

**EFFECTIVENESS OF EMERGENCY MEDICAL SERVICES
NETWORKS**

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EFFECTIVENESS OF EMERGENCY MEDICAL SERVICES NETWORKS

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ABSTRACT

Title of Dissertation	EFFECTIVENESS OF EMERGENCY MEDICAL SERVICES NETWORKS
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This study is a network of emergency medical services outside of hospitals in the three provinces of Khon Kaen, Nonthaburi, Ubon Ratchathani and Sa Kaeo provinces that has three objectives: 1) to study the operational processes of the network organization in Emergency Medical Services, 2) to study the effectiveness of the network organization in Emergency Medical Services, and 3) to present the models of the network organization in Emergency Medical Services right with Thailand that operated by Qualitative Research Methodology, In-Depth Interview, Focus Group Discussion, Non-Participant Observation and Document Analysis.

Khon Kaen provincial's Emergency Medical Service began with team and organization network building by a physician team in Khon Kaen hospital to develop an emergency referral system. They were supported by the International Cooperation Organization and the local administrative organization to join in the establishment of paramedics. That was the beginning of the systematic emergency medical services in Thailand and helped push forward the law to support the emergency medical system. After that, When the incident and disaster plan was later included in the National Economic and Social Development Plan, provincial medical centres and general hospitals started to establish paramedic units; and the local administrative organization started to participate by endorsement to establish district paramedic units. Ubon Ratchathani province began to establish an emergency response and command call centre in the Provincial Health Office. Nonthaburi and Sa Kaeo provinces established emergency response and command call centres at Phranangklaao Hospital and Sa Kaeo Crown Prince Hospital. In addition, Ubon Ratchathani and Sa Kaeo province decentralized the management of emergency response and command call centres to perform outside of hospitals to the local administrative organization.

The network building of emergency medical service was successful in Khon Kaen, Ubon Ratchathani, and Sa Kaeo province carried out by unity of purposes of leadership initiatives: to save people in emergencies through emergency medical services outside of hospitals. For this reason, emergency medical networks were established by building relationships and trust with other organizations to persuade to apply existing potential and resource in each organization to the establishment of emergency medical services to people. However, Nonthaburi provincial administrator has not contacted yet agreed to conjointly participate in establishing emergency medical service networks in the area yet.

The Khon Kaen provincial network administration of Emergency Medical Service was the most effective due to sufficiently building and expanding the number of network members to cover the entire province area, resulting in the performances can be accessed to emergency patients in time. Whereas the Nonthaburi provincial network administration of Emergency Medical Service was the least effective due to an insufficient number of network members, there were no equipment and tools enough to communicate. Sa Kaeo and Ubon Ratchathani provinces affect communicating with people. Local administrative organizations can disseminate the knowledge and understanding to people to decide to call for emergency medical services through appropriate channels.

Suggestion: the government should earnestly hasten to transfer the public health missions to the LAO, EMC should provide an understanding of the legitimacy for the performances of emergency medical services outside of hospitals to the LAO; transfer their missions to the Provincial Public Health Office in each region to represent; provide the cooperation with civil society to organize the standardized of emergency medical services; should integrate the emergency medical management of all organizations in the network; including the integration to combine all types of emergency numbers into a number for the convenience of the users' recognition.

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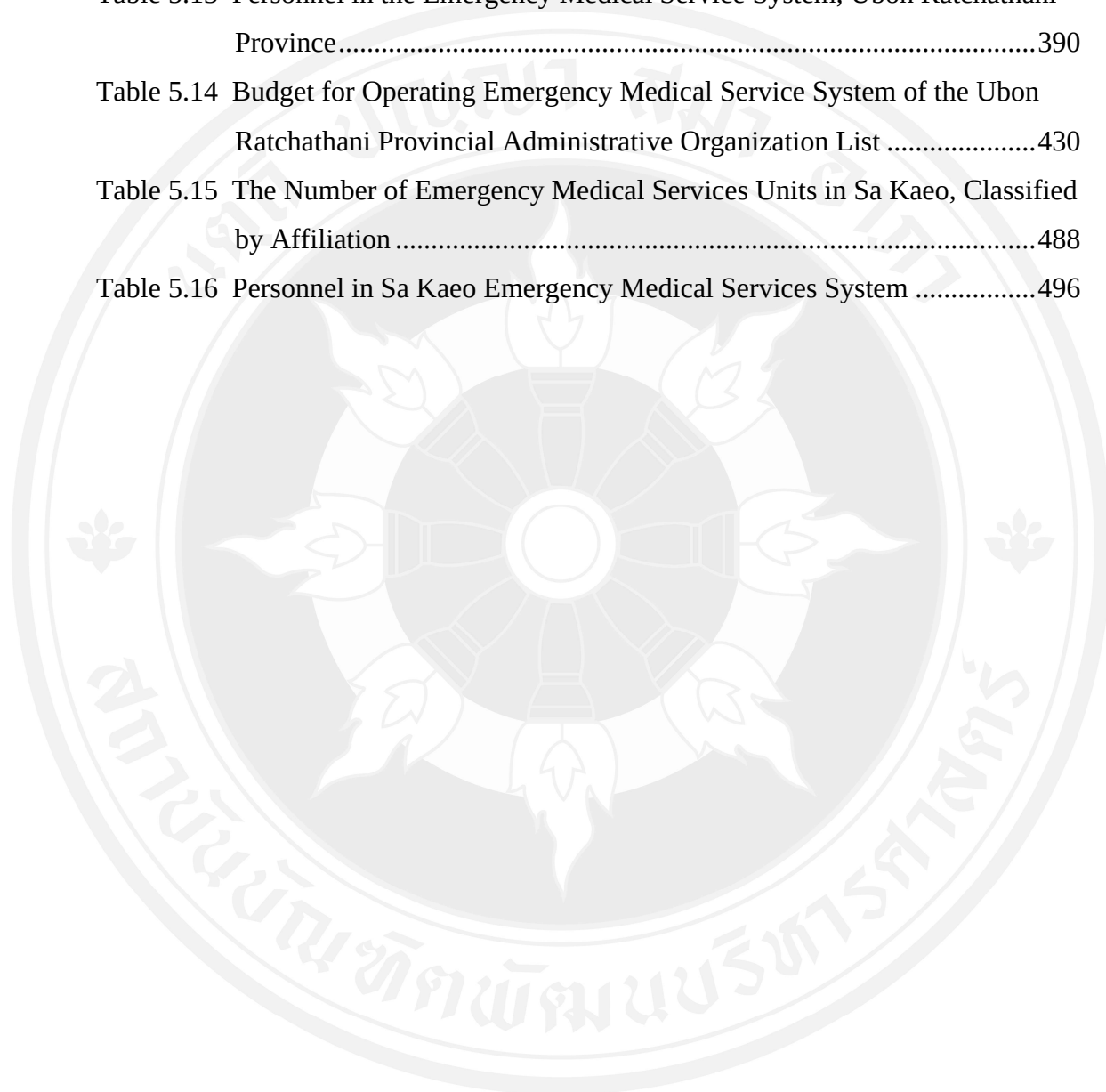
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CHAPTER 1

INTRODUCTION

1.1 Background and Significance of the Problems

Emergency illness situation including Stroke, Coronary artery and Traffic accidents was the top 5 of death of Thailand. Emergency medical service system was medical and public health services that has an effect on save and increase good quality of people life in Thailand. Then people can reach into necessary and urgent health care timely and safe is standard service that people deserve thoroughly and fairness. Pre-hospital care was the most valuable time that has an effect on emergency cases get off with death and permanent disability. Such picking up a patient at the scene or when get an emergency call by an Ambulances care that is pre-hospital care before arrived to hospital. Including an organizational network management system for emergency service, there is considerably an importance to emergency patient's survival and quality life.

Emergency medical service systematization that can easily be reached. All the operating depends on the emergency medical system knowledge and perception, local and urban leader's participation, share allocation for locally available resources and coordinating inter-organizational network who has responsibility under criterion standard to be accepted form especially responsible agency and organization for emergency medical help methodically and timely From case finding, help noticing, emergency medical teams taking action, pre-hospital care at the situation, moving arrangement care and hospital transfers are going to help urgent patients' life and reduced a cause of permanent disability. In any cases cannot be succeed with some operated but they have to rely on a cooperation and coordination inter-organizational related are the National Institute of emergency medicine (NIEM), Ministry of public

health, public-private partnership hospital, provincial public health officers, local administrative organization, nonprofit private organization and support division i.e., the Department of Disaster Prevention and Mitigation, Ministry of Interior, Ministry of Defense, Ministry of Digital Economy and Society, National Broadcasting and Telecommunication Commission, Royal Thai Police, Provincial Department of Disaster Prevention and Mitigation and other involved department as figures 1.1

Emergency
Medical Systems
in Normal and
Disasters



**Fully Ready 24 hours
All Emergency Cases**

Figure 1.1 Emergency Medical System in Normal and Natural Disaster Situations

Source: National Institute for Emergency Medicine (2013).

Since NIEM. has an idea to separate emergency medical operating and systematization in fieldwork because they want the local to be more play a role in area level. Thus nowadays, each province has a difference of emergency medical service model follow that areas management. There are able to classified 4 group

1) Management under Provincial Emergency Medical Fund which has Provincial public health offices (PPHO) or Provincial Administrative Organization who is the lead in system management.

2) Management in the model of provincial health care fund about supporting, prevention, treatment and recovering from emergency illness and natural disaster situations by emergency medical system main guide of provincial hospital level in that areas.

3) Management in the model of Memorandum of Understanding (MOU) to joint activity follow as mission of each organization under budget exists.

4) Management in the model of Provincial Emergency Subcommittee Structure by provincial governor who is president, and PPHO is secretary and main guide to push forward emergency medical system in provincial level. (Paibul Suriyawongphaisan et al., 2013, p. 70)

Source: Paibul Suriyawongphaisan et al. (2013, p. 5).

From previous operations the structure, management, support of network associate (agencies who cooperate to clearly develop emergency medical service system, formally make a deal and long-term goal) and support associate (agencies who cooperate to develop emergency medical service system to organize some activities on an ad hoc basis but without a formal agreement or for a while,) of provincial level of emergency medical service system, including resource support enough to be different to operate in each province in Thailand. This results in different operating and effectiveness of emergency medical services networks in each province also (National Institute of Emergency Medicine. (2016, p. 166). In addition, there are conflicts in some mechanism within emergency medical service network for instance between State Audit Office of the Kingdom of Thailand and provincial administrative organization, another one between foundation and hospital or

district/subdistrict administrative organization (figures 1.3). Thus all conflicts affect the effectiveness of emergency medical services.

Although the Ministry of Public Health will try to push forward for emergency medical system management which can meet rising demand and focus on development to increase effectiveness for rescuing victims. But at this time, the mortality rate has still increased continuously because there are many factors that affect the operation. The service is ineffective and undercovered throughout the country which consists of first aid, move the patient, medical personnel skills, good coordination of reports and emergency transfer of casualties. These difficulties are caused by structure, mechanism and management problems of each of different provinces which resulted in emergency medical service system being inconsistent in performance in each province especially emergency medical service system quality. The annual report of 2016, of the emergency medical institute found the emergency patient proportion required to operate the emergency medical fastest within 8 minutes. In 2017, each province has mainly differed performance. The smallest was Nonthaburi province as 23.72% and the largest was Songkhla province as 73.80% (National Institute of Emergency Medicine. (2016, p. 168). In addition, they found that the last operation hadn't still mostly achieved, whether be promoting to people had the realization in prevention of emergency situation or accession to emergency medical service system. At present, pre-hospital care assistance and notified emergency standard found that the management was quite different in each province.

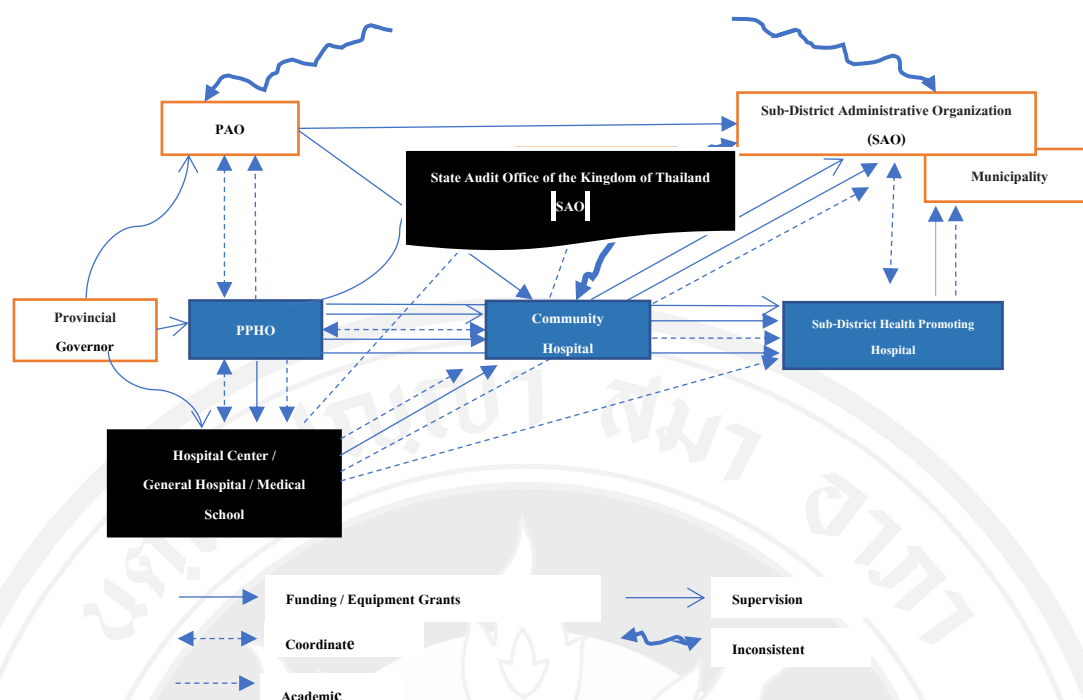


Figure 1.3 Characteristics of Interaction between Composition of the National Emergency Medical System

Source: Paibul Suriyawongpaisan et al. (2013, p. 70).

Moreover, the public's awareness and understanding are incomplete about emergency medical service policy such as a policy, define and extent of emergency situation under protection policy including some complaint channels when have an accident occurs. All indications are also that the public's communication and understanding is incomplete Besides, the ambulance 1669 and others emergency service are still low that shows a lack of confidence in such services. Therefore, most patients do not use emergency medical services, but instead use the hospital themselves mainly. (Wannapha Bamrungkhet, Sutheerada Chimnoi, & Samrit Srithamrongsawat, 2014, p. 57).

Emergency operating kit development to cover all common areas and special hard-to-reach areas. Adequate to resource promotion, emergency medical service awareness and understanding to operating requires the network management interorganizational as above. All mechanisms are important to the effective

development and emergency medical services management in areas. However, the mechanisms were implemented that effects emergency medical operations in different levels. Therefore, the interesting questions are “How do these mechanisms operate to be successful?”, “What are the key factors that support mechanisms to operate effectively?”, “What are the problems and obstacles in areas where cannot be performed effectively” and “What support mechanisms can facilitate the operation of these mechanisms?”.

From the importance of emergency medical system for emergency patient's survival and the network management interorganizational relations along with the emergency medical services network, there are still researchers limitedly. Therefore, this researcher is interested in studying the effectiveness of the emergency medical service network. The study results will provide insight into the emergency medical services network management, that plays a significant to rescue of emergency patient in crisis, recognize an effective model of the emergency medical service network and be benefits which can be applied to the provision of emergency medical services in other parts of the country in the future.

1.2 Research Objectives

- 1) To study the operating process of the emergency medical service network organizations.
- 2) To study the effectiveness of the emergency medical service network organizations.
- 3) To present an appropriate model for the emergency medical service network organizations in Thailand.

1.3 Research Questions

- 1) How is the operating process of the Emergency Medical Service network organization?
- 2) How effective is the Emergency Medical Services network organization management?

3) How are appropriate models of the emergency medical service network organization management in Thailand?

1.4 Research Scope

The scope of research consists of 3 parts as follows:

1.4.1 Scope of Education

The scope of education determination of the emergency medical service network consists of the Emergency Medical Institution, Provincial Emergency Medical System Executive Subcommittee, LAO, Provincial Administrative Organizations (PAO) and Subdistrict Administrative Organizations (SAO), Excellence Center (medical services such as Trauma Center, Cardiac Center, Provincial Health Office, District health service network (Contracting Unit of Primary Care: CUPs), Private organizations and foundations. These organizations focus on only operational processes from incident discovery to pre-hospital care, which defines the scope of the main educational issues covering the reporting system, communication system, operating division and network participation.

1.4.2 Scope of Education Area

The specifically of scope education area determination (purposeful selection) to obtain adequate, comprehensive and variety of information in the study (information-rich cases). The education areas were determined 4 provinces as Khonkaen, Nonthaburi, Ubon Ratchathani and Sakaeo Province.

1.4.3 Scope of Education Period

The study period between January 2019 and March 2021, totaling 26 months.

1.5 Expected Benefits

1.5.1 Policy Benefits

The information which assists decisions in policy reforms or policy updating and strategy to achieve an integration of the emergency medical service network of Central government, Provincial government, Local government organization, Civil society and the private sector, and to be the most effectiveness of emergency system of Thailand.

1.5.2 Benefits of Emergency Medical Practitioners

The results and conclusions of research, that enable emergency medical practitioners to understand the operational processes of interorganizational networks, and to be provide operational guidance for successful transformation of the processes of interorganizational networks management.

1.5.3 Benefits of The Public Service Recipients

People understand the emergency medical service system of Thailand. Increase roles of participation and access to appropriate and receive the quality of emergency medical services. Reduce the loss of death, property and disability from emergency illness. That will result in improving the quality of people's life.

1.5.4 Benefits of the Academics

The existence of Thailand's emergency medical service network had the accordance with network education of scholars in various fields (Agranoff, 2007; Agranoff & McGuire, 2001; Bryson & Crosby, 2008; Goldsmith & Eggers, 2004; Graddy, 2008; Isett, Mergel, LeRoux, Mischen, & Rethemeyer, 2011; Keast, Mandell, Brown, & Woolcock, 2004; Klijn, Steijn, & Edelenbos, 2010; Meier & O'Toole, 2003; Milward & Provan, 2006; O'Leary & Bingham, 2007; O'Leary & Vij, 2012; Thomson & Perry, 2006). Those indicating was caused by environmental thrusts such as illness states and deaths from people's emergencies. Result in the central public health, provincial public health and local government organization, have played a role in information exchange, resource dependence, and solved the joint complex

problems of the emergency medical services. Anyway, the network management implementation approaches need to consider influential factors of the networks such as network environments, network structures and features, network management and network potential availability. In the future, researchers who hope to study the network management, they should pay attention to those factors. The fundamentals of the organizations, which have joined the networks that usually have the difference of environments such as economic benefits, organization beliefs and values, political influences, etc. In addition, network structures and characteristics are influenced by the network size, goal and purpose concordance, exercise of executive authority and inter-organizational relationship. All things considered, the network has been coherently progressing, that also needs to deal with the effectively duration and continuity, coordination, endorsement, participation and freedom management. Including the network potential availability whether the confidence between group members, leadership capability, relationship experience between organizations and appropriateness of communication channels. The emergency medical service network management had the consistent conceptual framework of new public governance of Osborne (2010) explained that a new public administration is based on the existence of the traditional administration and conceptual framework of new public governance, and not replace a new paradigm place an existent conceptual framework. Thus, the new public governance covers the analysis aspects of management process in various dimensions: The interaction between socio-political governance, public policy process, public administration, public administration, mechanism management under the contract governance and network management. This can be observed from the emergency medical service network management in Nonthaburi province, which had been managed under the provincial of emergency medical network management, and there was also the mechanism management under a covert contract system within some local government organizations. For instance, Bang Kruai municipality has applied a contractor outsourcing system which allow proficient private agencies to be responsible arrangements of the emergency medical divisions under the name and supervision of Bang Kruai Municipality. In order to reduce a burden on the budget of manpower and technologies of the PAO, including helping to solve shortage problems of manpower and medical personals. The contractor service outsourcing will have had

some success when people were maintained full protections both in terms of price and service quality standard.

On the effectiveness of emergency medical service networks, this research supported a concept of McLean, Maio, Spaite, and Garrison, (2002); which is a quality assessment analysis of the emergency medical services networks to consider the indicators; 1) input factors are the quantity and distribution of resources, potential and knowledge of personals; 2) processes are the response time and the validity of the service standards; and 3) health outcomes are the survival rate of patients. Hence, the researcher saw the analysis as above, it was more appropriate to study the overall image of the effectiveness of emergency medical services network than only the analysis of response time. Probably due to the different context of each path between urban and rural areas. If there is focusing on speed, it can be dangerous both for rescuers and patients as well as surrounding people; and it was also valued the response time more than the patient.

On the research overview, even though there would be many studies and research which indicate the utility of network model to be applied to the administrations, but these results found that the model had been applied to the emergency medical service management in Thailand; and there still have been many bounded conditions and limitations such as an inequality of regulation determination, non-acceptance in social practices, difference between organizational culture, relationship between the confidence level, and resource readiness level applied within the network etc. The limitations resulted in adoptions of network model weren't make an effectiveness. The results or the effectiveness of network management, will be different depending on that contexts and circumstances; therefore, the education of the network model is necessary to study about problems and obstacles, including bounded conditions or limitations of the operation. The researcher saw that this features of educational will greatly contribute to develop the network theory, and also guidelines which will have adopted the network model for getting the most out of applied.

The concept sponsoring of New Public Governance and Effectiveness of Network Management, have caused the progress of academic, and accesses to new knowledge of appropriate the emergency medical network management models in Thailand; that will increase the emergency medical research for reinforcing facts of

the emergency medical service network management more broadly and clearly; as well as being stimulating interesting of scholars regarding the emergency medical researching continually

1.6 Definitions

1) Advanced Life Support Unit: ALS means the operation units have consisted of a vehicle registration of Advanced ambulance along with Advanced rescue equipment and emergency medical personals at least to be physician, emergency nurse or Advanced emergency medical extension of leader as registered by the NIEM. (National Institute for Emergency Medicine, 2013, p. 12)

2) Ambulance Vehicle Driver means those who have passed a training of the Ambulance Vehicle Driver course as certified by the EMC. (National Institute for Emergency Medicine, 2013, p. 12)

3) Basic Life Support Unit: BLS means the operation units have consisted of a register vehicle of basis ambulance with the NIEM along with basic rescue equipment and emergency medical personals at least to be basic emergency medical extension of leader as registered by the NIEM (2013, p. 12).

4) Call Taker means those who have passed a training of the Call Talk course as certified by the EMC. (National Institute for Emergency Medicine, 2013, p. 11)

5) Community Emergency Volunteer means Volunteers help emergency patients in the community. (National Institute for Emergency Medicine, 2013, p. 11)

6) Dispatch Center: DC means centers or operating divisions that has a communication network system and the appropriate resources in the area to directly receive public reports, receive notification through other emergency notification centers, or receive emergency reports from other sources about the emergency medical system. By the operation for communicating, coordinating assistance, advising primary assistance to patients and / or emergency responders, commanding and supervising the operations of the operating divisions and life support units, recording incident notification and command, coordinating cooperation with agencies who deal with emergency operations. (National Institute for Emergency Medicine, 2013, p. 13)

7) Emergency Medical Dispatcher: EMD means those who have passed a training of the EDM course as certified by the EMC. (National Institute for Emergency Medicine, 2013, p. 11)

8) Emergency Medical Fund means the funds which are established by Emergency Medical Act B.E.2551 section 33. There are objectives to support the emergency medical operations, be it contribution or compensation to personals, divisions or infirmaries who operate with the emergency medical and local emergency medical system management. (National Institute for Emergency Medicine, 2013, p. 9)

9) Emergency Medical Operation means emergency medical operations have started since the awareness of emergent situation until the processes of emergency patient treatment for surviving from a coma. This includes assessment, management, coordination, control, communication, transporting of patients, diagnosis and treatment for emergency patients both of out and in medical care facilities. (National Institute for Emergency Medicine, 2013, p. 10)

10) Emergency Medical Personnel means persons who performs emergency medical works as prescribed by the Emergency Medical Committee, including people who witness an accident, good citizens, as well as medical and public health professionals involved in emergency patients as follows;

- (1) People who witness and report or who has witnessed the incident
- (2) Call Taker
- (3) Emergency Medical Dispatcher: MED
- (4) Community Emergency Volunteer
- (5) First Responder
- (6) Emergency Medical Technicians-Basic: EMT-B
- (7) Emergency Medical Technicians-Intermediate: EMT-I
- (8) Emergency Medical Technicians-Paramedic: EMT-P
- (9) Emergency Nurse: EN
- (10) Pre-Hospital Emergency Nurse: PHEN
- (11) Physician
- (12) Emergency Physician
- (13) Medical Commander
- (14) Ambulance Vehicle Driver

- (15) Ambulance Vehicle Driver
- (16) Emergency Medical Institute of Thailand Personnel: EMITp
- (17) Emergency Team Chief: ETC
- (18) Emergency Medical Chief: EMC
- (19) Provincial Chief of Emergency Medical Office: PCEMO
- (20) Other personnel as prescribed by the Emergency Medical Committee (EMC)

11) Emergency Medical System means the systems which related to the emergency medical. (National Institute for Emergency Medicine, 2013, p. 9)

12) Emergency Medical System Standard means the emergency medical system standard which the Emergency Medical Committee (EMC) defined to be mainly that emergency patients are protected rights to access the emergency medical system fully, thoroughly, quality, by receiving assistance and medical treatment efficiently and on top of situations. (National Institute for Emergency Medicine, 2013, p. 9)

13) Emergency Medical Technicians-Basic: EMT-B means those who have passed a training of the Emergency Medical Technicians-Basic course as certified by the EMC. (National Institute for Emergency Medicine, 2013, p. 11)

14) Emergency Medical Technicians- Intermediate: EMT-I means those who have passed a training of the Emergency Medical Technicians- Intermediate course as certified by the EMC. (National Institute for Emergency Medicine, 2013, p. 11)

15) Emergency Medical Technicians-Paramedic: EMT-P means those who have passed a training of the Emergency Medical Technicians-Paramedic course as certified by the EMC. (National Institute for Emergency Medicine, p. 11)

16) Emergency Medical Unit means the units established to operate the emergency medical consist of emergency medical personals, ambulance, supplies, instruments which related to the emergency medical operations. The levels of different operating units are according to the National Institute of Medicine, that is divided into 4 operation units as follows;

- (1) First Responder Unit: FR
- (2) Basic Life Support Unit: BLS
- (3) Intermediate Life Support Unit: ILS

(4) Advanced Life Support Unit: ALS (National Institute for Emergency Medicine, 2013, p. 12)

17) Emergency Operational Condition means rules or conditions enforced by the EMC shall be effective or terminated in the event of uncertainty as to whether or not in the future regarding emergency operations. (National Institute for Emergency Medicine, 2013, p. 13)

18) Emergency Operational Criteria & Protocol means the criteria and procedures are defined in sequential steps by the EMC. This is a process for emergency medical of personals, life support units, operating divisions and medical care facilities to achieve a systematic and consistent the emergency operation for more efficient and timely emergency rescues and treatments. (National Institute for Emergency Medicine, 2013, p. 13)

19) Emergency Operational Principle means principles related to emergency operations defined by the EMC to diagnose and follow. (National Institute for Emergency Medicine, 2013, p. 13)

20) Emergency Operational Standard means the emergency operation as determine by the Emergency medical committee to be a principle that an emergency illness has received properly, equally and quality of guard the rights in the emergency medical access as. They deserve an effective and timely assistance and medical care. (National Institute for Emergency Medicine, 2013, p. 13)

21) Emergency Medicine means 1) Emergency Medical Operation 2) Studying 3) Training 4) Exploring 5) Researching 6) Emergency illness prevention. (1)-(6) concern with the estimation, management, emergency patient has treated since a perception of emergency illness situation to out of danger. There was classified into the emergency operation for the community, and the emergency operation for outpatient and inpatient of hospital.

22) Emergency Nurse: EN/Emergency Nurse Practice: ENP means persons who have registered and received a nursing and midwifery professionals license from the Thailand Nursing and Midwifery Council, and passed a training as prescribed by the Thailand Nursing and Midwifery Council. (National Institute for Emergency Medicine, 2013, p. 12)

23) Emergency Operation Division means agencies or organizations who perform emergency operations such as the National Institute of Emergency Medicine, Ministry of Public Health, Ministry of Defense, Ministry of Interior, Department of Disaster Prevention and Mitigation, Department of Local Administration, Department of Disease Control, Meteorological Department of Thailand, Royal Thai Polices, Provincial Health Offices, District Health Offices, health stations, dispatch centers, medical care facilities, private organizations, foundations, Local government organizations of Bangkok and Pattaya, including the entities, government agencies, private agencies, state enterprises, public organizations and other agencies that deal with the emergency operations. (National Institute for Emergency Medicine, 2013, p. 10)

24) Emergency Patient means persons who have been injured or had a sudden illness which is detrimental to their life or function of vital organs. They need timely evaluation, management and treatment to prevent death or aggravation of that injury or illness. (National Institute for Emergency Medicine, 2013, p. 10)

25) Emergency Physician: EP means persons who have received a certificate of expertise in the Professional practice in emergency medicine from the Medical Council of Thailand. (National Institute for Emergency Medicine, p. 11)

26) EMS Response Zone means defined area boundaries that each emergency operation divisions response to service for the public as classified by service areas of the geographic and/or administrative area, as well as the location of the main road. By taking into consideration the optimal proportion between the population density of the dwellings and the frequency of service calls and the number of life support units. (National Institute for Emergency Medicine, 2013, p. 13)

27) First Responder: FR means those who have passed a training of the First Responder course as certified by the EMC. (National Institute for Emergency Medicine, 2013, p. 11)

28) First Responder Unit: means the operation units have consisted of a register vehicle of first ambulance with the National Institute of Emergency Medicine along with basic rescue equipment and first responder volunteers as registered by the NIEM. (National Institute for Emergency Medicine, 2013, p. 12)

29) Hospital Emergency Medical Care means the emergency medical operation has taken an action in an emergency room since took a patient from pre-

hospital emergency care until the patient is discharged from the emergency according to the potential of the medical care facility. (National Institute for Emergency Medicine, 2013, p. 13)

30) Intermediate Life Support Unit: ILS means the operation units have consisted of a register vehicle of Intermediate ambulance with the NIEM along with Intermediate rescue equipment and emergency medical personals at least to be Intermediate emergency medical extension of leader as registered by the NIEM. (National Institute for Emergency Medicine, 2013, p. 12)

31) Medical Care Facility means Public health facility, including medical facilities where under the government regulation or medical facility of the Thai Red Cross Society. Legal medical facility is concerned with medical facility and other medical facility as specified by the Minister. (National Institute for Emergency Medicine, 2013, p. 10)

32) Medical Commander means those who have passed a training of the medical commander course as certified by the EMC. (National Institute for Emergency Medicine, 2013, p. 12)

33) Pre-hospital Emergency Medical Care means the emergency medical operation has acted at the crime scene during a transportation to the medical care facility properly. (National Institute for Emergency Medicine, 2013, p. 13)

34) Physician means persons who have registered and received a medical professional license from the Medical Council of Thailand. (National Institute for Emergency Medicine, 2013, p. 11)

1.7 Dissertation Arrangement

This dissertation consists of six chapters.

Chapter 1 Introduction that discusses the important issues to do Research, Research Questions, Research Objectives, including the Research Scope and Expected Benefits to be derived from this study.

Chapter 2 Discusses the general condition, background, concepts, policies, related agencies, the performance of the emergency medical system of Thailand and the National Emergency Medicine Master Plan.

Chapter 3 This chapter is a literature review. It contains content on knowledge about network organizations, inter-organization relations-IORs, Organizational Effectiveness. And related research.

Chapter 4 On the research methodology consists of 1) Research Approach 2) Unit of analysis, Level of analysis and Unit of observation 3) Research Design 4) Data Collection Guidelines 5) Data analysis Guidelines 6) Procedure.

Chapter 5 Summarizes the results and present recommendations.

Chapter 6 The research model is presented by considering its findings on the effectiveness of emergency medical service networks model.



CHAPTER 2

BACKGROUND AND SIGNIFICANCE OF THE EMERGENCY MEDICAL SERVICES SYSTEM

2.1 Background of the Emergency Medical Services System

The emergency medical services first appeared in the Bible which indicates that Sama people had started medical care and managements, and moving patients both of chronic illness or severe injury to admit through a physician treatment; also, there are also mentions to moving patients to acknowledge through a physician treatment in the period of King Caesar, (60 BCE-44 BCE) and medical cares and managements to soldiers illness in a military camp in the period of Emperor Napoleon; (1804-1815) until the late 1960s. In the early 1970s, “The Emergency Medical System” has developed result in a collaborative process of moving and caring for an injury before going to the hospital for further treatments. The system started its development in the late 1960s; by the expert heart doctor Dr. Frank Pantridge (1916-2004) from Belfast, Ireland; who had initiated the concept development of Mobile Coronary Care Unit (MCCU), and he had constructed the machine of “Portable defibrillator” that was the first machine of mobile units or “Flying Squads” by working with medical personals as doctors and nurses of mobile units to expand services of Coronary care unit through caring treatment for patients in a community before going to the hospital for further treatments is an example of a development model of the emergency medical system with various outstanding aspects to discuss at the academic development of emergency medical services (Asian Disaster Preparedness Center: [ADPC], 2002, p. 3).

The United States first used the emergency medical service system since the 1960s by the Committee on Trauma and Committee on Shock of the National Academy of Science as part of the Highway Safety Act 1966. A third of EU countries have determined legislations regarding the emergency medical service system, and

there were an increasing number of EU countries in the 1990s to 2000. For this reason, almost half of EU countries had legislation regarding the emergency medical service system. Nowadays, the emergency medical service system has various models and depends on many factors such as a history of system development and country context. Political factors determine; which agency will be the central division for supervising services (Samrit Srithamrongsawat, Bunyawee Eusiriwan, & Phintusorn Hemphisuth, 2013). The evolution of emergency medical services initially focused on providing injured patients (Trauma), mainly from traffic accidents. Afterwards, there were expansions of other emergency medical services for ill patients (Non-Trauma) and extended coverages through public health activities in a community, such as an injury/Illness prevention and surveillance. If there are capabilities to thoroughly maintain the service arrangement, that will achieve reliability in the emergency medical service system; the system could prevent injuries and do surveillance; by a comprehensive and thorough public health service.

There are currently two models of the emergency medical concept order referenced for the emergency medical service system management in developed countries; that is 1) Anglo-American Model (AAM), and 2) Franco-German Model (FGM); summary of differences between two models as the tables 2.1

Table 2.1 Summarizing Main Concept of the Emergency Medical Models of Anglo-American Model and Franco-German Model

	Model	
	Anglo-American Model (AAM)	Franco-German Model (FGM)
1. Beginning of year	1970s	1970s
2. Philosophies / Main Objective	- “Scoop and run” - We are having a short period for symptomatic treatments at the scenes and transferring patients to a medical facility as soon as possible.	- “Stay and Stabilize” - We have an extended period for symptomatic treatments at the scene and bring medicines to the settings.

Model		
	Anglo-American Model (AAM)	Franco-German Model (FGM)
	- We are transferring patients to a medical facility as soon as possible.	- Bringing health care to patients continued/..
3. Healthcare providers	- Inspections by the EMTs and supervising by the physician.	- Inspections by the physician and assisting by the EMTs; with integrated technologies for advancing cares.
4. Destinations	- Transport patients directly to the emergency room.	- Transport patients to specialized medical units.
5. The idea of connecting organizations	- The emergency medical system is a part of the Public safety organization.	- The emergency medical system is a part of the Public health organization.
6. Patient transfers	- Mainly used by van ambulances, and rarely used by aeromedical or coastal.	- Ambulances are usually used by Van, helicopter and coastal ambulances.
7. Related organizations	- Related organizations related to public safety services such as police, firefighters etc.	- We are providing services under the system of health care services.
8. Fees	- Higher than FGM.	- Lower than AAM of a health system.
9. Number of patients	- Most patients will have immediately transported to the hospital; a few patients will have treated at the scene.	- Most patients will have immediately treated at the scene; a few patients will have transported to the hospital.
10. Countries for deployment	- The United Kingdom, the United States, Canada, New Zealand and Australia.	- Germany, France, Malta, Australia

Source: Adapted from Charuwan Tadadej, Sirima Mongkolsomlit, & Paibul Suriyawongpaisal (2014).

2.2 Background of Emergency Medical Services System in Thailand

The emergency medical system evolved from Anglo-American Model (AAM) since the beginning year of 1994 until 2018; divided into four periods as follows (Charuwan Tadadej, Sirima Mongkolsomlit, & Paibul Suriyawongpaisal, 2014).

2.2.1 The Pioneer Era: Before 1994

The early pioneer era of EMS was transferring patients to the hospital by various volunteers; for instance, Por Tek Tung Foundation, where volunteers provided resuscitation and first aid to patients outside of the hospital. Later the government took this place for organizing service units “Police Hospital Transfer Center”. In 1989, the Department of Medicine Service and the Ministry of Public Health had collectively established an EMS building at Rajavithi Hospital as a centre of training and administration of the emergency medical services in Thailand. The Department of Medical Services was continually developed in cooperation with the Bangkok Metropolitan Region to divide the service area into seven areas, and increased service of emergency calls 1669 for emergency notification to the Department of Medicine, and 1554 to the Bangkok area; but the service has not comprehensive to all regions. Until 1993, there was a development plan of the emergency medical system on the seventh National Economic and Social Development Plan (1992-1996). The Ministry of Public Health received academic assistance from the Japan International Cooperation Agency (JICA) to establish an Emergency and Trauma Center at Khon Kaen Hospital to thoroughly assist prehospital services. Afterwards, the Bangkok Medical Service Department, on behalf of Vajira Hospital, opened an Emergency Medical Service unit. In December 1994 to provide services to the wounded, focusing on traffic accidents and various accidents by the name “SMART” (Surgico-Medical Ambulance and Rescue Team).

2.2.2 Trauma Care Prototype Era: 1994-2004

The “Trauma Center” was established in Khon Kaen Province, which is regarded as a master model of the emergency medical system in Thailand. There have

been increased life support units in Bangkok areas to coordinate with Narenthorn EMS centre by extension service areas to some provinces in the central. The curriculum of medical personnel production has been made the first edition; and also, was input the Accident Prevention Plan and Disaster Prevention plan on the seventh National Economic and Social Development Plan.

2.2.3 Trauma Care Proliferation Era: 2005-2008

The emergency medical services both inside and outside the hospital were expanded to central, regional and local government that had enough emergency operating units to cover all four operational personnel levels, including the roles of local government organizations. Also, emergency services of the internal medicine department were beginning in some disease groups. The National Health Security Office developed a system to support services with the Ministry of Public Health; that means the government was expanded roles in the development system with a higher amount of money, more development plans and more systematic implementation.

2.2.4 Post-promulgation Era in the Emergency Medical Act B.E. 2008

The National Institute of Emergency Medicine oversees and develops the emergency medical system of Thailand. The aim for emergency patients was to have the right to access the emergency medical service system with equitably thoroughly, quality and standards. Additionally, various components of the emergency medical service system have better-trained staffing, durable articles and service equipment, and service subsidies and development subsidies of service system; thus, this section had continuous expansion in volume.

Summary: The components of an emergency medical system according to the timeline of evolutionary emergency medicine is shown in tables 2.2

Table 2.2 Summary the Development of Emergency Medical Service System of Thailand According to the Timelines and Compositions

Compositions	Timelines			
	Pioneer era	Trauma Care Prototype era	Trauma Care Proliferation era	Post- promulgation era in the Emergency Medical Act
Period of Time	Before 1994	1994 - 2004	2005 - 2008	2008 - present
Destination	Infirmery	Accident and Emergency Unit	Accident and Emergency Unit / Specialized Medical Center	Accident and Emergency Unit / Specialized Medical Center
Connected Organization	The emergency medical system is part of the public health service.	The emergency medical system is part of the public health service.	The emergency medical system is part of the public health service.	The emergency medical system is part of the public health service.
Related Organizations	Police / Fire Department / Rescue foundation	Police / Public health agency / Rescue foundation	Police / Public health agency / Rescue foundation	Police / Public health agency / Rescue foundation
Emergency Service Workers				
Paramedic	Resuscitation volunteer	Emergency medical technician / Resuscitation volunteer	Emergency medical technician / Emergency medicine nursing / Resuscitation volunteer	Emergency medical technician / Emergency medicine nursing
Leading and Governance	Foundation	Physical / Public health agency (Khon Kaen Hospital /	Physical / Public health agency policy involving of accident	Resuscitation volunteers directed by a physical of the

Compositions	Timelines			
	Pioneer era	Trauma Care Prototype era	Trauma Care Proliferation era	Post- promulgation era in the Emergency Medical Act
		Narenthorn EMS center)	patients	Emergency Medical Act 2008 / NIEM / NHSO / LGO / BKK
Durable Articles and Service Equipment				
1. Transfer of patient	Resuscitation vehicles	Ambulance / Motorcycle / Aircraft	Ambulance / Motorcycle / Aircraft	Ambulance / Motorcycle / Aircraft
2. Communication Equipment	Telephone / Radio communication	Telephone / Radio communication	Telephone / Radio communication	Telephone / Radio communication / Computer
Financial Mechanisms - Sources of Capital	Mainly foundation	NHSO / Foundation / Private sector	NHSO / NIEM / Local	NHSO / NIEM / Local
Data and Information				
1. Command center / Emergency numbers	No command center / 123 /191	Set up the command center / 1669 / 1646 / 1554 / JS100 / 191 / 199 / 1356	Set up the command center in Bangkok and big counties / 1669 / 1646 / 1554 / JS100 / 191 / 199 / 1356	Command centers nationwide (Hospital / PPHO / SAO / LGO) 1669 / 1646 / 1554 / JS100 / 191 / 199 / 1356
2. Data System	No evidence found	Uploading database in some	Uploading database	ITMS and GPS Connect

Compositions	Timelines			
	Pioneer era	Trauma Care Prototype era	Trauma Care Proliferation era	Post- promulgation era in the Emergency Medical Act
Emergency services	Prehospital care (First aid at the scene / moving an injured or patient to an infirmary by volunteers	hospitals Prehospital care / Caring for an injured or patient between moving and caring in the emergency room	nationwide Prehospital care / Caring for an injured or patient between moving and caring by clinics and specialized centres	Prehospital care / Caring for an injured or patient between moving and caring in the emergency room or clinics and specialized centres

Source: Adapted from Charuwan Tadadej et al. (2014).

2.3 Structure and Operation of Emergency Medical Services System in Thailand

2.3.1 Structure of Emergency Medical Services System in Thailand

The structure of emergency medical service system involves both aspects of centralization and partially decentralization to departments of the Ministry of Public Health in the region, divided the management structure into three levels; central, regional (province) and local (sub-district) as follows; (Samrit Srithamrongsawat, Bunyawee Eusiriwan, & Phintusorn Hempisuth, 2013; Thanongsan Thienthavorn et al., 2014)

1) National or central level: the National Institute of Emergency Medicine acts as a supervisor; the Secretary-General of NIEM acts as an administration under the supervision of the Ministry of Public Health, in collaboration with a committee from the Office of the Permanent Secretary, Ministry of Public Health, and the National Emergency Medical Board which has the Public Health Minister as a

chairman; and representatives from relevant government agencies, distinguished commissioner, local government organization and the private sector joined as a committee.

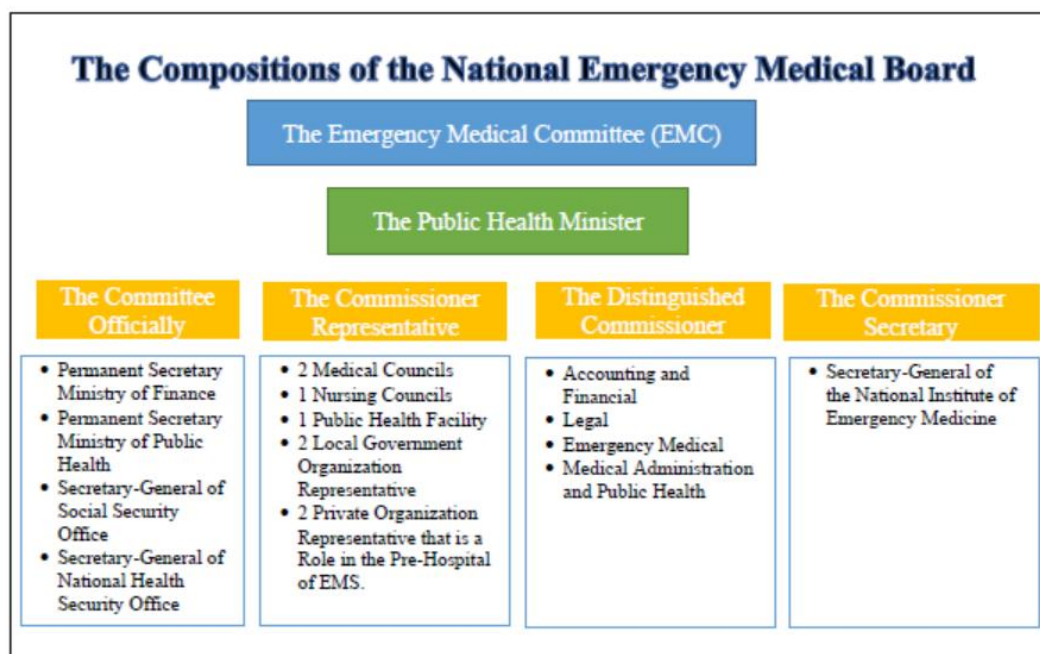


Figure 2.1 The Compositions of the National Emergency Medical Board

Source: National Institute for Emergency Medicine (2009, 2010).

2) Regional (Province) level: is a coordination between the Ministry of Interior and the Ministry of Public Health, which has the provincial governor and the provincial subcommittee to supervise through the Provincial Health Office; the PPHO oversees the communications command centre and support units in the emergency medical service system; hospital, local government organization and foundations registered as a service unit act onsite operation. At the local level, the PPHO is the supervisory unit of the local emergency medical service system in collaboration with the chief administrator of the local administrative organization. The service arrangement details may differ somewhat according to needs and suitability at the local level; for instance, Bangkok has an Erawan centre to supervise a service system, etc.

3) Local (Sub-district) level: The emergency medical service system and the operating units take responsibilities of the local administrative organization, assigned to be responsible for the service arrangement of governing; the delegation of service arrangements according to the township. This service is not determined by population density or population needs, but it is separated by the proportion of the physical context of the area. Zoning is only operated in urban community areas to resolve the redundancy of onsite operations of the foundation's operating units. Multiple servicing units access the function in the same place.

2.3.2 Operation of Emergency Medical Services System

Procedures performed by the medical service depend upon the Chain of Survival and Star of Life concept, which a globally used symbol of the emergency medical system; it features six procedures of early detection, early reporting, early response, on-scene care, care in transit, and transfer to definitive care; see the details as follows; (Runchana Sinthavalai, 2008, pp. 13-17)

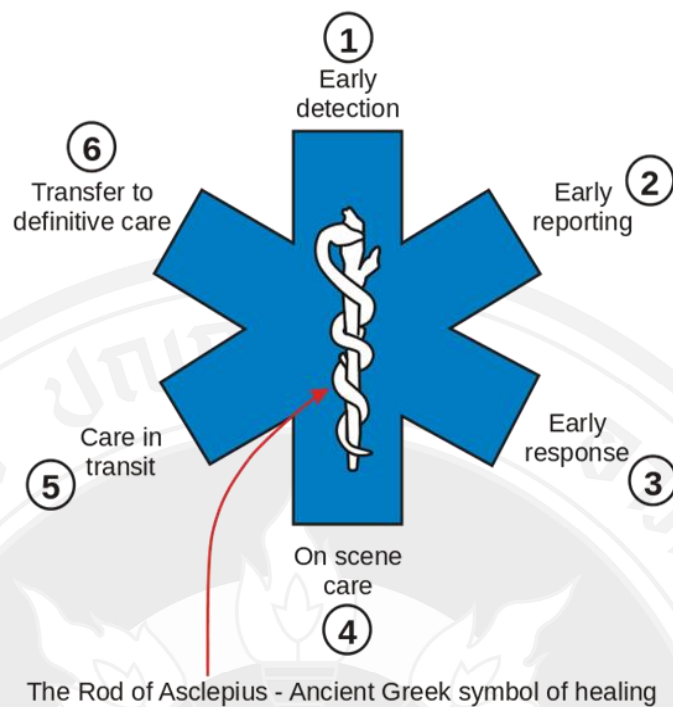


Figure 2.2 Star of Life Parts

Source: Wikimedia.org (2009).

1) Early detection: emergency illnesses are unpredictable, but timely treatment may help to reduce death, disability or disability; therefore, the emergency medical system places importance on being aware of emergency illnesses and reaching emergency patients as early as possible. If personnel encounter an accident, they can report the incident quickly, and the patient will have had a higher chance of survival.

2) Early reporting: Focusing on a fast incident report, the informant needs to know, and abilities to provide accurate information, including that informant have been able to sufficiently emergency medical care. The command-and-control centre also prepares for personnel, tools and communication system. In Thailand, there are command and control centres in every province. i.e Bangkok, Ubon Ratchathani, Songkhla, Lamphun, Mahasarakham and Sa Kaeo. Management, command and control at the provincial local government organization. The centres are located at Phangnga and Kalasin, by being in leadership, command and control by the regional health office. Also, each provincial centre hospital is responsible for the

executive of command-and-control centre. Generally, emergency medical number 1669 is mainly active for handling the emergency calls; for internal operating, there will be communication operation systems at least two, that is the emergency medical call 1669 and radio communication system etc.; along with operating staffs to service all 24 hours consisting of;

(1) The physician provides advice and resolves problems of the command and control centre; and, in case of some emergency medical unit are unable to take care of or solve that problem. The physician is not required to be on duty all 24 hours.

(2) Nurses act as regular personnel at the command and control centre, the direction of emergency medical on the prescription, and providing consultation in the case of the operator which cannot solve the problems during coordination with medical emergency response teams regarding missions along with following up on the results of that mission. The nurses have to pass the EMD course to increase their knowledge and skills in performing their specific duties.

(3) Operators serve to answer the calls from informants; who then inform and order incidences to the emergency medical unit under physicians or nurses' supervision in the centre. The operator can advise or direct the operations concerning the primary emergency mission or emergency patients with minor symptoms according to the prescribed medical practice manual.

3) Early response: Traditionally, Thailand's operation unit was divided into two levels: Advance life support (ALS) and Basic life support (BLS); later in 2001, Khon Kaen Province has tried out to organize the first sub-district emergency medical unit to the First Responder (FR) level, and a plan to develop an emergency medical system to the community level; by emphasizing on community participation and coverage throughout the country during the 9th National Economic and Social Development Plan (2002-2006). At present, Thailand has three levels of the emergency medical unit to care for emergency patients before transferring to hospitals that are;

- (1) Advance life support
- (2) Basic life support
- (3) First responder

Emergency medical units at all three levels must always be ready for taking mission by orders and comply with standards requirements by the National Institutes of Emergency Medicine such as period time to take the task, period time of the expedition, etc. The command-and-control centre will classify emergency patients according to severity, and then, they will direct the mission to appropriate levels of the emergency medical unit to perform.

4) On scene care—Emergency medical division will assess the patient's environment and conditions to provide appropriate care and provide emergency medical treatment as assigned by the supervisory physician following the rules of care, that is don't waste so much time at the scene result in a negative effect on the patient.

5) Care in transit-without aggravate to patient's injury. An Emergency medical personnel must train in techniques and methods for moving patients. During transport, patients are regularly assessed for their condition. And there may be some rescue operations on the vehicle while delivering the patient to the hospital.

6) Transfer to definitive care - transferring depends on the discretion which hospital can treat the patient by it's no wasting of time with the medical facility isn't ready. If the decision is an improper hospital, it can result in losses or problems in medical treatment that should not arise.

2.3.3 Emergency Medical Unit

The arrangement of the emergency response team depends on available human resources, suitable capacity, and the level of assistance needed. By using the criteria for consideration according to the standard scope as specified by NIEM, divided into four classes: (Paibul Suriyawongpaisarn et al., 2013)

1) First Response Unit (FR): the leader in the first responder, and there are at least three of the first responder in the team.

2) Basic Life Support Unit (BLS): the leader in Emergency Medical Technician-Basic (EMT-B), and there are at least 3 EMT-B or first responder in the team.

3) Intermediate Life Support Unit (ILS): the leader in Emergency Medical Technician-Intermediate (EMT-I), and there are at least 3 EMT-I, EMT-B or first responder in the team.

4) Advanced Life Support Unit (ALS): the leader in Emergency Medical Technician-Advanced (EMT-A), or nurse, or physician, and EMT-I, EMT-B or first responder in the team.

2.4 Emergency Medical Services System with Local Administrative Organizations

Emergency Medicine Act B.E. 2551 encouraged local government organizations to play a role in managing emergency medical services. The objective is to create cooperation in emergency medical practice together. This will enable emergency patients to be protected their rights to access the emergency medical system thoroughly, equitably, with standard quality, receive more effective and timely medical assistance and treatment. Information from the emergency medical information system found that most emergency medical operations belong to the local government organization; currently, 7853 local government organizations have participated in emergency medical services, accounting for 73 per cent of all local government organizations. Therefore, the provincial government organization is an essential mechanism for implementing and managing emergency medicine in Thailand, which is close to the people and has the legal authority to provide emergency medical services for local. (NIEMS, 2009) Information Technology for Emergency Medical System.

Local government organizations have been assigned roles and duties under the Emergency Medical Services Act B.E. 2551 Section 33, paragraph 2, that promoting local people play a position following the readiness and necessity by the Emergency Medical Committee to support and coordinate the local government organization for determining the criteria for the local government organization to operate and manage the emergency medical system at the local level. They may be subsidized from the fund and the Act establishing the decentralization plan and procedure to local government organizations B.E. 2542 Section 16 (19) (Government Gazette (1999, pp.

5-6) Act establishing goals and policies for decentralization to local government organizations. The Provincial Administrative Organization has the authority to make provincial hospitals, medical treatment, and the prevention, and control of infectious diseases. Thus, the local government organization are responsible for health and medical care for the benefit of the public on the role and functions of the law. “Emergency medicine” is a type of public health and medical care defined in the Emergency Medicine Act 2008. The local government organization operates and manages the emergency medical system at the local or area level. This emergency medical aim to provide a comprehensive and effectiveness of emergency medical system for the public; to have the ability to manage emergency medical systems at the local or area in normal conditions and disasters or disasters, including operating in connection with various networks in the emergency medical and rescue systems and developing the system of emergency medicine at the local or area level with the participation of citizens or other party organizations.

The Emergency Medical Committee meeting in B.E. 2553 has passed a resolution to the National Institute of Emergency Medicine to issue criteria of operation and management of the emergency medical system at the local or area level in 2020 by providing local administrative organizations to operate and manage local or area emergency medicine. The Ministry of Interior has issued a written notification to all local government organizations to acknowledge and use as guidelines for implementing and managing the emergency medical system in all areas. Also, there is a memorandum of cooperation between agencies, organizations, network partners, the National Institute of Emergency Medicine, the Ministry of Public Health, the National Health Security Office, the Ministry of Interior, the Provincial Administrative Organization Association of Thailand, the Municipal League of Thailand. And the Subdistrict Administrative Organization Association of Thailand on December 3, 2012. (National Institute of Emergency Medical Service, 2011).

2.4.1 The Primary Mission of Emergency Medicine of Local Government Organizations

National Institute for Emergency Medical Service (2011) Pichet Nongcham, Surasak Panngam, Yuttanata Tabandu, and Phongphitsanusri Thammanusarn (2014, pp. 13-14)

The EMC determines the mission to operate and manage the emergency medical services in the local or area of the local government organization such as the Provincial Administrative Organization, Bangkok, Pattaya City, Municipality and Sub-district Administrative Organization. For organizing emergency medical services to the public, especially emergency medicine, before reaching the hospital (Prehospital) with the management as follows;

2.4.1.1 Provincial of Command-and-control Centre

Establishing a provincial incident notification and command centre is one of the missions of the local administrative organization at the provincial level, that is, Bangkok, Provincial Administrative Organization. Answering the emergency number 1669 and ordering an ambulance in the local emergency medical system to serve people who have an accident in the provincial area. There are provincial-level local government organizations that establish the provincial command-and-control centre, for instance, Bangkok, Ubon Ratchathani Provincial Administrative Organization, etc.

2.4.1.2 Operation of Emergency Medical Service Management of Local Administrative Organizations together with the Provincial or Area Level

The provincial emergency medical service management has mainly three departments working together that are Provincial Administrative Organization, Provincial Public Health Office, and National Institute of Emergency Medicine, or involved agencies—using the signing of the Memorandum of Understanding (MOU) to jointly operate and manage the local emergency medical services of a local administrative organization. There are providing the emergency medical service vehicles, personnel development, training, the establishment of provincial of control and command centre, and development of the local emergency medical system, etc.

The operation and management of emergency medicine together with the local administrative organizations, begins with the signing of a memorandum of understanding (MOU) to jointly operate and manage the emergency medical services of the local administrative organization in the area between the provincial administrative organization and the municipality or sub-district administrative organization; or between the municipality and the municipality or sub-district administrative organization; or between the sub-district administrative organization and the sub-district administrative organization to have emergency medical services in that area.

2.4.1.3 The Emergency Medical Management of Prehospital

The emergency medical service management related to the prehospital of local government organizations, there are either self-organizing emergency response teams; take action in conjunction with or support other local governments; co-operated or hand on to an agency, foundation, non-profit charity with an emergency medical role to organize emergency response teams for emergency operations under the support and supervision of a local government organization, by signing a memorandum of understanding for operating of the emergency medical management, which consists of operators, emergency vehicles, and standards equipment that specified by the EMC or the NIEM along with registering the emergency response team for servicing all 24 hours to operate as commanded by the provincial of control and command centre including support network between areas Both in normal conditions and a disaster or disaster.

2.4.1.4 Operating Coordination of Emergency Medicine with other Relevant departments.

While the local administrative organization operates and manages emergency medicine, it will coordinate with the local government organization and related agencies, for instance, the National Institute of Emergency Medicine, Provincial Public Health Office, Hospital, Military Police, Provincial Disaster Prevention and Mitigation Office, Provincial Government Foundation or private

agencies; for managing and developing to be effective of the emergency medical service system, as well as equal access to emergency medical services.

2.4.2 Structure and Personnel in the Provision of Emergency Medical Services of Local Government Organizations

Pichet Nongcham et al. (2014, pp. 14-15)

2.4.2.1 Provincial Administrative Organization

The NIEM requires the emergency medical structure of provincial administrative organizations has emergency medicine departments to be under the Division of Public Health or the Division of Quality-of-Life Promotion, the Office of the Permanent Secretary or any other division as appropriate, or following the government structure and the rate of human resources framework that the civil service commission of Provincial Administrative Organization (PAO) determined. They require civil servants, employees, hiring workers, and other personnel performing emergency medical work; or following the standard for determining the position specified by the PAO, which the emergency medical department consists of the following tasks;

- 1) The task of provincial control and command centre has relevant personnel such as nurses, emergency medical physician, emergency medical practitioners, emergency medical workers, emergency medical volunteers or hiring workers involved in emergency response and command operations, emergency medical vehicle orders; and provide assistance to emergency patients.

- 2) The task of operation division has relevant personnel such as nurses, emergency medical physician, emergency medical practitioners, emergency medical workers, emergency medical volunteers, including ALS, BLS and FR.

- 3) The task of network organization and coordination centre has relevant personnel such as a public health administrator, nurse, public health scholar, public health worker, public health officer, medical emergency operator, emergency medical officer, medical emergency workers volunteer for emergency medical care or related hiring staff. Who has a mission to manage the zoning system, a network of regional operations, coordinate networks, develop service systems, support and manage emergency medical services, support equipment, develop personnel potential, training, and public relations.

2.4.2.2 Municipalities and Sub-district Administrative Organizations

The NIEM requires that emergency medical work structures be classified under the Medical Division, Health and Environment Division, Public Health Division, Office of the Permanent Secretary or other as an appropriate organization. According to the government structure and personnel rate framework specified by the Municipal Employees Committee (MEC), Sub-District Employees Committee (SEC); there are required employees and employers, including emergency medicine administrator, public health administrator, public health academician, emergency medicine operator (physician, nurse, emergency medical operator, emergency medical officer, medical emergency workers, emergency medical volunteers), and other staff performing of emergency medical tasks; or according to the standard of the position specified by the MEC and SEC.

2.4.3 Planning for Local Development and Emergency Medical Project

National Institute of Emergency Medical Service (2011) Pichet Nongcham et al. (2014, p.17).

Planning of development and projects were related to the emergency medical local administrative organization so that an annual budget could be developed. Then, there must be a development strategy plan, three-year development plan, and preparation ordinances/ordinances. Thus, the local administrative organization must comply with regulations and directives to get budget approval. First, the local administrative organization must determine the development strategy/approach outlined put in the development strategy plan; then, a development strategy/approach must be prepared the project details identify into the three-year development plan; subsequently, the project in the three-year development plan will be applied to draft annual expenditure budget ordinance/ordinance to obtain approval for the annual budget; finally, the annual budget is approved, the local government will prepare an annual financial plan and project details for requesting an approval of operation and budget spending according to the project details.

2.5 National Emergency Medicine Master Plan

Currently, Thailand's emergency medical system operation is the 3rd National Emergency Medicine Master Plan 2017-2021 (National Emergency Medicine Master Plan, 2016), established under the stated authority. In the Emergency Medicine Act 2008, Section 15, the objective is to serve as a common framework for all network partners in developing Thailand's emergency medical system to cover all dimensions, both in normal conditions and in public disasters.

The 3rd National Emergency Medicine Master Plan 2017-2021 emphasizes the enhancement of standards and quality of the national emergency medical system. It identifies the means and regulation entirely for the emergency medical system; operation personnel; adequate standards and quality; fiscal year source is encouraged to organize system as suitable and sustainable; regulations, rules, and laws are essential to developing a system; information system is applied to management; service and evaluation; efficient coordination system with both domestic and international government agencies and private sectors; communicating and creating knowledge provides people to gain understanding and access to emergency medical services in both of normal conditions and public disasters thoroughly and equitably. The People's Party participates in advocacy and cooperation to create participation, considering the connecting mechanisms of the national health system with other developmental plans in the same direction with many mechanisms. Numerous organizations and agencies are involved in the development of emergency medical systems, there are Ministry of Public Health, National Health Security Office, Social Security Office, Comptroller General's Department, Bureau of Budget, Local Administrative Organization, and other ministries etc., The main goal of the 3rd Master Plan is reducing deaths and disability from emergencies caused by disease and disasters.

The 3rd Master Plan was established to achieve the spirit of the Emergency Medical Services Act 2008, which focuses on protecting the right of emergency patients to effectively access the emergency medical system, equitably and in a quality manner. By receiving more effective and timely medical assistance and treatment to reduce and prevent emergency losses that may lead to the loss of life,

organ or vital organ failure, including little aggravation of injury or illness, both in ordinary and in public situations. The Emergency Medical Committee is responsible for determining standards, regulations, and procedures for emergency medicine. And the National Institute of Emergency Medicine (NEDA) is responsible for the management of coordination between relevant departments both of public and private sectors and domestically and internationally, as well as promoting local administrative organizations to play a management role to create sustainable cooperation in the implementation of emergency medicine, which is detailed as follows (Ratchakitcha.com, 2020)

Vision: Thailand has a standardized emergency medical system that everyone has access to thoroughly and equitably in normal conditions and public disasters with cooperation from all sectors.

Mission: With the cooperation of the central agency to develop a quality chain that complies with emergency medical service standards and strengthening the management capacity of the regional, local and community management chains until emergency illness prevention and operations are achieved and sustained.

General objectives:

- 1) To prevent disability and death from emergencies
- 2) To provide emergency patients to receive standardized emergency operations.

General goals: Reduce emergency deaths and disabilities caused by disease and disasters.

Specific goals:

- 1) Reduce the mortality rate of emergency patients in the prehospital period.
- 2) Reduce the mortality rate of emergency patients admitted to the hospital.
- 3) Reduce the death rate from traffic accidents.
- 4) Reduce the rate of death from cerebrovascular disease.
- 5) Reduce mortality from acute myocardial infarction.

It consists of 5 main strategies:

Strategy 1 Develop the quality of emergency medical systems.

Strategy 2 Develop a personnel management system in the emergency medical system.

Strategy 3 Develop a governance mechanism for the emergency medical system.

Strategy 4 Develop the capacity and participation of network partners both at home and abroad.

Strategy 5 Public communication in the emergency medical system to the people

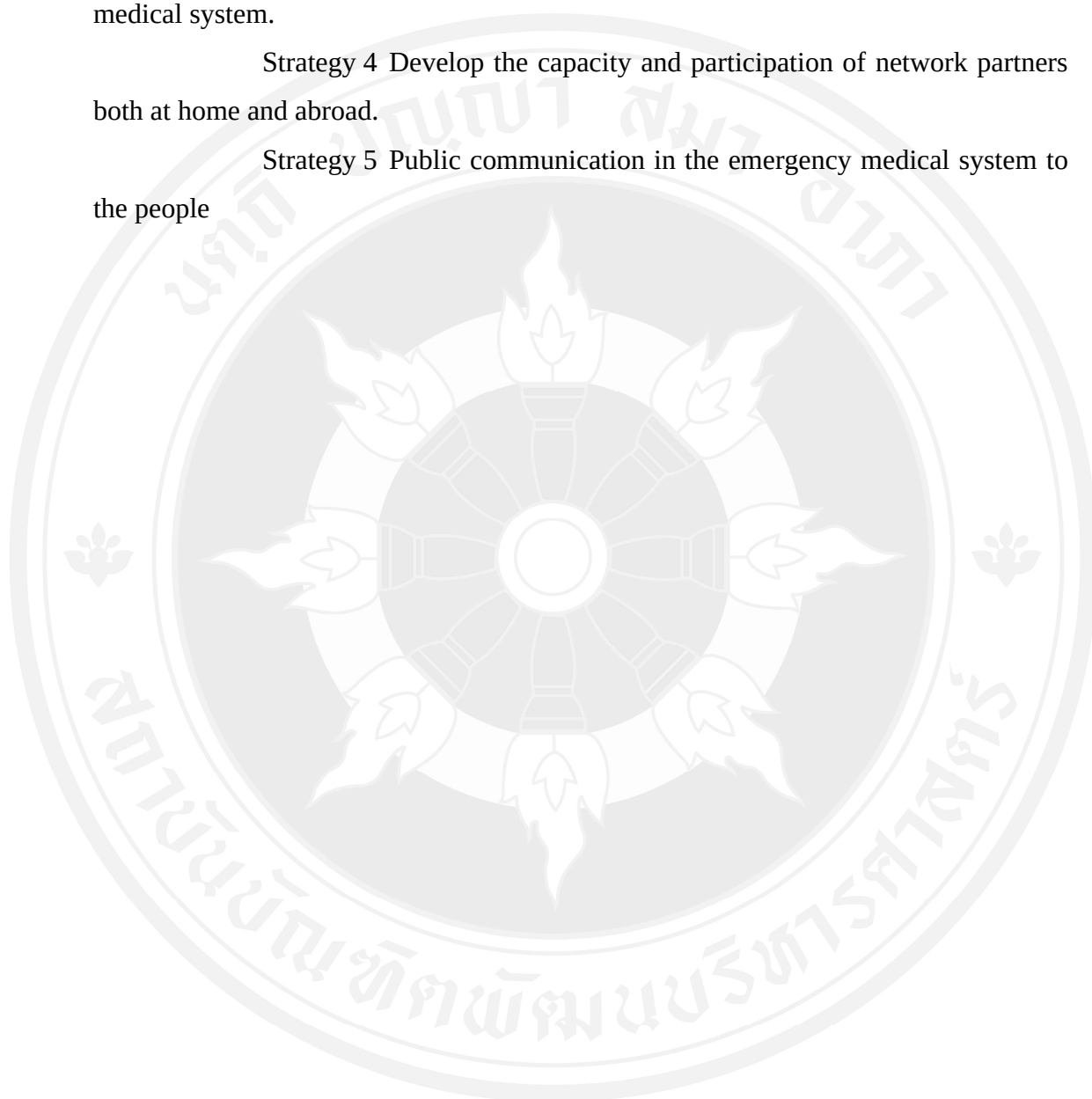




Figure 2.3 Linkage of 5 Key Strategies to Goals

Source: National Emergency Medicine Master Plan (2016, p. 14).

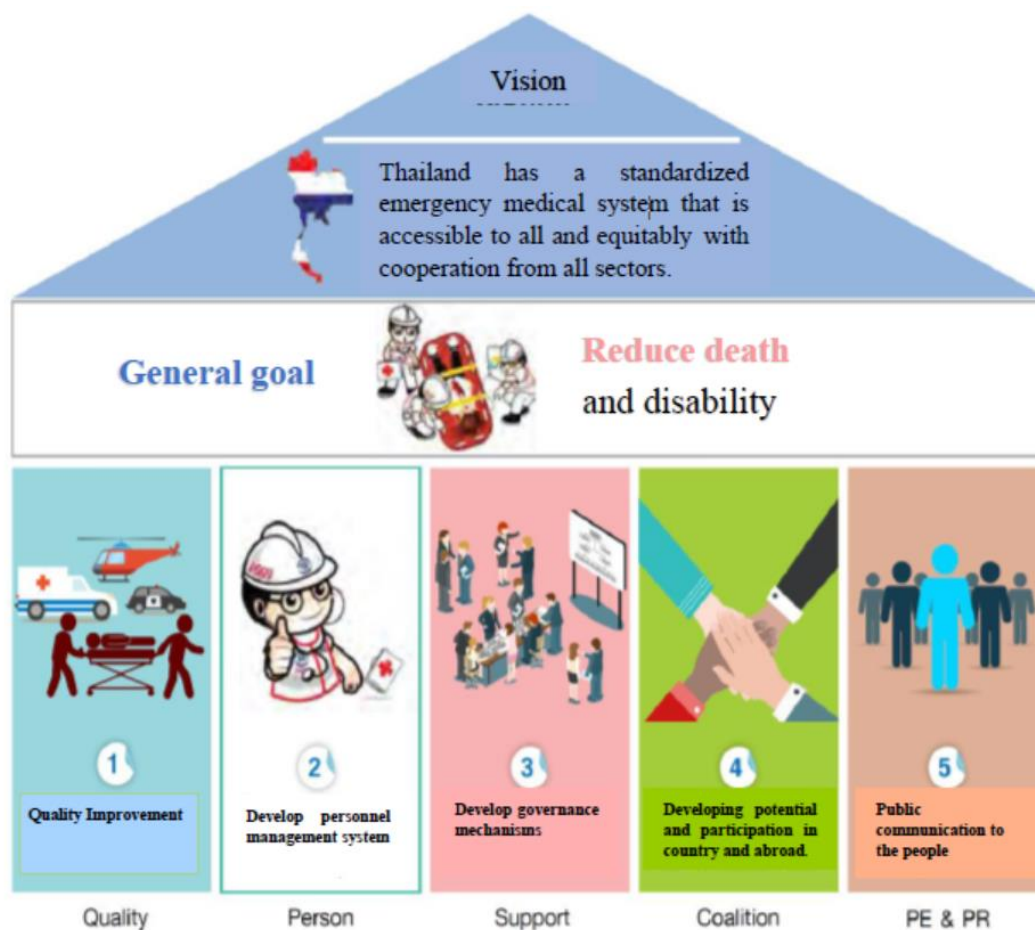


Figure 2.4 Strategic Framework for the Development of Emergency Medicine of Thailand in 5 Years

Source: National Emergency Medicine Master Plan (2016, p. 11).

Note: Q - Quality: Quality of the emergency medical systems
 P - Person: Develop human resources in the emergency medical system.
 S - Support: Supporting budget, information, law and research.
 C - Coalition: Cooperation
 PE & PR - Public Education and Public Relationship:

2.6 Agencies Related with Emergency Medical Services System Governance

2.6.1 National Institute of Emergency Medicine (NIEM)

The National Institute of Emergency Medicine is a state agency under the supervision of the Minister of Health. Established under the Emergency Medical

Service B.E. 2551 (The Act on Emergency Medical Service B.E. 2551) to be a unit responsible for the management, coordination between relevant agencies, both public and private, and encourage local government organizations to play a management role in order to create cooperation in emergency medical practice. This will enable emergency patients to be protected from the right to access the emergency medical system thoroughly, equitably, with quality, by receiving more efficient and timely assistance and medical treatment.

2.6.1.1 NIEM Authority

The Emergency Medicine Act B.E. 2551, Section 14 requires the establishment of the National Institute of Emergency Medicine (NEDA) was a government agency that was not a government agency under the Law on State Administration Regulations, or that was not a state enterprise under the law on budgetary procedures or other regulations by giving the institution status as a juristic person and under the supervision of the Minister.

National Institute of Emergency Medicine has the authority and duties under section 15 of the Emergency Medicine Act, B.E. 2551 (2008) as follows;

- 1) Preparation of a master plan on emergency medicine to submit to the EMC.
- 2) Preparation of standards and regulations for emergency medical systems to be submitted to the EMC, including criteria and procedures for emergency operations in accordance with the standards and regulations prescribed by the EMC.
- 3) Provide an emergency operating system, including management and development of communication and information technology systems to benefit emergency operations.
- 4) Study, research and develop as well as disseminate emergency medical knowledge.
- 5) Provide education and training for emergency medicine operations.
- 6) Coordinate, monitor and evaluate emergency operations.
- 7) To be a centre of coordination with government and private agencies both in the country and abroad, operating on emergency medicine.

8) Billing for emergency medical services and institutional operations

9) Responsible for administrative work of the EMC or other functions as required by this Act. Or other laws or assigned by the EMC.

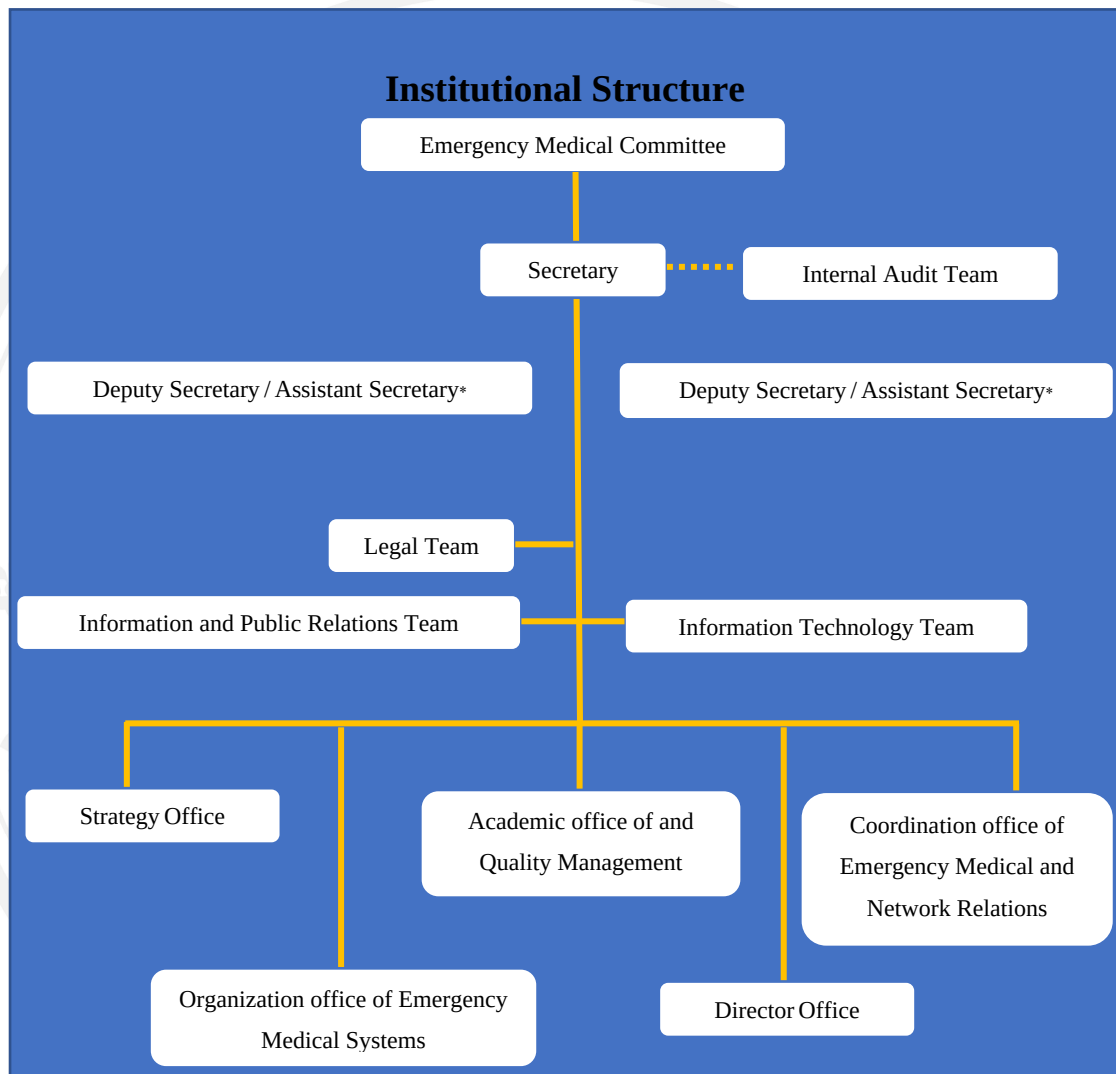


Figure 2.5 The Structure of the National Institute of Emergency Medicine

2.6.2 Administration Subcommittee of the Provincial Emergency Medical System

The administration sub-committee of the provincial emergency medical systems is a good platform for formulating policies and operational plans and

connecting and integrating management and operations of various departments in the area.

2.6.3 Local Administrative Organization

In recent, the Local Administrative Organization has widely played a role in supporting and managing emergency medical services. There are innovations in management, such as PAO established the provincial emergency medical fund by participating in various levels of LAO (Nong Bua Lam Phu); or PAO has played a role in the development and management of the emergency medical service system by supporting the patient delivery vehicles and the necessary equipment to the local government authorities and public health service units which participated in the establishment of rescuers and integrated rescue and rescue services at the provincial level (Ubon Ratchathani). At the same time, many municipalities and SAOs have established rescuers to service for residents; this is SAO, and some municipalities have established an emergency medical fund in the area to support the organization of such services (SAO Thiam, Salek, Phichit Province); In addition to providing emergency medical services, it also has an integrated community care service (Rangsit City Municipality, Thanyaburi District, Pathum Thani Province); or until delivery of the deceased home (Samran Sub-district Municipality, Mueang District, Khon Kaen Province). (Paibul Suriyawongpaisan et al., 2015, p. 5)

2.6.4 Excellence Center

Involves emergency medical services such as Trauma centre, Cardiac centre and Stroke fast track after establishing universal health coverage. The National Health Security Office (NHSO) has encouraged the establishment of an excellence centre for providing medical services to enhance the capacity of hospitals and regional centres to increase service capabilities. The assessment found that the mortality rate of injured persons treated at these centres of excellence was systematically reduced. It also allows patients to have access to emergency medical services promptly and receive comprehensive and integrated services, for example, Khon Kaen Center Hospital has developed a complete care system for accident patients, Including prevention, treatment, rehabilitation; or Thammasat Center has a good service network that makes

it possible for ischemic stroke patients to have access to blood clotting solution services and to be effective. (Paibul Suriyawongpaisan et al., 2015, p. 5)

2.6.5 Provincial Health Office

The important agency which manages and develops the emergency medical service system in the province because being in the position as the administration secretary sub-committee of the local emergency medical system, then meanwhile co-operate with local levels such as private organizations and foundations, including the development of a service network; some areas have coordination with the private sector/foundation, such as in Surat Thani Province; there are the primary rescuers belong to the foundation, and a resuscitation system has developed for people on the island for supporting tourism, etc. (Paibul Suriyawongpaisan et al., 2015, p. 5).

2.6.6 Contracting Unit of Primary Care: CUPs

This CUP is considered an essential agency in health service management at the district and sub-district levels as well as supporting the operations of rescuers in the area; and establishing local networks to deliver emergency patients to continue medical care; that also plays a vital role in supervising the local workforce (Sub-district Health Promoting Hospitals) as well as Empowerment of emergency medical services at the community level of the client unit.

2.6.7 Private Sector/Foundation

Both the private sector and foundations directly participate in the emergency rescue operation at the scene; they have trained exercises from NIEM to gain knowledge, understanding, and expert specialists; this operation must consider the public's safety, and emergency patients are essential.

2.7 Emergency Medical Network Governance

Establishing a network of partners will take considered agencies or organizations, as well as the private sector, involved and able to, directly and

indirectly, support the implementation of the goals of the “Emergency Medicine”, which can be classified as follows (National Institute for Emergency Medicine, 2014)

2.7.1 The Government Sector Consists of:

2.7.1.1 The provincial governor, the highest executive in the province, is the leader of government policies and national development plans to carry out development in the area, being an authority and prestigious in requesting cooperation from the head of government agencies and merchants, and more importantly, the provincial governor is also the person who has the power to oversee the administration of all types of local government organizations in the regional area according to the law and is authorized by the Ministry of Interior to exempt or diagnose problems in compliance with the regulations of the Ministry of Interior regarding the budget method Regulations governing the receipt of money, disbursement, deposit, retention and inspection of local governments, regulations on procurement of supplies, rules on the use and procurement of vehicles, B.E. 2548, criteria for budgeting expenditures and budget expenditures, subsidies category of local government organizations, etc., etc.

2.7.1.2 Provincial Health Office As a representative of the Ministry of Public Health and the National Institutes of Emergency Medicine, it is the academic control and standard of emergency medical practice; also, the agency that holds all types of public health legislation, coordinating with public and private hospitals. Which is affiliated with the District Public Health Bureau and the Sub-district Health Promoting Hospital in every sub-district, the provincial public health department, therefore, acts as a mentor to support the closest local operations, and it is necessary to co-think and coordinate emergency medicine with local forever.

2.7.1.3 Provincial Administrative Office helps coordinate the public relations and facilitate the emergency medical service vehicle (1669) through the sheriff and the village headman.

2.7.1.4 The local province is a consultant in compliance with the laws and regulations of the local government organization.

2.7.1.5 Provincial Disaster Prevention and Mitigation Office has a communication system, personnel and equipment to help, prevent and mitigate

disasters. Sometimes, “life support” has to work with “rescuers” (emergency operations) are therefore necessary to integrate.

2.7.1.6 Public health facilities and other autonomous medical facilities are located in the province by the Provincial Public Health Office will be the primary agency to coordinate and make an agreement to determine the procedures in practice with various sanatoriums as appropriate. Local administrative organizations are responsible for implementing and coordinating concrete actions.

2.7.1.7 Provincial transport is the agency that sets the standards and checks the vehicles as well as the registration of cars used as “Emergency medical service car.”

2.7.1.8 Provincial Police is an agency that inspects the installation request for flashing and siren signals following legal regulations and coordinates traffic facilitation if an emergency medical service vehicle brings emergency patients to the hospital through the traffic community zone. Dense

2.7.1.9 Others as necessary and appropriate for each province.

2.7.2 Local Administrative Organizations Consist of:

2.7.2.1 Provincial Administrative Organization (PAO) is a prominent local government organization with responsible areas throughout all districts in the province. Therefore, the PAO is considered the central unit to coordinate with other local government organizations, including municipalities and sub-district administrative organizations. PAO join as a network partner and integrate work to establish the “Emergency Medical Operation Division” in all types of local government organizations in the provincial area. Including having a total operating unit in the sub-district area using the strategy of human resource development, a local government organization of the decentralization committee to local government organization or clinic centre (National Institute for Emergency Medicine, 2019). In book of the Office of the Permanent Secretary Office of the Prime Minister Nr. 0106/W. 2934, May 14, 2006) and guidelines for the organization of public services between local government organizations. (Department of Local Administration, 2009). In book Ministry of Interior No. 0810.4 / W. 4524, December 27, 2006), which sets out guidelines for local governing bodies in nearby areas to form a voluntary

zoning group (PAO with the municipality or Sub-district Administrative Organization in every province). They are adhering to the principle of cooperation to coordinate guidelines for assisting the people or solving problems for the people together in various concurrent missions. The Provincial Administrative Organization prepares a memorandum of understanding (MOU) for the interconnection of utensils and an agreement on the responsibility regarding the expenses to be incurred, and each local government organization shall set up an expenditure budget following the relevant regulations.

2.7.2.2 Municipality

2.7.2.3 Subdistrict Administrative Organization

2.7.2.4 Other local government organizations established by law such as Pattaya.

All four organizations work together as network partners to establish an emergency medical operation division centred on the Provincial Administrative Organization. There is a local administrative organization with adjacent territories to join the network according to zoning.

2.7.3 Private Sector

These include associations, charitable foundations, or private volunteers who have worked in the form of a volunteer before. Provincial Administrative Organization and Provincial Public Health Office should request cooperation in practice following the criteria and conditions of the National Institute of Emergency Medicine by registering as an emergency operation division. Also, the Provincial Administrative Organization and Provincial Public Health Office should provide support and assistance to the private sector for developing human resource, equipment and vehicles, emergency medical services, and other necessary and related emergency medical operations to provide quality and standardized services of the private sector following the regulations of the National Institute of Emergency Medicine.

2.8 Management of Emergency Medical System

The management of each area of the emergency medical system involves interactions between different mechanisms through a correlation model of 5 things Funding/supplies, governance, coordination, academic support, and conflict between them. Which has the following details (Paibul Suriyawongpaisan et al., 2014)

2.8.1 Management of Thailand's Emergency Medical Services System

There is a centralized nature, And there is some distribution of power of management to the departments of the Ministry of Public Health in the region has a structure divided into three levels: central, regional (province) and local (district) as follows

- 1) National or main level The National Institute of Emergency Medicine acts as a supervisor, with the secretary-general of NEDA, managing under the supervision of the Ministry of Public Health, together with a committee from the Office of the Permanent Secretary, Ministry of Public Health. And the Emergency Medical Committee
- 2) Regional level (province) is coordinated between The Ministry of Interior and the Ministry of Public Health with the provincial governor and the regional subcommittee overseeing the process through the regional health office. Phang Nga and Kalasin provinces manage the command communication centre and various support units. The emergency medical operations are both owned by the hospital. Local government organization and foundations registered as a service unit, the details may differ according to the context of the area; for example, in Bangkok, there is an Erawan centre to supervise the service system.
- 3) Local-level of the emergency medical service system and the operating unit are responsible by the local government organization. By assigning the responsibility for providing services to the people in the local administration, the service is organized according to the local administrative area.

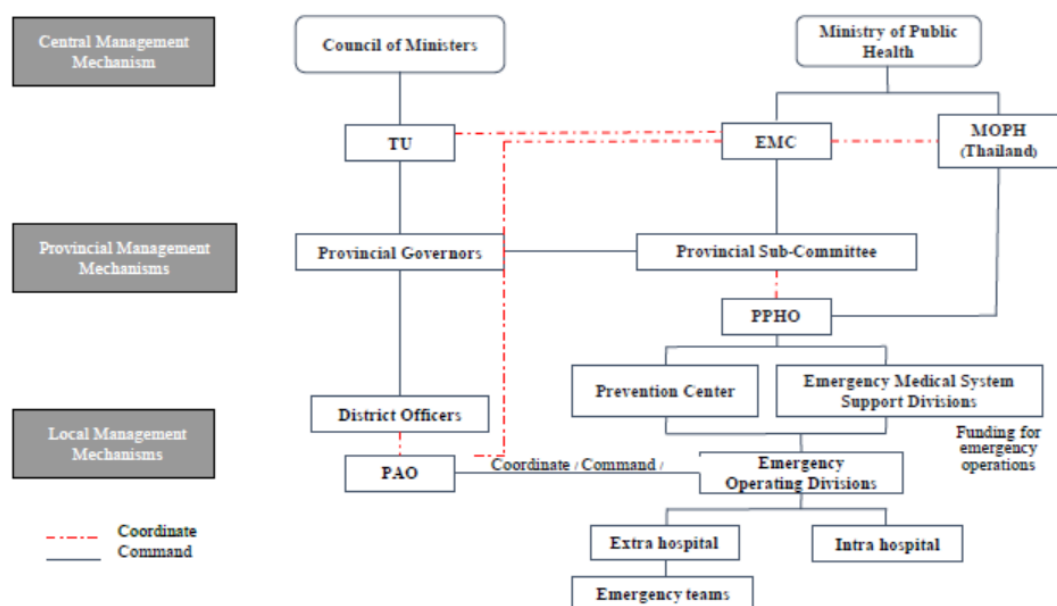


Figure 2.6 Structural Connection of Emergency Medical System Management Mechanism

Source: National Institute for Emergency Medicine (2009, 2010).

2.8.2 Fiscal Mechanism

Budget support for prehospital care was first introduced in the National Health Insurance System in 2003, with a population-headed budget (10 baht) and local government organizations encouraged to play a role in the provision of junior emergency medical operations. But after the Emergency Medical Act and the National Institute of Emergency Medicine, the budget support from the National Health Insurance System was terminated by the NHS as a support budgeting unit instead. Support is not considered as a reserved head like the NHS. But it is a prediction based on the number of operations executed in the past year. The budget does not include the salaries and wages of emergency medical staff, public health authorities, or local authorities employ most. The service charges will be paid to various operating units according to the number of operations executed through system 1669 at the rate of the NHS. As shown in Table 2.2, the Thai Emergency Medical Services System (excluding private hospitals) is a free service provided by the state to compensate for the operation according to the centralized service volume.

Table 2.3 Compensation Rate of Separated Operating Division by Level

	ALS	ILS	BLS	FR
Ground Operation				
Operate but not delivery	200	160	100	100
Operate and caring during delivery	1,000	760	500	350
Aquatic Operation				
Less than 15 km.	less than 5,000	less than 2,000	less than 1,200	
More than 15 km. but less than 50 km.	less than 36,000	less than 5,000	less than 3,000	
More than 50 km. but less than 100 km.	less than 36,000	less than 10,000	less than 4,000	
More than 100 km.	less than 50,000	less than 50,000		

Source: National Institute for Emergency Medicine (2009, 2010).

For budget allocation for emergency medical practice fiscal year 2018 following the ERC Resolution No. 11/2017 dated August 16, 2017, the budget limit for emergency medicine is approved. The Emergency Medical Fund amount of 922.444 million baht consists of the emergency medical operations compensation budget of 735.250 million baht and the emergency medical system development budget to support the area for 187.194 million baht, as shown in Figure 2.7.

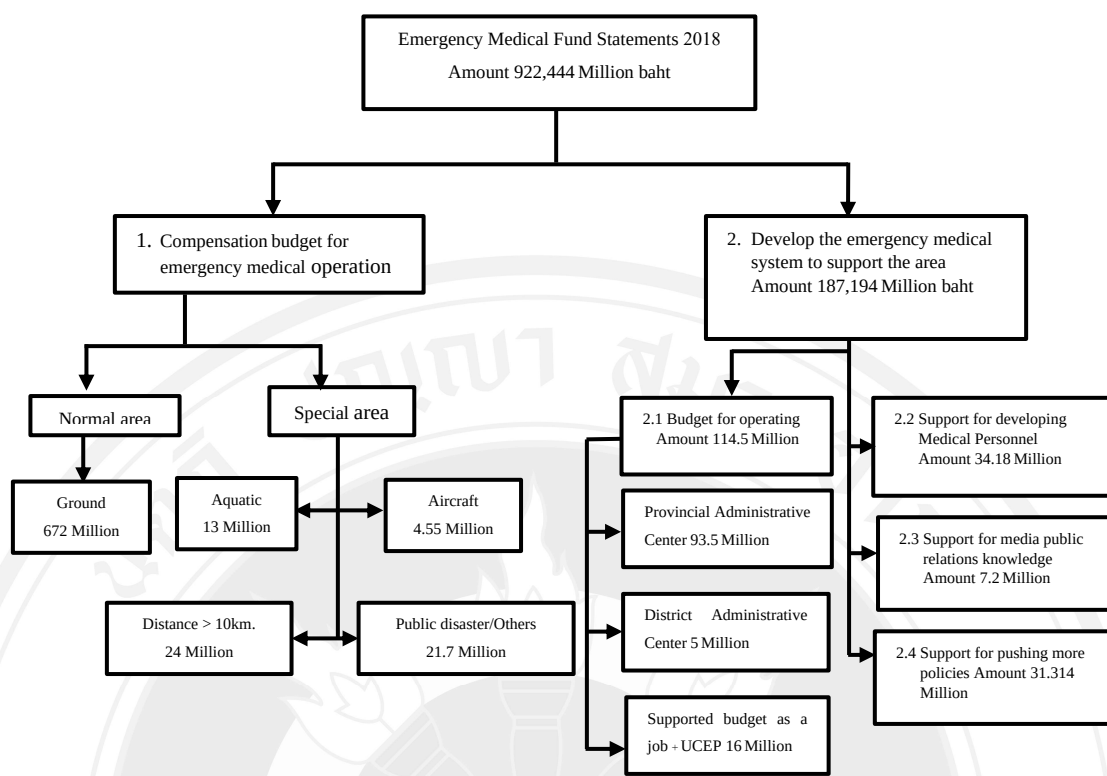


Figure 2.7 Framework for the Fund Allocation of Emergency Medical Funds, Fiscal Year 2018

Source: National Emergency Medicine Master Plan (2016, p. 14).

2.8.3 Durable Articles and Equipment

The equipment and equipment management system has minimum rules set with clear standards in accordance with documents and criteria on emergency medical systems that the operating unit has the duty to maintain various equipment to be ready for use at all times. The procurement of necessary equipment and medical equipment is the duty of the operating unit, whether it is a hospital, Local government organization or the foundation where the unit or operating set is mainly.

Vehicle resource data shows that the number of registrations of all types of vehicles is increasing every year. And the vehicle that was registered the most was a pickup truck, followed by vans. And performance data for the year 2016 showed that the vehicle registered with the most performance was pickup vehicles. Accounting for 66.80 per cent, followed by van, 63.97 per cent (National Institute for Emergency Medicine, 2016).

2.8.4 Information and Communication Systems

Information and Communication Systems Data is collected through the provincial command communication centre, in which each province is located in different locations. Some provinces are located at the provincial health office. Some provinces are located at the provincial hospital. And some provinces are located at the provincial administration organization. The planned system expects communication through number 1669 primarily, data collection and command communication to be done together, and to collect data in a record format. This will begin when the communication centre is notified that an emergency has occurred and an operation is ordered. It will keep the information continuously until the mission is completed. Which contains general information of the event Time spent on each step Illness Reported / Found Providing medical care, delivery, and details related to the incident

Currently, the emergency medical information system is introduced (Information Technology for Emergency Medical System: ITEMS) to facilitate data storage and use. And operating until covering an area in some areas, GPS systems are used to track ambulances. Some places use a video camera to be able to consult a doctor while operating. (National Institute for Emergency Medicine, 2009, 2010)

2.8.5 The Workforce in the Emergency Medical System

Workforce, there is information from the National Institute of Emergency Medicine in the fiscal year 2017 indicate that there are personnel and operating units in the emergency medical service system as follows; (Information Technology for Emergency Medical System, n.d.) Community Emergency Volunteer, the exact number is not known.

- 1) First Responder - FR Passed the Emergency Medical Responder Program at EMC 125,994 certified (78 per cent of all operators).
- 2) EMT-B Passed the Emergency Medical Technician-Basic Medical Program at EMC 6,368 certified (4 per cent of all operators).
- 3) EMT-I Passed the Emergency Medical Technician Intermediate Program at EMC 2534 certified (1.6 per cent of all operators).
- 4) EMT-P Passed the Emergency Medical Technician-Paramedic Program at EMC 304 certified (0.2 per cent of all operators).

5) Emergency nurse / Emergency nurse practice or resuscitation nurse
Passed the curriculum set by the Nursing Council of 162,039 people (1 per cent of all operators)

6) Licensed emergency physicians and doctors who have completed emergency medicine courses 1,764 (1.1 per cent of all operators)

Also, there is also emergency medical dispatcher (EMD) workers who must pass the EMD course as prescribed by the Medical Committee. Responsible for receiving notifications and considering orders to pay for the operation.

2.8.6 Service Management System

The public health service system (Service delivery) has a trauma care system. There is a Sub-district Health Promoting Hospital for primary care. There is a community hospital later. If unable to take care of them, patients must be brought to general hospitals or centres located in different regions across the country or medical schools. Fast track systems are used to care for patients with myocardial infarction; acute blood and cerebrovascular disease helps deliver from home or secondary medical facility to get appropriate treatment quickly.

2.9 Performance

National Institute of Emergency Medicine (2016, p. 13). Emergency medical performance regarding the participation of the network partners. The networks that were most involved in emergency medical care were local government organizations. Representing 64.66 per cent and local authorities registered in the operation and have performance results. The number of incidents was 72.36%. In 2016, there were 1,499,117 incidents, an increase of 172,812 times in 2015 (1,326,305 data in 2015). That is, through the number 1669, representing 77 per cent. 92, and in assessing the degree of emergency for deciding to direct the emergency kit, most of the results of the separation This was the level of urgent emergency (yellow), followed by the critical emergency level (red), indicating that the patients who came with the emergency medical system were more likely to be emergency patients and critically endangered patients. and the most commonly reported pilot syndrome was the 25th pilot syndrome (motor vehicle accident)

When considered the trend results of onsite emergency operations classified by emergency operations 2012-2016, the number of treated and delivered emergency operations tended to increase every year, with 1,414,393 incidents in 2016, accounting for 94.34 per cent. Compared with the total number of reports received, However, it was also higher every year when considering the trend of deaths among out-of-hospital emergency patients. Mainly, those who died before the series of operations reached (the data Year 2012 number of 911 persons in the year 2016 amount 2,366 persons), as well as those who died in the onsite mortality treatment were also more likely (the data Year 2012 number of 6,355 persons in the year 2016 amount 9,332 persons)

Quality of emergency operations According to the analysis of the quality of emergency operations in various fields, the quality of the sorting of emergency levels is lower than the actual emergency level of the patient. Under Triage between phone triage and scene, Triage was 17.01%, while ER Triage and scene triage sorting showed that Under Triage accounted for 34.71% of the consistency in the ordering of emergency operations and the level of emergency patient separation. It found that in the emergency crisis (red) group, there was 77.46 per cent consistency of prescribing. When considering the overall duration of the order, most countries were in the range of 0-1 minute, performing 92.14 per cent of the timely access to emergency patients. In particular, in the emergency crisis (red) group, 2016 data showed that emergency responses were observed within 8 minutes, representing 47.43% (the highest was Songkhla province, 77.73 per cent, and the lowest was Nonthaburi province). When the distance is considered, it is found that emergency patients (red) who undertested emergency operations within 8 minutes within 10 kilometres represented 59.43% (the highest is Yala province). 82.62% and lowest in Phitsanulok. 28.08% for emergency operational quality of emergency operations More than 90% of patients were found to be suitable in all aspects: 94.71% suitable blood supply quality, 94.88% optimal respiratory care quality, 91.39% optimal bone damaging quality, and 96.25% appropriate water supply quality for lead groups with the most insensitive/insensitive patients. 39.54% second only to lead syndrome 25 (automotive accident) National Institute for Emergency Medicine (2016, pp. 166-178).

2.10 Result of the Development of Thailand's Emergency Medical Service

Thailand's emergency medical system has evolved in an orderly manner and developed sequentially. Initially, it was a service to bring the injured to the hospital by volunteers from various foundations. Later, the “Trauma Center” was established in Khon Kaen, and the results expanded throughout the country. After that, the National Emergency Medicine Act B.E. 2551 was promulgated, and the National Institute of Emergency Medicine established. These changes resulted in the continuous development of the resuscitation service system by pushing the local government organization to play a more active role in providing the equipment and training. The various elements of the service system are clearly defined. Whether it is human resources, there is a course to support production and registration according to the Criteria for Equipment and Service Provinces. There is a standard. And service subsidies and development of support systems allocated by NEDA. As a result of these three developments, the number of emergency medical services has continuously increased. However, when considering the operating results, it was found that there was a lack of quality clarity countrywide. And there is also a significant gap between the areas.

CHAPTER 3

LITERATURE REVIEW

This chapter explores the literature related to the effectiveness of the emergency medical service network, considering the context of phenomena that has occurred to define a framework concept (Macro level) broadly. The purpose was to describe and explain the existing knowledge of Network Management Concepts, Network Effectiveness, International Emergency Medical Service Systems, Related Research, and the Preliminary Conceptual Framework for Research, respectively.

3.1 Network Governance Concepts

A network governance concept is part of the public administration to base on the civil society sector (Societal Governance) (Kooiman, 2000, p. 139), a joint administration between the public and private sectors to jointly solve existing problems of society; or opportunity creation to social. The administration's objectives were based on the cooperation of social-political governance by protecting and caring for groups of people in society. The concepts as above were found problems concerning with the New Public Management concept in the late 1970s that was thought the Traditional Public Administration to be full of problems, ineffective, inflexibility, lack of innovation, and inability to adapt changing under the context of globalization. Some knowledge and experience related to private sectors of business management should be vigorously disseminated and applied by successful market mechanisms in order to cause by increase high efficiency and effectiveness (Osborne, 2010, p. 3). The new public management concept has still faced many problems and limitations practically; the concept ignored for public participation (Pestoff & Brandsen, 2010, p. 229). The work of the private sector aims to maximize satisfaction to the customer, which is considered a short-term benefit. However, public administration will have the foresight to consider a long-term goal by developing the

work public to increase efficiency and effectiveness (Osborne, 2010, p. 3). Importantly people in the globalized era expect the development of good quality of life, but the government cannot respond to the request of such a development.

Additionally, people do not think of themselves as consumers who are solely waiting for government services. Therefore, the private sector and civil society need to cooperate with the government to operate and provide public services as partners with equality with the government sector. However, the new public administration concept does not allow the private sector and civil society to transition from being a consumer to a partner to lead to cooperation in public administration with the government sector in the form of networks (Pestoff & Brandsen, 2010, pp. 229-230). For this reason, public administration academicians created a diversion to a conceptual framework that transcended the limitation of “State Regulation” and “Market Regulation” (Sorensen & Torfing, 2008, pp. 1-2).

Western public administration always has the context change of public policy processes. The administrations of public affairs in society have resulted in governments at both national and local levels unable to resolve public issues successfully. This difficulty is true, especially the management of public affair administrations under a massive structure, complex chain of command, and vertical procedure of control and command; caused the government has been unable to raise progress in the affair administration in various social affairs. The concept related to public administration within civil society sector, business sector, community sector, private development organization and various professional benefit groups to participate in the country management of administration. All parties jointly came to negotiated governance and find solutions together through the country administration of network mechanism, which has appeared in various forms and began to gain more attention since the 1980s.

Failure to resolve and the limitation of delays (Red-Tape), inflexible, caused by bureaucratic regulations that have been considered inconsistent with democracy (Cheema, 2005), and blocked the creation of new opportunities for the government. Therefore, the market mechanism control system has opened up channels to organize public services continuously. Measures were applied to the market correspond to the concept that new government management drive public affairs administrations by

copying private administrations to increase efficiency and effectiveness vigorously. that consisted of privatizing public administrations to provide private sectors to create a market semi-competitive mechanism; the contracting of contractors for performing public services, reducing controls to open up competition, and applying a commercial organization system to the business organization of the public administration sector (Sorensen & Torfing, 2008, p. 2)

The government sector should focus on success in the work (rather than procedural work); clear performance evaluations in the form of “Key Performance Indicators-KPI” to promote entrepreneurial leadership; and the independent distribution of powers sub-divisions. Such measures are comparable to “private companies” that focus on operations for maximum efficiency and effectiveness. The central government reduced the regulation for flexibility of the sub-department to service under the competition to respond to the customers' maximum satisfaction. And the performance results can be examined (Osborne, 2010, p. 3).

The public administration faced problems of limitations of the new government management which required, reducing the role of the government's market. Both reduce and increase the role of the market and follow neoliberal principles. Such changes may not always lead to success, as seen from the everyday problems of providing public services. Some measures were not established by competition. Sometimes the market mechanism is unable to provide public services stable or sufficient to cover the needs of the people. External effects of public services or public affairs administration cannot be controlled and examined.

The private sector cannot imitate some parts of public administration. The market mechanism that was applied resulted in increasing inequity problems between different groups of people in society; meanwhile, the principles of theory also have conflicted with the principles of Performance in field assignments. The applications of the marketization strategy to expand the role in the market, the more there necessary were the state regulations. Importantly, the market mechanism applied to public administration has failed to coordinate the various parties. Pro-active governance based on joint objectives, mutual trust, and people were just considered a customer; That was not the right thing precisely because people want to be involved in public sector activities rather than simply being a service recipient (Osborne, 2010, pp. 1-16).

Nevertheless, several international governments continue to believe in the Neo-liberal Marketization Strategy as the new form of government. Management, caused by some sectors, remains supporting such a concept by still believing that only the complete market mechanism can perfectly supervise the public resource process. But on the other hand, there were still sectors conflict with the application of market mechanism concept to supervise the directions of public affairs administration widely; they had also requested the government to play a role in the supervision of the direction for acting a role in various sectors in order to jointly proceed to the goal of more society by focusing on all sectors of the network in implementing policies on resource allocation and problem-solving especially in using the management of network mechanisms (Sorensen & Torfling, 2007, p. 2)

3.1.1 Developing Network Governance Concept

The development of the network governance concept has been able to consider from the overview of the economic and political context changes since the beginning of the 20th century. That affects the state adjustment in different countries, including the structure of the public administration; the roles, expression and duties under their relationship with various sectors of society. The state adjustment reflects the guideline framework of public policy implementation in each period and the forms of the public service arrangements that the government adheres during that period. Osborne (2010, p. 2) has classified the concept of public policy implementation into three paradigms: 1) Traditional Public Administration: PA, 2) New Public Management: NPM, and 3) New Public Governance: NPG. Although in each paradigm, public administration has a model of public policy implementation and the public service organizing in different guidelines, all paradigms have some of the essence contexts together, including the paradigms that may appear and carry simultaneously.

3.1.1.1 Public Administration: PA

The traditional paradigm of public administration has emerged during the 19th century. In this age, the bureaucracy had expanding and grandiose, whose features were centralization, the royal system, the monopoly for implementing public policy and the public service to the people (Osborne, 2010). In addition, Hood (1991, pp. 3-19) said that the key elements of traditional public administration are focusing

on the rule of law and the role of bureaucracy to define and implement public policy. In practice, public administrative views have to completely separate “politics” from “administration”; and should prioritize increasing the budget for the administration of the state's mission, including the public services should be organized at a high standard by adhering to specialization and professionalism in each mission. This context shows that citizens expect the state to respond to socio-economic problems and the needs of people of all ages. Therefore, public administration is an essential tool to play the role of the government in response to the needs of citizens in various fields equally and thoroughly by relying on the government regulation established.

From the above principles, it can be concluded that the strengths of the conceptual framework for the traditional public administration are interest in exploring and analyzing the political dimensions for the policy implementation, including the complex and different processes between the policymaking and the policy implementation. This conceptual framework also has a weakness of public administration, which is unable to point out the factors that influence public policymaking. Thus, the research that was conducted under the conceptual framework of public administration, the researches were often ignored in exploring and analyzing the complexities within the sub-processes, which has Important to the outcome of public policy implementation, including an inattention in dimensions of public service that occur directly under a policy. In addition, the traditional public administration concept considers the operation management and public sector personnel in position for causing difficulties and obstacles to manage solving problems for political parties because the bureaucracy was considered that they always change the purposes of new policies established by political parties to their own goals (Osborne, 2010, p. 5).

Therefore, this era of bureaucracy has many problems resulting from the massive system structure and complex chain of command resulting in inefficient, ineffective and diseconomy (Rsenbloom, Kravchuk, & Clerkin, 2005). The traditional public administration will not support the participation of the people because they thought that the general public hasn't the expertise; tools for solving problems systematically and scientifically. They thought the general public often use only emotions or feelings and consider only personal interests rather than public interests.

It was also thought that if people were given the opportunity to participate, it would be a waste of time and a waste of budget and not worth it (Pestoff, 2010).

Such theoretical limitations and weaknesses led to the traditional public administration concept cannot be successfully implemented to respond to the various needs of the people. Because the reality of public policy implementation process and the organizing public service of agency sector often encounter problems and needs of people in society which has scope needs and volume to be more than exist governmental sources and budget. In the past situations, the public administration concept had begun to decline in popularity and received criticism in both of academics and the public administration until becoming a topic of education that gradually had less important led to the new trend of government management concept latterly.

3.1.1.2 New Public Management: NPM

The New Public Management (NPM) paradigm was developed from the problems of traditional public administration, which led to a search for new public management concepts to fill the traditional concept gaps. In the early 1980s, the public policy implementation and the public service delivery had begun to grow up with new discourses. The NPM concept has been widely applied in the Westminster countries of England, Australia, New Zealand, Anglo-American, and Scandinavia (Scandinavia). NPM has an important management model that is duplication, Private-Sector Management, Entrepreneurial Leadership, focus on input-output factors, and evaluation (Osborne, 2010, pp. 4-5) by treating the general public as customers. The new public management concept is based on a key assumption that if governments adopt private management techniques in the public policy implementation and the organizing public service, it will result in automatically able to achieve higher efficiency and productivity. Such hypothesis is the most clearly reflected in the British government's reform policies during the 1980s (Hirst, 2000, pp. 13-15; Rhodes, 2000, pp. 54-90).

The new governmental management will focus on applying the success experience of private sectors to government agencies, including referral of missions to external organizations to be managed representation by establishing an independent organization under the supervision of the state to oversee the referral of missions in

separating the public policy organization from a role as public policymaking in such matters. That is different from the separation of roles between political parties who are policymakers and government officials who implement policies in accordance with the original concept of public administration. The new government management concept also aims to create entrepreneurial leadership in the public sector of a service organization. In particular, they are focusing on civil servants to play their roles as professional managers like a manager in a business organization. These management systems were established to recognize controlling inputs and achievements as well as creating an assessing achievement system to measure work performance and internal audits of public organizations.

The new government management concept focuses on an organizational restructuring by dividing the public service organization missions in each procedure suitably for managing the structure of each agency as much as possible, especially downsizing the organization to control the cost management with worth and efficiency, including the introduction of market mechanisms to allocate resources for managing services of the public sector; organizing competitions, and applying mechanisms of private sector contractual system to hire or hire a contract for public service arrangements.

The new government management concept led to significant changes: changing roles of government organizations or public organizations by focusing on mission administrations according to government regulations and strictly adhering to the use of the authority of the agency, which will be able to successfully lead the mission administrations significantly under the new government management principles which all government agencies have own roles and responsibilities with all manageable, different from operating methods of the traditional government organization that have role separations and responsibilities of government agencies follow the line of work obviously.

Although the new public management framework has changed the perspective in the understanding of the policy implementation process and the public services from traditional public administration concepts, the new public management concept also has been criticized in various dimensions. The weakness of the new public management framework is one of the most negatively criticized, namely the

focus on the management of relationships within a single organization. At the same time, the increasingly complex public administration contexts are increasingly being ignored, along with the fact of the public policy process has played a wide variety of roles that are highly interconnected in the present. There is also a weakness in practice when private business management techniques are applied to public policy implementation and when applying those methods to government agencies. These techniques are outdated in business administration. And although there is empirical evidence to suggest that the business service management technique cannot always succeed in the public sector in many cases (Osborne, 2010, p. 5).

From the weaknesses of the new government management: some public administration cannot imitate the private sector, and comparing people as customers is not right because people have more needs and involvement in public sector activities than just service recipients. Thus, they have led to developing a new concept of public administration (NPG) that focuses on all sectors as a network in policy processes, resource allocation and problem resolution together.

3.1.1.3 New Public Governance: NPG

The new paradigm of public administration is a concept that arose from the existence of the traditional public administration paradigm and the new paradigm of public administration. These paradigms are neither a challenge to conventional ideas nor a replacement for either of the concepts above. But a new way of public governance is a conceptual tool that will expand our understanding of the changing world trend in the 21st century. The global social tide has undergone a more diverse and complex change in politics, economics, society and environments that affect a broad range of characters. Society is increasingly becoming a networked society, resulting in policymaking approaches that were previously focused on the role of government, and governments that used to emphasize conventional vertical management were seen as ineffective anymore.

When the focus on only good management (transparency, accountability, effectiveness, justice, cost-effectiveness, participation) is insufficient in the context and currents of a changing global society, it was proposed to have more approaches for developing the concept of policy networks and network governances. It should be developed more than conventional directives, whether through networks between

states, between public and private partners or between public, private and public sectors by thinking and operating together (Chhotray & Stoker, 2010; Klijn & Koppenjan, 2015; Rhodes, 2012; Torfing, Peters, Pierre, & Sørensen, 2012). This view has become a new focus of policy analysis and extensive public administration, both internationally and locally. That is an emphasis on network analysis, formation and dynamism, rather than analyzing the role of government as the main character, the same character as in the past.

The new public administration (NPG) is rooted in institutional and network theory, which is based on the consideration of the state as diverse within itself. The Plural State is seen as a constituent of various interdependent organizational levels and forms by entering into a role in providing public services to the people. (A Plural State: Where Multiple Interdependent Actors Contribute to The Delivery of Public Services). Pluralist State is the context in which the public sector is faced with social conditions that are different and diverse in various dimensions (A Pluralist State: Where Multiple Processes Inform the Policymaking System) (Osborne, 2010). Therefore, the new public administration (NPG) is an attempt to understand the development of public policy implementation and the delivery of public services in a natural state under the circumstances of the state in the 21st century with both the diversity and complexity of actors involved in the work of the public sector as well as the complexity of multiple societies and the diversity of agencies or organizations within the state structure.

The new public administration is a new type of relationship between the state and society. Public activities will not be monopolized solely by the government but rather through a plurality of actors of people from various sectors that take their interests and interests into action in these public events. The new management of public Governance is The Realist Perception of Old Government and the Westphalian System, where each state is divided independently, and each has its sovereignty, nationality, and centralization. However, the new concept of public administration considers the traditional public administration only as part of the new public administration because the new public administration is the involvement of various sectors in the public sector's activities in policymaking, policy implementation, and the delivery of public services (Kennett, 2010, pp. 20-21).

Osborne (2010, pp. 7-10) divided the perspective analysis of the new public administration into five forms: 1) Socio-Political Governance 2) Public Policy Governance 3) Administrative Governance 4) Contract Governance 5) Network Governance with details as follows:

1) Socio-Political Governance: this approach focuses on the analysis of institutional relationship within society, in the view that governments or political parties are not the main actors who play a sole role in making public policy and delivery of public services, but also about institutions and their interactions with other actors in society. Understanding policy definition and public policy implementation require that policy processes are often dependent on various societal actors. They will justify and achieve practical results to those policies only if the process is carried out consistently between government and Society (Kooiman, 1999).

2) Public policy governance: this concept focuses on how the policy elites and networks interact, creating and empowering public policy processes. This governing is considered central to the definition and policy implementation, and the delivery of public services is not the sole governmental function anymore. That is a community and network collaboration made up of actors across different sectors with different interests. Different traditional public administrative concepts with the government as the main character; there is a group of politicians who make policies, and there is a regular civil servant to lead the policy into action; in theory, politics and administration should be separated from Willson (2007).

3) Administrative governance: this concept focuses on applying the public administration to be effective in public administration in the current context and proposing to revise the practices under the traditional public administration principles to comply with the complex government management of the current era. An analysis of the changing viewpoint of this concept focuses on studying the approaches of policy implementation and the delivery of public services. And the development of a theoretical, conceptual framework suitable for the changing contexts of the current era. This type of governing is still based on traditional public administration principles. But there must be a significant improvement in the conceptual framework and practice to comply with the changing political, economic and social conditions. By applying the concept of public administration, in particular, the application of many public services in the nonprofit network; And the private

sector for profit, as a contractor, made the public sector a “Hollow State” (Ewalt, 2001), indicating that the state can no longer manage it alone. And the public administration is not a superior character in society, which makes social administration free from the centre of power Salamon (2002); Lynn, Heinrich, and Hill (2001); Frederickson (1999) reference by Osborne (2010)

4) The Contract Governance: this concept focuses on public administration under the New Public Management (NPM) framework, especially the application of the contractual relationships to the delivery of public services; and propose the adoption of a governing scheme in enabling private companies to undertake public service contracts. The government has coordinated and monitored the operations of various contract companies to ensure the public's satisfaction. The concept considers that modern states bear the responsibility of the public service system; therefore, it relies on a contracting system instead of the traditional bureaucracy (Kettl, 2000, as cited in Osborne, 2010).

5) Network governance: focuses on analyzing how to operate a network coordinated between the self-organizing of inter-organizational networks. This self-organizing of inter-organizational networks serve public services. The state may be being a partner of such networks. This concept is similar to that of public policy governance. However, it differs in the management concept of public policy that pays attention to the role of the policy classification in interacting with the network for initiating and establishing public policy processes. However, the concept of management as a network focused on the role of a network of actors who play a role in the implementation of public policy and public policy processes (Osborne, 2010).

The three concepts of public management above can be summarized in the comparison table 3.1.

Table 3.1 Concept Comparison of Public Administration, New Public Administration and New Public Governance

Paradigm / Importance of Element	Public Administration (PA)	New Public Administration (NPA)	New Public Governance (NPG)
1. The roots of the theory	Political Science and Public Policy	Reasoning / Public Alternative Theories and Management Science	Network theory and Institutional theory continued/..
2. Government nature	Unitary State	Regulatory State	Plural State and Pluralist State
3. Focus	Political System	Intra-organizational Management	Inter-organizational Governance
4. Emphasis	Policy formulation and policy implementing	Organizational resource management and Performance	They are negotiating, creating, defining meaning and relationships about something of value.
5. Mechanisms of resource allocation	Hierarchy	According to the market mechanism and contracting of classic and neoclassical	According to the mechanism of network and relationship contracting
6. The nature of the service system	Closed	Open rational	open changing of the environment
7. Value base	Public Sector Ethos	Competitive Performance and	Focus on scattering and

Paradigm / Importance of Element	Public Administration (PA)	New Public Administration (NPA)	New Public Governance (NPG)
		Market Operation	fighting or negotiating with each other

Source: Osborne (2010, p. 10).

Pestoff (2010) clearly emphasizes that the new management of public administration. “Service Receiver” as a “partner” engaging with the government in the provision of public services. It is different from traditional public administration that considers people to be “passive clients”. While the new governmental management considers people to be “Enthusiastic customers”, in this respect, it has resulted in the concept of traditional public administration, new public administration, and new public administration to have a distinct view of service recipients as shown in table 3.2.

Table 3.2 Perspectives on Public Administrators and Citizens Using Services, a Comparison between the Three Concepts of Traditional Public Administration, New Public Administration, and New Public Administration

Paradigm	Public Administration (PA)	New Public Administration (NPA)	New Public Governance (NPG)
Roles of public sector executives	An impartial, equitable, standardized, reliable service provider (Ewalt, 2001, p. 15) with the state in charge of all public services (Cheema,	Public Entrepreneur conducts a competition, directs direction and does not produce itself.	Keep a hand on the tiller, rather than doing the rowing (Ewalt, 2001, pp. 13-14)

Paradigm	Public Administration (PA)	New Public Administration (NPA)	New Public Governance (NPG)
	2005, p. 22).		
Perspectives on citizens using services	Passive Clients (Pestoff, 2010)	Active Customers (Pestoff, 2010)	Equal Partners in Co-Production of Services
Ideals of service to the people	Equal and Standard Service Deliveries (Ewalt, 2001)	Maximum Satisfaction of Service Deliveries (Ewalt, 2001)	Services Derived from Joint Negotiation and Collective Acceptance

The importance of elements of the new concept of public administration is summarized below.

1) Decentralization to Local Governments and Civil Society and Devolution of Political Authority and Resources includes assignments missions to local government and non-state organizations to empower people to have more decision-making power and participate in public works. It contributes to the development of civil society into a strong partner/social partner for the goal of success in human development and economic development, which will result in the establishment of an institution. And the democratic process at the grassroots level is ultimately strong.

2) The traditional concept of public administration was considered public work as the state's duty and the people as service recipients, as opposed to the new concept of public administration, which saw that although the government was the main responsibility, the state would not have a monopoly on work. The public is their own mission. At the same time, civil society and communities are also widely involved in operating and providing public services. Nevertheless, the government cannot pass the burden of responsibility on all parties. All public responsibilities remain with the state as before. Instead, the state has turned to act as a direction,

without necessarily being a direct manufacturer of products or services (Steer, Not Law).

3) The new model of operation of public administration is working in the form of a network. It consisted of partners such as government agencies from various levels, private and community business, NGOs, academic institutions, professional interest groups, foreign non-governmental developers, and international organizations (Kennett, 2013). That can be organized quickly (for example, parties travelling aid tsunami victims); or established in a permanent manner (for example, the water management committee, community forest management committee, water market management committee, etc.); the management of public partners has a flat organizational structure; relationships between parties without hierarchy and the informal chain of command.

The factors that link the networks together in order to enable the new public administration to operate effectively and efficiently are: 1) Mutual Trust unites all partners to work together to join forces to enable smooth and successful operations of the public, 2) Norms of Social Exchange focuses on the value of sacrifice for the public, support one another, and take responsibility to others and the public. If these values were able to win the hearts of members of the different parties, it would enable them to cooperate in public works with greater force, 3) Dialogue and Intensive Communication, such as frequent meetings between partners to foster mutual understanding, reduce conflicts, and foster cooperation, 4) Fragmented, but Integrated Leadership since the management of public partners has a membership component coming from different parties. While each Party had its independent leader, there was a very fragmented leadership. In managing public partners, it is important to recognize that multicenter collective leadership requires continuous and frequent coordination and dialogue methods to connect each point of leadership so that they can be coordinated and harmonized integrally 5) Conflict Management, in the management of new public governance comprising of a wide range of parties, it is highly susceptible to conflict by enabling a new line of public governance to focus on peaceful conflict management, tolerating differences, diversity, being open-minded, negotiating with reason, trying to ignore conflicting details about personal matters, and being willing to adjust their ideas by face-to-face. In general, however, if the

management of public partners is based on trust, upholding the values of sacrifice for the public. And there have communications with each other all the time, and it makes conflict difficult to arise; or if a conflict does arise, it can be resolved easily.

3.1.2 Definitions and Theories in Network Study

A network refers to a form of structural relationships between other organizations or departments. There is no one organization that has more control or command than any other organization in the network (O'Toole, 1997, p. 45). It has a formal and informal appearance. It is an exchange relationship and interdependent. Organizations within the network have common goals or ideologies to operate; (Frederickson, 1999, pp. 704-705); for solving problems of organizations that cannot act alone; (Agranoff & McGuire, 2003, p. 4) consist of 3 or more organizations that have a relationship in Compound directions for the same purpose (Provan, Fish, & Sydow, 2007, p. 482).

The network study was chosen to use at least two different words (Mandell & Keast, 2008, p. 690) 1) An Exchange network can occur in many situations as simply exchanging information and/or expertise; only rely on and interact with others when necessary, for example by transferring expert knowledge to employees on duty; 2) A Coordination network arises when an organization wants to deliver services to inefficient locations, it is imperative to collaborate with other organizations, including groups and/or individuals, to exchange information and/or expertise. This results in a relationship for the development of coordination on an individual level, which is interdependent but not merely looking for a better way to deliver services, and 3) A Cooperation network arise when it requires cooperation from participation in solving complex problems that cannot be solved by any Single organization. The importance of such cooperation is interdependent, meaning that each organization or individual is directly dependent. Operations must be initiated by each organization or individual, and there is a need for a shared commitment.

In general, at least two basic theories are used in the study of networks: 1) the Social Exchange Theory, which was developed by Cook (1997) and Homans (1958). The main idea of this theory is that collaboration works in the form of a voluntary exchange of resources by the characters. This has been analyzed to determine the

benefits and costs of the exchange (Costs) involved. Therefore, collaboration between organizations will take place. If those partnerships can benefit any organization; the scope of the “resource” is not limited to financial resources. These resources can be in abstract form such as reputation, honor, or group recognition, 2) Resource Dependency, by Salancik and Pfeffer (1978) and Ulrich and Barney (1984), explains that whenever an organization lacks operational resources, it creates a driving force or need to build cooperation with others or other organizations to have more resources. In this situation, many organizations work together, agreeing to reduce some degree of independence from each other, and increase the level of relations with each other more clearly to enable exchange or assistance of resources as needed.

However, the collaborative networks management is also necessary to apply knowledge from other sciences or combine them to create theories (Bingham, O’Leary & Carlson, 2008, pp. 14-15), for example; the concept of business management framework related to the negotiation theory and organizational research to help analyze the relationship dynamics of members within the network. Theory of conflict management and dispute resolution, which is a view to govern and resolve incompatibility in opinions within the network. Concepts and theories in the scope of political science, such as the study of the emergence of network structures and cooperation in the context of common pool resources (Ostrom, 1990) in which members or organization have the full power to plan or implement a policy; including the concept of democracy that is important to the Public Participation, and civic engagement which will create a greater understanding of the role of government networks from studying the network of various scholars. (Agranoff, 2007; Agranoff & McGuire, 2001; Bryson & Crosby, 2008; Goldsmith & Eggers, 2004; Graddy, 2008; Isett, Mergel, LoRoux, Mischen, & Rethemeyer, 2011; Keast, Mandell, Brown, & Woolcock, 2004; Klijn, Edelenbos, Steijn, 2010; Meier & O’Toole, 2003; Milward & Provan, 2006; O’Leary & Bingham, 2007; O’Leary & Vij, 2012; Provan & Kenis, 2008; Thomson & Perry, 2006). The network is driven by the environment of each organization to participate in a particular operation such as trade, dependence on resources, and solving complex public problems. The organization must be structured to be able to work together for maximum efficiency. However, networks are not able to operate on their own, they need to be managed in a systematic manner, and

network administration must have potential and readiness that is significantly different from conventional management. Therefore, to achieve understanding of the body of knowledge; The researcher has integrated a separate component for each aspect which can be described as follows.

3.1.2.1 Network Environment

Networks are generally tied to a special policy environment, in which this cooperative behavior is influenced by the individual environment that public, private and nonprofit organizations receive (Isett et al., 2011, p. 164), from economic politics and society. These things will coincide with the organizational culture and the management of each organization. The resulting environment is very important to the researcher or executive (O'Leary & Vij, 2012, p. 512) because public administration is the main system of relationships in the public domain. This can directly affect the goals, structure, and the outcome of cooperation including the complexity of the current environment. Therefore, organizations need to build and connect relationships to reduce uncertainty, and to maintain stability (Bryson, Crosby & Stone, 2006, p. 45).

The context of the relationship between organizations is driven by necessity-based partnerships that want to reduce dependence on resources, or the need to reduce transaction costs in operations. These are both institutional struggles and pressures affecting the sustainability of each organization over the long term (Bryson & Crosby, 2010, p. 66). A clear example of when government organizations are under pressure to improve the effectiveness of public administration practices is by supporting external organizations' competence through joint action in improving regulations and laws to facilitate collaboration.

However, the environmental differences of some organizations within a network can be very complex and confusing to network administrators. Some networks are fast and successful, others are slow and inefficient. In addition, each network may have different motivations for working together, for example, organizational administrators choose to join networks in order to increase productivity; to better serve citizens; or to achieve innovation. At the same time, they may join to reduce their original obligations and gain benefits without any effort, as

the above shows that networking may not always be for the overall benefit. In fact, a network can have a negative impact on a particular organization.

O'Leary and Bingham (2007, p. 10) summarized the complex environment of the network as follows: 1) Diverse Members, 2) Mission and Goal Differences, 3) Organizational Cultural Differences, 4) Differences in operating styles, 5) Stakeholder and capitalist differences, 6) Power differences, 7) Variety of decision-making processes, 8) Relationships between organizations and personnel, 9) Diversity of governance structures, and 10) potential conflicts with the social sector.

O'Leary and Bingham (2007) described a complex environment within a network, showed factors that can have a profound impact on network success; whether political differences, such as the support of the authority, the negotiation of stakeholders, or the setting of regulations and budgets. In addition, each organization has various perspectives and interests such as perspective of economic interest, public interest, duty, accountability. In addition, social and cultural differences can also raise expectations of organizations or personnel within the network, which may affect the administration within the network as well.

From the opinion of the scholars, it can be concluded that any network environment formed around the organization is influenced by political, economic, social and cultural systems. These influences can affect decision-making processes and joint operating behavior of each organization within the network.

3.1.2.2 Network Structure and Characteristics

A network structure can be achieved when individual organizations (government, private sector, and civil society) deem that operating alone is insufficient to successfully resolve a complex situation or problem. The network structure, therefore, is symbolized by the shared opinions of members of the operation with a clear agreement between them, aiming at the essential obligation of resource expenditures within the network (Keast et al., 2004, p. 364).

Agranoff (2007, p. 10) divided the network model from the evaluation of the network structure and operation into four categories: 1) Information Network where members join to exchange specific ideas on policies and projects, technology and solutions to problems, any activities that may arise from measures on a voluntary basis, 2) Development network where members join to exchange information and

techniques in order to provide education, learning and services, and increase members' ability to solve problems, 3) Access network where members join to exchange information and technology, create projects, exchange resources, identify service recipients, and increase accessibility to lead to the formulation of new guidelines, 4) Operational network where members join to create a collaborative change approach in order to shape the formal action and deliver services through the exchange of information and technology.

In addition to the network model classification, Provan and Kenis (2008, pp. 235-236) commented that the governance structure within the network can be determined by the internal control approach and the level of participation of any organization. Thich can be divided into 3 characteristics as shown in Figures 3.1

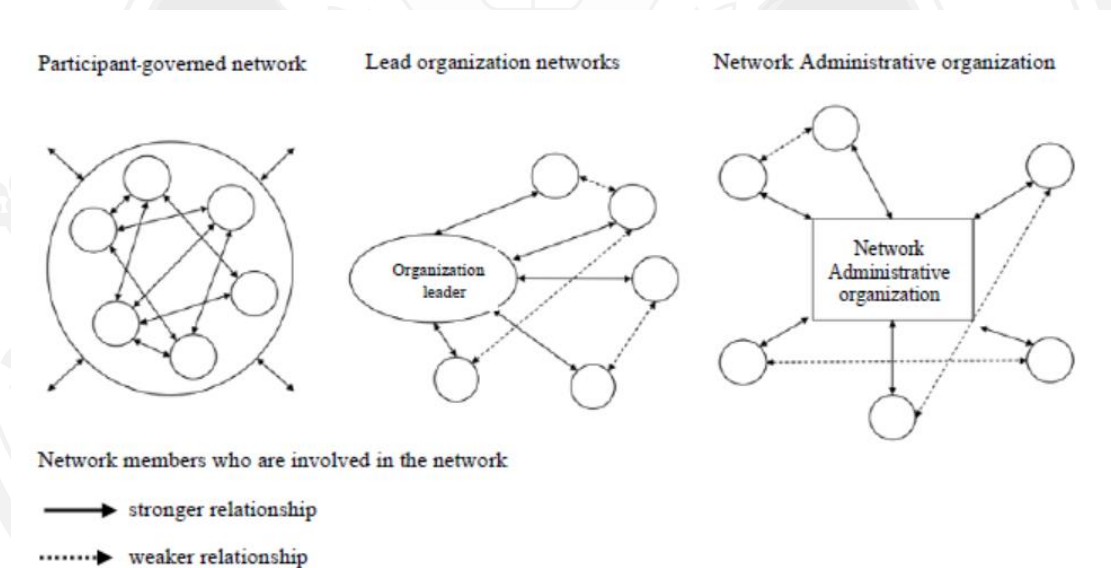


Figure 3.1 Models of Network Governance

Source: Provan & Kenis (2008, p. 8).

Participation network means a Network with a small number of members, self-administered non-discriminatory, regulated formally and informally in a decentralized manner, all members are equal, the nature of the relationship is shared and participated in Management both inside and outside the network, high level of coherence to common goals.

1) Organization Leader Network means a network with a moderate number of members, but one organization has the resource and legitimacy to play a leadership or representative role of the network by combining power. Leaders issue regulations and / or facilitate members for a common purpose.

2) Network Management Organization means a network with many members, each organization has various goals, so it is necessary to form a delegation from its members to direct, coordinate and control members within the network. This type of network serves as a mechanism to justify and mitigate conflicts in the goals of each member organization.

The Network Governance model has no fixed principles. Network design must consider changes in the context of different scenarios, such as an increase in the number of network members, and participation, which creates administrative difficulties because the target requirements differ greatly. Need to adjust governance to form a network of organizational leaders or network management organizations, etc.

The key features of government operations are network formats. Government organizations need to develop their capabilities to be able to work with other organizations, as shown in Figure 3.2

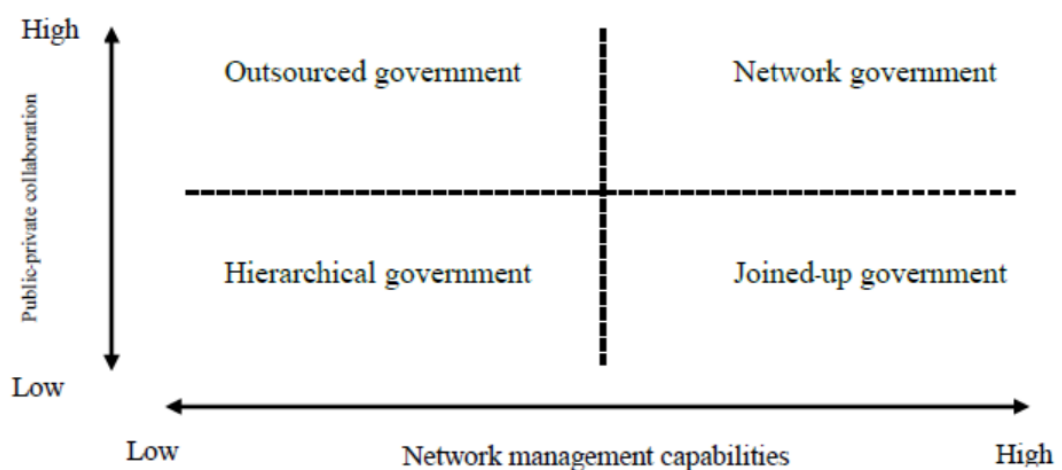


Figure 3.2 Models of Governance

Source: Goldsmith and Eggers (2004, p. 20).

Government organizations should concurrently develop a level of co-operation with external organizations in a plan that emphasizes the pursuit of “Partnership” (Goldsmith & Eggers, 2004, p. 19). The executive must understand the characteristics of the network that differ from general organization management. These allow networks to produce more powerful results (Graddy, 2008, p. 3). Therefore, it can be concluded that the structure and characteristics of the network are organizational relations to work together, with the formulation, goals, and levels of authority in the work performed in order to be able to work with each other properly and effectively.

3.1.2.3 Network Management

In general, the network cannot be operated on its own. It is imperative that there are guidelines for the implementation of the objectives to be achieved. The key to successful collaboration is finding the right ingredients to operate (through coordination and administrative dimensions according to the command line) and to build social capital in the relationships they form (Thomson & Perry, 2006, p. 25). Network management approaches that lack guidelines are difficult to achieve in the context of complex relationship processes (Klijn, Steijn, & Edelenbos, 2010, p. 1064).

Milward and Provan (2006, p. 19) describe the context in network management that comprises of different obligations. This can be explained from the role of overall management and the role of internal management in five functions, as in Table 3.3

Table 3.3 Overall Management and Internal Management within the Public Administration Network

Responsibility	Overall Management	Internal Management
1. Responsibility management	- Determine who will be responsible for the outcome. - Promote and reward for	- Check their organization against their participation in the network. - Ensuring that resources

Responsibility	Overall Management	Internal Management
	the goals of the network. - Investigate and punish the perpetrators.	are used in network operations. - Ensuring that their organization is recognized in the network - Against the perpetrators
2. Righteousness management	- Build and maintain processes, structures, and contributions to righteousness. - Promote your network, find resources and new members, and achieve tangible results.	- Communicate the value of the network with a participant. - Build an acceptance of their organization from member organizations Continued/..
3. Conflict management	- Establish conflict resolution and dispute resolution mechanisms. - Adhere to justice and impartiality to build good faith	- Give importance to the joint operation of the organization rather than the individual - Create a balance between the goals of their organization and the overall goals.
4. Design Management (Regulatory structure)	- Establish an appropriate governance structure. - Establish guidelines for action and manage - Keep an eye on the changes made in order to improve the structure in a timely manner.	- Operate with other organizations according to the rules of the network. - Recognizing their lack of autonomy on the basis of collective decision-making.

Responsibility	Overall Management	Internal Management
5. Obligation management	- Encourage participation at all levels - Listen to opinions from all concerned parties - Allocation of resources and equal access to resources - Provide opportunities for all organizations to take part in operations.	- Establish practices in their organization for collaborating with other organizations. - Encourage personnel at all levels in their organization to participate in the network.

Source: Milward and Provan (2006, p. 19).

Moreover, Agranoff and McGuire (2001, pp. 298-230) found that behaviors that enhance the efficiency of collaboration were: 1) the impulse were to find a context in which the network or its participants want to participate in the network, whether it is finance, skills, abilities, etc. The organization which will join the network will be appropriately selected as a complement to what the organization needs and yet lacks when operation alone, 2) definition the guideline framework as identified the different roles within the network that can enhance value and modify operational perspectives between them, 3) The setting of agreements and driving them into practice in order to achieve the objectives and, 4) Synthesis is to create an atmosphere that facilitates collaboration, reducing complexity, uncertainty, and any risks that may arise by providing information exchange in order to expand relations between organizations.

The network management strategic process is critical and can be used as a guideline to facilitate more effective relationships within the network (Klijn et al., 2010, p. 1069) as follows: 1) Connecting is the impulse of an actor or network startup resource that needs to find the needs of various actors that cannot be obtained through the operation alone. It can sometimes be called “Selection of impulse”, 2) Exploring Content identifies goals and viewer views to create solutions to problems. And it

gives any character an opportunity to participate in both decisions and actions, 3) Arranging guidance is the provision of a temporary structure for consultation and relations with each other, and 4) Process Agreements define rules for the relationship and the maintenance of value for each other of network actors.

From the study of the concept, it can be concluded that network management is the organizing process for coordination between organizations by determining the methods and obligations that must be performed to ensure continuity in the implementation of the agreement and network purpose

3.1.2.4 Network Capacity and Availability

Generally, organizations in the network find success that they cannot achieve on their own. The availability of technology, information, personnel or resources may not be enough to achieve the desired goals. The collaboration network has objectives to create an exchange of resources and knowledge, competence or information to a level that is sufficient to deal with the required problems efficiently and effectively. Thus, networks need to have the capacity and readiness to operate for those organizations to be successful (Provan & Kenis, 2007, p. 237).

Trust builds relationships and sustainability within networks, resulting in commitment, friendly negotiation, and consideration for the common benefit (O'Leary & Vrij, 2012, p. 514). In other words, confidence is an aspect of describing a relationship that is reflected "willingness to take risks based on positive expectations. About the intentions and behavior of other people" The conviction of network management is sufficient to provide a view of the good relationship between its members (Provan & Kenis, 2007, p. 237). And the confidence of an organization towards another organization will cause at least three good behaviors: 1) an honest effort to comply with agreements, 2) honesty in negotiations, and 3) hey do not take advantage of other organizations where they can (Thomson & Perry, 2006, p. 28). In addition, mutual trust can help reduce transaction costs, referring to costs associated with inter-organizational exchange, purchasing, and external audits (Goldsmith & Eggers, 2004, p. 18), as shown in Table 3.4.

Table 3.4 The Level of Confidence in Contract Supervision and the Relationship between Value and Cost

	High Trust	Low Trust
Contract supervision	- The results are flexible on a basis that is needed to improve the value.	- Rigorous and frequent audits impede improvement.
Relationship between value and cost	- Low cost, high value	- High cost, low value

Source: Goldsmith and Eggers (2004, p. 20).

Table 3.4, identifies that without confidence, the cost of making a network transaction is high as government officials need to spend a portion of their time negotiating, monitoring and contracting in lacking flexibility. Confidence reduces costs by encouraging more open exchanges of information and reducing the need to rely on costly legal means to address relationship issues.

Moreover, the network decision-making process is based on expertise, but other decisions are based on open-minded discussions from all organizations within the network (Agranoff & McGuire, 1998, pp. 85-87). In the study of network leadership, scholars' opinions had studied inter-organizational management and found that the role of network administrators was different from general administration according to other textbook standards. Both the mediator, the process manager, and the director who bring stakeholders into a mutual relationship need special skills and abilities (Edelenbos, Klijn, & Steijn, 2011, p. 427), including 1) diagnostic skills are the ability to understand and make decisions in the context of network complexity, 2) the ability to produce and design authority is the ability to analyze networks and establish design guidelines for governance of relationships in the network, and 3) situation reading skills are selective and conduct activities in the right place at the right time for the situation.

Meier and O'Toole (2003, p. 697) studying success during network operations, found that the network operator's experience had a significant impact on the results. Those who have been through a period have good competence and a

positive correlation to the outcome, which is consistent with Gazley's ideas (2008, p. 37). That said, those with cooperation experience are quick to perceive the situation where the success of the network operation results outweighs the regulatory obligations and sluggish operations. In addition, a study by Edelenbos et al. (2011, p. 428) found that the length of time spent on the job increases the experience of network administrators. In relationship analysis in the network, there are skills that will bring relevant people to work together effectively, and experience affects the number of strategies for implementing network management. However, network operations cannot be successful if they cannot allow organizations to communicate with each other quickly and flexibly.

The network needed to create greater internal communication channels requires that communication between each other allows consultation and dialogue to foster collaboration in brainstorming, whether it is finding solutions to arguments, identifying common interests, and building knowledge bases and funding shared society (Agranoff, 2007, p. 106; O'Leary & Vij, 2012, p. 514). Network communications must be fast, real-time, and continuous in order to provide solutions or provide services that meet the needs of member organizations. They should also be simple enough so everyone in the network can easily understand the information communicated. However, conventional face-to-face processes are still essential for networking. They may apply techniques in nearby offices to facilitate character communication and effective tacit knowledge exchange (Goldsmith & Eggers, 2004, p. 93)

From studying the above concept, it can be concluded that the potential and readiness of the network relate to the competence and readiness of leadership and member organizations in terms of personnel, attitudes, and communication channels. Including operational concepts that can promote and support the development of joint operations between organizations within the education network. Concepts and theories related to the management network from various scholars can summarize the relevant content of each aspect of the management network, as shown in table 3.5.

Table 3.5 Summary of the Management Network Elements

Network Elements	Related Content
1. Network environment	The various environments that occur and surround the organization. It is influenced by political, economic, and social and cultural systems. These influences can affect decision-making processes and joint operating behavior of each organization within the network.
2. Network structure and features	Managing relationships between organizations by setting goals. And the level of use of operational authority in order to be able to work with each other in an appropriate and efficient manner.
3. Network management	Organizing operational processes to create coordination between organizations It defines the methods and obligations that must be performed to ensure continuity of operations in accordance with the network agreements and objectives. Continued/...
4. Network potential and availability	Leadership organizations and member organizations have knowledge, abilities and readiness in personnel, attitudes and communication channels. Including operational concepts that can promote and support the development of joint operations between organizations within the network.

Studying network concepts and theories can be applied in a collaborative study approach, but the terms of the “Network” are aimed at whole networks, which are different from the terms of “Collaboration”. The study of networks is the study of relationships that occur and not between organizations within all networks that are not just organization-to-organizational cooperation, but the cooperation of one of the success elements of the network from the cooperation of all organizations and networks (Provan & Lemaire, 2012, p. 640)

In addition, the educational and research approach networks are relevant to the government's administration of past scholars. There are different approaches by Provan et al. (2007, pp. 482-483). They reviewed 20 years of network-related research from 1985 to 2005 and found that the network studies could be divided into two components: the independent variables used in the study (Organization or Network) and dependent variables or results adjusted according to the researcher. (Focus on the results of Any organization or results of the overview of every organization) as shown in table 3.6

Table 3.6 Relationship between Research Variables in Public Administration Networks

Independent Variable / Interesting thing	Dependent Variable / result of Interest	
	Organizational Relationship	Mutual Relationship
Organizational variables	1. Actions of any sector of the organization that affect another organization. (Only 2 parties)	2. Actions of any sector of the organization that affect the network.
Relationship network level variables	3. Network actions affect one of the organizations.	4. A holistic relationship spanning the entire network.

Source: Provan et al. (2007, p. 483).

From the above table, the study can be arranged into four categories: 1) the researcher uses organizational attributes or attitudes to describe the relationship of cooperation with other organizations, 2) the researcher uses organizational phenomena to describe the actions of a particular organization, how does it affect the network? 3) researchers focus on network studies and try to understand the impacts on one of organizational, and 4) the researcher studied at the network level that the

impact of the actions of all organizations. How does it affect the results or the structure of the network in a comprehensive manner? (Interorganizational level as whole network)

The researcher defined the study approach into four aspects, namely, the study in a holistic manner covering the entire network consisting of public, private and civil society organizations, without separate studies of specific sectors or comparison between each other.

3.1.3 Network Governance

The management of the network dimension is important in the network performance, resulting from the collaboration between self-managing organizations. (Self-organizing inter-organizational network). This can be seen from the role of networks in the process of organizing public services when government agencies are included in the network and those self-managed organization networks play a role in self-organizing public services without government agencies joined. The role actor network operates under this dimensional analysis framework by differing from a network analysis framework in public policy processes. This case focuses on the network of actors with the same kind of roles. Especially the implementation of policies} and organizing public services. This is different from the policy network case that focused on the role of the actor network with the same role model in policy definition (Osborne, 2010, p. 7).

The network management concept looks at the role of the state in a different dimension from the traditional public administration concept, based on the principles of public affairs to facilitate individual actors for the goals and objectives of the government various roles including government actors, non-governmental organizations, civil society organizations at the local, national and international levels for coordination, coordination and cooperation. The state plays a role under the government affairs process to be adjusted since the role was previously seen as a role that had to be limited to a public sector responsibility, it began to be seen as a role for other actors who could join in. As with many issues in society, it was previously seen to be solved only by governmental mechanisms, and other social actors could play a role in solving those problems as well. The government sector is responsible for

bringing the roles of actors in society to join together to drive problem solving and create opportunities for social development through a co-ordination mechanism in the form of a network (Pierre, 2000, p. 4).

In this respect, the administration of the country is a process that is carried out through cooperation between actors in different sectors of society for a model of coordination between actors in society to jointly carry out public activities. It is evident in many forms, such as networks, partnerships, and consultations to address various public issues (Deliberative Forums). Such forms of cooperation began to emerge in the 1970s following the decline of the government's centralized management model through hierarchical control mechanisms in bureaucracy and in turn to popularize the model of public administration based on the participation of multisectoral actors under relationships with all parties at equal status level (Hirst, 2000, pp. 18-19).

The main aim of networked cooperation is to involve relevant actors in negotiations to find common ground in various public affairs in society. With the goal of all parties to benefit together collaboration in public affairs under a networked relationship mechanism may take place in various governmental structures, from local or metropolitan levels to regional levels. It also includes a cross-sectional cooperation network between various sectors such as government, private business. And civil society for this reason, the actors appearing in the corporate governance process in a form of cooperation through a network have come from many sectors and levels, such as trade unions, trade associations, companies, non-governmental organizations. Local government organization Social entrepreneur Including groups and community organizations (Kjaer, 2004, pp. 48-49).

Under the principles, the governing body is a process of coordination and interaction between the public sector and various sectors of society, be it the private sector or civil society. It operates through a network of coordinating roles between each other in forms, both formal and informal. Therefore, the interaction between actors and social sectors is manifested through various forms of cooperation such as networks or partnerships. (Partnerships), thus reflecting the pattern of coordination (Co-ordination) between the different actors in the management of a public issue

together. It also reflects a self-management model for addressing public issues by the actors of each sector. (Self-Governance) along the way (Pierre, 2000, p. 3).

The administration of public affairs by means of a network mechanism is a form of government administration based on a collaboration between actors of many sectors ('Co' Governance). The appearance of playing roles between different actors. This occurs under the context of the complexity of development and management of various social issues. This requires cooperation from various actors involved in order to be able to work to achieve results. In such a situation, management of solving social problems cannot be achieved through unilateral centralized work of the government. But need coordination driven (Co-ordination) and play a role that is harmonious between all sectors. (Synchronization) including managing public problems through the creation of a network of cooperation without territorial divisions between the public and private sectors. (Public-Private Networks) (Kooiman, 2000, p. 150)

The network is considered a form of institutional structure that occurred from interactions between actors, government and private sectors, or civil society. Nonetheless, the network is an informal institutional structure because the voluntary cooperation of the members is not organizational management as required by law or government regulations. is accomplished in line with the goal of establishing the network. However, although the network is not an official organization, it is not a temporary gathering. It is an organization with permanent stability for a period, for example a network may work until an activity or project jointly undertaken by the goal of establishing a network.

Network management is important in the public policy process in the direction of co-operation to develop public policy, which can be classified into two types of networks: 1) Intergovernmental Networks refers to the relationship between governmental organizations only in implementing policies (administration in implementation) may differ at the state organization level, such as the intermediate state organization together with the regional state organization, or state organizations and local government organizations, etc., by creating interdependent relationships In different resources And different potential And build trust in operations to lead to policy results 2) Policy Network is a network of relations between different

organizations. It is not limited to being a governmental organization, such as a government network, but a link between a diverse organization with a common issue or with a specific area of public policy or a specific area of interest and expertise (Bevir & Richard, 2009, p. 122)

From the foregoing, working as an inter-organizational network may appear either in the form of a network between organizations or government agencies, or a network between external actors, whether private and civil social. The concept of public affairs emphasizes the importance of public affairs through networks that cross between the public sector, the private sector, and civil society in the process of geopolitics. The network serves as a coordination mechanism to achieve collaboration, decision-making, and as a mechanism for allocating resources among network members. Thus, it can be said that the network is a governing structure, which members of the network jointly design and build on a collective agreement (Rhodes, 2000, p. 61).

Social networks can play a role in both opposing and supporting government operations. In other words, many networks have the potential to effectively counteract public advocacy of public policy. As a result, the state has to face the problem of governability problems. On the other hand, those networks can also create a synergistic power to drive public policy into effective action. If the government has coordination, consultation and negotiations with networks related to public policy on each side. Hence, the public sector needs to adjust working styles from a focus on authority and control to working with other sectors of society. This requires negotiation skills to find common ground between all parties involved (Kjaer, 2004, p. 36).

The role of the government in the face of both internal and external challenges lies in directing the direction of the governance process (steering) to achieve the common goals of society. That is, the state does not only play a role in the exercise of governance over society, but it is also responsible for the role of actors in society in driving solving problems and creating opportunities for social development together. Because the target group of the government's mission is not just individuals or organizations, but the networks or subsystems of society (Societal Sub-systems). That's a self-organized network of group viewers. The direction and goals of the action are established (Pierre, 2004, p. 4).

However, the independent existence of a network made up of groups of people or organizations with specific interests in common makes it more difficult to exercise the power of the state to manage matters in society. This is because the network of actors in society is a self-contained system and independent of governmental control mechanisms (Auto-Poetic), thus making control interfering with the operation of these networks difficult (Kjaer, 2004, p. 36). Therefore, the role of government actors in the administration of public affairs, which should consist of two levels of functions: The first level is the function of network management of government agencies at another level. That is, the frameworks of rules, regulations, cooperation between networks in various sectors, whether in the government, business, private sector and civil society by managing government-run networks (Meta-Governance) because it is an institutional structured network management related to the governing and governance framework (Kjaer, 2004, pp. 48-49).

The role of the government in the administration of public affairs is network management. Public sector performs the operation of network management without exerting control over the social networks but in an equal position. Government officials play a role in enabling different groups of actors to network to carry out various activities within the public interest, while government agencies may become part of those networks. In this sense, social actors' network mechanisms and bureaucratic-hierarchical mechanisms do not exist or operate independently of each other, but there may be some or some point in the work process. Where the mechanisms of the two systems intervene or overlap with each other, for example, the coordination between networks in each group, which requires the role of government agencies to establish a connection through the establishment of rules. That is fair for all; coordinating all parties to sign contracts or enabling all parties to find an agreement, etc. Network management therefore relies on the role of government agencies as coordinators and collaborators. (Coordinator) (Kjaer, 2004, pp. 43-45)

3.1.4 Governance Network

Governance Network means “Network” with a unique form. Not a common social network such as communication, social, professional, terrorist, or multinational;

But referring to one particular form of “Governance”; and can summarize the essence of the “Managed Network” is as follows (Sorensen & Torfling, 2007, pp. 8-11);

1) There is a definite pattern of horizontal correlation networks between interrelated and interdependent actors. (Interdependent) while being independent in playing their own roles (Autonomous). The actors consist of the public, private, and civil society sectors (Semi-public). Each actor needs to depend on the potential and the resources of other actors, for example, political actors see that the public policy issues they want to drive rely on the cooperative role of other sectors, which express their desire to allocate their own resources and potential for other actors to come together; the actors of each sector have their own individuality in playing their roles. (Operationally Autonomous) No party is under direct control by another character, and no side is superior to a breach of command.

The interdependency relationship makes the relationship between the actors in a horizontal position where all parties are equal. Although each actor has not the same authority and resources, when dependent on the other, no one can exercise vertical control over any party without the risk of breaking the network. However, both concrete and abstract resource allocation may be asymmetrical allocations if all actors join the exchange, share voluntarily, and each party is free to withdraw from being part of the network at any time.

2) The interaction between the characters through the negotiation of the collective agreement. The collective bargaining has a “bargain” component of the mutual allocation of resources for each party in order to drive goals to achieve maximum results and to achieve maximum results. “Deliberation” about the advantages and disadvantages of a different approach to coordinating roles that will lead to mutual learning and mutual understanding of all parties. However, negotiations between actors in a particular network may not lead to “Unanimous Consensus” is always if negotiations are in a context where actors each want to use a power struggle, which is at risk of conflict and hostility. In most collaborative works “Joint Action” often takes place on the “Rough Consensus” is that all parties agree on a proposal together, even though each party still has conflicting opinions.

3) The negotiations for mutual agreements are carried out under the imaginary framework, cognitive, normative, and regulative framework that all parties

adhere to the interactions that arise from entering into negotiations for mutual agreement between actors in a particular network do not take place in the “Institutional Vacuum” or beyond any regulatory framework, but the functioning of a particular network always has a “Institutionalize Framework”. Network collaboration is not just about bringing together the rules and regulations that each party adheres to the network's regulatory framework. And it is not a fusion of all rules and regulations into one new set. Rather, it is a combination of ideas, concepts, understanding (Concepts) and rules (Rules) that each party offers to exchange.

The network interoperability framework is characterized by a Regulative Aspect, that is, rules, roles (Roles), and procedures (procedures). A network interoperability framework Therefore, there is a normative aspect, that is, there are norms in judging matters that all parties adhere to together (Norms), have a set of values or values to work together (Values) and a benchmark for action. Standards are also included in the framework of the network. “Cognitive Element” is a system of common meanings (Codes), a conceptual framework for describing common matters (Concepts), and specific knowledge in a variety of subjects. As a result, the collaborative framework has the characteristics of “Imaginary Aspect” is the creation of a common identity where all parties refer to themselves (Identities), Ideologies, and Common Hopes.

4) The network's work processes are carried out by a self-regulating process. They are independent within the limits set by external agencies. That is, the network has a certain degree of autonomy in self-regulation without any direct supervision; refuse to go under the rules and regulations of the law (Law); and refused to be in the mechanism of regulation of the market system (Market). The network drives a public policy within a self-governance framework based on ideas, resources, and dynamic interactions.

Coincidentally, the interactions that take place are under a “collaborative framework” that sets the rules, norms, awareness, and collective imaginations that can be modified according to the negotiation between members of the network. Therefore, the operation of a particular network is subject to a political and institutional environment (Political and Institutional Environment) which may facilitate the smooth running of a network's self-governance or have a limited effect of capacity for self-regulation.

5) The goal of the network is production of public purpose), that is, the work of the network reflects the objective of the public interest in various dimensions such as visions, Values, Plans, Policies, and Regulations which must be aimed at contributing to the benefit of the society (General Public). Actors in the network may take part in the political negotiations, but not to drive their own interests or goals. If it must be to play a role in pointing out public issues and ways to tackle emerging public problems, or to push forward the development of new public policy. In this respect, any network that does not have the goal of driving activities to bring about “Benefits for the public purpose” would not be counted as “governance networks”.

If considering the model of a network of administration, it was found that the network may appear differently depending on the political context, the institutional context, and the discursive context in which the network occurs, as the sample follows (Sorensen & Torfling, 2008, p. 11)

(1) A network may be formed by entering a “loose and informal contract”, but some networks may enter into a tight and formal agreement.

(2) A network may arise from a coordinated, collaborative role among actors within the intraorganizational, or coordination of roles between interorganizational.

(3) A self-grown network or may be initiated by promotion by another organization (Initiate from Above).

(4) The network may be open to new members (Open) or it may be a closed network (Closed).

(5) The network may persist for the duration of its mission, short-lived, or permanent operations.

(6) The network may operate on a sector-specific basis, or it may work on a society-wide scope of matter.

(7) The network may play a specific role in the Formulation of Policy process, or it may play a specific role in the Policy Implementation process.

3.1.4.1 Specification of Network Management

Governance network may be considered to be another mechanism driving the governance of the country. This is an alternative to “State” and “Market”

characteristics that make the network of governance different from the function of the mechanism of controlling the order in the hierarchy from the top. The downward trend of government and regulation mechanisms through market competition can be summed up in three ways (Sorensen & Torfling, 2008, pp. 11-12):

1) Relations between the actors (Relation between The Actors), that is, the public affairs management network is characterized by a “Pluricentric Governance System” unlike the regional administration system. The Unicentric System is the state operator that has the power to govern, regulate and organize various societies and economies. The centralization of state power cannot be denied or disputed. State power makes characters become “Subject”, rights and obligations are clearly defined.

Government Administration Network Unlike systems for organizing and controlling public affairs through a competitive market mechanism, which is a multicentric system because the market system is open to various actors who are focused on competing, pushing to protect self-interested many actors freely compete with each other, so each party has no common goals or no obligation to one another.

2) Decision making is the decision of the public affairs network, different from the decision-making in the mechanisms of the government administration, is the actors in the public affairs network, making decisions based on logic, rationality, that reflect the views and thoughts of All sides (Reflexive Rationality), while making decisions in public administration. It is based on logical reasoning under the essence of substantial rationality. That is the government's decision-making mechanisms would aim to transform the essence of the government's political values into concrete, through rules and regulations in order to apply them to the general public.

Decision making in the public affairs administration network are different from decisions made in the competitive mechanism in the market system, in that they are decisions made under the competition mechanism in the market system based on the rational logic established by the processes that all departments adhere together (Procedural Rationality). That is the organization of rules, procedures and open competition processes to power the market forces as “Invisible Hand”,

which leads to the optimal allocation of products and services. Decision-making and organizing overseeing the actions of various matters carried out in a “Reflexive interaction”, which takes place through a process of dialogue between actors and various sectors. This continues throughout, actors from various sectors come to negotiate with each other on condition that all parties rely on the roles of other parties (Interdependencies). decisions and find solutions to solve problems that all parties have a role together (Collective Solutions), even if actors from various sectors have interests; or their own needs; or have different or conflicting ideas and perspectives on issues.

3) In implementing the decisions resulting from the negotiations to find a collective agreement, that is, the public administration system, actors are self-obligated to comply with the decision-making in terms of order and control of the government. Governments, as they are under state law enforcement mechanisms. The market mechanism competition, actors are willing to commit themselves and accept mutual decisions among competing actors because they fear losing and losing the economic benefits they deserve when they are in the market.

In the public affairs network, actors are self-bonding and admitting to the results of their decisions together, as the network creates “Generalized Trust” and “Political Obligation”, which, when they arise, will remain firm and stable for a long time. It depends on the rules and regulations of self-care and Self-Constituted Rules and Norms.

The network management has transformed power into an equal relationship of diverse actors, which the relationship has different characteristics of resources and potential in each organization but under the same goal. And that organization will not lose its independence in managing its own organization; there is no structure of the chain of command; there is no competition within the network; but there is a collaboration to make decisions about managing something together (Bevir & Richards, 2009, p. 121). Differentiation of the hierarchy relationship can be summarized as follows: The nature of command, inequality of power, supervisors and subordinates, and a market with a variety of action, which emphasizes competition and does not have a chain of command, as shown in table 3.7.



Table 3.7 Mode of Government and Specifications

Mode of Government	Specifications
1) Hierarchy	Single action: Principal-agent that has superiors and subordinates.
2) Markets	There are many actors in a freedom and competitive economy.
3) Networks	Variety of independent actors: There are different resources and capacities, focusing on a collaborative relationship to improve and develop the common goals of the network.

When the mechanisms of governance appear in many forms, such as the mechanism of state, market, and governance network, social governance can be based on such options; or it may be applied modes of coordination to integrate depending on the mode of the public mission; or policy decisions may need to be confronted because each type of mechanism has its own strengths and weaknesses in a different way.

The management network has the advantage in the current context that it is an efficient governance mechanism because it is suitable for managing public policy issues that are complex, uncertain and based on conflicts of different parties concerned. That the public sector or the private sector cannot manage to achieve alone, for example, choosing to solve one problem leads to conflicts and new problems accordingly. Finally, it cannot fix the original problem and add more troubles and more problems.

3.1.4.2 Advantages of Network Governance

Four strengths that make the geopolitical network to have “Performance” than other mechanisms (Klijn & Koppenjan, 2000, pp. 114-124; Kooiman, 1994, p. 4; Kooiman, 2000, p. 155; Scharf, 1999, p. 20; March & Olsen, 1995, p. 27) are as follows.

1) The ability to proactively manage public affairs, that is, the actors of various sectors within the network of government administration They can jointly identify policy issues in various dimensions and be able to identify

opportunities for prevention. And solutions to deal with problems in advance from the moment the issues arose. In addition, network actors can jointly plan actions to address the problems in a flexible way that can improve image transformation. Management forms in accordance with the context, problem conditions are complex and vary according to the situation.

2) The ability to make judicious political decisions in public matters, that is, Government Administration Network. It is an important tool for gathering information. Knowledge and ignoring the problem from various perspectives from all actors involved. This will result in the most careful and conscientious decisions together. Because each part of the character has specialized knowledge on public issues or public affairs management in different dimensions when those characters fuse the knowledge, they have in their hands. Inevitably, making wise decision-making choices in the sense that they are decisions that are realistic and feasible, in order to act with the best possible outcome.

3) The ability to establish consensus between the actors involved, that is, Government Administration Network. It is a mechanism that operates on building consensus or collective consensus of all parties. Or at the very least This allows actors from various sectors that are in conflict to join. In other words, conflict can be transformed into cooperation because network members work together to create One of their own “Logic of Appropriateness” (Logic of Appropriateness) to adhere to each other in control, directing, negotiating processes creating an agreement that all parties can agree on, despite all disagreements Including managing conflicts that may arise during working together.

4) The ability to mitigate risks against the implementation of decisions made in policy or public issues, that is, if the relevant actors have a stake or affected in any way from a policy or public issue has taken a part in the decision-making process in that matter, and those actors tend to develop a shared sense of responsibility for the decisions made. And a sense of co-ownership to support the process of implementing judgments rather than hampering them.

3.1.4.3 Factors Affecting the Stability and Sustainability of the Network Governance

One of the important factors that stabilize the operation of the government management network is to have an appropriate network management system (Meta governance) to help prevent both external and internal obstacles that may interfere or affect the operation of the network due to a smooth and stable network may not always lead to positive results. In some cases, network operations can also create problems in the public policy process, such as making decisions or moving public policy heads or managing public affairs in a specific direction. It turned out to be an option that blocked a new proposal or initiative; or, in some cases, the network may pass the cost of driving its own public policy on other non-network actors and instead bear the blame for public policy reasons, etc. For this reason, governments and other political organizations need to play a role in the use of authority in driving the direction of the role of different actors. In the network to be appropriate and beneficial to the public, such as promoting the creation of appropriate elements, advocating ideas, understanding, motivating actors, etc. (Klijn & Edelenbos, 2007, pp. 199-214).

In addition to the aforementioned factors of having a network management system, the country administration network will be able to work smoothly. There is also a need to have the ability to cope with factors that undermine collaboration, Whether to change the elements of the viewer within the network; The presence of any conflicts or problems within the network that have been ignored and left untreated; there is a weak and inefficient leadership position makes the network unable to move; frustration or grievance among network members due to the interaction does not appear to have a concrete outcome as expected; as well as external events or situations affecting the public policy process, which the network was moving together at that time. As a result, the network operation is unstable and unable to work effectively. The network has become a mere non-profit gathering (Sorensen & Torfling, 2007, p. 13).

3.1.5 Study of Network Management

As mentioned above, concept of a Negotiated Governance network of management has emerged over the past several decades amid the theoretical debate about the guidelines for societal governance) between state and market supervision. Government administration through negotiation and mutual agreement between parties. That is a new form of social administration, which is neutral between a centralized monopoly of the public sector; and liberalization under the market mechanism by focusing on creating a space for the common role of actors in all sectors. These appear to have been cooperating in various mode, whether it is to create the public-private partnerships, strategic alliances, dialogue groups, consultative committees, including Interorganizational Networks (Sorensen & Torfling, 2007, p. 3)

For instance, big European shopping center was established by receiving finance from EU-funded Shopping Center. They aim to create new careers for the local unemployed. This operation requires a large cooperation network between government agencies, private business, and civil society organizations in the form of various voluntary organizations. Network actors responsible to share project plan; civil society coordinates with academics to study environmental impact data; organizing public hearings; the private sector accepts local workers to work in various parts of the project; the government set policies and action plans to support employment promotion, protection of rights and employee welfare; etc.

Meanwhile, academic circles have diverted the attention of alternative education between “Government management” and “market management” to the study of the roles and impacts of “Governance Networks” that appear in various forms, especially in the description of the public policy process and public governance. It was not only driven under the mechanisms of political institutions and the governmental or bureaucratic administration system, but driven under the interactive form of governance, which involves the roles of the main actors in various sectors such as public sectors, private sectors, and civil societies (Sorensen & Torfling, 2007, p. 3)

3.1.5.1 The Interaction between Government and other Sectors

Although the network of government administration will increase more roles, but the government and local government organization are not “Hollowed Out” at all since the roles and authorities of the state still exist, but the government authorities have been more new potentials. In other words, the state continues to play a key role in public policy processes at local, national, and international levels but the state is working to adjust the role to reduce the governance controlling (De-Governmentalized). And the government cannot “monopolize” the role of governing and controlling the operations of the people in the life, and general well-being of the people as they have done before. (Kooiman, 2000, pp. 148-151)

The result is the idea that the “sovereign state”, which control and governs society in top-down relationships, through the regulation of a macro-development plan that covers all areas. The project implementation as planned, and the regulations issuance as governed all matters have become inconsistent with the actual situation. Therefore, perspectives, ideas and insights are relevant to the role of the state in the government of society, that has been replaced by new ideas. That is the perspective of the governance to be carried out under Pluricentric Governance, which is based on a relationship that is Interdependent, Negotiation and Trust (Sorensen & Torfling, 2007, p. 3)

The state is affected by a changing perspective under the multiplication of roles and relationships towards networks between actors in different sectors. As a result, the educational dimension of the role of the state in the field of public administration has changed to a new perspective, especially considering public affairs under a new context. The public sector needs to reorganize a new administration structure in terms of management conditions and methods that are more advanced than the role of the state through a top-down bureaucratic mechanism; or the competitive mechanism of market idea has been adjusted to a management in the form of an overlapping network and a clearing separation of the roles of the actors (Kooiman, 2000, p. 138).

Subsequently, the role of the government has been attracted to analyze the government administration process in the form of networks that interact with each other in different ways. That covers the role of non-state actors under the social context is different, complex, and rapidly changing sides. In this sense, public

administration did not apply the private sector model of management to public administration; but it also means opening up the social sector to play a role in the administrative process to lead to the development of democracy at the national and global levels; by means of a network of management mechanisms through the cooperation of many parties, organizations, and institutions to oversee the public interest; because the network of relations between the organization of their own system works on the basis of trust, cooperation, and adaptation rather than command or competition.

The study of changes in relations between the public and private sectors in this manner is to focus on the “Shifting Roles of Government” rather than analyzing approaches in “Shrinking Roles of Government”, as it appears in the new trend of government management, because even though the government has changed its roles in various missions and realized the need to Co-operate more with other actors in society (co-operate). But it does not mean the role of government in the direction of government interventions will be completely depleted. (Kooiman, 2000, p. 138)

The government provides more opportunities for other actors to interact with actors in public administration, indicating that the government is becoming more aware of the limits of governing mechanisms based on control and order by Public Command-and-Control. It also shows the government's adaptation in response to social problems, which requires a wider variety of management mechanisms and tools. There is an adjustment to be in line with the changing state of public administration, the roles of the actors in other sectors of society have also evolved and adapted.

The actors of civil society have evidently changed from the broadening of the role of non-governmental organizations (NGOs) in terms of expanding the scope of existing missions and expanding their roles to new activities related to public administration processes. Local communities are increasingly starting to play a role in initiating and advancing the development and management of public problems in their own areas. The private business sector is becoming more aware of its role in showing social responsibility such as taking responsibility for environmental conservation,

providing opportunities for consumers to participate in the development of products and services including promoting employment in the area etc. (Kooiman, 2000, p. 140)

3.1.5.2 Self-Management of Social Sector

In the new context, the management perspective is seen to depend on the blurred lines of public, private, and social sectors. Since it is a management that interacts with many parties, so the important point of analyzing the governance process through the network does not depend on the dimensions of structure or roles of the state; but based on analysis “Interactions” that take place between the government and actors in other sectors of society. The analysis of interaction dimensions is important as it is a study that is aligned with the direction of social change which is a long-term trend. That is, while society separates roles and duties between actors in differentiation of sectors; on the other hand, there will be efforts to integrate roles between those actors. As the result, chains of interdependence link between actors have been expanded in society; in other words, the chain length of interactions has extended between characters in society. (Kooiman, 1994, pp. 1-8; Kooiman, 2000, p. 139)

In this respect, the study of management processes should be given attention to chain analysis or the chain of interaction between actors in society; which has begun to become more institutionalized; whether it is a form of interaction between Multilevel and actors from Multisectoral Dimensions; because when the length of the social interactions between social actors expands, the number of actors or actors involved increases in that process as well. Meanwhile, the rise of the indicator will result the interaction between them is increasing. The interaction between actors from different sectors as increase, resulting in a split line between the government and the private sector began to blur even further. And the results cannot determine what happens is in the interests of public or private interests, because all parties have benefit sharing. (Kooiman, 2000, p. 139)

The study of the management process applied to analyze of the Interactive Social-Political Forms of Governing, which was based on the interaction between various actors. It is considered an Interaction as Social Phenomena. The interactions between actors are involved in various levels of administrative processes of the parent unit, which can be seen in different ways. They are characterized by

interactions that appear in the social and political dimensions (Social-Political Interactions) because there is not clear separation between the roles of the government and the social sector (Kooiman, 2000, pp. 142-143)

The analytical framework for social and political interaction is based on the concept of continuous development in social processes including separating roles and responsibilities (including knowledge of the operational information of the organization, etc.) between the Differentiation each other. And at the same time, the roles of the actors are integration, so discrimination and integration are inseparable. Society actor interactions showed that even though each actor plays a different role but acting under the actor's role is related through connection with the actions of other actors. Such associations can occur at two levels: Intentional or Action Level and Structural or Conditional level. (Kooiman, 2000, p. 143)

Social actors can consider interaction analysis in two dimensions: Process and Structural Aspect of Interaction. The process dimensions of interaction demonstrate behaviors or actions of the actors involved in the interaction process. The potentiality of related actor roles are important factors to determine the patterns of the interaction processes that happened. A leveled analysis of the action indicated the intent, determination, goals, values, and interests that are trusted by each character group or organization. It is also the determining factor for the social expression or behavior of those characters (Kooiman, 2000, p. 143)

The structural level analysis of social interaction identifies the structure, cultural context, as well as the material context (i.e., resource, budget) when the interaction occurred. These environmental factors may be conditional to determine advantages or limitations on the role or action of the relevant actors; or it could be a condition that allows actors to do more than their role boundaries before. There are important structural factors such as institutional mechanisms, social structures in various fields, laws, rules, regulations, and behavioral norms; communication patterns Material resources and technology including conditions and important restrictions. (Kooiman, 2000, p. 144)

The administrative process is considered in the perspective of the interaction between the state and other sector actors as an attempt to see through the boundaries between actors that were previously clearly divided, such as the separation

between administrative department and subordinate department etc., to focus on Trans-Boundary Interactions. One of the most important benefits is the focus on analyzing the interactions between actors in society by opening perspectives to reveal the mutual relations in problem managing process that overlap with factors of social and political dimensions. (Social - Political Problems) (Kooiman, 2000, p. 144)

As the mutual relations may occur, between actors in the same sector, such as government agencies of different ministries or different levels; and actors in different sectors, such as government agencies and civil society organizations or the private sector. In addition, the interaction process considered at different actors, that are showing the dissolution and variation of the Movement of Tensions in those relationships. Obviously, the cause and consequences of each action will also depend on the roles or actions of the other actors involved, whether they are directed in any direction. In other words, how the interaction process will depend on the actions of all the actors involved in that process. Including what happens in other linked processes. (Kooiman, 2000, p. 144)

And above all, the concept of interaction helps to analyze management based on the view of reality in society and politics through the dimension of differentiation and integration. The first dimension shows that the public problem management or one side of development involves many social actors or stakeholders, there are many different positions and multiplicity. The second dimension shows that the public problem management paradigm or development correlates with two or more actors in a way in which different parties influence one another. At the same time, their relationship was run under the influence of each other which may be the driving force in sustaining that relationship; or it could be the driving force for changing. The driving force of the relationship is what makes social interaction always dynamic. (Kooiman, 2000, p. 144)

When there are variety problems in society; each issue involves several groups of actors, the interaction between government and social actors involved in the process of managing social problems; and there have occurred many forms and many levels. When there are various problems in relation to a particular problem, the interactions of problem management processes correlated with the interaction between the actors involved in the handling of the other problem. That is an

interaction process that set the precedent of the actor roles under their relationship with the other actors, while they can create a space for role-playing with each other. In other words, an area where actors of different sectors can play a common role in that interaction process. For this reason, the process of interaction between government and social actors related to the theoretical concept of “Public administration” which is not just focusing on relationships; and overlook the importance of “actors,” but that the characters and their interactions play an important role in regulating each other.

In summary, the concept of management as the interaction between government actors and social actors indicate that students need to have a clear understanding of the nature of the interaction processes at different levels involved in management to manage the problem, as well as to recognize the interrelated nature of each interaction process. Related to patterns, characteristics of the relationship between processes and those interactions as well.

3.1.5.3 Structure and Collaboration Mechanism

In the study of the governance process through networks, they focus on analyzing the interactions between government actors and other actors; They also focus on another interesting analytical dimension i.e., the social sector self-management dimension analysis. For example, the concept of social perspectives as actors has structured and self-administered mechanisms (Organizational Society), especially participating in public affairs or self-managing to solve public problems. It is no longer the conduct of public policy or the conduct of public affairs that is directed, defined, and operated by the bureaucratic mechanism of the state. The condition was caused by limitations within the mechanisms of governmental functions and roles that were divided into fragmentation of authority. For this reason, the function of governmental mechanisms must be linked with mechanisms of other nonstate / non-public bodies to achieve a common goal for the implementation of missions or arrangements for resolving public issues. (Hirst, 2000, p. 21)

Such conditions have dislodged many public affairs that had previously been in the public sector outside of public decision-making processes under political institutions and bureaucratic mechanisms. While the public space that used to be the role of government defender was partially divided under the role of

government actors. Some of them are under the role of the private sector. Some are under the role of civil society actors. Understanding mechanisms and processes in public spaces in society requires the concept of power dependence between network actors.

The concept of power dependence between actors in a network is described as the administration of public affairs is an activity that is broader than the exercise of governmental power. Each process involves many groups of organizations or entities with complex interrelationships. There are related groups of organizations including the government, the private sector, and civil society. The organization of public services was therefore carried out by the common roles of the organizations from each sector and each organization. They may play a role for each area of public service according to their potential and strengths. While other organizations play a role in coordination and cooperation based on their roles and capacities. (Rhodes, 2000, p. 60)

In this sense, the process of making public services can be driven under the construction of mechanisms to link the work between organizations from inter-organizational lineage. It is no longer the exercise of power to control and direct within the public sector through unilateral bureaucratic mechanisms. The coordination of this link between organizations and agencies occurs as each concerned organization sees that the implementation of the mission of organizing public services in its own responsibility can be successful. It is necessary to share administrative resources in various areas with other agencies or organizations. In other words, the mission of each organization depends on the role of the other organizations involved. In particular, the dependence of resources with each other is a factor that will enable each organization to drive its mission and responsibilities to achieve its goals. Therefore, the process of exchanging resources and working together takes place under the rules or regulations established by all parties. (Rhodes, 2000, p. 60)

The self-analysis of public affairs processes or public issues of social actors is based on public affairs considerations through “networks” as a mechanism for implementing public affairs to address economic and social issues; without clear separation of the scope of duties and responsibilities of the actors of each sector from each other; because the management of public issues cannot be accomplished by a

single government actor; but it also requires the cooperation of the private sector and civil society. Such condition results in the work of the organization and the agencies are always dependent on the authority of other organizations. Such interdependent cooperation is often manifested in the form of independent networks of Self-Governing, Interorganizational Networks. (Rhodes, 2000, p. 60).

The network of self-management mechanisms of the social sector arises from the cooperation between organizations and sectors. The network is a mechanism for coordination and a mechanism for allocating resources among the member parties to cooperate. By this definition, it can be said that the network is a governing structure, which members of the network jointly design and build on the framework of the collective agreement. Rhodes (2000, p. 60) describes the essential elements of the Governing Structure. The Public Mission Management Network is organized into 4 areas:

The network must arise from the interdependence and working link among the organizations in the network, which is a collaboration. Dependence and collaboration without a clear separation between the public, private and civil society sectors.

The work of the network must be carried out through a process of interaction among all member organizations. The interaction between network members must be ongoing. It is a process driven by the need for an exchange of resources with each other. Including the need to negotiate with each other to seek ways to work together that will lead to the achievement of common goals of all parties (Reciprocity).

The interaction process between the Parties to the network shall be governed by rules, regulations and rules jointly established by all member parties based on mutual trust and because of negotiations to find collective agreements at all. The parties agree based on their relationship as an alliance with each other.

The network must have some degree of autonomy in its work. That is, a process managed by a non-government network institution, and under the non-supervision of the government (Independence). But it has self-organizing system, self-Governing, setting up work policies, as well as creating appropriate management environment by themselves.

Under the perspective of management analysis through networks in the dimension of self-management system by social sector actors. The role of government actors is to transform working methods from the use of directive mechanisms to the search for new administrative techniques and tools used for promoting, supporting, and facilitating the management process by the non-government network institutions to run smoothly. Including directing and controlling the direction of driving activities of those networks to achieve the common goals of society. In other words, the government does not exercise authority over the functioning of the self-management networks of different groups of people in society but has an indirect role in directing the direction of public affairs of networks in society. The network is a form of a mechanism for governance that exists independently of itself. In addition to the government hierarchical management mechanisms and the market forces used to drive the operations of the private sector. But at the same time, links between those mechanisms can be coordinated under the common goal of achieving goals in the public interest.

3.1.5.4 Structure and Mechanism of Interaction

Another important dimension for network analysis of management processes is the consideration of structural dimensions and co-ordination mechanisms that support processes of interaction between government and other sectors in both of formal and informal. They focus on analyzing the structures and mechanisms of interaction between actors in society-centered under the framework of such analysis. Students should focus on the study of public affairs in the management of co-ordination as well as self-governance issues by actors in each sector as an example of cooperation in various forms such as forming networks or in the form of partnerships. (Pierre, 2000, p. 3)

For a guideline to study the management process through a network in dimensions of structure and collaboration mechanism. For example, rational Choice which indicates that the involvement of public policy actors involved in the network form represents a significant shift in the state government's structure. Because the concept of the policy network is a structural arrangement, a mechanism aimed at managing public policy problems. A network formed by actors involved in any public

policy issue is a governance structure based on the collaborative efforts of actors, including the public, private and civil society sectors. (Rhodes, 2000, p. 62)

Chhotray and Stoker (2009, pp. 27-32) studied the theory of management in network management issues. He suggested that network management is a concept of government management by collaborating on the performance of networks with many divisions and agencies involved under the policy network. The state governs the direction of network management (Steer) with two network management strategies: game management and structuring networks on related network management issues in the management of relationships within the network to the creation of conditions for collective decision making; and the second issue, the network structure that may require restructuring or the replacement of the network participants, changing the relationships between the network stakeholders, changing the resource distribution model, or finding the new supporters according to the network policy direction, etc.

The analysis of networked management processes through structured dimensions and institutionalized mechanisms focuses on explanation. The work of a network is carried out by means of a communication mechanism between the network parties through various channels, the exchange of information, the exchange of knowledge, experience, and the expertise of each of the parties beneficial to working together. Mechanisms for building trust, including the sharing of other resources relevant to the administration of the public policy that the network drives. If the decision dimension is considered in the network, it will be found that each network will have their own "Integrative Logic" adhered to by the member parties, which is evident through a set of decision-making rules that formulate negotiations to find agreements on final decisions among them in network member. (Rhodes, 2000, pp. 62-63)

Explaining the work of a network through a conceptual framework for making rational choices often emphasizes the benefits of networking, especially the advantages of public affairs management mechanisms as compared to the function of hierarchical command control mechanisms in bureaucratic systems with Mechanism of competition in the market system. That is, the disadvantage of bureaucratic mechanisms is the monopoly centralization of decision-making and unilateral

mandate as a result there are parties who do not benefit or are disadvantaged by the decisions of the state. As for the market mechanism, it has a negative impact on society such as the inaccessibility of public services by people who do not have sufficient purchasing power, the pursuit of maximum profit, etc.

Collaboration of characters under the network, they are the creation of a mechanism that depends on the application of the roles of the relevant actors from all sectors to Non-Hierarchical Co-ordination. They share their expertise and seek common ground in making decisions that will benefit all parties. The network mechanism is a management structure that allows the interests and needs of all parties to be raised equally prominently. While the policy measures at the public policy network and they have pushed for tangible results: the outcome of the negotiation process, the settlement of interests among the members under the network's decision norms (Rhodes, 2000, p. 63)

In conclusion, the analysis of the management process in the dimensions of the structure. And working mechanism It helps to point out that networks are a form of institutional structure that arises from interactions between actors, government and private sectors, or civil society. Therefore, the network is an informal institutional structure because it is a voluntary cooperation of the member states, not the organization established by law or government regulations. However, even if the network is not an official organization but it was not a temporary gathering. If it is an organization that is permanently stable for a certain period, for example, the network may work until an activity or project jointly undertaken by the Members is accomplished in line with the goal of establishing the network, for example, for the operation of that network. It is based on the rules, regulations and procedures jointly established by the Member of the Network. The network works by means of a horizontal mechanism of cooperation between the member parties. Mutual trust is the factor in which the mechanisms work together smoothly.

3.1.6 Research of Network Management

The study of management networks is a new research issue which has been found that there are several practical management cases that were not conducted in vertical relationships, but it continued the interaction of the negotiations between the

actors from various sectors such as the public sector, the private sector, and the civil society sector. In the early 1970s, researchers had begun to study networks between multi-sector actors in dimensions. “Interorganizational Relations” (Evan, 1976) until the early 1990s, they focused on studying the role of interest-group flat relations networks that formally organized to drive public policy and drive management networks (Marin & Mayntz, 1991; Kooiman, 1993; March & Olsen, 1995; Rhodes, 1997; Kickert, Klijn, & Koppenjan, 1997). And since the 2000s, the study of the network of administration has been found to be an important educational topic in public administration education (van Heffen, Kickert, & Thommassen, 2000; Pierre & Peter, 2000; Bang, 2003; Hajer & Wagenaar, 2003).

The main arguments point out the importance of a management network study appeared in a study on management networking, such as the work of Renate Mayntz (1993, pp. 3-18), he suggested that current policy drives achieve their goals because of governance processes that are not operated under the control of a unilateral government. Rather, it is a process that goes under widespread bargaining between parties including the government, the private sector, and civil society. The interaction between these actors creates a more stable policy-making scheme that has its own specific system of governance and control over the implementation of the policy. This can be seen in the mode of coordination. The study indicated that the construction of administrative networks is not a new phenomenon, as governments in many countries charged public policy fees through the mechanisms of “Corporatist Involvement of Social Partners”, which can be seen in both national policy formulation, or the state level, including the implementation of public policy, as well as administration model and public policy implementation. It is based on the Political Dialogue between the government and actors in other sectors, whether they are actors in the capitalist market system, or civil society actors has shown many examples.

But the difference in previous phenomena because of theorists, politicians, and central policymakers in countries has begun to acknowledge that “Governance Network” is a management mechanism that is both effective and justified for the strengths of the management network. That is managing of various groups or related organizations to join as a network, which will help make the corporate governance

process more effective. Because networks enable the implementation of processes to overcome issues of discrimination in society and resistance to policy change.

The explanation is relevant for adaptation, which is geared towards networking between organizations and has begun to appear in studies of organizational theory such as Mintzberg (1979) and Aldrich (1979), the concept of organizational adaptation is based on the definition of an open organization system. There is an adaptation to the changes of the external environment, which includes the organization in the environment. Such theorist's explanations provide an opportunity to further focus on the importance of analytical studies, Certified exchanging information, and resources between organizations under a definite negotiation between organizations in a structured manner.

The network management dimension was used to solve the problem of line of command and market management in accordance with the organizational format according to the concept of Powell (1990, p. 301, as cited in Tippawan Lorsuwannarat, 2013, p. 326), he divided the organizational format as methods of communication, conflict resolution, resilience, the ties between groups, the atmosphere, and the satisfaction of the agencies involved, as shown in Table 3.8.

Table 3.8 Organization Model Comparison

Importance of Features	Model of		
	Markets	Chain of Commands	Networks
Basic tradition	Property rights agreement	Employment relationship	Sharing strengths
Communication method	Price	Routine work	Relationship
Continued/			
Conflict resolution method	Negotiation	Command	Tradition of residence
Degree of flexibility	High	Low	Medium
Relationship levels	Low	Medium to High	Medium to High

Importance of Features	Model of		
	Markets	Chain of Commands	Networks
between groups			
Environment	Certainty / Uncertainty	Formality / Government	Benefit-blocking model
Satisfaction of the relevant or alternative units	Independent	Dependence	Interdependence
Mixed models	- Repeat transactions - Supervisory contract	- Informal organization - Similar to a market such as a profit center	- Status hierarchies - Multiple partners Official rules

Source: Powell (1990, p. 301, as cited in Tippawan Lorsuwannarat, 2013, p, 326).

The advantages of a management network are explained in the work of Scharpf (1997), indicates that when actors have stakeholders and making decisions on public policy, implementation of public policy and governance will have been raised to a higher level of democratic legitimacy. In practice, management through the network is formally supported and driven, such as the European Union (EU) policy, emphasizing the importance of implementing a management network at the national, national, and national levels, local, and above the nation state, etc.

A study of the role of networks in the policy-making process appeared a turning point in the work of March and Rhodes (1992), indicates the limitations of the “Corporatist” and “Neo corporatist” models, such as the tripartite system between states, trade unions and employers' organizations. As a result, the study of political theories in formulating public policy turned to the analysis of differences of “Policy network” different types more clearly. This is based on factors such as the degree of integration, cooperation, stability of the network and the exclusiveness of the network. (Rhodes, 1997).

The study and research of the management network showed a significant turning point in the field of policy analysis education. That is, public decision-making theorists point out that a model of rational explanation of the actor decisions that have limitations to analysis under complex contexts, process actions, and interactions by appearing in a fragmented polity system. There are also limitations in explaining the implementation of the policy as central planning and planning work, which has begun to face more and more opposition from both operational officials, interest groups as well as the public service recipient (Lipsky, 1980).

Bogason's (1991) and Mayntz's (1993, pp. 3-18) studies are policy analysis studies which had consistent conclusions on policymaking and implementing the policy. And their results are more effective when the main actors are drawn into one way or another in that public policy process. Therefore, the study of policy analysis focuses on policymaking in an interactive way based on the open participation of all parties. It is run under the government administration network in various forms, relying on a retrospective analysis of the role of political actors. It is run under the government administration network in various forms, relying on a retrospective role analysis of political actors; and considering that how do actors contribute to the policy appearing as it is; who is involved in policy decisions that appear to be such an outcome. Responding to this question, it is necessary to identify what kind of network of social and political actors in the policy decision-making process is involved.

Recent study directions appear in studies such as studies under editorial role of Kooiman, (1993) and Klijn and Koppenjan (2004). The analysis of the government administration network bases on the principles of current social; that are more complexity, fragmentation, and rapidly dynamics. Hence, central government policy makers and private sector tend to embrace new forms of interactive network governance as the most appropriate answer in the face of a fragmented society, complex and highly dynamic.

Kooiman's (1993) study suggests that the society fragmentation is caused by the separation of roles and duties of various units in society. Social roles are broken down into autonomous subsystems. The fragmentation made public and private actors more independent. In addition, there is a separation of political groups, and the

diverse groups of identity results in political actors; and the characters of various social groups multiplied.

On the other hand, complexity is caused by a multifaceted and escalating social problem. Those problems are so interrelated that they are difficult to separate. They are so interrelated that they are difficult to separate; the cause of the problem is complex and ambiguous, related to a specific context, solving one problem creates an impact as a new problem, a solution is at risk of creating a conflict between different stakeholder groups. Solving problems requires knowledge-based decision making and consider the risks and uncertainties in various forms (Kooiman, 1993, pp. 35-48). The dynamics arise from the relationship between the dimensions and locations of different actions, the blur of the dividing line, and conflicting competition between institutions, organizations, different sectors, and at different levels of supervision; this resulted in clashes, interaction between a series of reasons, procedures, strategies for formulating public policy and governance, as a result, developments cannot predict the outcome and new directions always happen.

In addition to analyzing the role of networks from the social complexity dimension, there are also analyze a perspective on “governance” in new approaches. For example, a study by Dean (1999) describes the phenomenon in which the public sector relies on the network of governance as a base for driving public policy and public affairs. That pointed out it reflected the “New Governmentality” refers to a progressive liberal government, which aims to minimize the role of governments in controlling and intervening in social territories; the government will not play a role in governing society directly, as in the past instead, “Intermediary Groups” in organizing and controlling society through creation “Self-Regulating Networks of Responsible Sectors”. Those characters are intermediary groups that appear in various forms, such as civic groups, professional groups, volunteer organizations, social partners, including private business organizations.

The outcomes of social governance have been analyzed through the role of networked groups in the social sector, be appeared in a study by Ross (1996), which indicated the opportunities of actors with their own potential and resources to participate in independent play under their own framework for organizing rules and norms in line with the overall government objectives. Inevitably, it will ease the

burden of the state to organize and control various matters in society and enable the public affairs to reach a comprehensive target audience. While the state uses less resources, it also plays a less top-down role in the control of command.

The study indicated that the consequences of the “public affairs network” could explain one of the most prominent phenomena in which politicians and executives focused on the “public affairs network” more. This can be seen from trying to make the negotiation process find a mutual agreement and making an agreement. It is more systematic and formal (Institutionalized Contracts and Negotiations); for instead, bringing stakeholders to participate in public policy processes and governance through mechanisms such as boards, committees, partnerships, as well as dialogue groups, which eventually became standard practice.

For a current overview, Serensen and Torfing (2008) studies suggest new perspectives and conceptual frameworks to analyze and explain the functioning of the public affairs network. This research has been spurred on to rapid growth, continually expanding new areas of study, but it is still considered a “new field” that does not yet have a solid foundation to build its own paradigm since there is no words, clear definitions, classification frameworks, and their own specific educational methods. Most of the studies appear in a cross-disciplinary based on the problem-driven, analyzing multi-level networks, comparing similarities and differences between comparative networks, and interactive research (Sorensen & Torfling, 2008, p. 6).

If considered by overall, it could be said that the study guidelines of the public affairs network focus on the “conditions”, “functionality”, “implications” of the network of interactions between actors in the corporate governance process. The aim of the study is to create open-ended, context-bound knowledge. The method of study was conducted through results analysis and network-based public policy processes based on empirical analysis within a theoretical framework. (Theoretically informed empirical analysis) with analysis units (Sorensen & Torfling, 2008, p. 7) are:

- 1) Outcome and processes are the result of structured, institutional interactions between actors in a particular network.
- 2) Form and characters refer to the efforts of organizations outside the network, regulating, forming the network, and network operation.

3) External conditions of the government network, whether it is socioeconomic conditions, predominant governmentality, a method for coordinating roles between actors in co-existence of different modes of coordination).

The major of the public affairs network study framework is based on four core questions (Sorensen & Torfling, 2008, p. 8):

- 1) Issues relating to the dynamics of the geopolitical network (Dynamics).
- 2) Issues relating to conditions for success and failure in the work of the government administration network (Conditions).
- 3) Issues relating to form and functions of the mechanism of governing the work of the network of government affairs (Met governance).
- 4) Issues relating to the democratic implications of the network of Democratic Implications.

Within the framework of the study, answering questions on the educational issues of the public affairs network usually covers the following key dimensioning questions in the analysis of dimensions:

- 1) Why did the network of government administration arise? (Why)
- 2) How did such a network come about? (How)
- 3) How has the network developed? (Developed)
- 4) How the network reshaped its structure and form? (Reshaped)
- 5) How was the network terminated or abolished? (Terminated)
- 6) What are the key factors or conditions that enable the governance network to be able to drive public policy, or public affairs to result in stable collaboration, negotiated interaction between actors with interdependent roles, but at the same time, they are independent of themselves (Autonomous)?
- 7) How can a political unit or organization take over the “Regulate work of the network with self-regulations governance networks to help reduce the risk of failures in the management of public affairs, and contributing to the greatest success?
- 8) How do you assess the pros and cons of the governing body network based on the Normative Standards of Democracy and the results of the evaluation of the value implications of the networks?

3.2 Network Effectiveness Concept

Many studies showed the benefits of network management model as an alternative mechanism to traditional administration along with the chain of command to increase efficiency and bring service and policy implementation (Agranoff, 2007; Agranoff & McGuire, 2001; Goldsmith & Eggers, 2004; Klijn, Steijn, & Edelenbos, 2010; Meier & O'Toole, 2003; Milward & Provan, 2003; Provan & Milward, 1995, Thomson & Perry, 2006). The effectiveness of the network refers to the degree of success in achieving the common goal of managing a network model. The success cannot occur from the operation of any organization alone but focused on successful management of the holistic nature of the entire network (Provan & Kenis, 2008; Provan & Lemaire, 2012; Turrini, Cristofoli, Frosini, & Nasi, 2010).

In fact, the administration of a cooperative network is different for each situation (Agranoff, 2003, p. 63), and it is only the choice of government executives. Therefore, it should always be considered by evaluating the outcome or expected effectiveness (Koontz & Thomas, 2006, p. 111). The network performance will enable the management or stakeholders to create a driving force for improvement and development of work to be more efficient. and enable to search for appropriate operational guidelines (Imperial, 2004, p. 18). It could be said that Performance measures have resulted in assessment, control, budget allocation, stimulation, promotion, celebration, learning, and improvement (Behn, 2003, p. 588). However, there are few studies that focus on the actual effectiveness of the network, especially the network-wide overall effectiveness study (Provan et al., 2007, p. 482), which is an appropriate level of analysis to study the network rather than the effectiveness of the organization or the goal achievement. Because although organizations within the network will take benefit, the results may not be effective at the network level (McGuire & Agranoff, 2011, p. 272). Therefore, appropriate assessments should be assessed by contributing to the quality of operations in the overall network, not merely based on productivity, especially solving public problems (Kenis & Provan, 2009, pp. 440-441).

Additionally, past network performance studies found flaws in the study (Kenis & Provan, 2009, pp. 441-444): 1) Most of the studies did not define the effectiveness as a dependent variable. But if there is, it is the outcome of a policy or the effectiveness of the service is only at the organizational level; 2) The study did not define or define actionable aspects of effectiveness (criterion), in return to focus on different conditions or factors for success, and encourage effectiveness; and 3) the criterion for effectiveness is transformed into measure, that is, the criterion is the benchmark over the decisions made, while the indicators are responsible for measuring what the criterion defines the action. However, the above problems and shortcomings prevent most scholars to take it seriously. Some of them think that any one of these criteria can be used for all forms of performance evaluation.

Measuring the outcome of a network management model is a very problematic, since those involved have different views, values, and objectives. It can also change over time, and it is difficult to determine the outcome of a network for just one purpose (Agranoff, 2007; Imperial, 2004; Klijn, Steijn, et al., 2010; Mandell & Keast, 2008; McGuire. & Agranoff, 2011). Kenis and Provan (2009, pp. 441-444) commented on establishing network evaluation criteria to determine: 1) What is the regulatory structure in the form of the Network? 2) Is the character of the establishment of mandated versus voluntary inception of network or compulsory? and 3) Has the developmental stage of the Network been started or just started for a while?

However, the network effectiveness study approach had differing opinions among scholars, including organizations, public policy, and public administration on how the network assessments should be formulated. For example, Provan and Milward (1995, 2001) studied the effectiveness of networks for health fund, public service and social welfare and found that the effectiveness of networks needed to consider the effectiveness at different levels, as shown in figure 3.3

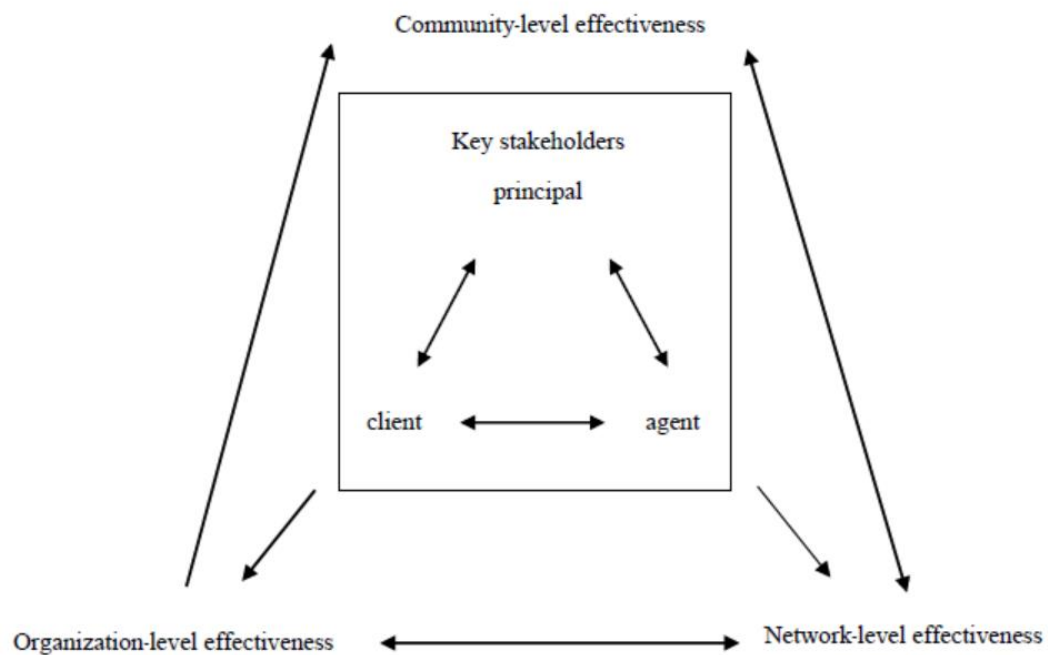


Figure 3.3 The Relationship between Effectiveness in Network Analysis Differences and Impacts on Main Stakeholders

Source: Provan & Milward (2001, p. 421).

The effectiveness of the network refers to the organization and community network level. Each level consists of a wide range of stakeholders, resulting in different perspectives on outcome and can directly influence results at other levels. These elements consist of the principal who monitor control, and the owner of the spending budget; agents who work in the network both of staff and experts in various fields; and clients who receive service from the network. Thus, networking will respond to the satisfaction of the needs and interests of stakeholders. The network assessments are necessary to integrate 3 levels by considering the following indicators: 1) network-level indicators include the growth of network member, service differentiation, relationship strength, service integration and coordination, and maintenance of the organizational management network, 2) organizational indicators include increased legitimacy, resource acquisition, service costs, service access, customer results, and member conflict mitigation, and 3) Community-level indicators

include reflections of people's perceptions, changes to problems, well-being, social capitalization, and community expenditures (Provan & Milward, 2001, p. 416).

Imperial (2004) studied the results of the cooperation in watershed management by applying the Behn concept (2003) and measuring the performance based on the responsibility and ready to audit the internal system (facilitation, coordination, and prioritization), pushing process (motivation), promote process of learning and improve governance. Agranoff (2007) studies the public value from the implementation of a collaborative network in the process and its outcomes such as the emergence of expertise, participation, operational improvement, tangible results, cost reduction, learning, and being responsible and ready to be examined.

Klijn, Steijn, et al. (2010) studied the Environmental Management Cooperation Network project by defining a substitute model of “perceived outcome” to describe network functions and identify differences between 1) content outcomes refer to the characteristics of the essence outcomes of action: innovation, problem-solving integration, support of participation, problem-solving ability, future outcomes, and the relationship between costs and benefits, and 2) Process outcomes refer to attributes of outcomes from management approaches, including management, conflict resolution, process of resolving constraints, productivity from different perspectives, increased interactions, and sufficient support for stakeholders.

Provan and Lemaire (2012) also focus on network management and governance assessment with successful network features, that will consist of: 1) all organization stakeholders of all sectors or all levels participated in the work and give opinions in order to create knowledge and understanding and result in effective implementation of the policy, 2) the design of the network and the function of the guideline must be clear, and the selection of network participants must be reasonable that can foster a successful network operation, 3) there is appropriate supervision and configuration of network management such as participation network, organizational leadership network, or network management organization, 4) there is legitimacy, acceptance by organizations within and outside the network, to help the network survive. External legitimacy consists of disseminating networks and searching for external resources to achieve goals. On the other hand, internal legitimacy stems from a networked organization, which can be determined by the values arising from

member engagement and the development of a relationship based on members, and 5) the stable relationship management depends on the responsibilities in each work. Some works may require flexible management and a focus on outer organizations. But some works need to be more focused on formal procedures, so networks must adhere to key objectives and be flexible in their administration in different situations.

From the scholarly concepts for the study of the effectiveness of public administration networks, the effectiveness measurement criteria of the networks can be summarized as table 3.9

Table 3.9 Summarize the Scholar Concepts for the Criteria for Measuring Network Effectiveness

Provan and Milward (2001)	Imperial (2004)	Agranoff (2007)	Klijn et al. (2010)	Provan and Lemaire (2012)
1. Network level	- Responsibility and available to be examined	- Expertise	1. Results from content	- Those involved at multiple levels
- Network growth	- Internal system	- Participation	- Innovation	- Network design
- Service differences	- Pushing process (motivation)	- Operational improvements	- Integrating and solving problems	- Proper supervision
- Relationship strength	- The process of promoting and evangelizing the gospel	- Tangible results	- Contribution support	- Building and maintaining righteousness
- Non-redundancy in service	- Learning and improving governance	- Reducing the cost of learning	- Problem solving ability	- Stability
- Service integration and coordination		- Being accountable and available for audit	- Future results	
- Maintenance of the Organization Management Network			- Relationship between costs and benefits	

Provan and Milward (2001)	Imperial (2004)	Agranoff (2007)	Klijn et al. (2010)	Provan and Lemaire (2012)
2. Organization level			2. Process results	
- Righteousness enhancement			- Management approach	
- Resource acquisition			- Conflict resolution	
- Service expenses			- The process of resolving constraints	
- Service access			- Productivity from a different perspective	
- Customer results			- Increased contact and relations	
- Conflict reduction			- Sufficient support of all involved	
3. Community level				
- The reflection of the public perception				
- Change to the problem				
- Well-being				
- Social capital building				
- Community expenses				

3.2.1 Criteria for Evaluating the Effectiveness of the Network

From the study of the effectiveness of the network, there are many differences. This is the nature of the network effectiveness studies that cannot be clearly identified and fixed. The determination of criteria and indicators is based on the norms of the educator or researcher perspectives. Not all criteria are equally suitable for evaluating a network. Network effectiveness is based on a focus on the evaluation criteria of each network's function. The investigator will be asked to find the evaluation criteria appropriate to the context in which the study is being studied (Kenis & Provan, 2009; Provan & Kenis, 2008).

The effectiveness of the network should be assessed over the entire network (Provan et al., 2007, p. 483) by integrating the effectiveness at three levels: network effectiveness, organizational and community level (Provan & Milward, 1995, 2001); and consider the nature of the structure, formation, and development processes (Kenis & Provan, 2009, p. 446) to achieve multi-dimensional and multi-level measurements within the network (McGuire & Agranoff, 2011, p. 274), including giving importance to consistency in the context.

3.2.1.1 Network-level Effectiveness

From the Provan and Milward (2001)'s concept that the main actors of this level of effectiveness was the principals who controls and monitors various operations in the network to be suitable as a Lead Organization Network, while Agents were a network of cooperation that occurs. Management contexts that have complex problems and their impact are linked to other problems, requiring cooperation from the network to come together in solving the problems. Principals expect performance from obligations assigned to agents or networks to resolve problems (Mandated Networks). Networks must design appropriate structures through Selective Integration of stakeholders to work in solving the problem (O'Leary & Vij, 2012; Provan & Lemaire, 2012), because the success of the network is the competence of the people who are involved within the network, whether it be personnel, expertise, tools, technology, etc. These will contribute to the development of operational guidelines (Imperial, 2004). Network design is like structuring

relationships between stakeholders to successfully execute a defined activity or project (Klijn, Steijn, & Edelenbos, 2010, p. 1064).

In addition to proper network design, network governance should be handled appropriately because government agencies often misunderstand that network operations push the burden of service management results in neglect of audits; or substandard rules and law enforcement are established. These results in an ineffective regulatory system (Goldsmith & Eggers, 2004, pp. 42-43). Also, government agencies may use the network to guide and support those who oppose or disagree as if they want to turn their enemies into a friendly to mitigate the effects of the conflict (Selznick, 1948, pp. 25-35). The supervision and cooperation of the network must be established with appropriate regulations. By considering the holistic and considering the potential, and the economic and social realities together. However, the network operating results are driven by clear operational guidelines (Klijn, Steijn, & Edelenbos, 2010, pp. 1064-1065), whether an event, or a project, must align with the overall goals. Unsuitable and unclear operational guidelines can affect network effectiveness because network operations require constant inter-agency coordination (Provan & Milward, 1995, p. 10).

However, the peculiarity of the network is its relational flexibility to its operations; the traditional chain of command model was not flexible, but networks that were too flexible resulted in instability and stability. Large flexibility results in ineffective operations, so network operations require a clear obligation to the organization's critical tasks in a centralized manner of official operations. And other periphery organizations gain roles and benefits from joining networks to achieve ongoing management (Provan & Lemaire, 2012, pp. 645-646). Network maintaining if the network missions have unsuccessful, it is necessary to maintain and support the network so that it can continue to operate. Network maintaining is one of the essential elements to maintain the success of the network by organizing joint activities and establishing a continuous incentive mechanism (Imperial, 2004).

From reviews of the academic concepts, the network-level effectiveness evaluation criteria can be summarized as: 1) network design and supervision mean selecting those involved and resolving problems to work properly and create a good working environment for more coordination. There are rules that

are accepted by all parties, including clear operational guidelines, 2) network stability means ongoing joint activities, determination of incentive mechanisms, the provision of adequate resources, assistance in problem solving, and continuous generation of young leaders.

3.2.1.2 Organizational-Level Effectiveness

Important actors of an organization refer to networks, organizations or agencies involved (Provan & Milward, 2001, p. 420). In operating networks, the public sector spends the budget that comes from the public tax. Therefore, it is imperative to have operational legitimacy, which can be examined from the outset as well as the selection, appointment of the board of directors; and various projects that have been undertaken. The foundations of legitimacy are not just legal practices, but the effects of inequality of various interests must also be monitored in operations (Moore, 2009, pp. 196-197).

In general, legitimacy occurs through looking at the objectives, values, actions, structures, and processes within a network. Which networks that are controlled regardless of whether it is a measure or a law, it can lead to a great deal of justification. The building of righteousness can be explained by the levels (Human & Provan, 2000, pp. 338-340; Provan, Kenis, & Human, 2008, p. 123) as follows: 1) Network formation - the starting point of the network is due to the legitimacy of the support or assistance that a particular organization needs, such as finance, 2) Network identity - righteousness needs to create a clear perception or identity within a network, such as structures and processes, and 3) Network interaction - the legitimacy of interactions within the organizational network must have a relationship with each other. Milward and Provan (2006, pp. 19-21) also viewed that the legitimacy of the network was based on its reputation and acceptance of operational measures. Especially the public sector Measurement of success is achieved through complex and difficult operations because the desired goals may be vague or conflicting, so righteousness is often used to measure results. This is like an alternative indicator of effectiveness and success in a network to establish legitimacy by acting through the support of all government organizations and community leaders involved in organizing joint meetings, consultations, discussing together, and preparing news media sent to member organizations, etc.

In addition to righteousness, leadership organizations must facilitate organizations to achieve their goals. Organizational leaders must have the ability to manage relationships among member organizations, especially conflict management that can arise over time. This is because the network consists of stakeholders from the public, private and civil society sectors. These stakeholders may have different views or approaches. The effectiveness of the network at the organizational level is reducing the conflict between the organization is kept to a minimum, whether it is conflicts in terms of resources and administrative expenses. This is because the network operation consists of projects that require cooperation among the organizations involved in achieving the goals (Provan & Milward, 2001, p. 416). In addition, conflicts can arise from differences in goals and trust among network members. Network management must use the ability of agile awareness, timely, and negotiation skills to avoid violent conflicts. It is necessary to define a mechanism for solving the problem; creating good faith as an impartial; and judging based on the overall goal of the network including the importance of operations within each organization to cover all departments to balance the needs of the organization and the network (Klijn, Steijn, & Edelenbos, 2010, p. 1066).

Therefore, this can be concluded that the effectiveness of the organizational network is: 1) network legitimacy means the establishment of an appropriate working group in a cooperative activity or project; operational measures are acceptable; performing work in accordance with the law or agreement; fair allocation of resources; and supports all involved persons to take part in the operation, and 2) Conflict management within the network means setting guidelines for resolving conflicts that arise between organizations in order to quickly resolve them; all decisions are based on overall goals, impartiality; and focus on the operation covering all problem areas.

3.2.1.3 Community-level Effectiveness

At the community level, the main actors are composed of the people (principal) and the organizations; or people involved who work for the network (under the auspices of the network), which describes the operation of a network that must focus on responsibilities through public review (budget owner) and be directly

impacted by the problem occurred. Generally, cooperation networks have power across legal boundaries and cover all sectors. Actions may be governmental or exclusive within an undisclosed group resulting in ambiguity and transparency in their responsibilities (O'Leary & Vij, 2012, p. 513; Rhodes, 1997, p. 72). The implementation of a cooperative network differs from hierarchical management, which is clear in its authority and responsibility. Sometimes the network behavior causes the burden of responsibility for others or organizations (Milward & Provan, 2006, p. 18). In addition, the network shares obligations with non-governmental organizations result in public activities are not limited to government organizations which are required to carry out legal activities and may have negative consequences. In other words, non-governmental actors are not subject to any requirements or conditions to comply with government regulations (Agranoff, 2007). Therefore, the organizations should clearly identify the responsibilities and duties within the network and examine and punish those who violate or fail to comply with the established agreements. Cooperation network operation, those involved must be aware of the necessity of “giving” to “get” from others in a new way; that is, the organization needs to compromise some of the identity and agree to change the system.

Therefore, it can be concluded that the effectiveness of a community network is: 1) responsibility and readiness for network audits mean defining the duties and responsibilities clearly and appropriately, or related persons have examined the performance of all sectors in society for the convenience of access to information, including transparent disclosure of information and related performance, 2) innovation and network transformation, including developing solutions to problems and promoting the transfer of knowledge and experiences between them on a continuous basis.

From studies and analysis of appropriate criteria for evaluating the effectiveness of the network. It can summarize and integrate relevant academic concepts at different levels as shown in table 3.10.

Table 3.10 The Integration of Relevant Academic Concepts to the Network
Effectiveness Evaluation Criteria

Academic	Network Effectiveness					
	Network Level		Organization Level		Community Level	
	Design and supervision	Stability	Righteousness	Conflict management	Responsibility and ready to be examined	Innovation and change
Agranoff (2007)	✓			✓	✓	✓
Imperial (2004)		✓			✓	✓
Klijn et al. (2010)	✓			✓		✓
Provan and Lemaire (2012)	✓	✓	✓			
Provan and Milward (2001)	✓	✓	✓	✓		✓

3.2.2 Factors Affecting the Success of the Public Administration Network

3.2.2.1 Academic Concepts on Factors Affecting the Success of Public Administration Networks

Goldsmith and Eggers (2004) studied public administration and networking and found that activities involved many stakeholders, including public, private, and non-profit organizations. The factors that can affect the success of this network operation are consistency of goals, supervision of communication channels, coordination, databases, and authority within the network.

Thomson and Perry (2006) studied the process factors, relationships from the research of cooperation scholars, the relationship between organizations and organizational behavior. It can be synthesized into 5 factors: governance, administration, organization independence, mutual relationship, and confidence norms

Agranoff (2007) studied Managing within Networks: Adding Value to Public Organizations. This study was a study on the management of government networks from the collection of 14 networks with different operating patterns. This was found that successful network management consisted of confidence, common goals, mutual relations, leadership, power, and communication.

Provan and Kenis (2008) studied “Modes of Network Governance: Structure, Management and Effectiveness”. The results showed that networks were different. Successful governance of a network must be based on the organization's structure and relationships within the network, including: Confidence, network size, consistency of goals, and nature of work

Bryson and Crosby (2008) studied “Failing into Cross-Sector Collaboration Successfully”, studied social value creation through inter-organizational cooperation, and found that successful cooperation had to focus on building the strengths of each sector (Public, private, and public). At the same time, they must try to reduce their weaknesses within their cooperation. Factors that can be analyzed to help achieve sustainable cooperation including environmental factors, leadership generation, justification, confidence, structure and design, institutional logic conflicts, planning, and unbalanced power.

Gazley (2008) studied cooperative behavior among networked organizations and found that motivating factors for cooperative behavior were divided into three levels: 1) sector levels are formal and informal structures, political incentives and the dependence of each sector, 2) group levels are experience and expertise, education and training, motivation for success, poverty level, amount of funding, regulatory incentives, uncertain environment, and organizational timeline, and 3) individual levels are gender, ideology, and merit.

Graddy (2008) studied the relationship between the structure and the success of government service delivery networks, found that factors affecting the effectiveness of service delivery networks were: 1) the regulatory structures include contract supervision, network supervision, and coordination between organizations, 2) service features include management integration, and agreement engagement, 3) operational interactions include participation in decision-making, and sharing information and resources, 4) member controls include confidence, coherence, and goal consistency, and 5) network controls include organizational income, network size, percentage of differentiation between sectors and businesses.

O’Leary and Vij (2012) commented that network management is complex and without standardized management model. Network management needs to find a balance from a variety of factors. From 14 case studies in nine countries that

Factors	Academics								
	Goldsmith and Eggers (2004a)	Thomson and Perry (2006)	Agranoff (2007)	Provan and Kenis (2007)	Bryson and Crosby (2008)	Gazley (2008)	Graddy (2008)	O'Leary and Vij (2012)	Provan and Lemaire (2012)
1. Politics						✓		✓	
2. Economy					✓			✓	
3. Society / Culture								✓	✓
Network Structure and Features									
4. Quantity				✓		✓	✓		
5. Goals / objectives	✓		✓	✓			✓	✓	✓
6. Authority	✓		✓		✓			✓	
Network Management									
7. Mutual relationship		✓	✓			✓	✓		
8. Nature of work				✓					
9. Coordination	✓	✓					✓		✓
10. Participation		✓					✓	✓	
11. Independence		✓							✓
Network Potential and Availability									
12. Confidence		✓	✓	✓	✓		✓	✓	
13. Leadership			✓		✓				
14. Experience						✓			
15. Communication channel	✓		✓					✓	

3.2.3 Effectiveness of the Emergency Medical Service System

The most widely used measure and evaluation of emergency medical service systems in many countries is the measurement of the response time of the emergency medical service system. Obviously, most of the countries that use the Anglo-American Model system (focused on hospital delivery rather than on-site treatment) has targeted response times for emergency and emergency crises as it emphasizes speed of hospital dispatch. While the country that uses the Franco-German model system (focus on providing services at the accident point rather than delivering to the hospital) may not target response times as it relies on a medical team to go out to service at the scene, especially in critical emergencies. The response times were relatively similar, for instant, a life-threatening critical emergency, rescuers had to arrive at the scene within 8 minutes, and the patient had to be taken to hospital within

19 minutes; or a non-critical emergency patient will receive a response within 19 minutes. This period may be different between international and urban-rural distances (Institute of Public Health System Research, 2010).

However, there is some suggestion that a single estimate of response time was unlikely to be sufficient, while the quality indicators were less interested. And a focus on speed of service can be detrimental to both rescuers and patients, as well as the public. If an accident occurs, it will be viewed as a time-priority over the patient, and a greater emphasis on outcome indicators will be requested for in response to social expectations (Al-Shaqsi, 2012, pp. 1-6).

There is a review of clinical competency and proposes an assessment of the quality of the emergency medical service system. Indicators should be considered as follows: 1) input factors such as the quantity and distribution of resources, and the capacity and knowledge of personnel, 2) processes such as response times, validity and suitability of standardized services, and the appropriateness of the use of resources and healthcare delivery, and 3) health outcomes, such as patient survival rates; specific diseases that will receive a clear vision from the emergency medical service system, the patient satisfaction includes a reduction in the pain or suffering of the patient. Disease groups for the definitive clinical outcome require a suite of emergency medical services that can be provided, such as cardiac arrest, trauma, ST elevated myocardial ischemia (STEMI), cerebrovascular disease, asthma, low blood sugar, etc. (El Sayed, 2012).

The Australian Services Review Directive (Commonwealth/State) has proposed an assessment of the capacity of the emergency medical services system based on eight indicators: the survival rate of out-of-hospital cardiac arrest, the rate of use of the emergency ambulance service, Percentage of emergency patients receiving services from the emergency medical system, response times at 50 and 90 percent, satisfaction levels, unit costs, expenditures per emergency and non-emergency, and expenditure per person (O'Meara, 2005).

Effectiveness of emergency ambulance service is another issue of concern, especially in countries that provide free services to the public. It was found that in Taiwan (O'Meara, 2005) and Finland (Suserad, Beillon, Karlberg, Pappinen, Castren & Herlitz, 2011, pp. 544-549), one third of the patients using the ambulance service

was not a real emergency. In addition, it was found that there was a difference in the rate of use of international emergency ambulance services (Krafft, Riesgo, Fischer, Lippert, Overton, and Robertson-Steel, 2006), as well as the difference in cost per ambulance calls and accident times.

The European Emergency Data Project (EED), EMS Data-based Health Surveillance System used five indicators to compare emergency medical service systems among participating countries (Krafft, Riesgo, Fischer, Lippert, Overton, & Robertson-Steel, 2006): 1) the number of working hours of ELS + BLS+ALS / 100,000 population is a measure of service system availability (ELS; Emergency Life Support refers to the function of FR, which is essential in providing primary assistance, such as CPR to stop bleeding before the arrival of emergency medical professionals), 2) percentage of critical emergency patients who received care within 8 minutes; see the access to EMS service, 3) Service rate of emergency patients / 100,000 population; see the rate of demand and workload, 4) critical diagnosis rates requiring EMS service/100,000 population (Cardiac Arrest, Acute Coronary Syndrome, Stroke, Respiratory Failure, Severe Trauma), and 5) operative rate of ALS / 100,000 population (dosing, ventilator use, intubation) based on the level of service provided by the EMS system.

In England it was found Although emergency ambulances can bring patients to the emergency department on time, more than one in five patients must wait more than 15 minutes according to the guidelines before being serviced by hospital personnel. Therefore, the competency assessment of the emergency medical service system needs to consider the management of the emergency room department as well as there is a coordination, delivery, and organization of the emergency room system to provide patients with timely services. At the same time, there were variations in service utilization rates and inter-service costs, indicating that the efficiency of service provision needed to be improved in the next phase of development. In addition, an additional outcome measure was required in addition to the response time measure. The proposed quality indicators for use since April 1, 2011 included (Department of Health, 2011) 1) outcome indicators were health outcomes of patients with Acute Myocardial Infarction, Acute Cardiac Arrest and Post-discharge Survival, percentage of Ischemic Stroke Patients at stroke center within the specified time, 2) quality

indicators include the proportion of hotline advice or clinically appropriate management without the need for an ambulance delivered to a hospital emergency room; and recursion rates for those who receive advice or administer or provide on-site treatment without needing to be taken to the hospital by making an emergency call, 3) safety indicators include hang-up rate before command center answers calls, length of time to answer calls when hotline calls come in, percent of critical emergency patients who get a response in 8 minutes, length of time the patient/injured person receives services from rescuers, 4) patient experience indicators were customer satisfaction/complaint.

However, there are significant differences in context between areas, whether it is the distance to deliver the patient from the incident to the hospital; And the potential of the hospital delivering. So, evaluation monitoring needs to be considered in the inter-area comparison (Macfarlane & Benn, 2003, pp. 188-191).

3.3 Related Research

3.3.1 Related Research in Thailand

Panoa Tachaatik, Suntraporn Wunsupon, and Sumana Sumritrin (2011), conducted a research study on the evidence-based evidence in nursing injured patients at the emergency unit found that they were the injured of the emergency, rushed, and non-rush as 6.2%, 4.9% and 88.9%, respectively; accounting for 90.5% overall performance, 100% injury classification; Early aid, subsequent assistance, and distribution of 97.94%, 93.62 and 70.29%, respectively; average satisfaction rating 9.0

Suphanwadee Pinyo, Thanya Yamroj, Kanyarat Keardkaew, and Kloyjai Srisakorn (2011), conducted a research study on Perceptions and Expectations of Emergency Medical Service of patients and relatives in accident and emergency at King Mongkut's Hospital, Phetchaburi province. The results showed that the awareness of emergency medical services about emergency medical services was less than 60.0%. The level of awareness was 51.0% lower than 25.2%, and 23.8% had a good and moderate level of awareness. Relatives were aware of emergency medical services 61.0% - 73.0% of patients and their relatives' awareness of emergency

medical services. Most of them think that emergency medical delivery is safer than first, as basic assistance is provided, and the service can be called 24 hours a day.

Emergency Medical Institute of Thailand (2011) studied the satisfaction of the public towards providing emergency medical services for the year 2011. The results of the study showed that the service satisfaction of the emergency medical care package was the highest (86.67%), followed by the satisfaction of the emergency room services (86.05%, and finally, the service satisfaction of Command communication center (83.94%).

Sukontip Kulprayong (2011) studied the satisfaction of users of emergency medical services, Ban Bueng District, Chonburi province. The results of the research showed that the satisfaction of each aspect in terms of coordination, service quality, convenience, courteousness, information perception is moderate; the overall satisfaction of Ban Bueng Hospital service users was higher than those from the Morality Association.

Krittaya Daengsuwan (2008) conducted a research study on the core competencies of professional nurses in accidents and emergencies according to the recognition of nurses in hospitals under the Ministry of Public Health of the three southern border provinces. The results of the study found that the overall core competencies of registered nurses were moderate (51.3%), and when considering several aspects, it was found that the one-sided performance with the highest percentage was at the high level. Cooperation

Wannara Chuenwattana (2012) conducted a research study on the satisfaction assessment of emergency medical service users. The results of the study found that the descriptive research on the assessment of the satisfaction of the emergency medical service users. The results showed that the overall satisfaction assessment of emergency medical services was 8.52 (85.2% of the full score) of service of incident notification. When classifying satisfaction by step, it was found that in step 1, the incident notification service (Notification and Command Center) had the mean satisfaction of 8.72 (87.2% satisfaction of the full score). Step 2, the service of the Emergency Medical Operation Kit (Paramedic) had a mean satisfaction of 8.68 (86.8% of the full score). Step 3: Hospital emergency room services had a mean satisfaction of 8.16 (81.6% of the full score).

Patcharaporn Untaja and Siriorn Sindhu (2011) Research studies on Evaluating the factors related to success in Access to treatment of patients with acute myocardial infarction (STEMI) to develop an emergency medical system. The results of the study showed that high-speed access to the acute myocardial infarction (STEMI) system. Medical to expand access to treatment must be carried out at the same time with the enhancement of the health care system to provide patients with successful access to treatment, rapid access to treatment networks, including organizing rapid chest pain clinic units that refer the patients, they receive treatment specifically and an emergency medical system that provides a network of medical services of doctors coordinate electrocardiogram (ECG) data and assess the body directly with the hospital, resulting in reducing assessment, diagnosis and travel time.

Paibul Suriyawongphaisan et al. (2011) studied the policy assessment report on evolution. The emergency medical system explains that appropriate and more important leadership is the knowledge-based leadership that is derived from information systems and clear appropriate practices to decision-making and learning. Knowing among the multidisciplinary organizations through the teacher relationship. With disciples or / and siblings by keeping the patient at the center

Suton Thangsiri, Chutima Nakhong, and Wasana Cherdchueng (2008) study and research on Development of service system models Community-Based Emergency Medicine in Si Satchanalai District, Sukhothai Province The results of the research revealed that the model of the community-based emergency medical service system in Si Satchanalai District must have three components and roles: 1) Si Satchanalai Hospital plays a key role, which requires cooperation, 2) local government organizations and community organizations, as well as participation, 3) people in the district, with the coordination of roles and duties of all 3 parts, Si Satchanalai district has a community emergency medical service system in all 10 sub-districts of the district. By harmonization as “Community Resuscitation Center Sales Network”, which will be an important part of the emergency medical service of Si Satchanalai District, efficiency, stability, and be able to serve people in the area more comprehensive and faster.

Wirote Semram (2009) Research on the implementation of policies for emergency medical service system. The results of the study found that the factors

affecting the application of emergency medical service system policy were as follows. Network support practitioners' attitudes, public relations and dissemination, standards and policy objectives, and communications. By jointly explaining the variation in the emergency medical service score within 10 minutes, the effectiveness of the implementation of the emergency medical service system policy was found that the implementation of the system development policy. The overall practice of emergency medicine is at a high level.

NichaPhat Khansakorn, Tasanee Silawan, Tasanee Rawivorakun, Wirin Kittipichat, and Umawadee Laothong (2016) studied the emergency medical service system for the elderly in Thailand using a cross-sectional descriptive research model. Data were collected through quantitative and qualitative methods. The sample areas in the research sampling the provinces with the proportion of emergency patients who came with the emergency medical system per 100,000 population at the high and low criteria of 2 provinces by simple random sampling method included 4 provinces, which were classified as provinces with a proportion of people. Emergency sickness with high criteria of emergency medical system in 2 provinces and provinces with Proportion of emergency patients who come by emergency medical system in the lower 2 provinces; Examples of this research include: 1) elderly people who have used emergency medical services in the past 6 months to the data collection date per province 120-180 people (600 people in total), 38 people were sampled for in-depth interviews, and 2) the main responsible person in the agency Operate in the emergency medical system of 36 people from 35 agencies. Research tools include the elderly interview questionnaire, the elderly in-depth interview questionnaire, and the in-depth interview questionnaire from the agency's emergency medical administrator. The results of the study show that all agencies involved in emergency medical services do not have an emergency medical policy for the elderly. Especially for emergency medical services, it was found that most of the reasons that the elderly used the service were home accidents, blood infection, hypoglycemia, etc. 80% of patients call to request services at the local administration organization service unit to deliver to the nearest medical facility. Once an elderly patient is admitted to the service system, he or she will be considered for treatment based on severity without special routes for the elderly. In addition, weaknesses of the emergency medical

service system for the elderly were also found, such as insufficient number of emergency medical personnel and potential, poor quality of personnel, inconsistent with their responsibilities, inefficient support information technology system, lack of efficiency equipment and operating budget, including lack of quality control system and standards. The study team recommended policy recommendations for the development of emergency medical care systems for the elderly, that is agencies involved in emergency medical services should establish a requirement or collective agreement in the form of “EMS HUB for the Elderly.” Elderly that operates both proactive and passive. There is continual support for appropriate operational budgets, developing medical personnel and the elderly to have knowledge and competence in taking appropriate care of the elderly according to age groups (Divided into 3 groups of the elderly: 60-69 years old, 70-79 years old and 80 years old and over) because the elderly in each group need different urgent assistance. In addition, there should be timely emergency notification system, including a monitoring system for the elderly, continuously.

Narirat Jitramontree, Vilaivan Thongchareon, and Sawitri Thayansin (2009) studied a model of good elderly care for families and communities, urban areas, and Bangkok by selecting two specific sample communities: Lock 4 - 6 community, Klong Toey district, Bangkok and 30 Kanyapattana community, Mueang district, Nakhon Ratchasima province. Data were collected through in-depth interviews, group discussions, and participatory observations. The sample were from 2 communities: 4 elderly patients, 4 main car workers, 4 elderly neighbors, public health volunteers (PHV) / Village health volunteers (VHV) 2 people, 1 community leader, 1 elderly club president, Volunteers / Volunteers 8 people, 2 nurses, and 4 villagers. Analyze data by analyzing content and summarizing key points. The results of the study found that one of the factors contributing to the good care of the elderly in urban communities is the effective support system from the government, the private sector, and volunteers to care for the elderly. There is also a system to meet the needs of the elderly, especially the road of the aged. The study team made recommendations on the policy of elderly care, namely, there should be a system for the movement of the elderly from home to nursing homes. The government should set a policy for establishing an emergency center in the community. In addition, vehicles are

supported for the transportation of the elderly, and there is a hotline system for contacting between houses. Elderly and nursing homes in this regard, such operations. The community is responsible for doing so. There is also a suggestion for the government to develop a care system for the elderly in the transition period from hospital to home. (transitional care or intermediate care) to prepare elderly patients to continue care at home.

Ranchana Sinthawalai (2008) studied good practice in managing the emergency medical service system before reaching the community hospital and local authorities to develop a model system. The development of the main indicators of the system was carried out by in-depth interviews with the operating guidelines of the departments involved in the system in the provinces in which case studies were Khon Kaen, Ubon Ratchathani, Lampang, Phetchaburi, Phuket and Songkhla. By selecting a conceptual framework for transcribing the lessons of each province, the Malcolm Baldrige National Quality Award (MBNQA) is selected. The conceptual framework is a systematic look at the linkages of each sub-element with results, summarizing outstanding practice as an example of amplification in other areas. Analysis of factors that contribute to success operating problems and obstacles are based on the MBNQA framework. Although the six provinces performed at different levels, the overall problems and obstacles were not significantly different. That is, even the provinces with the best performance at the national level, there were also problems in the management, process, personnel, and patient focus categories, which are common in other provinces. In addition, the problems reflected from the survey of the entire population who received and never received services through questionnaires found that the public relations problem was not comprehensive, and the quality of the service process is the same problem in all 6 provinces. This view reflects that every province has a diverse and interesting system development model, without making a difference in the level of operational results. Refers to all provinces aiming to develop a system to suit the provincial context. System development is therefore an issue that all provinces operate continuously. The interesting system development approach is therefore not limited to provinces with good performance only. For this reason, the results of this research are summarized in 2 parts: 1) MBNQA Conceptual Framework for Emergency Medical Service System, the research team viewed the MNBQA

framework to help system-related entities perform a holistic analysis of the sub-elements that might be overlooked. These provide excellent examples of outstanding practices in all six case studies the research team sees that it will be useful to other provinces that are developing the system to be a model or to further expand the results. Not specifying guidelines from provinces with high performance levels will encourage all provinces to see their potential for further development of the system.

3.3.2 Related Research Abroad

In the US state of North Carolina, Shan, Cai, Brooks, and Corke (2007, pp. 112-119) studied the elderly use of emergency medical services for a retrospective observational study by analyzing the 2007 data; and checked from the North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT) database. It was found 3,853,866 visits to the emergency department and record completed 2,743,221 visits, a total of 71%; 15% were the elderly 65 years and over; and 39% were the elderly 85 years and over. 61% of emergency medical services are used to hospital emergency departments, and in 2030, it was expected to increase by 47%. The proportion of patients sent to the emergency department by emergency medical services continues to increase. Elderly patients account for about half of those who use this service. The changes over the next 20 years will be a significant national change.

Light, Choi, Thomsen, Skeete, Latenser, Born, and Kealey (2010). the University of Rochester, found that a large proportion of older people use emergency medical services. Emergency medical services are responding to this need for the growing elderly population by preparing personnel, operations, and equipment.

Wu, Cheng, and Pei (2014, p. 309) studied the operation of an emergency medical service system in the unaccompanied elderly in Taiwan by reviewing the literature to determine the key factors affecting the procedures, processes, and quality of Emergency medical service system for the elderly. It was found that only 20% of elderly patients using emergency medical services had coma. Elderly unattended patients influenced the decisions of emergency medical technicians (EMTs) in Emergency care. This increases the difficulty and time of transferring patients. In 2007, Professor Okamoto proposed modifications to the emergency medical service

system. He aims for emergency medical technicians to provide immediate assistance based on an early history of illness, which is expected to simplify the treatment process and reduce the rate of illness. This system is to be successful through continuous improvement in service provision in education, training, and other factors.

3.4 International Emergency Medical Service Systems

3.4.1 Emergency Medical Services Systems in USA

The US Emergency Medical Service system is legally funded, with each state responsible for its own systems. The administrative, technology and materials responsibilities depend on the local responsible organization. They will use the Anglo-American Model of Emergency Care, is the movement of patients into the emergency room, primarily as an emergency health service system. The highlight of this system is the on-site treatment performed by emergency medical technicians (EMTs or paramedics), with advice provided by a physician in the emergency room of a community hospital or a nearby hospital before deliver to the emergency room, and the emergency physicians (EP) will take care of the emergency response before being transferred to the continuing care system (Shah, 2006, pp. 414-423).

Governance and guidance of the legal support system; each state is responsible for its own system of administration, technology, and materials depending on the local responsible organization (Schafereyer & Asplin, 2003, pp. 22-27).

Fiscal mechanism - the budget for the emergency medical service is from the public and private sectors. This could be a public fund, a private fund, or a private company acting as a representative of the client based on the interests of the client.

Equipment and tools - an organization established in that state or area defines the standard of equipment, equipment, and the person who is responsible.

Information and communication systems - the United States communicates using the phone. The 911 emergency number is a number used for people to call in three emergency cases: police, ambulance services / medical, and fire departments. A normal phone can show the actual location of that phone.

Manpower and roles of personnel - there is a training of personnel to support services ranging from victims to doctors in the accident and emergency department, as well as providing knowledge and understanding on occupational hazards.

The medical service system plays a role in guiding and supervising the system to ensure that the medical treatment that occurs is correct and safe in accordance with the principles of medical standards. A key strategy for achieving this objective is to establish pre-hospital treatment units, which differ as appropriate in each state or local community. There is a law on medical supervision in emergency systems, in-system medical supervision, and quality audits (Cummings, Lewellen, McIntire, Moore, & Trzeciak, 2012).

3.4.2 Emergency Medical Services Systems in Canada

The Canadian Service System is an emergency medical service in developed countries. There is a clear and legal service model, the classification of service levels to suit the needs of the area, the standardization of equipment and equipment to meet the needs of the people by taking direct responsibility of the local government. The service system also represents a continuous learning organization with the community. There is a performance report that allows the public to access and acknowledge all service system models, obtain basic knowledge, including guidelines for system selection and service models, and operational results. The results show the public about the service system, understand the service model, their rights, and duties as well as what they should receive, and be able to help themselves through the system (The Future of EMS in Canada, 2006).

Governance and system guidance - there is a clear organization, legal support, and the nature of working with the people.

Fiscal mechanism - Canadian Emergency Medical Service does not qualify as a necessary medical and public health service. There is a joint payment system which the service provider receives help from the people by sharing payment system by the consumer is a matter that has advantages and disadvantages. People must reserve part of their own money. But the advantage is that unnecessary or inappropriate calls can be reduced.

Equipment and tools - determination of standard equipment and tools is a good idea, and serious preparation will help the operation to be successful. More importantly, it is the ongoing audit, and direct governmental responsibilities in the area.

Information and Communication Systems - the Network Computer Added Dispatch (NetCAD) and severity patient classification were introduced to help the visualization of the system together. The use of administrative information for shared learning between the system and the people, including guidelines for staff members that enable the system to be continuously learned and developed (Ministry of Health and Long-Term Care, 2000).

Manpower - the style of working in this field is clear, which helps many people understand and set goals in life. Service system - connectivity and service continuity. (Service Ontario, 2010)

3.4.3 Emergency Medical Services Systems in UK

The British service system is an emergency medical facility like Thailand. That is, free service, provided by the state, a clear service model, service level classification to suit the needs of the area to meet the needs of the people. The service system has also been shown to be a continuous learning and community organization (South East Coast Ambulance Service NHS Foundation Trust, 2012).

There are clear departments, legal support for the provision of services, and the nature of working with the people so that the service system can be strengthened. This includes being a partner unit of the NHS Ambulance Trust that requires quality assurance (Joint Royal Colleges Ambulance Liaison Committee, 2006)

Information and communication systems that can connect the image of each system together. Using information in management because of learning from the results of clinical practice and economics, the system can be developed to achieve development goals, whether it is operating for Grade A patients, or reducing unnecessary expenses from patients who do not need an ambulance to be picked up, as well as setting standards for equipment and equipment required.

Fiscal mechanism - although the government supports all service costs, the mechanisms that have been introduced, whether it be the use of the Advance Medical

Priority Dispatch System (AMPDS) or the severity-based discrimination system, can help pay for the operating unit. Reducing unnecessary and improper operations or the introduction of number 111 to reduce unnecessary operations through 999 is a reduction in the budget that supports unnecessary operations (Joint Royal Colleges Ambulance Liaison Committee, 2006).

Equipment and tools - determination of standard equipment and tools is a good idea, and serious preparation will help the operation to be successful. More importantly, it is the ongoing audit, and direct governmental responsibilities in the area.

Manpower - there is a clear pattern of career in this field. Provides a clear career path, continuous learning from past information and issues, is a good example of continuous agency and self-development. Preparing personnel for management is the opportunity for people to develop themselves.

Service system - the continuity of service is a contributing factor and learning from data and past issues. There is an annual report of performance (annual report) that can be accessed by the public via the Internet to acknowledge the service system. Having historical knowledge from the beginning as well as knowing how to choose the system and service model and operating results are of vital importance to users. The results show the public about the service system, understand the service model, their rights, and duties, and what they should be receiving can help the system (Institute of Public Health System Research, 2010).

3.4.4 Emergency Medical Services Systems in Japan

Japan emergency medical system is a Fire Based Design, which is the result of the development to enhance the capabilities of the fire brigade, enabling the Japanese Emergency Operations to aid. In the area of resuscitation and rescue.

Regulation of Japanese law is covered by two laws to control the quality of the service, namely the capacity and quality of emergency medicine. Japan emergency medical system is supervised by the FDMA (Fire and Disaster Management Agency), which is directly affiliated with the Ministry of Interior and Communications. There is a decentralized fire brigade or local command center of each area to manage and develop quality among themselves in accordance with the main policy.

Due to the capacity of local authorities to cover both resuscitation, rescue and firefighting, a single unit has resulted in work related to out-of-hospital operations consisting of patient care, traffic, mass incidents, the fire was ended within a short and concise manner.

Japan online and Offline Medical Control - Japan has a clear structure and determination of the role of medical control. In addition, each local authority is responsible for developing their own areas in accordance with the main policy of the ministry (Yasunaga, Miyata, Horiguchi, Tanabe, Akahane, & Ogawa, 2011).

Fiscal mechanism - all budgets to oversee local operations are allocated from the Ministry of the Interior and through communications through the local FDMA agency. And the operation center has no income from other parts Patients who call for emergency medical care are free. In addition, Japan has a privately owned ambulance system, but it is rarely used and is not used for emergency medical services. This may be due to educating people at all levels about the fundamentals of saving lives and the proper calling of the emergency medical system. Japan's ambulance allocation has a clear system to meet the density of the population in each area, as well as the breadth of coverage, the best service, which can cover 99% of the population of all countries (Suzuki, Nishida, Suzuki, Kobayashi, & Mahadevan, 2008, pp. 166-170)

Manpower - Japan's emergency medical system is divided into 3 levels. The training period and capacity are clearly defined. In addition, procedures under various regulations are regulated and supported by law. Emergency medicine at all levels is based on fire personnel who have gained prior knowledge of situation assessment and rescue skills. Although Japan's emergency medicine is clearly not medical personnel, quality control and training systems require all emergency medicine to be trained or operated in a hospital. Regularly

Emergency Medicine Call and Information Management - Japan has only one number and patients are only cared for by single tiers. Patients are assessed for severity and screened for transferring to the hospital with suitable potential.

An important aspect of the Japanese Emergency Medical System is the introduction of the Geographic Information System (GIS) to identify the patient's location, which allows for shorter response times.

Another benefit of the GIS system is that basic patient information can be recorded and linked to the recording system. The adoption of data management technologies has resulted in operational assessment, quality review and, importantly, the reliability of the data, leading to useful long-term research (Hori, 2010, pp. 131-139).

3.4.5 Emergency Medical Services Systems in Singapore

Singapore Emergency Medical Service System Is a centralized system in a single unit. The budget is funded by the government, the Singapore Civil Defense Force (SCDF), which is a flexible combination of resources, people, equipment, and budgets for development. The Working Group has a clear policy covering services, human resource development, research, training, and social services, resulting in the development of services, information and communication systems, and human resource development. Operations will be distributed to various sub-centers to increase efficiency and flexibility in operations throughout the country, which is isolated as emergency and non-emergency. There is a medical advisory team to develop research and training services, but the agency may have disadvantages as a fire department, so the agency's policy may focus on fire work as a priority (Singapore Red Cross Society, 2013).

Organizational of establishment, guidance, and system governance - establishment of a centralized organization, enabling flexibility in budget management, defining a clear vision and mission. The SCDF oversees all personnel, equipment, and supplies of emergency medical services, enabling comprehensive supervision and standardizing equipment that is compatible across the system (Lateef, & Anantharaman, 2006, pp. 323-328).

Fiscal Mechanism - the budget is funded entirely by the state but has continued to engage in joint activities with various agencies, resulting in some funding from the agency.

Information and Communication Systems - the important information system is the Hospital and Emergency Ambulance Link (HEAL) system, which can connect patient care information at the scene of an accident or an ambulance to deliver to a medical facility. It also reduces the recording and storage time of the operator. And

increase the completeness and accuracy of operational information (Ehud & Kumar, 2010, pp. 9-18).

Equipment and tools - Equipment and tools that are of the same standard throughout the system, making it easy to use, all operators can use the equipment in all departments and can exchange equipment without having to wait for return.

Human resources and manpower - Personnel working in emergency medical services have clear training courses according to standards and require firefighters to train to perform their jobs.

Service system - a service system with only one incident notification center, resulting in sufficient human resources and budget for the development of emergency and non-emergency separation services. And there is a collection fee for non-emergencies. Make people learn and increase their suitability to call for services (Lateef & Anantharaman, 2000, pp. 272-275).

3.4.6 Emergency Medical Services Systems in Taiwan

Taiwan Service System is an emergency medical facility that is like that of Thailand. That is, free service, managed services by the government, has a clear service model, has been classified to suit the needs of the area, resulting in the ability to meet the needs of the people. But it is managed by the National Fire Agency (2021).

Governance and System Guidance - there is a clear and legal department (Emergency Medical Service Act, Fire Service Act). And there is a certification agency for personnel, resources, and directly to the Ministry of the Interior, or the administrative, or Fire work department (maybe from the first group of doctors to study in the United States) resulted in a positive effect on being a practicing agency (Chang, Yiang, Hsu, Huang, & Hu, 2005, p. 17).

Fiscal Mechanism - although the state supports all service expenses, and there may be problems in the future if the service cannot be reduced in patients who do not need to operate as a taxi service.

Equipment and tools - determination of standard equipment and tools is a good idea, and serious preparation will help the operation to be successful. More

importantly, it is the ongoing audit, and direct governmental responsibilities in the area.

Information and Communication Systems - connecting the overview and the system together Using information in management as a learning from performance, both clinical and economic results, can develop a system to achieve development goals.

Manpower - the assistance or cooperation between the Ministry of Public Health in the training and the fire department in the areas of systems and personnel is an important cooperation that has resulted in the continuous development of the emergency medical service system for manpower development. There is a clear pattern of occupation in this field, helping to have clear guidelines for occupation. In addition to the operational level, the provision of personnel for the management of personnel is also an opportunity for personnel to develop themselves and the system. But Taiwan Emergency Medicine belongs to the fire department, he principle of operation therefore emphasizes both rescue and resuscitation (Li, 2006).

Service system - Service connectivity and continuity are contributing factors and learned from past data and issues. In addition, service models are adjusted to suit the context, such as setting up an Emergency Operation Center to prepare and respond to disasters (Wu, Majeed, & Kuo, 2010, pp. 115-119).

3.4.7 Emergency Medical Services Systems in Hongkong

Hong Kong Emergency Medical Service System is an emergency medical service that is like Thailand. That is, free service, provided by the state, a clear service model, service level classification to suit the needs of the area to meet the needs of the people.

Governance and System Guidance - the presence of a clear organization requires quality assurance. It is a mechanism to bring service quality control. Assessment and quality control of service is also useful in allocating a budget to support both equipment and equipment, as well as to implement appropriate operations.

Fiscal Mechanism - Although the state supports most of the costs of the service excludes life insurance and industrial taxation (Wong & Liu, 1999)

Equipment and tools - there are various types of vehicles, including the Mobile Casualty Treatment Center (MCTC) and self-rescuer motorbikes, equipped with equipment and equipment, resulting in alternative resource optimization (Chim & Lau, 2004, pp. 240-244).

Information and Communication Systems - The overview of each part of the system can be connected and supported by the growing demand for services. The Third Generation Mobilizing System (TGMS) was used in the search. Database on the server to quickly bring the scene information displayed on the Monitor and GIS screen, resulting in the system to select the appropriate resources and reach the scene as soon as possible by calculating the actual travel distance (Lo, Lai, & Mak, 2000, pp. 283-287).

Manpower - the roles and responsibilities of personnel are clearly defined, helping to provide guidance for continuous monitoring and manpower development. There is a clear pattern of career in this field. There are quality and progress assessments which can be promoted or receive higher training, resulting in greater morale and encouragement in their work.

Service system - Coordination from the command and connection with the Fire Department results in a good overview. Quality control and assessment can be made easier (Cocks, 2000, pp. 216-219).

3.4.8 Emergency Medical Services Systems in Australia

The Australian Emergency Medical Service is Anglo-America and Ambulance Victoria is an independent organization under the supervision of the Minister of Health. And they have received government funding (Australian Bureau of Statistics, 2020).

Governance and System Guidance - establishment of an organization uses a single dispatch center system to combine resources and the budget is placed in the center as a single unit, resulting in flexibility in budget management, setting a clear vision and mission, as in Thailand that established the Narendera Center. Ambulance Victoria oversees personnel, equipment, and equipment. All the emergency medical services have resulted in a comprehensive supervision and standardization of equipment that is compatible with the entire system.

Fiscal Mechanism - Finance management, finance has laws to support the budget that supports. There are agencies that people apply for membership, resulting in the organization earning part of the income in addition to the state support budget. (Fitzgerald, 2010, pp. 39-49).

Information and Communication Systems - important information systems are map systems linked to basic public information such as name, surname, house number, home phone number, etc. As a result, the organization can access and connect with other information.

Equipment and tools - that are the same standard in the system, resulting in ease of use. All operators can use the equipment in any unit and can exchange the equipment without having to wait for it to return.

Human resources and manpower - It is the allocation of personnel of each type to suit the area and nature of the service work can provide efficient service. Personnel can develop more potential with the support of the organization. Personnel working in emergency medical services have clear and standardized training courses. A professional organization has been established to take care of the welfare of emergency medical practitioners. Personnel have the flexibility to work outside the hospital and coordinate with the emergency room, develop services, knowledge and research work for separate emergency and non-emergency services, it can reduce unnecessary workload.

Service system - The service system has only one incident notification center, resulting in sufficient human resources and budget for the development of emergency and non-emergency separation services. A service fee is collected for non-emergencies, resulting in the public learning, and increasing the appropriateness of service calls (Cvetkovski & Dietze, 2008, pp. 776-783).

3.5 Preliminary Conceptual Framework for Research

From the review of network management concepts, network effectiveness, and literature reviews related to the emergency medical services network the researcher analyzed the initial conceptual framework for the study of the effectiveness of the emergency medical service network organization through careful consideration based

on facts. It was presented a Process Conceptual Framework, which was created gradually during the research process and completed at the end of the research. Focus on conveying meaning through process maps with “Even-State Network” through the link between events and operational processes of the organization, the network of emergency medical services on Fundamentals of Causal Processes, specific stories of people, places, and events in the administration of the pre-hospital emergency medical service network. By operating in chronological order which is a continuous and systematic event in chronological order. In each event, there may be activities that change the state or state of the interest in the study of the effectiveness of the emergency medical services network administration at a certain point in time to a new state that occurred at a certain point in time.

This research focuses on analyzing the operational processes of the Emergency Medical Service Network Organization and analyzing the effectiveness of providing out-of-hospital emergency medical services across the entire network (Provan et al., 2007, p. 446), which is suitable for knowledge development, network management, emergency medical services. The researcher determines the elements of the network evaluation criteria to assess the network effectiveness by integrating the effectiveness at three levels: network effectiveness, organizational level, and community level (Provan & Milward, 1995, 2001). Qualitative and quantitative results were obtained from observation, interviews, group discussions, and document analysis to assess the effectiveness of the emergency medical service network to cover both: 1) the input factors were quantity and distribution of resources, potential, and knowledge of personnel, 2) the processes were response times, validity and service standards, and 3) health results were the survival rate of the patient and the satisfaction of the client population (El-Sayed, 2012, p. 7).

The researcher also considered the incident reporting system, communication system, operating unit, and the involvement of the Emergency Medical Service Network Organization to achieve multi-dimensional and level analysis within the network. Including the emphasis on the consistency of the network management context to provide emergency medical services, can summarize the basic conceptual framework for effectiveness research, namely emergency medical service network as shown in figure 3.4.

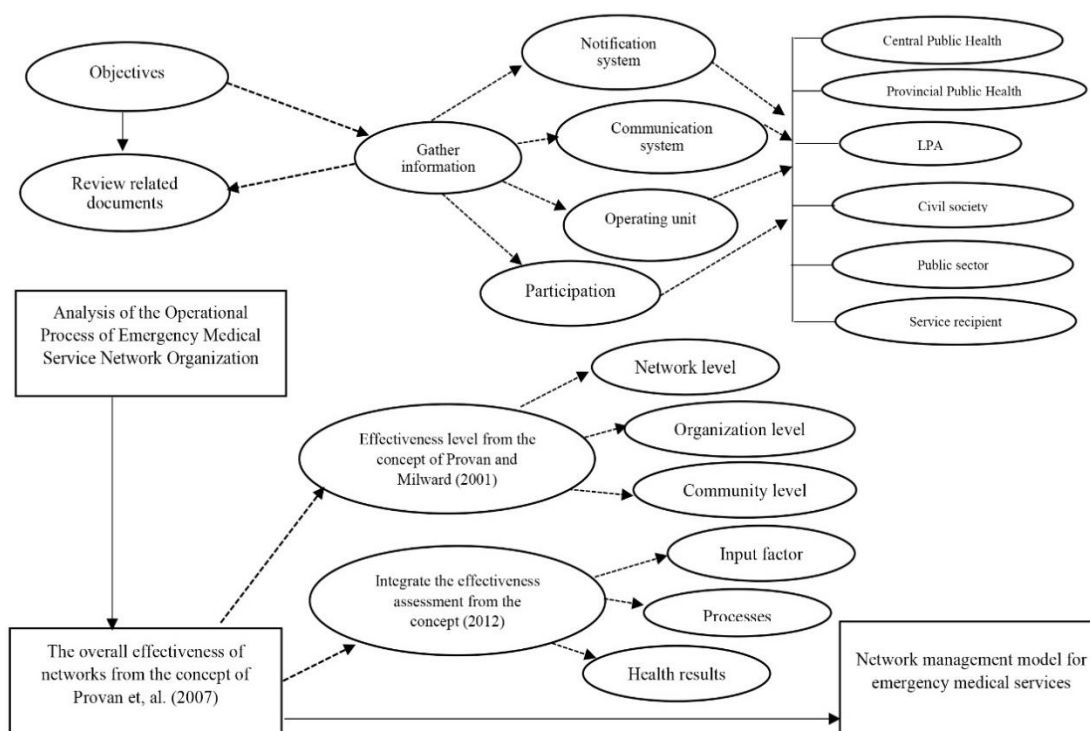


Figure 3.4 Basic Conceptual Framework for the Research on the Effectiveness of Emergency Medical Services Network

CHAPTER 4

RESEARCH METHODOLOGY

This research aimed to study the operational processes and effectiveness of network administration and to present a model of network organization management of emergency medical services that are suitable for Thailand. In this chapter, the researcher presents the research methodology used in this study to cover the following important areas: 1) Research Approach, 2) Unit of analysis, Level of analysis, and Unit of observation, 3) Research Design, 4) Data Gathering, 5) Data Analytics, and 6) Operation plan.

4.1 Research Approach

This study was performed by applying the qualitative research methodology in multiple case studies to set guidelines for researching the answers of the research questions defined.

The qualitative approach was selected in this research, in accordance with the main aim of the study is to understand the operational processes of the Emergency Medical Service Network Organization and the effectiveness of the management of the Emergency Medical Service Network Organization. It is necessary to perfectly understand the conditions of the operating processes and effectiveness in the context of Thailand in order to be synthesized as a model for network organization management. The review of literature indicates the suitability of emergency medical services in Thailand that the emergency medical service network of developing countries such as Thailand is relatively new case, compared to the developed countries. There has not direct support model yet. The related concepts are ambiguous, and the relationships between them have not been confirmed or rejected by empirical findings. When the theory is not sufficiently clear, it is appropriate to use a deductive approach to construct hypotheses and to test them using statistical

methods. In addition, the process of providing emergency medical services to be studied is of qualitative, dynamic and complex nature. Thus, using a qualitative approach, there is a greater opportunity to gain a more in-depth understanding of this phenomenon.

4.2 Unit of Analysis, Level of Analysis, and Unit of Observation

“Analysis unit” means an item that has the characteristics to be studied. In this case, the researcher wants to study the operation process of the Emergency Medical Service Network Organization and the effectiveness of the management of the Emergency Medical Service Network Organization. Therefore, “Emergency Medical Services Networking Process” and “Emergency Medical Services Network Governance” are the analysis units of this study. The operation process of the Emergency Medical Service Network Organization consists of various “analytical levels” at individual, organizational, local, regional, and national levels. Therefore, this study has “Observation unit” to collect data at various levels of individuals participating in public, private and civil society networks that provided LGO of emergency medical services by organizing an emergency operating kit and managing provincial incident and order center to carry out emergency medical work of the Provincial Public Health Office. This includes roles and mechanisms in the administration of the institution of emergency medicine and other environmental contexts.

4.3 Research Design

Research design through qualitative research methodology, focus on understanding of emergency medical service network organization processes, and effectiveness of emergency medical service network organization administration. These are the processes for establishing an appropriate emergency medical service network organization management model in Thailand to apply the methodology, for instead, the case study methods and comparative analysis for logically relating the research objectives and questions as shown in table 4.1.

Table 4.1 The Link between the Research Objective, the Research Question, and the Research Method

Research Objectives	Research Question	Research Method
1. To study the process of operating a network organization of emergency medical services	How is the operation process of the Emergency Medical Service Network Organization?	Case Study Method - Describe a case study
2. To study the effectiveness of the network organization administration of the emergency medical services.	Is the management of the Emergency Medical Service Network Organization effective, how?	- Comparative analysis - Explain the management of the network by causal conditional factors.
3. To present an appropriate model for the organization of emergency medical services in Thailand	What is an appropriate network organization management model for emergency medical services in Thailand?	- Synthesis of a network organization management model for emergency medical services.

4.3.1 Case Study Method

The researcher used the case study as a tool to answer the research question with the operation process and effectiveness of the emergency medical service organization network administration in the form of multiple case studies to examine suitability for selection a case study method. The researchers used the Merriam (1988, p. 8) criterion by defining four main case studies: 1) research questions about “why” and “how”, 2) the researchers were unable to control the factors they wanted to study, 3) the desired result is an in-depth understanding of the case study, and 4) the ability to identify the scope of the education system used compared to the above criteria can be seen that this study will be suitable for the case study method (Table 4.2).

Table 4.2 Suitability for Selecting a Case Study Method

Consideration Point	Characteristics of this Study
1. Research questions about “why” and “how”	The research question at the main of this study is: “How is the operation process of the Emergency Medical Service Network Organization?”
2. Unable to control factors	The researcher could not know all the variables involved, and unable to control those variables, including difficult to distinguish
3. Focus on understanding in depth	The objective of this study is an in-depth understanding of the operational processes and effectiveness of the emergency medical service network administration.

4.3.2 Case Study “Emergency Medical Service Network”

The researcher used the “Emergency Medical Service Network” as a case study. The selected emergency medical services network must be one that focuses on the operations from incident discovery to pre-hospital service, which must cover incident reporting systems, communication systems, operating units, and network participation. Hence, the definition of “Emergency Medical Service Network” for this study is defined as: 1) the central level of the network of emergency medical services are World Health Organization Collaborative Center for Accident Prevention of the National Institute of Emergency Medicine, 2) administration of regional emergency medical services network is provincial public health office, hospital center, provincial hospital, and excellent center. Providing medical services such as accident and crisis treatment centers and community hospitals. Contracting Unit of Primary Care (CUPs) such as Primary Care Cluster (PCC), 3) administration of emergency medical service network at the local level, such as the local government organization (PAO, LAO and

SAO), 4) civil society is foundations and associations, and 5) private organization is private hospitals with an emphasis on operating processes of pre-hospital care only.

Case studies will serve to describe the network of emergency medical services in depth. It will describe both the operational process and the effectiveness of the emergency medical service network organization administration as well as the various factors related to the emergency medical service network appearing in the case study because they want to propose an appropriate emergency medical service network organization management model for Thailand as well. Therefore, in order to see the complete cycle of the emergency medical service network and to increase the understanding of the operation process and the management of the emergency medical service network in depth, information should also be gathered from people who are receiving emergency medical services.

In each case study, the researcher analyzed the data, compared the same and different characteristics, and developed a conceptual model to show the operational processes, network management of emergency medical services, and relevant level factors, by relying on information about procedures, individuals, concepts, qualifications, factors, conditions involved at each stage of the operating process, and the effectiveness of the emergency medical services network management, as well as the relationship between those elements.

4.3.3 Case Study Selection

In this research, the researcher selected four networks of Purposive Sampling to obtain sufficient information and cover the information-rich cases with diversity and operations in the form of a network between each other, the procedure of selecting case studies are as follows:

4.3.3.1 Case Study Source

Case studies of network of emergency medical services, researchers have studied health network information; network structures and elements; network management; emergency medical services both in Thailand and abroad; decentralization of emergency medical management to local government organization; participation in emergency medical services by local government organization, civil society, and the private sector; measuring the effectiveness of

emergency medical services organizations and networks; and performance of emergency medical services in 76 provinces in Thailand and Bangkok; from the emergency medical information system, the Ministry of Public Health inspection report for the fiscal year 2019 (government inspection and supervision system e-inspection, 2019), documents and related research for selecting case studies, setting the observation framework, and interview questionnaires.

4.3.3.2 Criteria for Selecting a Case Study

From the sources of the case studies presented above. The researcher selects a specific case study by establishing the selection criteria on the basis of the following principles.

- 1) The principle of uniqueness is a selection of case studies by highlighting the strengths that appeared only in that case but not in other case studies.
- 2) The principle of diversity is different case studies were selected to observe the possibility of variation.

The researcher selected the emergency medical network from the data study in the first section, with the criteria for selecting the emergency medical network into 2 groups:

- 1) The group that has transferred the management of the provincial emergency medical service centers to PAOs.
- 2) The group has not yet transferred the management of the emergency medical system to PAO.

These two groups were determined based on the percentage of critical emergency patients who started emergency operation within 8 minutes (Performance evaluation criteria of the National Institute of Emergency Medicine, fiscal year 2019). The provinces with performance level 5 (above 50 percent), 1 province and performance level 1 (lower than 46 percent), 1 province were selected from the case study selection process. The researcher had a case study of 4 networks, the details are as follows:

Group 1: The hospital groups that are responsible centers for managing the Emergency Medical Command and Response Center for 2 networks such as Khon Kaen and Nonthaburi.

Group 2: The group has transferred the management of the Emergency Medical Command and Response Center to the LAOs. for 2 networks such as Ubon Ratchathani and Sa Kaeo.

Table 4.3 Case Study Area Performance

Province	The percentage of emergency patients who started emergency operation within 8 minutes	The management of the Emergency Medical Command and Response Center	Note
Khon Kaen	54.30	Khon Kaen Center Hospital	The first province was initiated in the form of emergency medicine management and was in the pilot provinces of official emergency medical development.
Nonthaburi	21.16	Phranangklao Center Hospital	Performance is the lowest in the 4th health service area.
Ubon Ratchathani	54.40	Provincial Administrative Organization	This is the part of the pilot provinces to develop official emergency medical work and the first provinces that have transferred the management of the Continued/...

Province	The percentage of emergency patients who started emergency operation within 8 minutes	The management of the Emergency Medical Command and Response Center	Note
Sa Kaeo	24.86	Provincial Administrative Organization	Emergency Medical Command and Response Center to the PAOs since May 19, 2014. transferred the management of the Emergency Medical Command and Response Center has been transferred to the PAOs since Nov 1, 2017.

Source: National Institute for Emergency Medicine (2019a).

The researcher does not claim that the emergency medical service network selected as a case study represents the entire emergency medical service network of Thailand. In addition to being the target of choice of cases to be studied, the network of emergency medical services is varied and dependent on a wide range of contexts. It is difficult to select one network of emergency medical services to represent the whole network. Nevertheless, the selected emergency medical services network has several distinct features that could be a factor in comparing other emergency medical services networks of similar qualifications.

4.4 Data Gathering

4.4.1 Required Information

The information that will be used as primary information comes mainly from the area of the case study in conjunction with the secondary data. The researcher aimed to collect both qualitative and quantitative data. The characteristics of the information which this study gave special importance to initially were: 1) information about the operations of commanders and personnel on duty in the event of emergency illnesses, 2) information about the roles and decisions of those involved in the emergency medical services network, and 3) network performance information for emergency medical services.

On the other hand, information that is the primary goal of data collection includes:

- 1) General information about the area as a case study
- 2) Background of the provision of emergency medical services in the areas.
- 3) Information related to the network of emergency medical services that appear in the area are:
 - (1) Information about the general condition of the network, such as location, local location, community, member of the network, etc.
 - (2) Information about personnel who perform work such as the number of personnel operating in the emergency area, the number of personnel operating in the area in the location, etc.
 - (3) Information about performance reports, assessment results, etc.
 - (4) Information about the operations and management of the emergency medical service network.
 - (5) Information about factors affecting the network of emergency medical services.
 - (6) Information about the effectiveness of administering a network of emergency medical services in the area.

The data was collected through the methods of documentary education, in-depth interviews, observations, and group discussions (Table 4.4).

Table 4.4 Information to be Collected, the Purpose of Collection, and the Method of Collection

Required Information	Purpose	Method of Collection
1. General information	- To describe the context of the case study area. - To analyze the contextual factors related to the network of emergency medical services.	- Documentary education - In-depth interviews - Non-participant observation
2. Background of local emergency medical services	- To describe - To be explanatory analysis	- Documentary education - In-depth interviews
3. Information about the network of emergency medical services	- To describe - To be explanatory analysis	- Documentary education - In-depth interviews - Non-participant observation
4. Information about the operations and management of the emergency medical service network.	- To be explanatory analysis	- Documentary education - In-depth interviews - Non-participant observation
5. Information about factors affecting the network of emergency medical services.	- To be explanatory analysis	- In-depth interviews - Non-participant observation - Group Discussions
6. Information about the effectiveness of administering a	- To be explanatory analysis	- Documentary education

Required Information	Purpose	Method of Collection
network of emergency medical services in the area.		- In-depth interviews

4.4.2 Data Collection Method and Primary Information Provider

This research study, the researchers used a variety of data collection methods to obtain the most comprehensive information and answers for research questions. The methods used for data collection consisted of documented data collection, in-depth interviews, group discussions, participatory and non-participation observations, which are detailed as below:

4.4.2.1 Documentary Research

The researcher has studied the document and used the information for this study with the following objectives: 1) to study as a research guideline – the researchers study documents and research related to the operation process and administration of emergency medical services network in order to define the research conceptual framework and guidelines for the research study, 2) to study the general condition and the context of the emergency medical service network.

Documents used for this study include news, journals, academic articles, annual reports of NIEM, information from emergency medical information system, Ministry of Public Health inspection reports, and local development plans. Including research related to network organization management and network organization management effectiveness by collecting data as follows:

1) Information obtained from Thai and foreign language documents - The researcher has researched data from the database of the Library Development Office, the National Institute of Development Administration, the website of the Institute of Emergency Medicine, the local government organization, researching additional information from the Internet, etc.; to obtain information and documents necessary to be used in this research.

2) The information is reviewed and summarized, synthesized and analyzed.

4.4.2.2 In-Depth Interview

The techniques used for data collection were interviews, which included semi-structured interviews and group discussions. The researcher has the criteria for selecting the target groups of important informants as follows:

- 1) Public, private, or civil society personnel who have responsibilities or roles directly related to the administration of the emergency medical service network.
- 2) People who have experience in managing emergency medical service networks for at least 3 years.
- 3) Personnel or people who have previously performed emergency medical services.
- 4) People who have experience in using emergency medical services.
- 5) Volunteers who agreed to interview topics to discuss the operational processes of the Emergency Medical Service Network Organization and the management effectiveness of the Emergency Medical Service Network Organization.

To obtain information covering all organizations in the emergency medical service network of each case study. That is, public health, regional, local government, private sector, civil society, and service recipients. The researcher has defined the main informant in each area of the study, as shown in Table 4.5:

Table 4.5 Study of Main Informants in Each Area

Areas	Main Informants	Quantity (Persons)
Central	In-depth interviews	
	- Director of the World Health Organization Cooperation Center for Accident Prevention	1
	- Executive of the National Institute of Emergency Medicine	2
	- Inspector General of the Ministry of Public Health	1
	- Doctor of Public Health	1
	- Director of the Health District Medical Bureau	3
Khon Kaen	In-depth interviews	
	- Provincial Public Health Doctor	1
	- Person in charge of emergency medicine work of PHO.	1
	- Center hospital and provincial hospital administrators	1
	• Physician of directors	1
	- Head of the Excellent center	1
	- Head of the District Health Network	1
	- Local Administrative Organization administrators	1
	- Head of the Emergency medical notification and command center	1
	Group Discussions	
	- Operator teams such as physicians, nurses, Emergency Medical Technician Intermediate units (EMT-I), paramedics, Emergency Medical Technician-Basic units (EMT-B), First	4

Areas	Main Informants	Quantity (Persons)
	responder units (FR), community emergency volunteers (CEV.)	
	- Representatives from private hospitals, foundations, private volunteers	4
	- Participator such as victims, relatives, or people affected in an emergency	4
Nonthaburi	In-depth interviews	
	- Provincial Public Health Doctor	1
	- Person in charge of emergency medicine work of PHO.	1
	- Center hospital and provincial hospital administrators	1
	• Physician of directors	1
	- Head of the Excellent center	1
	- Head of the District Health Network	1
	- Local Administrative Organization administrators	1
	- Head of the Emergency medical notification and command center	1
	Group Discussions	
	- Operator teams such as physicians, nurses, Emergency Medical Technician Intermediate units (EMT-I), paramedics, Emergency Medical Technician-Basic units (EMT-B), First responder units (FR), community emergency volunteers (CEV.)	4
	- Representatives from private hospitals, foundations, private volunteers	4
	- Participator such as victims, relatives, or people	4

Areas	Main Informants	Quantity (Persons)
	affected in an emergency	
Ubon Ratchathani	In-depth interviews	
	- Provincial Public Health Doctor	1
	- Person in charge of emergency medicine work of PHO.	1
	- Center hospital and provincial hospital administrators	1
	• Physician of directors	1
	- Head of the Excellent center	1
	- Head of the District Health Network	1
	- Local Administrative Organization administrators	1
	- Head of the Emergency medical notification and command center	1
	Group Discussions	
	- Operator teams such as physicians, nurses, Emergency Medical Technician Intermediate units (EMT-I), paramedics, Emergency Medical Technician-Basic units (EMT-B), First responder units (FR), community emergency volunteers (CEV.)	4
	- Representatives from private hospitals, foundations, private volunteers	4
	- Participator such as victims, relatives, or people affected in an emergency	4
Sa Kaeo	In-depth interviews	
	- Provincial Public Health Doctor	1
	- Person in charge of emergency medicine work	1

Areas	Main Informants	Quantity (Persons)
	of PHO.	
	- Center hospital and provincial hospital administrators	1
	• Physician of directors	1
	- Head of the Excellent center	1
	- Head of the District Health Network	1
	- Local Administrative Organization administrators	1
	- Head of the Emergency medical notification and command center	1
	Group Discussions	
	- Operator teams such as physicians, nurses, Emergency Medical Technician Intermediate units (EMT-I), paramedics, Emergency Medical Technician-Basic units (EMT-B), First responder units (FR), community emergency volunteers (CEV.)	4
	- Representatives from private hospitals, foundations, private volunteers	4
	- Participator such as victims, relatives, or people affected in an emergency	4
	Total	88

The researcher collected the data by interviewing from various groups of people. In reality, each individual was different from the background, so the researcher used both formal and informal interview methods to emphasize a simple and informal conversation in order to give the informant the confidence in the researcher and give the information as possible, the methods are as follows:

1) Formal Interview - in the interview, the researcher has broadly defined the subject matter of the study to allow the respondents the freedom to answer.

2) Informal Interview - the researcher has interviewed the people involved such as Director of the World Health Organization Cooperation Center for Accident Prevention, Executive of the National Institute of Emergency Medicine, Provincial Public Health Doctor, Center hospital and provincial hospital administrators, Head of the Excellent center, Head of the District Health Network, Local Administrative Organization administrators, Head of the Emergency medical notification and command center. Operator teams such as physicians, nurses, Emergency Medical Technician Intermediate units (EMT-I), paramedics, Emergency Medical Technician-Basic units (EMT-B), First responder units (FR), community emergency volunteers (CEV.). Representatives from private hospitals, foundations, private volunteers as well as participator such as victims, relatives, or people affected in an emergency. The researcher has broadly defined the subject matter of the study. There are 4 main characteristics: 1) the open format has not limited to the responses of the informants to enable the informant to answer questions fully and freely, 2) the format has a specific focus or in-depth to get the information the researcher needs, 3) persuasive style, in which interviews are made to get the feelings and attitudes of people in the field towards a particular subject. It is the method in which the investigator must be as cautious about the disclosure questions of informants, and 4) main informant interviews are specific interviews that are knowledgeable and explained.

The nature of the investigator's interviews emphasized informal discussions on general matters or about network activities of emergency medical services, including the results of management, and then link it to the issue that the researcher needs later.

4.4.2.3 Focus Group Discussion

To study the process and effectiveness of network administration, including proposing a model for network management organization of emergency medical services suitable for Thailand. The researcher collected information from groups of people who have knowledge and expertise in emergency medical services,

network management, effectiveness evaluation, and that area emergency medical services. The researchers focus on simple and informal conversations, create a relaxed atmosphere without over-tension, and balance the needs of the participants by controlling the action on the main topic including openness, listen, deep following, and consideration of alternatives to conclusions and corroborating the outcomes of the objectives, including reviews of matters that may still be incomplete and additions to the issues (if any).

Questions are characterized by an open-ended question such as “What do you think about the implementation of the process?” or “What do you think is most important to the effective management of an emergency medical network organization?”, etc. They must avoid using only the right or wrong answers to select the questions. The researcher has procedures for collecting the information from the interview as follows:

- 1) The researcher made a request letter to interview and collect information and submitted to a target group of 88 main informants.
- 2) The investigator clarified the issue of the interview and requested assistance to schedule an interview with the target group.
- 3) The researcher conducted an interview with a target group of 88 informants together with the research team.
- 4) The researcher took notes of conversations, images, and audio of every material received from the interview.
- 5) The investigator checked the correctness and completeness of the returned interviews and used the data for further analysis and processing.

4.4.2.4 Observation

The researcher used participant and non-participant observation by attending monthly meetings between organizations in the Emergency Medical Service Network and observing the network operating conditions, local context, communities, relationships among members of the network, internal communication, interaction on social media including various activities of the network of emergency medical services.

4.4.3 Research Instruments

4.4.3.1 Building Research Tools

The qualitative research tools have the following steps in creating research tools.

- 1) Study methods to create semi-structured interviews from secondary data, including documents, academic textbooks, theoretical concepts, and related research.
- 2) Define the format of the interview topic in accordance with the research objectives and terminology.
- 3) Create a semi-structured interview tool and verify it for accuracy and completeness.
- 4) The questionnaire tool was presented to the thesis advisor to verify the validity of the theoretical content, the variety, the idioms of the language, and to make corrections.

4.4.3.2 Research Instruments

The tools used by the researcher to collect the qualitative data in this research were:

- 1) Semi-structured interview is divided into 5 parts: questions about operational processes and administrative effectiveness of the Emergency Medical Service Network Organization to find the linkages of mechanisms at different levels of mechanisms, with details of tools or semi-structured interviews in each part are as follows:

Part 1 The main informant provides five basic interviews with the following questions:

- 1) Name-surname of the main informants as an open-ended tool.
- 2) Position (represents direct relevance to the administration of the Emergency Medical Service Network Organization) as an open-ended tool.
- 3) The experience in operating an emergency medical service network as an open-ended tool.

4) The period of time it has been to emergency medical services is an open-ended tool.

5) The voluntary interview is a type of checklist tool.

Part 2 The interview questionnaire concerned the process of the Emergency Medical Service Network Organization consists of the issue of process-based interviewing and operating procedures for emergency medical services in 6 issues as follows:

1) Interview issues regarding the process of the emergency and the detection consist of the educational issues related to the information as follows:

(1) Process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

(2) Problems and obstacles of the process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

2) Interview issues regarding the process of the reporting consist of educational issues related to the information as follows:

(1) Process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

(2) Problems and obstacles of the process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

3) Interview issues regarding the process of the emergency medical unit response consist of educational issues related to the information as follows:

(1) Process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

(2) Problems and obstacles of the process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

4) Interview issues regarding the process of the emergency medical treatment at on scene care consist of educational issues related to the information as follows:

(1) Process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

(2) Problems and obstacles of the process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

5) Interview issues regarding the process of the care in transit consist of educational issues related to the information as follows:

(1) Process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

(2) Problems and obstacles of the process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

6) Interview issues regarding the process of the transfer to definitive care consist of educational issues related to the information as follows:

(1) Process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

(2) Problems and obstacles of the process of emergency illness procedures and the organization mechanisms for emergency medical services at each level.

Part 3 The interview questionnaire concerned the administrative effectiveness of the Emergency Medical Service Network Organization, which consisted of interview points according to the evaluation framework of the management effectiveness of the Emergency Medical Service Network Organization, divided into 4 components as follows:

1) Administrative effectiveness interviews relate to elements of the emergency medical notification system. (Policy formulation / planning, administration, and development of communication system of emergency medical service network / able or unable? / How to? / What are the obstacles? / Why? / What are the solutions? / and What is the result?)

2) Administrative effectiveness interviews relate to elements of the emergency medical communication system. (Policy formulation / planning, administration, and development of communication system of emergency medical service network / able or unable? / How to? / What are the obstacles? / Why? / What are the solutions? / and What is the result?)

3) Administrative effectiveness interviews relate to elements of the emergency medical operation unit. (Policy formulation / planning, administration, and development of communication system of emergency medical service network / able or unable? / How to? / What are the obstacles? / Why? / What are the solutions? / And What is the result?)

4) Administrative effectiveness interviews relate to elements of the network participation to administer and perform emergency medical operations. (Policy formulation / planning, administration, and development of communication system of emergency medical service network / able or unable? / How to? / What are the obstacles? / Why? / What are the solutions? / What factors influence the participation and support of work from various sectors, including the private sector, civil society, and local communities in the area? / and What is the result?)

5) Administrative effectiveness interviews relate to elements of the emergency medical performance evaluation process. (Policy formulation / planning, administration, and development of communication system of emergency medical service network / able or unable? / How to? / What are the obstacles? / Why? / What are the solutions? / and What is the result?)

Part 4 The interview questionnaire concerned factors and the managements of the network mechanism for emergency medical services that was the most successful in 3 areas. (What is the management of the network? / What was the characteristics of success? / Why was the management successful? / What are factors support and support success? / Why do factors support success?)

Part 5 The interview questionnaire concerned problems and obstacles, and the managements of the network mechanism that was the most unsuccessful in 3 areas. (What is the management of the network? / What are the characteristics of the unsuccessful? / Why is it not successful? / What problems are the obstacles to success? / Why?)

1) Recording interviews - the researchers will use a sound recording method to help record information from the interview, but the investigator will always ask the informant's permission. They will record with permission.

2) The transcribed interviews -when the investigators have recorded audio from the informants, they are transcribed to note the points and analyze, interpret, synthesize, and conclusions.

3) Image recording - The researcher uses imaging methods to bring reflections or reminders and to recall the context and atmosphere that occurred by observing during the interview. If any photos are used for confirmation or whatsoever, the researcher will always ask permission of the person in the picture first.

4.5 Data Analytics

After the researcher entered the field to collect data. The researcher performed the management of information along with the collection of information such as data attenuation, data review, data analysis, and using data from analysis to record research reports. The process of preparing the information has the characteristics and details as follows:

4.5.1 Data Attenuation

In each field study, the investigator took detailed field records, after which the investigator will review the recorded data and determine what relevance to the study issue. Then the researcher will compile the data to clearly compile the study issue such as steps of the network management process for emergency medical services, elements of relationships within and outside the network, in addition, the researcher will add opinions or analysis points derived from the subject.

4.5.2 Data Verification

As researchers collected field data the accuracy and completeness of the data in terms of validity and certainty was verified using a three-prong verification method (Triangulation Technique). The technique can be observed by targeting audiences by

collecting data from primary actors (personnel in the network of emergency medical services), third parties (World Health Organization Cooperation Center for Accident Prevention), and those affected by emergency medical services (participant), as well as analyzing documented data.

4.5.2.1 Verification of Data Completeness (Data Triangulation) - when the researcher collected the data, they can prove that “Is that information accurate?” by examining the data from the source. That are sources of information about time, place, and people. This verifies the accuracy of the information that when the information received has different time, location, and person, it will be the same or not. This can be seen from the diverse collection targeting from primary actors (personnel in the network of emergency medical services), third parties (Representatives from relevant external organizations), and those affected by emergency medical services (participant).

4.5.2.2 Verification of Data Reality - the researcher used the data fact checking by data collection method. The researcher used a variety of methods to collect data on the same subject, including observation, interview and document analysis.

4.5.2.3 Verification of Data Integrity and Reliability - the researcher examined the data by analyzing the collected data and then submitting it to main informants and related parties for review that “Are the researchers interpreting it correctly or not?”. And since the researcher took a long time to collect the data, the main points were accurately examined and understood.

4.5.3 Data Analysis of this Research, the Researcher Analyzes the Case Study Data Using the Following Methods

Data analysis consists of three main parts: (1) the descriptive analysis is a detailed description of the case study by developing the collected data to gain an understanding of the emergency medical service network management process, (2) the analysis of the effectiveness of the emergency medical service network administration through the conceptual framework of the research together with qualitative data collected from each case study, and (3) the analysis through

presenting an appropriate emergency medical service network management model for Thailand

4.5.3.1 Descriptive analysis

This is an in-depth description of the case studies. The researcher had to use both qualitative and quantitative data to describe various aspects of the issue in the case study, covering the following areas:

Characteristics of Emergency Medical Service Networks - describe the characteristics of emergency medical service networks to create a basic visualization of the area.

Community and Context - this section primarily describes the physical case study of the community area. These include resources on location, population, socio-economic status, emergency illnesses that occur in the overall area.

Emergency Medical Service Network - This section describes the characteristics of the management, operation of the Emergency Medical Service Network Organization according to the necessary elements.

A portrayal is a presentation of the facts that have been discovered from the area on the issues already mentioned by focusing on the classification, classification of information from techniques that can be used are: Content Analysis, Event Listing, Event flow Network, Role Analysis. However, analytical techniques still depend on the patterns of the actual collected data and the emergence of unexpected but significant issues on the study.

4.5.3.2 Explanatory Analysis

The explanatory analysis is an analysis to understand the different steps in the operation process of managing an emergency medical service network, including the conditions affecting the appropriate emergency medical service network model in Thailand.

This section analyzes the case studies from the previous descriptions, focusing on the separation of steps in the emergency medical services network management implementation process.

Another part is to distinguish the changing appearance of the emergency medical service network.

In addition, the descriptive analysis is a comparative analysis of different case studies to identify the set of conditions associated with the presence or absence of a network model of emergency medical services by analyzing the conditions for studying some of the doctrines in Qualitative Comparative Analysis (Ragin, 1989; Ragin, Shulman, Weinberg, & Gran, 2003). The qualitative comparative analysis assumed that any causal factor would show its influence in conjunction with another, so the relevance of different factors will not be able to reach the results if only one factor is considered. But it will be understood if other relevant factors are taken into account. Therefore, the goal of the qualitative comparison method is based on identifying which combination of factors differs from the other combinations.

The qualitative comparison technique also has assumptions about “Causal Heterogeneity”, which means having multiple options in a combination of factors that could lead to the same outcome. This technique is aimed at finding the least combination of factors that produce the desired descriptive results (Ragin, 1989, pp. 374-375).

Since the researcher is a physician and has a position as Assistant Director of the Medical Bureau, Health Region 6 (responsible for Chonburi, Rayong, Chanthaburi, Trat, Samut Prakarn, Chachoengsao, Prachinburi and Sa Kaeo), it has an advantage in understanding and analyzing the data obtained by gathering of document, observation, and interviews. And although the researcher is a doctor, it is not involved in the emergency medical service (the researcher is a rehabilitation physician), so he does not cause a bias to analyze the data in this emergency medicine research work.

4.6 Operations

The study consisted of three work sessions: identification and design, data collection and analysis, and synthesis and summarization as follows.

4.6.1 Identification and Design Range

- 1) Identification of research objectives and research questions

- 2) Conceptual Model Development (Research conceptual framework)
- 3) Choosing a Case Study Together
- 4) Design of Data Collection Structure

4.6.2 Data Collection and Analysis Range

4.6.2.1 Data collection in the case study area starting with

1) Preparation for field studies

(1) When the researchers select a case study, they will coordinate with the caregiver of the case study to request data collection for the research by submitting a request to the emergency medical services network of the case study.

(2) The researchers will determine the duration to collect field data for that case study.

(3) Researchers understand methods, procedures and issues for data collection through observation, interviews, and document analysis.

(4) Researchers provide field data collection equipment, including notebooks, files and documents, audio recorder, camera, etc.

2) Field study planning

Researchers have established a field study plan, study duration, and data access plan to make fieldwork effective. They have also defined out information on the management model, organization, emergency medical service network, and integration to suit the Thai context systematically and effectively, as defined in Table 4.6.

Table 4.6 An Overview of the Field Study Plan

Objective	Activity	Data source
1. To study the process of operating a network organization of emergency medical services	- In-depth interviews - Non-participant observation - Group	- Director of the World Health Organization Cooperation Center for Accident Prevention - Executive of the National

Objective	Activity	Data source
	discussion	Institute of Emergency
	- Document	Medicine
	study	- Provincial Public Health Doctor
		- Center hospital and provincial hospital administrators
		- Head of the Excellent center
		- Head of the District Health Network
		- Local Administrative Organization administrators
		- Head of the Emergency medical notification and command center
		- Operator teams such as physicians, nurses, Emergency Medical Technician Intermediate units (EMT-I), continued/paramedics, Emergency Medical Technician-Basic units (EMT-B), First responder units (FR), community emergency volunteers (CEV.)
		- Representatives from

Objective	Activity	Data source
		private hospitals, foundations, private volunteers
2. To study the effectiveness of the network organization administration of emergency medical services.	- In-depth interviews - Non-participant observation - Group discussion - Document study	- Director of the World Health Organization Cooperation Center for Accident Prevention - Executive of the National Institute of Emergency Medicine - Center hospital and provincial hospital administrators - Head of the Excellent center - Head of the District Health Network - Local Administrative Organization administrators - Head of the Emergency medical notification and command center - Operator teams such as physicians, nurses, Emergency Medical Technician Intermediate units (EMT-I), paramedics, continued/... - Emergency Medical

Objective	Activity	Data source
3. To present an appropriate emergency medical service network organization management model for Thailand.		Technician-Basic units (EMT-B),
	- In-depth interviews - Non-participant observation - Group discussion - Document study	- First responder units (FR), community emergency volunteers (CEV.) - Representatives from private hospitals, foundations, private volunteers - Past Performance - Director of the World Health Organization Cooperation Center for Accident Prevention - Executive of the National Institute of Emergency Medicine - Provincial Public Health Doctor - Center hospital and provincial hospital administrators - Head of the Excellent center - Head of the District Health Network - Local Administrative Organization administrators - Head of the Emergency

Objective	Activity	Data source
		medical notification and command center - Operator teams such as physicians, nurses, Emergency Medical Technician Intermediate units (EMT-I), continued/... paramedics, Emergency Medical Technician-Basic units (EMT-B), First responder units (FR), community emergency volunteers (CEV.) - Representatives from private hospitals, foundations, private volunteers - Participator such as victims, relatives, or people affected in an emergency

4.6.2.2 Planning of Access to Information

The researchers have planned to access to the data by disclosing the identity of the investigator with a group of informants who are Director of the World Health Organization Cooperation Center for Accident Prevention, Executive of the National Institute of Emergency Medicine, Provincial Public Health Doctor, Center hospital and provincial hospital administrators, Head of the Excellent center, Head of the District Health Network, Local Administrative Organization administrators, Head

of the Emergency medical notification and command center. Operator teams such as physicians, nurses, Emergency Medical Technician Intermediate units (EMT-I), paramedics, Emergency Medical Technician-Basic units (EMT-B), First responder units (FR), community emergency volunteers (CEV.). Representatives from private hospitals, foundations, private volunteers as well as participator such as victims, relatives, or people affected in an emergency since the beginning of the collection until the end of the collection for collecting the most consistent and objective information. The researcher has a background as a physician and thus understands the role of healthcare professionals, providing access to insights and real data.

4.6.2.3 Relationship Building

For collecting this field data, researchers have established strong relationships with the informants since the start of the field until the end of the research process in order to obtain truthful information. The personnel being researched differed in their status, social roles, thoughts, attitudes, values, beliefs, sex, age, and education. Therefore, the researcher created relationships according to different groups of people. The researcher is in the status of a physician, thus able to build relationships and get cooperation from personnel in the emergency medical service network of each case study.

4.6.2.4 Data Collection

Before starting a research proposal, the researcher has arranged an informal interview with Dr. Phairoj Boonsiri Khamchai as Deputy Secretary-General of the National Institute of Emergency Medicine and Dr. Pichet Nong Chang as Director of the Office of Emergency Medical Coordination on February 9, 2018 to understand the overview of emergency medical services and the context of each organization in the Emergency Medical Service Network of Thailand by visiting Khon Kaen on 22 March 2018 and Ubon Ratchathani 26 March 2018 in order to explore the real working conditions of the network and create a basic understanding. From the preliminary interviews and fieldwork, the advantage is that he has gained an understanding of how the research was conducted and the research questions followed. It also builds familiarity and ties with the area, resulting in easy access to data, diverse and accurate data collection. Complete data collection process, the researcher has to interview Dr. Wittaya Chat Banchachai, as a qualified physician and

director of the World Health Organization Cooperation Center for Accident Prevention, twice: the first time was an informal talk on February 4, 2019 and the second was a semi-structured interview on March 15, 2019. After that, he officially interviewed Dr. Phairot Boonsirikhamchai as Deputy Secretary-General of the National Institute of Emergency Medicine and Dr. Pichet Nongchang as Director of the Office of Emergency Medical Coordination of National Institute of Emergency Medicine in a semi-structured form, one time each on April 30, 2019, and participated in the non-participation observation of the 13th National Emergency Medicine Symposium 2019 on May 29-31, 2019.

Data collection in Khon Kaen Province Researchers went to Khon Kaen Province 4 times because it is the first province and the researcher does not have the expertise to collect the data. The first time, June, 24-27 2019, went to the observation area to interview, collect data and study documents in the Muang district. Beginning with the Khon Kaen Center Hospital, which is the model of emergency medicine in Thailand by interviewing the nurse head of the emergency medical center; group discussion with the Emergency Operations Director, the Emergency Operations Manager, the Emergency Operations Coordinator, and the Emergency Service staff; interviewing the Chief Physician of the Accident and Crisis Therapy Center, Chief Emergency Medicine Officer, Emergency Operations Director, Accident and Emergency Supervisor Nurse; group discussion with medical emergency operatives, medical emergency operatives, rescuers at Khon Kaen Hospital; Nong Kung Family Doctor Clinic, Sila Subdistrict, Mueang Khon Kaen District; interviewing emergency room nurses as service recipients, Khon Kaen Provincial Public Health Office, Provincial Public Health Doctor, and Emergency Accident Supervisor. The second time, July 1-3, 2019, went to the provincial administrative organization area to interview the President of the Provincial Administrative Organization, Head of the Department of Disaster and Environment; went to the Sila municipality to interview the Mayor of Sila Town, Director of the Division of Public Health and Environment, Head of Public Health Service; group discussions with personnel working in the Sila Municipal Rescue Service and the Khon Kaen Highway Patrol Rescue Unit; visited Bangkok Hospital Khon Kaen to interview the advanced paramedics of Bangkok Hospital Khon Kaen. To better

understand and overview the work of the Emergency Medical Operation Unit of Khon Kaen Province, the researcher went to Khon Kaen for the third time to observe non-participation with basic level rescuers, Sila municipal rescuers, and attended the EMS Day meeting on July 22, 2019, at the invitation of Dr. Wittaya Chatbanchachai. The meeting was held at the Khon Kaen Provincial Public Health Office once a month on a monthly basis. The fourth time, the researcher went to the area to discuss with the rescuers at Sam Sung Hospital, Samran Subdistrict Municipality, Nong Ko Subdistrict Municipality, Ban Phai Town Municipality, Ban Non-Subdistrict Administrative Organization, Ban Ton Subdistrict Municipality, Nong Makhuea Subdistrict Administrative Organization, Tha Phra Sub-district Municipality, Ban Haet Sub-District Municipality, and Nong No Sub-District Municipality, on July 31, 2019.

The case study of Nonthaburi Province is a province close to Bangkok so it can travel easily. The researcher started by visiting the area for data collection at Phranangklao Center Hospital, on August 1-2, 2019 by interviewing the head nurses of the alert and command center; group discussion with the Emergency Operations Supervisor, the Emergency Operations Dispatcher, the Emergency Coordinator, and the Emergency service staff; interviewing the chief physician of the emergency accident center, chief physician of the emergency medicine, the accident and emergency supervisor nurse; group discussions with medical emergency responders, medical emergency responders Phra Nang Klao Resuscitation Unit; And interviewing relatives of patients in the emergency room of Phranangklao Hospital as service recipients. The second time on August 5, 2019, visited Bang Bua Thong Hospital to interview a nurse at the emergency room and the paramedic at Bang Bua Thong Hospital. The third time on August 14-15, 2019, visited the Nonthaburi Provincial Health Office to interview the Provincial Public Health Doctor and Head of the NCDs Control Division; Provincial Administrative Organization to interview the President of Nonthaburi Provincial Administrative Organization; Nonthaburi City Municipality to interview the Mayor of Nonthaburi and group discussion with the personnel working in the paramedics of the Nonthaburi Municipality. The fourth time, August 20-21, 2019 went to the area to interview the director of the Medical Bureau of Health Region 4; visited the Chest Disease Institute to observe the practice of delivering patients of the non-participating paramedics and interviewing the referral nurses at the

Emergency Room of the Chest Disease Institute; visited Vibharam Pakkred Hospital to interview emergency room nurses in the emergency room and to group discussion with the personnel working in the Vibharam and Burapha Rescue Service, Nonthaburi.

Researchers went to Ubon Ratchathani province to collect all emergency medical services network 3 times. The first time on September 25-27 2019, went to the area to observe, interview, collect data, and study documents at the Ubon Ratchathani Emergency Medical Command and Report Center, which has already transferred the management to the Ubon Ratchathani Provincial Administrative Organization; begin by interviewing the Chief Health Promotion Nurse, Quality of Life Promotion Division, and discussing a group with the Emergency Operations Supervisor, the Emergency Operations Coordinator, and the Emergency Response staff; also group discussion with personnel working in the moral resuscitation unit and interviewing Deputy Permanent Secretary of Ubon Ratchathani Provincial Administrative Organization (acting in lieu of the Permanent Secretary PAO, and perform duties as Prime Minister of the Ubon Ratchathani Provincial Administrative Organization); went to Sanphasitthiprasong Hospital to interview the chief nurse of the referral center, the chief nurse of the emergency nurse, the chief physician of the accident and crisis treatment center, the head physician of the emergency medicine group, the emergency operations director, the accident supervisor and emergency, relatives of emergency patients who were brought to the emergency room by the paramedics and a group discussion with medical emergency responders, medical emergency responders, paramedics; also interviewed with the Director of the Medical Bureau of Health Region 10; Visited Sanpasit Inter Hospital to interview emergency room nurses operating in Sanphasit Inter paramedics; visit the Ubon Ratchathani Provincial Public Health Office to interview the Provincial Public Health Doctor and Head of the Emergency and Disaster Medicine Division. The second time, October 7-9, 2019, went to the area to collect emergency medical service networks at community hospitals and sub-district health promoting hospitals located around Mueang District, namely Warin Chamrap Hospital to interview doctors of emergency medicine and have a group discussion with personnel operating in the Warinchamrab Rescuers; Visited the Trakan Phuet Phon Hospital to interview the

emergency room nurses and the Trakan Phuet Phon operating unit; visited Ban Pao Health Promoting Hospital to interview emergency medical staff working in Ban Pao rescuers and community emergency volunteers in Ban Pao Subdistrict, and to discuss groups with personnel who served in the Ghitam koa Rescuers. Since Ubon Ratchathani Province has an area of more than 40,000 square kilometers, if you want accurate and complete information covering the network of emergency medical services in remote areas of the city district, the researcher went to the area for the third time on October 23-25, 2019 to collect data at Nam Yuen Hospital Nam Yuen District to interview emergency room nurses and perform paramedics. And a group discussion with Pho Sai Subdistrict Municipal Rescue Unit, Rom Pho Sai Subdistrict Rescue Unit, Khok Chan Subdistrict Administrative Organization, Muang Si Kai Subdistrict Municipality Rescue Unit. Ubon Ratchathani Province has an area of more than 40,000 square kilometers. The researcher needs accurate and complete information covering the network of emergency medical services in remote areas of Muang District, so the researcher had visited the area for the third time on October 23-25, 2019 to collect data at Nam Yuen Hospital, Nam Yuen District to interview emergency room nurses and rescuers, including a group discussion with the Pho Sai Subdistrict Municipality, Rom Pho Sai Rescuers, Khok Chan Subdistrict Administrative Organization, Muang Sri Kai Subdistrict Municipality Rescue Unit.

Sa Kaeo Province was the last province where researchers went to the area to collect data. Although Sa Kaeo Province has an area of only 7,000 square kilometers, most of the area is mountainous and complex, which makes it difficult to travel. Therefore, the researcher divided the data collection area into 3 times for the first time, from November 4-7, 2019, collecting data by observation, interview, collecting, and analyzing documents at the Sa Kaeo Emergency Medical Notification and Command Center, which has been transferred the administrative authority to the Provincial Administrative Organization, the same as the province of Ubon Ratchathani. He visited the incident and command center to interview head nurse of the emergency response and command center, as well as discuss groups with the emergency response superintendent, emergency responders, emergency coordinators, and Emergency service staff, personnel working in the rescue service, Sa Kaeo Provincial Administrative Organization; visited the area at the Sa Kaeo Provincial

Administrative Organization to interview the President of the Sa Kaeo Provincial Administrative Organization; visited the hospital area of Somdej Phra Yuaparat Sa Kaeo to interview deputy medical director, chief physician of the emergency medicine department (also served as the chief nurse of emergency operations), chief nurse of emergency medical care, chief nurse of Accident and emergency treatment, Emergency relatives who were taken to the emergency room by the rescuers of Yuparaj Sa Kaeo Hospital, including group discussions with emergency medical practitioners, emergency medical operators, rescuers; visited the area at Yuparaj Sa Kaeo Hospital to chat with monks and the people who participated in the emergency medical volunteer program organized by the Sa Kaeo Royal Hospital at Wat Tham Khao Chakan and chat with the personnel at Perform duties in the rescue unit Sawang Sa Kaeo Dhammasathan Foundation. And the third time, the researcher collected the data by participating in the non-participation observation in the EMS Day meeting on November 27, 2019, which was held every last Wednesday of the month at the Sa Kaeo PAO. every month: and join a group discussion with personnel who perform duties in the rescue unit of Wang Thong Municipality, Paramedics - Rescue SAO., Phraphloeng Subdistrict Rescue Unit, the rescue unit of Tambon Wang Thong subdistrict, Fire Buddha SAO., as summarized in Table 4.7.

Table 4.7 Summary of Data Collection of 4 Case Studies

Case Studies	Date	Agencies	Activities	Main Informants
Before starting a research proposal, and select a case study	Feb 9, 2018	NIEM.	- Informal interview	- Dr. Phairot Boonsirikhamchai, MD. - Dr. Pichet Nongchang
	Mar 22, 2018	Khon Kaen	- Informal interview	- Head of the Emergency medical

Case Studies	Date	Agencies	Activities	Main Informants
				notification and command center
	Mar 26, 2018	Ubon Ratchathani	- Informal interview	- Head of the Emergency medical notification and command center
	Feb 4, 2019	World Health Organization Cooperation Center for Accident Prevention	- Informal interview	- Dr. Wittaya Chatbanchachai, MD.
Central of public health	Mar 15, 2019	World Health Organization Cooperation Center for Accident Prevention	- In-depth interview	- Dr. Wittaya Chatbanchachai, MD.
	Apr 30, 2019	NIEM.	- In-depth interview	- Dr. Phairot Boonsirikhamchai, MD. - Continued/... - Dr. Pichet Nongchang -
	May 29-31, 2019		- Non-participant observation	- 13th National Conference on Emergency

Case Studies	Date	Agencies	Activities	Main Informants
Khon Kaen	Jun 24-27, 2019	Khon Kaen Hospital	- In-depth interview	Medicine
				- Head of the Emergency medical notification
				- Head of the Accident and Crisis Treatment Center
				- Head of Emergency Medicine Group
Nong Kung		Family Doctor Clinic	- In-depth interview	- Emergency Medicine Physician
				- Physician Director
				- Accident and Emergency Supervisor Nurse
				- Incident notification officer
PHO.			- In-depth interview	- Emergency operator
				- Nurse of an emergency room
				- Physician of Provincial Health Office

Case Studies	Date	Agencies	Activities	Main Informants
				- Accident and Emergency Supervisor
	Jul 1-3, 2019	PAO.	- In-depth interview	- Prime Minister PAO
				- Head of Disaster and Environment
		Sila Municipality	- In-depth interview	- The mayor of Sila
				- Director of the Division of Public Health and Environment
				- Head of Health and Recreation Services
			- Group discussion	- Emergency operator
		Highway Police Rescue Bangkok	- Group discussion	- Emergency operator
		Hospital Khon Kaen	- In-depth interview	- Emergency operator
	Jul 22, 2019	Sila municipality	- Non-participant observation	- Emergency operator
		PHO.	- Non-participant observation	- EMS Day

Case Studies	Date	Agencies	Activities	Main Informants
	Jul 31, 2019	- Sam Sung Hospital - Samran Sub-district Municipality - Ban Phai Municipality - SAO. of Ban Non - Ban Ton Sub-District Municipality - SAO. of Nong Makhuea - Tha Phra Sub-district Municipality - Ban Haet Subdistrict Municipality - Nong No Sub-District Municipality	- Group discussion	- Emergency operator - Continued/...
Nonthaburi	Aug 1-2, 2019	Phranangklaeo Hospital	- In-depth interview	- Head of the Emergency medical notification - Head of Emergency

Case Studies	Date	Agencies	Activities	Main Informants
				Medicine Group
				- Emergency Supervisor Nurse
				- People
			- Group discussion	- Incident notification officer
				- Emergency operator
Aug 5, 2019	Bang Bua Thong Hospital		- In-depth interview	- Nurse
				- Emergency operator
				- Continued/...
Aug 14-15, 2019	PHO.		- In-depth interview	- Physician of Provincial Health Office
				- Head of the non-communicable disease control group
	PAO.		- In-depth interview	- Prime Minister PAO
	Nonthaburi City Municipality		- In-depth interview	- The mayor of Nonthaburi
			- Group discussion	- Emergency operator
Aug 20-21, 2019	Medical Department		- In-depth interview	- Director of the Medical Bureau of Health Region 4
	Chest Disease		- In-depth	- Nursing referring

Case Studies	Date	Agencies	Activities	Main Informants
Ubon Ratchathani	Sep 25-27, 2019	Institute	interview	patients
		Nonthaburi City Municipality	- Non-participant observation	- Operation of the rescuers of Nakornnon municipality
		Vibharam	- In-depth interview	- A nurse
		Pakkred Hospital	- Group discussion	- Emergency operator
			- Rescue Burapha Nonthaburi	- Emergency operator
		Notification Center	- In-depth interview	- Head of the Emergency medical notification
				- Incident notification officer
			- Group discussion	- Emergency operator
		PHO.	- In-depth interview	- Deputy Permanent Secretary PAO
				- Head of Public Health Promotion Division, Quality of Life Promotion Division
		Medical Department	- In-depth interview	- Director of the Medical Bureau of

Case Studies	Date	Agencies	Activities	Main Informants
				Health Region 10
		Sanphasitprasong Hospital	- In-depth interview	- Head of Emergency Medicine Group
				- Head of the Accident and Crisis Center
				- Physician Director
				- Emergency Nursing Supervisor
				- Head of Referral Center
				- People
			- Group discussion	- An emergency operator
		Sanpasit Inter Hospital	- In-depth interview	- A nurse
		PHO	- In-depth interview	- Doctor of Provincial Health Office
				- Head of the Emergency and Disaster Medicine Division
				- Continued/...
	Oct 7-9, 2019	Warin Chamrap Hospital	- In-depth interview	- Emergency Medicine Physician

Case Studies	Date	Agencies	Activities	Main Informants
			- Group discussion	- Emergency operator
		Trakan Phuet Phon Hospital	- In-depth interview	- A nurse
		Ban Pao Hospital	- In-depth interview	- Emergency operator
				- Community emergency volunteer
		Ubon Ratchathani Chitam Koa Charity Foundation	- Group discussion	- Emergency operator
	Oct 23-25, 2019	Nam Yuen Hospital	- In-depth interview	- A nurse
				- Emergency operator
		- Rom Pho Sai Subdistrict Municipality	- Group discussion	- Emergency operator
		- Khok Chan Subdistrict Administrative Organization		
		- Mueang Si Kai Subdistrict Municipality		
Sa Kaeo	Nov 4-7, 2019	Notification Center	- In-depth interview	- Head of the Emergency

Case Studies	Date	Agencies	Activities	Main Informants
				medical notification
				- Incident notification officer
		PAO.	- In-depth interview	- Prime Minister PAO
		Sa Kaeo Hospital	- Group discussion	- Deputy director
				- Physician Director
				- A nurse
				- Emergency operator
				- People
		Sawang Sakaeo Dhammasathan Foundation	- Group discussion	- Emergency operator
		Wat Tham Khao Chakan	- Group discussion	- A priest
				- People
Nov 18-20, 2019		Ministry of Public Health	- In-depth interview	- Inspector General of the Ministry of Public Health
				- Physician of Public Health
		Medical Department	- In-depth interview	- Director of the Medical Bureau of Health Region 6
		PHO	- In-depth interview	- Provincial public health president
				- Head of the non-communicable

Case Studies	Date	Agencies	Activities	Main Informants
				disease control group
				- Accident and Emergency Supervisor
	Nov 27, 2019	Khao Chakan Hospital	- In-depth interview	- A nurse
		PAO.	- Non-participant observation	- Emergency operator
		LAO.	- Group discussion	- EMS Day
				- Continued/...
				- Emergency operator

4.6.3 Case Study Analysis

- 1) Describing the case study
- 2) Analysis of the processes and effectiveness of the management of the emergency medical service network, including the conditions related to the effectiveness of the emergency medical service network administration.

4.6.4 Model Synthesis of Medical Service Network Management

The researcher used data from all four case studies to create an overview of the sub-events as a result of various events. Then synthesize it as a model for the management of emergency medical services in the form of Inductive Approach. And after, preparing a description report and analytical description that are the ultimate outcome of this study.

4.7 Research Ethics

In this study, the researcher focused on the ethical issues of research. In which the researcher has carried out various principles of research ethics as follows:

1) Role of the researcher in conducting research when the researcher enters the area of conducting the study.

The researcher clarified the main informants or study participants on the subjects of the researcher's status that the researcher was etc. In addition to conducting this research, the researcher revealed the identity of the overt by explaining to the study participants that “Who is the researcher?”, “What is the researcher conducting?”, “What is the purpose of the researcher”, and “How will the research results be used?”.

2) Clarification with the study participants to ensure their personal safety.

Before beginning any interview, group discussion, or inquiry; the researcher will introduce himself and clarify the confidentiality issues of the main informants by concealing the names or the status of the main informants, and without identifying the identities of the contributors. The presenting the conduct information will be represented by a representative code such as “Interviewer No. ...” or “Informant No. ...” instead of identifying the name or location of the main informant. Before processing the data, the researcher requests permission to collect the data, sound, or data recording. However, if the contributor does not permit the information or ceases the provision of the information, the researcher will immediately stop the data collection process; or if, while the subject matter requests that the information be not recorded in any way or does not permit the recording, the researcher will not record the information as requested by the contributor. In addition, when the research is over, the investigator has proceeded to erase and destroy all the information that has collected.

4.8 Conclusions

This is because this study aims to build an understanding of the operations of the Emergency Medical Service Network Organization, the qualitative research methodology is an appropriate research guideline to be used as a guideline for the study by assigning “Network Operational Process” and “Network Organization Administration” were analyzed by the researcher and conducted a total of 4 case studies. Case studies were selected based on their specificity and diversity.

The emergency medical service networks of Khon Kaen, Nonthaburi, Ubon Ratchathani, and Sa Kaeo provinces were selected as a case study in an in-depth study of both the operational process and the effectiveness of the emergency medical service network administration.

The data collection was conducted by interviewing persons directly involved with the emergency medical service network and stakeholders in the emergency medical service of all 4 provinces as case studies. In addition, the researcher also relied on secondary data on the process and administration of the emergency medical service network of the four provinces to be used for analysis by focusing on the operating process from incident discovery to pre-hospital service only. By the researcher will focus on analyzing issues such as incident reporting, communication systems, operating units, and network participation.

CHAPTER 5

EFFECTIVENESS OF EMERGENCY MEDICAL SERVICES NETWORKS RESULTS

In this chapter, the study results are the description of the process and effectiveness of the emergency medical service networks in 4 provinces presented in the following order, 1) Khon Kaen, 2) Nonthaburi, 3) Ubon Ratchathani and 4) Sa Kaeo.

5.1 Khon Kaen

5.1.1 Operating Process of Emergency Medical Services network in Khon Kaen

5.1.1.1 General Condition of Emergency Medical Services in Khon Kaen

1) Background of Emergency Medical Services in Khon Kaen

The emergency medical services in Khon Kaen are considered the first province and the starting point for systematic emergency medical services in Thailand. Dr. Wittaya Chatbanchachai, who at that time was a surgeon at Khon Kaen Hospital, was the founder who formed a team and network to develop a transferring system for accident patients in 1989 with a budget from the World Health Organization for establishing an accident center in Khon Kaen Hospital and a committee for patient service system development at the scene of the incident. In 1992, the Khon Kaen Charity Foundation was opened as the first private rescuer in Khon Kaen and the region aiding services for traffic accident patients in Khon Kaen municipality. The Khon Kaen Provincial Police Station was used as an assistance command center using 191 as an emergency number. Then, in 1994, Khon Kaen Hospital established a live rescuer at Khon Kaen Hospital as the first public rescuer

unit of regional public health, with objectives to improve the quality of patient assistance at the scene of incident and reduce mortality and disability among the injured patients. Initially, there were 6 rescuers who were drivers and trained to be the First Responder (FR). A small emergency medical controlling center was established at Khon Kaen Hospital using all hospital's budget. Later, there was a push for the establishment of rescuer units in all public hospitals in Khon Kaen, due to the fact that a network could reduce the time of access to the incident area and increase the effectiveness of emergency care outside hospitals. Therefore, connections with relevant agencies were developed in an integrated way using both formal and informal forms, for example, organizing a meeting and dining forum with the governor as a president and the heads of government agencies as participants and Khon Kaen Hospital as the host. Hospital administrators began to realize the importance of this issue. Personnel were sent to attend training for emergency patient care at the scene of incident, establishment of rescuer unit and development of a seamless connection of emergency medical services system up to the community level. The command center of Khon Kaen Hospital served as the host for receiving the incident news via telephone number 043-237137, while the Muang Provincial Police Station served as the co-host using hot-line number 191. Upon receipt of the incident news, the rescuers would be notified to help patients at the scene of the incident, and brought them to the hospital faster, resulting in the first time that a traffic accident patient was taken to the hospital by rescuer unit.

In 1994, The Trauma Center was established. The Trauma Fast Track was started by clearly determining policies, work structure, personnel, workflow, information system, roles and duties in service units and roles and duties as a working team in networks at different levels, for example, hospital level and international level. The system was designed for Trauma Center to cooperate with ER, Trauma Ward, ICU and Burn Unit with Trauma and Emergency Committee, Trauma Director, Committee Mission, Direction and Master Plan. Networks were created and expanded by using proactive processes to find and recruit relevant agencies for cooperation. Information was prepared to present to the management team or head of agencies in order for them to see the importance of providing emergency medical services. Then, a project was created for all related sectors to work together. It was

important to appreciate and encourage well-performing organizations to encourage and inspire the development of emergency medical care by relying on the participation of multidisciplinary and reliable and up-to-date information systems. The Trauma Center of Khon Kaen Hospital was the inspiration for the National Emergency Medicine Act 2007.

Dr. Wittaya Chatbanchachai introduced the concept of the World Health Organization and adopted a prototype from the United States. The key principle was helping the emergency illness patients outside the hospital to survive, who must work with the hospital. When considering The Star of Life, Figure 5.1, the symbol of the Emergency Medical System was a six-pointed star, where each of which represented six steps or key elements in ensuring the survival of the emergency patient as followed. 1) Detection: When an accident occurred, the incident must be reported by a good citizen or an eyewitness. 2) Reporting: Reporting for assistance to the emergency incident and command center. 3) Response: The response was to send the nearest and most appropriate emergency medical services for operation and assistance. 4) On scene care: On scene care was to prevent the patients from a life-threatening condition. 5) Care in transit: Caring for patients during the transfer to hospital. 6) Transfer to definitive care: Transfer patients to an appropriate medical facility. Part 1 and Part 2 were the responsibility of the community. Without the first part, the others could not continue. Also, the rescuer was the closest person to the patient or victim if the hospital was unable to take an ambulance to pick up patients in their area on time. Having its own rescuers in each area could reach patients faster. This concept, led to the creation of a network consisting of public hospitals, private hospitals, local government organizations (Provincial Administrative Organization, Municipality and Sub-district Administration Organization), foundations and volunteers. There were 3 levels of designed resuscitation network. 1) The community resuscitation network was responsible for reporting news, requesting help and providing primary care of patients before the rescuers would arrive at the scene of the accident. Responsible agencies included municipalities, communities, social medicine units of every hospital, volunteer in the community, relatives of chronic disease patients, teachers, students in the community, with knowledge and understanding of reporting incidents to the Incident and Command Center as well as first aid for the

patient while waiting for the ambulance to arrive. 2) Sub-district resuscitation network was the outpost in reaching out to the people, providing basic resuscitation services, including coordinating cooperation with the provincial network and community network. Local government organizations, city municipalities, sub-district municipalities and sub-district administrative organizations were responsible for the network at this level. 3) Provincial resuscitation network was responsible for designing the management system, connecting networks into unity, developing operational standards and personnel, supervision, monitoring and evaluation, providing services to patients of all severity levels, especially in critical patients, and serving as a mentor for operating rescuers at other levels. All hospitals in the province, hospital centers, university hospitals, general hospitals, community hospitals, private hospitals, private foundations, Sirithon College of Public Health, Boromarajonani College of Nursing, Provincial Health Office and Provincial Administrative Organization were responsible agencies in the network at this level. Khon Kaen started by expanding the establishment of sub-district rescuers to local administrative organizations in Muang Khon Kaen district in 1995, resulting in an available of 20 rescuers in all 20 municipalities in Mueang Khon Kaen District. It started with encouraging the awareness among local government organizations by organizing meetings with the governor as a meeting president, inviting Chief of Provincial Administrative Organization, mayor and chief of subdistrict Administrative Organization to attend the meeting and discuss the establishment of rescuers. Some areas with existed foundation's rescuers shall proceed the implementation. Khon Kaen Hospital would help to organize the system and set standards to be consistent across the province. The first phase of its operation was funded by the Japan International Cooperation Agency (JICA). This concept was a very important turning point. As a result, in 1996, the Ministry of Public Health began to recognize the importance and necessity of rescuers. Regional Hospital Division, the Ministry of Public Health, issued a policy for all provincial hospitals to establish a resuscitation unit as those at Khon Kaen Hospital. Therefore, in 1997, Khon Kaen Hospital held a hospital meeting in surrounding provinces located in the 7th health area, including Kalasin, Mahasarakham and Roi Et, to establish a network of management for out-of-hospital patient care system and evacuation of emergency patients with emergency sickness or

injury, including transferring them to the appropriate hospital. The network was expanded by persuading other provincial hospitals in the Northeast to join in building a system for the advanced emergency medical system of the Northeast region and strengthened network. Later, the National Health Security Office (NHSO) began to realize the importance and supported the budget for emergency medical services in the amount of 10 baht per capita, and the budget for on incident response to high-level operation units for 1,000 baht per time, intermediate-level for 750 baht per time, basic-level for 500 baht per time, and basic-emergency team for 350 baht per time. The budget supported by the NHSO was another important part of the expansion of all sub-district in Khon Kaen to provide emergency medical services (Public Health Office of Khon Kaen, personal communication, August 6, 2020).



Figure 5.1 The Star of Life

Source: Ems.gov (n.d.).

As the emergency medical system of Khon Kaen expanded for more services on the incidents, there was a problem of insufficient rescuers. Khon Kaen Hospital solved the problem by trying to create sub-district rescuers throughout the province and strengthening the emergency medical service network of Khon Kaen as followed. 1) Organizing a regular monthly meeting of the rescuers network throughout Khon Kaen, called EMS day. It was a platform where all parties have the

opportunity to exchange and learn experiences together, solve problems and resolve disputes, as well as adjust for mutual understanding. In addition to the rescuers, there were provincial health offices, hospitals, local administrative organizations and the police departments attended the meeting as well. The police could give advice or suggest issue required by law at the meeting immediately. For connecting networks and sectors as well as seeking cooperation, solving problems with the provincial emergency medical service system, Khon Kaen Hospital would use the EMS Day meeting as the main stage. Therefore, most policies, driving forces, connections and solutions to problems would be determined from this stage. 2) Organizing meetings between hospitals in Khon Kaen regarding the provision of emergency medical services was held on a monthly basis. 3) Organizing a meeting of emergency medical services at the 7th service area level every 2 months. 4) Organizing an EMS Rally academic meeting for networks to meet and exchange experiences at both provincial and national levels, allowing a stage to exchange knowledge and share it to other provinces. 5) Assigning the community hospitals of each district to act as a mentor to the sub-district rescuers in the district, causing rescuers in the area to join together in unity with direction. 6) Determining regulations for the provision of emergency medical services of the province. 7) Organizing training to review and increase knowledge on a regular basis. 8) Building personnel for the emergency medical service system by coordinating with the Royal Institute of Public Health and the Sirindhorn College of Public Health in Khon Kaen, to conduct a pilot project and create a 2 years course of Certificate of Public Health (Resuscitation) in 1996, in order to produce medical emergency personnel (EMT-I) to operate the patient service system at the incident scene.

In 2001, Khon Kaen Hospital opened the Accident and Emergency Center, and established the Office of the Rescue Unit with an emergency medical service system command and communication center on the 5th floor of the building. There was the War Room, a meeting room, for the support in the event of a disaster, which was funded by the Japanese government under the project named “The Project for Development of Trauma Center Complex” in the amount of 80 million baht. After the completion of the project, the Japanese government invited the project leader to be a guest speaker to present a model for the development of accident

centers in foreign countries. There was a national seminar on traffic accidents to present the results of the development of models and operations in the emergency medical system (EMS) in various provinces. Also, annual national seminars have been held regularly until now. The World Health Organization has approved Khon Kaen Hospital as the first academic cooperation center for “Injury Prevention and Safety Promotion” in Southeast Asia, with Dr. Wittaya Chatbanchachai as the responsible person (Director of the Center). It was scheduled to provide training for medical personnel in the member countries of the South-East Asia Regional Office (SEARO) consisting of the Lao, Cambodia, Myanmar, Indonesia, Philippines, Malaysia, Singapore, Brunei, Vietnam and Thailand. The trainings were in the field of Injury Prevention and Safety Promotion, which each of them would be attended by 4 medical personnel from each country. The training has been scheduled to be held once a year from 2003 until the present. In addition, Dr. Wittaya still believed that in order to reduce the number of accidents, the participation of many organizations to carry out the work was required. Therefore, it was proposed to the fund management for the Promotion of Health (Thai Health Promotion Foundation) in 2005 that there should be a mobilization of people with knowledge and competence in 6 areas, namely Education, Enforcement, Engineering, EMS, Empowerment and Evaluation, to create a “Project to support the prevention and mitigation of road accidents in pilot provinces”. The project was operated in 51 provinces by dividing into 2 phases. The Phase 1 was operated in 26 provinces, Phase 2 was operated in 25 provinces, and Phase 3 was the overall of all provinces.

In 2006, the Accident-Emergency Service System Development Committee, Public Health Group 6 (District 10 and 12), Ministry of Public Health, was appointed to establish policies to develop an emergency-accident patient service system in District 10 (Udon Thani, Nong Khai, Nong Bua Lam Phu, Amnat Charoen) and District 12 (Kalasin, Mahasarakham, Roi Et), determine guidelines for normal and emergency command for accident patients, and mobilize regional assistance according to the situation. This committee determined guidelines for indicating the level of urgency (severity) of emergency cases across the province, who were able to enter the express channel of Khon Kaen Hospital and / or Srinagarind Hospital without having to prior go through the referral system to the hospital center in the

district, as well as integrated multidimensional assistance to support the operation of each other with the preparation of guidelines as a working manual. This committee has had a continuous meeting to find the direction to develop the system together every 2 months until now. In 2009, Dr. Wittaya Chatbanchachai, who at that time was an expert in emergency medical system and prevention of traffic accidents, was appointed as the operating committee of the GRSP Collaboration Program on Community Youth Helmet Use Project. Also, the Royal College of Surgeons of Thailand appointed Dr. Wittaya as the Chair of the Accident Committee of the Royal College of Surgeons of Thailand and the consultant for the development of emergency room service system of the Bangladesh Ministry of Health. Later, in 2010, WHO appointed Dr. Wittaya Chatbanchachai as WHO Specialist in Trauma Quality Improvement Program (TQI Program). Later, Dr. Wittaya organized the training of TQI Program for the heads of surgery groups across the country in 2012, as well as jointly promoted the WHO Global Alliance on Trauma Care, as the leader of the model of Trauma System of Thailand, and jointly conducted the WHO SEARO Recommendation on Child Traffic Injury Prevention.

Dr. Wittaya Chatbanchachai was one of the key forces in driving the establishment of a systematic emergency medical service in Thailand. With his knowledge and experience, he was invited to participate in an executive level meeting to formulate an emergency medical strategy. From the meeting, it could be concluded that the importance of organizing national emergency medical services must begin with the following actions. 1) Establishing a main institution that is responsible for emergency medical services. 2) Establishing an effective command communication system. 3) Establishing a service personnel development system. 4) Creating an emergency medical service model in all provincial hospitals, while suggesting the government to be aware of the importance of emergency medical services at the same time. As a result of these efforts, the National Emergency Medicine Act in 2008 enforced to establish the National Institute of Emergency Medicine (NEDA), the Emergency Medicine Committee with Dr. Wittaya Chatbanchachai as the Emergency Medicine Committee and Chairman of the Strategic Subcommittee for the Development of Emergency Medical Service) and allocated a budget for emergency medical services. After that, NEDA introduced the

Khon Kaen emergency medical service model for implementation throughout the country.

Khon Kaen has continuously developed the emergency medical service system by giving given importance to both the prevention and the care, since 1991 until now. There was a campaign to encourage 100% of the province population to wear helmets while riding. The Ambulance Station and Trauma Center were established in Khon Kaen Hospital. A national seminar was organized on the topic of zoning division for emergency medical services. Each rescuer was responsible for caring for patients in their own area. The World Health Assembly Resolution Subcommittee was proposed to consider setting a “Trauma Care” as a standard for all medical institutions to perform in a same direction. The Motorway for Trauma and Emergency Fast Track Project was started to provide services for 3 groups of diseases (Stroke, STEMI, Head Injury) in Khon Kaen by developing at the community level, so that the injured patients and those with cardiovascular disease - cerebrovascular disease could be treated promptly. The community resuscitation network structure was developed by volunteers to cover all areas with emergency medical service system that was able to respond to the incident notification. There were appropriate advice and coordination with destination hospital in preparation for accepting patients. Guidelines for the treatment of patients in all 3 disease groups were given for community hospitals. A fast and efficient patient transferring system was developed. There were 2 operating Excellence Centers, namely Khon Kaen Hospital and Srinagarind Hospital, Khon Kaen University, as the host of cardiovascular diseases (STEMI Fast Track) and Stroke Fast Track. There were creating teams and expanding networks in the Northeast region and other provinces, mainly relying on private relationships like brothers and sisters, teachers and students, which enabling rapid network expansion. Srinagarind Hospital team supported knowledge, human resource development and all matters. An information system was developed to connect ITEMS data of the National Emergency Medical Institute with the E-claim database about traffic accident cases of central companies. An information system was organized for the development using Patient Center principles and Clinical Decision Support as a model for preparing Trauma Registry for other provinces.

National Institute of Emergency Medicine had a pilot project to seek a model and management approach in the form of a fund under Section 33 of the Emergency Medicine Act 2008. In 2010, a budget of 100,000 baht was given per province in a total of 13 pilot provinces, including Khon Kaen, Nong Bua Lam Phu, Chon Buri, Phitsanulok, Surat, Nan, Lamphun, Satun, Ayuthaya, Saraburi, Chonburi, Ubon Ratchathani, Nakhon Ratchasima, so that each province would seek a model for developing an emergency medical system as a model for other provinces. Dr. Wittaya Chatbanchachai established the “Khon Kaen Emergency Medical Fund” in 2012, which operated by integrating with network partners within the province. The main leader was the Accident and Crisis Treatment Center, Khon Kaen Hospital. Later, the name was changed to “Khon Kaen Emergency Medical Foundation”. The development of emergency medical services in Khon Kaen was summarized in chronological order in Figure 5.2.

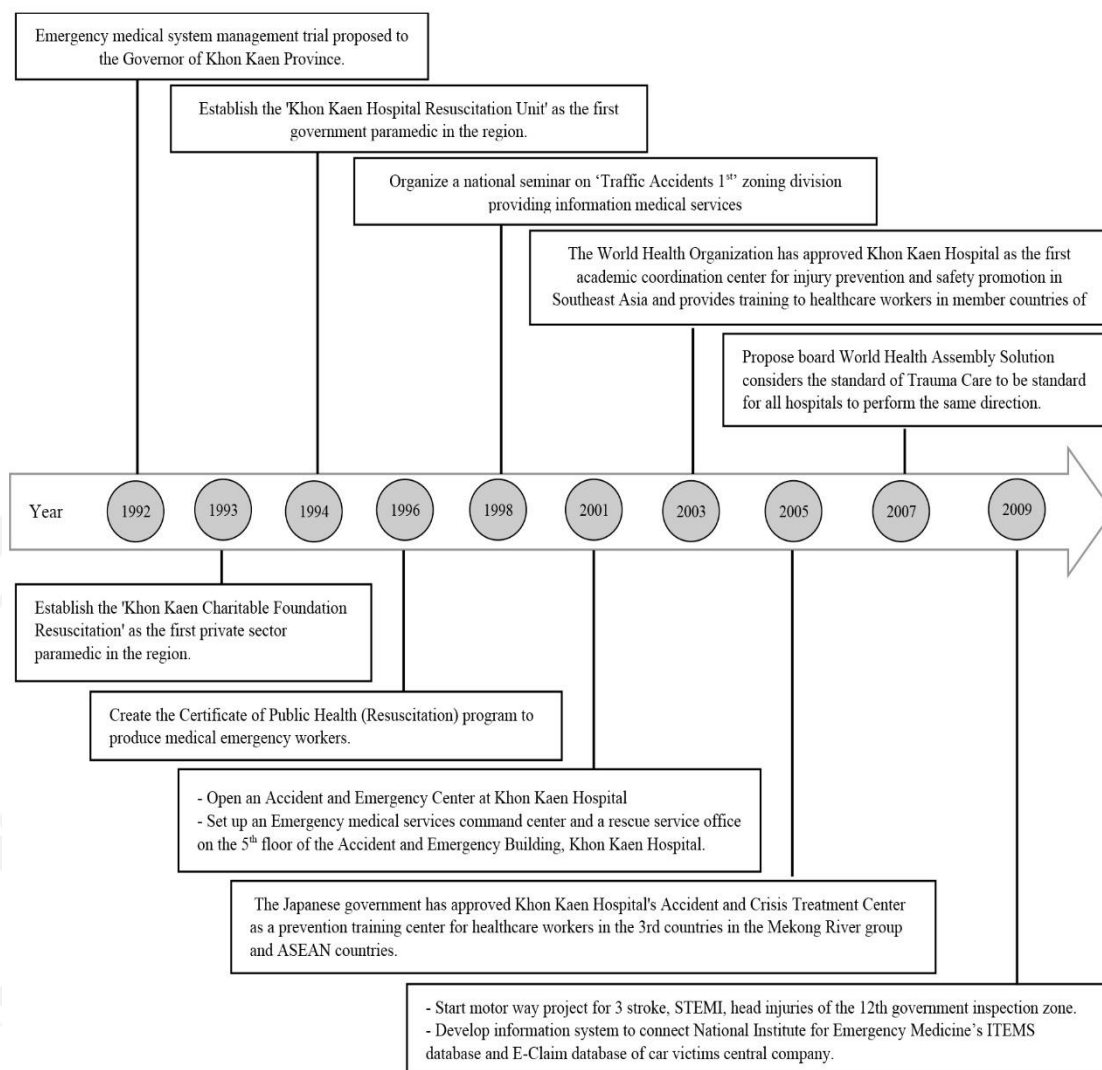


Figure 5.2 Development of Emergency Medical Services in Khon Kaen in Chronological Order

2) General Conditions Related to the Processes of Emergency Medical Services

In Khon Kaen – Emergency medical services in Khon Kaen were supported by the cooperation from many local government organizations. The Department of Local Administration organized approximately 340 rescuers, which operated for more than 60% of total cases. There were 26 community hospitals in total. There were 19 units of foundations' rescuers located in the Muang district for 6 foundations, namely Khon Kaen Highway Police Foundation, Sawang Khon Kaen Unity Uthit Foundation, Jitkusol Foundation, Thepsitthimuni Foundation, Wat Sawang Wittaya Foundation, Wat Pa Saeng Arun Foundation, and those located outside the Muang District for 13 foundations. Every foundation was strong and be a major force of emergency medical services in Khon Kaen. At present, 7 small sub-districts in Khon Kaen still lack life rescuers. Those areas are rescued and supported by their neighboring sub-districts instead. Rescuing operation of hospitals were different from those provided by local authorities and foundations. The Emergency Medical Command and Emergency Service Center of Khon Kaen Hospital was responsible for making decisions and ordering the rescuers to cases according to the severity of the patients. For patients with red level of severity, the hospital would order hospital's rescuers to operation at the scene of incident. Meanwhile, for patients with yellow and green levels of severity, the hospital would order the Department of Local Administration's rescuers and foundations' rescuers to the scene of incident for operation. The command center of Khon Kaen had developed a lot compared to other provinces. It was the largest incident command center in Thailand, despite the command center of the Provincial Administrative Organization of Songkhla that combined life rescuers, accident rescuers and police together, while the one at Khon Kaen was only one resuscitation. With over 100,000 notified incidents/year and within 8 minutes of time to reach the scene, this could be considered as target achieved (Director of the World Health Organization Cooperation Center for Incident Prevention, personal communication, February 4, 2019). Dr. Wittaya Chatbanchachai believed that the emergency command center should be under the management of a hospital or provincial public health office because the incident command center had to

be able to classify the severity of patients, operate appropriately, be able to give advice to rescuers when there is a problem on the scene.

Currently, the work of emergency medical services of Khon Kaen Provincial Health Organization was under the Non-communicable Disease, Mental Health and Drugs Prevention Division, responsible for inspecting the performance standards of personnel, operations and emergency vehicles of the operation unit to be in accordance with the standards specified by the NESDB, as well as preparing a registration, reviewing the documents and approving the disbursement of emergency operations (Doctor at Khon Kaen Provincial Health Organization, personal communication, June 25, 2019).

The management of emergency medical services in Khon Kaen had a structure divided into 4 responsibilities, including 1) communication, public relations and coordination, 2) personnel development, 3) development of ambulance vehicles and resuscitation network, and 4) performance evaluation, as shown in Figure 5.3.

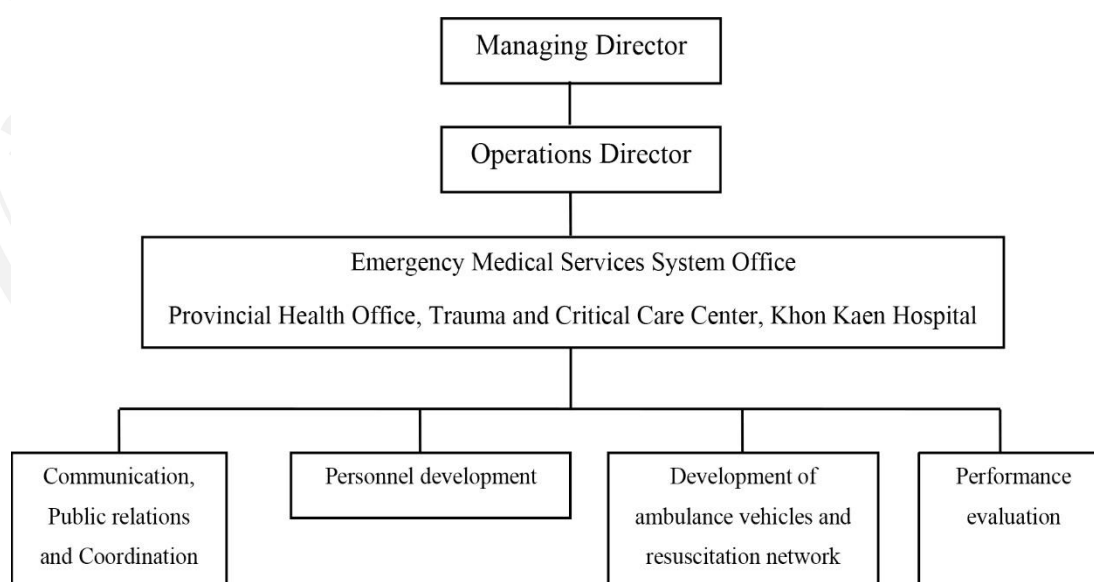


Figure 5.3 Structure of Emergency Medical Services Management in Khon Kaen

Source: Khon Kaen Provincial Public Health Office (2020).

Board of Directors of the Emergency Medical Services System in Khon Kaen consisted of the provincial governor as the president, provincial public health doctor as a member and secretary, Dr. Wittaya Chartbanchachai and Dr. Kasem Patararitthikul as members and assistant secretaries. The committees came from 1) heads of various government agencies or their designated representatives, including the private sector, 2) directors of all central hospital, general hospitals, private hospitals and community hospitals, 3) public health of every district, and 4) various rescuers, volunteers and foundations. The committee was responsible for setting up policies and plans for the implementation of the emergency medical services system, coordinating and cooperating with various departments to resolve related problems between departments, and supporting research in the emergency medical services system.

The Committee of Khon Kaen Emergency Medical Services System Office consisted of the provincial public health doctor as the president and doctors who played emergency medical roles as members and secretary. The committee came from personnel of the provincial public health office, command center, central hospital, general hospitals or community hospitals. Their responsibilities were as followed. 1) Setting provincial standards based on the central. 2) Prescribing criteria for allocation of service areas, quality control and evaluation, as well as compensation for service units based on the central. 3) Supervising the operations of the provincial coordination and command center and the provincial emergency medical services system office. 4) Distributing plans for providing knowledge plans on emergency medical services according to the curriculum or training to all levels of personnel, including focusing on training the general public to be efficient reporters thoroughly. 5) Considering and making decisions on various issues as specified and presented by the Provincial Emergency Medical Service System Office.

The Committee of the Office of Emergency Medical Services System established 7 strategies for emergency medical services in Khon Kaen as followed. Strategy 1 – The organization of emergency medical services before reaching the hospital – The areas of providing emergency medical services were allocated to cover the entire province by dividing the areas into 6 zones with a

designated main hospital per each zone to act as a mentor giving academic support, caring and transferring patients, as shown in Table 5.1.



Table 5.1 Khon Kaen Emergency Medical Services Areas Allocation

Zone	Area	Head Zone Hospital
1	Mueang District, Ban Fang District, Phra yun District, Ban Haet District	Khon Kaen Hospital
2	Nong Ruea District, Phu Wiang District, Wiang Kao District, Nong Na Kham District	Phu wiang Hospital
3	Nong Ruea District, Phu Wiang District, Wiang Kao District, Nong Na Kham District	Chumphae Hospital
4	Ban Phai District, Mancha Khiri District, Chonnabot District, Pueai Noi District, Non Sila District, Khok Pho Chai District	Ban Phai Hospital
5	Phon District, Waeng Noi District, Waeng Yai District, Nong Song Hong District	Phon Hospital
6	Nam Phong District, Kranuan District, Ubolratana District, Khao Suan Kwang District, Sam Sung District	Kranuan Crown Prince Hospital



Service area division and number of resuscitation-rescue vehicles, Khon Kaen Province

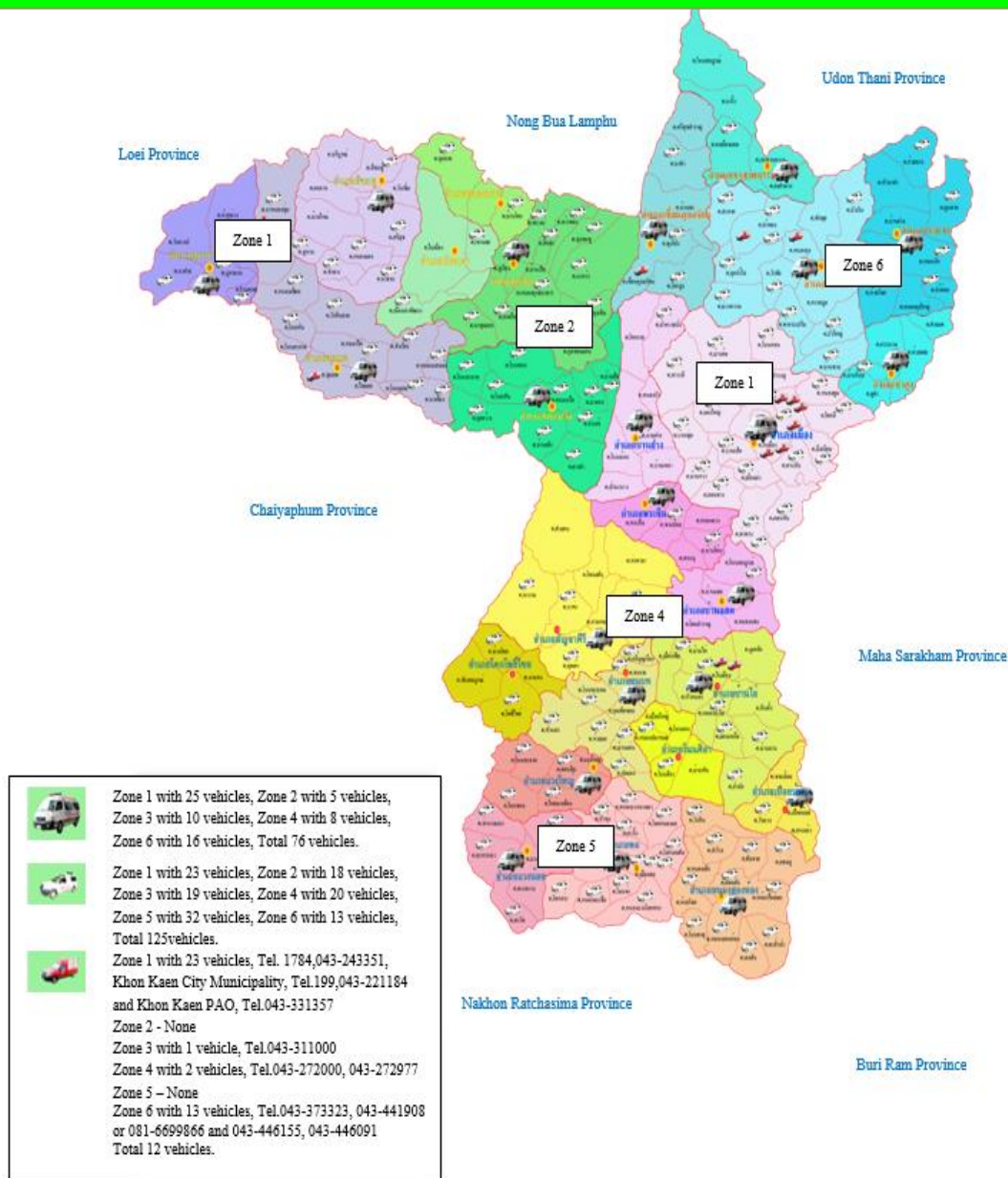


Figure 5.4 Map of Khon Kaen Province Showing the Allocation of Emergency Medical System Service Areas

Source: Khon Kaen Provincial Public Health Office (2020).

Muang District was divided into 4 networks to aid, both academic and service support in each network. There were hospitals, foundations, emergency operation units (paramedics) of the local government organization jointly responsible for the operation as shown in detail in Table 5.2.

Table 5.2 Network of Emergency Medical Services Outside Muang District, Khon Kaen Province, and Responsible Agencies

Network	Responsible agencies		
	Hospital (the main hospital in the network that was responsible for all types of patients with an emergency level, including critical patients (red) and emergency patients (yellow)).	Foundation (was responsible for traffic accident patients with yellow and green severity levels on main roads).	Local government organization (was responsible for critical emergency patients (red) and emergency patients (yellow) to provide primary care before the high level emergency unit reach the point of incident, or transfer halfway (dual system), non-severe emergency patients (green), accident patient in administrative areas, traffic accident patients on secondary road in administrative areas).
1. North	Srinagarind Hospital Faculty of Medicine Khon Kaen University	Boon Tanta Foundation Highway Rescue Unit Khonkaen Samakkee Utid (Part)	Sila Sub-district, Samran Sub-district, Ban Kho Sub-district, Non Thon Sub-district
2. East	Khon Kaen Hospital	Wat Pa Saeng Arun Foundation Khonkaen Samakkee Utid (Part) Chit Kuson Khon Kaen Foundation (Part)	Phra Lap Sub-district, Bueng Niam Sub-district, Khok Si Sub-district, Nong Tum Sub-district
3. South	Ratchapruek Hospital	Chit Kuson Khon Kaen Foundation (Part)	Ban Pet Sub-district, Ban Wa Sub-district, Don Chang Sub-district, Mueang Kao Sub-district
4. West	Bangkok Hospital Khon Kaen	Tep Sitthi Munee Foundation	Sawathi Sub-district, Ban Thum Sub-district, Daeng Yai Sub-district, Don Han Sub-district, Tha Phra Sub-district

In other districts, the areas were divided into 2 levels according to the ability to serve patients as followed. 1) District Community Hospital with a high level of capability was responsible for all types of patients with following levels of emergency, critical emergency patients (red), emergency patient (yellow), 2) Emergency operation unit (paramedic), Tambon Health Promoting Hospital (in case

of establishing an emergency operation unit) / foundation / club / association / local government organization, were responsible for critical emergency patients (red) and emergency patients (yellow) in providing primary assistance before the advanced emergency unit reaches the point of accident or transfer halfway, non-severe emergency patients (green), accident patients in the administrative area, patients with traffic accidents on the secondary roads in the administrative area, in the administrative area of that local administrative organization, or other local administrative districts that had been agreed upon, within 10 minutes of traveling time to the scene or within 10 kilometers of distance.

The communication systems were developed and provided by adequate service providers, so that people in the province could call for services from the communication and command center of Khon Kaen 24 hours a day. Number 1669 was set as the central number to request for all medical, rescuing and investigative assistances. Public relations were performed to create awareness among people in the province to call emergency medical services according to severity and patients were excluded from the conditions of general patients who can get through normal hospital procedures. The evaluation of all rescuers was managed to meet the standard of medical service. There was an evaluation of the quality of the ambulance and personnel potential. The use of medical supplies was inspected according to the level of service capability. There were audit, verification, and record of emergency medical services that would be reported to the head of the Office of Emergency Medical Service in Khon Kaen for further operation within the specified period. Personnel was developed to meet the standards required by the National Institute of Emergency Medicine.

Strategy 2 – Communication system in the command center – For site structure development, the 5th floor of the Sirindhorn Accident Center Building, Khon Kaen Hospital, was set as a center for emergency command center to support patients in Khon Kaen. The 1669 calling system was organized to cover the province area with sufficient number of lines for service calls. Sufficient numbers of communication devices were provided to be installed at the communication and command center. A radio communication system was prepared for contact with hospitals. The Command Center was determined to advise, order and coordinate

assistance under the supervision of doctors, record incidents (incident notification – command for assistance - reporting back to the center), resolve the situation, report the critical and essential situations to the head of the accident and crisis treatment center and those involved in the prescribed guidelines. There were prepared manual and standard for dealing with the reporters and receivers, manual of guidelines for coordination between the communication and command center and senior management officers, and manual of coordination for the network supporting operation in and out of the province. There were trainings for staff at the communication and command center, monthly meeting for operating system development of personnel at the communication and command center. There was a system development for recording operational information of the networks contacting with the communication and command center, and a system for quality development and internal result monitoring and evaluation. Public relations were promoted for people to have access to the emergency medical services systems and to cooperate in support of the rescuer's operations.

Strategy 3 – Information Systems-Coordinating all agencies participating in providing emergency medical services in Khon Kaen to submit information of emergency medical services to accident and crisis treatment center, Khon Kaen Hospital, within the 30th of the month. The information received from the participating agencies was checked for its correctness and completeness by coordinating with the incident command center to verify every request for permission to operate emergency medical services. The received information was recorded by Online system and notified to the emergency medical institution. Coordinating the office of emergency medical services system (Khon Kaen Provincial Public Health Office) to submit the certified information to the head of the office/representative to verify the accuracy and consider paying compensation as requested by the agencies.

Strategy 4 – Public Relations – Studying / researching / evaluating people's perception in calling the emergency medical services system (1669) to cover Muang District and outside Muang District. Coordinating relevant agencies in setting up public relations signs throughout the entire province. Coordinating with community leaders in Muang district to organize public relations in

every village for awareness of 1669 service calls. Coordinating with media to campaign for accident prevention and 1669 service calls.

Strategy 5 – Evaluation and Development of Service Quality
Hospital or Juristic persons participating in the project – The effective incident notification (telephone / radio communication), readiness of rescuers and all operations must be commanded by the communication and command center. Providing timely assistance to the injured and emergency patients for 24 hours with medical treatment at the scene. Transporting patients to the hospital. Effective coordination between the rescuers and the command center connected the information system between each other for the benefit of sending news and information. Supporting academic, solutions to solve problems and management. The allocation of service areas must be evaluated to cover all areas in the province. The standards and potential of the rescuers were evaluated. The evaluation results were applied to develop planning to increase the efficiency of emergency medical services.

Strategy 6 – Personnel Development – Providing comprehensive training courses. Coordinating with the Royal College - association - various agencies certified by the government for training. All certified trainees must receive a certificate. Providing training according to the specified time. Khon Kaen Province had established a training center at Khon Kaen Hospital.

Strategy 7 – Roles and duties of the Office of Emergency Medical Services, Khon Kaen – Organizing an emergency medical services system and developing structures within the province. Controlling and auditing the standards of personnel, ambulance and service units' vehicles, and the providing services according to the specified standards. Also, the registration of emergency medical services would be revoked and scheduled for a period of 2 years. Monitoring the results of the service unit evaluation at least once a year. Supporting emergency medical services units to work for 24 hours a day. Providing 24 hours servicing hospitals for emergency patients. Supporting and encouraging local government organizations to organize emergency medical services units covering all districts. The area of emergency medical services was allocated to cover the whole province area. Controlling central disbursement and budget allocation in accordance with

government regulations that could be examined. Preparing an emergency medical service system development project plan.

After the strategy had been established and the service area was allocated, Khon Kaen Hospital and Provincial Health Office had strictly implemented strategies. There were training in emergency medical services. Most of them were organized by Khon Kaen Hospital. Occasionally, Khon Kaen Provincial Administration Organization organized trainings by coordinating lecturers from Srinakarin University Khon Kaen and Khon Kaen Hospital (Doctor at Khon Kaen Provincial Health Organization, personal communication, March 15, 2019). Zoning the service area and providing trainings allowed the personnel in the emergency medical system of Khon Kaen to have brothers and sisters, student and teacher, relationship with the respectful nurses as head of the emergency command center. As a result, there were good cooperation from the operation units after notifying the operation unit to operate at the incident. This relationship also helped to reduce the feud and conflict between the operation units. When the conflict arises, the chief nurse of the incident command center would be able to mediate before things get worse. Because of the respected and considerate relation given by all parties, so now there is no problem of fighting over cases and zones among operation units (Director of the World Health Organization Cooperation Center for Accident Prevention, personal communication, March 15, 2019).

From the data obtained from the mentioned analysis and interview, it could be seen that the emergency medical services of Khon Kaen under the leadership of Dr. Wittaya Chatbanchachai had accumulated knowledge, planning, development and operation for more than 20 years. The development started from a beginning of helping each other to build a network, creating an information system, finding funding sources, while educating people. It became a clear strategy formulation and was being used as a model for emergency medical services in Thailand. This was also an important advisor to the Institute of Emergency Medicine in setting up a system for collecting information on emergency medical procedures in Thailand.

5.1.1.2 Emergency Medical Operation Unit of Khon Kaen

Announcement of the Emergency Medical Commission divided the emergency medical operations into 2 types, namely the administrative operation and

the medical operation. The emergency medical operation unit in the administrative operation type was the provincial incident command center. Meanwhile, the emergency medical operation unit in the medical operation type was the out-of-hospital emergency medical operation units.

1) The Emergency Medical Operation Unit in the Administrative Operation Type.

The incident command center, which was currently located at Khon Kaen Hospital, had a management operation for both general and direct supervision by emergency medicine physicians. There were professional nurses as the head of the incident command center, the emergency medical officers as the emergency cases receivers, and emergency medical practitioner indicating severity code and overseeing emergency operations during business hours. Out of office hours, there would be professional nurses from various departments, for example, anesthetist nurses, alternately serving to indicate severity code and dispatching emergency operations. The emergency medical operation unit in the administrative operation type of Khon Kaen was classified as an advisor level (The announcement of the emergency medical committee on types, levels, authorities, duties and responsibilities and limitations of the operation unit, in 2019, divided the emergency medical operation unit into 3 levels including basic, high and advisory levels (Government Gazette, 2019).

The incident command center was responsible for receiving all kinds of medical emergency reports. The informant would ask 7 questions consisting of name, surname, telephone number of informer and patient, incident location, observation spots, confirming the occurrence of the incident, asking patients for symptoms to analyze the situation and assess preliminary symptoms. The obtained information would be filled out on an online form and connected to Google Drive for everyone on the network to access to the information at the same time, except for the operation unit on the ambulance who must receive the information via radio signal and use a note-taking method instead. The center would direct and dispatch the work by selecting the operation unit based on the severity of the patient and supervising both the administrative and medical terms. There would be emergency medical physicians to ensure the accuracy of decision-making processes related to medical

treatment and operation, advice the informer to provide appropriate care and first aid. There was coordination for the appropriate route used by the emergency medical ambulance in order to reach the scene efficiently and timely. When discharging for operation, in case of any change in any special operation, the cancellation of operation, advice on medical treatment, coordination for suitable hospitals for receiving and treating patients were considered as the responsibilities of the center (Head of the incident command center, Khon Kaen Hospital, personal communication, June 27, 2019).

2) Emergency Medical Operation Unit

In medical operation type - Emergency Medical Operation Unit in medical operation type operated outside the hospital. Currently, Khon Kaen had 4 levels of emergency operations, including the High-Level Emergency Operation Unit (ALS) (121 units), the Intermediate Emergency Operation Unit (ILS) (2 units), the Primary Emergency Operation Units (BLS) (87 units), the Basic Emergency Operation Unit (FR) (305 units). Public hospitals, private hospitals and provincial administrative organizations were responsible for out-of-hospital emergency operations at the ALS and ILS levels. Meanwhile, the municipal foundations and the sub-district administration organization were responsible for out-of-hospital emergency operations at the BLS and FR levels. There was no local government organization with an operation unit for high level operation (ALS). Also, from planning to build a rescuers network for each sub-district, there had been at least one rescuer in Muang district since 1996. In 2014, the project of “One Tambon One Search and Rescue Team (OTOS) was started by organizing training to local administrative organization staff, volunteers, civil defense department members, causing Khon Kaen to have a local administrative organization that was able to organize emergency medical operations throughout the area. There were operation and management to provide emergency medical services to the people in the designated area for 24 hours a day thoroughly and timely. The distribution of the FR operation units covered 84.65 percent of all the Tambon area. Among a total of 242 operation units of emergency doctors in Khon Kaen, most of them belonged to the local government organization, classified by their affiliation as shown in Table 5.3

Table 5.3 Khon Kaen Emergency Medical Operation Units classified by Affiliation

	Unit	Percent
SCOT*	1	0.41
Foundation / Association	19	7.85
Private hospital	2	0.82
Provincial public health office	1	0.41
Subdistrict administrative organization	128	52.89
Subdistrict municipality	53	21.90
City municipality	5	2.07
Department of royal Thai army medical service hospital	1	0.41
Community hospital	22	9.09
General hospital	2	0.82
Central hospital	1	0.41
Somdej Phra Yupparat Hospital	1	0.41
Subdistrict health promoting hospital	4	1.65
University affiliated hospital	1	0.41
Not specified	1	0.41
Total	242	100

Source: Khon Kaen Hospital (2016).

Note: *SCOT: Special Covid-19 Operation Team - The Special Emergency Operation

(1) Vehicle Use for Emergency Operations

Khon Kaen had a total of 559 ambulance vehicles, comment this is a large number is it correct? 21 ALS trucks, 44 BLS pickups, 198 FR trucks, 126 ALS vans, 4 ILS vans, 52 BLS vans and 113 FR vans (National Institute

for Emergency Medicine, 2019). The local administration agency that organized emergency medical operation units procured cars by purchasing them according to the standard equipment price list, Bureau of Budget, which was complied with the Ministry of Finance Regulations on Public Procurement and Procurement.

“Ambulance services for the injured from accidents are prepared comprehensively in all areas, especially in Muang district. They are prepared by the local administration agencies, foundations and various volunteers, with no charge when calling the service by 1669” (Professional Nurse, Family doctor clinic, Nong Prung subdistrict health promotion hospital, personal communication, June 27, 2019).

There was patient monitoring system in ALS ambulance through Telemedicine connecting to the Khon Kaen Hospital, doctor consulting system through ER Call center, and ambulance GPS system for controlling and reporting ambulance speed. Also, now it was in the process of preparing a place to support the Ambulance Operation Center (AOC) system (Documentation of the Ministry of Public Health, Health District 7, 2020, Round 1, 2020).

(2) Emergency Operators

Khon Kaen had a number of emergency medical doctors who passed the required manpower framework, but lacked emergency medical nurses and practitioners (the number was lower than the specified manpower framework standard). Khon Kaen Hospital had sent 2 personnel to attend emergency medical practice nurse training per year (Documents of the Ministry of Public Health, Health District 7, 2020, Round 1). Most emergency medical practitioners in Khon Kaen had an Emergency Operation Certificate according to the Notification of the Emergency Medical Commission, or a license for medical operation and a renewed Emergency Operation Certificate (Head of the Khon Kaen Emergency Medical Services Center, 2019: Interview). Details of personnel in the emergency medical services system in Khon Kaen were shown in Table 5.4.

Table 5.4 Personnel in the Emergency Medical Services System in Khon Kaen

Accreditation Status	Position / Duty	Number (Person)
Positions in ITEMS	EMT-B	51
Positions in ITEMS	EMT-I	17
Positions in ITEMS	EMT-P	2
Positions in ITEMS	FR	1,400
Positions in ITEMS	Other	181
Positions in ITEMS	Not specified	49
Being accredited by the SOT*	นถพ. (Paramadic)	8
Being accredited by the SOT*	จถพ. (A-EMT)	99
Being accredited by the SOT*	พถพ. (EMT)	229
Being accredited by the SOT*	อถพ. (EMR)	1,965
Being accredited by the SOT*	ผกป. (Supervisor)	1
Being accredited by the SOT*	ผจป.(EMD)	2
Professional Council	Nurse	409
Professional Council	Physician	35
	Total	4,448

Source: Khon Kaen Hospital (2016).

Note: *Subcommittee on Organization, Operator and Training Program Accreditation and Certificate to People Who Have Passed Education or Training.

Most of the budget for personnel, operating vehicles, equipment and tools of the hospital's emergency operation units came from the personnel budget and capital investment of public hospitals. The other part of the budget was supported by the Subcommittee on Organization, Operation and Training Program Accreditation and Certificate for the operation units according to the actual operation. Local Administration Organization that organized emergency medical operations supported the costs of performance development and personnel training in emergency operation training project to restore and increase the performance of emergency practitioners and provided cars by purchasing according to the standard price and equipment lists, Bureau of Budget, which complied with the Ministry of Finance Regulations on Public Procurement. For foundation or volunteers, the operations used funds from the foundation or private funds to provide and maintain emergency ambulances and equipment. Due to budgetary constraints, although emergency ambulances and equipment had passed the inspection standards of the Provincial Health Office, but their condition might be old, causing the service recipients or the public to refuse to use the service.

Out-of-hospital ambulance operations - The operation units stationed in the area of responsibility were always ready to be commanded and executed operations quickly and safely according to the handbook certified by a medical professional. When receiving a report from the center, the center would use the radio communication to notify the operation unit within about 1 minute. This could take longer time due to many factors, for example the Civil Defense Volunteers had not being prepared for the incident at all times, being unable to communicate with local operation units, having more than 1 case of emergency incident at the same time at the same location. When the operation unit was ready, the unit would depart to the scene of the scene of accident within about 8 minutes. This could take longer than 8 minutes due to the large number of cars in the city area or traffic jams, especially in the morning, but most of the cases took no longer than 8-10 minutes. To select a hospital for patient to be transferred was based on the severity of the patient. If it were not an emergency case, the patient could be transferred to the desired hospital. For red level patient, the case must be reported back to the command center to coordinate for the Advance team to pick up the patient on the way. For coordination or cooperation

with hospitals or rescuers, the center would coordinate by using radio communication based on the rescuers network area nearby. The rescuers would divide the area of responsibility according to the road area, for example, Sawang Foundation was responsible for the area along the Friendship Road. There was no arguing over the patient cases because of the zoning of responsibility (Khon Kaen Emergency Medical Operation Unit, personal communication, June 31, 2019).

Transfer to hospital and medical treatment in the hospital - Important information about the treatment was informed to the hospital in advance. The incident command center then considered the hospital to transferring and coordination. Criteria for the transferring of emergency patients to hospitals with nearby emergency care capability in the area of responsibility were established. Sometimes, the hospital could be considered by the health insurance and the preference of the relatives or the patient. There were some cases when a relative or patient was requested to be transferred to the hospital with previous medical records. For the patient with no emergency stage, the patient would be transferred to the preferred hospital. In case of a critical emergency, the nearest hospital with potential for treatment would be selected by operation unit. When the emergency unit arrived at the hospital's emergency department, the operation unit would verbally report to the relevant staff and deliver a written patient report for the hospital's acknowledgment and continued treatment (Khon Kaen Emergency Medical Operation Unit, group discussion, July 31, 2019).

5.1.1.3 Participation in the Emergency Medical Networks of Khon Kaen

Khon Kaen Emergency Medical Operation had established a model that emphasized on the participation of networks, including public organizations, private sectors, local government organizations, foundation, association and people since the beginning, as it was believed that providing effective and sustainable assistance to injured or sick patients under limited resources required cooperation of all parties. Relying only on the government or the hospital could not be successful, so the service model in the accident and emergency services system in Khon Kaen adopted and developed the principles of the World Health Organization as an emergency medical services system with volunteers and people in communities receiving basic resuscitation training to work in conjunction with standard rescuers.

According to the World Health Organization, this model provided efficient and sustainable assistance to injured or sick patients under limited resources with the participation of public, private and local government organizations. The Accident and Emergency Services System Development Committee at Khon Kaen had divided the area of emergency medical services into 6 zones covering the whole province. The emergency medical strategy in Khon Kaen was defined on the topic of organizing emergency medical services before reaching the hospital. There was a main hospital in each zone to support each other's operations. The service was divided into 3 levels, including provincial rescuer network, subdistrict rescuer network and community rescuer network. All three levels were coordinated and linked to operations by the Command Control Center. Nowadays, Provincial Public Health Organization, Local government organizations, foundations, private associations and people were all involved in emergency medical services as follows.

1) Public Health

(1) Khon Kaen Provincial Public Health Office

Emergency medical work of Nonthaburi Provincial Health Organization was under the Non-Communicable Disease Prevention Group. Khon Kaen had appointed the Khon Kaen Emergency Medical Services Subcommittee since 2008 and assigned the Provincial Public Health Doctor as Chairman of the Committee of Khon Kaen Emergency Medical Services System Office, Member and Secretary of the Emergency Medical System Administration Committee. This allowed the Provincial Health Organization to participate in the emergency medical system of Khon Kaen, both in decision-making, participation in operation, benefits and evaluation as follows.

Participating in strategic initiatives for the organization of pre-hospital emergency medical services, communication system in the command center, information system, public relations, evaluation and service quality development, human resource development and the roles and duties of the Office of the Emergency Medical Services Systems clearly. Setting various provincial standards based on the central. Allocating area of emergency medical services to cover the whole province. Setting a high-level ambulance parking spot in Khon Kaen to cover the access area within 8 minutes. Participating in establishing a policy to drive,

coordinate, connect, make decisions and solve various problems, which mostly occurred during the EMS Day conference (Khon Kaen Health Doctor, personal communication, June 27, 2019).

Participating in the operation - Provincial Health Office served to support resources. Coordinating and cooperating with various departments to resolve related problems between departments. Providing a register of practitioners and operation units. Requesting for cooperation in the local administration and the private sector to be in accordance with the rules and conditions of the National Institute for Emergency Medicine by registering as an emergency operation unit. Checking the vehicle condition, flashing signal light and sound signals, tax payment, medical devices and supplies, to meet the standards of the registered types and levels. Coordinating networks. Developing service system. Supporting and developing communication systems and technology, personnel potential development, training, providing knowledge and public relations (Head of the Department of Disaster and Environment, Engineering Administration Office, Khon Kaen, personal communication, June 27, 2019).

Contributing to social benefits - Reducing socio-economic loss by reducing illness, disability, and death from emergency illness, while increasing the quality of life of people in Khon Kaen. Also, funding was received from Statement of support for the implementation of the workload Emergency Medical Fund, National institute for Emergency Medicine. The Provincial Health Office kept 50 percent of the received fund, and the rest was divided to the command center (Doctor of Public Health, Khon Kaen, personal communication, June 27, 2019).

Participating in the evaluation, control and audit of all activities by overseeing the operations of the incident command center and the provincial emergency medical services system office, quality control and evaluation, training and registration of volunteers for rescuers. The provincial administrative organization reviewing the performance standards of personnel, operations and emergency vehicles of the operation unit to be in accordance with the standards specified by the National Institute for Emergency Medicine. Also, preparing a registration, reviewing documents, approving the disbursement of emergency

operations, considering and making decisions on various issues, including central-based compensation payments (Doctor of Public Health, Khon Kaen, personal communication, June 27, 2019).

(2) Khon Kaen Center Hospital

Dr. Wittaya Chatbanchachai, a former head of the Accident and Crisis Treatment Center, Khon Kaen Hospital, was a pioneer of emergency medical services in Khon Kaen and a systematic source of emergency medicine in Thailand. Before his retirement, he served as a member of the public health facility in the Emergency Physician of Thailand, and a member and assistant secretary of the Khon Kaen Emergency Medical Services System Steering Committee. Currently, he was a director of the World Health Organization Cooperation Center for Accident Prevention. Khon Kaen Center Hospital was considered to be extremely involved in the emergency medical system, whether its participation in decision-making, operation, benefits and evaluation both at the provincial and national levels.

With the role of bring a director of the emergency medical system in Khon Kaen, Khon Kaen Center Hospital participated in decision making, setting up policies and plans for operating the emergency medical services system, coordinating and cooperating with various departments, solving related problems between different departments, and supervising the operation of Khon Kaen Emergency Medical Services Center that located at the Khon Kaen Center Hospital.

Khon Kaen Center Hospital was involved in the operation of both the management of the incident command center and the regional command of Khon Kaen, which was open 24 hours a day. It received an incident notification and coordinated with operation units, established an out-of-hospital emergency unit at the ALS level to provide emergency assistance to patients with a red level of severity, and provided training related to emergency medical services to personnel in the emergency medical system.

Contributing to social benefits by reducing disability and deaths caused by emergency illness. The direct benefit of Khon Kaen Center Hospital was to be a well-known and recognized hospital for the system and emergency care system both nationally and internationally. It received funding from the support budget for the implementation of the workload by Emergency Medical Fund. The

Provincial Health Office divided the fund into 50% and allocated to Khon Kaen Center Hospital to manage the incident command center.

For participation in the evaluation, Khon Kaen Center Hospital as a provincial rescuer level had the duties to supervise, monitor, assess, and evaluate district resuscitation and community resuscitation.

(3) Community Hospital

In addition to the resuscitation network in Muang District, Khon Kaen Province, outside Muang District, there was also a strong resuscitation network. For example, Samsong District that started from Samsong Hospital, which was a hospital. Samsong district started designing and developing the resuscitation system. Although at that time, Samsong Hospital faced quite a lot of financial problems, but the hospital's management realized the importance of emergency medical services. The standard of the Institute for Emergency Medicine to provide out-of-hospital emergency care services and was opened in 2009. After that, the results began to become apparent and able to meet the need for emergency medical services in the community relatively a lot. There was a mobilization of volunteers to develop a database. The local administrative organization in the Samsong district began to pay attention to participate in starting with budget support. As a result of the efforts to build a resuscitation network of the Samsong Hospital Resuscitation Supervisors, various sub-district administrative organizations in the Samsong district established their own rescuers. There was an operation unit of Ban Non-Subdistrict Health Promoting Hospital that was established by Samsong Hospital serving as a mentor to various level of operations in the Samsong district. There was a standard of professional resuscitation service. Organizing training to review and restore knowledge to personnel in the Samsong resuscitation network, such as training and rehabilitation of obstetrics and gynecological emergencies, emergency birth delivery to Samsong District Rescue Network. Evaluating the causes and weaknesses to be continuously developed. A “targeting plan” had been developed to increase the opportunity to reach patients quickly and timely by applying PowerPoint program and mobilizing the volunteer community to explore the community to create a database of household maps linking information of the Ministry of Interior. Developing the information forwarding system (Refer Click), which facilitated the staffs to

communicate, prepare and provide care for patients. Building awareness and understanding of resuscitation services in the district through teachers, students and volunteers. Publicizing the system and services to the public and be aware of the warning signs of stroke and cardiovascular disease thoroughly, especially in high-risk groups, for example, placing stickers and publicity signs. Developing a comprehensive expressway service system at all levels of the area. Developing a special channel for Samsoong's Fast Track Model. Organizing a training workshop on "Anyone can do pace making" project for teachers, students and volunteers. Organizing first aid training, CPR + AED for the volunteer staffs (Emergency medical supervisor, Samsoong Hospital, personal communication, June 25, 2019).

2) Local Government Organization

(1) Provincial Administrative Organization

Khon Kaen Provincial Administration Organization had not separated the structure of emergency medical work, but emergency medical work was located in the disaster and environment department, engineering bureau. It was primarily responsible for the supervision and disaster prevention and mitigation, rescuers resource support (Head of the Department of Disaster and Environment, engineering office). Participation in the emergency medical services system of the Khon Kaen Provincial Administration Organization was considered low. There was no involvement in decision-making and evaluation because Khon Kaen Hospital was able to do well already. However, a budget support was provided approximately 800,000 - 1,000,000 baht per year to the Emergency Medical Foundation in Khon Kaen depending on the budget that the Provincial Administration Organization received each year. The activity for opening a learning center was "Anyone can do pace making" in the municipality of Khon Kaen to educate people on the basic resuscitation with an automated pacemaker in Khon Kaen (President of Khon Kaen Provincial Administrative Organization, personal communication, July 1, 2019).

(2) Municipalities and Sub-district Administrative Organizations

Many municipalities and sub-district administrative organizations had cooperated in providing out-of-hospital emergency medical services. There was a joint operation between local authorities in the area between the municipality and the

sub-district administrative organization for emergency medical services in the area comprehensively. There were 194 local authorities (91 percent) registered to provide emergency medical services, and 176 local authorities (91 percent) actual performed the operation (data from ITEMS system, searched on 11th January 2019). Many of them had outstanding achievements, such as the Samran Subdistrict Municipality's Rescue Unit, Nong Ko Subdistrict Administrative Organization's Rescue Unit, Ban Phai Municipality's Emergency Operation Unit, Ban Non Subdistrict Administrative Organization's Rescue Unit, Ban Than Subdistrict Municipality's Rescue Unit, Nong Makhuea Subdistrict Administrative Organization's Rescue Center, Tha Phra Subdistrict Administrative Organization's Rescue Unit and Ban Haet Subdistrict Administrative Organization's Rescue Unit. Each operation unit established an operation center, locations, personnel, vehicles, emergency medical services, materials, and equipment to serve as a communication channel, both by telephone, radio and the Internet. There were personnel operating emergency vehicles and equipment according to the standards specified by the National Institute for Emergency Medicine, with registered operation unit standing by for 24-hour service. Personnel were arranged to perform duties in an emergency operation unit according to the emergency medical standard, and stationed for 24-hour operation, arranged in an 8-hour or 12-hour shift, and performed operation as notified by the provincial command center. There was a report on the operation of the emergency operation unit via the internet computer system to reimburse emergency operations compensation from the National Institute for Emergency Medicine (The rescue unit of the local government organization in Khon Kaen, 2019: group discussion). However, the Provincial Administrative Organization, Municipalities and Subdistrict Administrative Organization in Khon Kaen did not cooperate to form a network partner to establish an emergency medical operation unit. There was no agreement to cooperate to organize emergency medical operations. Each local administrative organization of emergency medical operations was responsible for providing emergency medical services within its own district. Some municipalities and subdistrict administrative organizations with adjacent areas were affiliated as a network according to zoning by the command center received notification and

commanded as the center (President of Khon Kaen Provincial Administrative Organization, personal communication, July 1, 2019).

Most of the municipal or subdistrict administrative organizational emergency medical work providing emergency operating units were affiliated with the Department of Public Health and Environment. Personnel consisted of medical emergency workers, emergency medical volunteers, and other staff who perform works related to emergency medicine (Sila Subdistrict Municipality's Rescue Unit, 2019: Group discussion). Most of them had rescuers and personnel with specialized knowledge in the emergency medical system available in their area. However, there was no plan or targeting to increase the number of rescuers or personnel due to the fact that existing personnel frequently turn in and out or change jobs. Most of the paramedics were hired as a contract, not fully employed as regular civil servants, so they feel that their work was not stable with no welfare (Local administrative organization, Khon Kaen, group discussion, July 1, 2019).

The municipality and subdistrict administrative organization conducting an emergency medical operation unit with operating personnel, emergency vehicles and equipment according to the standard as specified by the National Institute for Emergency Medicine with registered operation unit providing 24-hour service, performed emergency operations as notified by the Khon Kaen Provincial Emergency Command Center. There was development on emergency medical system, such as education, training, and research on the emergency patient care management evaluation, prevention of emergency illnesses, as well as practice on emergency medical plans (Tha Phra Subdistrict Municipality Rescue Unit, group discussion, July 31, 2019).

Most participation in the exchange of comment and problems solving arising from the emergency medical system of municipality and subdistrict administrative organization occurred from attendance at EMS Day, which was held regularly on a monthly basis. A majority of policy making, and decision-making was also a duty of regional public health, where municipality and subdistrict administrative organization were responsible for implementing those policies (Data from the non-participant observation of the researcher).

Contributing to social benefits reduced the rate of disability and mortality among residents of the area. In addition, the local government's emergency medical services did not serve emergency patients only, but also provided services to transport patients to the hospital and home, as well as nursing patients with chronic diseases at home, for example, replacing nasal feeding tube, urinary catheter replacement. As a result, the leaders of the local government organization were popular with local people and affected the voting during the election of local politicians in the next period.

Local government organizations had not participated in the overall evaluation of the provincial emergency medical system, but local administrative organizations organizing the Emergency Medical Operation Unit monitored and evaluated the results of emergency medical operations. There was self-assessment of the organization by doing a satisfaction survey with clients in the area, measuring and comparing performance against the set standards with both quantitative and qualitative criteria. The results obtained from the monitoring and evaluation could be applied in planning and performance developing.

3) Association, Foundations and Non-governmental Organizations

Association, foundations and non-governmental organizations, such as private hospitals in Khon Kaen, were involved in the out-of-hospital emergency operation unit and providing services to patients in the area of responsibility designated by the Khon Kaen Public Health Office. They had a duty to comply with the policies, requirements and standards set by the National Institute for Emergency Medicine and regional public health.

From the researchers' observation in the EMS Day meeting without participation, it was found that the EMS Day activity was held once a month at the Khon Kaen Provincial Public Health Office. It contributed to participation in expressing opinions, solving problems, giving suggestions, disputes and exchange experiences of emergency medicine from foundations, associations and private organizations.

4) People

For the emergency medical system of Khon Kaen, citizens participated in the free personal benefit of calling emergency medical services when

emergency injured or sick for free of charge with comfort, safety of life and property. The community leaders, community emergency volunteers and people were involved in awareness of emergency illnesses, such as STROKE STEMI, things to do when encountering an emergency, requesting for assistance with emergency medical services through the 1669 hotline calling, through publicity using brochures, stickers, road signs, public relations boards, broadcasting towers, community radio stations, community training and providing knowledge on emergency medicine, basic emergency response skills training, for example, first aid, CPR and AED use.

Participation in public practice included providing first aid when encountering an emergency patient, primary resuscitation when encountering an emergency patient, primary resuscitation. The call to report could notify necessary information as needed to the command center by the recipient when encountering emergency patients. Also, people in some areas donated an emergency ambulance, and raised funds for the purchase of supplies and equipment used for providing emergency services such as AEDs.

People in Khon Kaen could participate in the evaluation of emergency medical services by providing suggestions and complaints to the provincial public health offices, hospitals and various emergency medical operations, whether belonging to a local government organization or the hospital, including the evaluation by answering questionnaires, the satisfaction of the emergency medical service recipients and the operation unit that they call.

Emergency Medical Operation Unit in the administrative operation type or Emergency Command Center in Khon Kaen was at the consultant level, which having doctors with received Diploma of Emergency Medicine as the director, both the general director and the direct director in the medical operation unit type. There were 4 levels of operations, including ALS, ILS, BLS and FR. Public hospitals, private hospitals and Provincial Health Organization were responsible for organizing operations at the ALS level. Meanwhile, local administrative organization, foundations, associations and some district health promotion hospitals organized operations at the ILS, BLS and FR levels. The operating areas were allocated to cover the entire province. With the long planning to build a network of emergency medical operations, many local government organizations gave priority and cooperated in

establishing an emergency medical operation unit to serve people in their own area. Currently, most of the operation units belonged to the local government organizations. Also, there were many successful and outstanding operation units. The main success factors were the focus of the leader or management in emergency medicine work, clearly integrating emergency medical work into strategic plans and administrative structures. The budgets were allocated for operating costs, employee wages, training fees, appropriate equipment and ambulance procurement. There was the cooperation with local people networks to create understanding of service use and support the emergency medical services continuously and sustainably. The Khon Kaen Center Hospital, Srinagarind Hospital, Khon Kaen University and hospital in the system served as a support for academic knowledge and training to revive and update the knowledge frequently.

5.1.1.4 Emergency Medical Services Networks Management in Locality

1) Samran Sub-District Municipality

Khon Kaen Hospital received a scholarship from JICA, Japan in 1992 to establish the emergency medical services at Samran Sub-District Health Center. Later, in 2004 Khon Kaen Hospital persuaded Samran Sub-District Municipality executives to further operate by showing the importance of emergency medical services and Samran Sub-District Municipality joined the urgent pre-hospital treatment services with Khon Kaen Hospital in the same year by opening services and establishing Samran Sub-District Municipality paramedic services to provide 24- hour services, preparing paramedic service management fund regulations with reference to the Emergency Medicine Act B.E.2551 (2008) that prescribed local administrative organizations to be responsible for emergency medical services. An expenditure budget for Samran Sub-District Municipality expenditure budget for emergency medical services was prepared by adopting a budget from National Health Security Office (NHSO) that supports locality with regard to sub-district health security fund and the other part was from local fund. An operational plan was offered and contained in the 3-year development plan of Samran Sub-District Municipality and operated on the basis of committee. However, it was opposed by the State Audit Office of the Kingdom of Thailand (SAO) on the use of the sub-district health security fund that probably broke the regulations. Therefore, it was changed to be operated in the form

of paramedic service revolving fund. In 2009, Samran Sub-District Municipality paramedic service was under supervision of Division of Public Health and Environment who takes charge of budget, personnel, vehicles, and equipment, making the operation flexible and emergency medical services were developed in a systematic way, considerably satisfying people on pre-hospital emergency medical services. Its performance was empirically significant, being a place for observational studies both domestic and international levels. Persons responsible for emergency medical services of Samran Sub-District Municipality are competent and act as speakers at the national level quite often. They play an important role in generating manpower in paramedic services in communities, manpower planning. At the early stage, operation personnel were from various agencies in the Municipality, 1-2 persons or community leaders, members of the municipal council, village health volunteers (VHV) but problems occurred since the operation personnel had daily routines and they could not perform paramedic services by the time they were required. Consequently, an entrance examination for paramedic volunteers was introduced to those who have volunteer spirit, wish to work and do not have routine work for being trained and work in paramedic service. Therefore, there are personnel directly responsible for the job and provide 24 hours service, divided into 2 shifts; morning shift is 07.30-18.00 hrs., afternoon shift is 18.00 – 07.30 hrs. of the next day. Each shift has 2 persons, one is an ambulance driver and the other one is a paramedic. Each person is required to pass the EMT-B course. Work is clearly shared between an ambulance driver and a paramedic. Each person works in the scope of their duties and responsibilities as assigned; for example, a driver will take care of a vehicle, a paramedic will oversee equipment to ensure they work properly and efficiently. Training is provided for personnel to restore their knowledge every month such as annual restoring training, providing mobile service units, demonstrating the operations, giving knowledge to various groups and trying to increase competency continuously like sending FR staff to be trainees at sub-district health promoting hospitals or inviting registered nurses to teach oxygenation and suction therapies, etc. A public relations campaign for Samran Paramedic Services is conducted by holding a meeting of community leaders, implementing mobile service unit for people, and organizing activities for older persons, enabling people to understand the emergency medical services system and

how to call the services for help. Emergency reporting networks are established by giving emergency reporting training to village health volunteers (VHV), civil defense volunteers, and those who use radio communication equipment (walkie-talkie) to be villager representatives in reporting when emergencies or sudden illness occur. Academic assistance comes from Khon Kaen Hospital and Srinakarin Hospital. Training is given to prepare readiness for handling mass casualty incidents, personnel training on delivery of a baby. An analysis is conducted to monitor risky points in communities, a campaign is launched to promote the way to solve risky points and establish emergency medical services networks in communities, schools, factories and do public relations continuously. Their own innovation is made as well as a form to use durable articles and equipment such as fuel request form, vehicle request form, material requisition form, etc. Each locality provides materials and equipment to serve the operations. From the operations, it was found that when there was a patient or accident and no one took care of the patient or a paramedic service arrived very late, in a community there was “a flock of onlookers” but those people could not give any help. Therefore, an idea came up that if those people have emergency medical skills to help people, they will be able to give a primary care to those victims before calling 1669. Thus, those people were surveyed, trained FR course and assigned to be community paramedics to help patients or those who have an accident before a paramedic service will pick them up. There are 3 groups of community paramedics; community paramedics, corporate paramedics and school paramedics. Community paramedics do not earn remuneration and welfare, but they will be developed through a meeting held every month so as to exchange knowledge, restore knowledge, and discuss with other groups to strengthen community paramedics sustainably (Director of Division of Public Health, Samran Sub-District Municipality, personal communication, July 2, 2019).

2) Nong Ko Sub-district Administrative Organization –

Nong Ko Sub-district Administrative Organization is another local administrative organization that operates emergency medical services accepted by people in the area. “Nong Ko Sub-district Administrative Organization Paramedic Services” was established and started the operations on 16 July 2009, giving services to people living in 15 villages of Nong Ko Sub-district Administrative Organization

(Nong Ko SAO) and neighboring areas where a paramedic service has not been established. It receives coordination from Kranuan Crown Prince Hospital (host hospital/standard-level hospital) and Khon Kaen Hospital. The structure of Nong Ko Sub-district Administrative Organization Paramedic Services is under supervision of Office of the Chief Administrator of Nong Ko Sub-District Administrative Organization. Chief Executive of Nong Ko SAO is the chairman, Deputy Chief Executive of Nong Ko SAO is the committee, Chief Administrator of Nong Ko SAO is the committee and secretary and Chief of the Office of Nong Ko SAO is the committee and assistant secretary and personnel in the paramedic service. There are 19 FR staff being contract employees and there is 1 FR ambulance. The paramedic service is given to those who are injured from accidents or sudden illness so as to receive first aid before submitting to a hospital for further appropriate hospital treatments, and picks persons who recover from injury or illness up and sends to their homes in the responsible areas if they have no car to pick them up. As for budget disbursement, the budget is disbursed from the sub-district ordinance on annual expenditure budget in the section of housing and community work plan on expenses in emergency medical services project for 200,000 baht/year separated to wages paid to staff, gasoline expense, medical equipment expense, repair and maintenance expense for vehicles and radio communication equipment, and expense for staff uniforms. With regard to personnel development in the paramedic service, every staff member passes the first aid course (24- hour course) and received continuous training in the first aid and emergency medical responder (EMR 40-hour course). There are 4 staff members in each shift, 2 shifts per day. Three staff members work at a scene and 1 staff member works at the office. Free service is available for 24 hours including picking up and sending people according to the policy of Chief Executive of Nong Ko SAO. Services are given to people with sudden illness 300 times (consistent with the data in ITEMS system finding that in 2017 the paramedic provided services 339 times, 316 times in 2018 and 295 times in 2019. (NIEMS, 2019). Besides, the paramedic service provides first aid mobile unit which is available in different festivals such as Children's Day, Traditional Football Match, Bung Fai Tradition (annual rocket festival), participation in road accident prevention, a campaign on 100% safety helmet wearing, etc. The paramedic service is able to give service within

2 minutes after being reported a case in accordance with the standard required by National Institute for Emergency Medicine, 100%. A satisfaction survey of service receivers on convenience and speed of services, politeness of service providers, attention in services found that satisfaction towards the service providing is at good-excellent levels except convenience in coordination which was evaluated at fair-good levels. Training in collaboration with District road accident center is provided in order to give knowledge to people in the responsible areas about prevention and reduction road accidents, determination of points at risk of road accident of the district, participation in a project for preventing children from drowning that is held for educational personnel and teachers taking care of children in all 4 childcare centers of Nong Ko sub-district administrative organizations. Knowledge is given to people about wearing safety helmets. Every time training is held, public relations about emergency medical services system will be inserted through leaflets, public relations signs including asking for collaboration from sub-district and village headmen to do public relations through village public address system. The committee of Nong Ko Administrative Organization has a clear policy on the existence of emergency medical services by including the emergency medical services in an agenda of a monthly meeting and allowing staff stationed at the sub-district emergency medical services unit to participate activities that the standard-level hospital holds to develop personnel potential in work skills to meet standards and efficiency; for example, assigning staff who pass FR course (24-hour course) to attend first aid and EMR training (EMR 40-hour course) to increase their potential, participating in EMS Rally for the north region (Kranuan, Namphong, Khao Suan Kwang, Ubonrat), participating in paramedic flea market training, participating in rehearsal plans to prevent mass casualty incidents in Kranuan district. Paramedic personnel of Nong Ko SAO were selected to receive class 5 honorable pins held by National Institute for Emergency Medicine in 2015 (Nong Ko Sub-district Administrative Organization Paramedic Services, group discussion, July 2, 2019).

3) Ban Phai Town Municipality

Provision of emergency medical services of Ban Phai Town Municipality started from the importance given by the management team of Ban Phai Town Municipality to health and hygiene problems and access to public health

services, leading to determination of a policy on public health development known as “ Ban Phai Healthy Town” and a policy on development of society and quality of life which become people and society development strategies to elevate the good quality of life of people in the area. Emergency medical services are managed systematically and developed continuously. Clear work plans are available. FR staff is available for 24 hours as well as ambulances equipped with devices and durable articles that meet the standard determined by National Institute for Emergency Medicine with modern communication system. The structure of Ban Phai Town Municipality Emergency Medical Services is affiliated to Division of Public Health and Environment. The highest commander is the mayor of Ban Phai Town Municipality. The executive board for emergency medical services operations of Ban Phai Town Municipality was appointed according to the order number 915/2016 dated on 4 December 2015, comprising 3 groups of board of committee, operations committee, and emergency medical unit. Ban Phai Hospital is the host hospital. As soon as it is reported from emergency report center, the emergency medical service can reach a scene within 1-2 minutes. There are 12 persons working rotationally in the emergency medical unit, 12 hours per shift. Day shift starts from 08.00-20.00 hrs., and night shift starts from 20.00-.08.00 hrs. of the next day. Now, there are 8 emergency medicine workers, 1 emergency medicine volunteer, 2 FR workers. They are elevated to become basic life support (BLS) health care providers. Knowledge and ability of the emergency medical unit are developed at the area level after the FR training is finished. After that they are sent to practice and increase work skills at Ban Phai Hospital for 1 month 20 days. Besides, basic skills are regularly practiced in Ban Phai Town Municipality public health center. Workers rotationally practice providing services to people such as wound dressing, measuring blood pressure, facilitating convenience for people who receive services, recording a report, etc. Provision of vehicles for emergency medical services is a project containing in the municipality development plan. A budget is set up to purchase a van and equipment that meet the National Institute for Emergency Medicine standard. The van is registered to be a paramedic van correctly. As for the provision of the equipment in addition to the standard equipment, the municipality prepares a project contained in the municipality development plan and sets up a budget in the municipal law to support the operations efficiently, i.e., base radio,

mobile radio, wave antenna, etc. including other equipment to provide facilities for those who are on duty for 24 hours. Activities related to emergency medicine are organized regularly such as proactive operations in 39 communities; emergency medical units visit communities in the project I See You (it is the project that brings the public service work of the municipality to provide proactive services to communities such as primary treatment, buying repeated frying oil, hazardous waste in exchange for eggs, vaccination to prevent rabies, awareness campaign of hemorrhage, receiving complaints, prevention and disaster prevention and mitigation, civil registration, tax payment, reading promotion by establishing a mobile library, public relations of the municipality system of service providing to people for their perception. The important point is visiting house-bound patients, bed-ridden patients, persons with disabilities and the disadvantaged, led by Ban Phai Town Municipality Mayor and network associates, i.e., physical therapists, Ban Phai Hospital, registered nurses, public health academics, older adult caregiving volunteers, village health volunteers (VHV), etc. to give knowledge and understanding of emergency medical services of Ban Phai Town Municipality. In case house-bound patients, bed-ridden patients or the disadvantaged need to be submitted to hospitals, they can call the emergency medical service. If they need to use equipment to take care themselves such as medical beds, wheelchairs, canes, walking aids, diapers, money from the Ban Phai fund will be used. In case of accident/disaster, they can call 1669. In addition to the I See You project, public relations signs are attached throughout communities as well as leaflets are distributed to community leaders and given to service agencies such as Finance Division, Public Health Division, Section of Civil Registration, etc. Public relations are conducted with youth and students. Documents are given to them so as to communicate with their parents. Leaders of collaboration of Ban Phai Town Municipality emergency medical services are appointed, i.e., chairman of the community and VHV chief to be collaboration networks in reporting/informing in case of asking for assistance from the emergency medical services. Satisfaction of people is evaluated. It is found that satisfaction towards the process and procedures of service providing of the emergency medical services unit is overall at the highest level (Ban Phai Town Municipality Emergency Medical Services, group discussion, July 31, 2019).

4) Ban Non-Sub-District Administrative Organization

Executives of Ban Non-Sub-District Administrative Organization give importance to sudden illness status of people in the area. Therefore, Ban Non-Sub-District Administrative Organization Paramedic Services were established and has been operated emergency medical services since September 2015 until today. They are categorized as BLS paramedic services. There are 11 paramedics, 4 emergency medicine workers, 4 emergency medicine volunteers and 2 FR workers. There are 2 shifts, 3 persons per shift. Morning shift is 08.00 – 20.00 hrs. and night shift are 20.00-08.00 hrs. of the next day. A survey on people's satisfaction towards the services found that the satisfaction was 97.30%. Personnel competency development is available. Personnel are supported and promoted to practice and review emergency medicine skills and knowledge regularly. Personnel was assigned to participate in national level EMS Rally in 2015 and 2016 and won the first prize in the national level EMS Rally BLS team in 2015 and the first prize for the academic base on aeromedical evacuation of patients and maritime and aquatic life support in the national level EMS Rally in 2016. Personnel was supported and promoted to be speakers at district level, zone level and provincial level on emergency medicine and disaster response skills continuously. They are speakers in community emergency volunteer training held for village health volunteers, students, community leaders, policemen, volunteers, and civil defense volunteers in Sam Sung district. They are speakers in EMS Rally at district level and zone level. They participate in mass casualty incident and potential disaster rehearsal plans at district level, zone level, and regional level. In terms of monitoring of road accidents, they participate with Sam Sung district paramedic network in monitoring and inquiring traffic accidents by collecting data related to risky points for road accidents and presenting the data to the executives and Sam Sung Hospital to bring the data for solving road accident problems continuously. They are co-speakers with other agencies in Sam Sung district in giving knowledge about road accident prevention. As for monitoring and preventing people from falling into water and drowning, they are speakers in training provided for paramedics in other agencies to have skills in helping people who are falling into water and drowning. They are co-speakers with other agencies in Sam Sung district in giving knowledge about how to help people who are falling into water

and drowning. With regard to public relations, people in every household of Ban Non-sub-district are advised the hot line number for emergency medicine, 1669. Stickers were attached to their house walls and documents advising how to use the emergency ambulance and the telephone number 1669. Advertising spots are prepared on how to use emergency ambulance service and given to local radio stations and village public address system. Innovation equipment to help people falling into water are built and installed by public pools everywhere in Ban Non-sub-district. Training about helping people from falling into water and drowning is provided to people living near public sources of water to enable them to help those who are falling into water and drowning quickly and correctly. The success of emergency medical services is from personnel who are committed to develop themselves with a strong devotion to their work in order to take care of people in their areas based on their sacrifices. Meanwhile, the highest leaders of the organizations understand and support the operations of emergency medical services. They support personnel to have skills development continuously. Necessary devices and equipment are implemented to serve the operations sufficiently. Personnel in paramedic services are living in harmony and taking care of their colleagues as if they are their relatives, making their work filled with smoothness (Ban Non-Sub-District Paramedic Services, group discussion, July 31, 2019).

5) Ban Ton Sub-District Municipality

Ban Ton Sub-District Municipality emergency medical services were originated the same way as those of Ban Non-Sub-District Administrative Organization. That is executives of Ban Ton Sub-District Municipality viewed the importance of developing emergency medical services. Ban Ton Sub-District Municipality is the first local administrative organization of Phra Yuen district that opens emergency medical services that meets National Institute for Emergency Medicine Standard and the services comprehensively cover the area of Ban Ton Sub-District Municipality and neighboring areas as requested by people and in accordance with the orders of Khon Kaen Emergency Report and Order Center. The structure of the emergency medical services comprises 6 steering committee consisting of Mayor, Deputy Mayor, Municipal Clerk, Deputy Municipal Clerk, Director of Division of Public Health and Environment and Chief of Subdivision of Public Health. Advisory

group consists of 5 persons; Phra Yuen District Chief, Chief of Phra Yuen District Office for Local Administration, Phra Yuen District Public Health Officer, Director of Phra Yuen Hospital and Director of Ban Ton Sub-District Health Promoting Hospital. There is 1 Chief of Emergency Medical Unit. Manpower management is prepared in 2 groups, 3 persons per group. Each group consists of 1 ambulance driver and 2 patient caregivers. Services are available for 24 hours (each emergency medical unit works 12 hours). As for budgeting, an annual expenditure budget is set up for emergency medical services management which includes payment for contract workers of emergency medical services, 6 positions, expenses in emergency medical services project (such as training expense, uniform expense), medical supply expense and expenses for necessary materials/equipment, repair and maintenance expense for durable articles, vehicle expense and transportation expense, gasoline and lubricant expenses, scientific or medical durable articles, pulse oximeter, blood glucose meter with small needles and testing strips. Provision of equipment and procurement adhere to Ministry of Interior regulations. Development projects related to emergency medical services are prepared such as assigning 2 staff members to take a training course about ambulance driving. Staff members are assigned to participate in accident rehearsal plans/mass casualty incidents with Phra Yuen Hospital and Khon Kaen Hospital 1 time per year, to attend EMS Day meeting in Khon Kaen that is held every month. People living in the responsible area of Ban Ton Sub-District Municipality and neighboring areas give importance to and participate in providing tools and equipment associated with emergency medical services. A van was donated by people in the area to serve emergency medical services. People joined hands to hold EMS offering activity to participate in donation for buying an automated external defibrillator (AED) (Ban Ton Sub-District Municipality Emergency Medical Services, group discussion, July 31, 2019).

6) Nong Makhua Sub-district Administrative Organization

Nong Makhua Sub-district Administrative Organization established Nong Makhua Sub-district Administrative Organization Paramedic Center to serve emergency medical services (EMS) in 2004 and it has been operated until today. Its executives have a policy to provide services for those who get injured from accidents or those who have sudden illness in the responsible area including

supporting services for emergency patients in neighboring areas once requested, and to provide services to patients with chronic illness who need continuous treatments. Since Public Health Office is not available in Nong Makhua Sub-district Administrative Organization, emergency medical services are affiliated to Office of the Chief Administrator. Section of Disaster Prevention and Mitigation is assigned to oversee the early stage of the operations and carry out hiring contract workers having qualifications that fit Emergency Medicine Act. Currently, there are 6 FR workers. Each day has 3 workers work from 08.00 – 08.00 hrs. of the next day (24 hours). Their duties and responsibilities are as follow: 1 worker is assigned to work at Radio Monitoring Center/Monitoring Center of all types of communication devices, 2 workers are assigned to work outside (driver and patient caregiver in a passenger cabin). With regard to vehicles and equipment, there is one pickup truck converted its back into a passenger cabin with one bed, equipped with first aid equipment that meet National Institute for Emergency Medicine standard. As for communication, there are 2 fixed synthesizer radios, 10 watts, 2 base stations VHF/FM and 7 handheld radios, 5 watts. Two telephone numbers are available. Annual expenditure budgets are set up to be payment for 6 contract workers from outside at the amount of 504,000 baht per year, a purchasing budget of medical supplies at the amount of 6,000 baht per year, and a budget for improvement and repair. “Emergency medical services” are contained in the 3-year development plan and a budget is set up in the provisions of annual expenditure budgets. Emergency medical services (EMS) project is prepared in each fiscal year. Details of activities and how to spend the budgets are clearly identified. Various orders are prepared, i.e. an order establishing emergency medical service center, emergency medical service working group order, emergency medical personnel order (emergency medical personnel is required to pass the training in accordance with National Institute for Emergency Medicine standard), driver order and order for monthly operations/standard control, preparation of an action plan to be used as a guideline for the operations (consistent with the National Institute for Emergency Medicine major plan, No.2, 2013-2019 and the National Institute for Emergency Medicine major plan, No. 3, 2017-2021). An instrument is determined to be an indicator measuring operational performance to respond to vision, mission, goal, and strategy. The value of quantitative data is determined to be not lower than

80%, considered passing the standard. Activities to publicize 1669 are organized. Rehearsal with network associates and civil sector is performed. Plans to reduce the duration of transferring patients to hospitals are prepared. Operational plans are clearly prepared, consistent with the major plans. An indicator is prepared to measure whether or not the operations can respond to the vision, mission, goal and strategy as planned, making the organization possess data to analyze and solve problems at the right point while the operational guideline is set to ensure the operations will meet the standard continuously (Nong Makhua Sub-district Administrative Organization Paramedic Center, group discussion, July 31, 2019).

7) Tha Phra Sub-district Municipality

Tha Phra Sub-district Municipality established emergency medical services center (Tha Phra Sub-district Municipality Paramedic Services) in 2010 and it has been operated continuously until now for people in the area and neighboring areas. There are workers who pass Emergency Medical Technician-Paramedic (EMT-P) program and Emergency Medical Responder (EMR) program available for 24 hours by adhering to the principle “workers are happy, service receivers are safe, all networks are connected, and happiness is returned to community”. The Emergency Medical Services (Tha Phra Sub-district Municipality Paramedic Services) are affiliated to Section of Communicable Diseases Prevention and Control, Public Health Administration, Division of Public Health and Environment. The chain of command is shown in Figure 5.5.

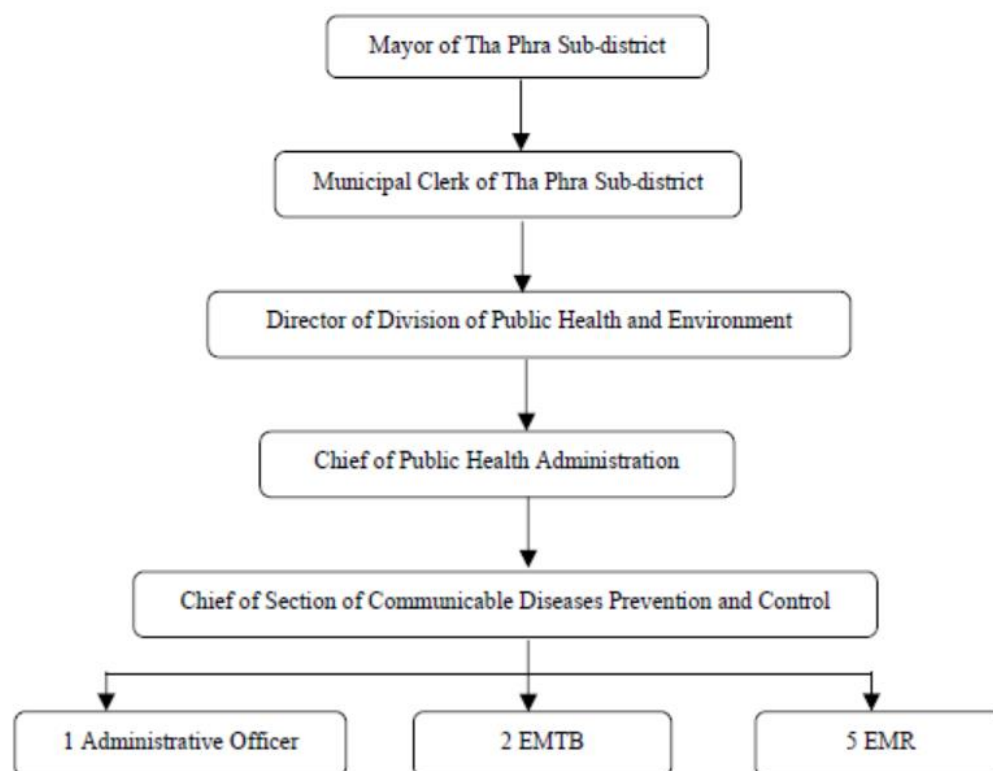


Figure 5.5 The Chain of Command of Tha Phra Sub-district Municipality Paramedic Services

Source: The order for establishing Executive Board of Tha Phra Sub-district Municipality Emergency Medical Unit

8) Mayor of Tha Phra Sub-district. 7.2 Municipal Clerk of Tha Phra Sub-district. 7.3 Director of Division of Public Health and Environment. 7.4 Chief of Public Health Administration. 7.5 Chief of Section of Communicable Diseases Prevention and Control (1 Administrative Officer).

Tha Phra Sub-district Municipality determines policies and plans associated with emergency medical services in local development plans every year, both a short-term plan (annual plan) and a long-term plan (4-year plan) by reviewing and improving the plans to be consistent with provincial level policies, national level policies and community context that seems to change every year. Moreover, the structure of emergency medical services (Paramedic services) is determined in writing and budgets for implementing related projects are allocated every year uninterruptedly. There is 1 ambulance providing emergency medical

services, separated from another department, and is ready for 24-hour service. All ambulance drivers are required to pass the safety driver training with a host hospital. Training for reviewing and restoring a body of knowledge is provided to all personnel regularly at least once a year. In the meantime, all personnel pass the registration and license renewal of emergency medical services system. Group accident insurance is given to all emergency medical services workers in every year. Most people were satisfied with the services (2014-2018) at a good level. Participatory emergency medical services are integrated with network partners, government agencies, private agencies and civil society. Fundraising is conducted among Tha Phra Sub-district Municipality, private agencies and civil sector to purchase 2 automated external defibrillators (AED). Training is provided to build networks of community emergency volunteers, leader groups and general people. These people are assigned to set up checkpoints during New Year and Songkran festivals. Exhibition booths are held, and activities are organized to give knowledge about cardiopulmonary resuscitation (CPR) for children and youth on Children's Day. They are speakers giving knowledge and how to practice CPR in schools and workplaces in Tha Phra Sub-district Municipality area. They participate in paramedic and rescue plans and fire evacuation rehearsal with government agencies and private workplaces in the area every year. They operate their services in mobile medical unit in various charitable activities such as offering ceremony of sandalwood flowers to HM late King Bhumibol (King Rama 9), walk-run mini marathon with Tha Phra Police Station, charity bike ride with Thai cycling Association, traditional merit making ceremonies, etc. Public relations of information about emergency medical services are conducted through several media continuously throughout the year, i.e., leaflets, stickers, public address system, vinyl signs. The important thing that brings the success to Tha Phra Sub-district Municipality Paramedic Services is executives determined policies clearly in writing. Emphasis is placed on teamwork with the connection of health networks from government sector, private sector and civil society to drive the services. People are put at the center and provided services as if they are relatives or family members in a fast and safe manner. Morale and encouragement are built among workers through supporting their career path according to "THAPRA" slogan.

(1) T (Team) = Teamwork.

(2) H (Health Network) = Connection of health networks.

(3) A (Active) = Fast, active and safe services.

(4) P (People) = People are put at the center.

(5) R (Relationship) = People are provided services as if they are relatives or family members.

(6) A (Advance) = Career path support is given to emergency medical services workers (Tha Phra Sub-district Municipality Paramedic Services, group discussion, July 31, 2019).

9) Banhad Sub-district Municipality – Mittraphap Road Is Cut through Banhad Sub-district Municipality.

There is a lot of traffic from a huge number of vehicles, frequently causing accidents. People in the area got trouble as well as the loss of life and property. The existing emergency medical unit could not comprehensively oversee the whole area. Consequently, community leaders in the area of Banhad Sub-district Municipality brought the trouble of their people to the Sub-district Municipal Council. The council members viewed the importance of the ongoing problems. As a consequence, emergency medical services system was managed to solve people's trouble. The emergency medical services system has been operated since 2012. Banhad Sub-district Municipality Emergency Medical Services Center affiliated to Division of Public Health and Environment; Banhad Sub-district Municipality is under supervision of Banhad Sub-district Municipality Public Health Services Center. Mayor of Banhad Sub-district Municipality as an executive is the one who gives policies and operational guidelines. Director of Division of Public Health and Environment transforms the policies into practices. Chief of Division of Public Health Services has duties to supervise, monitor the operations, standard preparation, summary of the operations management, finance, personnel, materials, and management system. Two emergency ambulances equipped with standard equipment were purchased for using in the operations. There are 15 workers divided into 7 emergency medical services workers, 8 emergency medical services volunteers. The operations are divided into 2 teams. Team A consists of 5 workers and Team B consists of 5 workers. Another 5 workers work in the emergency room of Banhad Sub-district Municipality Public Health Center, available for 24-hour services. The

morning shift is 08.00-16.00 hrs., the afternoon and night shifts run from 16.00 to 08.00 hrs. of the next day. The satisfaction survey of people in the area and neighboring areas who received services showed that they were satisfied with the services, more than 87%. Knowledge about symptoms of stroke and asking for services through the telephone number 1669 were publicized. Project to prevent children from falling into water and drowning was prepared which was developed further from speaker training. Sources of water were surveyed, and warning signs are prepared. Assisting devices were installed for saving people from drowning in water sources of communities. The services were evaluated and met the bronze medal level in 2018. Stroke Fast Track is connected to Provincial Healthcare Network Certification (PNC is a service system designed for every patient, no matter where they are in a province, when they suffer from a certain disease, to be able to access the treatment of that disease equally and seamlessly, and the treatment must meet standards) to Stroke Unit and communities with the participation of paramedic volunteers. PODD Application is used to report problems and ask for help, which comprehensively covers all communities; for example, reporting problems, how to handle when an accident occurs, follow-up like in case of being bitten by a dog, basic advice on first aid is given or advice about vaccination. Persons in charge can be contacted in community areas (Banhad Sub-district Municipality Emergency Medical Services Center, group discussion, July 31, 2019).

10) Nong No Sub-district Municipality

The location of Nong No Sub-district Municipality is similar to Banhad Sub-district Municipality. Namely, a main road is cut through with a lot of traffic and there are points at risk of road accidents. There are a lot of junctions and curves where accidents occur very often. Meanwhile, people in the area suffer from underlying diseases, causing life-threatening status which requires them to have treatments at hospitals such as diabetes, blood pressure, stroke, and bedridden patients. The management team of Nong No Sub-district Municipality was aware of the importance and trouble of people. Therefore, the provision of emergency medical services began in 2012. Nong No Sub-district Municipality Paramedic Services

Center is under supervision of Section of Prevention and Mitigation of Disaster affiliated to Office of the Municipal Clerk. The budget for managing the paramedic center is contained in the 4-year locality development plan. It is a long-term plan put into the ordinance on annual expenditure budget to be used in paramedic services which comprises payment for contract workers, medicine expense/medical supply expense, training expense and expenses spent on performing duty as a civil servant. There are 4 emergency medical services workers and 6 emergency medical services volunteers. They work in shifts. Each shift has 3 workers working 12 hours/day. Everyone will have 1 day off per week. The structure of Nong No Sub-district Municipality Paramedic Services Center is managed in the form of committee divided into 2 teams; steering committee consists of Mr. Paiboon Bussaracum, Mayor, is the chairman of the committee and Mr. Hataithep Poohong, Municipal clerk, is secretary/committee, and executive committee consisting of Mr. Anant Muangprom, Chief of Office of the Municipal Clerk is the chairman. Flight Sergeant Third Class Prawitchkorn Khunkang, Rescue officer, is secretary/committee. Mayor of Nong No Sub-district Municipality has policies to drive emergency medical services of Nong No Sub-district Municipality Paramedic services to be consistent with MOU and in the same direction of network partners in the form of committee with regard to management, performance evaluation. Emphasis is placed on how services will comprehensively cover all areas of villages, communities in Nong No Sub-district as well as safety at work and saving patients' lives. Services are provided with politeness, making people satisfied according to the principle "Nongnno Smart EMS". A satisfaction survey of patients' relatives towards the services found that 95% of service receivers were satisfied with the services. Paramedic services provide mobile service unit to measure blood pressure and provide primary health checkup for older persons. The Paramedic Services in collaboration with network organizations in Nong No area give knowledge about how to report emergency through 1669 system, knowledge about stroke fast track to people in communities to build their understanding and awareness for accessing treatments in a speedy manner. Leaflets, name cards are handed out to people in communities. Line Application is introduced in the areas where a large number of people travel a lot to build familiarity and recall in service access such as flea markets, community markets, village public pavilions.

They are speakers giving knowledge about how to take care of emergency patients before an ambulance arrives, how to perform CPR to general patients and drowning patients to community leaders, people, students, etc. Performance of Nong No Paramedic Services was quite outstanding. They received merit maker award for the silver level of preventing drowning at the district level for 2018, advanced RTI Team award, Khon Kaen BLS award 2018 from Khonkaen EMS Forum 2018 , the winner prize of EMR in The 6th EMS Rally 2016, the north zone, certificate of Training to The Trainer , capacity development of leaders in professional paramedic networks, zone 6 at Ubonrat Dam, Khon Kaen, certificate of participation in EMS Rally 2016, north zone during 29-30 November 2016 at the 3rd Cavalry Division. These awards bring pride to Nong No Sub-district Paramedic Services (Nong No Paramedic Services, group discussion, July 31, 2019).

From what was mentioned earlier, it can be seen that many local administrative organizations participate in establishing paramedic services and emergency medical services. Due to policies of local administrative organization executives and political reasons, their paramedic services do not provide services only to emergency patients but also non-emergency patients who need an ambulance to be delivered to hospitals; for example, picking up patients from home to have physical therapy at hospital, picking up patients from hospital to home including calling paramedic services to serve chronic patients at home such as changing nasogastric tubes, changing urinary catheters, making a large number of patients call 1669 based on non-emergency reasons. Before, Paramedic services perform their operations, they are required to inform Emergency Report Center to ask for a number before performing the operations every time. If the number is not issued, they cannot ask for payment from the emergency operations from National Institute for Emergency Medicine (NIEM). Many times, that the Emergency Report Center considered that their operations were not helping emergency patients, so a number was not issued, meaning that Paramedic Services would not receive payment. Khon Kaen Public Health Office and Khon Kaen Hospital have tried to solve this problem by giving advice to the leaders of local administrative organizations that in case of non-emergency patients, an ambulance should be provided so that the nursing will be

separated from paramedic services (Chief of Khon Kaen Emergency Report Center, personal communication, June 24, 2019).

5.1.1.5 Khon Kaen Emergency Medical Services Communication System

1) Khon Kaen Emergency Report System

The number 1669 is the main telephone number for Khon Kaen emergency report system. It can be called from all telephone systems. The number is shown and able to record voice (now there are 7 coaxial cables). When calling within the area of Khon Kaen province, the number will reach Khon Kaen Emergency Notification and Command Center located at the 5th floor of Accident and Emergency Center Building in Khon Kaen Hospital that has mission to receive an incident report and give a command to an emergency medical services ambulance to give assistance to emergency patients, make coordination in emergency medicine with relevant agencies. It is open 24 hours. Some incidents are reported to hospitals, local administrative organization paramedic services, foundations, or volunteers. When any hospital or paramedic services receive an incident report, they will report to the Emergency Notification and Command Center using a communication radio or telephone for acknowledgement of the Center in case workers need to start the operations before asking for an incident number (if the number is not issued, workers will not be able to ask for payment). In addition to reporting an incident using the telephone number, NIEM (National Institute for Emergency Medicine) made the 1669 Application for reporting incidents through mobile phones but none of people report through this Application since it is not made known too public.

Workers, 5 positions, work at the same time in Khon Kaen Emergency Notification and Command Center, which consist of 1) doctors working as Medical Director being on duty at the Center working in shift within 24 hours, 2) nurse as the Chief of the Center, 3) Emergency Medical Call Taker, 4) Emergency Medical Coordinator, 5) Emergency Medical Dispatcher. When the emergency medical call taker, who passed the training in handling medical calls and communication, receives a telephone call, he/she will ask the following questions: (1) What is wrong with the patient (s)? and what are the symptoms? (2) Where is the patient? (3) Which number you are calling from?, What is the telephone number you can be reached? (4) What is the name of the caller? (5) Is the patient conscious

(awake, be able to speak)? (6) Does patient breathe normally? (7) In case the caller is not sure if the patient is conscious or be able to breathe or not, the caller must stay on the line. The emergency medical dispatcher (EMD) who passed the training in handling medical calls and command will triage emergency levels of the patient and assigns emergency medical unit of various levels to start the operations in a sequence of urgency of the emergency patient. In case patient is unconscious and unable to breathe, the red code emergency medical unit or advance paramedic services will be assigned to conduct the operations. While waiting for the arrival of the emergency medical unit, advice on first aid will be given to the caller, advice on emergency nursing care and treatment is given to the emergency medical unit including the moving while transferring the patient. Emergency medical coordinator will coordinate with hospitals and relevant agencies to support the operations of the emergency medical unit and coordinate to deliver the emergency patient to an appropriate hospital including coordinating and solving problems related to the operations of the emergency medical unit according to the orders of the Center. Workers at the Center will record data in the form of documents and computer program to be real time through Google Drive as seen in Figure 5.6.

Figure 5.6 The Process of Emergency Call Taking and Command in Khon Kaen

As soon as the emergency medical unit in the area receives a command from the Report and Command Center, they respond to the operations using a communication radio and inform the Center again when they leave the base of the operations. When the emergency medical unit arrives at the scene of the incident, they will evaluate symptoms, give medical treatment there and report to the Center and inform the symptoms of the patient to the Center for acknowledgement. In case assistance is needed, the Center will coordinate with relevant agencies, destination hospital and seek advice from Medical Director for primary medical treatment. In case of red code patients, the patients will be delivered to the nearest hospital. In case of yellow code or green code emergency patients, the patients will be delivered to the hospital where they have the rights to health coverage service or a hospital where patients or their relatives request. The emergency medical unit will inform the Center when they leave the scene of the incident and when they deliver the patients to the destination hospital. The emergency medical worker will report symptoms and medical treatment to an emergency room nurse verbally in the first place. A report will be prepared in writing and sent to ITEMS system within 24 hours. If it is overdue, the chief of the Center will keep asking through LINE Application since the emergency medical unit will not receive payment if the report is not sent within the specified time.

When the Emergency Notification and Command Center, open 24 hours, receives a report from a victim of an emergency incident or a person close to the victim, Call Taker will ask where the caller is and assign the job to the emergency medical unit in the responsible area or the emergency medical unit in the neighboring areas to start the operations. Next, emergency medical services or paramedic services, i.e., various emergency rescue services, radio amateur society, and rescue clubs in Khon Kaen, will assign their staff to enter the scene of the incident to deliver the victim to a hospital. If problems are found during they perform the operations, they will report to the Center and the Center will coordinate with relevant agencies to facilitate convenience or help the victim in the first place; for example, calling the police to open a traffic route or calling civil defense volunteers (CDV) to help breaking a car to bring the victim out of the scene of the incident

(Khon Kaen local administrative organization paramedic services, group discussion, July 31, 2019).

Telephone and communication radio are major devices used for communication in connecting to the assistance of the Emergency Notification and Command Center. However, today there are problems related to unreadiness of equipment and communication radios that are out of order and under repair or buying replacement. Now, Khon Kaen Hospital is moving and improving the Center. A budget is requested from the Smart City project of Ministry of Digital Economy and Society and the budget is approved at the amount of 22,000,000 baht. It is expected that the problems will be solved after the improvement. A new place can facilitate a higher number of emergency medical call takers. Previously, there were only 10 persons but today the place can facilitate more people. As for the communication problems with local administrative organizations or foundations in remote areas, due to insufficient numbers of coaxial cables for giving advice when patients have sudden change in symptoms. Sometimes communication radios cannot transmit the signal. Meanwhile, only 1 telemedicine device is available in each community hospital. Therefore, problems are solved by using a mobile phone to contact the Center directly.

Personnel of the Center consist of 7 doctors and 40 nurses (nurses in emergency room of Khon Kaen Hospital are included), 7 paramedics, 16 emergency medical technicians intermediate (EMT-I), 16 emergency medical technicians basic (EMT-B), 8 emergency medical responders (EMR 40-hour training), 27 First responders (FR) (16 or 24-hour FR training), 1 emergency medical director and other 18 contract workers. They take turn working in each shift for all 24 hours of work (Chief of Khon Kaen Emergency Notification and Command Center, personal communication, June 24, 2019).

Most of the budgets for the Center are from the subsidies of Khon Kaen Hospital, Khon Kaen Emergency Medical Foundation. Some parts of the budgets are allocated by NIEM (National Institute for Emergency Medicine) from Emergency Medical Fund in the part of the operations support which Khon Kaen Provincial Public Health Office gives to the Center by 50%. (Chief of Khon Kaen

Emergency Notification and Command Center, personal communication, June, 24, 2019).

To enable people to understand how to use emergency medical services and be able to report an incident correctly so that the Emergency Notification and Command Center will be able to send paramedic services to help patients correctly, fast, and be able to increase the survival rate of patients, hospitals, Khon Kaen Provincial Public Health Office, and paramedic services in Khon Kaen conduct public relations for emergency medical unit by installing EMS 1669 signs in communities. Documents/leaflets are handed out to community leaders and given to mobile medical service units. Documents are given to youth and students for passing them on to their parents to give knowledge and understanding of emergency medical services and the 1669 emergency hotline. Community chairman and chief of village health volunteers are appointed to be core leaders for collaboration networks in reporting/informing news about asking for help from emergency medical units (personnel in the Emergency Notification and Command Center, Khon Kaen Paramedic Services, Ban Non-Sub-District Administrative Organization Paramedic Services and Ban Ton Sub-District Municipality Paramedic Services, group discussion, July 31, 2019).

Khon Kaen Provincial Public Health Office prepared a public communication plan to launch public relations for building awareness of emergency medical services in people at risk and their families so that they will have basic knowledge about sudden illness such as stroke, STEMI, what to do when having an accident or seeing an emergency incident, asking for help from emergency medical services through the 1669 hotline, and to increase basic skills in handling emergency incidents like carrying out first aid, performing CPR, using AED to community leaders and community FR workers. Local administrative organization started to be involved more and more which can be seen that Khon Kaen Provincial Administrative Organization brought an emergency medical services project in the 5-year development plan (2018-2022) to put in the ordinance of annual expenditure budget for the year 2020 of local administrative organizations in accordance with regulations of Ministry of Interior. The project is the opening of the learning center of “CPR, anyone can do it” around Khon Kaen City Municipality to give knowledge about

performing CPR (cardiopulmonary resuscitation) using AED (Automated External Defibrillator), (Chief Executive of Khon Kaen Provincial Administrative Organization, personal communication, July 1, 2019).

Most people know that they can report accidents and emergency incidents through the 1669 hotline. They have seen various public relations such as stickers, PA system (Public Address System), posters, vinyl signs but they lack understanding of the use of emergency medical services. Many people understand that when they call 1669, an ambulance will pick them up in all cases, regardless of being an emergency incident, like calling an ambulance of the private sector. Some people call 1669 to ask for a nurse to take care of a bedridden patient at home. Khon Kaen Hospital solves such problems by setting an emergency medical unit to provide services to patients at home, separated from emergency medical services. If the services are needed, patients and relatives need to bear the expenses on their own (Chief of Khon Kaen Emergency Notification and Command Center, personal communication, July 1, 2019). Besides, some service receivers feel that emergency medical call takers speak in an unfriendly way, do not have medical communication skills, keep asking many questions even after being answered, ask some questions that should not be asked. They must wait for such a long time before an emergency medical unit arrives. Sometimes they need to wait for 1 hour, but an emergency medical unit does not arrive. The operations are not consistent with the severity of patients. If they call paramedic services directly, they will get faster services than calling the Center. In addition to the 1669 hotline, they can call a hospital or local administrative organization paramedic services to report emergency incidents. It seems that they receive faster services than calling the Center. In case local administrative organization paramedic services are not available because they provide services to other patients or ambulances are not available, the paramedic services will coordinate with the Center (Registered nurse, Family Medical Care Team, Nongprung Sub-district Health Promoting Hospital, personal communication, July 31, 2019).

2) Khon Kaen Emergency Medical Communication System

When there is a patient with sudden illness in Khon Kaen, onlookers or relatives can call 1669 and it will put the caller through the Emergency

Notification and Command Center that provides 24-hour service. The 1669 hotline can be called from home telephone and mobile telephone of all telephone service providers. The system is managed through private automatic branch exchange (PABX) of TOT Public Company Limited. The caller's telephone number will appear at Khon Kaen Emergency Notification and Command Center, the 5th floor of Accident Center, Sirindhorn Building in Khon Kaen Hospital. Khon Kaen Emergency Medical Committee gives importance to the communication system management in the Center and put it in the emergency medical strategy of the province.

Communication equipment within the Center comprises 6 office radios, VHF/FM handheld radio. The equipment can contact all community hospitals in Khon Kaen, hospitals in northeast region, Srinagarind Hospital, local administrative organizations, and foundations that participate in Khon Kaen emergency medical services system, Khon Kaen Police Station, Khon Kaen Provincial Police Region 4, Khon Kaen Radio Amateur Society and Radio Communication Center of Ministry of Interior. There are 10 coaxial cables, single site band, fax machine, and computer connecting to the internet.

Advice, command, assistance coordination from the Center will be carried out under the supervision of Medical Director being on duty at the Center through communication radio or telephone. Today, the communication of networks has problems related to unreadiness of equipment and communication radios of the Center which are out of order and under repair or buying replacement. Sometimes the Center has communication problems with local administrative organizations or foundation in remote areas due to insufficient number of coaxial cables for providing advice when patients have sudden change in their symptoms (now only 7 coaxial cables are workable). Sometimes communication radios cannot transmit the signal. Meanwhile, only 1 telemedicine device is available in each community hospital. Recording incidents, receiving a report of incident, commanding assistance and reporting to the Center are carried out through Google Drive. In case of an important incident, when the incident is already solved, it must be reported to the Chief of Trauma Center & Critical Care and relevant persons according to the determined guideline. In general, Head nurse of the Emergency Notification and Command Center will give an early report through telephone. Khon Kaen Hospital provides

nurse, communication staff and data recording staff to be on duty at the Center, at least 4 persons/shift to receive-send radio/telephone communication, coordinate the operations according to the command of the Chief of the Center, check readiness of the communication system within networks, record operational performance of paramedic services, collect data for sending to Trauma Center & Critical Care. Now, Khon Kaen Hospital is moving and improving the Center. A budget is requested from the Smart City project of Ministry of Digital Economy and Society and the budget is approved at the amount of 22,000,000 baht. It is expected that the problems will be solved after the improvement. A new place can facilitate a higher number of emergency medical call takers. (Chief of Khon Kaen Emergency Notification and Command Center, personal communication, June 24, 2019).

The Emergency Notification and Command Center prepared the manual and standard for making contact for emergency callers and emergency medical call takers, the manual of coordination guideline between Communication and Command center and chief executives to serve the operations, networks supporting the operations both inside and outside the province. Nurses being on duty at the Communication and Command Center are appointed to serve the operations and develop the quality of the Communication and Command Center. Training is provided to staff being on duty at the Communication and Command Center as well as a monthly meeting to develop the operations system of permanent staff of the Communication and Command Center, development of the data recording system of the operations of networks contacting the Communication and Command Center, system management of the quality development and monitoring internal evaluation.

Communication of emergency medical units, hospitals, Khon Kaen Provincial Public Health Office, local administrative organizations, sub-district health promoting hospitals, foundations, and associations providing emergency medical services is carried out through the telephone number used to make contact and coordinate between the Emergency Notification and Command Center throughout 24 hours. Durable articles and communication equipment in emergency medical units comprise 60 meters high telecommunication tower with fixing cable, VHF/FM communication radio, emergency medical radio service frequency, permission for possessing and using communication radio granted by Office of the National

Broadcasting and Telecommunications Commission (NBTC) to be installed in emergency medical services operation center, ambulances, and attached with paramedics. Training about possessing and using communication radio is provided for personnel. PC computers connected to local area network (LAN) or wireless-LAN (WIFI) are provided. Reports of the operations of emergency medical units are prepared through a computer system on the internet to make a requisition for the compensation of emergency medical services operations.

The command to ask emergency medical units to start the operations must be clear and without ambiguity. It is asking for cooperation from paramedic services due to good relationship like teacher-students or siblings but not boss-subordinates. It is considered that all emergency medical units help one another at work to help emergency – patients to survive. A LINE group is prepared to communicate between personnel associated with Khon Kaen emergency medical system. Khon Kaen Hospital does not provide financial support to paramedic services of foundations or volunteers (payment from working at the scene of the incident is from NIEM: FR= 350 baht, BLS=500 baht, ILS=750 baht, ALS = 1,000 baht) but supports various kinds of devices and equipment such as bed sheet, cervical collar, arm, and leg splints (Chief of Khon Kaen Emergency Notification and Command Center, personal communication, June 24, 2019).

Khon Kaen is a pilot province in developing the information system that connects to ITEMS data of National Institute for Emergency Medicine (NIEM) and E-claim database of the Road Accident Victims Protection Company. When victims request emergency medical services, the Emergency Notification and Command Center will assign emergency medical unit to start the operations at once. Data will be recorded in the information technology for emergency medical system (ITEMS) about accident, car, and victims. An operation number will be issued. As soon as the emergency medical unit starts the operations according to the command of Emergency Notification and Command Center, details will be recorded in a record of emergency medical services operations in accordance with each level of the emergency medical unit. The records of the operations will be collected and submitted to Provincial Office of Emergency Medical Services. Information about the accident, car, and victims will be reported to the Emergency Notification and Command Center.

In case additional information is required, the officer working on motor vehicle road accident victim's protection of the hospital will check information in E-claim system. In case the victims are delivered by emergency medical services, but data are not found in the E-claim, coordination will be made with the Emergency Notification and Command Center to record the information abruptly and the information will be checked to give primary protection to the victims from AITEMS. When the system checks which notification numbers will receive protection confirmation, the information about medical expenses will be recorded. Two sets of documents are prepared for the hospital and NIEM. Invoices will be collected to bill the Road Accident Victims Protection Company. When NIEM checks accuracy of the reported information in the ITEMS, information of the victims will be submitted to the hospital through the E-claim system (information about the accident, car, and victims) to confirm protection and to monitor the overall operational performance. When the insurance company checks and find out insurance information in accordance with the Motor Vehicle Road Accident Victims Protection Act, and checks documents and invoices. As soon as the documents and invoices are complete, the Company will implement transferring money for vehicle compensation and submit to NIEM and will issue a payment report.

3) Models of Communication among Agencies in Emergency Medical Services Networks

Communication to submit information among National Institute for Emergency Medicine, Emergency Notification and Command Center and various operational units is carried out through ITEMS system. Emergency Notification and Command Center and Provincial Public Health Office can record information of emergency medical units fast and correctly. The Emergency Notification and Command Center monitors the recording of information in the system after emergency medical units perform the operations. If it is found that the information is not recorded, asking for the information will be done through LINE application. As for the sending and receiving information of service receivers in an emergency room of government hospitals to Ministry of Public Health, it will be carried out on IS Online through the file "ACCIDENT" in the 43 folders system.

EMS Day meeting has been held every month at Khon Kaen City Hall continuously more than 20 years. It is an important forum for discussion with various agencies in emergency medical services networks, both formal and informal discussion, so as to inform news or clarify stories or incidents that personnel in Khon Kaen emergency medical services system should know, to teach or give academic knowledge, to offer and persuade relevant agencies to participate in emergency medical services, to make decision on doing something related to emergency medicine and to resolve disputes or incomprehensibility among emergency medical units or agencies associated with emergency medical services including presenting outstanding performance of many paramedic services for being awarded. This activity brings harmony and collaboration to emergency medical services networks in Khon Kaen. In the afternoon part of EMS Day meeting, it will be a meeting of head nurses of emergency rooms of all hospitals in Khon Kaen to solve ongoing problems in hospitals and problems related to the morning part. Besides, there is EMS Rally activity initiated by Khon Kaen and has been organized every year. It is another important activity that gives rise to both formal and informal communication. Familiarity and intimacy bring harmony to emergency medical units, causing smoothness of communication. EMS Day is considered an important strength of emergency medical services networks in Khon Kaen. In Thailand, fewer than 10% of emergency medical services networks that can hold a meeting every month continuously like Khon Kaen (Director of WHO Collaborating Center for Accident Prevention and Initiator of Khon Kaen emergency medical services, personal communication, February 4, 2019).

Communication among National Institute for Emergency Medicine and agencies related to Khon Kaen emergency medical services (Provincial Public Health Office, Emergency Notification and Command Center and emergency medical units) is most likely carried out in a formal manner through the issuance of regulations, rules, and standards in writing, holding an academic meeting, holding an opinion exchange forum, and conducting an area survey to give supervision and paying a visit. The communication for formal teaching or giving academic knowledge to emergency medical units will be implemented in the form of holding a meeting, academic training which most likely held by Khon Kaen Hospital, Srinagarind

Hospital, Faculty of Medicine Khon Kaen University, and tertiary care hospitals in each zone.

As for communication to make widely known to public about access to emergency medical services and collaboration given to the operations of paramedic services, hospitals, Provincial Public Health Office and local administrative organizations providing emergency medical services publicize and give knowledge to people in the area that they can call the services when they get injured or have sudden illness or get injured from accidents, which cases they can call the services and how to call the 1669 emergency hotline so that people can call emergency medical services correctly and abruptly. Leaflets, stickers, roadside signs, public relations signs, public address system, community radio, training, community meeting are implemented to build people's awareness of emergency medical services so that they will have knowledge about sudden illness such as stroke, STEMI, what to do when they have an accident or see an emergency incident, methods to report an incident or ask for help about emergency medical services through the 1669 emergency hotline, an increase in basic skills for handling emergency incidents such as performing first aid, performing CPR, using AED are given to community leaders, community first responders (Doctor (Physician) of Khon Kaen Provincial Public Health, persobal communication, June 27, 2019. and Khon Kaen emergency medical units, group discussion, June 27, 2019). However, most people who are incident callers lack understanding of reporting the information of emergency patients and they feel they are asked too much, feeling they are wasting their time (Relatives of emergency patients who use the 1669 emergency hotline in Khon Kaen, personal communication, June 27, 2019).

With regard to command given to emergency medical units, Emergency Notification and Command Center uses communication radio to inform all emergency medical units to be able to hear thoroughly and equally. Due to their good relationship, the command is in the form of asking for collaboration for starting the operations, not a command. As for communication with people to publicize how to use the 1669 hotline and making understanding of emergency medical services by relevant agencies, it has been implemented regularly and continuously. The summary

of communication of Khon Kaen emergency medical services networks is shown in Figure 5.7.



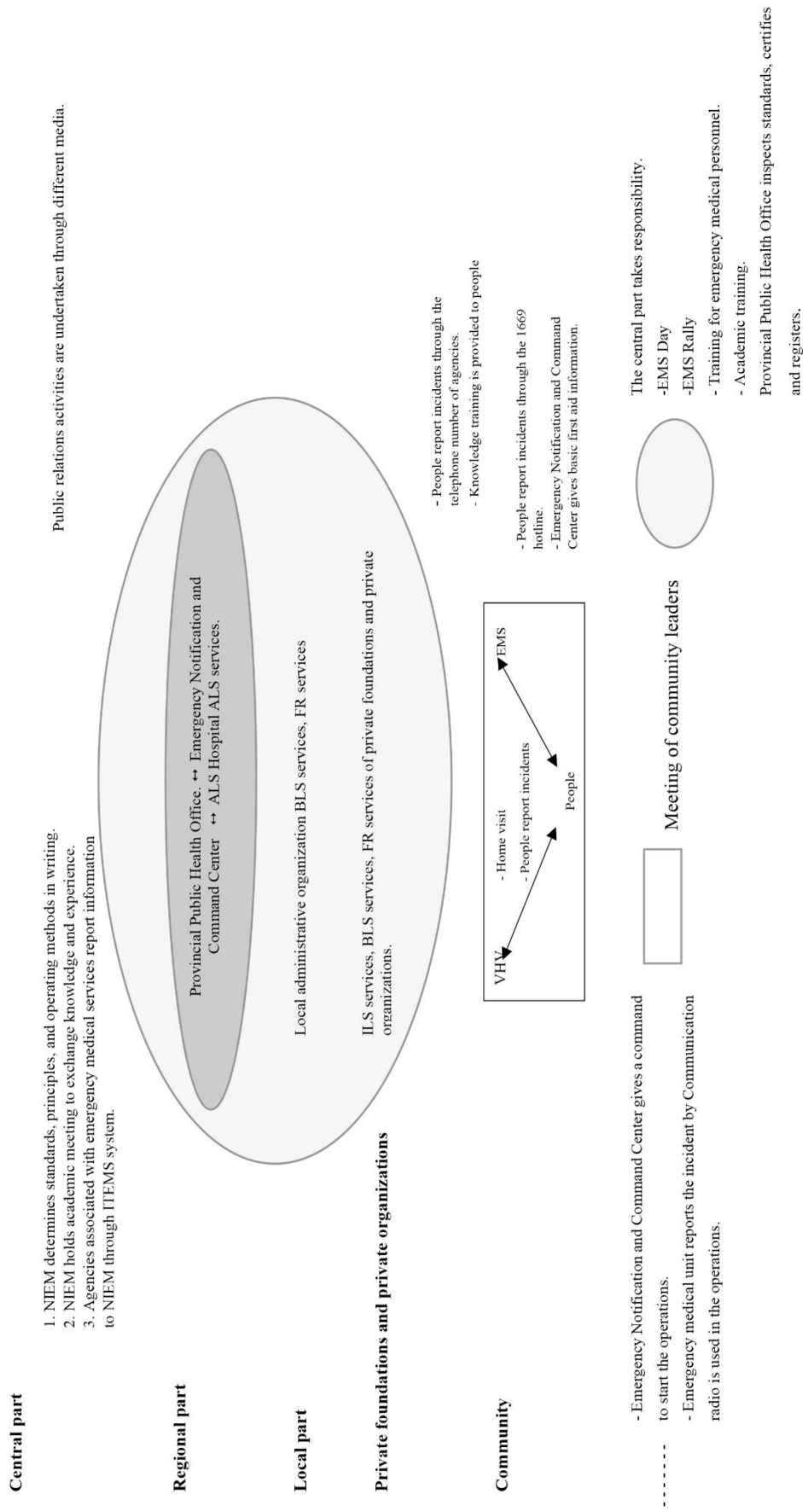


Figure 5.7 Communication of Khon Kaen Emergency Medical Services Networks

5.1.2 Effectiveness of Khon Kaen Emergency Medical Services Networks Management

Provan and Millard (1995, 2001) divided effectiveness measurement of networks into 3 levels, community, network, and organizational levels. According to the study on effectiveness of health service networks, Provan and Milward (1995) selected effectiveness of community level network, namely, good health and well-being of people as an indicator since it is the most important thing in health services.

Glickman, Boulding, Manary, Staelin, Roe, Wolosin, and Schulman (2010) measured the success of emergency medical services networks and EI-Sayed (2012, p. 2) measured the quality of emergency medical services by considering the structure, process, and outcome of the services. Outcome is the indicator reflecting effectiveness of the overall emergency medical services. The outcome was measured from 1) death rate, 2) subsequent diseases, 3) remaining disability, 4) obtained illness and discomfort, 5) satisfaction of service receivers and worthiness of services (6D's: Death, Disease, Disability, Discomfort, Dissatisfaction, Destitution).

Based on the review of the study on effectiveness of emergency medical services networks management, the measurement of success and quality of emergency medical services networks as mentioned above, the researcher then measured effectiveness of emergency medical services networks at community level by considering 1) access to emergency medical services, 2) death rate of emergency patients, 3) perception of information about emergency medical services and 4) people's perception and understanding of emergency medical services.

1) Access to Emergency Medical Services

Access to emergency medical services is the way that people with sudden or critical illness receive emergency medical services by a standard emergency medical unit at the scene of incident to hospital by a command of Emergency Notification and Command Center, considering from critical emergency patients through Khon Kaen emergency medical services (EMS) in the past one year accounted for 20.09% (National Institute for Emergency Medicine, 2019a). Ministry of Public Health set the goal in the fiscal year not lower than 26% while NIEM set it not lower than 20%. Details of percentage of critical emergency patients (at

emergency room) from Khon Kaen EMS, classified by fiscal years are shown in Figure 5.8.

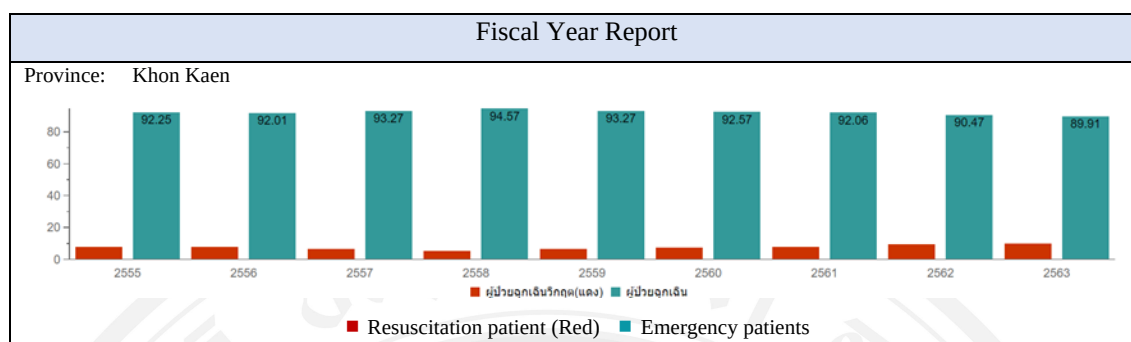


Figure 5.8 Percentage of Critical Emergency Patients (at emergency room) from Khon Kaen emergency medical services, classified by fiscal years
Source: National Institute for Emergency Medicine (2019a).

Regarding coverage of emergency medical units in each area, Khon Kaen has 26 districts, 202 sub-districts. ALS units are in 25 districts. Today there are 121 ALS units. BLS units are in 48 sub-districts and there are 87 BLS units in the province. Kranuan and Phu Pha Man districts have one ILS unit. Ubolratana district has 2 ILS units and 305 FR units, which is the district having FR units covering 84.65% of the entire districts. Khon Kaen can appropriately recruit relevant persons for working, making 194 local administrative organizations registered emergency medical services, accounted for 86%. There are 176 local administrative organizations that perform actual operations, accounted for 91% of the entire registered ones. There are 19 foundation/association emergency medical units. There are 559 emergency ambulances, 21 ALS pickup trucks, 44 BLS pickup trucks, 198 FR pickup trucks, 126 ALS vans, 4 ILS vans, 2 BLS vans and 113 FR vans.

National Institute for Emergency Medicine (2019a). The proportion of red triaged emergency patients delivered by ALS units in 2019 of Khon Kaen was 270.08 per 100,000 population. The proportion of red triaged emergency patients, delivered by ALS units, per 100,000 population of Khon Kaen, classified by fiscal years in Figure 5.7 indicates that the number of emergency patients delivered by ALS units has increased continuously since 2015.

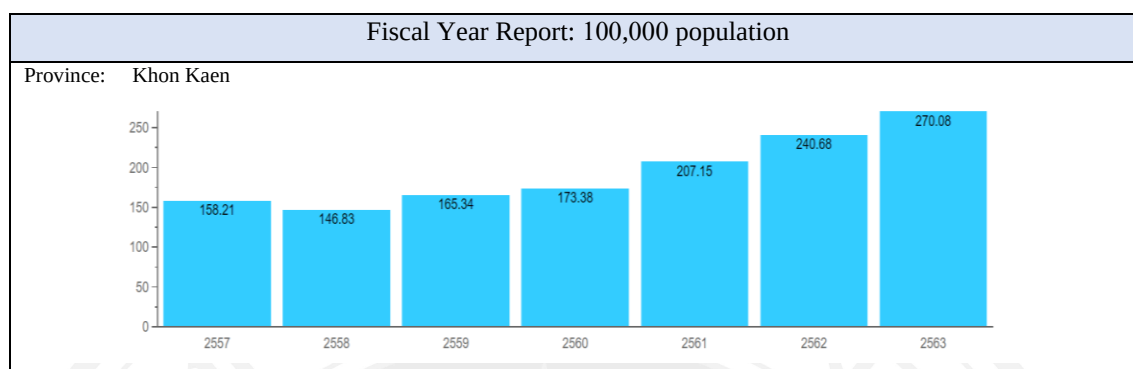


Figure 5.9 The Proportion of Red Triaged Emergency Patients, Delivered by ALS units, per 100,000 population of Khon Kaen, Classified by Fiscal Years
Source: National Institute for Emergency Medicine (2019a).

Now Khon Kaen is deprived of emergency nurse practitioners and paramedics (the number is lower than manpower requirement criteria) and facing problems of career growth in registered nurse, Head (Chief) of Emergency Notification and Command Center. The Head registered nurse of Emergency Notification and Command Center is under the structure of emergency nursing job. The highest position is the professional level (C7), being unable to be promoted to the senior professional level (C8) since the structure of nurse positions of Ministry of Public Health, senior professional level, in terms of caring emergency patients provides only one position, namely, Head of Emergency Nursing Division. To get the career growth as expected, they need to move out of Emergency Notification and Command Center and work in hospital emergency room. The other problem is performance evaluation for promotion. Working as Chief of Emergency Notification and Command Center does not have a direct contact with patients, which is not consistent with nursing job.

“Chief of Emergency Notification and Command Center, it is a head position but there’s no career growth, we need to move to emergency room to meet the right field of work. Everyone in the accident center is under the frame of ER workforce but they do not grow because they do not work at the scene of

incidents. For nursing, Emergency Notification and Command Center is not the right field of work because they do not make a direct contact with patients. (Head of Emergency Nursing and Ex-chief of Khon Kaen Hospital Emergency Notification and Command Center, personal communication, June 24, 2019).

“Being Chief of Emergency Notification and Command Center is famous but cannot grow in the career and is not promoted to a higher position. The highest position is only C7. If you want to grow, you must leave and move to work at emergency room” (Chief of Khon Kaen Hospital Emergency Notification and Command Center, personal communication, June 24, 2019).

NIEM modified the criteria of training duration and renewal of licenses. NIEM requires the renewal of licenses to be taken place every 2 years, the age of emergency medical personnel, First Responder (FR) 24 hours training is changed to be Emergency Medical Responder (EMR) 40 hours training, making FR need to attend additional 16 hours training. Some people do not renew their licenses and are not interested to have additional training since they must pay for it, and it is considered wasting their time while they must go to the city to receive training. Though they receive additional training, their remuneration is the same, making many emergency medical personnel disappear from the system.

“Recently, NIEM changed FR to be EMT and they have to get additional training. A lot of FRs disappear from the system. Previously there were 5,000 persons, around 2,000 persons disappeared. They did not want to get training as they must pay for it, they think it wastes their time and they must get to the city to be trained. Though they have additional training, their salary is the same. Khon Kaen Hospital tried to organize training and support training expenses but due to limitation in budget and a number of speakers” (Chief of Khon Kaen Emergency Notification and Command Center, personal communication, June 24, 2019).

“Personnel in local administrative organization emergency medical services have a high turnover rate or change their jobs frequently since most workers in

paramedic services are contract employees, they are not included as permanent government official and they feel that their job is insecure without any welfare given to them” (Khon Kaen Local Administrative Organization Paramedic Services, group discussion, June 24, 2019).

“If EMT position is open in Nonthaburi, please tell me because I will apply for it. I would like to be included as a permanent government official; it is more secure. Now, I am a contract employee and need to renew the contract every year. I do not know when I will be laid off. Now no welfare is given” (Emergency medical volunteer, personal communication, June 24, 2019).

From the information mentioned earlier, it can be concluded that though Khon Kaen has a lot of local administrative organizations joining hands in providing emergency medical services and emergency medical units can cover the whole area as many as 84.65% of the entire sub-districts, people’s access to emergency medical services is lower than the criteria since the number of personnel in the emergency medical system is not sufficient to services. A lot of first responders (FR) disappeared from the system due to a spending problem and no time to get additional training to be promoted to a higher position and renewal of the license required by NIEM. The employee turnover rate is quite high due to insecure job and a lack of career development. In this regard, some emergency medical units are unable to perform their operations due to a lack of personnel.

2) Emergency Patient Death Rate

Consideration of effectiveness of emergency medical services at a community level found that there are 146 persons who died at the scene, accounted for 0.15% and 17 persons who died during being delivered to hospital, accounted for 0.01%. Hospital treatment outcomes show that 483 persons dying at hospital, accounted for 0.49%, 27 persons being discharged from hospital and dying at home, accounted for 0.03%. Death rate within 24 hours of patients undergoing treatments from intermediate secondary care hospital (F2) or higher is 4.72% (National Institute of Emergency Medicine, 2020). The goal in the fiscal year 2019 of NIEM and

Ministry of Public Health determined the death rate to be less than 10%. (National Institute of Emergency Medicine, 2018).

Assigning emergency medical units to perform pre-hospital operations in an appropriate manner depends on the accuracy of the triage of emergency levels of patients and emergency medical units that meet the levels of illness severity of patients, affecting treatment and survival of emergency patients (Rehn et al., 2009, p. 1). The accuracy of triage based on emergency types of patients over the telephone conversation in the past one year found under triage by 53.22% and over triage by 53.51% (National Institute of Emergency Medicine, 2020). The Figure showing the percentage of triage identifying critical emergency patients over the telephone conversation according to the fiscal year 2012-2020 found under triage and over triage rates more than 50%. American College of Surgeons Committee on Trauma recommends an under-triage rate below 5% and an over triage rate 25-50% (Mohan, Sarswat, Ok, & Pittman, 2014).

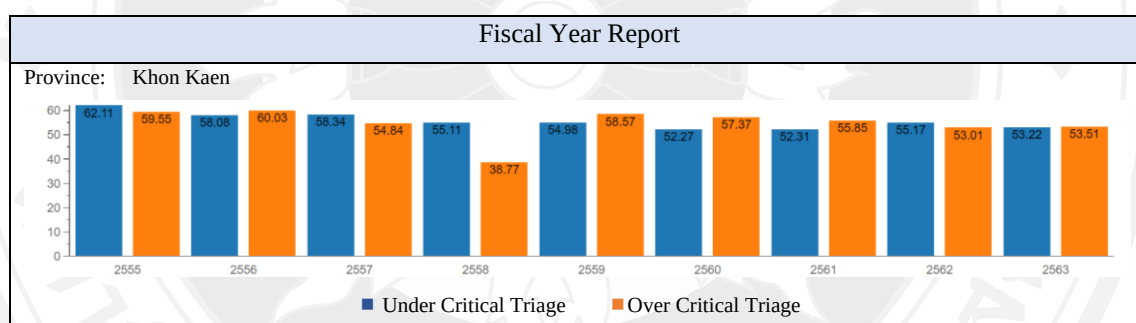


Figure 5.10 Percentage of Telephone Triage Identifying Critical Emergency Patients (Under and Over Triage) of Khon Kaen, Classified by Fiscal Years

Source: National Institute of Emergency Medicine (2018).

Waiting time of receiving emergency medical services of emergency patients affects death rate (Benjamin, Blaha, Chiuve, Cushman, Das, Deo,... & Muntner, 2017, as cited in Cabral, Castro, Florentino, Viana, Costa Junior, Souza, ... & Medeiros, 2018). Khon Kaen critical emergency patients received emergency medical services within 8 minutes in 2019 were 62.18% (National Institute of Emergency Medicine, 2020). NIEM determines the standard of performance measurement in 5 levels: Level 1 = 43 - 45.9%, level 2 = 46 - 48.9%, level 3 = 49 -

51.9%, level 4 = 52 - 54.9% and level 5 = 55 – 100%. Details of percentage of Khon Kaen critical emergency patients receiving emergency medical services within 8 minutes, classified by fiscal years are shown in Figure 5.11.

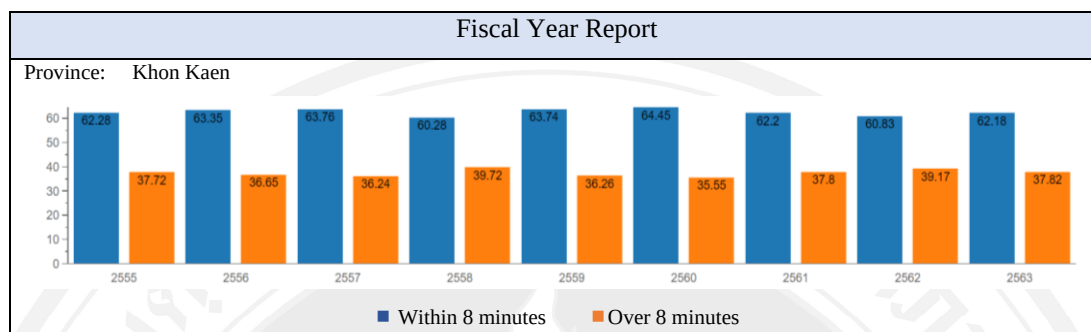


Figure 5.11 Percent of Khon Kaen Critical Emergency Patients Receiving Emergency Medical Services within 8 Minutes, Classified by Fiscal Years

Source: National Institute of Emergency Medicine (2018).

Communication between Emergency Notification and Command Center and emergency medical units to perform their operations in helping emergency patients is carried out speedily within 8 minutes. The major devices used in the communication are communication radio and telephone. Currently, there are problems about unreadiness of equipment and radios as they are out of order, under repair or buying replacement. In the meantime, Khon Kaen Hospital is moving and improving the Center. A budget is requested from the Smart City project of Ministry of Digital Economy and Society and the budget is approved at the amount of 22,000,000 baht. It is expected that the problems will be solved after the improvement. A new place can facilitate a higher number of emergency medical call takers. Previously, there were only 10 persons but today the place can facilitate more people. As for the communication problems with local administrative organizations or foundations in remote areas, due to insufficient numbers of coaxial cables for giving advice when patients have sudden change in symptoms. Sometimes communication radios cannot transmit the signal. Meanwhile, only 1 telemedicine device is available in each community hospital. Therefore, problems are solved by using a mobile phone to contact the Center directly.

“We most likely use a communication radio to ask emergency medical units to perform the operations but this one is old. Signal does not reach some remote areas. Now we are making a request for improvement. Next year, Emergency Notification and Command Center will be moved to another building. There will be more spacious. There will be a greater number of call takers and coaxial cables. Now communication radio is not workable, we need to use mobile phone instead but calling from a mobile phone we need to press number, it is not fast like using communication radio”. (Chief of Emergency Notification and Command Center, personal communication, June 24, 2019).

3) Perception of Information about Emergency Medical Services

Perception of information about emergency medical services is considered from calling the 1669 hotline when emergency illness occurred in Khon Kaen in the past one year. It was found that emergency patients called the 1669 hotline by 72.14% (National Institute of Emergency Medicine, 2020). Khon Kaen was at the level 1 (NIEM determines the standard of performance measurement in 5 levels: Level 1 = 70%, level 2 = 72.5%, level 3 = 75%, level 4 = 77.5%, level 5 = 80% or higher. Ministry of Public Health determines the standard of emergency performance within 12 months in fiscal year 2019 not below 95.5%). Details of Khon Kaen emergency patients reporting incidents through the 1669 hotline, classified by fiscal years 2012-2020 are shown in Figure 5.12.

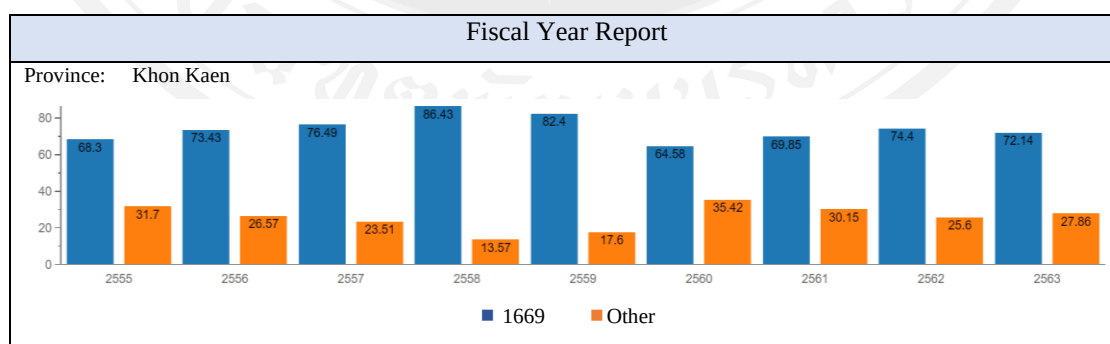


Figure 5.12 Percentage of Khon Kaen Emergency Patients Reporting Incidents Using the 1669 Hotline, Classified by Fiscal Years

Source: National Institute of Emergency Medicine (2018).

Most people know that they can call the 1669 hotline to report accidents or emergency incidents. They have seen a lot of public relations such as stickers, public address system, posters, vinyl signs.

“Most people know they have to call 1669 when there is an emergency. They have seen posters and the village headman announces through public address system in the morning” (Village health volunteer, personal communication, June 25, 2019).

“I see a 1669 signs when I contact SAO. When I go to a hospital, I see someone giving leaflets. 1669 Signs are along roadsides (People who receive emergency medical services in Khon Kaen, personal communication, June 25, 2019).

However, people who receive services gave an opinion that emergency medical services should be made widely known through other channels more and more.

“Public relations should be done through online increasingly such as LINE@, mobile vehicles for public relations to villages”.

“A big sign with telephone number should be attached at hospital so that people can share information through Facebook or LINE more easily”.

“Public relations should be done through media quit often. Ask SAO to inform details to people or ask people to attend training so that they will understand more. VHV or health officers visit people in the villages to inform news”.

“It should be advertised more often. A sign should be attached with details of 1669 like what 1669 is, if it is free service or not, when we can use services”.

“It should be advertised on TV, newspapers, signs, increasingly. Let hospital or SAO publicize. 1669 Activities should be organized so that people can remember it easily”. (People who receive emergency medical services in Khon Kaen, personal communication, June 25, 2019).

People who know and do not know emergency medical services choose to call local politicians, community leaders, VHV or local administrative organization paramedic services rather than calling 1669. The reason is that village leaders need to help people when people are in trouble. They know that local administrative organizations have an ambulance to deliver them to hospital and they do not need to pay for it. When calling 1669, they need to answer several questions and must wait for an ambulance longer.

“We vote him to be Chief of SAO, he needs to help people and people can depend on him, if not ,we do not vote him. When there is an emergency, people can call him and he can deliver people to hospital” (Relatives of patients in emergency room of Khon Kaen Hospital, personal communication, June 25, 2019).

“I see an emergency ambulance parked at SAO. If we need to urgently go to hospital, we can call. It is free service”. (Relatives of patients in emergency room of Khon Kaen Hospital, personal communication, June 25, 2019).

“When I call 1669, I have to answer many questions. It’s better to call a doctor at SAO, an ambulance picks us up faster.” (Relatives of patients in emergency room of Khon Kaen Hospital, personal communication, June 25, 2019).

“When I call, staff do not receive a call, I have to call several times. The line is busy and exceedingly difficult to be reached. Call center staff do not know how to describe routes or places, some staff speak in an unfriendly tone, some staff said we need to call the police first before calling 1669. Sometimes we are told that there is no ambulance to pick a patient, the number of ambulances is not enough, an ambulance is not ready for services, an ambulance is out of order. It takes such long time to reach an incident site, sometimes 30 minutes which it is too long. An ambulance is not clean, and its condition is not good.

An ambulance is old and not fully equipped”. (People who receive emergency medical services in Khon Kaen, personal communication, June 25, 2019).

“Call takers speak in an unfriendly way. They lack medical knowledge for communication. They repeatedly ask the same questions. After calling for help, it takes such a long time before an emergency medical unit arrives. Sometime an emergency medical unit is not suitable for patients’ severity of illness. If we call directly to paramedic services, we will get faster services. When we call the Center, we will get an incredibly old ambulance like a vehicle that carries dead bodies. That is why we do not want to use the services. Sometimes we found an emergency ambulance near where a patient is but cannot call because it is not on duty” (Registered nurse Family Medical Care Team, Nongkum Sub-district Health Promoting Hospital, personal communication, June 25, 2019).

“When calling directly to local administrative organization paramedic services, we will get faster services than calling the Center. If local administrative organization paramedic services are not available, they will coordinate with the Center accordingly” (Registered nurse Family Medical Care Team, Nongkum Sub-district Health Promoting Hospital, personal communication, June 25, 2019).

4) Perception and Understanding of People about Emergency Medical Services

Organizations providing emergency medical services in Khon Kaen such as government hospitals, Provincial Public Health Office and local administrative organizations conduct public relations and organize training to enable people to know about emergency medical services and build awareness and understanding of people about primary care when emergency illness occurs.

“The strategy for operating Khon Kaen emergency medical services is the strategy 4 – public relations. Emergency medical services are made widely

known by coordinating with relevant agencies by installing cutout signs, signs along highways throughout Khon Kaen according to the approved budget or the budget supported by the private sector. Community leaders in urban areas are coordinated to organize public relations in every village to ensure people perceive the 1669 emergency services. Mass media are coordinated to participate in accident prevention and calling 1669 services” (Director of WHO Collaborating Center for Injury Prevention Khon Kaen Hospital, personal communication, March 15, 2019).

“Khon Kaen builds community paramedic services networks in municipalities and communities, social medicine units in every hospital, community volunteers, relatives of chronic patients, teachers and students in communities to perform their duties in informing news about asking for help, primary patient care before paramedic services arrive the scene of an incident. They need to have knowledge and understanding of informing an incident to Emergency Notification and Command Center and first aid given to patients during waiting for an ambulance to pick them up” (Khon Kaen Provincial Public Health Office staff, personal communication, June 27, 2019).

“People in every household of Ban Non sub-district are advised the hot line number for emergency medicine, 1669. Stickers were attached to their house walls and documents advising how to use the emergency ambulance and the telephone number 1669. Advertising spots are prepared on how to use emergency ambulance service and given to local radio stations and village public address system.” (Ban Non sub-district administrative organization paramedic services, personal communication, June 27, 2019).

However, most people think they do not have enough knowledge and ability to perform CPR. Though they receive training, they are not confident that if they see a real incident, they will be able to do or not. When they are trained and if they do not practice, they will forget it soon. When they are trained, they need to help when an incident occurs. If they cannot help, they will file a lawsuit. Some people

believe that emergency illness and accident caring is the duty of doctors, nurse, paramedics, VHV, and village leaders.

“I used to taught how to do CPR but not I can’t remember. If I must do now, I think I cannot” (People in Nong No Sub-district, personal communication, June 25, 2019).

“I don’t want to do CPR for anyone, if he dies, his relatives will file me a lawsuit.” (People in Nong No Sub-district, personal communication, June 25, 2019).

“If we see unconscious patients, better call paramedic services or VHV. They learn and have more experiences than us” (People in Nong No Sub-district, personal communication, June 25, 2019).

From quantitative and qualitative data mentioned above, Khon Kaen emergency medical services networks have high effectiveness. Patients died from emergency accidents were in a small number. Most local administrative organizations give importance to organizing emergency medical units, making almost all sub-districts have emergency medical units in their areas. All relevant agencies make emergency medical services widely known to people, making most people call the 1669 hotline when an emergency occurs. Most critical emergency patients receive the services within 8 minutes after calling for help through the 1669 hotline. However, the accuracy of the triage of emergency levels of patients and emergency medical units that meet the levels of illness severity of patients of Khon Kaen Emergency Notification and Command Center had high error, more than 50%, due to communication problems between emergency medical call takers and callers and emergency medical dispatcher lack working experience in patient care, making the triage of emergency levels have errors. Meanwhile, most people do not have knowledge and confidence in doing basic first aid when an emergency occurs.

The success came from long time planning and developing emergency medical services. Khon Kaen emergency medical committee is appointed to formulate

emergency medical strategies since 2008. Rules and regulations are clearly set including operation guidelines that are accepted by all parties. Contact and coordination among organizations are carried out regularly through EMS Day meeting, once a month. It promotes the exchange of experience, knowledge, innovation, relationship among agencies and perception of problems and obstacles, leading to never ending improvement. EMS Rally activity is an activity that helps practice preparedness and capability among paramedic services in a concrete manner while awards will stimulate enthusiasm of each agency in developing their work continuously, bringing stability and security to networks. Collaboration in organizing activities, determination of mechanism of motivation by giving awards enable workers in the networks take pride in their performance.

Provision of supporting resources in a sufficient manner is done by establishing Khon Kaen emergency medical foundation to be a source of fund in developing emergency medical services with regard to personnel development, public relations, basic equipment, development of command communication system, development of data system for monitoring by running a fundraising campaign from all sectors sharing responsibility for or gaining benefits from emergency medical services in the areas, which is another important strategy that elevates participation and ownership of emergency medical services of locality. TEP is used as an operational strategy, T = Training – development of personnel and agencies or persons related to Khon Kaen emergency medical services, P = Planning – planning to find sources of funds, planning to develop Khon Kaen emergency medical services, E = Equipment – provision of equipment supporting the operations of Khon Kaen paramedic services networks to achieve efficiency. Objectives of foundations are clearly determined to enhance people to have knowledge and access public health services in a speedy manner, personnel working in emergency medical services are developed to ensure they can work efficiently, emergency medical services integration is supported to have emergency medical units covering Khon Kaen area (Founder of Khon Kaen emergency medical services foundation, personal communication, July 31, 2019).

Khon Kaen emergency medical services networks produce work and expand through a mutual learning process regularly and continuously, formally, and

informally (sharing knowledge, experience, devices, resources), giving assistance in problem-solving based on brotherhood relationship and teacher-student relationship.

Regarding developing emergency medical services personnel in Khon Kaen, it has been started since 1996, emergency medical technicians intermediate (EMI-T) have been produced from Sirindhorn College of Public Health Khon Kaen, Khon Kaen Hospital, Srinagarind Hospital, Faculty of Medicine Khon Kaen University. Besides, these places are training sources for emergency medical responders (EMR), emergency medicine residents. Khon Kaen Hospital assigns personnel to attend the training for emergency nurse practitioner, 2 persons per year. However, Khon Kaen Hospital has problems related to employee retention. A turnover rate is quite high, and personnel change their job frequently due to insecure job and no career growth. The way that NIEM modified a new rule by requiring First Responder (FR) to be Emergency Medical Responder (EMR), making FR need to attend additional 16 hours training. Some people do not renew their licenses and are not interested to have additional training since they must pay for it, and it is considered wasting their time while they must go to the city to receive training. Though they receive additional training, their remuneration is the same, making many emergency medical personnel disappear from the system.

Personnel being representatives of emergency medical services organizations in Khon Kaen perceive and understand the process and objectives of emergency medical services. They have knowledge and ability. Their reputation has been recognized at national and international levels. Knowledge and learning to increase skills and experiences have been provided continuously. Khon Kaen is a source of knowledge training for domestic and international personnel. Khon Kaen is one of a few provinces of Thailand that has the number of emergency medicine physicians that passes the standard of the required workforce frame but lacks emergency nurse practitioners and paramedics. In terms of career growth and career security, it is found that career growth and career security of emergency medicine physicians are like other specialist physicians. The problems related to career growth and career security of personnel in other fields are found, especially nurses in Emergency Notification and Command Center. The Head registered nurse of Emergency Notification and Command Center is under the structure of emergency

nursing job. The highest position is the professional level (C7), being unable to be promoted to the senior professional level (C8) since the structure of nurse positions of Ministry of Public Health, senior professional level, in terms of caring emergency patients provides only one position, namely, Head of Emergency Nursing Division. To get the career growth as expected, they need to move out of Emergency Notification and Command Center and work in hospital emergency room. The other problem is performance evaluation for promotion. Working as Chief of Emergency Notification and Command Center does not have a direct contact with patients, which is not consistent with nursing job.

The quality development of Khon Kaen Hospital emergency medical services is compared to and competed with academic and service approaches of Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, a university hospital providing learning and teaching for physicians and personnel in emergency medical services networks. It provides emergency medical units outside the hospital at ALS level providing services in Mueang district area like Khon Kaen Hospital. The difference is Srinagarind Hospital does not have Emergency Notification and Command Center. Emergency medical services personnel of both hospitals feel they are competing informally, but they are not enemies because personnel from both places are teachers-students and siblings in the same profession. They exchange their innovation and propose what one hospital is doing well to the other to motivate the other one to try to do better. From the unofficial competition, these 2 places develop the quality of emergency medical services constantly (Head of Emergency Medicine, Khon Kaen Hospital, personal communication, July 31, 2019).

Organization leaders see the importance and give support in the form of budgets and equipment continuously. Doctor Wittaya Chartbanchachai (MD), former head of Trauma Center & Critical Care, Khon Kaen Hospital viewed the importance of emergency medical services. He devoted his ability and used a body of knowledge and sincerity to develop relevant personnel, sought funds to conduct research and encouraged everyone to work and disseminate their work. He used both formal and informal methods to build a team and expanded networks in northeast region. He persuaded local administrative organization leaders to see the importance and provide emergency medical services in their areas. When local administrative

organization leaders see the importance and give support in the form of budgets, provision of devices and equipment, training is provide to personnel to review and increase their knowledge and ability to be up-to-date at all times and encourage personnel who have outstanding skills to show their ability such as being speakers, making those personnel are proud of themselves, have organizational loyalty and are service-minded in emergency medical services, helping retain personnel in organizations and emergency medical services. A lot of emergency medical units have outstanding performance, making Khon Kaen one of the leading provinces having emergency medical units that cover various areas.

5.2 Nonthaburi Province

5.2.1 Operational Process of Nonthaburi Emergency Medical Services Networks

5.2.1.1 General Status of Nonthaburi Emergency Medical Services

1) Background

Pre-hospital emergency medical services in a systematic manner of Nonthaburi province started when Phra Nang Klao Hospital established “Phra Nang Klao Paramedic Services” in 2004 which provided services to emergency patients outside the hospital in collaboration with Poh Teck Tung and Ruam Katanyu Foundations. At that time, it was under supervision of Bureau of Emergency Medicine or known as the rescue Narenthorn Center, Ministry of Public Health. It picked emergency patients up once they called Phra Nang Klao Hospital and bedridden patients who cannot go to hospital by themselves. As soon as the Emergency Medicine Act B.E.2551 (2008) was enacted on 7 March 2551 in conjunction with the establishment of National Institute for Emergency Medicine (NIEM) to take charge of management and coordination of relevant agencies, both government and private sectors. Meanwhile, one emergency notification and command center was determined to be available in each province. Therefore, Phra Nang Klao Hospital established Nonthaburi Provincial Emergency Notification and Command Center pursuant to the regulations and standards of National Institute for Emergency Medicine, to be notified incidents through the telephone number 1669, within Nonthaburi province, under

supervision of Section of Emergency Medicine, Phra Nang Klao Hospital. Phra Nang Klao Paramedic Services became a team member of the emergency medical unit, but the name is the same (Registered nurse – Chief of Emergency Notification and Command Center, Phra Nang Klao Hospital, personal communication, August 2, 2019). Currently, Phra Nang Klao Paramedic Services provide services to emergency patients outside the hospital in collaboration with foundations and some local administrative organizations that participate in emergency medical services. Nonthaburi Provincial Public Health Office performs its duty to coordinate and designate service areas for each emergency medical unit.

2) General Status of the Process of Nonthaburi Emergency Medical Services

The provision of Nonthaburi pre-hospital emergency medical services is the duty of government hospitals, private hospitals, foundations, associations, and private sector. Phra Nang Klao Hospital (Tertiary care hospital), community hospitals and private hospitals are responsible for providing ALS emergency medical units. Some foundations, associations, private sector, and local administrative organizations take charge of providing BLS emergency medical units and first responders (FR). Now, there are local administrative organizations registered to provide emergency medical services by 48% (22 local administrative organizations) and the number of local administrative organizations running the actual operations by 59% (13 local administrative organizations). (National Institute for Emergency Medicine, 2020). Large- sized local administrative organizations that participate in emergency medical services such as Nonthaburi City Municipality, Muang Mai Bang Bua Thong Town Municipality, Ban Bangmuang Sub-district Municipality, Bang Mae Nang Sub-district Administrative Organization can provide emergency medical services in an efficient manner. But the reason why most local administrative organizations are not interested in participating in emergency medical services is they do not want to bear more work burden, are concerned with being responsible for patients' lives, and are afraid of being filed a lawsuit if patients die.

“Municipalities and SAOs in the province are less likely to join pre-hospital emergency medical services. Only large-sized municipalities join like

Nonthaburi City Municipality, Bang Bua Thong, Ban Bangmuang, Bang Mae Nang” (Director of Bureau of Emergency Medical Alliance, personal communication, August 2, 2019).

“No local administrative organization has ALS ambulances and only a few local administrative organizations join emergency medical services. So, ALS, BLS, FR ambulances cannot cover the whole province. We need to ask for help from foundation ambulances. If some areas their local administrative organizations give cooperation like Bang Yai, Bang Bua Thong being large-size municipalities, the services will be good and get to patients fast. Most local administrative organizations are afraid to join emergency medical services because it is a matter of life and death. They are afraid that if patients die, they will be sued. They are not ready and public health workers like nurses do not want to take charge of other tasks other than what they are doing daily, they do not want to change from their routine work.” (Registered nurse, Chief of Nonthaburi Emergency Notification and Command Center, personal communication, August 1, 2019).

Phra Nang Klao Hospital takes charge of establishing the emergency operation division for managing and dispatching emergency medical services ambulances in the provincial emergency medical services using the number 1669 to ask for medical assistance. For rescue and inquiry, other numbers will be used. Furthermore, the hospital performs its duty in improving Emergency Notification and Command Center in terms of place, communication equipment, provision of ambulances, patient symptom report system and record system of the operations of networks. The budget for developing the Emergency Notification and Command Center is majorly from Phra Nang Klao Hospital, some parts of the budget are from NIEM that allocates from emergency medical services fund. About the budget supporting the operations according to task burden, Provincial Public Health Office gives to the Center at a ratio of 40:60 (Provincial Public Health Office: Center). The reason why the Provincial Public Health Office allocates more budget to the Center is Phra Nang Klao Hospital has a lot of task burden in the part of

emergency medical services but as of today the budget coming from NIEM is not enough for the operations. From the resolution of the cabinet on 3 September 2019 on the fiscal year 2020 expenditure budget limit of NIEM at the amount of 927,054,400 baht, it decreased by 150,193,900 baht from the 2019 (The fiscal year 2020 expenditure budget limit, National Institute for Emergency Medicine, 2019), making the budget that Nonthaburi province received decreased more than 1 million baht. Therefore, it must rely on the budget of the hospital for supplying equipment and devices for communication and emergency medical operations outside the hospital and pay for personnel salaries. Now, personnel of Emergency Notification and Command Center and emergency room of Phra Nang Klao Hospital are separating. Beside the Chief of Emergency Notification and Command Center organizes projects to ask for a supporting budget from National Health Security Office (NHSO) as well.

“Most of the budgets are from the hospital, some parts are from NIEM from emergency medical fund. The Provincial Public Health Office divides to the Center by 40:60. The Center receives more than Public Health Office due to a lot of tasks. Anyway, they are not enough because Phra Nang Klao Hospital uses Paramedic and EMT-I separated from ER of the Center. Then, we need to have a budget from NHSO to help. The budget of NHSO is cut more than 100 million baht, making the budget allocated to the Provincial Public Health Office smaller accordingly. Previously we got almost 2 million baht but this year we receive less than 1 million baht”. (Chief of Section of Emergency Medical Services, Nonthaburi Provincial Public Health Office, personal communication, August 1, 2019).

Nonthaburi Provincial Administrative Organization (Nonthaburi PAO) is not involved in pre-hospital emergency medical services management and the budget for emergency medical services has never been designated since it viewed that Phra Nang Klao Hospital is doing a good job. Chief Executive of the PAO views that it is not a task of the PAO while he does not have knowledge and understanding of regulations and management of local administrative organization emergency medical services. He is afraid that he will be inspected by Office of the Ombudsman

Thailand, but he is willing to support a budget for emergency medical services. Today, the structure of Nonthaburi PAO has Division of Public Health but responsibility for emergency medicine is not available. In the meantime, there are no government officials, employees, contract employees and other workers working with emergency medicine.

“PAO is not involved in emergency medicine. It does not determine work plans or budgets related to emergency medicine. There is no plan to transfer Emergency Notification and Command Center for management because Phra Nang Klao Hospital is doing a good job. It is not the duty of PAO. If PAO does, it will be audited by State Audit Office of the Kingdom of Thailand (SAO), but if PAO must do, it can because it has a budget. Like sub-district health promoting hospitals, they should be managed by local administrative organizations. For money, if they want, propose a project to PAO, but the hospital has never proposed a project, then PAO is not involved” (Chief Executive of Nonthaburi Provincial Administrative Organization, personal communication, August 15, 2019).

Phra Nang Klao Hospital has developed many aspects of emergency medical services, i.e. developing Excellent Center in Trauma Team, monitoring the care of high risk diseases like acute coronary syndrome, stroke, sepsis, head injury and multiple injury; developing data connectivity system for caring patients with emergency conditions at the scene of incident outside the hospital between emergency medical units and doctors on duty in emergency room in real time using telemedicine in order to take care of patients appropriately at the scene or during the transferring to ensure patients' safety; preparedness of emergency medical units to help in case of disaster within the country and foreign countries as requested by chief executives in Ministry of Public Health to help victims from water-related, land-related, and air-related disasters. Medical emergency personnel are divided into 2 teams as mini medical emergency team (Mini MERT) and medical emergency response team (MERT). Medicines, medical supplies, food, drink, and survival bags are

prepared; preparedness of vehicles for transferring patients, i.e. super ambulance that can transfer 6 patients each time and 2 paramedic ambulances; preparedness of live saving equipment to help victims from water-related, land-related, and air-related incidents; preparation of a coordinating project for preparedness of emergency medical operations with foundation volunteers in the networks to collect vehicle resource, aid equipment during normal circumstances and disaster circumstances; making collaboration with the police and staff from Road Accident Victims Protection Company to launch a campaign to reduce traffic accidents in Nonthaburi in a continuous manner; developing patient screening by using region 4 triage system (R4Ts). Currently, Phra Nang Klao Hospital has Trauma & Emergency Administration Unit (Tea Unit) that passed the assessment criteria. Tea Unit development is carried out to manage data of injured persons and emergency patients. (Chief of Nonthaburi Emergency Notification and Command Center, personal communication, August 2, 2019).

Nowadays, the information system of Phra Nang Klao Hospital emergency medical services does not have ambulance operation center (AOC) system, but GPS tracking system and speed warning are installed in ambulances to control excessive ambulance speed. Vital sign monitoring system has not been installed in ambulances but the use of communication to report patients' symptoms, seek advice and assistance through LINE, telephone with a team of emergency medicine physicians and specialists is carried out. IS online is used to transmit data of all service receivers in emergency room through the file "ACCIDENT" in the 43 folders system and ITEMS program of National Institute for Emergency Medicine is used. The Emergency Notification and Command Center has a plan to install and develop teleconsultation system by integrating with hospitals in the networks (Chief of Nonthaburi Emergency Notification and Command Center, personal communication, August 2, 2019).

To improve and increase efficiency of cardiopulmonary resuscitation, Phra Nang Klao Hospital organizes training to restore knowledge and develop skills

for performing advanced CPR according to the operations standards for nurses by emergency medicine physicians. 100% of Phra Nang Klao Hospital personnel attend the training. Duties and tasks are assigned to each worker to make the CPR role much more outstanding. CPR record form is prepared and improved constantly to be used for efficiency analysis of performing CPR. Causes of death in patients receiving CPR are reviewed to find out problem solution guidelines accordingly (Head of Section of Emergency Nursing, Phra Nang Klao Hospital, personal communication, August 2, 2019).

Emergency medicine of Nonthaburi Provincial Public Health Office is under supervision of Section of Non-communicable Diseases Prevention and performs the following duties: 1) inspect qualifications of emergency medical service units as determined by NIEM. In case of the pass criteria, information will be recorded in ITEMS system and in case of the failure criteria, persons asking for registration will be informed to correct or improve related components. When persons are granted the registration, an acknowledgement letter will be sent to them and information will be reported to Emergency Notification and Command Center, 2) collect, inspect, and improve command data from command forms, and operations data in ITEMS system, and make a requisition, 3) manage the budget allocated by National Institute for Emergency Medicine in the part of emergency medicine fund. The proportion of the budget of provincial operations center is 60% of the obtained budget for developing emergency medicine system, (4) manage human resources by developing workforce and supporting personnel training in Nonthaburi emergency medicine system, (5) receive complaints and handling conflicts among emergency medical units such as running on the same routes, scrambling patients by making a collaboration with Phra Nang Klao Hospital to designate services areas and routes as well as dates of operations as seen in Table 5.5, (6) promote public knowledge to encourage people at risk for emergency illness and their families to be aware of emergency status, how to ask for help and basic first aid when emergency illness occurs and be able to access the services properly and speedily by generating public communication networks. Mass media in the areas in collaboration with local administrative organizations, district hospitals and sub-district health promoting

hospitals promote knowledge and skills to community leaders and volunteers in the areas. Local administrative organizations, hospitals, foundations, associations, and private sector are enhanced to give knowledge and skills to target groups who are people at risk and people in the areas. Since there are many tasks related to emergency medicine, operations personnel view that emergency medical services should be separated clearly and persons in charge of the services should be assigned specifically.

“Emergency medicine of Nonthaburi Provincial Public Health Office is under supervision of Section of Non-communicable Diseases Prevention, it is not clearly separated but personally I think now emergency medicine has a lot of tasks, its structure should be separated to take charge of specific tasks. Generally, the structure of provincial public health office designated from Ministry of Public Health does not separate emergency medicine, but each provincial can separate the structure internally. Some provincial public health offices do.” (Person in charge of emergency medicine, Section of Non-communicable diseases Control, Nonthaburi Provincial Public Health Office, personal communication, August 4, 2019).

“Provincial Public Health Office does not set a strategy in emergency medical services management clearly but there is a project to develop emergency medicine in the development strategy for primary care, secondary care and tertiary care management to meet quality standards, it emphasizes participation of all sectors. Its roles and duties follow what NIEM designates”. (Nonthaburi Provincial Public Health Office physician, personal communication, August 4, 2019).

“The roles of Nonthaburi Provincial Public Health Office follow what NIEM designates; hold a meeting among relevant agencies; organize training by inviting speakers from hospitals in Health Region 4. Most speakers are invited from Phra Nang Klao Hospital. It joins hand with Phra Nang Klao Hospital in zoning service areas to have clarity and prevent redundancy. It also registers

emergency medical services units, register ambulances, inspect ambulance condition, supervise work in emergency medical services units. Many ambulances are registered in Nonthaburi but most of them are not used in actual operations or they are registered but misused; for example, use ambulances for personal benefits or deliver patients between hospitals and homes and charge for the services, making emergency medical services unable to cover all areas. A method to solve the problems is checking actual operations after being registered of previous years. If they were not used in the actual operations, they will not be renewed registration in the following years”. (Person in charge of emergency medicine, Section of Non-communicable diseases Control, Nonthaburi Provincial Public Health Office, personal communication, August 4, 2019).

“Nonthaburi Provincial Public Health Office manages and organizes training for hospitals, paramedic services, and persons related to emergency medical services in Health Region 4 by coordinating speakers from educational organizations and Phra Nang Klao Hospital”. (Person in charge of emergency medicine, Section of Non-communicable diseases Control, Nonthaburi Provincial Public Health Office, personal communication, August 4, 2019).

Table 5.5 Classification of Service Areas of Nonthaburi Emergency Medical Services

Levels of Emergency Medical Services Units	Emergency Medical Services Units	Areas of Responsibility	
		District	Sub-district
ALS	Phra Nang Klao Hospital	Mueang Nonthaburi	Talat Khwan
			Bang Kraso
			Bang Khen
			Bang Si Mueang
			Sai Ma

Levels of Emergency Medical Services Units	Emergency Medical Services Units	Areas of Responsibility	
		District	Sub-district
			Bang Rak Noi
			Bang Krang
			Tha Sai (Part)
			Bang Phai (Part)
	Bang Kruai		Bang Si Thong (Part)
			Bang Khanun (Part)
			Bang Khun Kong (Part)
	Bang Yai		Bang Len
	Bang Bua Thong		Bang Rak Yai (Part)
	Pak Kret		Tha It
			Om Kret (Part)
			Bang Phlap (Part)

Though Nonthaburi Provincial Public Health Office classifies service areas for emergency medical services units clearly, problems are still found. Some prosperous areas are popular among emergency medical responders. There are many emergency medical services units, causing the problem related to scrambling patients since they would like to maintain their dignity. Some areas are found with a lack of emergency medical services unit. For example, Sainoi district, none of emergency medical responders is available and the number of emergency medical services units is not enough. Meanwhile, nurses in community hospitals responsible

for advance operations must work in emergency rooms at the same time, making them unable to perform the operations by the time Emergency Notification and Command Center call them. There are small numbers of local administrative organizations that provide emergency medical services. Volunteers cannot perform the operations throughout 24 hours, but they can do when they are free from their routine work. In this regard, there were only 19% of critical patients who received emergency medical services within 8 minutes in the year 2019. (National Institute for Emergency Medicine (2019).

Nonthaburi Provincial Public Health Office allocated a budget for the 2020 development project of Nonthaburi emergency medical services at the amount of 3,638,200 baht, it is contained in the 2nd strategy of Nonthaburi public health strategies for the year 2020-2023 with regard to service excellence, and prepared projects associated with emergency incident prevention, i.e. (1) the development project of the 2020 Nonthaburi emergency medical services (it uses a supporting budget for management and development of emergency medical services system). Meetings were held to increase the management efficiency and the quality of Nonthaburi emergency medical services such as the 6 times meeting of committee/working group of the provincial level emergency medical services (Tertiary care hospitals/all community hospitals and network associates in Nonthaburi) to develop a mechanism to drive emergency medical services of the whole province, (2) The 2 times meeting of EMS working group and all levels of networks in Nonthaburi (Tertiary care hospitals/all community hospitals and network associates in Nonthaburi) to develop a mechanism to drive emergency medical services of the whole province, (3) the 2 times training to improve potential of operations personnel and health networks (Tertiary care hospitals/all community hospitals and network associates in Nonthaburi) in managing Nonthaburi emergency medical services system to develop a mechanism to drive emergency medical services of the whole province, (4) training to develop potential of community leaders (public health officers/community leaders of all districts) in managing emergency medical services at area level so as to develop a mechanism to drive emergency medical services at area level in 6 districts.

The Provincial Public Health Office implemented knowledge assessment and training for all levels of personnel in order to develop their potential in emergency medical services to achieve knowledge and increase their skill in operations through (1) the 2 times advance trauma care workshop to internship and nurses working in emergency rooms of all tertiary care hospitals and community hospitals in order to develop personnel to have knowledge and skills in caring injured patients and to increase survival rate and reduce severity of disability from injury, (2) the 3 times training to develop potential of nurses in emergency medicine system to new nurses working in emergency rooms of all tertiary care hospitals, community hospitals and sub-district health promoting hospitals in Nonthaburi in order to develop the quality in assessing emergency patients and operating emergency assistance at the scene of an incident and emergency patient care during transferring, (3) EMR (Emergency medical responder) training, 2 classes, for first responders of local administrative organizations/foundations/associations in order to develop the quality of first responders to achieve knowledge and understanding and be able to analyze and apply the obtained knowledge to their operations, to possess morality and ethics, know scope of responsibility and limitation in the operations at the scene of an incident, (4) development of the direct payment of compensation for the operations paid to workers associated with emergency medical service system at private hospital/local administrative organization / association / foundation levels in order to achieve efficiency in financial allocation by reducing procedures, times and mistakes in disbursement

In order to develop the quality of emergency care system (ECS), the Provincial Public Health Office implemented through 1) holding 8 times meeting of working group to develop a mechanism of ECS, 2) developing potential of personnel working in Nonthaburi emergency medical services system so that they can improve their knowledge, themselves, have love and unity, know how to work in a team by providing training to personnel working in emergency rooms and EMS of tertiary care hospitals, community hospitals and network associate hospitals in Nonthaburi, 3) 8 times meeting for monitoring and assessing the performance of developing the quality of ECS to hospital personnel in order to develop personnel to

achieve knowledge and understanding all components of the development, 4) holding a table-top exercise workshop, 5) holding a dress rehearsal workshop.

Preparation of public relations – To enable people to know how to access services when they have emergency illness, accidents, or disasters, 6 public relations signs are attached ,1 sign per district. A budget is allocated to support the operations and develop 1669 coordination center and develop the Provincial Emergency Notification and Command Center at the amount of 500,000 baht (60% of the budget that Nonthaburi Provincial Public Health Office received is allocated from National Institute for Emergency Medicine). Preparedness to facilitate traffic accidents during New Year and Song Kran festivals is implemented. Accident information is recorded to integrate with prevention and reduction of road accident at the provincial level. Equipment in training about helping emergency and critical patients are provided such as CPR model, AED, etc. to increase knowledge and skills of all levels of personnel in emergency medicine system including volunteers and people. Equipment supporting the emergency medical services operations are provided to emergency medical services networks. A project developing health services system (Service Plan) was prepared as well as projects related to non-communicable diseases, drug, and mental health in 2020. (Action plans of Nonthaburi Provincial Public Health Office, 2020).

From the above mentioned information, it can be noticed that the role in emergency medical services of Nonthaburi province most likely belong to the Provincial Public Health Office and Phra Nang Klao Hospital which in addition to managing Emergency Notification and Command Center of the province and arranging ALS pre-hospital emergency medical services unit, it works in collaboration with the Provincial Public Health Office in designating emergency medical services areas of emergency medical service units in the province to achieve clarity, prevent and reduce conflicts that might occur. Though Nonthaburi did not set an emergency medicine strategy, the Provincial Public Health Office prepares projects and determines budgets for emergency medicine system development regularly and continuously every year. Those projects cover training for restoring knowledge and developing personnel potential in emergency medicine, preparedness to cope with public dangers and disasters, supporting equipment and devices to emergency medical

services units with a lack of readiness, managing information system to reach accuracy and completeness, utilizing information in accident preventing plans, conducting public relations of emergency medical services to let people know and be able to call the services correctly and be able to do basic first aid before emergency medical services units reach the scene of an incident, including setting a joint meeting of emergency medical services units in the province to have communication exchange, mutually set a plan and mutually solve ongoing problems bimonthly. Provision of pre-hospital emergency medical services units is implemented by government hospitals, community hospitals, private hospitals, foundations, associations, and private sector. There are a few numbers of local administrative organizations that participate in emergency medical services. Therefore, pre-hospital emergency medical services units do not cover the whole area, making some sub-districts are deprived of emergency medical services units. The Provincial Administrative Organization (PAO) does not involve in emergency medical services since the Chief Executive of the PA) lacks understanding of regulations and authority of local administrative organization emergency medical services management and views that emergency medical services are not burden or duty of local administrative organizations.

5.2.1.2 Nonthaburi Emergency Medical Services Units

1) Emergency Medicals Services Unit – managerial Type

Emergency medicals service unit – managerial type or Emergency Notification and Command Center currently is located at Phra Nang Klao Hospital. It is under supervision of Section of emergency medicine. It receives notification of incidents, coordinates, dispatches, and always monitors managerial implementation. Medical Director is not appointed but advice can be sought from 4 emergency medicine physicians of Phra Nang Klao Hospital who take turn to work in shift to receive notification of incidents and request for help in emergency medical services over the telephone and communication radio throughout 24 hours. They assess symptoms, coordinate with neighboring and suitable service units, give advice at the scene of an incident before an emergency medical service unit reaches the scene, coordinate with destination hospitals before delivering patients in case of emergency, monitor public danger and disaster risk, prepare readiness for helping

emergency patients and injured persons during normal and disaster circumstances and report to the management team accordingly, including giving health advice over the telephone. Phra Nang Klao Hospital is a hospital responsible for helping transferring patients through water, land, air transportation modes in the central region.

Nonthaburi emergency notification and command comprises Emergency Call Center, Dispatch Center, and Command and Control Center located as one stop service at Phra Nang Klao Hospital. The Center perform its duty to receive notification of all medical emergencies, analyze incidents, command, dispatch and monitor managerial and medical approaches. There are emergency medicine physicians monitor and oversee the system of incident notification from people through the 1669 hotline and receive incident notification from foundations, volunteers through communication radio, triage patients' symptoms into red, yellow, green codes. In case of unconscious patients, basic first aid is advised during waiting for an emergency medical service unit to arrive at the scene. The triage is done to assess which ambulance level will pick patients up and deliver to which hospitals. Asking for symptoms takes around 1 minute. In case of red code patients, coordination is made with foundations or hospitals responsible in the area or neighboring areas of patients to pick up. When an emergency medical service unit starts the operations, it will inform the Center that it is performing the operations. When it meets the patients, symptoms of the patients and assistance given to the patients are informed to the Center. The Center then informs the symptoms to a destination hospital. In case of yellow code or green code patients, the Center will inform an emergency medical services unit. Other procedures are the same to those of red code patients. In case patients or their relatives wish to have a medical treatment at other hospitals in Nonthaburi and patients' symptoms are already assessed, they can be delivered to that hospital safely. The Center will coordinate with the destination hospital to reduce pressure among volunteers, patients, relatives, and the destination hospital. In case an incident occurs in Nonthaburi but patients or their relatives wish to be delivered to a hospital in Bangkok, the Center will ask them to have a medical treatment at the nearest hospital initially and will ask that hospital to make contact with the hospital where the patients or their relatives wish to be delivered (Emergency Medical Technician who receives notification of incidents and takes history of

patients for triage at Emergency Notification and Command Center, Phra Nang Klao Hospital, personal communication, August 1, 2019). The summary of working procedures of Nonthaburi Emergency Notification and Command Center is shown in Figure 5.13.

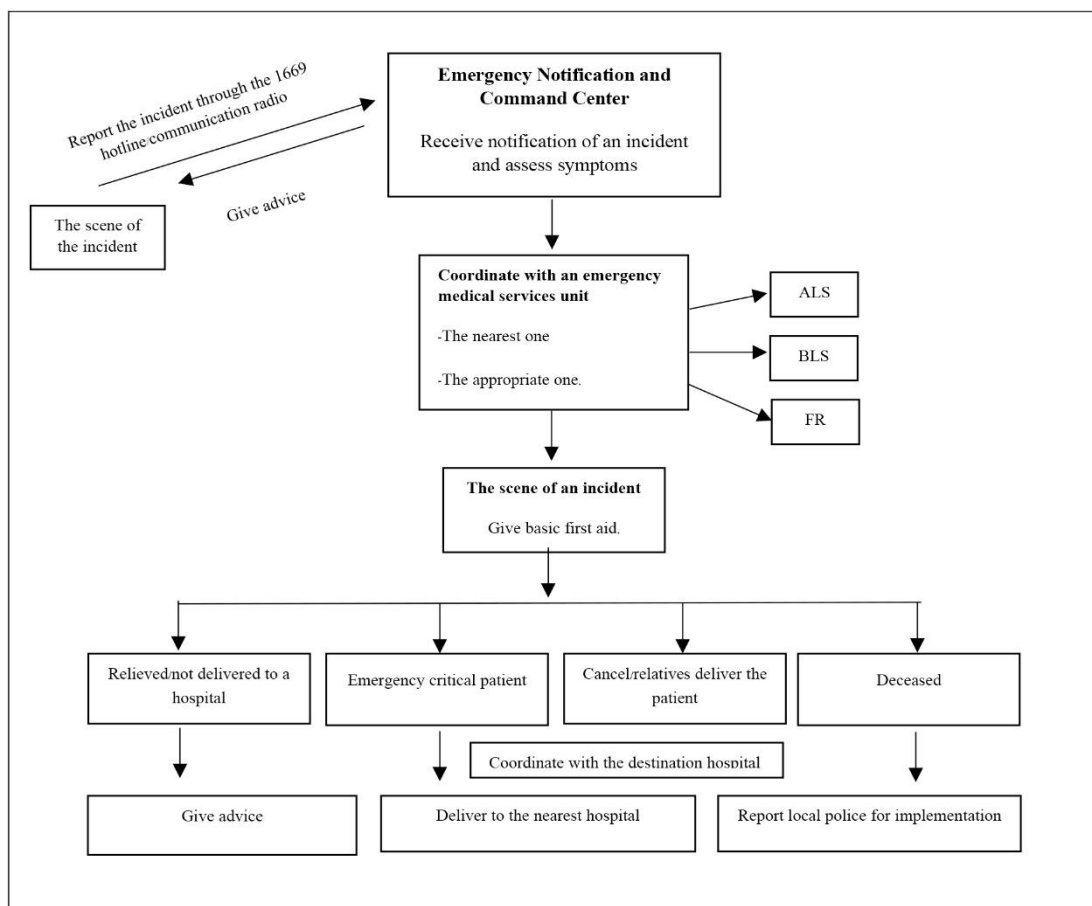


Figure 5.13 Working Procedures of Nonthaburi Emergency Notification and Command Center

Phra Nang Klao Hospital determines the duty of personnel working at the Emergency Notification and Command Center in 3 aspects as (1) Commander is responsible by nurses or paramedics receiving notification of incidents through the 1669 hotline and communication radio, triage and arrange the nearest and appropriate emergency medical services unit to perform the operations, supervise the operations within the Center and working team to meet the standards and in the same

direction, give advice of basic help at the scene of an incident during waiting for the arrival of the emergency medical services unit, give advice to the emergency medical services team and networks in Nonthaburi, coordinate with a destination hospital in case ALS emergency medical services unit delivers the patients there, and report to the executives accordingly. In case of accidents and disasters, coordinate with supporting agencies to ask for additional assistance, supervise orderliness in the Emergency Notification and Command Center, record and report incidents to the executives, (2) Information recording is under responsibility of paramedic, EEMT, EMT, practical nurse (Nursing Assistant) or administrative officer who receive notification of incidents through the 1669 hotline or communication radio, record information of the operations in ITEMS system in real time, follow up information from emergency medical services units and record information in ITEMS, contact and coordinate with relevant agencies over the telephone, oversee the orderliness in the Emergency Notification and Command Center, inspect recording forms to be ready for use and perform other tasks as assigned like preparation of a plan for greeting a member of the Royal Family, (3) Communication officer is under responsibility of paramedics, AEMT or EMT to inspect readiness of communication equipment to ensure they are in full number and ready for use, receive notification of incidents through the 1669 hotline and communication radio, coordinate over the communication radio with relevant agencies, coordinate with emergency medical services units that are performing the operations and coordinate with supporting agencies to ask for additional help; for example, the police, fire brigades, rescue equipment, coordinate with traffic police to open a route in case of emergency or traffic congestion, record information in an incident notification form, check the strength of communication radio signal of emergency medical services networks in Nonthaburi – 3 times a day at 00.03 hrs, 09.30 hrs and 18.30 hrs., and take care of cleanliness of working areas and communication devices.

Personnel of Emergency Notification and Command Center of Phra Nang Klao Hospital comprise 3 emergency medicine physicians, 1 pediatric physician, 14 nurses (all nurses working in the emergency room of Phra Nang Klao Hospital are included), 6 paramedics, 8 emergency medical technicians intermediate (EMT-I), 1 emergency medical technician basic (EMT-B), 5 emergency medical

responders (40 hours EMR training), 9 first responders (16- or 24-hours FR training), and 3 contract employees. The workforce for the operations at the Emergency Notification and Command Center is arranged in 3 shifts, 8 hours/shift from 8.00 – 16.00, 16.00-24.00 and 24.00 – 8.00 hrs. Each shift consists of 1 emergency medicine physician working as Medical Director, 1 registered nurse or paramedic, who passed dispatcher training, works as a commander, 1 paramedic or EMT-I or EMR working as a communicator, and 1 paramedic or EMT-I or EMR who records information in ITEMS system.

Phra Nang Klao Emergency Notification and Command Center conducts a risk analysis on mistakes in screening and patient triage from receiving notification of incidents and sets a guideline to prevent mistakes that might happen by taking history of patients in accordance with the Emergency Medical Triage Protocol and Criteria Based Dispatch. Occurring mistakes are recorded and problems are discussed to seek a preventive measure to reduce mistakes that might occur in the next time and designates an indicator for developing the quality. Response time is determined to be less than 8 minutes, more than 80%, and on-screen time to be less than 10 minutes, more than 80% (Chief of Nonthaburi Emergency Notification and Command Center, personal communication, August 1, 2019).

2) Emergency Medical Services Unit-medical Operations Type-Now,

Nonthaburi has 3 levels of emergency medical services unit-medical operations type: ALS (13 units), BLS (15 units) and FR (13 units). Government hospitals, private hospitals and the Provincial Public Health Office take charge of ALS pre-hospital emergency medical services units. Foundations, municipalities, and sub-district administrative organizations take responsible for BLS and FR pre-hospital emergency medical services units. None of local administrative organizations have ALS pre-hospital emergency medical services units. There are a few numbers of local administrative organizations that provide emergency medical services units which do not cover the whole area. The Provincial Public Health Office conducted an on-site inspection to discuss about establishing emergency medical services units with local administrative organizations, but the answer is “we are not ready due to a budget, personnel, and the important thing is it is a matter of life and

death. If we are filed a lawsuit, we cannot handle it, it should be the duty of hospital.” (Nonthaburi Public Health Physician, personal communication, August 4, 2019), making FR units cover only 23.08% of the whole sub-district area. There are 42 emergency medical services units in Nonthaburi, most of them belong to foundation volunteers. The number of emergency medical service units classified by their affiliation is shown in Table 5.6

Table 5.6 The Number of Emergency Medical Services Units in Nonthaburi
Classified by their Affiliation

Subordination of the Operation Unit	Unit	Percentage
Medical Department	1	2.38
Department of Disease Control	1	2.38
Foundation / Association	5	11.90
Private Hospital	8	19.05
Provincial public health office	1	2.38
Sub-district administrative organization	10	23.81
Sub-district Municipality	5	11.90
City Municipality	1	2.38
Town Municipality	2	4.76
Community hospital	5	11.90
General hospital	2	4.76
University affiliated hospital	1	2.38
Total	42	100

Source: National Institute for Emergency Medicine (2015).

Phra Nang Klao Hospital provides ALS-emergency medical services units known as “Phra Nang Klao Paramedic Services” provide pre-hospital

medical services to all types of emergency patients at the scene of an incident in the areas of responsibility and neighboring areas within Nonthaburi throughout 24 hours, provide patient care during transferring in accordance with standards, coordinate with the Emergency Notification and Command Center and inform patients' symptoms before delivering them to the nearest hospitals as appropriate, prepare readiness for a plan for greeting a member of the Royal Family in Nonthaburi area, deliver patients according to their medical treatment rights in Bangkok area and Bangkok outskirt area, provide knowledge and training to paramedics, students in emergency medicine, emergency medical technicians and volunteers in emergency medicine system.

The areas of responsibility of Phra Nang Klao Paramedic Services are urban area. Some parts are old community areas where houses are located next to each other. There are a lot of small and narrow lanes, some parts are condominiums while the other parts are houses located along Chao Phraya River which influenced by storm surge causing high-tide flooding. Emergency medical services workers design characteristics of the operations to meet with residential areas of patients and the scene of an incident. Besides, Nonthaburi is an area with a lot of traffic since it is well connected to Bangkok, especially during rush hours. Therefore, the system of coordination and network associates is arranged to facilitate the traffic and prepare places to be able to access patients or the scene of an incident faster.

Phra Nang Klao Paramedic Services comprise 4 positions of personnel (1) team leader is under responsibility of a paramedic performing the duties in preparing readiness of ambulances every day, especially a morning shift (8.00-16.00) and an afternoon shift (16.00-24.00), take care of cleanliness of the ambulances and equipment. The team leader leads a team to perform the operations in helping emergency patients, caring emergency patients during delivering and transferring, coordinating with Emergency Notifications and Command Center in case additional assistance is required, following up the complete information of emergency patients to be sent to Emergency Notification and Command Center, recording an operations report after returning from hospitals, overseeing orderliness and preparing readiness of equipment after operations, supervising and providing knowledge to students and trainees. If there are no emergency medical services tasks, the team leader will work in an emergency room except when the chief of Emergency

Notification and Command Center is attending a meeting, the team leader is assigned to be on duty at the Center, (2) the 1st member is under responsibility of a paramedic or AEMT performing duties in preparing readiness of ambulances every day, especially a morning shift and afternoon shift and overseeing cleanliness of the ambulances and equipment, being a team leader to perform the operations at the scene of an incident, caring emergency patients during delivering and transferring, coordinating with Emergency Notifications and Command Center in case additional assistance is required, following up the complete information of emergency patients to be sent to Emergency Notification and Command Center, recording an operations report after returning from hospitals , overseeing orderliness and preparing readiness of equipment after operations, supervising and providing knowledge to students and trainees. If there are no emergency medical services tasks, the 1st member will work in an emergency room or help transfer patients between hospitals, (3) the 2nd member – paramedics, AEMT, EMT or EMR perform the duties in preparing readiness of ambulances every day, and overseeing cleanliness of the ambulances and equipment, being a team leader to perform the operations at the scene of an incident, caring emergency patients during delivering and transferring, coordinating with Emergency Notifications and Command Center in case additional assistance is required, following up the complete information of emergency patients to be sent to Emergency Notification and Command Center, recording an operations report after returning from hospitals , overseeing orderliness and preparing readiness of equipment after operations, supervising and providing knowledge to EMT-I, EMT-B, and EMR students, helping prepare equipment and devices for medical procedures, moving patients. In case there are no emergency medical services, the 2nd member is assigned to work in an emergency room or help transfer patients between hospitals, (4) driver is under responsibility of EMT performing duties in inspecting readiness of ambulances according to the checklist, overseeing cleanliness of ambulances in collaboration with EMS team, performing the operations with a paramedic team, helping provide first aid at the scene of an incident and moving patients. The operations of pre-hospital emergency medical services sometimes have interns mutually perform the operations.

The workforce of Phra Nang Klao Paramedic Services is divided into 3 shifts, 8 hours per shift, 8:00 - 16:00, 16:00 - 24:00 and 24:00 - 8:00 hrs. Each shift comprises 1 registered nurse or paramedic who acts as the team leader, 1 paramedic or EMT-I as the 2nd member, 1 paramedic or EMT-I or EMR as the 3rd member and EMT-B or EMR acts as the driver. Reserve workforce is available to serve mass casualty. Essential devices and equipment for services are Defibrillator, AED, Patient Monitor, O2 Sat, Digital BP, moving equipment, ambulances that are enough and continuously maintained to be ready for use throughout 24 hours.

Supporting money from NIEM paid to ALS emergency medical services units according to actual operations is 1,000 baht which is not enough for the management. Phra Nang Klao Paramedic Services use a subsidy from Phra Nang Klao Hospital.

“Each operations will be paid 1,000 baht, it is not enough as there are a lot of devices, gasoline expense, etc.” (Chief of Nonthaburi Emergency Notification and Command Center, personal communication, August 1, 2019).

The number of emergency medical services units in Nonthaburi is quite small, being unable to cover the whole area. Therefore, Phra Nang Klao Hospital makes a risk analysis caused by unreadiness of ALS- emergency medical services units when there are emergency critical patients and sets a preventive measure by providing neighboring services units to support BLS-emergency medical services units in the area for giving primary assistance and delivering to the nearest hospital and recording problems to propose to the management team. Drivers are assigned to attend safety ambulance training; GPS tracking system is installed in ambulances to monitor the working of drivers. Drivers are required to inspect readiness of ambulances every time when they start their shift and drive at the speed limit and assess safety of the scene of an incident before entering. A plan to prevent inappropriate care during patient delivery is set. All personnel are required to attend pre-hospital care training. Paramedic personnel are evaluated by destination hospitals and all equipment must be ready before starting the operations every time. Supervision is provided when mistakes occur. Problems are gathered to find solution

guidelines. Cases of patients are brought to a meeting for mutual learning. Dissatisfaction of patients and their relatives are prevented by encouraging all personnel to follow the required standards; speak politely and gently and being sympathetic. Incidents are recorded to seek advice and propose to the management team to mutually find a solution.

Nonthaburi Provincial Public Health Office sets a measure for implementing emergency medical services system to achieve orderliness and preventing conflicts that might occur among emergency medical services units. The emergency medical services units must receive a command from the Emergency Notification and Command Center before starting the operations: (1) As soon as the Emergency Notification and Command Center receives a notification of incident in case it is a redundant area and there are 2 emergency medical services units in the area, notification is given 3 times through communication radio. If 2 emergency medical services units acknowledge, both can perform the operations in the area. The services unit that will have the rights to the implementation is the one with readiness of ambulance, personnel and informs the Emergency Notification and Command Center to perform the operations. If they do not inform the Center, they will not have the rights to start the operations. (2) In case emergency medical services units receive notification of an incident in their area, they must inform the Center to ask for permission to perform the operations. If they are not the services units in the area, they need to inform the Center so that the Center will make a command. In case it is not a redundant area, when emergency medical services units in the area receive a command from the Center, they can start the operations abruptly. If the Center assigns neighboring emergency medical services units to perform the operations, the emergency medical services units in the area will not have to perform the operations. In case of a redundant area, the emergency medical service unit that reaches the scene of the incident shall perform the operations. The paramedic at the scene will evaluate symptoms of injured persons and inform the Center to acknowledge before giving assistance to the injured persons. After the mission is complete, report the information to the Center according to the record form of a certain shift. Failure to report will not be able to make a disbursement.

(1) Vehicles

Nonthaburi has 212 ambulances; 24 ALS- ambulances, 16 BLS-ambulances and 172 FR-ambulances classified by affiliation as seen in Table 5.7.



Table 5.7 The Number of Ambulances of Nonthaburi Emergency Medical Services in 2019

FR	Number (Cars)	BLS	Number (Cars)	ALS	Number (Cars)
Poh Teck Tung Foundation	78	Associate nurse	2	Phranangklaao Hospital	4
Ruam Katanyu Foundation	63	Nurse (Tung)	5	Chonprathan Hospital	1
Siam Nonthaburi Foundation	10	Bang Muang Sub-district Municipality	1	Pakkred Hospital	1
Nonthaburi Rescue	4	Bang Khurat Sub-district Administrative Organization	1	Bangbuathong Hospital	2
Sala Klang Sub-district Municipality	4	Bang Mae Nang Sub-district Administrative Organization	3	Bangyai Hospital	2
Sao Thong Hin Sub-District Municipality	2	Bang Bua Thong Sub-District Administrative Organization	1	Bangkruai Hospital	2
Bang Len Sub-district Municipality	1	Nonthaburi City Municipality	3	Sainoi Hospital	2
Phimonrat Sub-district Municipality	1			Bangbuathong Hospital	2
Bang Muang Sub-district Municipality	1			Bamrasnaradura Infectious Diseases	2
Bang Phai Sub-district Administrative Organization	2			Vibharam Hospital	1
Bang Rak Noi Sub-district Administrative Organization	1			Kasemradinter Hospital	3

FR	Number (Cars)	BLS	Number (Cars)	ALS	Number (Cars)
Ban Mai Sub-district Administrative Organization	1			Kasemrad Hospital Rattana Thibet	2
Bang Yai Sub-district Administrative Organization	1				
Bang Rak Phatthana Sub- district Administrative Organization	1				
Lahan Sub-district Administrative Organization	1				
Bang Krang Sub-district Administrative Organization	1				
Total	172	Total	16	Total	24

Source: Ambulance Registration Document for Emergency Medical Services,
Nonthaburi Provincial Public Health Office, 2019.

It is found that Nonthaburi has many registered ambulances, but they are not used in actual emergency medical services, but they are misused. The Provincial Public Health Office has tried to solve the problem by checking operational performance after being registered in the past one year, if they were not used in emergency medical services, they will not be renewed the registration for the following year.

“Nonthaburi province has many registered cars, but most of them are used for other purposes. The car was used to pick up the patients at home¹, sent to the hospital, and charged. This makes the car unavailable not available for service

throughout the province. We have prevented it by looking at whether after registration has issued EMS. If EMS is not issued at all, next year we will not register for them.” (Person in charge of emergency medicine, Non-Communicable Disease Control, Nonthaburi Provincial Public Health Office, personal communication, August 4, 2019)

Currently, the dispatch of ALS-ambulances is not enough to access emergency patients within 8 minutes (in the 10 km. radius) and the number of FR and BLS-ambulances of volunteers in official working hours is not sufficient in the areas where they are not supported by local administrative organizations such as Sai Noi district since volunteers are unable to perform the operations during official working hours since they have routine work, making access to emergency patients quite late.

Nonthaburi ambulances are not equipped with ambulance operation center (AOC) but installed GPS tracking system to control and report speed of ambulances and warn when they are over speed limit as well as monitoring the working of drivers. Vital sign monitoring system for patients is not available in ambulances. Communication is used to report patients’ symptoms. Advice and assistance are sought over the telephone or LINE with the emergency medicine physician team and specialists. For safety, drivers are required to inspect readiness of ambulances every time when they start their shift.

(2) Paramedics

Nonthaburi has the number of personnel in the emergency medicine system lower than the standard of workforce. All paramedics are granted certification of emergency medical services according to the notification of emergency medicine committee or have a medical practitioner license and their certifications are renewed (Chief of Nonthaburi Emergency Notification and Command Center, personal communication, August 1, 2019). Details of personnel in the emergency medical services system of Nonthaburi are shown in Table 5.8.

Table 5.8 Personnel in the Emergency Medical Services System of Nonthaburi

Certified Status	Position / Duty	Number (people)
Positions in ITEMS	EMT-B	9
Positions in ITEMS	EMT-I	4
Positions in ITEMS	EMT-P	3
Positions in ITEMS	FR	673
Positions in ITEMS	Other	62
Being accredited by the SOT	1) นพพ. (Paramedic)	7
Being accredited by the SOT	2) จพพ. (A-EMT)	11
Being accredited by the SOT	3) พพพ. (EMT)	47
Being accredited by the SOT	4) อพพ. (EMR)	237
Professional Council	Nurse	123
Professional Council	Physician	9
Total		1185

Source: National Institute for Emergency Medicine (2015).

Note: *SOT = Subcommittee on Organization, Operator and Training Program
Accreditation and Certificate to People Who Have Passed Education or
Training

Phra Nang Klao Hospital develops potential of personnel in the emergency medicine system by using the training process of significant diseases such as care of patients with coronary artery disease (ACS), care of patients with head injury, care of patients with shock, advanced cardiovascular life support (ACLS), CPR, screening patients, care of injured patients using integrated management. Personnel in the emergency medicine system are developed by attending prehospital

nurse training through 3 courses, i.e. 3-day restoring course for personnel who passed training, and 5-day course for new personnel, and speaker course to increase knowledge in nursing care for persons suffering from mass casualty while a simulation situation is made for better understanding. A mass casualty situation is rehearsed with follow-up and evaluation of performance according to specific qualification of each position, work characteristics, and job description.

Emergency medical services workers –practitioner level are required to be able to receive notification of an incident accurately and completely. They should evaluate a situation correctly before reporting to their supervisors and informing relevant persons. They must be able to perform the operations according to mass casualty plan correctly and appropriately, be able to prepare places, devices and equipment, workforce mobilization to handle with patients properly. Emergency medical services workers – professional level are required to be able to screen and evaluate symptoms, triage types of patients at the scene of an incident correctly and help victims of mass casualty properly according to severity of each patient. They must be able to supervise, monitor, evaluate, and plan nursing care continuously, be able to manage, improve and solve ongoing problems and determine to be an agency standard.

In addition to the operations of pre-hospital emergency medical services, personnel in the emergency medicine system of Phra Nang Klao Hospital have duties to prepare teams and be speakers to give knowledge to personnel at provincial and regional levels; Mini MERT program, paramedic-nurse, patient triage, EMR program (EMR training 1 class/year, EMR restore 7 classes/year) , and first-aid program, be speakers in EMS Rally at provincial, regional, and national levels, giving first-aid knowledge to government and private agencies; basic CAPR and using AED to VHV, students and private companies.

Nonthaburi Provincial Public Health Office sets the operations standard of personnel who help injured persons or patients to have basic first-aid training for 24 hours from agencies accepted by Nonthaburi Provincial Public Health Office or receive training from Nonthaburi Public Health Office. They need to present a paramedic card issued by Nonthaburi Public Health Office only every time they perform the operations. They must wear uniform of agencies they are affiliated to. In

case paramedics speak in an unfriendly manner or impolitely, their paramedic cards will be seized, and they will be prohibited to perform the operations. In the operations, if patient conditions are beyond their ability to handle, they must wait for ALS-emergency medical services unit. If they mutually work with the ALS services, they need to listen to a command of the nurse in the operations. Do not move patients before receiving a command. If they fail to follow the command, their paramedic cards will be seized and will be terminated their employment as paramedics of Nonthaburi immediately. If paramedics wish to move agencies, the old affiliation agency must inform in writing to Nonthaburi Emergency Medical Services Office. If the affiliation agency informs the reason of resignation that it is from improper behavior and failure to follow the regulations or measures of Nonthaburi emergency medical services system, they are not recruited as paramedics of Nonthaburi emergency medical services system. If paramedic fail to follow the regulations mentioned above for the first time, Nonthaburi Public Health Office will give a warning notice. For the second time, their operations will be ceased for 1 week. For the third time, their paramedic card will be seized, and they will be terminated their employment as Nonthaburi paramedics.

EMR training – Training for license renewal or being promoted from FR to be EMR, EMT training (110 hours) and training for restoring knowledge to volunteers in the networks of Nonthaburi emergency medical services are not adequate, making many volunteers who wish to receive training and are willing to devote their time and their own budget to attend the training do not receive training and adjust their status to be EMR as designated by NIEM.

“Now NIEM requires EMR, FR is not enough. Additional training needs 40 hours. We need to pay by ourselves. We would like to attend the training. We are willing to waste our time to have the training but EMR training is not available.” (EMR, Ruam Katanyu Foundation, personal communication, August 20, 2019).

“I would like EMR training available in many places. I pay for it by myself, but it is difficult to find a training place.” (EMR, Por Teck Tung Foundation, personal communication, August 20, 2019).

“Training should be available more and more, medical knowledge changes all the time. We need to keep pace with it. Provincial Public Health Office should update our knowledge.” (EMR, Ruam Katanyu Foundation, personal communication, August 20, 2019).

“Some people would like to be EMR but they learn from someone through the back door because EMR training is not open, that’s why they are not registered.” (FR, Nonthaburi Por Teck Tung Foundation, personal communication, August 20, 2019).

“EMT training is very useful, volunteers should learn more to change from EMR to be EMT but training is not available. Nonthaburi has not held the training for 3 years already. I attended the training in Suphanburi, and I paid 8,500 baht for 110 hours. Some people must find an extremely far training place like Khon Kaen. Provincial Public Health Office knew this, and they said they would solve the problem but until now, nothing changes.” (FR, Nonthaburi Por Teck Tung Foundation, personal communication, August 20, 2019).

The budgets for personnel, ambulances, devices, and equipment of emergency medical services units of hospitals are from personnel budget and investment budget of government hospitals. The other part is from NIEM that pay to emergency medical services units when they perform actual operations. Local administrative organizations that provide emergency medical services support the expenses in developing potential of personnel and personnel training and provide ambulances by buying ambulances in accordance with a price list of durable articles, Bureau of the Budget, and regulations of Ministry of Finance on procurement and management of government supplies. Emergency medical services units of foundations or volunteers use a budget from foundations or their personal budget to

provide and maintain emergency ambulances and equipment. Due to budget limitation, though emergency ambulances and equipment will pass inspection standards of the Provincial Public Health Office, the old condition of the ambulances may encourage services receivers or people to refuse the services.

“Out-of-hospital ambulance operations, Nonthaburi Province has a set of operations with a duty to operate 24 hours a day. Upon receipt of the incident, symptoms, severity, and location of the incident from the Incident and Command Center, the Operator will prepare the team and depart to the incident site and reach the patient within 10 minutes. Upon arriving at the scene of the accident, the team leader will take a history taking and a physical exam to assess the initial symptoms. If the patient is unconscious, Advanced Cardiac Life Support (ACLS) will be performed, starting with intubation, which is a function of Paramedic and specialized nurses. If the patient has cardiac arrest, CPR will be performed, and a defibrillator will be used. Treatment provided to the patient follows the manuals, standard practices, learned or trained knowledge, and new knowledge of life saving methods, tools, equipment that the emergency medicine physicians of Phra Nangklao Hospital have brought. If the patient's heart does not return, the patient will not be moved. When the heart returns, the incident will be notified to command center for coordination with the destination hospital, and before departure, the command center will be informed again. Upon arrival at the destination hospital, the patient's condition, initial treatment given to the patient at the scene and on the way prior to the arrival of the hospital, will be reported to the staff of the destination hospital, primarily described orally. Then, the patient's condition report will be written in the form specified by the National Institute of Medical Emergency. (Head of Phra Nang Klao Resuscitation Operation Team, personal communication, August 1, 2019).

“Hospital delivery and hospital treatment (Transfer to hospital): When the Emergency Call Center is informed, symptoms will be sorted to assess which kind of vehicle will be sent to pick up the patient and which hospital will be sent to for treatment and will report the patient's condition to hospital to be

delivered before the operating unit leaves. If a patient or relative wish to go to another hospital in Nonthaburi Province, if the symptom is assessed and the patient can be safely taken to that hospital, the center will coordinate the destination hospital to be delivered to relieve the pressure between volunteers, patients, their relatives, and the destination hospital. However, if an incident occurs in Nonthaburi Province, but the patient or his relatives request to be sent to a hospital in Bangkok, the center will request treatment at a nearby hospital first, and then contact the hospital to send the patient to the hospital that the patient needs. Upon arrival at the destination hospital, the patient's condition, initial treatment given to the patient at the scene and on the way prior to the arrival of the hospital, will be reported to the staff of the destination hospital, primarily described orally. Then, the patient's condition report will be written in the form specified by the National Institute of Medical Emergency (Emergency medical officer, performing duties, receiving incident notification, and taking history taking to sort out the presence of Emergency Call Center, Phranangklaao Hospital, personal communication, August 1, 2019).

Nonthaburi Province has no problem. Emergency medical practitioners choose to bring accidental patients to private hospitals in the hope of receiving remuneration from delivery, and private hospitals in Nonthaburi province do not have to pay patient bounty to rescuers brought to the hospital

“Non province has no private hospital that pays for volunteering. Like Kasemrad, he will give a Gift Set of first aid kit when the accident patient is delivered.” (Emergency Medical Volunteer, Ruam Katanyu Foundation, personal communication, August 20, 2019).

“We never pay for the rescuers who deliver accidental patients. We previously suggested to management that there should be little things available to the rescuers who brought the patients, but it is still under management's

consideration.” (Head of Emergency Nursing Division, Vibha Ram Pakkred Hospital, personal communication, August 20, 2019).

5.2.1.3 Participation in the Emergency Medical Services Networks of Nonthaburi Province

In operating emergency medicine in Nonthaburi Province, the majority of roles belong to Nonthaburi Provincial Hospital, Phranangklaao Hospital, and Community Hospital, Private hospitals, foundations and associations since most local government organizations, especially the Nonthaburi Provincial Administrative Organization, have not yet seen the importance and lack of understanding of the roles and duties of providing emergency medical services of the local government organizations, thus, participation in the emergency medical network is still relatively small. The local authorities that organize emergency medical operations are few and do not cover all areas.

“Nonthaburi Provincial Administrative Organization has no emergency medical operations, no work related to service system organization, system development or network coordination for emergency medical services, and no emergency medical development plan” (Chief Executive of the PAO, Nonthaburi Province Administration Organization, personal communication, August 15, 2019).

“The municipalities and sub-municipalities in the province have not been involved in providing emergency medical services before reaching the hospital. There will only be large municipalities such as Nakhon Non, Bang Bua Thong, Pak Kret that cooperate in organizing the operation units.” (Director of the Office of Emergency Medical Coordination, personal communication, April 30, 2019).

1) Provincial Public Health

(1) Nonthaburi Provincial Public Health Office

The emergency medical work of Nonthaburi Provincial Health Organization is under the NCDs Prevention Division, which is involved in the emergency medical system according to the role of the emergency medical service provided by the National Institute of Medical Emergency. The Nonthaburi Provincial Health Office is responsible for managing the Office of Emergency Medical Service System at Nonthaburi Provincial Public Health Office. The Provincial Health Organization does not have a clear strategy for organizing the emergency medical service system, but the emergency medical service development project is in the strategy to develop the organization of primary, secondary, and tertiary service systems to have quality standards, with the participation of all sectors and has roles and duties as specified by the National Institute of Medical Emergency. There is a budget allocation for the Nonthaburi Emergency Medical Service System Development Project in 2020, in the amount of 3,638,200 baht, in the second strategy, Service Excellence, establishing the Emergency Medical Service System Development Project of Nonthaburi Province, Year 2020. Most of the budget is spent on meeting between various departments in Nonthaburi Province's network of emergency medical services to discuss, clarify and exchange information, make deals, solve problems together, and foster participation and unity among departments. Training is organized to enhance and restore personnel knowledge of the emergency medical system. Part of the budget has been allocated for the development of an incident and command center, and to provide necessary life support tools and equipment to the unavailable operations, such as supporting the management and development of the medical services system to increase the efficiency of emergency medical management in Nonthaburi Province and to improve the quality of the emergency medical services system. The meeting of EMS working group and networks at all levels of Nonthaburi Province are held 2 times / year to develop mechanisms to drive emergency medical work throughout the province. There is training for personnel to develop the potential of personnel in the emergency medical service system at all levels to have knowledge and increase operational skills, to prepare for the situation of traffic accidents during the New Year and Songkran festival and to record the Accident Information in Nonthaburi Province to integrate road accident prevention and mitigation at provincial level with efficiency in

managing traffic accident problems and obtaining quality information. Training materials for emergency and critically ill patients are provided, such as CPR training manikins and demonstration automated defibrillators to increase knowledge and skills for all levels of emergency medical system personnel, including volunteers and the public. Budget allocated to support operations for the development of the Coordination Center 1669 Phranangklao Hospital to manage the work driving mechanism and quality development of the provincial incident and command center for 500,000 baht. Emergency medical readiness equipment has been provided to the inadequate network of emergency medical operations so that staff and teams can handle the situation, be ready to work both in and out of the hospital. Nurses are available 24 hours a day, but due to the limited budget of the Provincial Health Organization, they cannot provide ongoing support as required by the operating unit.

In addition, Nonthaburi Provincial Municipality also serves to divide the stationary zone of service areas to ensure clarity and prevent overlap, responsible for operating unit registration, operating vehicle registration, vehicle inspection and supervision of various departments to evaluate the results, listen to the problems that occur in order to bring the problems to find a solution to come together to find a solution to solve the problem of each agency (Person in charge of emergency medicine, NCDs control division, Nonthaburi province, personal communication, August 4, 2019).

(2) Phranangklao Hospital

Phranangklao Hospital is the starting point of providing emergency medical services to patients before reaching the hospital of the Ministry of Public Health in Nonthaburi Province. Phra Nang Klao Resuscitation Center was established in 2004. Outpatient assistance operations are conducted by receiving incident reports from witnesses, calling in to the emergency room of Phranangklao Hospital and receiving orders from the Emergency Medical Service System Office, Ministry of Public Health or Narendon Center. With over 20 years of out-of-hospital emergency care services, emergency medical supervisors are well known and respected by emergency medical operations and related personnel. Phranangklao

Hospital is therefore highly involved in providing emergency medical services in Nonthaburi province, including participation in practice, participation in benefits and participation in assessments.

Nonthaburi Province has established an out-of-hospital emergency medical system in accordance with the standards of the National Institute of Emergency Medicine, establishing and managing the emergency medical service center in Nonthaburi Province, receiving emergency medical assistance requests via telephone and radio 24 hours a day, and assessing the symptoms and coordinate the delivery of nearby and appropriate services to the emergency patients. In addition, an out-of-hospital emergency operation unit has been set up at the ALS level to provide emergency medical assistance to patients at the accident site. Phranangklao Hospital personnel are lecturers in educating provincial and district personnel in Mini MERT courses, resuscitation nurses, patient screening, EMR (Emergency Medical Responder) courses, and first aid courses, main lecturers for EMS Rally at provincial and regional and national levels, and lecturers in providing first aid knowledge to both public and private entities.

Phranangklao Hospital contributes directly and indirectly to social benefits. Providing pre-hospital emergency medical services of Phranangklao Hospital was able to reduce mortality and improve quality of life for emergency patients in Nonthaburi Province. Due to its long-term service, Phranangklao Hospital personnel have experience, expertise, and specialty in providing emergency medical services including the management of the emergency response center and the operation. Phranangklao Hospital's Emergency Out-Hospital Rescue Team made Phranangklao Hospital recognized by hospitals and other resuscitation operations in Nonthaburi Province and Hospitals in the Ministry of Public Health inspection area 4 as a training center for personnel in the emergency medical system. Another benefit participation is funded by the National Health Security Office, the Institute of Emergency Medicine, and the Nonthaburi Provincial Public Health Office to support the management of the incident response and command center and the Phra Nang Klao resuscitation unit.

In participating in the evaluation, the incident response and command center and the Phra Nangklao Resuscitation Unit have indicators and

assessments of the unit's performance annually. In addition, Phranangklaao Hospital, in collaboration with the Nonthaburi Provincial Public Health Office, is responsible for supervising, monitoring, and evaluating the emergency operating units of Nonthaburi Province.

(3) Community Hospital

All community hospitals in Nonthaburi province have set up an ALS emergency response unit to aid the red critically ill patients in the area assigned by the Provincial Public Health Office, under the responsibility of each emergency ambulance service. Hospitals, Therefore, community hospitals in Nonthaburi province are involved in out-of-hospital ambulance operations. However, the constraints on the number of community hospital personnel make the work of each duty unit required to share personnel with the emergency room. Therefore, if called for operation when personnel are involved in an emergency room mission, such as resuscitation operations, CPR in the emergency room, they will not be able to leave the hospital. The Emergency Call Center will order the nearby area operations unit to operate instead.

“Perhaps we are stuck in the ER and cannot go out to the scene. Sometimes there are 2 CPR cases, even if we want to do it, we cannot get it out, as we must help in ER. We have to help in front of work here first because there are no people too, if we don't do it then who will do it?” (Medical emergency officer, Bangyai Hospital, personal communication, August 5, 2019).

“Sometimes, we had already directed the action, but they could not act because people in the ER were not enough. We understood. Sometimes we ordered, she said “I have 2 CPR cases, only 3 people are here. We cannot go out and take patients.” We solved the problem by ordering another unit to help instead, or our own rescuers.” (Head of Emergency Call Center, Nonthaburi Province, personal communication, August 1, 2019).

2) Local Government Organization

(1) Provincial Administrative Organization

“Nonthaburi Provincial Administrative Organization is not involved in the management of out-of-hospital emergency medicine. The Local Development Project of Nonthaburi Provincial Administrative Organization from the past to the present (2018 - 2022) has not yet been a project related to the provision of emergency medical services. (Chief Executive of Nonthaburi Provincial Administration Organization, personal communication, August 15, 2019).

(2) Municipalities and Sub-district Administrative Organizations

There are few municipalities and sub-district administrative organizations involved in providing emergency medical services and do not cover the area. There are 48 percent of the local authorities registered to provide emergency medical services (22 local authorities), only 59 percent of those worked out (13 local authorities) (Information from ITEMS, retrieved 11 January 2019). Large local authorities such as Mueang Nonthaburi Municipality, Mueang Mai Bang Bua Thong Municipality, Ban Bang Muang Subdistrict Municipality, Bang Mae Nang Subdistrict Administrative Organization can provide emergency medical services very well, but there is no mutual operation between local authorities.

“There are no local authorities with ALS vehicles and a small number of local authorities participating in emergency medical services, causing coverage of ALS, BLS, FR vehicles in the province is not comprehensive, requiring a foundation vehicle to help. If any area has local cooperation, such as Nakhon Non, Bang Bua Thong, Ban Bang Muang, which are large municipalities, the service will be good and able to reach patients quickly. Most local authorities are afraid to work in emergency medicine because it is related to life and death. They are afraid that if the patient dies, they will be prosecuted, so they are not ready yet. And people in charge of public health, such as nurses, do not want to be responsible for any other job than their full-time job. They do not want to change from their original work.” (Registered Nurse, Head of Emergency Call Center, Nonthaburi Province, personal communication, August 1, 2019).

Participation in the exchange, opinion, and collaboration in solving problems arising in the emergency medical system of the municipalities and the TAOs participating in the emergency medical service is largely through attendance among the network parties at the Provincial Health Office, held about 2 months / time. Policy formulation and decision-making is the duty of Provincial Health Office and Phranangklao Hospital. The municipality and the Subdistrict Administrative Organization are responsible for implementing policies.

Participating in the social benefits of municipalities and sub-district administrative organizations to provide emergency medical services as part of the local government's mission has reduced the mortality and disability rates of people in the areas in which they are responsible. This creates satisfaction to residents, as well as popularize local politicians providing emergency medical services and receiving votes from the people when running for the next election.

Local government organizations in Nonthaburi Province do not participate in the overall evaluation of the provincial emergency medical services, but the performance of their own agencies is assessed by the satisfaction survey of the clients.

3) Foundations, Associations, and Non-governmental Organizations

Foundations, associations, and non-governmental organizations in Nonthaburi province have been serving emergency accident patients to hospitals in conjunction with Phranangklao Hospital for more than 20 years, and therefore have a lot of participation and role in organizing an out-of-hospital emergency operation unit, especially in areas where there is no emergency operating unit of the local government organization. In some private hospitals, Vibha-Ram Hospital can provide the ALS high level operations unit and serve the patients very well and is a vital force of the ALS high-level emergency operations unit for Nonthaburi province. Currently, it is available to patients in responsibility defined by the Nonthaburi Provincial Public Health Office and has a duty to comply with the policies, requirements and standards set by the National Institute of Medical Emergency and the Provincial Public Health Office.

Participation in presenting opinions and solving problems arising in the Foundation's Nonthaburi Emergency Medical System of the Foundation, Association and NGOs can be done by attending a meeting between Nonthaburi Province's Emergency Medical Network partners, organized by Nonthaburi Provincial Health Office about 2 months per time.

4) People

People in Nonthaburi Province participate in receiving personal benefits from calling emergency medical services when injured or sick by receiving medical services at the scene of the incident and delivering to the appropriate hospitals, increasing the chances of survival, and participate in the awareness of emergency medical assistance through the hotline calling 1669, through publicity by using brochures, stickers, road signs, publicity signs. Phranangklaao Hospital filmed a documentary to increase people's knowledge of first aid and resuscitation to youth, broadcasting on TV on various occasions. Provincial Health Organization organized a training for community leaders' potential in organizing an emergency medical service system at the local level. Community leaders and community emergency volunteers are trained in first aid knowledge and skills to be able to help themselves and others safely prior to hospital delivery and basic emergency skills training such as first aid, CPR, the use of AED, but some people still remember the number 1669 incorrectly, pressing the wrong number, making it impossible to call to report an accident.

“Sometimes the patient still failed to call, and some people called 1966, 1169 and was unable to report the incident.” (Volunteer for Emergency Medicine, Nonthaburi Province, personal communication, August 20, 2019).

“The patient's relatives told the call to report the incident with 1669. They said that they tried many times, but the line cannot be reached, so I asked to look at the phone and saw that they dialed the wrong number to 1666, 1966, 1996” (Volunteer for Emergency Medicine, Nonthaburi Province, personal communication, August 20, 2019).

Some people participate in the practice by volunteering, emergency medicine, and using their own funds to purchase and provide life-saving equipment, including the conversion of a private car to be a car to be an emergency ambulance to transport patients to take care of the emergency patients at the scene of the accident. But nowadays, there are fewer people coming out as emergency medical volunteers due to the economic recession and their income decreases and they do not have enough resources to be used as emergency services, causing some areas to lack emergency operations.

“My own car, tools I bought myself, my neck strap ordered from America, I paid myself. Last time I got 30 and distributed to other agencies. Anyone who does not have it can come and get it. When the patient was sent to the hospital with the neck splint, he left it at the hospital. So, I would tell the hospital to call me when it was finished, then I would go back and get it. I never asked for donations of these things because there are people who love, and there are people who hate. If I ask for a donation, people might look at me that I want benefits. I came to volunteer. I do it with my heart, I like the work here.” (Volunteer for Emergency Medicine, Nonthaburi Province, personal communication, August 20, 2019).

“I came out as a volunteer during my time off. I like driving at night more because of the better road congestion, and I must work during the day. The car is my own car, I have a van, many tools are bought. Every month, I go shopping and buy stuffs, salt, and accessories at the drug store near Siriraj” (Volunteer for Emergency Medicine, Nonthaburi Province, personal communication, August 20, 2019).

“Now, there are fewer volunteers because the economy is not good. Each time it takes a lot of money, including consumption, fuel, car tools, medical equipment. As we volunteer, we do not receive money or compensation from the Foundation, assuming that being a volunteer is we are ready to give. Unlike the permanent staff of the foundation, he receives a salary from the

foundation. The declining number has led to a lack of assistance vehicles in some areas. Existing volunteers must take out more patients. Ruam Katanyu Foundation has 4 cars for Non-Province, 2 ambulances out during daytime; 1 car to pick up dead bodies, 1 night car. When the day is over, they go off duty. We volunteer to continue at night.” (Medical Emergency Staff, Ruam Katanyu Foundation, personal communication, August 20, 2019).

In participating in the evaluation of emergency medical services, people in Nonthaburi Province can express their satisfaction, propose recommendations, and make complaints about emergency medical services to Nonthaburi Provincial Public Health, hospitals, foundations, associations, and Local government organization that organizes the Emergency Medical Operation Unit including expressing satisfaction with the services received through social media.

5.2.1.4 Administration of the Local Emergency Medical Network Organization Nonthaburi City Municipality

Nonthaburi City Municipality is a large local government organization established an emergency medical service unit in 2013 to provide pre-hospital assistance services and delivery to the hospital by trained emergency medical practitioners who has passed the rescuers training courses according to the standards set by the National Institute of Emergency Medicine, providing services and assistance to emergency patients and victims of accidents 24 hours a day. The emergency medical work of Nonthaburi City Municipality is under the Medical Service Division, Public Health Service Division, Office of Public Health and Environment, supervised by the Director of Public Health Service, Head of the Medical Service and Head of Emergency Medicine. Currently, there are 9 personnel comprising of professional nurse (municipal worker) positions and 8 emergency medical workers (general contractors), divided into 6 EMT-B levels and 2 FR (Basic) levels. Plus, there are 2 ambulances with equipment.

The Mayor of Nonthaburi gives importance to management in order to provide people in the area with a good quality of life, thus establishing an emergency medical service system to serve people who are sick and in an accident by bringing the emergency medical service system establishment in the five-year development plan (2018 - 2022) to be paid in the municipality's budget for the year 2018 according to the regulations of the Ministry of Interior in the amount of 1,000,000 baht, by setting disbursement statements from the budget of the Office of Public Health and Environment, Nonthaburi City Municipality annually. There is a project to train, develop personnel and provide materials and equipment necessary to perform the duties of emergency medical workers and emergency medical volunteers, both during and outside office hours. In which the municipality has organized 8 emergency medical workers divided into 2 teams, 3 turns, 24 hours a day. The morning team of 4 people, 2 ambulances, 2 people each (1 turns, 8.30 - 16.30), the afternoon team of 4 people, 2 ambulances, 2 people each (with 2 turns, 16:30 - 24.00 and 24.00 - 8.30) (Mayor of Nonthaburi, personal communication, August 15, 2019).

The staff performance evaluation was based on the satisfaction questionnaire of Nonthaburi Municipality where the respondents were relatives, related persons, or patients. It was found that the service recipients were satisfied with the service of the staff at the best level, more than 80 percent.

The emergency medical service unit of Nonthaburi City Municipality organizes emergency medical activities continuously, participates in the fire prevention and mitigation plan in the community, in schools and government agencies under the area of Nonthaburi Municipality, provides knowledge to build understanding the initial movement of victims to community residents, students, teachers and related persons, as well as organizes training to provide knowledge on first aid procedures, observing abnormal symptoms to students in 6 municipal schools, community committee members and community leaders. There are public relations channels to request emergency medical services through different channels so that people of all groups have access to the most services such as through a 3X3 meter LED TV screen at various road intersections, above the roof of the police box,

Nakornnon monthly journal of Nakornnon Municipality, website www.nakornnont.go.th, Facebook: Nonthaburi Municipality, Line: Public Relations, Nonthaburi Municipality.

Nonthaburi City Municipality executives bring technology to assist in emergency medical practice to make incident reporting and coordinates more convenient and faster by signing a memorandum of agreement with King Prajadhipok's Institute under the Smart City project for the service industry. Smart health, which is in the process of application development. In addition, it also cooperates with the Faculty of Engineering, Burapha University to be a trial area for the equipment which is in the process of studying and improving the system to be able to use for maximum efficiency.

Most of the communication between the emergency medical network of Nonthaburi Municipality uses radio communication and telephone. There are 2 radio waves, Witthayu Waree, controlled by the Disaster Prevention and Mitigation Department (Fire Fighting), Nonthaburi Municipality and Nonthaburi Provincial Police Office. (Nonthaburi Municipality Rescue Unit, personal communication, August 15, 2019).

From the above information, it can be concluded that the participation of the emergency medical service network in Nonthaburi Province is mainly of the Nonthaburi Provincial Public Health Office, Government Hospital, Private Hospital, Association Foundation and some people with public mind who become a volunteer for emergency medical care, and provide personal funds, cars, tools and equipment, form a team to jointly provide assistance to out-of-hospital emergency patients outside of regular work hours. It is under the control and registered with the Nonthaburi Provincial Public Health Office, which will issue an incident when notified by the Nonthaburi Provincial Incident and Command Center, located at Phra Nang Klao Hospital. Local government organizations are not involved in emergency medical services. Nonthaburi Provincial Administrative Organization is not involved in providing emergency medical services in any way, as the administrators do not realize the importance and understand the regulations on the provision of emergency medical services of the local administrative organization. There are only some local

government organizations that administrators understand and deem that the provision of emergency medical services will increase the chances of survival, reduce disability, reduce the loss of life and property of the people, and establish rescuers to serve specific people in their area. As a result, the operating unit does not cover all sub-districts. Along with the reason that Nonthaburi is like a capital city with heavy traffic, there are many villages, the road is complicated, and some people live next to the Chao Phraya River. This makes the journey of paramedics to reach the scene, or the patient takes a long time, and the performance is not as targeted.

5.2.1.5 Communication System for Emergency Medicine, Nonthaburi Province

1) Nonthaburi Province's Emergency Notification System

Nonthaburi Province's emergency notification system uses the number 1669 as the central number for requesting medical assistance. The rescue and investigation are still using a different number. The caller can call from any phone system. The Emergency Call Center can specify the calling number and record the sound. When calling in the Nonthaburi Province area, the line will reach to the Nonthaburi Provincial Emergency Call Center, located at Phra Nangklao Center Hospital. In addition to the telephone number 1669, the caller and the operating unit can contact the Incident Center by calling 02-9681364. When the incident notification center is notified, they will ask history, ask the site of the incident, assess symptoms, sex, telephone number of the incident person. After that, the hospital or volunteer team will be coordinated and directed in the immediate vicinity of the incident. The incident notification center will have information of all vehicles and personnel in the emergency medical network registered with the Provincial Health Organization of Thailand. The coordination method is to use radio communication first according to the requirements of Nonthaburi Provincial Health Organization. If they cannot be reached in the event of a technical failure, they will contact by phone. Every operating unit will have a radio to listen to news of the center's incident. If the patient is unconscious or the severity of the red, they will coordinate the hospital ALS to pick up. Radio-communication coordination communicates the patient's condition, location of the incident to the operating unit. The ALS team will notify the center that the incident is being issued and return to the center once they reach the scene. Upon

meeting the patient, he will assess symptoms, provide initial treatment, and inform the center again about what assistance has been given so that the center will coordinate with the receiving hospital to prepare. The Emergency Call Center will inform the patient details of the patient's symptoms, treatment and procedures given to the patient at the initial scene of the incident. Then the rescuers will return to the center when they leave the scene. In the case of patients with yellow severity, the volunteer team's vehicle will be informed to operate. The coordination process is the same as the ALS team every time when sending a patient to the hospital, they must contact to the center. If a patient wishes to be admitted to the desired hospital far from the incident point, the center will coordinate with the desired hospital to facilitate the volunteer team. Therefore, they do not have to answer questions from the emergency room as to why not send the patient to the hospital near the site of the accident, reducing the clash between the volunteer team and the emergency room. The referral of an emergency case of red severity for treatment would choose the hospital closest to the incident. When the patient's condition is stable, he/she will be forwarded or sent back to the hospital according to the patient's right of treatment. Coordination of emergency medical operations with other relevant agencies is the duty of the Emergency Call Center. If encountering traffic congestion, they will coordinate with the police to facilitate the opening of the traffic route. Operators at the Emergency Call Center will record various information both in documents and computer programs to Real Time or up to date via the Google Drive system as shown in Figure 5.14.



Figure 5.14 Process of Emergency Call Center, Nonthaburi Province

The personnel of the Phranangklaao Hospital's incident notification center consisted of 4 doctors, 14 nurses (including the total number of nurses in Phranangklaao Hospital), 6 medical emergency operatives, 8 medical emergency officers, 1 medical emergency worker, 5 emergency medical volunteers (EMR training 40 hours), 9 emergency medical volunteers (FR training 16 or 24 hours), and 3 other hired workers (Head of Emergency Call Center, Nonthaburi Province, personal communication, August 1, 2019).

Nonthaburi Province has an Emergency Call Center, Dispatch Center, and Command and Control Center, all in one center at Phra Nang Klao Hospital, by accepting all kinds of medical emergencies, analyzing events, directing, and dispatching and supervising both administrative and medical. There are emergency medicine doctors to supervise the system, receive incident reports from the public via 1669 and receive notification from the Volunteer/ Foundation via radio communication. The report will inform the location of the incident, whether conscious or not, whether there is any underlying disease or not and a telephone number to contact if the operative cannot find the scene. Then the symptoms will be sorted into red, yellow, and green levels. If in case the patient is unconscious, first aid will be recommended while waiting for the operation. Symptom separation will be performed to assess which level of vehicle should be sent to pick up the patient and which hospital should be sent to. Asking for symptoms takes about 1 minute. If the patient is red, after receiving the notification, the foundation or hospital responsible for the area or near the patient will be coordinated to pick up. When the operation unit issued the incident, it will report back to the center that it has been operating. When the patient is found, it will report symptoms and help given to the patient and return to the center. Then the center will report the symptoms to the hospital to deliver. When the operating unit leaves the scene of the accident, they will notify the center that they are traveling to the hospital. If the patient is yellow or green, the center will notify the volunteer operations unit. Other procedures are the same as for red-grade patients. If an operative has been deployed, is found to be beyond its capability and requires assistance from another operating unit, the incident center will coordinate the operation. This is to prevent conflicts between operating units because the emergency call center will know who oversees the area and which day is the responsibility of

which operation unit. If a patient or relative wish to go to another hospital in Nonthaburi Province, and the symptom is assessed, and the patient can be safely taken to that hospital, the center will coordinate the destination hospital to be delivered to reduce the pressure between volunteers, patients, patient relatives, and destination hospitals. However, if an incident occurs in Nonthaburi Province, but if a patient or a relative ask to be sent to a hospital in Bangkok, the center will request treatment at a nearby hospital first, and then contact the hospital for treatment and send the patient to the hospital where the patient needs. The operating unit will notify the center when it leaves the scene of the accident. And when sending the patient to the destination hospital, the emergency operator will verbally report the symptoms and treatment to the primary emergency room nurse and make a written report and submit to the ITEMS system within 24 hours. If the report is not submitted within the specified time, the incident fee cannot be reimbursed. (Emergency medical officer, performing duties for receiving incident notification and taking history taking in order to sort out the station at the emergency call center, Phranangklao Hospital, personal communication, August 1, 2019).

Some volunteer operations did not cooperate in the system logging after operation because the compensation was not interested and exceptionally low, the FR was only 350 baht. The emergency call center and the provincial public health office tried to collect the information as accurately and quickly as possible. (Head of emergency call center, Nonthaburi Province, personal communication, August 1, 2019).

“I am a volunteer for the foundation. When leaving for FR, National Institute for Emergency Medicine pays 350 baht per time. The money will go to the foundation. They will use it to build temples, build schools, build toilets. I did not receive any money from the National Institute for Emergency Medicine” (Emergency medical volunteer, Ruam Katanyu Foundation Nonthaburi, personal communication, August 20, 2019).

Most of the budget for the Referral Center was from the monetary allowance of Phranangklao Hospital. And partly, the National Institute for Emergency Medicine will allocate from the Emergency Medical Fund in respect of the budget for operating support according to the workload. In which the Provincial

Health Office shared 60% of the emergency call center, which was not sufficient for management, so the head of the emergency call center used a method to write a project and request funding from the NHSO on an annual basis. (Head of Emergency Call Center, Nonthaburi Province, personal communication, August 1, 2019).

Provincial hospital and paramedics in Nonthaburi province organized public relations of emergency medical operations by installing publicity signs for the EMS unit code 1669 installed by the community, making documents and pamphlets distributed to the community leaders, sticking stickers, conducting VDO public relations through television and LED billboards, placing documents and brochures by the public relations service unit for youth, students; handing out materials for media to parents to educate, build understanding of emergency medicine and the system to request assistance using the number 1669. The community president and volunteer leader were appointed to lead the cooperation of the Emergency Medical Operation Unit to be a network of cooperation in informing / sending news in case of requesting assistance from the Emergency Medical Operation Unit. Nonthaburi Provincial Health Organization prepared a public communication plan, Public relations campaign to raise awareness about emergency medicine among vulnerable people and their families to have basic knowledge on emergency illnesses such as STROKE STEMI, what to do in case of an accident, or encounter an emergency, seeking assistance in Emergency medical services through the hotline calling 1669 to gain basic skills in emergency response such as first aid, CPR, AED use for community leaders, community emergency volunteers in order to provide people with an understanding of emergency medical services, to be able to correctly report incidents, which will enable the emergency response center to send rescuers to help patients correctly, quickly and increase the survival rate of the patient.

Most people know they can report an emergency through 1669, see a variety of publicity such as stickers, posters, vinyl banners, but some still cannot remember the phone number, making them dial the wrong number and unable to report the incident. And most people choose to go to the hospital in the event of an emergency because they feel that they are faster than 1669 (Relatives of Emergency Patients at Phranangklaao Hospital, personal communication, August 5, 2019).

2) The Emergency Medical Communication System of Nonthaburi Province.

Phranangklao Hospital is responsible for the development of location command communication center, communication equipment, ambulance management, patient symptom reporting system and network operational data recording system. When there is an emergency patient in Nonthaburi province, witnesses or relatives can call to report the incident to request an ambulance to pick up the patient in an emergency and deliver to the hospital via number 1669 free of charge 24 hours. Both landline and mobile phones of various telephone companies are organized through a branch in the system of TOT Public Company Limited, which will allocate a line number to be used in each province. The telephone number of the informant will be appeared at the Nonthaburi Provincial Emergency Call Center, Phranangklao Hospital.

Providing advice, ordering, and coordinating assistance from the center will be done under the supervision of the Director General via radio communication or telephone. Nowadays, radio communication systems sometimes have problems because many provinces use the same radio channel. Nonthaburi Province uses the same channel as Pathum Thani Province because the radio communication channel according to the NBTC's Office of the NBTC approved allocation of radio frequencies to the National Institute of Emergency Medicine, in which there are only 11 channels, making it necessary to use more than 1 province per 1 channel causing communication delay. If there are many incidents at the same time, they will listen to the emergency rather than ask for permission to use the channel first, or use the telephone directly to the center, or use the radio communication channels of each foundation instead. The center will know which foundation is responsible for each point. Nonthaburi province has 4 foundations, namely, Ruam Katanyu, Poh Teck Tung Foundation, Siamnon, and Rescue Nonthaburi. And the radio communication channels of the DLA, who joined the medical service system, had reported the problem to the government agencies that oversee the allocation of radio communication channels, but could not solve the problem because each province had allocated radio channels for each province, and some areas lack internet radio communication due to lack of budget. Event logging, receiving incident reports,

ordering assistance, and reporting back to the center are done via the Google Drive system (Head of Emergency Call Center, Nonthaburi Province, personal communication, August 1, 2019).

The emergency call center has a manual and standard for communicating with the caller, analyzing the risks, including laying out preventive measures and guidelines in the event of an error in the communication of the notification center and conducting the training of the center staff, development of a system to record operational information of the network that contacts the communication center, organizing a quality development system and monitoring and evaluating internal results.

Communication of the operating units, hospitals, local administrations, government agencies, foundations and associations that have organized emergency medical operations have a number that can be used to coordinate between the emergency call center 24 hours. There are supplies and communication equipment in the operating unit according to the requirements of NIEM. Type 2 telecommunication equipment is used to communicate within the emergency medical service network, Nonthaburi Province, which is the radio device that cannot be adjusted from the front of the receiver-transmitter. To adjust the frequency, the frequency must be programmed either from a programmer or from a computer program. There are 2 active communication systems: VHF/FM in the frequency band 152-156 MHz and the public band 245 MHz and the SSB/AM system.

Radio communication used to communicate within the network of emergency medical services in Nonthaburi Province are of 3 types: (1) Portable type or Handy: The regulations require a maximum of 5 watts of transmit power, able to communicate in close distances. The effective distance is about 5-10 kilometers. (2) Car or mobile type: It has a maximum power of 30 watts, can communicate at a distance, able transmit a distance of about 50 kilometers due to higher transmission power. (3) Base station type has a maximum power of 45 watts, can communicate over a long distance. It can transmit about 100 kilometers due to the antenna's height (60 meters) and the transmit power is higher. A permit was requested to have and use radio communication from the Office of the Broadcasting Commission. The National Television and Telecommunications Business (NBTC), installed in operation centers,

emergency medical service vehicles and emergency operators, as well as training on the availability and use of radio communication for personnel, and procurement of PC computers to connect. Through the Local area network (LAN) or Wireless-LAN (WIFI) and prepared a report on the performance of the emergency operating kit via a computer system via the Internet to reimburse emergency operations.

The command for the incident response unit will follow the standards set by the NIEM. The supervisor is trained to have knowledge, understanding about the medical practice, resulting in consistent communication on a specific basis, having knowledge, regulations, and etiquette for the use of radio communication and knowledge of radio frequencies of related agencies, including the frequency channel of the Ministry of Public Health, the frequency channel of the Bangkok Emergency Medical System, the Office of Disaster Prevention and Mitigation. And the police officers in the area with knowledge about the code used in the communication or Code Wor., Such as Wor. 35 means preparing to be ready to issue an emergency, making communication for emergency medical orders of Nonthaburi Province effective. (Head of Emergency Call Center, Nonthaburi Province, personal communication, August 1, 2019).

Communication via radio communication in reporting information about patients in Nonthaburi Province, the commander will send a signal via radio communication, calling the operating unit to speak via radio communication such as Wor. 2 (meaning heard / known) and then continue with the name of the organization or the caller code, which is a reply to notify. Speaking to communicate and command is to speak slowly, clearly, and using short, concise conversations with smooth voice, words used should have a clear meaning, polite, and not extravagant since many provinces share communication channels. If it is necessary to send messages longer than 3 seconds, it will be paused for 2-3 seconds so that other agencies with urgent or necessary news can be inserted. Radio communication is heard by many listeners, so patient names and personal information are not broadcasted. Beware of explaining what it means to other people in a bad way, as it could be prosecuted. (Incident notification and command staff, Nonthaburi province, personal communication, August 1, 2019).

The use of radios by emergency medical volunteers in Nonthaburi province still uses illegal radio. NBTC has not been registered, and the frequency has not been legally certified.

“Most of our volunteer radios are not legal. No one has registered. The channel used; the frequency used is not correct. The frequency band used is not yet certified. The radio in use is still illegal. If we are arrested by the police, the Foundation cannot help us. “(Nonthaburi Province Medical Emergency Volunteer, group discussion, August 20, 2019).

3) A Form of Communication between Various Departments in the Emergency Medical Services Network

The communication for the transmission of information between the National Institutes of Emergency Medicine, the emergency call center and the various operating units will be done through the ITEMS system by the emergency call center and the provincial health office can record the information of the operating unit accurately and quickly, the center will follow up and record the information in the system after the operating unit is deployed. Transmitting information to emergency room service recipients in public hospitals to the Ministry of Public Health is done via the IS Online system through the “ACCIDENT” file in 43 files, which is the same format as Khon Kaen Province.

Organizing a meeting between network parties to provide emergency medical services, organized by the Provincial Public Health Office, Nonthaburi Province, scheduled for 2 months / time. The participants of the meeting consisted of representatives from Nonthaburi Provincial Public Health Office, all public hospitals in Nonthaburi Province, private hospitals, foundations, private associations and volunteers providing emergency medical services throughout Nonthaburi Province, creating a dialogue between the departments in the network of emergency medical services, both formal and informal, to inform or clarify stories of incidents, to resolve disputes or misunderstandings that arise between operating units or agencies involved in the emergency medical profession, jointly solve problems and put measures to prevent the same problem from occurring again. Nonthaburi Province

is planning to organize EMS Rally at provincial level, but it has never actually been held. All personnel in Nonthaburi's emergency medical service network are members of the LINE Group Application, established to communicate and deliver important information, both urgent and non-urgent, to everyone thoroughly.

Nonthaburi Provincial Public Health Office in collaboration with Phra Nang Klao Center Hospital organizes training for personnel in the emergency medical system in both Nonthaburi and other provinces in the 4th health zone (Saraburi, Lop Buri, Ang Thong, Nakhon Nayok, Singburi, Phra Nakhon Si Ayutthaya, Pathum Thani) to teach or educate, increase, and review knowledge to keep up with the modern era and to renew licenses for personnel in the emergency giving system of Nonthaburi Province. In addition, Phranangklao Center Hospital is also a training and study center for personnel in the emergency medical system of Nonthaburi province, making it a good relationship between the personnel of the emergency medical center and the operation unit as disciple – teacher and brother – sister. The head of emergency call center is revered by personnel in the emergency medical system. When problems arise between networks, they play an important role in negotiating, mediating, dissuading, and solving them. In addition, the head of emergency call center is like a center to make everyone in the system know each other, having a brotherly relationship with each other. Good personal relationships make it possible to seek mutual help when assistance is needed. When problems arise, everyone can discuss and agree. Thus, it can help reduce the conflict between the operating units a lot.

Provincial Provincial Administrative Organization and Head of the Nonthaburi Provincial Administrative Office, use the method to visit the area to communicate, talk and persuade the administrators of the local administrative organization to see the importance and to participate in the emergency medical service, and visit the area to monitor the results of the work, talk to listen and join in solving the problems that arise based on providing emergency medical services in each agency (Head of the Emergency Medical Service and Call Center, Phranangklao Hospital, personal communication, August 1, 2019).

The communication between the National Institute of Emergency Medicine and the departments involved in providing emergency medical

services in Nonthaburi Province (Provincial Health Organization, the Emergency Call Center, and the Emergency Medical Operation Unit) is mainly in the form of official communication through the issuance of regulations, rules, and standards in writing, organizing academic conferences, holding forums, and conducting visits for supervision. National Institute of Emergency Medicine has never discussed with the Chief Executive of Nonthaburi Provincial Administrative Organization for cooperation in arranging emergency medical services. The communication section for formal teaching or providing academic knowledge to the operating unit is in the form of meetings, academic training, mainly organized by Phra Nang Klao Hospital and Nonthaburi Provincial Administrative Organization. (Deputy Secretary General, National Institute of Emergency Medicine, personal communication, April 30, 2019).

Communication to publicize the public to have access to the emergency medical service system and to provide cooperation to support the operation of rescuers, hospitals, health provincial office and local administrative organizations providing emergency medical services, public relations and education for people in the area to provide emergency medical services and can call the service when injured or sick in an emergency, in order to let the public know what is the injury from an accident or emergency sickness that can call the service, how to report the incident when encountering an emergency patient or an accident victim, have consciousness and call 1669, provide information about the nature of the incident, what kind of accident has occurred, or is it an emergency patient in any way? Tell the scene of the accident or important points that can be seen and the path that can be reached, the gender, age, number of injuries, the severity of the individual, the level of consciousness of the injured person, the repeat of the risk, such as in the middle of the road, there might be a risk of being repeatedly stepped on by a vehicle, the name of the informant or the rescuer, or the telephone number that can be contacted and assisted according to the instructions of the staff based on the symptoms of emergency patients while waiting for an emergency medical operation unit to pick up the patient to be brought to the hospital and publicize to raise awareness not to harass the emergency hotline 1669. "Emergency sickness, call 1669. Free call, but don't play.". by using brochures, business cards, stickers, road signs, public relations boards, community training, exhibitions, public relations, opening video clips and

advertising spots, EMS calling process, patient assistance through the 1669 hotline. Most foundations and private associations also promote a report directly to their agency rather than calling 1669.

Organize public relations to increase access to Early Warning Signs to raise awareness about Acute Coronary Syndrome and STROKE emergency medicine to people at risk and their families to have basic knowledge on emergency illness, first aid, CPR and AED use to volunteers, students, and community leaders (Nonthaburi Provincial Public Health Medical Doctor, 2019: Interview and Volunteer Emergency Medicine, 20 August 2019: Group discussion.). However, some people still cannot remember the number 1669 and others lack confidence in calling 1669. Some called the staff and thought they were at the incident center, and many of the questions were delayed, so they chose to deliver the patient themselves, or call the rescuer's number that you know, which will be faster than calling 1669 (Relatives of emergency patients using the emergency room service at Phranangklaao Hospital, 2 August 2019: interview). And some people are still unsure about the emergency ambulance service by volunteers, foundations, and associations. "Sometimes the patient doesn't want to go to my car. He said he was going to the hospital car. I explained that if waiting for an ambulance, you must wait a long time, if you can wait, you can wait. But I will look at the initial symptoms first." (Emergency Medical Volunteer, Siamnont Resuscitation, personal communication, August 20, 2019).

"Ever met a patient tell "I haven't died yet. Why you come here?" I will explain that my car is not a corpse collector. There is another car to collect the corpses. My car is like an ambulance in everything "(Emergency medical volunteer, Por Tek Tung Foundation, personal communication, August 20, 2019).

"When I see a patient telling me that he does not want to take the foundation car, I will report back to the 1699 center that the patient does not take my car, he only takes an ambulance. The 1699 Center will talk to the patient's relatives to understand that my car can bring them to the hospital as well."

(Emergency medical volunteer, Por Tek Tung Foundation, personal communication, August 20, 2019)

Most of the communication between the notification center and the operating unit uses radio communication to notify all operating units to hear at the same time as specified by the Nonthaburi Provincial Administrative Organization. When the Radio Emergency Notification Center, the operating unit responsible for that area will respond to the incident via radio communication and return to the Call Center. However, if three times have been reported via radio and no operating unit responds to the incident, the emergency call center will identify the unit responsible for the incident. If the operative in charge of the area is unable to issue the incident, ask another operator closest to the incident area to act instead. As for communicating with people to publicize the use of services in 1669 in Nonthaburi Province, most of them are the duties of the National Institute for Emergency Medicine and the Provincial Health Office. Some of the Emergency Medical Volunteers organize activities to promote incident reporting through number 1669 and primary life support to students in schools. The communication summary of the emergency medical service network of Nonthaburi province is shown in Figure 5.15.

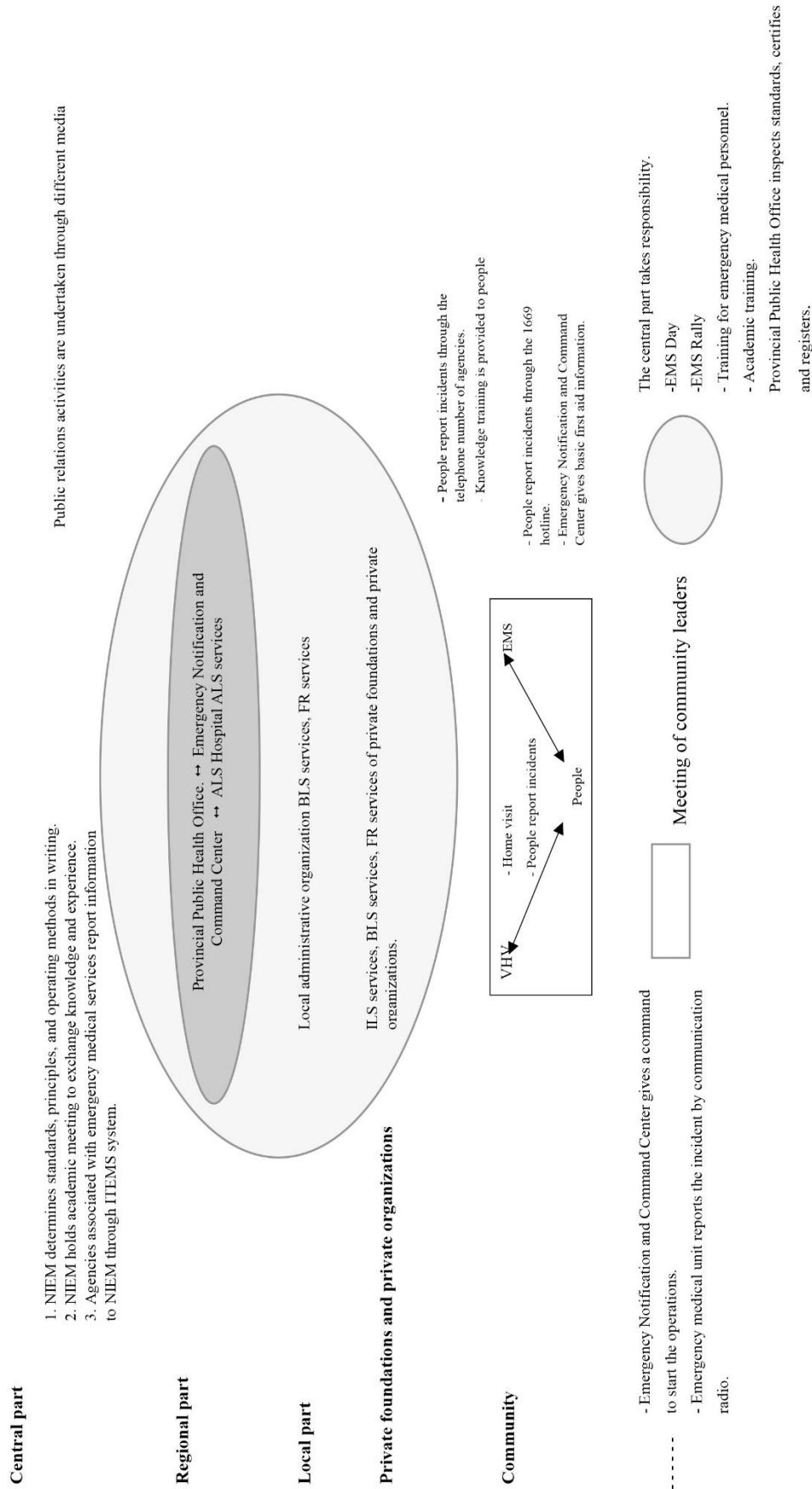


Figure 5.15 Communications of the Nonthaburi Provincial Emergency Medical Services Network Organization

5.2.2 Effectiveness of Network Organization Administration of Emergency Medical Services in Nonthaburi Province

1) Access to Emergency Medical Services

Access to emergency medical services is when critically ill populations receive emergency medical services by a standardized emergency operating package from the scene of the incident to the medical facility by the command of the Emergency Call Center, considered from critical emergency patients who came by the Emergency Medical System (EMS) of Khon Kaen, Nonthaburi Province for the past 1 year, accounting for 13.75 percent. (National Institute for Emergency Medicine, 2015). In which the Ministry of Public Health sets target criteria for fiscal year 2019 at least 26% while the National Institute for Emergency Medicine sets at least 20%. The percentages of critical emergency patients (at the emergency room) who come from Nonthaburi province's emergency medical system classified by fiscal year are shown in Figure 5.16.

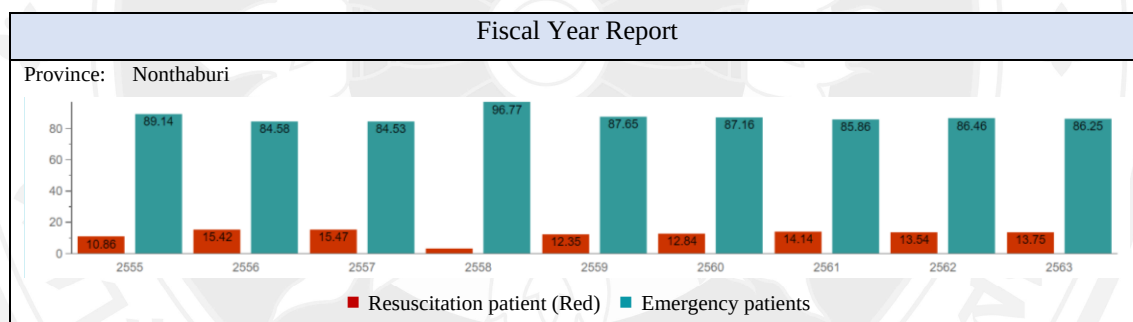


Figure 5.16 Percentage of Critically Ill Patients (at the Emergency Room) Who Come from Nonthaburi Province's Emergency Medical System Classified by Fiscal Year

Source: National Institute for Emergency Medicine (2015).

As for the coverage of emergency operations in each area, Nonthaburi Province has 6 districts, 52 sub-districts, with a total number of ALS operating units covering 6 districts. Currently, there are 13 operational units of ALS level operations, five districts with BLS operating units, 16 BLS operating units in provinces. There are 13 units of FR operations. Sub-districts with FR operations cover 23.08 percent of the

total districts. There are few local government organizations that cooperate to organize emergency operations. 22 local government organizations registered to provide emergency medical services, accounted for 48 percent, but only 13 local administrative organizations, accounting for 59 percent of act real operation. There are 5 units of work of the foundation / association. The number of emergency medical services is 100 vehicles, 4 ALS trucks, 60 BLS trucks, 3 FR trucks, 14 ALS vans, 5 BLS vans, 34 FR vans (National Institute for Emergency Medicine, 2020).

The proportion of critical emergency cases in red that were delivered by the ALS High Level Emergency Action Unit for the year 2019 in Nonthaburi province amounted to 252.33 per 100,000 population (National Institute for Emergency Medicine, 2015). The proportion of patients in critical emergency in red that were delivered by the ALS High Level Emergency Action Unit per 100,000 population of Nonthaburi Province, classified by fiscal year, pictured below, showing that the number of emergency patients delivered by the ALS high-level operating suite has steadily increased since 2015

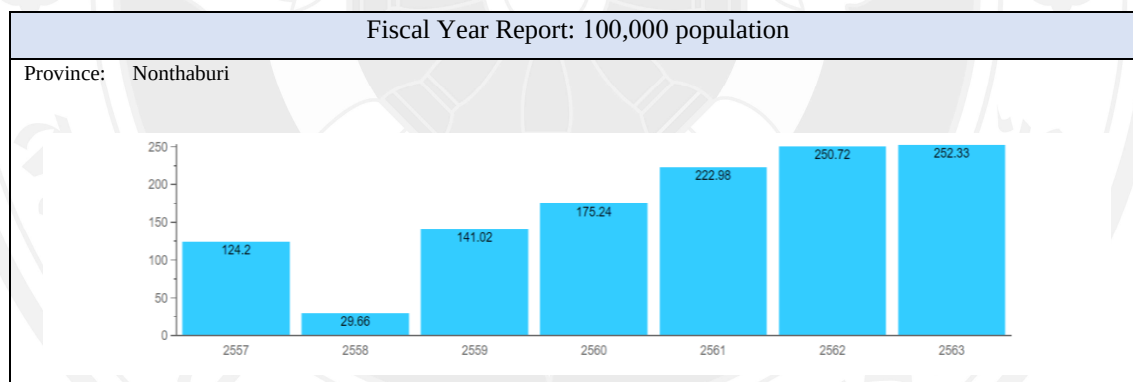


Figure 5.17 The Proportion of Red Critical Emergency Patients Delivered by the ALS High-Level Emergency Operating Unit per 100,000 Population of Nonthaburi Province Classified by Fiscal Year

Source: National Institute for Emergency Medicine (2015).

Nonthaburi Province has personnel in the emergency medical system all positions below the specified manpower framework, whether it is an emergency medicine doctor, emergency Practice Nurses, Medical Emergency Operators, and

Medical Emergency Staff. Massive personnel are leaking from the bureaucracy to the private sector. This is because the workload of the public sector is greater than the private sector but has less compensation. Due to insufficient personnel, the organization of an ALS-level medical emergency operation unit of a community hospital requires personnel with the nurses operating in the emergency room. In the event of emergency room care, they will not be able to act, causing the community hospital's ALS emergency operating unit to not be always ready, where the Emergency Call Center solves the problem by having the Phra Nang Klao Rescuers, or nearby rescuers to operate instead.

“The nurses did not stay long. Stay together for a moment, then resign. 2 of them just resigned recently causing insufficient personnel to work. Not enough people working in ER. When called to help, even if we wanted to help, we could not go. This problem has been around for a long time. Executives know, but do not know how to solve the problem because here, we work hard but we earn less money. Rarely people live together for a long period. Most of them left to live in the private sector, earning more than their comfortable jobs” (Medical emergency officer, Bangyai Hospital, personal communication, August 5, 2019).

“The ALS vehicles of Nonthaburi province are not enough, only the Phranangklao Hospital is ready to operate all the time. In other community hospitals, their personnel must also work in the emergency room. If they are on CPR, they cannot go out because at the time of operation, the emergency room nurses will disappear 3-4 people. The issue of insufficient ALS vehicle was always controversial at the meeting, but it still couldn't solve the problem” (Volunteer Medical Emergency, personal communication, August 20, 2019).

The position of Head of Emergency Nursing Center still lacks career advancement due to the hospital's structure. The highest position is Professional Nurse (C7). To rise to the Specialist (C8) position, it is a must to be the Chief Emergency Nursing Officer only.

“I have been the head of the emergency call center for a long time. The top of career path for this position is C7 professional nurse, and I have been C7 for a long time. If I want to get C8, I must be a head of ER” (Head of Emergency Call Center, Phranangklao Hospital, personal communication, August 1, 2019).

From the above information, it can be concluded that people in Nonthaburi province still have little access to emergency medical services, although some private hospitals cooperate in organizing an ALS-level action unit and operate to help with many events, Emergency medicine is not yet covered in all areas. Local government organizations have not cooperated in arranging an emergency medical operation unit, emergency medical volunteers are unable to work 24 hours due to their regular job placement and their number decreased due to economic problems, and the ALS-level operations of the community hospitals cannot go out of operation due to the lack of personnel.

2) Mortality Rate of Emergency Patients

When considering the effectiveness of the community-level emergency medical services network from the deaths of critically ill patients in Nonthaburi Province for the past 1 year, the results of initial care showed that 507 of the emergency patients died at the scene of the accident, accounting for 2.39 percent and 10 deaths during delivery, accounting for 1.97 percent. The hospital results showed 130 deaths in the hospital, representing 0.61 percent, 1 returning to death at home, accounting for 0.005 percent. The 24-hour mortality rate among patients admitted to the Intermediate Secondary (F2) hospital was up 5.43% (National Institute for Emergency Medicine, 2020). The target criteria for the fiscal year 2019 of the NEDA and the Ministry of Public Health was set to be less than 10 percent. (<http://healthier.moph.go.th/kpi/kpi-list/view/?id=793>).

The Nonthaburi Provincial Emergency Call Center still sorted out the severity of the patients quite below the truth. The accuracy of the screening was performed with an emergency telephone call for the past 1 year was 12.85% lower than the severity level compared with the hospital (Under Triage), and higher than the severity level compared with the hospital (Over Triage) at 23.96 percent. (National Institute for Emergency Medicine, 2020). From the picture showing the percentage of

screening indicated as a critically ill patient over the phone compared to the hospital by fiscal year 2016 - 2020, most Under Triage was less than 10% and Over Triage was less. 20 percent, with the American College of Surgeons Committee on Trauma targeting the accuracy of the degree of emergency screening among patients under Triage less than 5 percent and Over Triage at 25-50 percent (Mohan et al., 2014).

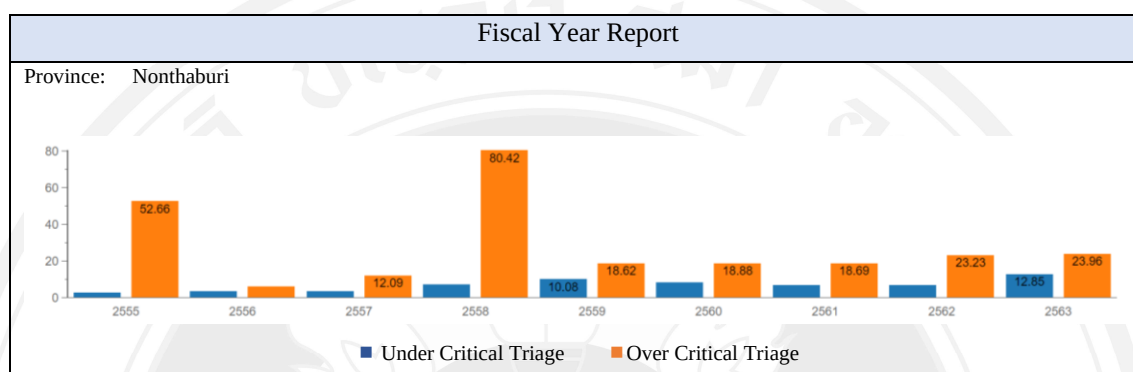


Figure 5.18 Percentage of Separation that Indicates a Critical Emergency Patient over the Phone Compared to Nonthaburi's Hospital (Under and Over Triage), Classified by Fiscal Year

Source: National Institute for Emergency Medicine (2015).

“Listened to the radio, heard the center command the volunteer to leave because it was assessed as a yellow case. But when the volunteers arrived, they had to call the radio back to the ALS car center to help because the patient was red.” (Emergency Medical Volunteer, personal communication, August 21, 2019).

“The Center assigned as yellow, so I ordered my car to leave. But when I arrived, the patient was red and had to have an ALS call center to help, slowing down the patient's opportunity to receive assistance was a waste of time for the patient.” (Emergency Medical Volunteer, personal communication, August 21, 2019).

The waiting time for emergency patient exposure affects mortality rates (Benjamin et al., 2016, as cited in Cabral et al., 2018, p. 2). Critical emergency

patients who started receiving emergency operations within 8 minutes in Nonthaburi Province, 18.71 percent (ITEMS system <http://report.niems.go.th/niemsdwh/portal/link.html>, 2020). NIEM sets the benchmark for performance, divided into 5 levels: Level 1: 43 - 45.9 percent, Level 2: 46 - 48.9 percent, Level 3: 49 - 51.9 percent, Level 4: 52 - 54.9 percent., Level 5: 55 - 100 percent. The details of the percentage of critical emergency patients who started receiving emergency operations within 8 minutes in Nonthaburi province classified by fiscal year are shown in Figure 5.19.

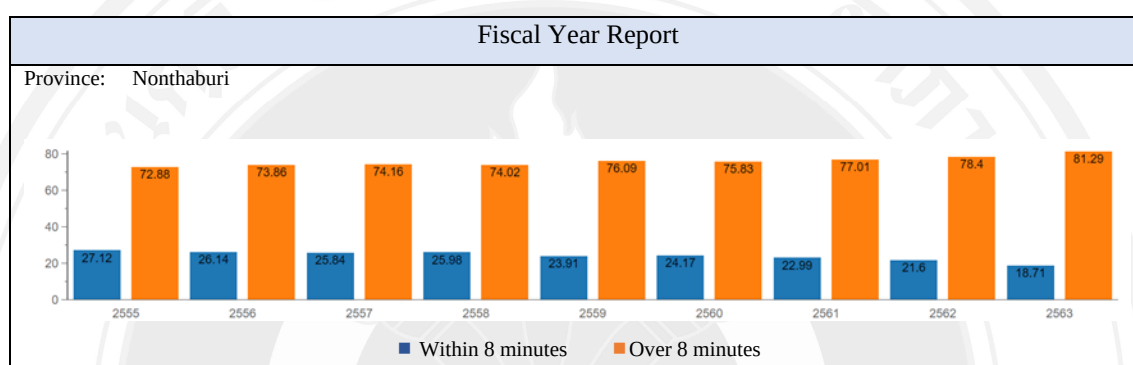


Figure 5.19 Percentage of Critical Emergency Patients Who Started Receiving Emergency Operations within 8 Minutes in Nonthaburi Province Classified by Fiscal Year

Source: National Institute for Emergency Medicine (2015).

Communication for the command of the incident and order center mainly uses radio communications, but at present, the radio frequency channels allocated by the NBTC for emergency medical care are insufficient, 1 radio frequency channel must be shared in many provinces. Sometimes the incidents were reported at the same time and the emergency services center could not hear some important information that rescuers had given over the radio, wasting time to go out to an accident.

“Our radio channels must also be shared with other provinces. Pathum Thani uses the same channel as us. When reporting a collision, they will see who the emergency is. If their issue is heavier than us, let them use it first. We either

wait or just avoid by using the phone instead.” (Head of emergency call center, Nonthaburi Province, personal communication, August 1, 2019).

“Radio communication problem is another issue. Sometimes I use radio at the same time as other provinces. If another provincial command center uses a radio, the signal will be stronger than mine already because the center is where the antenna is located. Sound will drown out my voice. When I bring important information back to Nonthaburi center, they will not hear me.” (Volunteer for emergency medical care, Por Tek Tong Foundation, Nonthaburi, personal communication, August 20, 2019).

As Nonthaburi Province does not have emergency operations in all areas, and the problem of using radio communication between incident and command centers and operating units, together with Nonthaburi Province is characterized as an urban area, traffic jams, houses, people as villages. Plus, there are several separate alleyways that require the expertise of the driver's area and some are adjacent to the riverside, the accessibility of patients is difficult and takes a long time, resulting in only 18.17 percent of critical emergency patients receiving emergency operations within just eight minutes. Moreover, often, the Nonthaburi Provincial Emergency Call Center has lowered the severity of the severity of emergency patients, resulting in the death rate of emergency patients at the scene of Nonthaburi Province higher than in Khon Kaen, Ubon Ratchathani and Sa Kaeo are shown in Table 5.9.

Table 5.9 Comparison of Morality in Critically Ill Patients at the Scene of the Accident, during Delivery, in the Hospital, at Home and Died within 24 Hours in Secondary and Intermediate hospitals (F2) or Higher in Khon Kaen, Nonthaburi, Ubon Ratchathani and Sa Kaeo Provinces (1-Year historical Data)

Province	Results of initial care		Hospitalization results		The mortality rate within 24 hours of the patients admitted to the hospital at F2 level and above (fiscal year 2019 target criteria to be less than 10%).
	Mortality rate at the scene of the accident (person)	Mortality rate during delivery (person)	Hospital death (person)	Return to death at home (person).	
Khon Kaen	0.15 (146)	0.01 (17)	0.49 (483)	0.03 (27)	4.72
Nonthaburi	2.39 (507)	1.97 (10)	0.61 (130)	0.005 (1)	5.43
Ubon Ratchathani	0.41 (195)	0.01 (7)	1.39 (667)	0.06 (29)	7.99
Sa Kaeo	0.59 (97)	0.006 (1)	1.78 (293)	0.02 (4)	6.86

3) Information Acknowledgement about Emergency Medical Services.

Information acknowledgement about emergency medical services. The perception of information about emergency medical services is based on calling 1669 when the emergency illness occurred in Nonthaburi province for the past 1 year, it was found that 80.21 percent of emergency patients reported the incident by emergency number 1669. (National Institute for Emergency Medicine, 2020). Nonthaburi Province is at level 1 (NIEM sets the performance measurement criteria, divided into 5 levels, level 1 is 70%, level 2 is 72.5%, level 3 is 75%, level 4 is 77.5%, level 5 is 80% or more. And the Ministry of Public Health has set the criteria for emergency operations in the 12 months of the fiscal year 2019 of not less than 95.5 percent). Details of emergency patients who report an emergency by emergency number 1669 classified by fiscal year 2012 - 2020 are shown in Figure 5.20.

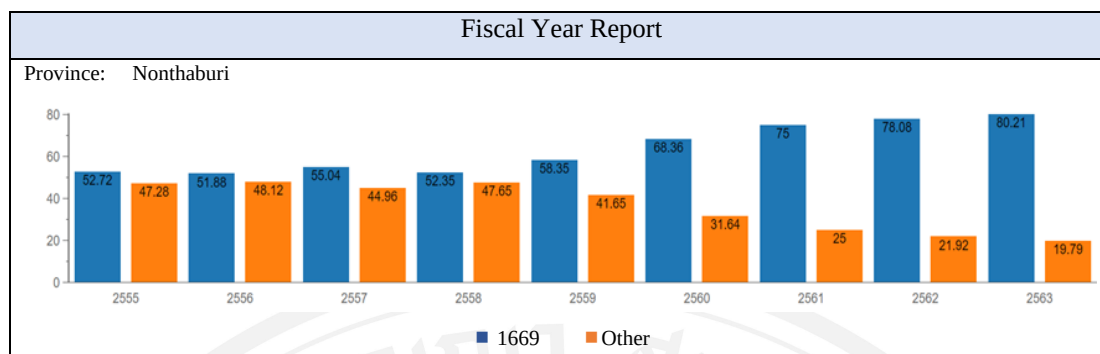


Figure 5.20 Percentage of Emergency Patients Reporting an Incident by Emergency Number 1669 in Nonthaburi Province, Classified by Fiscal Year
Source: National Institute for Emergency Medicine (2020).

Most people already know or have heard of the Emergency Services Number 1669 through various media such as billboards, brochures, radio media, public relations from the SAO officials, NCPO, community leaders and the service call of 1669 up to Over 80 percent in 2020. As for foundations and associations, they also promote public calls to their own agency's direct numbers rather than using 1669. Some people still feel that calling 1669 will have to answer many questions and receive service later than travel to the hospital themselves and are unsure of using the services of rescuers for fear of an accident and think that the rescuers' cars were used to carry the corpse before.

"I've seen the billboards 1669, but I don't know who I have to speak to after I call"

"If I call 1669, call for a car, I do not know how long to wait. Will the car come for sure? The car is likely to be stuck until it comes to the scene. If I go by myself, it should be faster"

"I used to make calls but no one answered the call. Wait several minutes in line. Such a waste of time"

"The operator asked a lot. I do not know why they want to know that much. Patients are between life and death."

"Better take your own car. More convenient. Go straight away. Do not have to wait. As we don't know how long it takes for them to come"

“The rescuer, the Foundation car, used to be a corpse carriage. I don’t dare to use”

“I am afraid of accidents. The driver of the resuscitation car drives amazingly fast, overtakes left overtaking right all the time, afraid of not reaching the hospital.” (People receiving emergency medical services in Nonthaburi, personal communication, August 2, 2019).

4) Public Perception and Understanding of Emergency Medicine

Nonthaburi Provincial Public Health Office and various agencies that provide emergency medical services There is a publicity of the emergency medical service system by using stickers, brochures, publicity boards, request for cooperation of the Kamnan, village headman, public relations at the news distribution tower, on the website of Provincial Health Office and local authorities volunteer to educate students in various schools Causing emergency patients in Nonthaburi province to report their incidents with the emergency number 1669. Although the public knew the number 1669, but from interviews with the service recipients, it was found that the public relations did not make the public understand the purpose of 1669. Some people still understood that emergency medical services only accepted accident patients. Some thought that it charged for service calls, unable to call for 24-hour ambulance services, and did not understand how to report the incident, causing the user to not understand the purpose of the inquiries of the telephone operator, leading to the dissatisfaction of questioning of the center staff. Some people who used emergency medical services did not call the service again because they found it difficult to call to inform sick information and tell the site of the incident. They thought that if their illness was not severe, and they had already had medication or a device to relieve the symptoms, they did not want to use an ambulance. Moreover, some people thought that if the illness was in an emergency, they had to come to the hospital as soon as possible and did not want to wait. Some thought that the ambulance was insufficient, so they should be used to pick up a sick person who had more severe symptoms, and some thought that when they were shocked, they forgot to think of an ambulance.

“I knew 1669, but my father had a chest pain so I brought him to the hospital. No car crash or motorcycle accident. I did not call 1669.” (A relative of emergency room patient, Institute of Chest Diseases, personal communication, August 2, 2019).

“I have a car, so I bring my own car. If calling 1669, I do not know how much they will charge for the service. It's better to bring my own car, don't waste my money.” (A relative of emergency room patient, Institute of Chest Diseases, personal communication, August 2, 2019).

“In the middle of the night, not sure if they will have a car for service.” (A relative of emergency room patient, Institute of Chest Diseases, personal communication, August 2, 2019).

“The operator asked a lot. I do not know why they want to know that much. Patients are between life and death.” (A relative of emergency room patient, Phranangklao Hospital, personal communication, August 2, 2019).

“Going by myself is better. 1 time is enough for 1669. They asked a lot. I was so shocked at that time, so I was not convenient to answer the detail of my location to them.” (A relative of patient in the emergency room, Phranangklao Hospital, personal communication, 2 August 2, 2019).

“After asking a few questions, the tone of the relative starts to change, starts to get dissatisfied, doesn't want to answer questions, starts to scold at me.” (Incident operator, Emergency Call Center, Nonthaburi, personal communication, August 1, 2019).

“The symptoms were not very severe, our oxygen can be taken in the car by ourselves. Emergency vehicles should be kept for people with severe symptom.” (A relative of emergency room patient, Phranangklao Hospital, personal communication, August 2, 2019).

“When seeing a bad sign, I quickly put him in the car and brought to the hospital. If I call for an ambulance, or call 1669, it is a waste of time to wait them to come, and there might be a chance to encounter traffic jam. I drive mine myself, better, faster.” (A relative of emergency room patient, Bangyai Hospital, personal communication, August 5, 2019).

“To be honest, I was shocked and hurried to think of a phone number. I can't think of anything, I can't think of 1669 at all.” (A relative of emergency room patient, Bangyai Hospital, personal communication, August 5, 2019).

From the above quantitative and qualitative data, it can be concluded that the Emergency Medical Service Network Organization of Nonthaburi Province is not as effective as it should be. Patients who died from emergency accidents had a higher ratio than those in Khon Kaen, Ubon Ratchathani and Sa Kaeo provinces. Local government organizations are less concerned with providing emergency medical services, relying on volunteer operations, foundations, or associations, causing the operating unit to not cover the area. In addition to the nature of the provincial area, it is an urban area with heavy traffic. Most of the houses are villages. Some of the houses are adjacent to the Chao Phraya River. There are many small alleyways subdivided into streets. Reaching out to the patient is quite difficult. As a result, most of the critical emergency patients did not receive service within 8 minutes of reporting the incident via the telephone number 1669. Some of the relatives lacked confidence and were dissatisfied with the service due to the long wait for the ambulance. Many emergency patients called 1669 and the Nonthaburi Provincial Emergency Call Center can sort out the level of emergency of the patients and order the emergency unit to take care of the patients quite appropriately, with little mistakes since the Nonthaburi Provincial Emergency Call Center defines the scope and duty and responsibility of the job (Job Description) that when the personnel of the center are free from work, they must go to help care for the emergency patients at the emergency room of the hospital, so they can understand the situation when receiving a report over the phone. Although most people know and call emergency medical

services through 1669 numbers, some still lack the understanding of the emergency medical service system.

The problem of the local government organization has not been involved in organizing an emergency operation kit and the emergency operations unit does not cover the area, partly caused by the emergency medical institute and the provincial public health agency; particular, doctors, who are regarded as reliable personnel, recognized and respected by all parties, have not yet been in the field to talk, build good relationships, correct understanding and seek cooperation from the local government organization in Nonthaburi Province seriously.

In organizing a meeting between network parties to provide emergency medical services in Nonthaburi Province, which is an important mechanism for communication, building good relations, building cooperation, participation in expressing opinions, working together to solve problems and obstacles, there will be doctors from various hospitals in the province participating every time as well. However, the number of meetings is small and irregular, including training to create knowledge, refresh, review, and transfer experience to personnel, which increases and improves the quality of emergency medical services to be effective is not enough to meet the needs of the personnel in the system. And there are no activities to help rehearse readiness, increase capacity, and build good relationships among networks in provincial emergency medical systems such as EMS Rally in the network to create pride within the province.

Procurement of resources to support the emergency medical system in Nonthaburi province is not enough. No emergency medical foundation was established within the province. Most of the budget comes from the expenses of each hospital. Some of them have been allocated by emergency medical institutions, and people with public mind join as medical emergency volunteers use private funds to provide vehicles, equipment, and drugs. Some hospitals in Nonthaburi province face a lack of financial liquidity and the current recession have resulted in insufficient and uninterrupted resources to support the emergency medical system in Nonthaburi province.

Members of the Nonthaburi Emergency Medical Service Network have good relationships with each other. From the relationship between brothers - sisters,

students - teachers, it is possible to create a collaborative learning process, share knowledge, experience, tools, resources, and aid in solving informal problems consistently and continuously. The head of emergency call center is a positive thinker. He is well respected by all personnel in the emergency medical system. He acts as a center for communication, knowledge transfer, negotiation, mediation, and problem solving between all parties.

Nonthaburi Province has continued to lack of personnel building in the emergency medical system. There is no educational institution in Nonthaburi Province that offers a course for medical emergency responders or medical emergency personnel. In which, if wanting personnel to receive education, they must use competitive examinations with personnel in other provinces. Phranangklao Hospital does not provide training for home physicians, emergency medicine, or paramedics. It is the only source of study and visit to enhance skills of personnel in the emergency medical system only. And Nonthaburi Provincial Health Office does not provide training for emergency medical workers. Currently, the training of emergency medical volunteers is not sufficient to meet the needs of the personnel. When the number of personnel is insufficient, the remaining workload rests on the personnel in the system. This causes personnel to work harder and are more likely to quit. Especially nurses in public hospitals because they are paid less compared to the responsibility. As for the career progress of nurses, the head of the emergency call center has the same problems as Khon Kaen Province. The emergency call center is under the management of Provincial Hospital Center, under the Ministry of Public Health.

Phranangklao Center Hospital has improved the quality of emergency medical services by defining both quantitative and qualitative indicators of emergency medical services in line with the National Institute of Emergency Medicine. It provides a plan to develop, review, put in place measures to prevent risks, fix problems and errors that may arise. The personnel are educated by the hospital's emergency medicine physicians, and they visit the area to help the people, sometimes with doctors to improve their skills. This makes it possible to save the lives of patients effectively.

Doctors are considered an important organization leader in the emergency medical system, but rarely have a role to play and see the importance of building and managing the emergency medical service network in the province. Much of the role is still in medical care and knowledge transfer to personnel. Therefore, the leaders of most local government organizations have not been urged to recognize the importance of emergency medicine and have incorrect understanding of the regulations for the organization of emergency medical services of the local government authorities. They did not provide emergency medical services in their area due to fear of being examined by the State Audit Office, affecting their access to emergency medical services.

Due to the problems of personnel, budget, tools, equipment, and lack of cooperation from the local administrative organizations, the management of the emergency medical services network of Nonthaburi Province is ineffective.

5.3 Ubon Ratchathani Province

5.3.1 Operation Process of the Emergency Medical Services Network, Ubon Ratchathani Province

5.3.1.1 General Conditions of Emergency Medical Services in Ubon Ratchathani Province.

1) History of Emergency Medical Services in Ubon Ratchathani Province

Since Ubon Ratchathani Province is a large province and has a rugged area bordering neighboring countries, making access to health services in emergencies is rather difficult due to the distance from the village to some public health facilities. In the event of an emergency, the service from community hospitals was unable to reach the site of the accident within a reasonable period, causing the patients to be unable to receive comprehensive care. Therefore, began to develop the emergency medical service system in 2002 by using the ambulance of the Ubon Ratchathani hospital and the rescue volunteer vehicles of the various foundations, and training personnel to qualify for assistance at the scene of the accident, organized first aid training for volunteer rescuers of various foundations, with Sappasit Hospital as

the host to support. However, at the initial stage, there was no systematic linkage to the whole network.

March 30, 2004, an emergency medical service center was established at the Ubon Ratchathani Provincial Public Health Office. The participating service units included 23 units of Advance Life Support (ALS) under the Sunpasitthiprasong Center and Community Hospital, Basic Life Support (BLS), 5 units under private foundations, 46 units of health stations and First Responder: FR, 38 units under the sub-district administration organization. Each unit underwent a tool vehicle rating based on service unit standards. The emergency medical service of Ubon Ratchathani Province used the principles “Service close to home near the heart” because emergency patients were happened in areas in each community and rural areas. Patients with accidents and emergencies that were far away from the hospital needed services in the nearest area which was the health center. Initial operations were only covered in municipalities, whereas in the periphery, the service was not accessible due to the remote area. Each district has only one hospital service unit. Initially, the health stations and service units of the Tambon Administrative Organization performed relatively few incidents due to limited personnel and lack of public relations. (Office of Emergency Medical Service System Ubon Ratchathani, 2013)

Based on the above limitations, Ubon Ratchathani Provincial Administration Organization sought a coalition to help organize the system to be clearer, based on the Act establishing plans and procedures for decentralization to local government organizations, B.E. 2542 (1999) (Act establishing plans and procedures for decentralization to local government organizations, (Government Gazette, 1999). Vol.116, Part 114 Kor. (Dated 17 November 1999).). Section 16 (19) provides that the Pattaya Municipality and Subdistrict Administrative Organization have the power and duty to organize public service system for the benefit of their own local people regarding public health, family health and medical treatment, and Section 17 (19) prescribes that the Provincial Administrative Organization has the power and duty to provide provincial hospital, medical treatment, prevention, and control of communicable diseases. Ubon Ratchathani Provincial Health Office has created a collaboration between the Ubon Ratchathani Provincial Administrative Organization,

the Ubon Ratchathani Provincial Public Health Office, and the National Health Security Office. In 2006, they jointly developed a project to develop an emergency medical service system in Ubon Ratchathani Province to commemorate the occasion of His Majesty King Bhumibol Adulyadej's 60th anniversary and set a goal to develop an emergency medical service system to cover the area of Ubon Ratchathani Province to provide services to people with ailments thoroughly, including the organization of incident notification system, personnel development to meet the standards, have stable life, able to work, have stable income, have a sustainable management system. An emergency ambulance had been provided to meet the standard for transporting patients by establishing "Chalermraj 60 Years Paramedic Rescuers" in Ubon Ratchathani Province, and a memorandum of cooperation in managing the emergency medical service system in Ubon Ratchathani Province. Ubon Ratchathani Province had assigned the Ubon Ratchathani Provincial Public Health Office to be a unit to support the administration of the emergency medical service system for continuous development, providing a service unit to cover the public service thoroughly, supervise emergency medical standards and control the operation of the Ubon Ratchathani Emergency Operations Unit. The National Health Security Office provided budget support to support the emergency medical service system in Ubon Ratchathani Province by paying in advance as compensation for emergency medical services according to actual workload and developing an emergency medical service system. The Ministry of Public Health was responsible for academic development and human resource development including monitoring and evaluation to continuously develop the emergency medical service system of Ubon Ratchathani Province and to manage the Emergency Medical Command Center. Ubon Ratchathani Provincial Administrative Organization supported emergency ambulances with equipment by helping to provide enough rental vehicles to the sub-district emergency operations unit to provide people with equal quality service and across all areas 24 hours a day. People call the service mainly via number 1669, together with the Ubon Ratchathani Provincial Public Health Office organized a training for volunteers from the sub-district using the 110-hour EMT-B basic emergency medicine course (or equivalent to medical emergency workers (Currently Emergency Medical Technician: EMT) and registered as Basic Emergency Medicine Operations Unit. As a result, the number of

operations increased exponentially and increased the number of incident operations from thousands a year to tens of thousands a year (Ubon Ratchathani Provincial Administrative Organization, 2013). It was considered the first successful step in cooperative cooperation, by organizing a cooperative meeting with local leaders to create awareness, understanding to jointly define the management model of the emergency medical service system in Ubon Ratchathani, both in terms of budgeting, personnel, supplies and management of emergency medical services and emergency medical systems.

The Ubon Ratchathani Provincial Public Health Office requested the use of the area around the OTOP Center of the Provincial Administrative Organization of the Provincial Administrative Organization of Thailand as the location of the provincial administrative and emergency call center. For incident reporting staff, using the personnel of the Provincial Health Organization to receive notification only in the event of an accident or emergency illness. However, it was found that several people called 1669 to seek help in other areas that were not an accident or emergency illness, which the Provincial Health Organization could not provide the assistance that the people needed. For this reason, the Provincial Administrative Organization had arranged personnel of the Provincial Administrative Organization to join in the work and help answer the telephone calls at the incident call center to help solve problems and alleviate the problems of the people calling in 1669 from other causes that are not the case of emergency illness. Later, Ubon Ratchathani Province established the Ubon Ratchathani Province Emergency Service Coordination Center, which provided Integrate Emergency Management I-EMS by using the number 1669 to notify the emergency, fire, accident, emergency, bring loved one's home (Bring the terminally ill patients back to death at home) to provide timely service to the public, 24 hours a day, with a location at the OTOP Center, Ubon Ratchathani Provincial Administrative Organization.

When there was the Emergency Medicine Act 2008 (Emergency Medicine Act 2008. Government Gazette Vol.125, Part 44 Kor. (Dated March 6, 2008). Section 33, paragraph 2, has stipulated that the Emergency Medical Board supports and coordinates the local government organization to establish rules for a local government organization to operate and manage the emergency medical

system at the local or area level, with the National Emergency Medical Institute to pay compensation for incidents based on the number of actual operations performed. The NIEM then went to the area to talk and persuade the Chief Executive of the Ubon Ratchathani Provincial Administrative Organization to manage the incident notification and command center. The Chief Executive of Ubon Ratchathani Provincial Administrative Organization saw that the emergency medical service system of the Provincial Administrative Organization was another important channel to respond to the health policy of the local government organization. It does not overlap with the missions of the central government and the regional public health authorities. Rather, it would fill a gap and connect people with access to public health services. And Dr. Ubon Ratchathani Provincial Physician agreed that the Ubon Provincial Administration Organization has the potential for budget and personnel that can manage the provincial emergency call center, to alleviate the burden of regional public health, help people get better services, and willing to transfer the mission to PAO. Ubon Ratchathani Provincial Administrative Organization therefore accepted the transfer of the mission of the Ubon Ratchathani Provincial Public Health Office from the Ubon Ratchathani Provincial Public Health Office and had operated a full management of emergency call center since May 19, 2014. This is the first local government organization in Thailand to receive the transfer of this mission and provide the Integrate Emergency Management System (I-EMS) service by using the service number 1669 in emergency notification, Fire, Accident and Emergency Service to the public 24 hours a day and direct to the operating unit in the Ubon Ratchathani Province Emergency Medical Service Network to issue an incident to help people (Head of the Emergency Call Center, Ubon Ratchathani Province, personal communication, September 25, 2019).

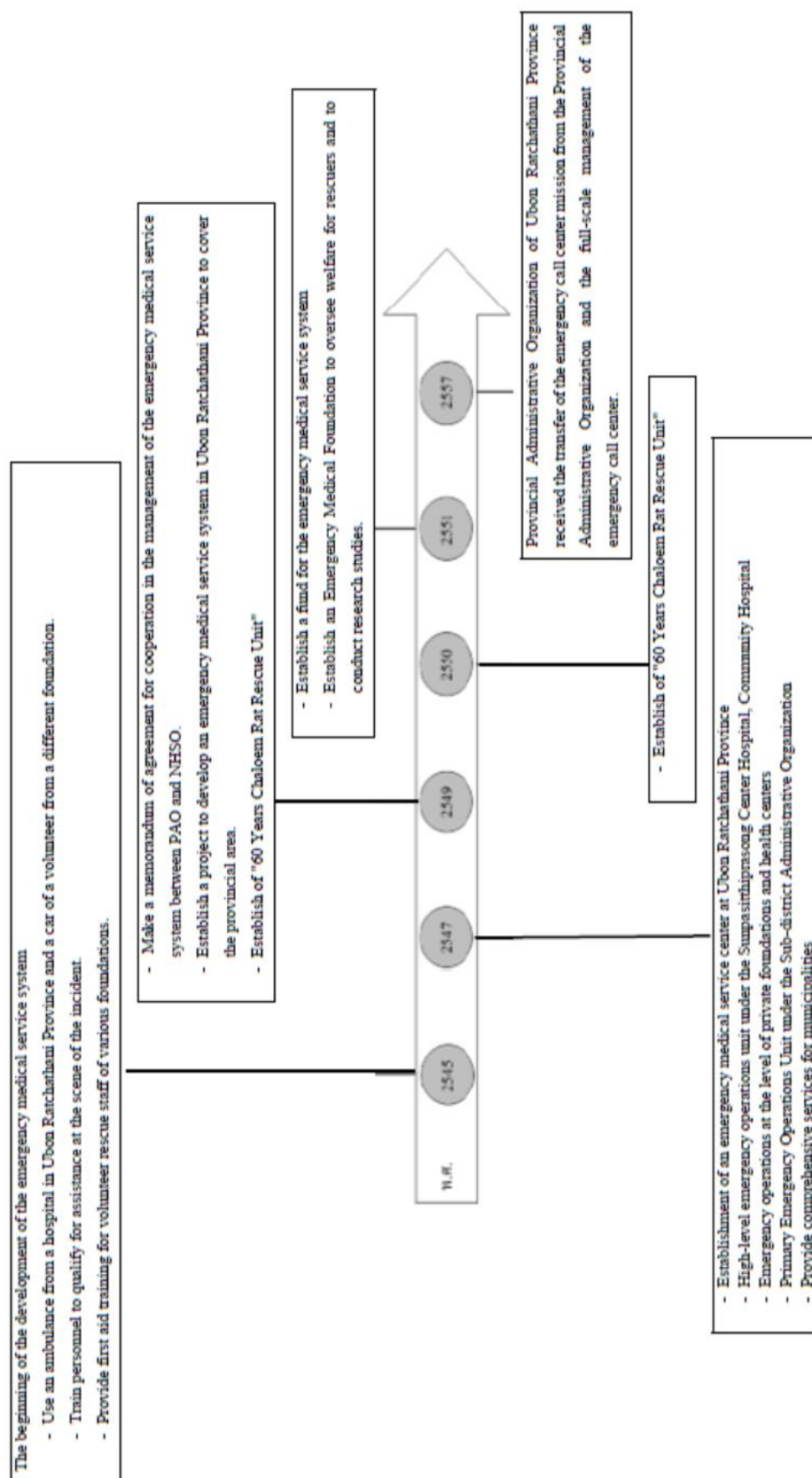


Figure 5.21 Development of Emergency Medical Services in Ubon Ratchathani in Chronological Order

2) General Conditions about the Emergency Medical Service Process of Ubon Ratchathani Province.

Ubon Ratchathani Province began to develop the emergency medical service system in 2002 with Sunpasitthiprasong Hospital as the host to provide support, which was the beginning of the development of a medical service system that was a model of Ubon Ratchathani Province. Dr. Wuttikrai Moongmai, former medical doctor at Ubon Ratchathani Province, saw the importance of providing emergency medical services to help people cover the entire area of Ubon Ratchathani 24 hours a day. In which, providing such an effective emergency medical service, regional public health, whether it is a Provincial Health Organization or a hospital, cannot be operated alone, but requires cooperation from the local government organization and the National Health Security Office to support and join in the process.

In 2006, Dr.Wuttikrai persuaded Mr. Pornchai Kowsurat, former Chief Executive of Ubon Ratchathani Province to invest in infrastructure such as ambulances, building equipment, a command center, and several rescuers. Then, the Ubon Ratchathani Provincial Administrative Organization provided emergency ambulance support to various operating units in Ubon Ratchathani Province by continuing to operate the emergency operation vehicle rental program. And in 2012, the Ubon Ratchathani Provincial Administrative Organization took part in the emergency medical operation by establishing an emergency operation unit. “Koon Na Tham resuscitation” Currently, Ubon Ratchathani Provincial Administrative Organization has operating units with ALS and BLS class emergency ambulances to provide assistance to emergency patients with red and yellow-green violence, respectively.

Governor of Ubon Ratchathani Province Recognizing the importance of the development of the resuscitation service system, preparing for emergency response, and helping the victims correctly, considering providing emergency medical treatment for injured and sick people at the scene before delivery to the hospital (Emergency Medical Service) is a basic service that people should receive. Therefore, there is a policy to operate 1 Tambon, 1 Paramedic Unit and expand the emergency medical service network into the local area covering all sub-

districts. And the Ubon Ratchathani Provincial Administrative Organization responsible for procuring pickup trucks converted to an emergency ambulance with life-saving equipment to the network causing Ubon Ratchathani Province to have an emergency operation unit quite covered in the area.

In 2014, the Ubon Ratchathani Provincial Administrative Organization received the transfer of the Ubon Ratchathani Provincial Public Health Office from the Ubon Ratchathani Provincial Public Health Office, the first provincial administrative and incident notification center in Thailand to operate, managed by the Provincial Administrative Organization, which was an emergency call center for all events, apart from just emergency medicine. It provided an integrated public service under a system called the Integrate Emergency Management System (I-EMS). Communication technology infrastructure had been established so that people can access quickly, easily, and conveniently via fixed-line telephone, receiving 1669 calls from the original 8 lines to 50 lines, equipped with two-line telephone recorders, regular telephone lines, control systems and facilitating the use of telephones through a control cabinet. Automatic PABX (PABX) Hybrid IP PBX PABX system records telephone numbers and conference calls, linking to other external numbers such as 191 (police), 1129 (electricity). People can report other emergencies, power failure services, fires, as well as seek resuscitation, rescue in various fields, consultation on health issues, return home deportation of the terminally ill (Bringing the lover one home project), all together in only one 1669 phone number, 24 hours a day.

Ubon Ratchathani Emergency Medical Operation Operated under the Ubon Ratchathani Province Emergency Medicine Subcommittee by Order of the Ubon Ratchathani Emergency Medical Subcommittee No. 4204/2557 dated October 29, 2014, totaling 21 persons with 3 years position period consisting of the Governor of Ubon Ratchathani Province, as the chairman of the subcommittee, the Chief Executive of the Ubon Ratchathani Provincial Administrative Organization and the commander of the Royal Thai Army 22 as the Deputy Chairman of the Subcommittee, Commander of 21st Air Force 21, Commander of the Ubon Ratchathani Provincial Police, Commander of the 22nd Border Patrol Police, Head of the Disaster Prevention and Mitigation Office, Director of Sanphasitthiprasong Hospital, Director of Sanphasitthiprasong Camp Hospital, Ubon Ratchathani Province, Director of the

National Health Security Office Region 10, Mr.. Suraphon Saipan, Mr. Prasop Sarasak, Pol. Pol. Prathib Kijwattana, Sen. Denruek Kulbut, Public Relations Provincial and provincial telephone as a subcommittee, provincial health physician as a subcommittee and secretary of medical practitioner (Preventive medicine), Provincial Administrative Organization as Subcommittee and Assistant Secretary, Director of the Quality of Life Promotion Division, Ubon Provincial Administrative Organization, Head of Public Health Promotion Department, Ubon Provincial Administrative Organization and Head of System Group Emergency Medical Service, Ubon Provincial Administrative Organization, Assistant Secretary as shown in Figure 5.22.

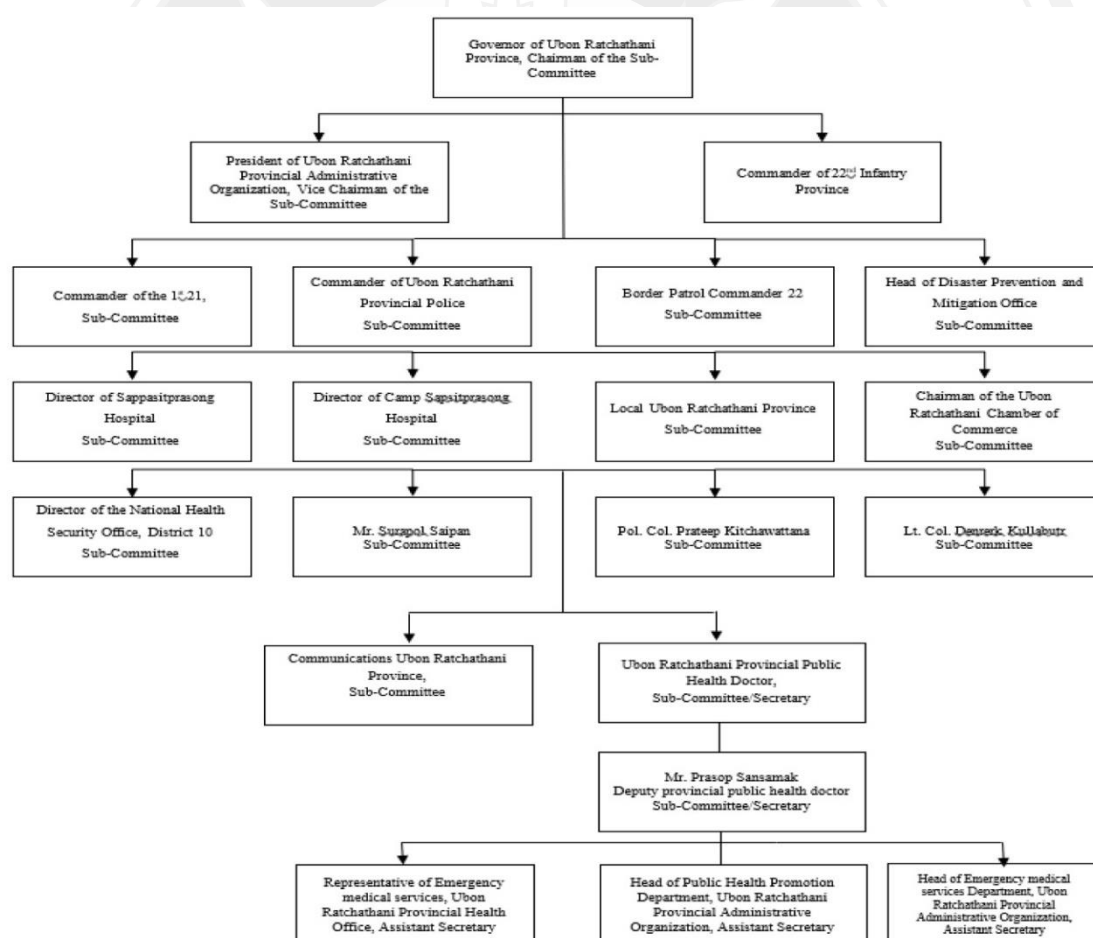


Figure 5.22 Subcommittee of Emergency Medicine, Ubon Ratchathani Province

Source: Adapted from Ubon Ratchathani Provincial Emergency Medical Subcommittee Order No. 4204/2014.

The Ubon Ratchathani Provincial Public Health Office separates the emergency medical service system development from other groups to be responsible for managing the emergency medical system in the province. And under the Emergency Medical Service System Development Office, Ubon Ratchathani Province Public Health Division, divided into internal sub-divisions into emergency and disaster medicine work, working on the quality control of the Ubon Ratchathani Province's rescuers and the Emergency Medical Foundation of Ubon Ratchathani Province to have a standard of practice in helping people to have safety and to reach the hospital correctly.

Provincial Health Office has set a policy, directions for emergency medicine operation at the provincial level, with a clear vision at the provincial level that people receive emergency medical services in case of emergency illness under the concept of system development as follows: 1) People can use the service 24 hours a day 2) The emergency medical service system is sustainable 3) Workers can work as a career 4) Local participation.

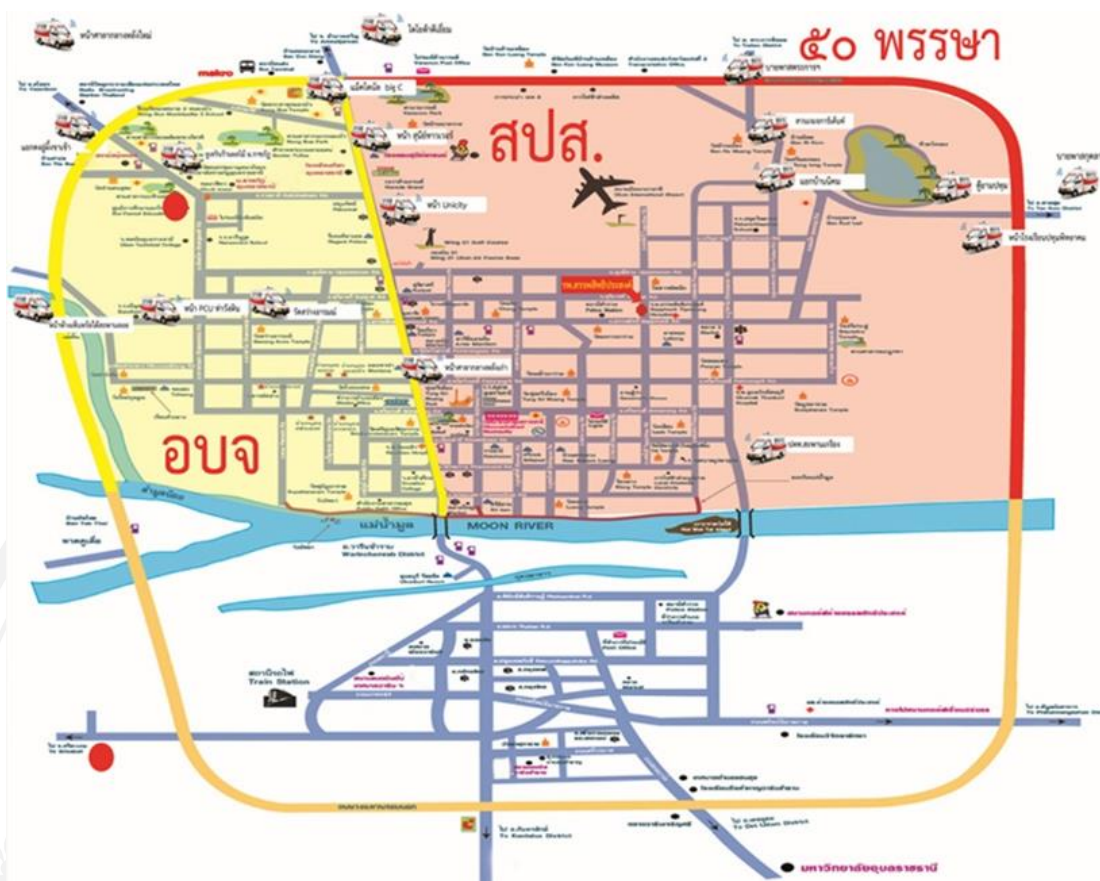
Policy and operating guidelines formulation as well as planning in the first phase will be mainly based on the meeting of the Ubon Ratchathani Emergency Medical Service System Executive Committee, which has a meeting 2-3 times a year, but at present it will be once a year. The operation of the provincial emergency medical service is a systematic nature, with the main person responsible for the provincial emergency medical services to coordinate and develop the system. The Provincial Emergency Medical Service System Development Committee has been appointed, consisting of representatives from all registered rescuers, and has a monthly working group meeting to acknowledge the direction of the work plan as well as jointly create regulations, set indicators, monitor the performance of all units, report problems, find solutions, including exchange knowledge and propose new ideas for development.

The Provincial Health Organization is responsible for the registration of service units and operating units in accordance with the regulations of the Provincial Health Organization, with registrations every 1 year, and requires personnel in the emergency medical system to undergo recurrent training,

development of the internal information system in emergency ambulance tracking and able to view ambulance locations through the website (Geographic Information System: GIS Tracking).

In standardization and quality control, the service unit / operating unit conducts 3 standard audits as follows: 1) Personnel by testing their operational skills in recurrent training to renew the operating contract each year. 2) equipment, tools and ambulances. 3) Standard set of operations by supervising and monitoring the unit twice a year.

Ubon Ratchathani Provincial Administrative Organization organizes a monthly meeting to communicate information, inform updates and change in the system, and jointly solve problems that arise among all rescuers in Ubon Ratchathani Province on a monthly basis, and organize training for review knowledge to all emergency medical workers and emergency medical volunteers in Ubon Ratchathani Province, with the requirement that all medical emergency workers and medical emergency volunteers be reviewed and rehabilitated in the provision of emergency medical services at least once a year.



PAO (อบจ) = Ubon Ratchathani Provincial Administrative Organization

SSO (สปปส.) = Sappasitthiprasong Hospital

50 Year (50 พรรษา) = Year, The 50th Anniversary Mahavajiralongkorn Hospital

Figure 5.23 Map of Areas Responsible for High-Level Emergency Operations in Muang District, Ubon Ratchathani Province (PAO = Ubon Ratchathani Provincial Administrative Organization, SSO = Sappasitthiprasong Hospital, 50 = Year, The 50th Anniversary Mahavajiralongkorn Hospital)

Source: Ubon Ratchathani Province Emergency Medical Operation Documents.

3) Ubon Ratchathani Provincial Administrative Organization in collaboration with Ubon Ratchathani Provincial Public Health Office organizes emergency medical service areas covering the entire province, by defining an area for emergency medical services for ALS-level paramedics in Muang District, which is the area responsible for the organization. Administration of Ubon Ratchathani Province,

Sanphasitthiprasong Hospital and the 50th Anniversary Mahavajiralongkorn Hospital, as shown in Figure 5.23, and the distribution of rescuers at the level of FR, BLS and ALS to cover all sub-districts in Ubon Ratchathani Province, along with a map showing the parking spots and areas in the responsibility of every unit, published on the website of the Provincial Health Office In order for all people to be informed and to increase their confidence in using the service as shown in Figure 5.24.

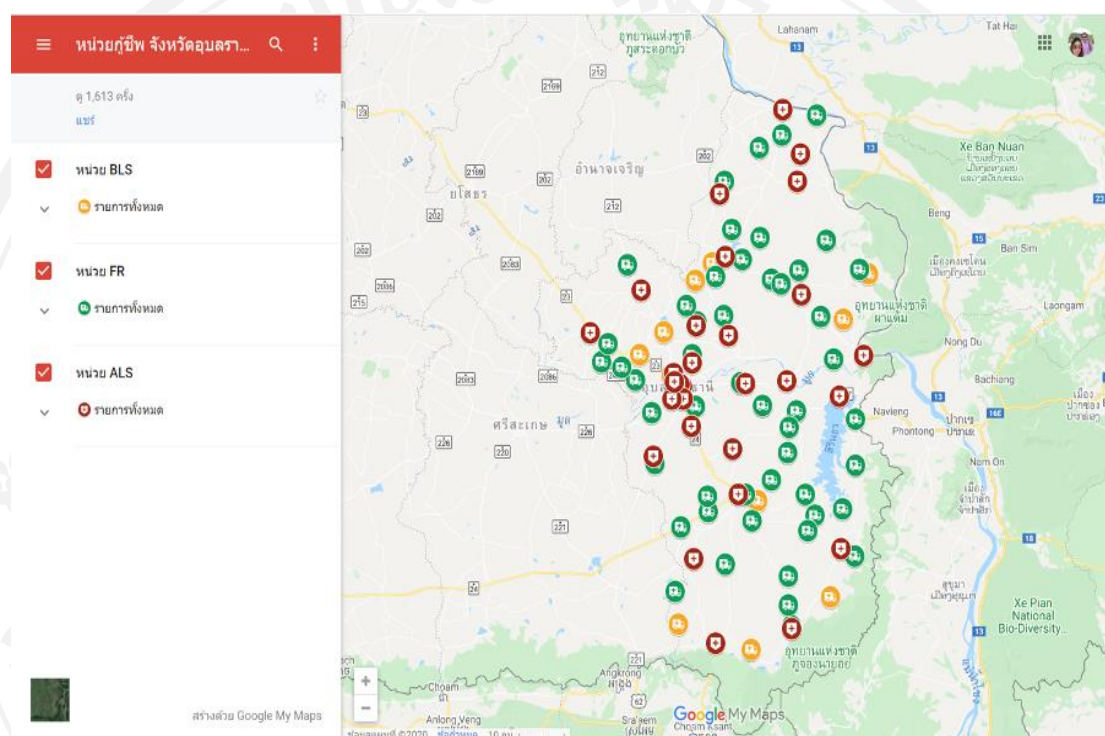


Figure 5.24 Map Showing the Distribution of Rescuers at the FR, BLS and ALS Levels of Ubon Ratchathani Province

In 2015, Mr. Pornchai, former Prime Minister of the Ubon Ratchathani Provincial Administrative Organization, was dismissed from office due to the Office of the National Anti-Corruption Commission (NACC) and the Office of the Auditor-General (OAG) found guilty data in the case of procurement, and in 2016 was guilty of the purchase of rescued motorcycles, and the OAG oversaw the issue of renting an emergency ambulance. Therefore, the Ubon Ratchathani Provincial Administrative Organization has changed the method of procuring emergency ambulances from using the rental method to using the purchase method. The purchase

must be organized and find the middle price, so it takes time to procure, resulting in the number of emergency ambulances in Ubon Ratchathani Province declining and insufficient for service and contributing to the operating results in the emergency medical service in Ubon Ratchathani Province has decreased.

“OAG came to check and said that renting an ambulance was in violation of regulations, so we had to change to use the method of purchase. Buying is not easy. The royal government does not have a medium price, so we must find a regulation. There should be a middle price for us. Creating a new project is a waste of time. So, the ambulance was lacking. Really, it is better to rent. No need to be responsible for Maintenance. Repairing will require quite a bit of money. If we rent when it is old, we change, that's it.” (Acting on behalf of the Chief Executive of the Ubon Ratchathani Provincial Administrative Organization, personal communication, September 26, 2019).

“Now it is impossible to rent an ambulance car, so we have to buy. As I said before, how many ambulances must have this year? Which hospitals must be, which SAO we must give, so now we cannot? We are now lacking ambulance. Causing many places to be unable to go out to work, so the results are not so good now. I like to rent it because the car is always new. They will take care of the whole set of tools and equipment. If you buy it, it must be used until it is old and cannot be repaired until you buy a new one. We are workers, old cars, old tools, we have a hard time working.” (Registered Nurse, Head of the Rescue Unit, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 25, 2019).

From the above information, it can be concluded that the emergency medical service of Ubon Ratchathani Province began with the importance of the emergency medical system of former doctors, Ubon Ratchathani Provincial Public Health Office. Dr. Wuttikrai aimed to create an emergency medical system in Ubon Ratchathani province to have a standard. The first phase used resources from agencies under the public health department, including the Ubon Ratchathani

Provincial Public Health Office, State Hospital and Sub-district Health Promoting Hospital for management. Later, only agencies under the Provincial Public Health Department could not organize emergency medical services for all people in the Ubon Ratchathani area to receive services effectively due to inadequate budget, personnel, emergency ambulance and assistive equipment for lift support, so it was necessary to create a network of cooperation between various organizations in Ubon Ratchathani Province, therefore began to persuade the provincial administrative organization leaders to provide support for ambulance vehicles and equipment in order to have rescuers covering all sub-districts and sufficient to serve all citizens in Ubon Ratchathani Province. Local government organizations in each district are encouraged to set up a rescuer, and the National Health Security Office to support the budget. Causing the local administrative organization in Ubon Ratchathani Province to be greatly involved in the provision of emergency medical services, until the responsibility of the Ubon Ratchathani Emergency Call Center was transferred from the Provincial Administrative Organization to the Ubon Ratchathani Provincial Administrative Organization, which constituted the participation of the local government at the highest level in the provision of emergency medical services. In addition, Dr. Wuttikrai also set up a system to communicate and create participation in the system implementation to express opinions, discuss, and jointly solve problems that arose between personnel and departments in the emergency medical service network in Ubon Ratchathani Province through a joint meeting every month, which was an important mechanism for Network strengthening, but later when the provincial health office doctor changed, it was found that the system to strengthen the network and the meeting was reduced.

5.3.1.2 Emergency Medical Operation Unit of Ubon Ratchathani Province

1) Emergency Medical Operation Unit, Operating Director

Type

The mission of Ubon Ratchathani Province Emergency Medical Operation Unit or the Provincial Office of Emergency Management was transferred from the Ubon Ratchathani Provincial Public Health Office to the Ubon Ratchathani Provincial Administrative Organization since May 2014, which is

considered a center to notification and order of the first provinces in Thailand operated and managed by the Provincial Administrative Organization, which was an emergency call center for all events apart from emergency medicine alone. It provides integrated public service under the system called Integrate Emergency Management System (I- EMS). People can report other emergencies, power failure services, fires, as well as seek rescue assistance in various areas, counseling on health issues, repatriation of the terminally ill at home (Project Bringing the Love One Home) all together in only a single 1669 number, 24 hours a day, located at the OTOP Center, Ubon Ratchathani Provincial Administrative Organization. Emergency Medical Operation Unit, Operating Director Type of Ubon Ratchathani Province is considered a high level (Announcement of the Emergency Medical Commission on Type, Level, Authority, Scope of Responsibility and Limitations of the Operational Unit, classified emergency medical operations unit is divided into 3 levels: basic, advanced and consultant level, Government Gazette, 2019), which conducts operations for receiving notification, coordination, dispensing and supervising and monitoring both the general director and direct supervision at any time in order to allow emergency patients to receive medical practice., and advance according to the criteria, methods, routines and medical orders

Since the Ubon Ratchathani Province incident notification center is under the management of the Ubon Ratchathani Provincial Administrative Organization which has the mission of serving the people, the Ubon Ratchathani Province incident notification center therefore receives all kinds of reports including accidents, emergency illnesses, the water does not flow, the power goes out, the oil runs out, catches a snake, brings back the terminally ill patients at home, etc. When an emergency worker trained in the Emergency Medical Staff (EMT) course (but not trained in the Emergency Sickness Responder and Emergency Operations Coordinator) receives the call, he or she will distinguish it as an accident or illness. Is it emergency? If it is an accident or emergency illness, he will ask for more information with the standard 7 questions: what is the symptoms?, what is the condition?, where is it?, what is the phone number?, ask for the contact number, name of the informant, Is the patient conscious?, Is the patient breathing normally or not for triage patients according to the Criteria for Severity Level of Patients of the

Emergency Medical Institute. If the patient is in a critical emergency, such as sudden loss of consciousness, convulsions, respiratory distress, high-speed traffic accident, death of the patient, the red code will be given, and the high-level ALS operator will issue an accident. If the incident site is in a remote area or there are no rescuers in the parish, the center will direct the BLS base level operations near the dual incident site to reach the patient and provide first aid assistance first. While waiting for the operations unit to arrive, the center will provide first aid instructions to the caller, coordinate the ALS and BLS operations to arrange transfer points, and coordinate the destination hospital to prepare for receiving the patient. If the call to 1669 is not an emergency, the staff will switch the call to one of the non-emergency responders, which is located at one point in the center, and is also a consultation point because it is a call that takes time to talk, and has a radio station employee who is responsible for listening to emergency communications via radio communications from volunteers other than notified by telephone 1669 to carry out emergency assistance. (Registered nurse, Head of the emergency call center, Provincial Administrative Organization of Thailand, personal communication, September 25, 2019).

If a relative of an emergency patient reports an incident by making a direct telephone call to a hospital or paramedic, that hospital or paramedic must return to the emergency call center every time to request an incident number in the event of being in responsibility. But if the scene is outside the area of responsibility, the command center will dispatch the work to the responsible operating unit in that area. When the operative reaches the site of the incident, it will report the situation and symptoms of the patient back to the center. The center staff will then coordinate the hospital at the destination to receive the patient to prepare to wait for the patient. The process of receiving incident notification and dispensing work in Ubon Ratchathani Province is shown in Figure 5.25.

Process of receiving incident notification and work dispatching, Ubon Ratchathani Province

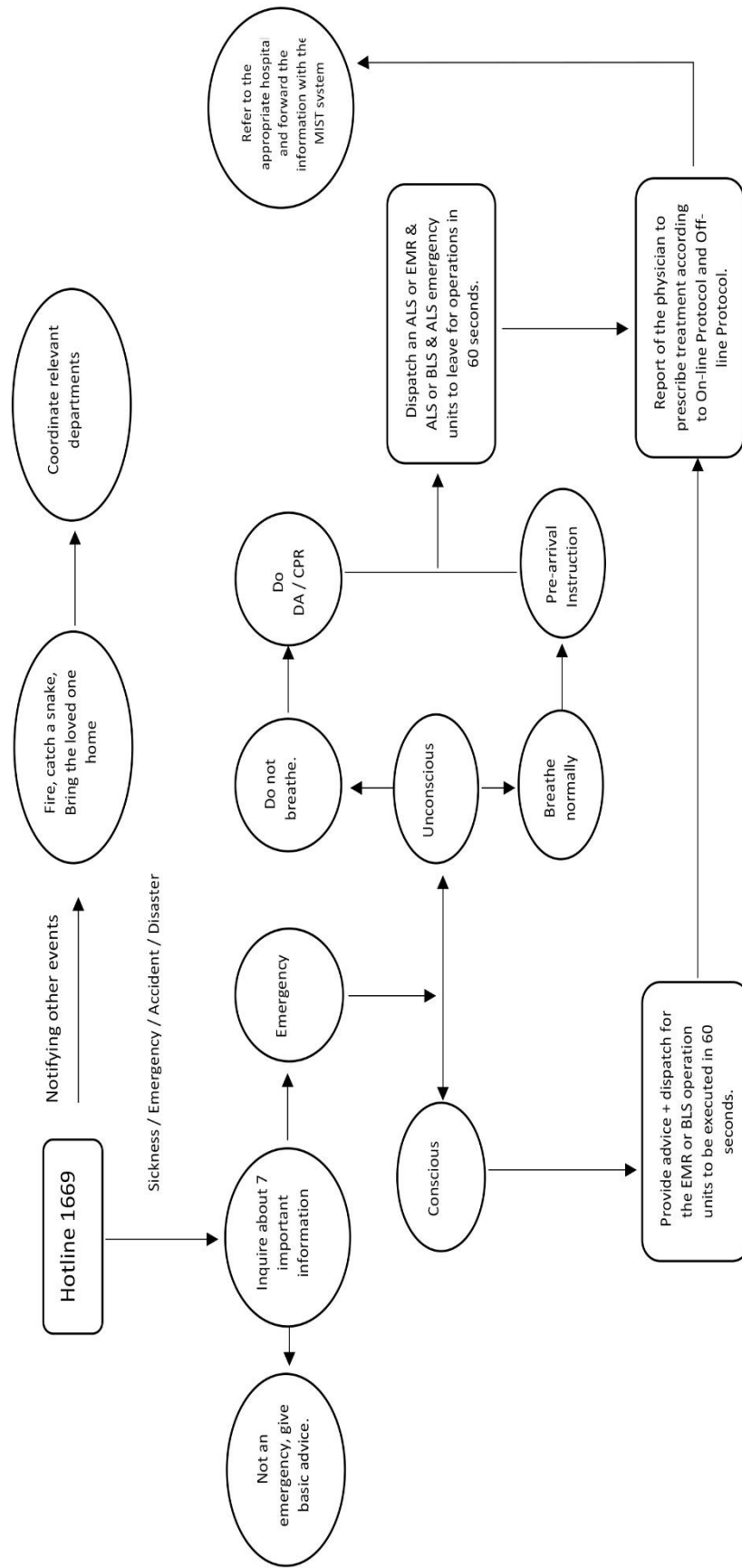


Figure 5.25 Process of Receiving Incident Notification and Work Dispatching, Ubon Ratchathani Province

Within the Emergency Call Center, there are complete information equipment as required by the NIEM. There are 50 telephone lines, 5 radio communication systems. Every time an incident is received and ordered, the center will record this information in the ITEMS of the NESDB and Google Drive to collect and communicate information to all personnel in the center to acknowledge.

Personnel in the emergency call center have good relationship with personnel in every operating unit. Command communication is carried out with caution in words so that the operatives do not feel that they are being commanded. Ordering the operating unit to operate will avoid using the word “order” in order not to make the unit feel that the center is the boss or has superior authority over the operating unit but will use the word “dispatch” instead.

“Even if the center was moved to the Provincial Administrative Organization, there was no problem. We have no problems with volunteers or rescuers. When we order rescuers, they cooperate well. When giving orders, we will never use the word “order”, instead we will use the word “dispatch” because otherwise he will feel that we have ordered “. (Registered nurse, head of the emergency call center, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 25, 2019).

“When using the radio to call the rescuers, I never used the word “order”, we couldn't order them. They did not think that we could go and order them, we assumed that we “dispatch”. We work in a network together, work together, we are friends, brothers and sisters.” (Emergency call center staff, emergency medical and emergency dispatch center, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 25, 2019).

When deciding to order an operative, usually choosing an operating unit within 10 km and a maximum distance of about 30km, where most ALS-class ambulances can reach the scene within 8 minutes. PAO has set up a network of BLS emergency parking spots of the PAO, distributed in all areas in the district of Muang District, all 4 stops for officers to board there. 4 points still of the

PAO is not enough, but at present, the PAO has only those emergency vehicles for service. When assisting the patient has been delivered to a medical facility, the center's work will end with recording and storage as well as receiving the operational report of the operations team. (Head of the emergency call center, Provincial Administrative Organization of Thailand, personal communication, September 25, 2019).

The personnel at the Emergency Call Center consists of the emergency call takers, the dispatchers of the operating units, the emergency patient assistance coordinator, the operations supervisor, and medical director. The medical director will be at the hospital (Not stationed at the center), connected to the communication and information coordination system with the ITEMS system. In the Emergency Call Center, Ubon Ratchathani Province, there are 12 8-hour turnover personnel, 3 turns per day. Summarized in Table 5.10, there are always 2 nurses on each duty, with 6 Call Takers and Dispatcher at the point of receiving incident reports by telephone through the hotline 1669. After receiving notification and ordering an operating unit that is close to and suitable for the emergency patient to assist the patient at the scene of the incident, it will be forwarded to the coordinator, which has two points to coordinate with the operation until the patient can be sent to the hospital successfully by using radio communication system and telephone. There is a Supervisor overseeing all staff in the center, including coordinating with doctors at the hospital for a Medical Consultant. In addition to developing a long-distance communication system (Telecommunication) and in case of critical emergency patient, it will coordinate to the medical director at the hospital through the telecommunication system of telemedicine. The Provincial Administrative Organization's advanced ambulance has a machine that can send heart waves, vital signs, and blood oxygen. At Sanphasitthiprasong Hospital, there is a 24-hour doctor-director and there are specialists on duty, ready to provide medical assistance through the said telemedicine information system (Registered nurse, head of the emergency call center, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 25, 2019). The personnel structure of Ubon Ratchathani Emergency Call Center is shown in Figure 5.26.

Table 5.10 Arrangement of the Rate of Operation at Ubon Ratchathani Emergency
Call Center

No.	Operation	Morning Shift 8:00-16:00	Evening Shift 16:00-24:00	Night Shift 24:00-8:00 (Persons)
		(Persons)	(Persons)	
1	Medical Director	1	1	1
2	Supervisor	2	2	1
3	Emergency Medical	1	1	1
4	Dispatcher	1	1	1
5	Co-Ordinator	7	7	5
	Call Taker & Dispatcher			
	Total (Person)	12	12	9

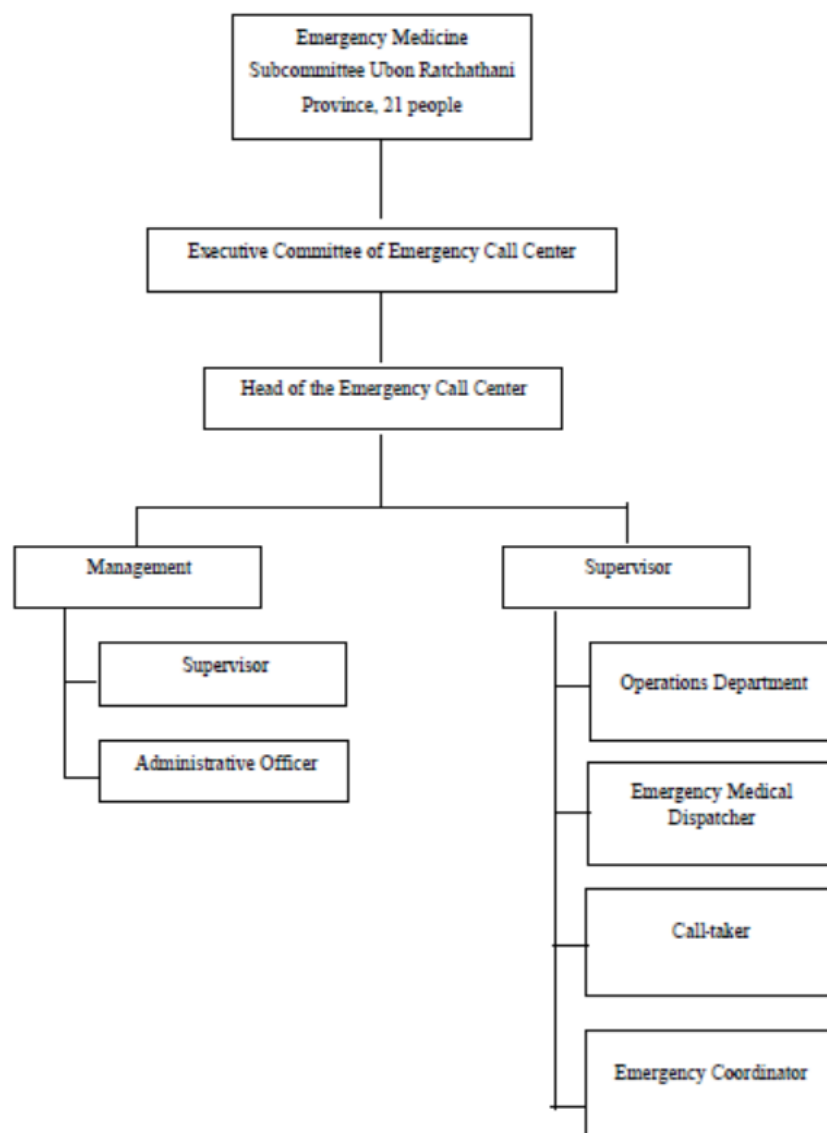


Figure 5.26 The Personnel Structure of Ubon Ratchathani Emergency Call Center
Source: Ubon Ratchathani Provincial Administrative Organization (2020).

The administration of the center implements on the policy of the Chief Executive of the Ubon Ratchathani Provincial Administrative Organization, namely “there is no denying the public assistance request. Consider the feelings of the people as the main” The call taker must answer questions with a focus on the feelings of the people. When assistance is requested, efforts must be made to assist

all patients. Always keep in mind that the people who call in are in trouble and call in for help. PAO must be dependable to the people. (Registered nurse, head of the emergency call center, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 25, 2019).

The emergency medical work structure of the Ubon Ratchathani Provincial Administrative Organization has established a department responsible for emergency medicine under the Division of Public Health and Environment, with the presence of civil servants, employees, hiring workers and other officials who perform emergency medical work according to the standards for determining the position of the local government organization: (1) 1 Medical Director, who is an emergency medicine physician of Sappasitthiprasong Hospital, 2 people alternating up a duty, 1 person each time, not sitting at the center. Use the on-call method when caring for the sick person. (2) 2 Supervisors (3) 15 Emergency Medical Dispatchers (4) 4 Co-Ordinator (5) 27 Call Takers & Dispatchers. Of these, there are hiring nurses or medical emergency workers who work regularly in community hospitals who want to earn extra income, alternate on duty to receive emergency reports, dispatch emergency medical services and provide emergency assistance to the people in the free time from routine operations since the number of permanent employees of the Provincial Administrative Organization is insufficient. All Operators receive a Certificate of Emergency Operations, Type of Operations Director, and are renewed. The Ubon Ratchathani Provincial Administrative Organization defines the roles and duties of personnel within the emergency call center according to the personnel structure standard of the emergency call center. Head of the emergency call center, the position of Head of Public Health Promotion Department (Primary Health and Environment Manager) has duties and responsibilities in 4 areas: Planning, Administration, Human Resource Management, and Resource and Budget Management.

Planning: The head of the emergency call center has the duties to jointly define the vision, mission, strategy, and direction goals to plan and prepare a project plan for the development of the notification and command center, join in planning work, projects, or work plans of the center, including goals and achievements, monitor and expedite activities in accordance with plans, projects, or

operational plans. Evaluate and report on the implementation, joint planning and formulating public health policy in the area. Join in planning the study, analysis and suggesting guidelines for setting and developing standards and strategies for implementation to improve work processes to be efficient under budget, personnel, and time constraints. Research and apply new technologies or knowledge related to the work in the mission of the organization to improve the work, work systems or work processes. Make a public service plan and process it. Analyze job-related statistical data in accordance with the problem.

The head of the emergency call center duties consist of organizing the work system of the center and the operational procedures for the official practice of the officers, assign, supervise, inspect, follow up, make recommendations, improve in various matters involved. Consider approving, allowing the actions to be taken in accordance with the responsibilities of the mission to achieve the intended goals. Contact and liaise with government agencies, private organizations, and related persons for cooperation or integration. Clarify facts, give opinions, suggestions at the appointed meetings of the committees and working groups. Assign, inspect, monitor, advise, improve, correct, and supervise the service of the emergency call center to facilitate the people to receive fast, standardized, and accurate services. Contact and liaise with government agencies, private organizations, and related persons to achieve cooperation. Determine the management policy of the emergency call center and support for the implementation of research studies to develop standards and use them in their operations. Propose guidelines, determine the development of standards and operating methods of the notification center and order to ensure quality by adhering to good management principles. Organize a system for monitoring, evaluating performance as well as analyzing benefits, impacts, problems, obstacles to support or make improvements.

The head of the emergency call center has duties in human resource management, organizing work systems and staffing rates in the emergency call center and directing them in accordance with the mission, workload, and budget. Follow up and evaluate the performance of the officers in the supervisor, give advice, make recommendations, improve, and develop the performance of the officers in the command to have the capability and competencies that are suitable for the work

performed. Formulate and lay out the operational guidelines of the personnel in the notification center to be appropriate and flexible to the performance by assigning or delegating power to officers who have the characteristics of work consistent or support each other, able to perform work interchangeably in every position to make the operations flexible and continuity. Teach, develop performance, train, or transfer knowledge to subordinates to develop officers who have expertise and able to work for sustainable benefits.

In terms of resource and budget management, the head of the emergency call center is responsible for setting policies and planning the utilization of resources and budgets in accordance with the policy, mission, and goals of government agencies. Track, monitor the use of resources and budgets for efficiency, cost-effectiveness and in line with the set goals. Control, supervise, inspect the procurement of supplies to be transparent and correct to make the budget use worthwhile, to maximize benefits and to initiate, to innovate to be appropriate and efficient. Cooperate or plan and coordinate activities to use resources in terms of budgets, buildings, and work equipment to achieve efficiency, cost effectiveness and achieve goals.

Ubon Ratchathani Provincial Administrative Organization assigns the head of the emergency call center to be the head of the Public Health Promotion Department, which is the executive branch, giving an opportunity to advance in the career path, able to reach the level of specialization, making progress in occupation than head of emergency call center under the management of a hospital or provincial health office which is under the Ministry of Public Health.

“I was a nurse at the Provincial Health Office before since the center belonged to the Provincial Health Office. I worked in the emergency call center since then. When the center moved to the Provincial Administrative Organization, I also moved to the PAO to take care of the center. It is better to stay with the Provincial Administrative Organization here. I now have the position of C8 Specialist. If I am in the Provincial Health Office, I can only live with C7 or just expertise. The other head of the center at the center belongs to the hospital, he can only get C7.” (Professional nurse, head of the emergency call

center, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 25, 2019).

A supervisor working in a professional nurse position must have passed the emergency operations supervisor training program as approved by the organizational certification subcommittee and operator education and training program and providing a certificate or accreditation mark to prescribe educated or trained persons who must be appointed by the Emergency Medical Administrator or agreed or assigned by law or contract with the guidance of the Emergency Operating Physician with authority. The scope of responsibility and limitations are on directed by the director of medical orders or routine orders, as well as assist in the analysis, planning, formulating, and executing plans for emergency medical systems in the local or that area and the emergency operations of operating units and healthcare facilities. Control, supervise the operations of the workers in the emergency call center. Be a consultant and help solve problems that are beyond the potential of the director at all levels. Collect data, analyze research, and make recommendations for policies to senior management. Make a strategic plan, an action plan for the director, assign a schedule, assign duties to personnel in the reporting and command center at all levels. Coordinate with the Emergency Operations Physician. Manage the Risk Management of the Emergency Call Center. Manage disaster information and resources. Assist operators in the roles of the Emergency call taker, emergency coordinator and dispatcher of emergency operations. Provides accurate advice on how to sort out and advise workers at all levels of the center. Provide stress management advice to emergency call takers, emergency coordinators and emergency dispatchers.

Emergency Medical Dispatcher is responsible for dispatching and helping supervisors with authority, with scope of responsibility and limitations in directing, medical orders or routine orders, including helping to direct local emergency operations and the emergency operations of operating units and healthcare facilities. Assess, classify, and prioritize emergency illness severity. Provide advice on primary emergency care before the action units reach the scene. Take appropriate assistance in the event of an incident. Dispatch operations that are consistent with sorting, coordinating, and relaying medical orders from emergency medical director to

emergency responders. Control and supervise the operation to be in accordance with the orders of the emergency operating physician. Analyze the information, receive the incident report, record the dispatch information, help perform the duties of the emergency call takers and the emergency operations coordinator. Verify the correctness of receiving the incident and provide basic assistance advice to the incident reporter. Control, supervise, and assist the operations of the emergency call takers and the emergency coordinators. Provide advice on how to help incident reporters and emergency operation units. Provide stress management counseling to emergency personnel and emergency responders.

Co-Ordinator is responsible for coordinating with various agencies involved. Follow up on the performance of the operating units and related units until the end of the operation. Report coordination results to emergency dispatchers, record coordination information. Perform duties in the role of an emergency call takers when necessary, assisting with emergency operations.

Call Taker is responsible for receiving emergency sickness notifications, providing basic necessary advice to emergency callers, reporting information to dispatchers for appropriate action on the incident, recording notification and coordinating actions with emergency operation. There is a control and supervision of telephone notification of emergency call takers by professional nurses at the emergency call center and emergency medical director.

Most of the source of budget for the management of the emergency call center is received from the Provincial Administrative Organization, which the Provincial Administrative Organization of Ubon Ratchathani Province has set a budget for the management of the center, both as compensation, wages for physicians and nurses, wages for personnel, cost of equipment and communication tools, totaling more than ten million baht annually. Some budget, NIEM allocates from the Emergency Medical Fund in the part of the budget to support the operation according to the workload, by the Provincial Health Office, by sharing it to the center in proportion to the Provincial Health Organization: 50:50 But the budget of the PAO is sufficient to manage the center, and the money received from the NIEM is exceedingly small, so this money is not used.

“The budget used, is the money of the Provincial Administrative Organization. PAO has money, money from NIEM that has never been used. The first year that the center was relocated, 400,000 was not used. Last year it was only 500,000. It is little. I do not know what to use it for. I never used the money here.” (Head of Emergency Medicine, Ubon Ratchathani Provincial Public Health Office, personal communication, September 25, 2019).

Ubon Ratchathani Provincial Emergency Medical Call Center is the first incident reporting center managed by the Provincial Administrative Organization of Thailand. From the importance and continuous support of the PAO executives, they can operate, manage, and solve problems that arise, whether it is a system of coordination, personnel, and equipment until they have outstanding works, making it a place to study, visit for both domestic and international personnel. Every provincial administrative organization that is currently in charge of managing the emergency call center must study the operation process of the Ubon Ratchathani emergency call center. In addition, the Ubon Ratchathani emergency call center is also visited by the country's top executives such as the Prime Minister, Deputy Prime Minister, Minister of Public Health, Permanent Secretary, Ministry of Public Health. This creates great pride for the personnel of the Ubon Ratchathani emergency call center and the Ubon Ratchathani Provincial Administrative Organization.

“Our center is the first center of the Provincial Administrative Organization. Everyone must come and see the work here. Sa Kaeo Provincial Administrative Organization, Sarakham Provincial Administrative Organization, Songkhla Province Administration Organization Now that they take care of the center themselves, they must come to see the work here first. Both Thai people and foreigners come to see the work here. Prime Minister, Vice President also visited. Almost everyone in the Ministry of Health, including Mr. Piyasakon came. We also just welcomed Mr. Tu.” (Registered nurse, Head of emergency call center, Ubon Ratchathani Province, personal communication, September 25, 2019).

2) Emergency Medicine Operating Unit, Physician Operation Type

At present, Ubon Ratchathani Province has 4 levels of emergency medical operating units or out-of-hospital emergency medical operating units: The Advanced Life Support Units (ALS) (28 units), the Intermediate Life Support Units (ILS) (1 unit), Basic Life Support Units (BLS) (52 units), First Response Units (FR) (136 units). Government hospitals, private hospitals, Provincial public health office and provincial administrative organizations are responsible for emergency operations outside the hospital at the ALS level. The municipal foundation and the SAO are responsible for out-of-hospital emergency operations at the ILS, BLS and FR levels. With the planning of building a network of emergency medical services from former medical doctors in Ubon Ratchathani Province, former Prime Minister of Ubon Ratchathani Province saw the importance of providing emergency medical services and starting to establish “Khunnatham Rescue” in the year 2012, which was the first resuscitator of the Provincial Administrative Organization of Ubon Ratchathani Province. The paramedics of the Provincial Administrative Organization has been continuously developed. Originally there were only BLS and FR level rescuers to receive yellow and green patients, but to be able to assist red-level emergency patients within 8 minutes, PAO provided an ALS ambulance with professional nurses in issuing crisis-level emergency patients by zoning the service in the Muang district together with Sanphasitthiprasong Hospital and the 50th Anniversary Mahavajiralongkorn Hospital. It greatly improved the access to critical patients within 8 minutes. The death rate of emergency patients at the scene of an incident in the Muang district dropped from 2.43 percent to 1.41 percent, and an annual budget for 1669 ambulances was allocated. Until now, Ubon Provincial Administrative Organization has been able to set up one high-level ALS operation unit, and 4 BLS. (Deputy Permanent Secretary, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 26, 2019).

According to the policy of the former governor of Ubon Ratchathani, who wanted every sub-district to have at least one resuscitation unit and

the Provincial Administrative Organization to support emergency ambulance with life-saving tools and equipment to the state hospital, municipality, and the SAO, causing many local government organizations to participate in the organization of the rescuers. There are 56 percent of the local administrative organization registered to provide emergency medical services (133 local administrative organization), but at present, only 35 percent of the local administrative organization has actually issued their work (46 local administrative organization), due to Provincial Administrative Organization objected to regulations for emergency ambulance rental and emergency ambulance rental or budgeting for municipalities and Subdistrict Administrative Organization. PAO can no longer rent an ambulance, and must be changed to a purchase method, which requires time to find the middle price and make a purchase order. Many emergency ambulances have expired and are unable to replace them, leading to the lack of emergency ambulances and unable to operate. There was a distribution of the FR units package covering 57.27% of the district. The total number of emergency medical operations in Ubon Ratchathani Province was 219 units. Most of them belong to local government organizations, classified by their affiliation, shown in Table 5.11.

“Office of the Auditor General of Thailand said that renting an emergency ambulance by PAO is not a cost-effective use of the budget. Because if buying a car, it will belong to you, but if the rental contract expires, the car must be returned to the company.” (Registered nurse, Head of Emergency Call Center, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 25, 2019).

“As the Provincial Administrative Organization will give the SAO vehicle, it must be careful, it will violate the regulations again. OAG came to check and said, “why do you have to give a car to the SAO. It is already wealthy.”” (Acting for Chief Executive of Ubon Ratchathani Provincial Administrative Organization, personal communication, September 26, 2019).

“It is difficult to make a purchase. The NIEM did not have a medium price to us, so we must find a price ourselves. We have to find the middle price, and do the procurement causing the lack of many ambulances” (Acting for Chief Executive of Ubon Ratchathani Provincial Administrative Organization, personal communication, September 26, 2019).

Table 5.11 Number of Emergency Medical Operations in Ubon Ratchathani Province, Classified by Affiliation

Affiliate	Total	Percentage
Department of Medicine	2.00	0.91
Royal Thai Army Medical Department	1.00	0.46
Foundation / Association	31.00	14.16
Private Hospital	3.00	1.37
Sirindhorn College of Public Health	1.00	0.46
Provincial Health Office	1.00	0.46
Provincial Administrative Organization	2.00	0.91
Subdistrict Administrative Organization	120.00	54.79
Subdistrict Municipality	15.00	6.85
City Municipality	1.00	0.46
Community Hospital	23.00	10.50
General Hospital	1.00	0.46
Hospital Center	1.00	0.46
Somdej Phra Yupparat Hospital	1.00	0.46
Subdistrict Health Promoting Hospital	15.00	6.85
University hospital	1.00	0.46
Total	219	100

Source: National Institute for Emergency Medicine (2020).

Since Ubon Ratchathani Province is a province with a large area of more than 40,000 square kilometers compared to the population and area size, Ubon Ratchathani Province should have 39 ALS operations to provide access to emergency patients within 8 minutes. However, currently there are only 28 units, so it

is not enough and does not cover the area. If there is an emergency or crisis in a remote area, a parallel system must be used. That is, report the incident to the FR or BLS, along with the ALS, and arrange a transfer point. If sufficient ALS level operations are to be provided, the district health promotion hospital where nurses are stationed should provide ALS operations to serve people in the area. However, for Sub district Health Promoting Hospital to organize the ALS operations, it is necessary to transfer the Sub district Health Promoting Hospital management mission to the local administrative organization, because if Sub district Health Promoting Hospital is still under the management of the Ministry of Public Health as it is today, the ALS operation cannot be organized due to insufficient budget of the Ministry of Public Health.

“ALS cars of our province are not enough. If calculating from the provincial area, we need 39 ALS units, but now there are only 28 units. To get enough, Subdistrict Health Promoting Hospital must have an ALS vehicle. Subdistrict Health Promoting Hospital can do it because it has nurses but does not have money. For the Subdistrict Health Promoting Hospital to organize the ALS unit, the hospital must be transferred to the local one like the administrative office of Khlong Hin Poon, Sa Kaeo, where the Subdistrict Health Promoting Hospital is now belonging to the municipality with ALS ready to be operated. If it is still under public health, it cannot be done because the budget is not enough, but if it is local, it can be done because of having money.” (Registered Nurse, Head of the Rescue Unit, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 25, 2019).

(1) Vehicles for Use in Emergency Operations

Ubon Ratchathani Province has a total of 236 ambulance vehicles, 3 pickup trucks, 1 ILS pickup truck, 48 BLS pickup trucks, 132 FR pickup trucks, 31 ALS vans, 16 BLS vans, 5 FR vans (National Institute for Emergency Medicine, 2020).

The Provincial Administrative Organization of Ubon Ratchathani Province began with the provision of cars for emergency medical

services by renting a car in accordance with the Ministry of Finance's letter regarding car rental rates for government use, the Government Procurement and Supplies Administration Act and Regulation of the Ministry of Interior on Budgeting Methods of Local Government Organizations. However, it was objected to the State Audit Office. PAO was therefore unable to rent an emergency ambulance, it must be changed as a purchase method. PAO set a budget of 18,000,000 baht to purchase 14 emergency ambulances but purchasing need to take time to find the middle price and make a purchase order. Many emergency ambulances had expired their lease agreements and were unable to replace them. Many operations lack emergency ambulances. On the other hand, practitioners believed using the rental car method is better than the purchase method due to the rental after 5 years can change to a new car, so the cars would be in good condition and always ready to use.

“The emergency ambulance rental of Ubon Ratchathani Provincial Administrative Organization was accused by the State Audit Office that the budget was not worth it. Another problem from renting a car and using a temporary employment contractor to drive is that when an accident occurs, the court will interpret that the car is not a PAO car, while the driver is not an employee of the district. When an accident occurs, the fault will be placed on the driver. If changing to buying a car and using a driver who is an employee of the PAO, when an accident occurs and the driver is not reckless, PAO will be involved in responsibility. This is to prevent the occurrence of problems with the person; therefore, switched to buying instead of renting. The provincial administration set a budget of 18 million to buy 14 vehicles, making the ambulance much less now. The department and the ministry did not set a median price for purchasing or renting an emergency ambulance for PAO. We must waste time talking to the Ministry of Finance to determine the median price itself, delaying the procurement, the car is not enough. As for the maintenance of the emergency ambulance, if buying cars for the Provincial Administrative Organization, there will be no problems with the maintenance budget.” (Acting for Chief Executive of Ubon Ratchathani Provincial Administrative Organization, personal communication, September 26, 2019).

“If you ask us, we think renting is better than buying methods. If rented, after 5 years, it can be replaced. Our car will always be new and no problem to be used. But if using the method of purchase, it must be used until the repair is not possible to purchase a replacement. Usually more than 5 years, the condition is not good, then needs to be repaired often, when the condition is not good, when using it, problems occur. But SAO does not understand. They came to check and said it was in violation of regulations, making it impossible to rent, you have to change to buy instead” (ALS Operation Unit, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 2019).

Ubon Ratchathani Province uses a GPS system to track ambulance vehicles such as various types of ambulances, use road traffic and traffic analysis systems to manage access times for emergency patients and arrival times to hospitals. There are CCTV cameras attached to the ambulance both inside the cabin and outside the cabin, which can be transmitted to the center and transmitted to the medical facility so that relevant doctors are able to see the current patients and operations outside the hospital. It has been developed to connect with the doctor in the hospital, including specialists in various fields were aware of the illness of emergency patients while at the scene of the accident or during delivery by installing a system for monitoring and transmitting health information through telecommunication and information technology systems to provide Telemedicine. It is a solution to emergency illnesses caused by distance and time to access medical services at a medical facility in a timely manner to connect to Fast Track system that the hospital has provided whether it is a fast-track system for brain emergencies, cardiac emergency, medical emergencies, obstetric emergencies, neonatal emergencies, etc. The hospital has specialized doctors in various fields for 24-hour consultation. Communication system provides a telemedicine system to assist patients in emergency before reaching the hospital by connecting to the communication and information system with the emergency call center. The high-level ambulance of the Provincial Administrative Organization has a machine that can send heart waves, vital

signs, and oxygen in the blood. At Sanphasitthiprasong Hospital, there is a 24-hour medical director and there are specialists on duty, ready to provide medical assistance through the telemedicine system (Registered Nurse, Head of the Rescue Unit, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 25, 2019).

Most of the budget for providing emergency ambulance is funded by the local government. The Ubon Ratchathani Provincial Administrative Organization sets a budget for the supply of emergency ambulances on an annual basis, as shown in the table. And conclusions from the workshop to review the local development plan 2018-2020 of the Ubon Ratchathani Provincial Administrative Organization found that PAO gives priority to emergency ambulance support 1669, accounting for 9.06% of the importance, which is the third place after (1) Construction and development of roads, transport routes, and (2) Dredging and development of water sources, excavation of pools, construction of overflowing dams, dampening dams. (Local Development Plan (2018-2022) Ubon Ratchathani Provincial Administrative Organization), and the local development project of the Ubon Ratchathani Provincial Administrative Organization (2018-2022) in the fourth strategy on social development and quality of life, the public health program has established an emergency operating vehicle rental project to provide people with fast access to the emergency medical service system thorough and efficient and consistently up to standard. Year 2018-2019, a project for renting a pickup truck, converting a raised roof to an emergency operating vehicle with life-saving equipment, totaling 216 vehicles and modified vans to be emergency operating vehicles with life-saving equipment for 4 cars, with a budget of 68,476,800 baht. Year 2020, the project of renting pickup trucks, converting the raised roof to 136 emergency operating vehicles with life-saving equipment, and 4 vans converted into an emergency operating vehicle with life-saving equipment, with a budget of 26,372,160 baht. Year 2021-2022, a project for renting pickup trucks, converting a raised roof to emergency operating vehicles with life-saving equipment, totaling 110 vehicles with an annual budget of 31,812,000 baht.

Table 5.12 Amount of Emergency Ambulance Procurement of Ubon Ratchathani
Provincial Administrative Organization

Fiscal Year	Number of Emergency Ambulances (Cars) Modified Pickup (Cars)	Modified Vans
2006	42	-
2007	18	-
2010	60	-
	(Replacement of 42 cars and 18 cars that have expired)	
2011	30	-
2012	130	2
2014	60	-
	(Replacement of 60 cars that have expired)	
	26	4
	(Replacement of 26 cars that have expired).	

(2) Paramedics

Ubon Ratchathani Province, lack of specialist personnel, including emergency medicine physicians, emergency medicine nurses and paramedic practitioners. Currently there are just 4 emergency medicine physicians. 4-7 emergency physicians are still needed, 81 emergency medicine nurses, accounting for 33.30% of the framework that should have, and there is no paramedic, but 3 people is currently studying (Supporting Documents for the Ministry of Public Health, Health District 10, Year 2020, Round 1, 2020). Most of the paramedic practitioners of Ubon Ratchathani Province have an Emergency Operation Certificate according to the Notification of the Emergency Medical Commission or have a license to practice the arts and the Emergency Operation Certificate that have been renewed (Head of emergency call center, Ubon Ratchathani Province, personal communication, September 25, 2019).

Details of personnel in the emergency medical service system in Ubon Ratchathani Province are shown in Table 5.13.

Table 5.13 Personnel in the Emergency Medical Service System, Ubon Ratchathani Province

Accreditation Status	Position / Duty	Number (person)
Positions in ITEMS	EMT-B	123
Positions in ITEMS	EMT-I	30
Positions in ITEMS	FR	924
Positions in ITEMS	Other	69
Positions in ITEMS	Not specified	8
Being accredited by the SOT	จฉพ. (A-EMT)	92
Being accredited by the SOT	พฉพ. (EMT)	175
Being accredited by the SOT	อฉพ. (EMR)	811
Being accredited by the SOT	ผจป. (Supervisor)	1
Being accredited by the SOT	ผจป.(EMD)	1
Professional Council	Nurse	510
Professional Council	Physician	34
Total		2778

Source: National Institute for Emergency Medicine (2020).

Note: * Or Sor Por = Subcommittee on Accreditation of Organizations and Programs of Education and Training for Operators and Granting Certificates or Accreditation Marks to those who have Passed Education or Training.

As with other provinces, community hospital emergency operations share personnel with personnel working in the hospital's emergency room, making it impossible to operate if the emergency room resuscitation mission is

undertaken. Some community hospitals allow ward or delivery nurses to perform additional work in the emergency room when the emergency room nurse goes outside the hospital. If the number of personnel is not complete, they will not be able to issue an incident. If called, the call center must be reported and ordered to command other nearby units to operate instead, resulting in insufficient numbers of ALS operations.

Ubon Ratchathani has educational institutions that can produce personnel in the emergency medical system, including Program of Nursing Specialty in Emergency Nurse Practitioner (ENP) by Sanphasitthiprasong Hospital for 4 months and AEMT (Advanced Emergency Medical Technician) course, or formerly known as EMT-I (Emergency. Medical Technician Intermediate) by Sirindhorn College of Public Health, Ubon Ratchathani Province with the study period of 2 years, by accepting people who have graduated from high school or equivalent to enroll. Upon graduation, they will receive a Diploma in Emergency Medicine Operations (Vocational Certificate).

4-month training of emergency medical nurses in public hospitals do not receive special fees, unlike nurses in other fields such as cardiovascular nursing care, stroke nursing care, critical care nursing, adult respiratory disease nursing which spent the same 4 months training period. However, when training to become a specialist nurse, they will receive an extra 500 baht per month which makes most nurses ignore the training in emergency medicine, by reasoning that after training they must undertake more work, must go out to work and take care of patients who are at increased risk but receive the same compensation.

“I graduated ENP for a long time, worked in the emergency room. I have been serving patients for a long time. Our work is heavy, the risk is more than others. There should be some money for the risk. But I did not receive additional money like other branches that have been trained such as CNN Stroke training for 4 months as they earn 500 extra every month. Our work is riskier. We must work outside the office. But I have not tried to give feedback to the department for many years. If the doctor knows an upper level, then please tell them for me. “(Emergency Practice Nurse, Warin Chamrap Hospital, personal communication, October 7, 2019).

“Our hospital ENP training has been organized every year with both our people and others coming to study. We send our people to train every year. But the new nurses do not want to come to the ENP training. The training does not increase the money. Work is harder. Need to pick up patients outside, plus having to stay on duty, we don't have enough ENP” (Emergency Practice Nurse, Sappasitthiprasong Hospital, personal communication, September 27, 2019).

The Ubon Ratchathani Provincial Public Health Office requires new, trained EMRs to go on the job training at a hospital emergency room for a period of 1 week before going to work. The command center will send the letter to the rescuers and arrange the operational skill test for the rescuers after receiving the training.

Ubon Ratchathani Provincial Administrative Organization requires that medical emergency workers and medical emergency volunteers of Ubon Ratchathani Province receive training to rehabilitate and enhance knowledge at least once a year. The province is responsible for organizing training and organizing meetings among the network of emergency medical service units of the local government organization, foundations, associations, and volunteers monthly to provide information, allow all units to express their ideas, see together to fix the problem and to create unity between the rescuers. This results in no problems in fighting to get patients during the rescuers in Ubon Ratchathani Province.

“Our PAO stipulates that all rescuers, EMR, FR here all have to do training once a year. Provincial Administrative Organization will arrange the training, and we also have a meeting every month between the rescuers of the SAO, PAO, municipalities, volunteers, the foundation to update new information. Like last month, I just had a meeting to inform the ITEMS 3 system to change the dispatching and coordinate the hospital to use the OIS system, no radio required, no phone app required. We meet often, talk a lot. There are rarely problems with resuscitation or fighting. They do not compete for the case. Who goes first, which unit goes first, they will pick up the patient and look

after the patient. The person who arrived later returned.” (Head of emergency center, Ubon Ratchathani Province, personal communication, September 25, 2019).

The budget for most emergency medical personnel is the responsibility of the personnel agency. The budget for the capacity development of personnel in the emergency medical system has been continuously supported by the local government organization by the Provincial Administrative Organization organized a local development project of the Ubon Ratchathani Provincial Administrative Organization (2018-2022) in the fourth strategy on social development and quality of life. There is a potential development of the emergency medical service system in Ubon Ratchathani Province to provide people with quick, comprehensive, efficient and standardized emergency medical services in the year 2018-2022 by allocating a budget of 4,688,000 baht per year by organizing activities to enhance knowledge and skills for emergency operations personnel and relevant staff, organizing training meetings, seminars, study tours of 4 models, each of 250 people, each of which is 1,000 people/year; organizing a seminar on the network of emergency medical services in Ubon Ratchathani Province to acknowledge the results of operations, problems, obstacles in the operation of the emergency medical service system in Ubon Ratchathani Province, 12 times, each of 250 people, 3,000 persons/year.

Provincial Administrative Organization organizes a training program for the rehabilitation of emergency personnel in Ubon Ratchathani Province to develop knowledge and skills of personnel in emergency operations to have the knowledge, skills and experience in emergency patient assistance by organizing training for emergency personnel in Ubon Ratchathani Province in 2018, 1,000 people / year with budget allocation of 4,050,000 baht, organizing training for emergency personnel of Ubon Ratchathani Province in 2019, totaling 750 people / year with budget allocation of 1,500,000, organizing training for personnel of the Emergency Operation Unit, Ubon Ratchathani Province, year 2020-2022, 1,000 people/year with an allocation of 2,200,000 baht per year.

Training project and field trip to visit officers at Ubon Ratchathani Command Center to gain knowledge of incident notification and

command, skills, and readiness to perform the operation, as well as to introduce basic assistance to patients and emergency patients. The training was organized to 40 officers at the command center in 2018 by the Provincial Administrative Organization allocating a budget of 150,000 baht.

Mass Accident and Public Disaster Practice Project provided knowledge and skills for Emergency Operations Officers, Khunnam Resuscitation officers and Ubon Ratchathani Provincial Administrative Organization's resuscitation officers to help victims of mass accidents and public disasters. The mass accident and public disaster practice was provided for 130 emergency operations officers, Khunnam Resuscitation officers and Ubon Ratchathani Provincial Administrative Organization officers per year in 2018, 2020, 2021, 2022 with a budget of 200,000 baht per year allocated by the Provincial Administrative Organization.

Ubon Ratchathani Provincial Health Office established a welfare fund for operation practitioners in case of accidents, disabilities, and deaths, both work-caused cases and non-work-caused cases, including for further education and capacity development, by deducting from salary in addition to having life insurance for operation practitioners like other provinces. Also, there were projects for developing personnel potential in the emergency medical system on an annual basis. In the fiscal year 2019, 4 workshops for accident and emergency supervisors were organized to create a critical emergency patient information system, and together defining the definition of emergency patients at each level consistently. There was also a meeting to follow up on the implementation of workshop projects, stakeholders, referral processes, in Ubon Ratchathani, to brainstorm and to guide and install a referral system for patients with different diseases. Also, guidelines for forwarding the district event commander development workshop were announced and implemented for district administrators to have knowledge and understanding of the Incident Command System (ICS) and ICS incident command skills.

Ubon Ratchathani Disaster Response Project was to manage disasters quickly and appropriately. The capacity development project of resuscitation operations for public health personnel was to develop the resuscitation operation skills and the use of AEDs of health personnel for 2 emergency room practitioners per hospital, 1 officer per sub-district health promotion hospital and all officers at Ubon

Ratchathani Provincial Health Office. Accident Investigation Project was to organize a multidisciplinary accident investigation team. The drowning prevention operation development project was to support the implementation of the outstanding good-promoter measures in 2013 by organizing an academic conference and presenting the results of the provincial good-promoter team. The importance of risk points was emphasized for the local with guidelines for developing and building a copper-level good-promoter team in all districts and all risk areas for exchanging, learning, and taking lessons of the development to honor and encourage practitioners. There was a campaign to practice a plan of helping water disaster victims at least once a year in risk areas. The area was encouraged to build a good-promoter team by a direction for development with network partners and sharing of resources in the area, to be ready for an assessment of the good-promoter team at the health district and national level. The potentials of teacher b in 3-day buoyancy course were developed to have trained and certified local speakers who were able to build a local team to teach children aged 6-14 with learning and swimming skills for survival. Volunteer Resuscitation Potential Development Project was to gain patient caring skills in crisis with standard, to be able to assess the condition according to the Glasgow Coma Scale: EVM (Eye opening, Verbal response, Motor response), to plan assistance properly, and to be able to separate critical patients from general patients, for volunteers in emergency medical resuscitation to operate more efficiently. Rehabilitation training project was to develop the potential of medical emergency volunteers to enhance the skills of emergency medical volunteers to be more capable, to be able to provide emergency care according to the Emergency Medical Act, by training 120 emergency medical volunteers who had trained for more than 1 year per generation, in a total of 2 generations. Emergency Medicine and Public Disaster Conference Project. Rescue vehicle standard inspection project organized a check-up for BLS / FR level rescuer ambulances.

Although both the Center Hospital and the Ubon Ratchathani Provincial Administrative Organization would organize several training courses to enhance personnel in the emergency medical system with a welfare fund set up for the operation practitioners, but the number of personnel in the current emergency medical system was insufficient. In addition, there was a problem of many operating personnel

leaking out of the system because most personnel were not fully employed, causing the lack occupational security and lower wages.

“Now, there is a problem of insufficient personnel. The new entrants will soon leave after training. We must waste time training new entrants. Most of the personnel are contractors. We do not have a position for them, so they will leave after having a better new job or better paid job that is more stable and secure than being registered as a full-time position here” (professional nurse, Head of the Ubon Ratchathani Emergency Medical Command Center, personal communication, September 25, 2019).

Out-of-hospital ambulance operations-When received a notification from the agency's telephone, internal number, 1669 hot line, ambulance phone number or radio communication, to accept an accident, the case must be reported back to the center to request for operation. It took time to receive and inquire information about gender, age, congenital disease, and patient symptoms within 2 minutes. With agreement of Ubon Ratchathani Province, the patient in a remote area, regardless of whether the condition was severe or not, must be picked up by an EMS ambulance, which took about 30 minutes. The center would send an FR-level operation unit located in or near the accident scene for a preliminary assessment. There must be a method of transferring vehicles on the way to check the patient symptoms and check the transfer point. If there was no rescuer ambulance near the scene of the accident, the relative would be instructed to perform CPR while waiting for the operation team. The average time taking to arrive the scene was within 8 minutes (10 minutes since received the phone call). Choosing whether to use a BLS or ALS ambulance vehicle was evaluated based on the patient's condition. After arrived at the incident scene, the patient would be re-evaluated to see if the condition were as described or not, and report call back to the center. If the patient had changes in condition, it must be reported back to the center. As standard, there would be 2 times of call back to the center. The method of transferring the patient would follow the standard by lifting the patient's head and feet sides. If it were necessary to request for another co-operation unit, report would be made to notify the incident notification and

command center for coordination. Also, in case of wanting to consult a medical director, the doctor would assess the patient's symptoms via application, and command the treatment via phone. For a red level emergency patient assistance, Warin Chamrap Hospital's ALS operation unit, which was a M1-level general hospital with 210 beds and 4 emergency physicians, would be a jointly went on site operation always providing emergency medical services (Ubon Ratchathani Emergency Medical Operation Unit, personal communication, October 7, 2019).

Transfer to hospital and medical treatment in hospital - Before bringing the patient to the hospital, the center would notify the hospital in advance of the symptoms and treatment at the scene of the incident. The command center then considered the hospital for referrals and coordination. Criteria had been established for the delivery of emergency patients to hospitals with emergency care capability in or near the area of responsibility. Sometimes, the guarantees and satisfaction of the relatives or patients were considered because they requested to be sent to the former hospital or the hospital in which they were entitled to treatment. When arrived at the emergency department of the hospital, the operation unit would verbally to the relevant staff and submitted the patient report in written form according to the form specified by the National Institute for Emergency Medicine for the hospital's acknowledgment and continued treatment (Ubon Ratchathani Emergency Medical Operation Unit, group discussion, October 24, 2019).

5.3.1.3 The Participation of the Ubon Ratchathani Emergency Medical Network

Since 2006, Ubon Ratchathani Provincial Public Health Office laid the foundation for the emergency medical service system to create participation between agencies under the Ministry of Public Health, including the Provincial Public Health Office, Hospital center, University hospital, Community hospital and Subdistrict Health Promotion Hospital; Local government organization under the Ministry of Interior, including the Provincial Administrative Organization, Municipality and Subdistrict Administration Organization; non-profit organizations, including foundations and associations in Ubon Ratchathani Province. This resulted in the involvement of local government organizations in providing emergency medical services, especially the Provincial Administrative Organization, which provided

support for both the training budget and the emergency ambulance for local government organizations and public hospitals. On the other hand, the private sector was less involved in providing emergency medical services, since there were few private hospitals in Ubon Ratchathani Province, and there was no private hospital located outside the Muang district. Nowadays, the Regional Public Health Office, Local government organizations, foundations, associations, private sectors, and people were all involved in emergency medical services as follows.

1) Regional Public Health:

(1) Ubon Ratchathani Provincial Public Health Office

Ubon Ratchathani Provincial Public Health Office played an important role in the initial arrangement of the emergency medical services in the province as the main agency that clearly systemized the emergency medical services in Ubon Ratchathani. It had participated in the emergency medical system of Ubon Ratchathani Province, both in terms of decision-making, practice and operation, benefits, and evaluation as follows.

Starting from March 2004, the Provincial Public Health Office evaluated the provincial emergency medical service performance, and found that there were personnel restrictions, lack of publicity in the broader picture, and necessity of finding allies to organize for the more explicit system. Former doctor of the Provincial Public Health Office, Wuttikrai Moongmai was aware of the problems and limitations, and initiated actions in various fields by starting from the development of the first period of emergency medical system (2005-2010). It was started from when the Provincial Public Health Office proposed the policy of providing emergency medical services to the administrators of Provincial Administrative Organization. The project was acknowledged and allowed to be presented to the Provincial Administrative Organization Council in 2006 by the Provincial Public Health Office. Finally, the Provincial Administrative Organization Council agreed to approve the ambulance rental request to support the emergency medical services, and then established the 60 years Chaloem Raj Rescuers Project that involved the Provincial Administrative Organization, Municipality and Subdistrict Administration Organization in the organization of the emergency medical service in 2007. The Emergency Medical Service System Fund was established by having

Executive Committee, Directors and Secretary to operated and established an Emergency Medical Foundation to take care of welfare for rescuers and to conduct a research study in 2008.

Development in the integrated period (2010-2012) began with the idea of the former governor of Ubon Ratchathani, Surapob Saiphan, who wanted to have a rescuers center coexistence with 24-hours operation. This led to the development in the mission transfer period in May 2014, when the Ubon Ratchathani Provincial Public Health Office transferred the provincial incident command center work to the Provincial Administrative Organization as the operator. This was the first provincial command center in Thailand that was operated and managed by the Provincial Administrative Organization, as an emergency command center for all emergency incidents apart from emergency medicine alone to provide integrated public services.

The internal structure management of the Provincial Health Office clearly separated the internal structure as an emergency medical service center in Ubon Ratchathani Province since starting the service, which consisted of Emergency Command Center and the Office of Emergency Medical Service System. At present, the Emergency Medical Service System Development Division, Ubon Ratchathani Provincial Public Health Office, divided internal sub-divisions into Emergency and Disaster Medical Operation that controlled the quality of the rescuers in Ubon Ratchathani and the Foundation for Emergency Medicine in Ubon Ratchathani to have a standard of practice in helping people with safety and arriving medical institutions properly, as shown in Figure 5.27.

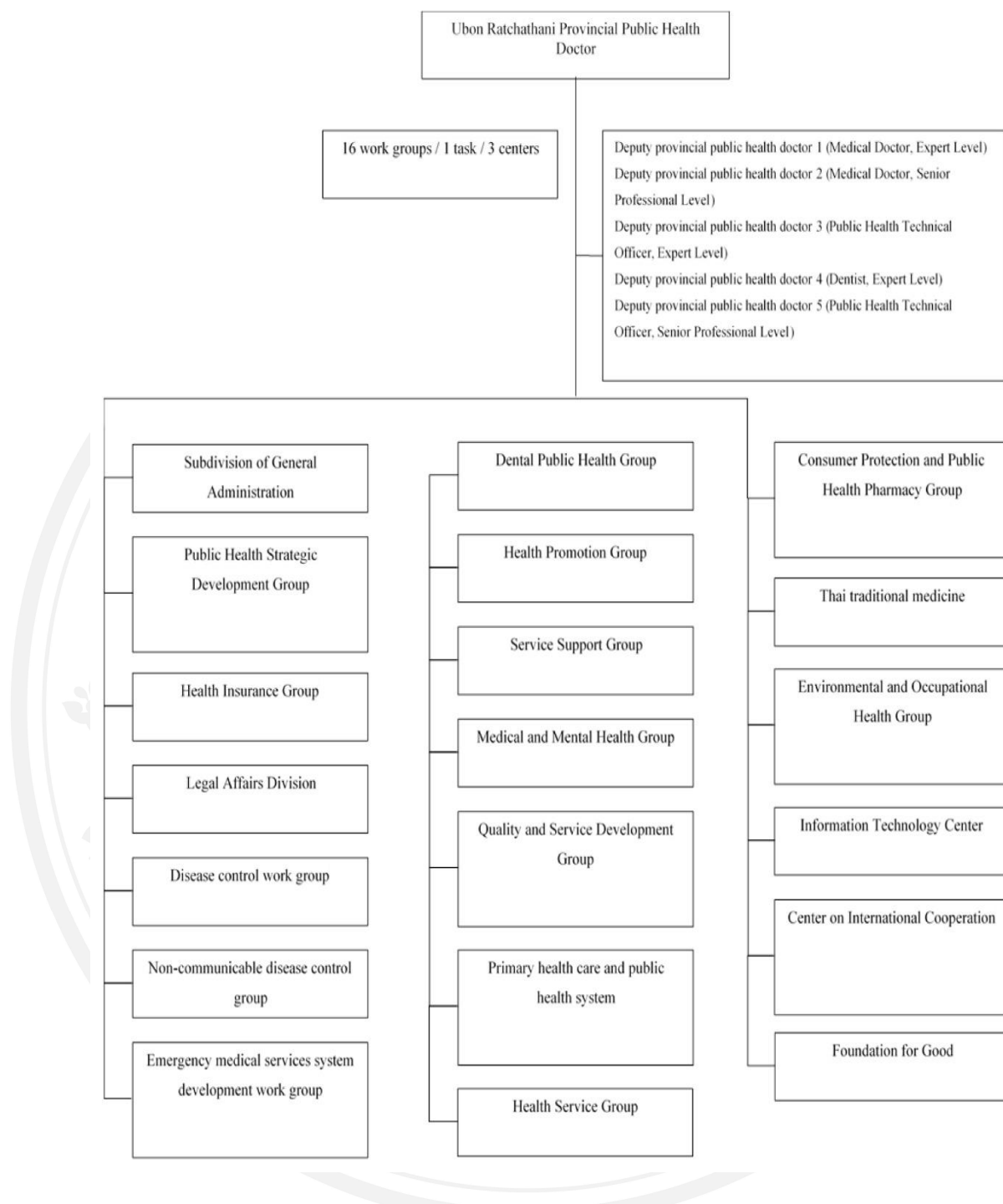


Figure 5.27 Ubon Ratchathani Provincial Public Health Office Organization Structure

Source: Ubon Ratchathani Provincial Public Health Office (2019).

For provincial operational direction policy formulation, the Provincial Health Office clearly set a vision at the provincial level that people received emergency medical services when having emergency illness or accident under the concept of system development, including 1) people could use the services for 24 hours every day, 2) the emergency medical service system was sustainable, 3) operation practitioner could be a career, 4) local participation, operating guidelines and plan preparation in the first phase would be mainly based on the meeting of the Ubon Ratchathani Emergency Medical Service System Executive Committee that was held 2-3 times a year (at present, the meeting is held once a year). Doctors at the Provincial Health Organization created the concept of managing the operation units at the provincial level, where 1 operation unit consisted of 6 rescuers, took care of 40,000 people, and worked for 24 hours a day.

The operation of the provincial emergency medical service was a systematic operation by having the main person responsible for the provincial emergency medical services in coordinating and developing the system. The Provincial Emergency Medical Service System Development Committee was appointed and consisted of representatives from all registered rescuer units. A meeting of the working group was scheduled every month to acknowledge the direction of the work plan, together create regulations, set indicators, monitor the results of the implementation and operation of all units, report problems, find solutions, exchange of knowledge, and introduce new ideas for development. However, nowadays the meeting was held only 1-2 times a year.

“The Provincial Health Office had not held a meeting for a long time. There had not yet been a meeting this year, which might be because of the COVID pandemic. The meeting was held once or twice in the last year.” (professional nurse, Head of the Rescue Unit, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 25, 2019).

“In the past, there were some meeting of rescuers organized by the Provincial Health Office, but this year, I haven't seen any meeting, especially during COVID pandemic situation that there is no meeting at all.” (professional

nurse, Emergency Nursing Supervisor, Sunpasitthiprasong Hospital, personal communication, September 27, 2019).

The Provincial Health Office was responsible for the registration of service units and operation team in accordance with the regulations of the National Institution for Emergency Medicine that would be renewed every year. Personnel in the emergency medical system was determined to undergo rehabilitation training, development of an information system for tracking emergency ambulance, and be able to view the ambulance position through the website (Geographic Information System: GIS Tracking).

There were 3 areas of standard and quality control of service units / operation units of the Provincial Health Office, including 1) personnel that was tested by their operational skills in rehabilitation training to renew the operation contract every year, 2) equipment, tool, and ambulance, 3) standard of operation units that was supervised and monitored by the Provincial Health Office twice a year. The data was analyzed for the purpose of supervising the operation unit and planning of risk points to reduce accidents.

The Provincial Health Office required the trained EMR to go on the job training at a hospital emergency room for a period of 1 week before the actual operation by the submission of letter from the command center. The test of operational skills for rescuers was organized after the training with an EMS Conference and an EMS Day meeting.

For motivating personnel, the Provincial Health Office set the career promotion according to the public health system, where all officers could be evaluated and promoted.

The Provincial Health Office conducted several emergency medical development projects in the fiscal year 2019 as follows. (1) 4 workshops for the accident and emergency supervisors to establish a critical emergency patient information system, together define emergency patients at each level consistently, and participate in the meeting to follow up the performance. (2) Workshop project for stakeholders on the processes of patient referrals in Ubon Ratchathani Province to brainstorm and guide the forwarding of referral system installation for patients with

each disease, and announce the use of referral guidelines. (3) Workshop project for district level incident commander development for district administrators to have knowledge and understanding of Incident Command System (ICS) and skills in incident command under the ICS system. (4) Disaster response project in Ubon Ratchathani Province to quickly and appropriately manage disasters. (5) Resuscitation operations capacity development project for public health personnel to develop resuscitation operation skills and AED use of health personnel, which was provided to 2 emergency room personnel per hospital, 1 district health promotion hospital officer and all staff at Ubon Ratchathani Provincial Public Health Office. (6) Accident investigation project to organize a multidisciplinary accident investigation team. (7) The drowning prevention operation development project was to support the implementation of the outstanding good-promoter measures in 2013 by organizing an academic conference and presenting the results of the provincial good-promoter team. The importance of risk points was emphasized for the local with guidelines for developing and building a copper-level good-promoter team in all districts and all risk areas for exchanging, learning, and taking lessons of the development to honor and encourage practitioners. There was a campaign to practice a plan of helping water disaster victims at least once a year in risk areas. The area was encouraged to build a good-promoter team by a direction for development with network partners and sharing of resources in the area, to be ready for an assessment of the good-promoter team at the health district and national level. (8) Developing potentials of teacher b in 3-day buoyancy course to have trained and certified local speakers who were able to build a local team to teach children aged 6-14 with learning and swimming skills for survival. (9) Volunteer Resuscitation Potential Development Project was to gain patient caring skills in crisis with standard, to be able to assess the condition according to the Glasgow Coma Scale: EVM (Eye opening, Verbal response, Motor response), to plan assistance properly, and to be able to separate critical patients from general patients, for volunteers in emergency medical resuscitation to operate more efficiently. (10) Rehabilitation training project was to develop the potential of medical emergency volunteers to enhance the skills of emergency medical volunteers to be more capable, to be able to provide emergency care according to the Emergency Medical Act, by training 120 emergency medical volunteers who had trained for more

than 1 year per generation, in a total of 2 generations. (11) Emergency Medicine and Public Disaster Conference Project was done by organizing academic conferences on emergency medicine and disasters. The Provincial Health Office organized various academic conferences and training sessions by coordinating speakers from educational organizations, Ubon Ratchathani Provincial Administrative Organization and Sanpasitthiprasong Hospital. (12) Rescue vehicle standard inspection project arranged a check-up for ambulance vehicle, flashing lights and buzzer, tax payment, medical equipment and medical supplies, BLS and FR ambulances, according to the standards of registered types and levels (Doctor at Provincial Health Office, Ubon Ratchathani, personal communication, September 27, 2019).

(2) Sunpasitthiprasong Hospital

Sunpasitthiprasong Hospital was the hospital with the greatest number of ICU in Thailand and a large-scale hospital center located in the health area 10 serving patients in 5 provinces, including Ubon Ratchathani, Si Saket, Yasothon, Amnat Charoen, Mukdahan and neighboring countries, such as Laos, Cambodia, and people in the South part of Northeast area of Thailand. The hospital provided services in five areas of Excellence Centers. Including heart disease, cancer, accident, newborn baby, and organ transplantation, and provided emergency cardiovascular and cerebrovascular disease patients with STEMI Fast Track and Stroke Fast Track (SFT) systems. It played an important role in providing emergency medical services in Ubon Ratchathani and the health zone 10.

With the policies that continued to be the corporate culture, namely “Do not reject patients” and “all emergency completes here”, the emergency medical service of Sunpasitthiprasong Hospital had provided services to accommodate unlimited patients. There was a developed system for refer service that quickly transferred patients to community hospitals. The hospital supported the development of community hospitals for efficient return of patients, for example, there was a provincial central fund to support the development of community hospitals to be ready for the return of patients for continued care. In addition, managerial officers were also supportive of the service provision that covered all dimensions and centers of excellence.

Sunpasitthiprasong Hospital had an Intensive Care Unit Hub (ICU Hub) that was responsible for coordinating critical patient information before referral, as well as assessing the quality of referral care of community hospitals. The service was supported by the patient tracking system (Tracking) with the Global Positioning System (GPS) and real time communication.

In 2006, 5 Super ambulances were allocated to Ubon Ratchathani Province. The former doctor of Provincial Health Office, Doctor Wuttikrai Moongmai, coordinated with relevant departments, and decided to use the vehicles of the provincial central forwarding system, by starting to organize a system for efficient referrals of critically patients, establishing a command center at the Provincial Health Office, and assigning Sunpasitthiprasong Hospital as an ALS service unit. Later in 2008, it was upgraded to a mobile intensive care vehicle (Mobile ICU) with technologies that supported the communication of patients and healthcare professionals in real time (Real Time Telemedicine) and GPS. The nurses were trained to be able to insert ventilator, save life with a defibrillator, and provide patient saline. A network of community hospitals and general hospitals in nearby provinces had been developed to provide accurate and timely patient referral (now, all community hospitals had Mobile ICU).

Emergency room of Sunpasitthiprasong Hospital had 4 main missions, including (1) emergency examination room, (2) emergency medical service (EMS), ALS unit, (3) emergency forwarding system (self-arrived emergency cases would be referred through the ICU Hub / ambulance-delivered emergency cases would be referred to ER / CCU), and (4) patient transfer unit with 6 emergency physicians, ICU Hub as a point of contact, and a trained nurse as a supervisor. After passing through screening, the department for patient referral would be decided, which could consult with emergency medicine doctors and specialized doctors. A Cardiac Care Unit (CCU) was established for accepting emergency patients, mainly STEMI Fast Track.

Communication in the Sunpasitthiprasong Hospital's emergency medical system was focused on the patient flow at each service point, the management flow, and data analysis to reflect the result for patient-centered team learning.

Sunpasitthiprasong Hospital conducted research studies and obtained evidence that most of the patients who died were from emergency injuries. Meanwhile, the key factor to increase the survival of the patient depended on the personnel at all levels. For example, hospitals had operating rooms with personnel ready for operation; patients were delivered in the best condition (good and efficient referral system with knowledgeable personnel); community hospitals were able to screen and take care of patients primarily and properly before referring to the hospital center. Therefore, the development of human potential at all levels was important, as well as the development for community hospital nurses to be able to read the electrocardiogram (ECG). The district health promotion hospital staffs should be able to know the normal ECG. Client's hospitals should also be able to give advice when a patient had an abnormal ECG.

Personnel at each level of the hospital were developed with a collaborative learning process. The referral system would discuss the patient's death issues at the meeting for learning purpose (Referral, EMS, and Dead Case Conferences). When a patient was referred to the hospital, there would be a nurse to check for the correct referral. There was a Check List, which if something were not correct, it would be informed or taught immediately (Transfer Audit).

Sunpasitthiprasong Hospital in collaboration with the Royal Thai Army College, Phramongkutklao College, formulated a 4-months (16-weeks) mobile intensive care ambulance training course (Mobile ICU). This course was acknowledged by the Nursing Council and the National Institute for Emergency Medicine. The first generation of paramedic students received a funding from the health service area (Inspector General of the Ministry of Public Health) for 1.6 million baht. There were 51 students in the first generation of the course (40 people were personnel of Ubon Ratchathani Province and 11 served the army).

Professional nurse was the closest personnel to serve patients. The training for emergency medical practice nurses (ENP) was organized to 4-5 nurses per district (based on the Emergency Medicine Act in 2008, Section 28) for nurses to accompany the care-needed patients during their referral by allowing nurses to insert a ventilator for the patient (certified by medical professionals and doctors of Provincial Health Office).

An EMS Conference between the network of emergency medical services in Ubon Ratchathani Province and Sunpasitthiprasong Hospital was organized every 2 months. The EMT group and the director of community hospitals were invited to participate as well. It was determined to have 1 issue for appreciation and 2 issues for development. Also, there were various forums related to emergency medical services, such as an academic forum for policies implementation, a forum for the heads of the section in the Provincial Public Health Office (that was originally scheduled 1 time / month, but now held only 1-2 times a year), a forum for the health district committee through the directors of community hospitals, including a forum for 7 dangerous days during New Year and Songkran festival that was held annually. A real time conference was held for involved government agencies from every district to truly connect the command and allow all sectors to work together. The work performances were collected to be presented in academic forums both in the country and international stages (Head of Emergency Medicine Division, Sunpasitthiprasong Hospital, personal communication, September 27, 2019).

Emergency care for cardiovascular patients at Sunpasitthiprasong Hospital was one of the best STEMI Fast Track hospitals in the country. The beginning of the establishment of the STEMI network of Sanpasitthiprasit Hospital began in January 2007 from the STEMI network workshop, which marked the beginning of clarity on how to work together with the clear and systematic referral network for patients with acute myocardial infarction. The project received funding support from the National Health Security Office (NHSO), enabling it to drive the operation quickly. There was a communication information system for referral (consultation through cardiologists and cardiologists' intensive care unit (CCU) to provide initial care), and an information system for disbursement from NHSO.

At present, Sunpasitthiprasong Hospital in Ubon Ratchathani served as a referral server for emergency patients with coronary artery. It had 1 CCU room (12 beds), 1 Cath Lab, 3 Interventionists, 17 professional nurses in CCU room (7 of them graduated with specialized cardiac nursing program and 1 graduated with doctoral degree). The server network consisted of hospitals in 5 provinces, namely Ubon Ratchathani, Sisaket, Yasothon, Amnat Charoen, Mukdahan

(covering a population of 4.54 million people). A total of 54 network hospitals provided 24-hours consultant with cardiologists every day via Line Application using iPad. Case manager, who treated patients directly as a clinical expert, was responsible for managing everything related with the patient together with personnel working in the service unit, from the first hospital admission until being discharge from the hospital and coordinating with relevant departments both inside and outside the organization. The case manager development was organized as the on-job training by focusing on Telemedicine on Real Time Basis (Line, iPad) for Individual Care.

For the innovative care for patients in emergency coronary heart disease, the host hospital organized the “Open heart with rhythm”, invented a model for teaching patients before inserting a defibrillator, and created “Cardiovascular Conservation Media”. An EMS Member Club activity was organized to build a network of emergency assistance to the chronic patient’s group, such as diabetes and high blood pressure, to be able to access to and receive emergency medical services promptly in an emergency. Relatives of the at-risk patients were taught to perform CPR. There was a participatory and collaborative learning process by organizing referrals, EMS, and dead case conferences. Case managers were developed by on job training. Also, a STEMI Manager was beginning in 2012 with duties of (1) Coordination: Coordinate hospital network, ICU Hub, Refer Center, Cardiologist, Cath Lab, etc. to provide quick treatment to patient, (2) Direct Patient Care, (3) Educating & Couse Empowerment, (4) Clinical Tracer Audits. The Clinical Practice Guidelines (CPG) was co-established and updated with the network continually with regular meeting with the network (Director of the Medical Bureau of Health Region 10, Department of Medical Affairs, personal communication, September 27, 2019).

Emergency care for cerebrovascular patients began in 2002 by establishing a cerebrovascular ward by the Neurology Unit, Internal Medicine Work Group, in the first stage as a Stroke Corner, located in the male ward for 4 beds and in the female ward for 4 beds, which was not successful. Later in 2005, it began to collect indications of cerebrovascular disease, mortality rates, complications, and re-hospitalization, together with the United Research Network. In September 2008, Sunpasitthiprasong Hospital established the first Stroke Unit in the Northeast. It had

12 beds, and provided Stroke Fast Track service, Evidence-Based Practice, Anti-Platelet Drugs, Stroke Unit establishment, Fibrinolytic Drugs in Stroke Fast Track and Stroke Patients Rehabilitation. The patient referral was emphasized to be treated promptly. Therefore, medical, and public health personnel were educated with knowledge to be able to sense the Stroke Warning symptom to refer patients as soon as possible. When the patient arrived at the hospital, according to the criteria, if the case were considered as being able to get Fibrinolytic drugs, the drug would be given immediately, but if not, patients would be sent to the stroke ward with medical team ready to service. Before the patient arrived at the hospital, the command center would send information to the hospital first and always communicated with each other.

Sunpasitthiprasong Hospital aimed to create participation and collaborative learning process in the emergency care of cerebrovascular patients by organizing a meeting to educate medical personnel and emergency medical services network about cerebrovascular disease for 2 times a year. A manual educating the public about stroke was prepared for people to be aware of the symptoms of the disease, and able to observe the symptoms of the initial disease and send the patient to the hospital as soon as possible. A multidisciplinary team was developed for taking care of stroke patients. In terms of information system, guidelines for the treatment of stroke were made with the collection of indicators of cerebrovascular disease, such as mortality, incidence of complications, brain computed tomography (CT Brain), physical therapy, health education before discharge, rate of recurring hospitalization within 1 month, receiving antiplatelet drugs, etc. A Discharge Planning was prepared for continuing care at home and / or community hospitals (Director of the Medical Bureau of Health Region 10, Department of Medical Affairs, personal communication, September 27, 2019).

In the fiscal year 2019, Sunpasitthiprasong Hospital had 78,190 times of patients attended emergency room services. Among them, 49,005 times were emergently critical patients (Level 1,2,3) that was accounted for 62.67 percent, and 16,986 times were other patients (Level 4,5) that was accounted for 21.72 percent. Emergency medical care system management covered EMS, ER, Refer, and Disaster. Mortality rate of emergently critical patients (Level 1) within 24 hours was at 9.66 percent. The emergently critical patients (Level 1, 2) with an

indication for admitting in the ER within 2 hours was at 94.04 percent (documents for the Ministry of Public Health Ubon Ratchathani Province: Ubon Ratchathani Provincial Public Health Office, 2019).

Most of the emergency medical work of Sunpasitthiprasong Hospital was the emergency medical service in the hospital, receiving emergency patient referrals from community hospitals within the province and other hospitals in health area 10. Meanwhile, patient care before arriving at the hospital would only be providing 1 high-level ALS emergency operation unit to receive emergently critical patients in Muang District and organizing personnel training to build personnel in the emergency medical system only, because of many missions for taking care of patients in the hospital, so the hospital was not responsible for managing the provincial incident command center.

“I do not want to interfere with the EMS operation. It is too busy, just looking after the ER patients and referral is already busy enough, because we must take care the ICU Hub as well. For EMS, we have an ambulance with ALS unit to pick up patients and support the Provincial Administrative Organization already. Sometimes the Provincial Administrative Organization is busy taking the ALS ambulance unit for other use other than the patient referral. At the hospital, we can help when their cars are not available. The command center is taken care and responsible by the Provincial Administrative Organization. I just cannot handle it too. The Provincial Administrative Organization has budget and personnel, so it is ok already. We support the doctors to be the operation, so there be 2 doctors to switch up on the duty, and that is okay.” (Head of Emergency Nurse, Sunpasitthiprasong Hospital, personal communication, September 27, 2019).

(3) Community Hospitals and Tambon Health Promoting Hospitals

Trakan Phut Phon Hospital, Warinchamrab Hospital and Ban Pao Sub-district Health Promotion Hospital were a contracted unit of primary care (CUP) under the Ministry of Public Health of Ubon Ratchathani Province and is

a local health service network area that jointly take care for emergency patients and accidents in the area.

Trakan Phut Phon Hospital

Trakan Phut Phon Hospital was a 120-bed (M2) community hospital with a total capacity of 386 manpower. The provision of emergency medical services began to be concrete in 2014 when the Ubon Ratchathani Provincial Administrative Organization made a MOU with local authorities who want to be involved in the provision of emergency medical services. At present, in Trakan Phut Phon District, there were 23 sub-districts, 29 primary care units (PCU) and 28 FR-level emergency response units, and 5 BLS-level emergency response units.

Manpower was allocated as a clear division of duties and responsibilities. There were 4 professional nurses on duty at the emergency room and 1 nurse assistant, which 1 nurse was the head of the shift, 1 nurse oversaw the referral work, 1 nurse was responsible for emergency medical work and 1 nurse was responsible for Mobile ICU. The hospital director gave freedom to work for the head nurse of the emergency room. In addition, there was a data collection of services, both general information and emergency medical service information, including information on providing services for stroke and coronary heart disease patients, allowed them to be aware of problems and led to solutions for problems. For example, the problem of access to services was solved by organizing public relations activities, a forum to learn about the management of the emergency medical service system between the Subdistrict Administration Organization Hospital and the District Health Promotion Office (Professional Nurse, Head of Emergency Nursing, Trakan Phut Phon Hospital, personal communication, October 8, 2019).

The Trakan Phut Phon Hospital attempted to coordinate with local authorities to push forward the service by preparing EMS roaming to visit the area for result presentation, and to achieve information sharing between areas, since 2012, with all invited and participated local authorities in responsibility. Also, Trakan Phut Phon Hospital was one of the front-line hospitals before patients was referred to Sunpasitthiprasong Hospital, the center hospital (professional nurse, Head of Emergency Nursing, Trakan Phut Phon Hospital, personal communication, October 8, 2019).

Warinchamrab Hospital

The emergency medical operation of Warinchamrab Hospital was started by Dr. Praween Chanchampa (Emergency Medicine Physician, Bangkok Hospital Khon Kaen) who had the opportunity to be trained for specialists in emergency medicine at Khon Kaen Center Hospital. It was also inspired by Dr. Wittaya Chatbanchachai, who was a pioneer in patient care since the early days, performed his duties at Warinchamrab Hospital, and initiated new things or challenges. However, the initial phase required a lot of effort to prove himself to hospital personnel, until he was entrusted and accepted by hospital personnel, and began to adjust for the more systematic work processes. The staff at both BLS and ALS levels were trained to have knowledge and capabilities in the service. The hospital team was developed for resuscitation knowledge and skills, and identification of the patient severity. The fund was raised purchase equipment from the private sector by using the private relationship of emergency medicine doctors and organizing acrobatics show from China. The operations would be tested and experimented first, so that it would work in systematic manner during the actual incident. Warinchamrab Hospital had the same status as Trakan Phut Phon Hospital for being a front-end hospital before referring patients to Sunpasitthiprasong Hospital (professional nurse, operation of the emergency room at Warinchamrab Hospital, personal communication, October 7, 2019).

Ban Pao Sub-District Health Promoting Hospital

Ban Pao Hospital Sub-district Health Promotion Hospital accepted the policy from the Ministry of Public Health to provide emergency medical services since 2006 and continue to operate with support from the Provincial Health Office. The staff were trained for EMT-B Emergency Medical Technician (EMT) or formerly named Emergency Medical Technician Basic (EMT-B). Also, there was the BLS operation unit serving in the area from the beginning. At present, it was one of the service units that had made a memorandum of understanding (MOU) with the Ubon Ratchathani Provincial Administrative Organization. The Sub-district Operations Unit was responsible for the area of Pao sub-district, Nong Tao sub-district and Na Samai sub-district. For the operation unit that made a memorandum of understanding (MOU) with the Provincial Administrative Organization, the PAO

would be responsible for the personnel, training fees and their salaries. Ban Pao Sub-district Health Promoting Hospital coordinated and received quality inspections from the Trakan Phut Phon Hospital as a mentor (medical emergency officers, Ban Pao Sub-district Health Promoting Hospital, personal communication, October 7, 2019).

2) Local Administrative Organization

(1) Provincial Administrative Organization

Ubon Ratchathani Provincial Administrative Organization had been involved in supporting the provision of emergency medical services since 2006. At the beginning, Dr. Wuttikrai Moongmai, former doctor of the Provincial Health Office invited Mr. Pornchai Kowasurat, former Prime Minister of the Ubon Ratchathani Provincial Administrative Organization, to jointly invest in infrastructure, such as ambulance, building, equipment, command center and rescuers, and eventually participated in the management of the operation unit of directors (provincial incident command center). There was a joint operation and management of emergency medical services of local government organizations at the local level. Provincial Administrative Organization and other local authorities operated and managed emergency medical services together with the signing of the Memorandum of Cooperation (MOU) for the implementation and management of emergency medical services of the Local Administration Organization in the area between Provincial Administrative Organization and the municipality, and Provincial Administrative Organization and Sub-district Administration Organization to provide emergency medical services in the area (person acting on behalf of the President of the Provincial Administrative Organization and person acting on behalf of the Permanent Secretary of Ubon Ratchathani Province, personal communication, September 26, 2019).

For the participating in the provision of emergency medical services before arriving at the hospital, Ubon Ratchathani Provincial Administrative Organization established provisions of the Provincial Administrative Organization on emergency medicine. The management team appointed a working group to prepare details and present information, to draw up provisions, examine the details to be correct and appropriate in accordance with the rules, laws, regulations, and propose it to the Provincial Administrative Organization Council for consideration, which was

currently implemented and effective (Deputy Permanent Secretary, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 26, 2019).

Provincial Administrative Organization was involved in organizing a series of emergency medical operations by itself and supporting the operations of other local authorities in Ubon Ratchathani Province to organize emergency operation units under the promotion, support, and supervision of the Provincial Administrative Organization of Thailand, for example, supporting an emergency ambulance and providing training for the staff of the operation unit. The Memorandum of Cooperation (MOU) had been signed in the implementation and management of emergency medical services to have emergency vehicle operators and equipment in accordance with the standards required by the National Institution for Emergency Medicine. The operation units were registered, provided 24-hour service for emergency operations as notified by the emergency command center, and supported networks between areas both in normal conditions and in a disaster situation. However, the Provincial Administrative Organization providing budget support or an emergency ambulance to other local authorities must be done with caution as the Office of the Auditor General of Thailand had investigated and objected the support provided by the Provincial Administrative Organization for the funding and ambulance to the municipality and the Sub-district Administration Organization for emergency medical services (person acting on behalf of the President of Ubon Ratchathani Provincial Administrative Organization, personal communication, September 26, 2019).

The operation unit of the Provincial Administrative Organization of Ubon Ratchathani Province used both nursing personnel, medical emergency officers and medical emergency volunteers. There were high-level emergency operation units (ALS) and basic emergency operation units (BLS) released for operation. There was no doctor on the operation. However, if there was a problem with the need for advanced medical procedures, such as intubation and intravenous injection, doctors could give advice through Telemedicine, which was developed and funded by the Provincial Administrative Organization to be modern and easy to use. The model was much more convenient for usage than the first version by pressing just

one button to contact a doctor right away (head of the incident command center, Ubon Ratchathani Province, personal communication, September 25, 2019).

For the participation in service system organization, system development and network coordination, Ubon Ratchathani Provincial Administrative Organization used nursing personnel, public health scholars, public health officers, public health personnel, medical emergency operators, emergency medical staff, emergency medical volunteers, and related hiring staff, to participate in the zoning of service areas, network of operation units. Parking spots for the operation units of the Provincial Administrative Organization was determined in Muang district. The registered operators and operation units were responsible for network coordination, developing and supporting service, communication systems and technology for emergency medical operations, supporting and managing emergency medical service ambulances, supporting materials, equipment, practices, plans and human potential development, training, education and public relations (professional nurse, Head of the incident command center, Provincial Administrative Organization, personal communication, September 25, 2019).

Ubon Ratchathani Provincial Administrative Organization became the administrator of the area-level emergency medical system. High level ambulance park had been set with high level operation units provided to cover an area that could access within 8 minutes. Also, Ubon Ratchathani Provincial Administrative Organization had set up a high-level operation unit to distribute the high-level ambulance parking spots for operating in Muang District and Warinchamrab District. The area was divided for 4 hospitals, including Sunpasitthiprasong Hospital, 50 Pansa Hospital, Warinchamrab Hospital and Camp Sunpasitthiprasong Hospital. On the area of 2 districts, 1,025 square kilometers, it was calculated to be able to access within 8 minutes with a driving speed of 60 kilometers/hour. It was found that the area of responsibility was approximately 201 square kilometers, which after divided by 1,025, it was equal to a need of 5.09 ambulances. Therefore, the area was divided into 5 parking stops, and the result appeared to be accessible within an average of 4 minutes and the slowest was about 6 minutes. It was found that the critical emergency patients died before the ambulance arrived at a rate of only 1.4 percent (head of the

incident command center, Ubon Ratchathani Province, personal communication, September 25, 2019).

For the coordination of emergency medical operations with other relevant agencies, the Provincial Administrative Organization was involved by coordinating with local authorities and related agencies, including the National Institution for Emergency Medicine, the Provincial Health Office, Hospital, Military, Police, Provincial Disaster Prevention and Mitigation Office, Provincial Government Foundations and private agencies to manage the provision of emergency medical services and system development. The incident command center would coordinate for participation in the service when needed. The Ubon Ratchathani Provincial Administrative Organization organized a meeting to discuss problems, find deals and develop services by establishing a work plan and filling in the local development projects of the Ubon Ratchathani Provincial Administrative Organization on a regular basis every year (staff of the incident command center, Ubon Ratchathani Province, personal communication, [group discussion], September 25, 2019).

For the participation in the development of the emergency medical system, the Provincial Administrative Organization organized several emergency medical system development projects, such as the training for reviewing one district, one rescue team (OTOS), the capacity development for emergency medical service system, the training for the rehabilitation of personnel in emergency operations, the training and visits of staff at the incident command center, the development of capacity for emergency operations, the “Water Resuscitation and Rescue Training Course”, the mass accident and disaster practice for emergency operations officers, Khunnamat resuscitation officers and Ubon Ratchathani Provincial Administrative Organization’s resuscitation officers, the building of a Network of Emergency Volunteers in the Community of Emergency Medicine, the education, the academic conference for “exchange of knowledge and drive the emergency medical work of the local government organization in 2018”, the training in the development of communication and operational information systems, the emergency medicine automation. The administrators of the Ubon Ratchathani Provincial Administrative Organization created an emergency medical development plan in accordance with the guidelines for the local development plan according to the

regulations of the Ministry of Interior on the preparation of the development plan of the local government organization and the book of rehearsal guidelines for implementing the four-year local development plan (2018-2021) (President of Ubon Ratchathani Provincial Administrative Organization, personal communication, September 26, 2019).

Ubon Ratchathani Provincial Administrative Organization organized a meeting with other local authorities to make an agreement to cooperate in organizing emergency medical services in the area by preparing a memorandum of agreement (MOU) in writing and presenting each local council for consideration and approval. The process was done by complying with the law establishing a local government organization. A copy of the memorandum of agreement was reported and sent to the supervisor of the local government organization. Details of the Memorandum of Understanding included 1) list of local government organizations participating in the preparation of public services, 2) objectives of operation, 3) term of operation, 4) operational plans and project expenditure management, 5) budget, and 6) scope of responsibilities and activities of public service organization, which was in accordance with the Decentralization Committee's Notification on the agreement to cooperate in the preparation of public services of the local government organization, dated 22 May 2015. There was a clear separation of duties of each department by authority and agreement for the effectiveness in the operation and management of emergency medicine, which would enable emergency patients to receive comprehensive and timely services (Deputy Permanent Secretary, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 26, 2019).

For the participation in monitoring and evaluation, Provincial Administrative Organization monitored and evaluated the results of emergency medicine operations to know the progress of the operation and performance measurement compared with the specified criteria or standards, both in quantitative and qualitative terms. The obtained results from the monitoring and evaluation were used in planning and developing the capabilities of personnel, tools, and emergency medical management system. The framework or guidelines for monitoring and evaluating emergency medical performance consisted of 1) evaluating

the satisfaction of service recipients in various areas, such as the service behavior of personnel, personnel potential, efficiency of tools, utensils and facilities, duration of service; 2) evaluating the satisfaction of operators in various areas, such as tools, appliances, materials, equipment, facilities, processes or procedures for the implementation of the support system; 3) evaluating the potential of personnel by internal departments, the performance of duties according to the plan, the work procedures and methods of operation, performance or service behavior; 4) problems, obstacles, failures or conflicts in performance (professional nurse, head of the incident command center, Provincial Administrative Organization, personal communication, September 25, 2019).

(2) Many Municipalities and Sub-district Administrative

Many municipalities and sub-district administrative organizations cooperated in arranging out-of-hospital emergency medical services. There was a joint operation between the local authorities in the area. The Memorandum of Cooperation (MOU) was signed for the implementation and management of emergency medical services of the Local Administration Organization in the area between Provincial Administrative Organization and the municipality and between the Provincial Administrative Organization and Sub-district Administration Organization to provide emergency medical services in the area. However, not all sub-districts were covered with the services. 56 percent of the emergency medical services (133 local administrative organizations) were registered, but only 35 percent were operating (46 local administration organizations) (data from the ITEMS system, searched on 11th January 2019). Most of them received support from the Ubon Ratchathani Provincial Administrative Organization. For example, the Pho Sri Sub-District Municipality established the rescue unit of Pho Sub-district Municipality for patient referral in 2006, coordinated with the Ubon Ratchathani Provincial Administrative Organization, participated in the development of the emergency medical service system, and developed the emergency medical service system project of Pho Sri Sub-District Municipality.

Pho Sai Sub-district Administrative Organization signed MOU with the Provincial Administrative Organization. Officers were sent for various trainings, for example the Basic Emergency Operator Training (FR). After the

training, they were registered as the Basic Emergency Operators and the Ubon Ratchathani emergency medical service system service units. The Pho Sai Sub-district Service Operation Unit was named “Rom Pho Sai Rescue Unit”.

Khok Chan Sub-district Administrative Organization organized the Khok Chan Sub-district emergency medical system project and the Khok Chan Sub-district emergency medical operation unit, which were supported with 1 emergency operating ambulance with life-saving equipment from the Ubon Ratchathani Provincial Administrative Organization for operation, since 2011 to present.

Muang Sri Kai Sub-District Municipality received the transfer of emergency medical mission from Muang Sri Kai Sub-District Health Promoting Hospital and established a rescue unit of Muang Si Kai Sub-District Municipality by preparing a MOU between the Ubon Ratchathani Provincial Administrative Organization, Ubon Ratchathani Provincial Health Office, and Muang Sri Kai Sub-District Municipality on 8th October 2013. Ubon Ratchathani Provincial Administrative Organization was an emergency ambulance supporter (modified pickup truck with high roof) with car equipment. Also, Muang Sri Kai Sub-District Municipality was responsible for the administration of the rescuers.

In addition, Ubon Ratchathani Province had 4 local emergency operations, because Sawang Wirawong District was an area where accidents often occurred frequently, but there was no district hospital in the area. The Head of Khok Somboon Health Center, Sawang Wirawong District, foresaw the problems, and presented the project organizing community emergency medical services, the development of Wirawong Operation Unit for 4 Sub-district Administrative Organizations, namely Kaeng Dome Sub-district Administrative Organization, Bung Malang Sub-district Administrative Organization, Tha Chang Sub-district Administrative Organization and Sawang Sub-district Administrative Organization, to request for the budget support for the management of the operation unit. The Khok Somboon Health Center was the location of the operation unit since it was the center of all 4 sub-district administrative organizations. The head of the Khok Somboon Health Station acted as director and management team to provide ambulances, communication equipment and tools, as well as supervise 12 personnel.

Now, it became a well-known emergency operation unit with a proven track record as a source of information for the organization of community emergency medical services for many areas both in and outside Ubon Ratchathani Province.

Most of the municipal emergency medical services and the sub-district administrative organizations that provided emergency medical services were under the disaster prevention and mitigation structure. Personnel and employees included public health scholar, operators in the emergency medical system (medical emergency staff, emergency medical volunteers, etc.) (Rescuer Unit of Ubon Ratchathani Provincial Administrative Organization, group discussion, September 26, 2019).

The operation unit of the municipality and the sub-district administrative organization established an operation center with location, personnel, vehicles, emergency medical services, materials, and equipment to serve as a communication channel through telephone, radio, and internet. There were operation personnel, emergency vehicles and equipment according to the standards specified by the National Institute for Emergency Medicine. The operating units were registered. They provided 24-hour service by arranging personnel to perform duties in accordance with the emergency medical standard. There was a 24-hour operation, arranged as an 8-hour shift or 12-hour shift, to operate as notified by the command center. Reports on the operation of the emergency operating units were prepared via the computer system and internet to reimburse compensation for emergency operations. The budget for emergency operating compensation would be transferred from the National Institute for Emergency Medicine to the Local Administration Organizations after the Provincial Health Office had verified the accuracy (professional nurse, head of the incident command center, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 26, 2019).

The municipality and the Sub-district Administration Organization that conducted an emergency medical operating unit had operation personnel, emergency vehicles and equipment in accordance with the standard as specified by the National Institute for Emergency Medicine. There were registered operation units that provided 24-hour service and performed emergency operations as

notified from the Ubon Ratchathani Provincial Emergency Command Center. The emergency medical system had been developed, such as education, training, research, research on the assessment, management and care for emergency patients, and prevention of emergency illnesses, including practice on emergency medical plans (Rom Pho Sai Rescuers, group discussion, October 24, 2019).

Most participation in the exchange, comment and jointly solve problems arising in the emergency medical system of the municipality and the Sub-district Administration Organization participating in the emergency medical service was generated from the monthly meeting organized by the Ubon Ratchathani Provincial Administrative Organization once a month. Policy formulation and decision-making were responsible by the National Institute for Emergency Medicine, the Provincial Health Office, and the Provincial Administrative Organization, then the Provincial Health Office and the Provincial Administrative Organization would convey the project to the municipality and the Sub-district Administration Organization for implementation (Rom Pho Sai Rescue Unit, group discussion, October 24, 2019).

Providing emergency medical services had reduced the rate of disability and mortality in the area, which was already the direct benefit of the municipality and the Sub-district Administration Organization. Providing emergency medical services was also the result of the local government organization. In addition to receiving indirect benefits, it was obvious that the leaders of the local government organization were recognized and respected as the familiar and close supporter of people, it also allowed the local administration of the local government to receive votes for the next election as well.

Local government organizations participating in the overall evaluation of the provincial emergency medical system were still limited to the Provincial Administrative Organization. Meanwhile, other local authorities only monitored and evaluated the results of emergency medical operations in their own agencies by surveying the satisfaction of service recipients in the area. The performance was measured against a predetermined both quantitative and qualitative criteria. The results obtained from the monitoring and evaluation were applied in planning and developing the performance and potential.

3) Association, Foundation, and Private Organization

The associations and foundations in Ubon Ratchathani Province were involved in the operation, namely organizing an emergency operation unit outside the hospital and providing services to patients in the responsible areas, which was defined by the Provincial Health Organization and Provincial Administrative Organization with duties to comply with the policies, requirements and standards set by the National Institute for Emergency Medicine, Provincial Health Office and Provincial Administrative Organization.

There were relatively few private hospitals involved in emergency services because there were few private hospitals in Ubon Ratchathani Province, and no private hospitals in other districts, except in Muang District. Also, the private hospital in Muang District located awfully close to the Sunpasitthiprasong Hospital at a distance of only 350 meters. All private hospitals had ALS ambulances that were rarely commanded for operation, even though the incident happened near the hospital. Private hospital emergency room personnel who were responsible for out-of-hospital emergency services felt that, as a private hospital, it was viewed as an exploitation and striving for patients from other departments, so it was not commanded for service from the center.

“There is the ALS ambulance in the hospital, but I have never use it for accident and emergency service. They said that this is a private hospital, so doing EMS is just for the benefit. Even when I listened to the radio, there was an incident happened near my hospital, and the Sunpasitthiprasong Hospital was not available, I was close to the incident but there was no request for ambulance operation. In addition, my hospital is small. There are not many patients. Most of them are plastic surgery and cosmetic surgery patients. Most ER patients are wound dressing cases. There is only one GP, so they might think that my hospital is not ready” (professional nurse in the emergency room Sanpasitthi Inter Hospital (now renamed to Prince Ubon Hospital), personal communication, September 27, 2019).

The monthly paramedic meeting was organized by the Provincial Administrative Organization once a month. The foundations and the rescuers' association were involved in expressing opinions, solving problems, giving suggestions, disputing, and exchanging experiences of emergency medicine. However, private hospitals had not yet invited to attend the meeting.

4) People

For public participation in the emergency medical system of Ubon Ratchathani Province, citizens jointly received personal benefits of free calling for emergency medical services when injured or sick, as well as comfort and safety for life and property. Also, community leaders, community emergency volunteer and the public were involved in awareness of emergency sickness, such as STROKE STEMI, practice when encountering an emergency or accident, requesting emergency medical assistance via the hotline calling 1669, through public relations using brochures, stickers, road signs, public relations boards, broadcasting towers, community radio broadcasts, training, community communication and emergency medical education, basic skills training in emergency response prepared by Provincial Administrative Organization and Provincial Health Office, including first aid, CPR and use of the AED, as provided in other provinces. Most people knew that 1669 was a source of all types of notification centers from emergency sickness, accidents, disasters, and non-emergencies incident, which was available to service 24 hours every day. The Provincial Administrative Organization organized a budget for public relations 1669, but some people still pressed wrong numbers, for example, 1119 or 1666, especially the elderly who were panic when an accident occurred, causing delayed assistance. Some people therefore wanted to make the number easier to press or press one button to contact the center.

Public participation included first aid when encountering an emergency patient, primary resuscitation, the call to report necessary information as required by the recipient when meeting an emergency patient. The Provincial Administrative Organization involved in creating public participation by organizing a project of building a network of emergency volunteers for emergency medical communities in Ubon Ratchathani Province to build up knowledge of emergency medicine among youth with volunteerism and to practice first aid skills, lifting and

moving, disaster preparedness and basic resuscitation. Workshops were organized for a total of 1,440 volunteers in 12 schools, divided in 120 volunteers per each school, including school health volunteers (Aor Sor Ror.), school health youth (Yor Sor Ror.), red-cross youth volunteers, and students interested in emergency medical work in schools under the Ubon Ratchathani Provincial Administrative Organization in 2018-2019, with an allocated budget of 738,400 baht per year. The workshops were also organized for 2,400 people per year, including youth and the public, in 2020-2022, with an allocated budget of 1,500,000 baht per year.

Most of the participation in the evaluation of emergency medical services in Ubon Ratchathani Province was done by providing direct feedback and complaints to the administrators of the local government organization. Some of them were evaluated through provincial public health offices, hospitals, and various emergency medical operations by responding to the satisfaction survey of emergency medical service recipients.

The director type of emergency medical operation unit or the emergency command center in Ubon Ratchathani was at a high level, with a doctor who received a certificate of emergency medicine as the director, both the general director and the direct director. Meanwhile, the medical the medical type of operation unit consisted of 4 levels of operations, including ALS, ILS, BLS and FR. Public hospitals, private hospitals and the Provincial Health Office were responsible for organizing operations at the ALS level. Local administrative organizations, foundations, associations, and some district health promotion hospitals organized operations at the ILS, BLS and FR levels. The operation area was divided to cover the entire province from building a network of cooperation with the local authorities to participate in the provision of emergency medical services. It started from requesting emergency ambulance support, emergency operation units and the location of the incident command center from the Provincial Administrative Organization to the transfer missions of the of the incident command center management to the Provincial Administrative Organization. This made the Provincial Administrative Organization and other local administrative organizations to participate in the emergency medical service of the province. The Sunpasitthiprasong Hospital played a key role in organizing physician, academic support, training for knowledge review and creating

personnel in the emergency medical system for Ubon Ratchathani Province. However, because of the large area of Ubon Province, it was necessary to use many emergency units and operation ambulances to cover the entire province. Also, many emergency ambulances sponsored by the Provincial Administrative Organization had expired rental terms and were unable to continue using the rental method, so the method must be changed for purchase. As a result, many operation units lacked emergency ambulances, so they could not go out for operation, affecting the current operation of the emergency medical service in Ubon Ratchathani Province.

5.3.1.4 Administration of the Local Emergency Medical Network Organization

1) Provincial Administrative Organization

Ubon Ratchathani Provincial Administrative Organization started to support the organization of emergency medical services since 2006. Dr. Wuttikrai Moongmai, former doctor of the Provincial Health Office invited Mr. Pornchai Kowasurat, former Prime Minister of the Ubon Ratchathani Provincial Administrative Organization, to jointly invest in infrastructure, such as ambulance, building, equipment, command center and several rescuers. The principles of political science were used in the project to propose support for 42 ambulances, which was in consistent with members of the Provincial Administrative Organization Council from 42 districts. This was a coordination of political interests, making the project received a unanimous vote from the Provincial Administrative Organization Council in support of the budget to providing for 42 emergency ambulances and increased to 60 ambulances in 2008.

In 2011, the Ubon Ratchathani Provincial Public Health Office requested additional support for emergency medical services from local government organizations due to insufficient numbers to serve people. Also, the meeting of the Executive Committee of the Emergency Medical Service in Ubon Ratchathani had set response time (time to notify the accident) within 10 kilometers, and 8 minutes of the time, both in urban and rural areas, when at that time Ubon Ratchathani Province performed below the target criteria. To cover the service areas and responsibility for 20,000 people / rescuer unit, and to reduce the problem of rushing operations, the Provincial Administrative Organization therefore procured 30 additional ambulances.

In 2012, Ubon Ratchathani Provincial Administrative Organization established an emergency operation unit named “Khunnatum resuscitation” to honor His Majesty the King on the 84th Birthday Celebration on 5th December 2011. Also, the Ubon Ratchathani Provincial Public Health Office and local government organizations would like to request additional support for emergency ambulance due to the insufficient number of ambulances available to service, and to develop an emergency medical service system in Ubon Ratchathani Province by expanding the network into local areas to cover every district. The Provincial Governor of Ubon Ratchathani also established a policy to implement 1 Tambon 1 Rescuer with the objective of developing a rescue service system as the preparation for responding to incidents and helping the victims correctly. Because providing emergency medical treatment for injured and sick people at the accident scene before delivering to the hospital (Emergency Medical Service) was a basic service that people should receive, Ubon Ratchathani Provincial Administrative Organization therefore procured 130 modified pickup trucks as emergency ambulances with life-saving equipment and 2 modified emergency ambulance with life-saving equipment.

In 2014, Ubon Ratchathani Provincial Administrative Organization operated an emergency operating ambulance rental project because the Ubon Ratchathani Provincial Public Health Office and local government organization requested support for ambulances to replace those with expired rental terms. Ubon Ratchathani Provincial Administrative Organization therefore procured 60 and 26 modified pickup trucks as emergency ambulances with life-saving equipment (different rental contract) and 4 modified van as emergency ambulances with life-saving equipment, totaling 90 ambulances.

In 2015 Ubon Ratchathani Provincial Administrative Organization received a request for emergency ambulance support from the Ubon Ratchathani Provincial Public Health Office and local government organization as a replacement for 110 emergency ambulances with expired rental terms. Ubon Ratchathani Provincial Administrative Organization had continued and developed the emergency medical service system. The agencies that requested emergency ambulance support from the Ubon Ratchathani Provincial Administrative

Organization must join as a network in the emergency medical service system, make a memorandum of understanding to support and promote the operation and management of Emergency Medicine of Ubon Ratchathani Province, clearly define roles and duties of each agency.

On May 2014, the Ubon Ratchathani Provincial Administrative Organization received the transfer of the Ubon Ratchathani Provincial Command Center from the Ubon Ratchathani Provincial Public Health Office. It was the first provincial administrative and incident command center in Thailand operated and managed by the Provincial Administrative Organization, which was an emergency command center for all events in addition to emergency medicine, to provide integrated public service under a system called Integrate Emergency Management System (I-EMS) to provide the maximum benefit to the people of Ubon Ratchathani. The communication technology infrastructure had been established for people to access quickly, easily, and conveniently via 1668 hotline calls that was increased from 8 lines to 50 lines. 2 lines of general fixed telephone line recorders were installed, which were sufficient for providing communication system. There was a system to control and facilitate the use of the telephone through the control cabinet, automatic PABX, Hybrid IP PBX PABX system, to record telephone numbers and conference calls, connection to other external numbers, such as 191 (police), 1129 (electricity), for people to be able to report other emergencies, service for power interruptions, fires, as well as resuscitation assistance, rescue in various areas, such as flood, no water, petrol oil running out, snake invading the house, counseling on health problems, returning the terminally patients at home (taking loved one back home project). These services would be included in only one 1669 telephone number providing 24 hours service a day. There were installations of a mobile phone system with telecommunication for base station, Very-High Frequency (VHF), Handheld Portable Station with a 5 watts transmission power, radio telecommunications equipment via the Internet (E-Radio) to connect to the radio communication system. Single Sideband (SSB), Networking (LAN), Internet System, Telephone System, Radio Communication System, Trunked Radio, Citizen Band (CB), GPS System in Vehicle Rescuers and Streaming Technology, were used with the Khunnatum rescue unit, Ubon Ratchathani Provincial Administrative Organization. Determination of the

structure and the manpower framework of the Ubon Ratchathani Provincial Administrative Organization was shown in Figure 5.28.



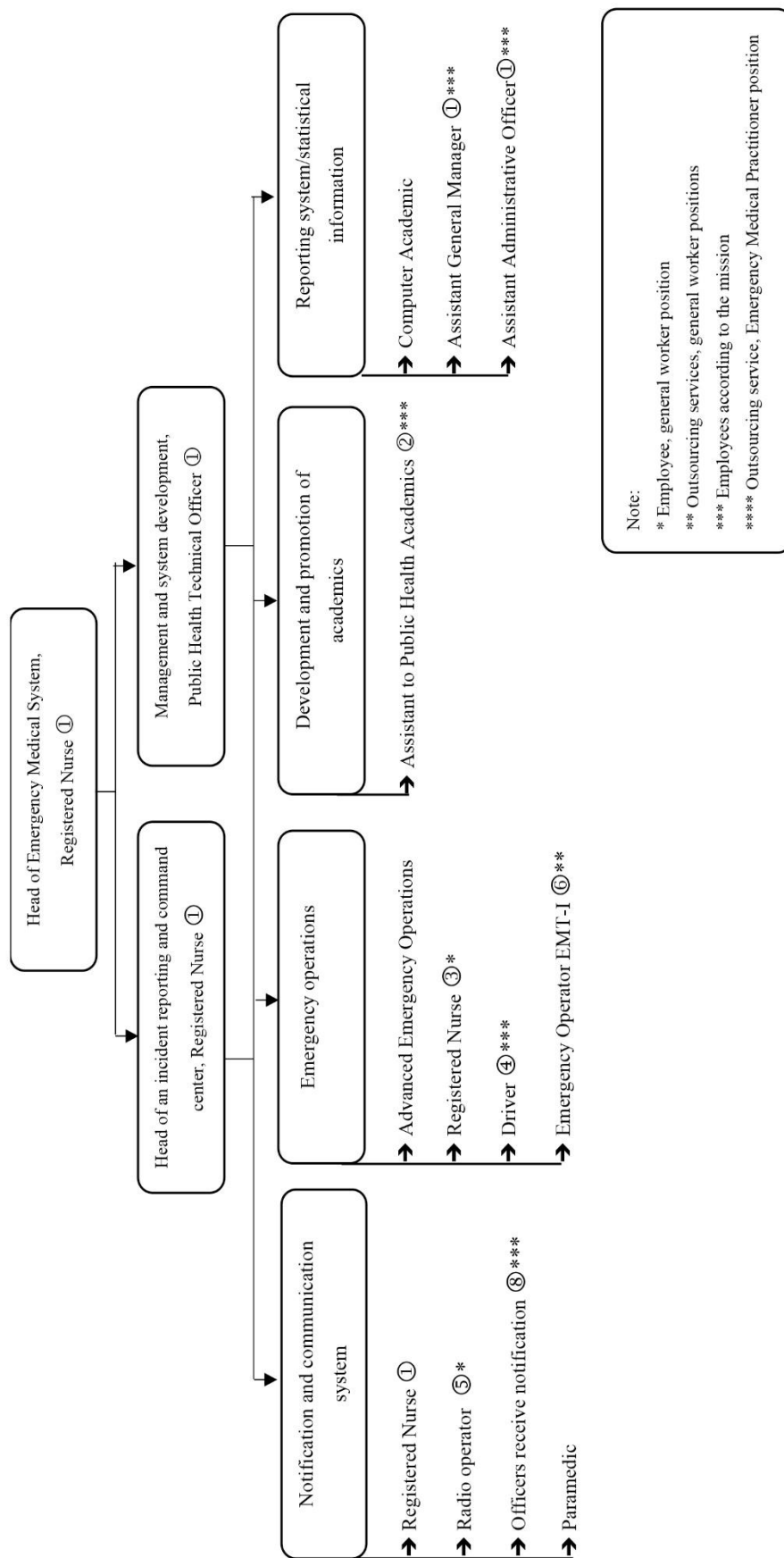


Figure 5.28 Structure and Manpower Framework of Incident Command Center, Ubon Ratchathani Province
Source: Ubon Ratchathani Provincial Public Health Office (2019).

After receiving the transfer of the administrative mission of the Ubon Ratchathani Provincial Public Health Office, the Ubon Ratchathani Provincial Administrative Organization allocated approximately 18-20 percent of its total operating budget for the management of the emergency command center and the emergency operations on a continuous basis. The details were shown in the table. The management policy of the Provincial Administrative Organization administrators' incident command center was based on the principle of responding to the needs of all service recipients. 1) People received quality, standardized and fast emergency medical services for the patients and their relatives, or the incident reporters were asked with correct, clear, complete information for the fast and correct assistance. 2) The operation units received accurate, clear, complete and fast information from the incident command center. 3) The target-to-deliver hospitals were coordinated for referral and received patient information correctly before the operation unit delivering patients to the hospitals.

“The president mentioned to answer the phone well at all time as we care about them. He gives great importance to the feelings of people. When answering the phone, always think that people are in trouble. We must care for people's feelings. We must serve the people well. Because if the phone is not answered well with bad service, people will complaint the president” (incident command center officer, Ubon Ratchathani, personal communication, September 25, 2019).

Table 5.14 Budget for Operating Emergency Medical Service System of the Ubon Ratchathani Provincial Administrative Organization List

List	2014	2015	2016
Emergency operation ambulance rental	62,332,100	65,965,540	75,656,080
Wages for service personnel at the incident command center	1,503,278	1,729,920	2,186,850
Wages for service personnel at the Khunatum resuscitation center	6,886,785	7,829,640	6,123,180
Compensation for doctors and nurses at incident command center and ALS unit	-	1,000,000	2,000,000
Cost of medical science materials	524,714	1,000,000	1,000,000
Fuel cost	2,357,679.70	541,586.40	3,020,000
Expenses for emergency medical service system development project in Ubon Ratchathani	-	-	14,521,400
Total	73,604,556.70	77,066,956.40	101,487,510

Source: Ubon Ratchathani Provincial Public Health Office (2014-2016).

Because the emergency medical work of Ubon Ratchathani Provincial Administrative Organization had been laid down by Mr. Pornchai Kowsurat, former President of the Ubon Ratchathani Provincial Administrative Organization, the Provincial Administrative Organization had a systematic operation with outstanding performance that was accepted and preferred by the public. There was an ongoing emergency medical work in the operation plan and project execution.

Although the National Council for Peace and Order (NCPO) enforced Section 44 and ordered Mr. Pornchai Kowsurat to stop performing in his position in 2015 due to the Office of National Anti-Corruption Commission (NACC) resolved to identify his offenses in the procurement of construction projects, causing a change in the management of the Provincial Administrative Organization, but the policies and projects were continually supported by the management team.

“President Pornchai knew the best about emergency medicine and EMS because he has worked since the beginning. With Section 44, he was discharged from the position. Now, the Deputy Permanent Secretary, Me. Sawat, is acting on behalf of both the president and the Permanent Secretary. Mr. Sawat knows less about EMS when compare him to Mr. Pornchai. However, it does not prevent the support provided continuously every year. The project has been implemented and continued to service for people” (professional nurse, head of the incident command center, Ubon Ratchathani, personal communication, September 25, 2019).

There were many local development projects of the Ubon Ratchathani Provincial Administrative Organization (2018 - 2022) in relation to emergency medicine. They were defined in the Strategy 4, social development and quality of life, public health programs, One Tambon One Rescue Team (OTOS) training program. The objectives of the projects were to develop knowledge and skills of rescuers in 2020, 2021, 2022 with a budget of 1,200,000 baht per year, to provide training for 120 volunteers and people in Ubon Ratchathani per year to be able to provide emergency medical care at the incident scene and before referring patient to hospitals, to have a good attitude towards emergency medical services, to be able to provide primary emergency medical services effectively, so that people have a guarantee of safety in case of disaster occurrence, and reduce losses and costs.

Emergency operating vehicle rental program provided people with quick access to emergency medical service system comprehensively and efficiently with standard. In 2018 - 2019, rented 216 modified high-roof pickup trucks as emergency operating ambulances with life-saving equipment and 4 modified vans

as emergency operating ambulances with life-saving equipment by having an allocated budget 68,476,800 baht. In 2020, rented 136 modified high-roof pickup trucks as emergency operating ambulances with life-saving equipment and 4 modified vans as emergency operating ambulance with life-saving equipment by having a budget of 26,372,160 baht. In 2021 - 2022, rented 110 modified high-roof pickup trucks as emergency operating ambulances with life-saving equipment by having a budget of 31,812,000 baht per year.

The emergency medical service system development project to provide people with quick, thorough, efficient, and standardized emergency medical service system access in 2018–2022 by allocating a budget of 4,688,000 baht/year. The project has organized activities to enhance knowledge and skills for emergency operations personnel and related personnel. There were training, meetings, seminars, and study tours of 4 models, each of which was 250 people, 1,000 people/year. In addition, there was also a conference on the network of emergency medical services in Ubon Ratchathani Province to acknowledge the results of operations, problems, and obstacles in the operation of the Ubon Ratchathani emergency medical service system for 12 times, 250 people/time, 3,000 people/year.

Emergency operations personnel rehabilitation training program to develop knowledge and skills of emergency personnel to have knowledge, skills, and experience in emergency patient assistance. This project organized training for emergency personnel in Ubon Ratchathani Province in 2018, 1,000 people/year with a budget of 4,050,000 baht. There was a training for emergency personnel in Ubon Ratchathani Province in year 2019, amount 750 people/year with budget allocation of 1,500,000 baht, and training for emergency personnel in Ubon Ratchathani Province in year 2020-2022, 1,000 people/year with a budget of 2,200,000 baht/year.

Training and study visit project for staff at Ubon Ratchathani Province incident notification center to create knowledge for staff in incident notification and command to have skills and readiness in the work as well as make recommendations in providing initial assistance to the patients and the emergency responders. This project provided training for 40 personnel at the incident notification and command center in 2018 by allocating a budget of 150,000 baht.

Emergency Operation Unit Development Program - “Water Resuscitation and Resuscitation Training Course” was to educate emergency responders to have knowledge and skills in water resuscitation and life-saving rescue by training 120 emergency personnel in 2018 with an allocated budget of 650,000 baht.

Project for renting Operation Information System (OIS), Phase 2, was to develop communication and information systems for automation system of operating emergency medicine by renting 1 Operation Information System (OIS) for 90 operating units in 2018 with an allocated budget of 2,248,686 baht.

Mass accident and disaster drills for emergency operations officers, Kunatham rescuers, and rescuers at Ubon Ratchathani Provincial Administrative Organization for the emergency operations officers, Kunatham rescuers, and rescuers at Ubon Ratchathani Provincial Administrative Organization have knowledge and skills in helping victims of mass accidents and disasters. This project organized mass accident and disaster rehearsal activities for emergency operations officers, Kunatham rescuers, and rescuers at Ubon Ratchathani Provincial Administrative Organization for 130 persons/year in 2018, 2020, 2021, 2022 with budget allocation of 200,000 baht/year.

Planting seedling project to build a network of emergency volunteers in emergency medical communities in Ubon Ratchathani Province was to build up knowledge of emergency medicine among youth with volunteerism and to practice first aid skills, lifting and moving, disaster preparedness and basic resuscitation. Workshops were organized for a total of 1,440 volunteers in 12 schools, divided in 120 volunteers per each school, including school health volunteers (Aor Sor Ror.), school health youth (Yor Sor Ror.), red-cross youth volunteers, and students interested in emergency medical work in schools under the Ubon Ratchathani Provincial Administrative Organization in 2018 - 2019, with an allocated budget of 738,400 baht per year. The workshops were also organized for 2,400 people per year, including youth and the public, in 2020-2022, with an allocated budget of 1,500,000 baht per year.

Academic Conference Project - “Exchange of knowledge to drive the emergency medical work of the local government organization in 2018” was

a platform for exchanging knowledge of the emergency medical system and supporting the application of knowledge to be applied in the operation and development of emergency medical system work in the local government organization in 4 aspects, including the personnel management, the budget management, the management of materials and equipment and the management model of the emergency medical service system of the local government organization, by organizing an academic conference for 300 participants from local government administrators, chairman of the Council of Local Government Organizations, members of the Council of Local Government Organizations, Permanent Secretary, Deputy Permanent Secretary, people who were responsible for Emergency Medicine, Local Government Organizations, administrators and people in charge of emergency medical services, Provincial Health Office, Center Hospitals and community hospitals in 2018 with an allocated budget of 500,000 baht.

The training project for the development of automation communication and information systems for emergency medical operation was to provide personnel in the operating units to have knowledge and skills in the use of automation communication and information systems for emergency medical operation, by organizing training for 3 personnel in each emergency operation unit, totaling 450 people from 150 units per year in 2019-2022 with an allocated budget of 300,000 baht per year.

2) Pho Sri Sub-District Municipality

Pho Sri Sub-District Municipality's resuscitation was established in 2006 as an emergency medical service center for patients in Pho Sri Sub-District Municipality from a total of 14 villages and nearby sick and injured patients to receive immediate assistance for 24 hours a day. Because Pho Sri Sub-District Municipality was aware of the problems of the public and intended to take action to fix them, so it coordinated for cooperation with the Ubon Ratchathani Provincial Administrative Organization, participated in the development of emergency medical service system (EMS), and created the emergency medical service system project of Pho Sri Sub-District Municipality. Its objectives were 1) to provide quality emergency medical services and delivery services for emergency and accident patients in the area for 24 hours a day, 2) to provide effective emergency and accident

services for 24 hours a day, 3) to reduce injuries, deaths and disabilities of patients or accident victims, 4) to reduce the cost of accessing public medical services.

For public relation, the Pho Sri Sub-District Municipality's rescuer units applied public relations, such as stickers, brochures, and publicity boards. The village headmen were asked for cooperation for public relations at the broadcasting hall for people to be aware of the access for assistance request by calling 1669 or direct call to the Pho Sri Sub-District Municipal Rescue Unit via the number 093-4429669, when any accident or emergency occurred. Public relations were done through the municipality's website, www.phosicity.com, as well.

Pho Sri Sub-district Municipality Rescue had supported and participated in many projects and activities with other organizations in its responsible areas and neighboring areas to promote health and create knowledge and understanding of first aid for its own operating personnel, citizens and community leaders, for example participating in a resuscitation training program with Pibun Mangsahan Hospital, the annual accident practice project of Phibun Mangsahan Hospital, the public health examination project in the area of Pho Sri Sub-district Municipality in collaboration with Nong Pho Health Promoting Hospital, the community sub-district training project in collaboration with Phibun Mangsahan Police Station, the first aid training project for members of the Civil Defense Volunteer, Sai Mun Sub-district Administrative Organization (Pho Sri Sub-district Municipality Rescue Unit, group discussion, October 23, 2019).

3) Pho Sai Sub-district Administrative Organization

Pho Sai Sub-district Administrative Organization had a policy of providing emergency medical services 1669 hotline and agreed to make an MOU between Pho Sai Sub-district Administrative Organization and the Provincial Administrative Organization. Then, the officers were sent to various trainings, for example, the Basic Emergency Operations Training Course (FR) (Pho Sai Sub-district Administrative Organization Paramedic Rescue Project) on 27-29 October 2010. After passing the training and being registered as the first emergency operator and the emergency medical service system in Ubon Ratchathani Province, the service unit was named "Rom Pho Sai Rescue Unit" and opened for public service on 27th

December 2010. There were 16 rescuers practicing and working to improve their skills at Pho Sai Hospital from 27th December 2010 to 19th January 2011.

To increase the efficiency of people accessing to emergency medical services in the area, Pho Sai Sub-district Administrative Organization had organized a public relations and resuscitation project for Rom Pho Sai to participate in community activities and gathered a budget from the National Health Security Office. The 1669 rescue network training program was organized for target people along with a map of the Rom Pho Sai Rescue Center community to view the history of emergency illnesses and the frequent accident locations to reach patients more quickly (Rom Pho Sai Rescue Unit, group discussion, October 24, 2019).

4) Khok Chan Sub-district Administrative Organization

Khok Chan Sub-district Administrative Organization had developed the Emergency Medical System Project of Khok Chan Sub-district Administrative Organization to be a public service for a good life quality of people according to the policy of the local administrative organization's administrators by including such projects in the public health work plan, the public health service and other public health works. Also, an emergency medical operation unit of Khok Chan Sub-district Administrative Organization was established by receiving a support of 1 emergency operating ambulances with life-saving equipment from the Ubon Ratchathani Provincial Administrative Organization for operation since 2011.

Khok Chan Sub-district Administrative Organization had established a committee to oversee emergency medicine operation by being affiliated in the disaster prevention and mitigation division, Office of the Permanent Secretary, Khok Chan Sub-district Administrative Organization, and selected and sent 6 personnel to attend first aid training course (FR). Upon successful completion of the training course, before the actual operation at Trakan Phut Phon Hospital, to enhance skills of the primary care practitioners and patient care takers during the referral to hospitals, the MOU was made for the emergency ambulance project with equipment to be used for the government between the Ubon Ratchathani Provincial Administrative Organization and the Ubon Ratchathani Provincial Public Health Office, issue dated 5th January 2015.

The Khok Chan Sub-district Administrative Organization had allocated expenditures annually since the commencement of the Emergency medical care in the fiscal year 2011 onwards by setting a budget in accordance with the provisions of the annual budget in the public health plan, public health service and other public health work to carry out the project organizing the emergency medical service. Also, the Khok Chan Sub-district Administrative Organization surveyed the satisfaction of the service process, service staff and equipment, tools, and facilities, and found that the overall satisfaction was very satisfied.

Activities of Khok Chan Subdistrict Administrative Organization's emergency medical operation unit consisted of visiting patients in bed in the area of Khok Chan Sub-district, organizing training on prevention of drowning for young children development center, providing knowledge of first aid, providing basic resuscitation assistance to people, participating in the accident practice with Trakan Phut Phon Hospital and the emergency paramedic in Trakan Phut Phon district, operating mobile public relations unit for emergency medical activities.

Khok Chan Sub-district Administrative Organization's emergency medical operation unit invented the "Help Map" innovation, which was the preparation of maps locating information of chronic patients, bed-bound patients, and patients at risk, by surveying and visiting patients in Khok Chan Sub-district, collecting patient information, and making plans to help patients in the case of an emergency promptly and timely, and to provide the right life support equipment according to the individual patient type. From making the map, the operation of the Khok Chan Sub-district's rescuers team was more convenient and faster for all rescuers and volunteers who cared for people with high risk of disease in Khok Chan sub-district.

Khok Chan Sub-district Administrative Organization was a model for many rescuers as a learning center for rescuers for newly established rescuers. It received the BLS Outstanding Resuscitation Award in Sub-District Level in 2018 and was selected to show the work of Emergency Operations Management at the Conference of the Local Government Organization in 2018. It was a learning and training source of preventing children from water accident for the pre-enlisted children training center. The organization participated as a learning center to drive a

network of building a livable sub-district by local communities, the Health Promotion Foundation (SSO), Khok Chan Sub-district Administrative Organization, Trakan Phut Phon District, Ubon Ratchathani Province (Khok Chan Sub-district Administrative Organization, group discussion, October 25, 2019).

5) Muang Sri Kai Sub-district Municipality

Muang Sri Kai Sub-district Municipality had received the transfer of emergency medical mission from Muang Sri Kai Sub-district Health Promoting Hospital and established a rescue unit of Muang Sri Kai Sub-district Municipality, by preparing a MOU between the Ubon Ratchathani Provincial Administrative Organization, Ubon Ratchathani Provincial Public Health Office, and the Muang Sri Kai Sub-district Municipality on 8th October 2013. For such operations, the Ubon Ratchathani Provincial Administrative Organization was a sponsor for emergency ambulances (modified high-roof pickup trucks) with equipment. Muang Sri Kai Sub-District Municipality was responsible for the management of the rescuers. Muang Sri Kai Sub-district Municipality Rescue Unit was Basic Operation Unit (BLS) located at Muang Sri Kai Sub-district Municipality Disaster Prevention and Mitigation Building, Village No. 3, Muang Sri Kai Sub-district. There was 1 emergency ambulance with 6 operating rescuers for service who were responsible for 7 sub-districts with a total population of approximately 30,000 people.

Muang Sri Kai Sub-district Municipality defined emergency medicine work under Disaster Prevention and Mitigation Division, Administrative Division, Office of the Permanent Secretary of Muang Sri Kai Sub-district Municipality, which managed tasks according to the government structure as specified by the municipality to facilitate the management. Muang Sri Kai Sub-District Municipality had established a project of an Emergency Medical Service System (EMSS) to request budget support for emergency medical operations from the municipal council with the approved budget from the municipal council annually.

Muang Sri Kai Sub-district Municipality had formulated the Emergency Medicine Strategic Plan of Muang Sri Kai Sub-District Municipality for 2017 - 2019 by including the Emergency Medical Work Project in the 4-Year Municipal Development Plan and setting the budget in the Annual Budget Ordinance

for administrative expenses of the unit, such as wages of rescuers, materials and equipment needed to perform the work, clothing costs. Muang Sri Kai Sub-district Municipality organized the workforce of rescuers by establishing an order of Muang Sri Kai Sub-District Municipality monthly. The duty was divided into 2 shifts per day, where the 1st shift started from 8:00 am - 6:00 pm, and the 2nd shift started from 6:00 pm - 8:00 pm (of the next day). Rescuers had to rotate the workforce to prevent them from working continuously for more than 24 hours.

Muang Sri Kai Sub-district Municipality Rescue Unit served people more than 1,000 times/year on an average of 100-120 times per month. The satisfaction level of the public service recipients was at the highest level, which could be accounted for 94.36 percent (data from the results of the public satisfaction assessment of the service recipients for the fiscal year 2018).

Activities and innovation of the Sri Kai Sub-district Municipality's rescuers included the innovative equipment for helping young patients named "Baby EMS Kits". It was invented and manufactured by having a Baby Long Spinal Board, Baby Splint, and Baby Hard Collar, for assistance when an accident occurred with a child victim and being able to help the suffered children more safely and effectively. The development of a Real Time Internet Communication System enabled communicate both video and audio simultaneously through an application on the Internet system between the operating unit and the command center to assess the patient's condition and provide first aid in accordance with the authority of the operator under the supervision of the medical directors with cooperation and support from the College of Medicine and Public Health, Ubon Ratchathani University.

Muang Sri Kai Sub-district Municipality Rescue Unit was awarded of the outstanding provincial rescue unit in 2016 by the Ubon Ratchathani Provincial Public Health Office in conjunction with the Ubon Ratchathani Emergency Medical Foundation. The unit was honored to be a place to study visit for students in the Politics and Governance in Democratic System for Executives, Class 21 from King Prajadhipok's Institute, led by Dr. Phairoj Boonsirikhanchai, Deputy Secretary-General of the National Institute of Emergency Medicine. It was also a place for study and visit of the Nacharoen Sub-district Administrative Organization, Det Udom District, Ubon Ratchathani Province. There was 1 operator who received a pin of

honor at a praise level 4 from the National Institute of Emergency Medicine, and 1 operator who received the award for outstanding person in emergency medical practice at the Medical Emergency Volunteer Level from the Ubon Ratchathani Provincial Public Health Office (Muang Sri Kai Sub-district Municipality Rescue Unit, group discussion, October 25, 2019).

In summary, the development of an emergency medical service system in Ubon Ratchathani Province had been developed continuously with following steps: (1) setting up a system, (2) developing together with the provincial administrative organization, (3) integrating life rescuers and disaster rescuers together as “Emergency Medical Service Center” in normal situation, as “Disaster Front Command Center” in disaster condition, and as a War Room, which consisted of emergency medicine, military, police, civilian and administrative, (4) transferring missions to local. The emergency medical service system of Ubon Ratchathani Province had performed well since many local government organizations joined the establishment of rescuers and provide emergency medical services. Receiving support in the budget and emergency ambulance from Ubon Ratchathani Provincial Administrative Organization without deceiving from Office of the Auditor General of Thailand regarding regulations for budget support and emergency ambulance rental would make the administration of the Department of Provincial Administration for the emergency medical service be more successful.

5.3.1.5 Emergency Medical Communication System, Ubon Ratchathani Province

1) Ubon Ratchathani Emergency Notification System

Ubon Ratchathani Province's emergency notification system used the number 1669 mainly. There was an Emergency Call Center, Dispatch Center, and Command and Control Center), which combined as one center at the OTOP Center, Muang District, Ubon Ratchathani Province, providing Integrate Emergency Management System (I-EMS). The communication technology infrastructure had been established for people to access quickly, easily, and conveniently via 1668 hotline calls that was increased from 8 lines to 50 lines. 2 lines of general fixed telephone line recorders were installed, which were sufficient for providing communication system. There was a system to control and facilitate the use of the

telephone through the control cabinet, automatic PABX, Hybrid IP PBX PABX system, to record telephone numbers and conference calls, connection to other external numbers, such as 191 (police), 1129 (electricity), for people to be able to report other emergencies, service for power interruptions, fires, as well as resuscitation assistance, rescue in various areas, such as flood, no water, petrol oil running out, snake invading the house, counseling on health problems, returning the terminally patients at home (taking loved one back home project). These services would be included in only one 1669 telephone number providing 24 hours service a day. Also, the operating unit in the Ubon Ratchathani Province Emergency Medical Service Network to notify an incident and assist people mainly used telephone and radio communication.

Personnel in the Emergency Medical Service Center included call taker, dispatcher, coordinator, supervisor, and medical director. The medical director would be at Sunpasitthiprasong Hospital (not stationed at the command center). The communication and information system were connected by the ITEMS system. There were 3 shifts of 8-hours duty per day, and 12 persons stationed per shift. There must be always 2 nurses on each shift. There were 6 positions of call takers and dispatchers who received incident report by telephone through the 1669 hotline. The patient information, accident location, and patient symptom would be asked and screened with preliminary instructions given before the ambulance arrived. They ordered an operating unit that was close and suitable for the emergency patient to assist the patient at the scene of the accident. Then, patients would be forwarded to coordinators, which stationed for 2 positions, to coordinate with the operation unit until successfully referred patient to the hospital by using a communication system with radio communication and telephone. There was a supervisor overseeing all staff in the center and coordinating with doctors at the hospital for a Medical Consultant.

Ubon Ratchathani Province had developed long-distance communication system (Telecom-communication). In case of critical emergency patients, the operation would be coordinated with the medical director at the hospital through the Telemedicine. The high-level ambulance of the Provincial Administrative Organization had a machine that could send heart waves, vital signs, and oxygen in the blood information. At Sunpasitthiprasong Hospital, there was a medical director

stationed for 24 hours with medical specialists on duty and ready to provide medical assistance through a telemedicine information system.

The 1669 helpline was for emergency cases only. If the recipient noticed that the call was not an emergency case, the case would be switched to the non-emergency response officer, which was another section in the center and was also a consultation section as it took time to answer each call. There was one more section that was the radio station, which listened to media emergencies through radio communications from other volunteers and was not informed by telephone 1669 to perform emergency assistance in another way. Considering the selection of an emergency response unit usually was within 10 km. The maximum distance was about 30 km, where the ALS-level emergency ambulance could reach the scene within 8 minutes. The Provincial Administrative Organization had set up its own network of emergency parking spots that were distributed into 4 stops for the officer to station there. 4 spots were still insufficient for the Provincial Administrative Organization, but there were currently just the 4 ambulances. When referring the patient to a hospital, the center's work would end with the recording and storage of the data in the ITEMS and Google Drive systems, as well as receiving the operational team performance report as shown in Figure 5.29 (Head of the Command Center, Ubon Ratchathani Provincial Administrative Organization, personal communication, September 25, 2019).



Receiving Emergency Medical Notification and Command, Ubon Ratchathani

When received a notification from the agency's telephone, internal number, 1669 hot line, ambulance phone number or radio communication, to accept an accident, the case must be reported back to the center to request for operation. It took time to receive and inquire information about gender, age, congenital disease, and patient symptoms within 2 minutes. With agreement of Ubon Ratchathani Province, the patient in a remote area, regardless of whether the condition was severe or not, must be picked up by an EMS ambulance, which took about 30 minutes. The center would send an FR-level operation unit located in or near the accident scene for a preliminary assessment. There must be a method of transferring vehicles on the way to check the patient symptoms and check the transfer point. If there was no rescuer ambulance near the scene of the accident, the relative would be instructed to perform CPR while waiting for the operation team. The average time taking to arrive the scene was within 8 minutes (10 minutes since received the phone call). Choosing whether to use a BLS or ALS ambulance vehicle was evaluated based on the patient's condition. After arrived at the incident scene, the patient would be re-evaluated to see if the condition were as described or not, and report call back to the center. If the patient had changes in condition, it must be reported back to the center. As standard, there would be 2 times of call back to the center. The method of transferring the patient would follow the standard by lifting the patient's head and feet sides. If it were necessary to request for another co-operation unit, report would be made to notify the incident notification and command center for coordination. Also, in case of wanting to consult a medical director, the doctor would assess the patient's symptoms via application, and command the treatment via phone. For a red level emergency patient assistance, Warin Chamrap Hospital's ALS operation unit, which was a M1-level general hospital with 210 beds and 4 emergency physicians, would be a jointly went on site operation always providing emergency medical services (Ubon Ratchathani Emergency Medical Operation Unit, personal communication, September 25, 2019).

The operating unit in the incident area would be commanded by the incident command center, responded using radio communication, and notify the command center again when leaving the base of operations. When the operating unit reached the accident site, the patient would be assessed for the symptom, treated at the

accident site, and reported back to the center with the patient's condition. In case of needing assistance, the center would coordinate with the relevant departments, destination hospital and consulted with the medical director to provide initial treatment advice. The red level critical emergency patient would be referred to the nearest hospital, while the yellow level or green level critical emergency patient would be delivered to the hospital according to the right of treatment or the hospital requested by the patient or relative. The operating unit would notify the center when leaving the incident scene and when sending the patient to the destination hospital. The emergency responders reported symptoms and treatment to the primary care emergency room nurse in words and writing report that would be submitted to the ITEMS system within 24 hours (the paramedics of the Provincial Administrative Organization of Ubon Ratchathani, group discussion, September 25, 2019).

Ubon Ratchathani Provincial Administrative Organization's incident command center consisted of 1 nurse, 6 medical emergency workers, 8 emergency medical volunteers (40 hours of EMR training), 2 emergency medical volunteers (16 or 24 hours of FR training), 1 emergency operator, 19 hired workers who had duties to receive incident notification and command the dispatch of emergency medical ambulances and provide assistance to the emergency patients with high-level director type (head of the incident notification and command center, Ubon Ratchathani Province, personal communication, September 25, 2019).

Training project and field trip to visit officers at Ubon Ratchathani Command Center to gain knowledge of incident notification and command, skills, and readiness to perform the operation, as well as to introduce basic assistance to patients and emergency patients. The training was organized to 40 officers at the command center in 2018 by the Provincial Administrative Organization allocating a budget of 150,000 baht. Most of the budget for the notification center was received from the Ubon Ratchathani Provincial Administrative Organization. The Provincial Administrative Organization had allocated a budget for the management of the incident command center and emergency operation units continuously for approximately 18-20 percent of the total budget for operation. There was a training project and field trip to visit officers at Ubon Ratchathani Command Center to gain knowledge of incident notification and command, skills, and readiness to perform the

operation, as well as to introduce basic assistance to patients and emergency patients. The training was organized to 40 officers at the command center in 2018 by the Provincial Administrative Organization allocating a budget of 150,000 baht. Also, there was a project for renting Operation Information System (OIS), Phase 2, was to develop communication and information systems for automation system of operating emergency medicine by renting 1 Operation Information System (OIS) for 90 operating units in 2018 with an allocated budget of 2,248,686 baht. In addition, there was a training project for the development of automation communication and information systems for emergency medical operation was to provide personnel in the operating units to have knowledge and skills in the use of automation communication and information systems for emergency medical operation, by organizing training for 3 personnel in each emergency operation unit, totaling 450 people from 150 units per year in 2019 - 2022 with an allocated budget of 300,000 baht per year. With the budget allocated by the Provincial Administrative Organization for the development of the emergency medical system continuously, the incident command center had never used the budget allocated from the National Institute of Emergency Medicine at all (head of the incident command center, Ubon Ratchathani Province, personal communication, September 25, 2019).

To provide people with an understanding of the use of emergency medical services and be able to correctly report incidents, which would enable the emergency response center to send rescuers and help patients accurately and quickly, and to increase the survival rate of patients, therefore hospitals and paramedics in Ubon Ratchathani publicized the Emergency Medical Operation Unit, using stickers, brochures, publicity signs, asked the village headman for cooperation, and publicized the news distribution hall to launched a mobile public relations unit for emergency medical activities (personnel in the incident command center, rescue Unit of Sunpasitthiprasong Hospital, Rom Pho Sai Rescue Unit and Muang Sri Kai Sub-district Municipality's Rescue Unit, personal communication, and group discussion October 25, 2019).

Most people knew that they could report an emergency via 1669 hotline from seeing a variety of publicity, such as stickers, voice calls, stickers, posters, and vinyl banners. They felt that making an emergency call could be quick

and easy, but still wanted the phone number to be less in numbers, maybe 3 digits, which would make it easier to remember. Also, the command center should call back to the number that was called from time to time for accuracy and speed in picking up the patient at the incident scene. Some of them had experience of asking for help and did not have an ambulance to pick them up. Some needed staff to assist them at the scene without referral to any hospital (if the symptom was not severe). When they could go home by a doctor after completed the examination is complete, they would like to have a vehicle to send them back home as well, because most of the patients did not have good financial status. They wanted the patient referring vehicle to be a van from the hospital because the modified pickup truck was small and inconvenient, with no equipment inside the car. More adequate ambulances and equipment should be provided. There should be more preparedness and readiness for handling accidents (service users from calling 1669 and relatives of emergency patients, emergency room, Sunpasitthiprasong Hospital, personal communication, September 27, 2019).

2) The Communication Technology Infrastructure

Had been established for people to access quickly, easily, and conveniently via 1668 hotline calls that was increased from 8 lines to 50 lines. 2 lines of general fixed telephone line recorders were installed, which were sufficient for providing communication system. There was a system to control and facilitate the use of the telephone through the control cabinet, automatic PABX, Hybrid IP PBX PABX system, to record telephone numbers and conference calls, connection to other external numbers, such as 191 (police), 1129 (electricity).

Emergency medical communication system to report incidents and direct orders to the operating unit in the Ubon Ratchathani Province Emergency Medical Service Network to issue an incident to help people. PAO has installed a mobile phone system with radio telecommunication for base stations , Very-High Frequency (VHF) system, Handheld Portable Station with a transmission power of not more than 5 watts, and E-Radio to connect communication systems for radio communication systems Single Sideband (SSB), LAN, Internet System, Telephone System, Radio Communication System, Trunked Radio, Citizen Band (CB) radio, GPS system in the vehicle of rescuers, and Streaming Technology system used with the Kunatham rescuers of the Ubon Ratchathani Provincial Administration Office.

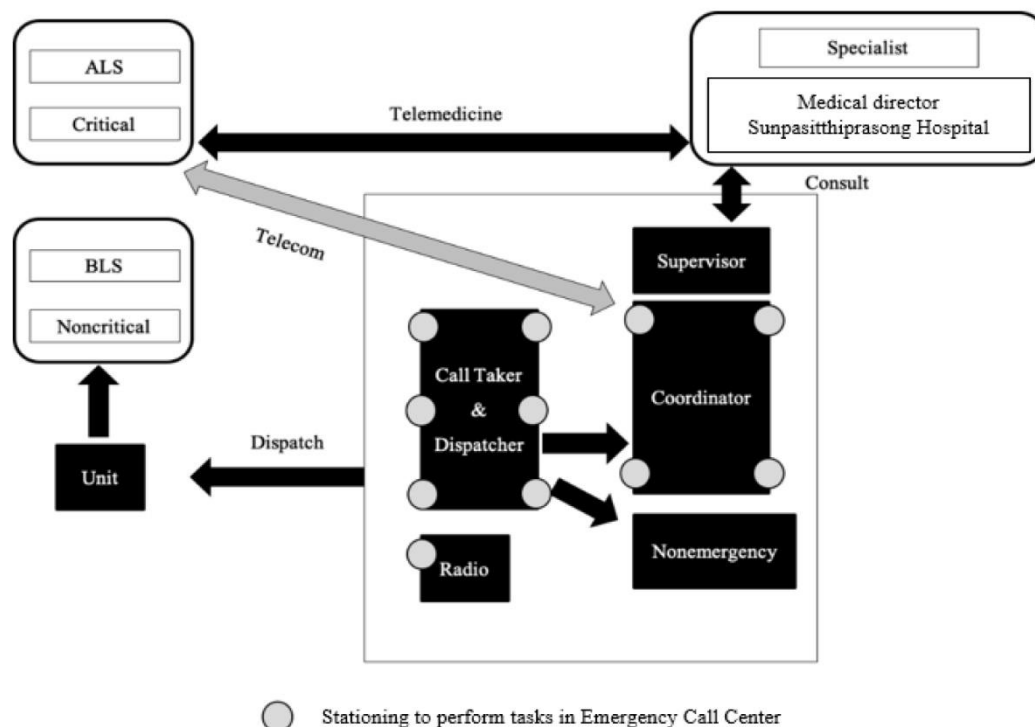


Figure 5.30 Position Arrangement for Each Personnel Duty in Ubon Ratchathani Provincial Incident and Command Center

Ubon Ratchathani Province incident notification center has 5 people working at the same time, totaling 12 people in the morning (8:00-16:00) and afternoon (16:00-24:00), and 9 people in the late night (24:00-8:00). There are five types of command center personnel: 1) Doctor 1 person who serves as a Medical Director. Emergency Medicine Physician at Sappasitthiprasong Hospital is not at the center but receives a consultation through the phone 24 hours a day. 2) Supervisors 2 people. 3) Emergency medical dispatcher 1 person. 4) Co-Ordinator 1 person. 5) Call Taker & Dispatcher 7 people in the morning and afternoon, and 5 people at night. Operational positions for individual personnel in the notification and command center are arranged to facilitate communication between each other, as shown in Figure 5.30.

The Ubon Ratchathani Provincial Administrative Organization has planned and prepared a project to install a telemedicine system for all ALS-level ambulances in Ubon Ratchathani Province using a private company software.

However, Dr. Phairoj Bunsirikhamchai, Deputy Secretary-General of the Institute of Emergency Medicine, advised that the use of software by private companies is expensive and requires a budget of 1 million baht or more and there is a limitation if the device has to be changed or developed according to technology advances, it will be difficult to implement because it requires the operator of the same company, and the medical equipment included in the system, each of which is unnecessary and overlapping, and does not have a vibration-dampening standard in the vehicle. If emergency telemedical direction system developed by National Science and Technology Development Agency (NSTDA) in collaboration with TOT and Kasetsart University is used, it will be cheaper; it is around 300,000 baht and it is software that is not copyrighted. Ubon Ratchathani PAO conducts a trial run of the emergency telemedical direction system and it is selected to be a pilot province to use operation information system, ITEMS version 3 developed to have ability in supporting the operations of emergency medical services units in helping patients. It can identify the scene of an incident accurately using call center information service (CIS) system. People just make a telephone call through a regular telephone system, no need to call through Application, coordinates of patients' location will be known. Discrepancy is not greater than 7 meters. Meanwhile, there is a system supporting decision-making on selecting the nearest and the most appropriate emergency medical services unit to the scene of an incident and patients' symptoms. All ambulances are installed GPS tracking system and telemedicine unit which can connect to a medical director. Physicians will know vital signs, electrocardiography of patients, see patients through a camera and retrieve fingerprints to check patients' health information to provide a medical treatment to patients in a timely manner. Next, there will be a staff member who monitors the operations to give advice and coordinate with the nearest and the most appropriate hospital to the scene of an incident and patients' symptoms until patients are delivered to the emergency room of that hospital. The information taken placed during the operations of helping patients will be sent based on real-time online, which can be used to analyze and support assistance for patients to get out emergency speedily and accurately, being potential development of emergency medicine in Ubon Ratchathani (Chief of Ubon Ratchathani Emergency Notification and Command Center, personal communication, September 25, 2019).

The Emergency Notification and Command Center prepared a manual and standard of operations for personnel working in the Emergency Notification and Command Center. Nurses being on duty at the Center are appointed to work and develop the quality of the Center. Training projects are regularly providing every year for restoring and giving knowledge to personnel working at the Center including setting up a budget to purchase devices and equipment and develop the communication system of the Center. A summary of operational performance about the number of patients from receiving notification is published on Facebook of Ubon Ratchathani Emergency Notification and Command Center every month for acknowledgement of people and relevant persons (Chief of Ubon Ratchathani Emergency Notification and Command Center, personal communication, September 25, 2019).

Commanding to urge emergency medical services units start the operations is clear without ambiguity. Workers' feeling is considered by avoiding using the term "command" and changing to "dispatch" so that they do not feel they are ordered or being subordinates of the Emergency Notification and Command Center. The Emergency Notification and Command Center has good relationship with all emergency's medical services units since the mission of the Center management have been transferred from the Provincial Public Health Office to Ubon Ratchathani PAO for more than 5 years. Systems are set and activities are organized to build harmony among emergency medical services units and the Emergency Notification and Command Center such as holding a monthly meeting of emergency medical services unit networks, yearly training for restoring knowledge to personnel in emergency medical services units, setting up LINE group for communication among personnel related to the provincial emergency medicine system including supporting emergency ambulances and equipment to emergency medical services units, making it accepted by personnel in the emergency medicine system (Chief of Ubon Ratchathani Emergency Notification and Command Center, personal communication, September 25, 2019).

3) Communication to Send Information among National Institute for Emergency Medicine

Emergency Notification and Command Center and emergency medical services units is done through ITEMS system. Emergency Notification and Command Center and Provincial Public Health Office monitor the recording of information in the system after emergency medical services units start the operations. The sending and receiving information about service receivers in emergency rooms of government hospitals to Ministry of Public Health is done through IS Online through the file “ACCIDENT” in the 43 folders system.

The monthly meeting between local administrative organization paramedic service unit networks and foundations is held by PAO. It is an important forum for informal and formal discussion among emergency medical services networks in order to inform or clarify news or incidents that personnel in the emergency medicine system of Ubon Ratchathani should know, to teach or give academic knowledge, to propose and persuade relevant agencies to participate in emergency medical services, to make decision on doing something related to emergency medicine, and to correct dispute or incomprehensibility arising among emergency medical services units or agencies related of emergency medicine. However, physicians, personnel from the Provincial Public Health Office and ALS-emergency medical service units of hospitals do not participate this meeting regularly. They will attend the meeting when there is an agenda related to them or when they are invited by PAO. Communication through monthly meeting of the Provincial Public Health Office is attended by participatory hospitals, making communication between personnel and organizations under the emergency medicine network lacks accuracy and completeness. The important thing is a lack of academic opinions from physicians and medical personnel who are important persons and leaders of knowledge about caring patients and managing the emergency medicine system.

Communication among National Institute for Emergency Medicine and agencies related to Ubon Ratchathani emergency medical services (Provincial Public Health Office, Emergency Notification and Command Center and emergency medical services units) is done through issuance of rules, regulations, and standards in writing, holding of academic meetings, holding a forum for opinion sharing, and conducting an on-site inspection for supervision and visiting. Communication for teaching or giving formal academic knowledge to emergency

medical services units is done in the form of meeting, academic training held by the Provincial Public Health Office, Sunpasitthiprasong Hospital and PAO.

Communication in Ubon Ratchathani to make known to public about access to emergency medicine system and collaboration in supporting the operation of paramedic services is implemented by hospitals , Provincial Public Health Office, PAO and local administrative organizations that provide emergency medical services by preparing public relations media for communicating with and giving knowledge to people in the area in the form of leaflets, stickers, roadside signs, public relations signs, public address system, community radio, training, community meeting, voice recording of dialect having a variety of content such as characteristics of services which include the 1669 hotline, qualifications of emergency medical services units that are correctly trained, nurses and fully equipped ambulances. The important thing is the service to deliver emergency patients to hospital is free. Besides, a song is composed with a catch phrase saying, “whenever emergency illness occurs, don’t forget to call Ubon paramedic services”.

Provincial Public Health Office and PAO are the major agencies responsible for preparing necessary data and information to be ready for use so that personnel and people can access that information properly. They can access information about the emergency medicine system from Ubon Ratchathani Provincial Public Health Office. (2019) and Ubon Ratchathani Provincial Administrative Organization (2020). respectively that show various information such as operational performance of emergency medical services units, projects related to emergency medicine system, award-winning work (Ubon Ratchathani Public Health physician, personal communication, September 25, 2019).

Though Ubon Ratchathani publicized the emergency medical service number 1669, some people lack understanding and decide to go to a hospital by themselves. They give reasons that their symptoms do not seek emergency care and they can take care of themselves. They think driving their own car to a hospital will be more convenient and faster. They feel Emergency Notification and Command Center asks too many questions, wasting their time. They are not aware of benefits they will receive from going to hospital by emergency medical services (Relatives of

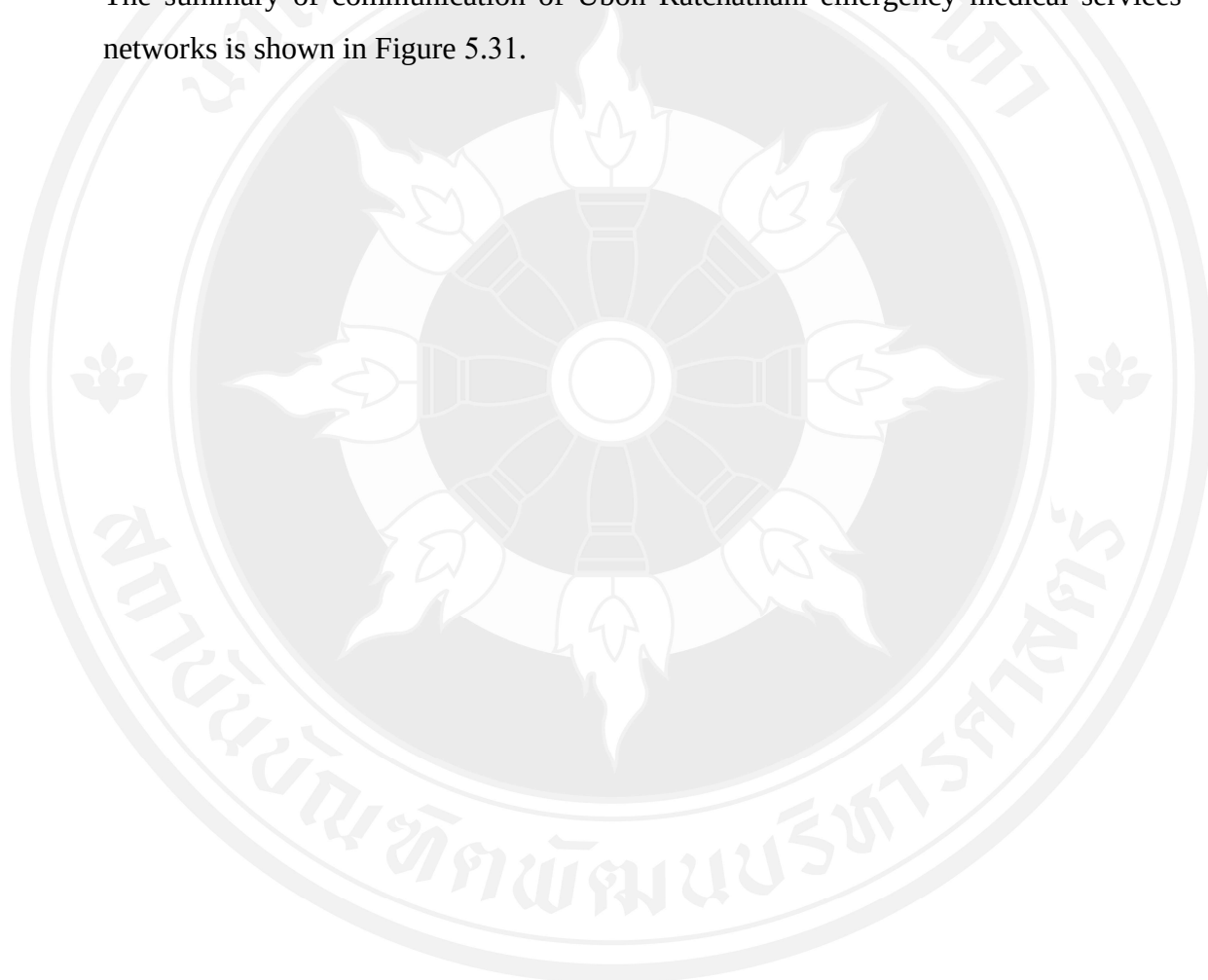
patients in emergency room, Sunpasitthiprasong Hospital, group discussion, September 27, 2019).

Ubon Ratchathani emergency medical services do not cover the whole area, making some people do not receive emergency medical services adequately. They were refused services and received bad experience from using the 1669 services, making them refuse to use the 1669 emergency medical services next time.

“My grandmother is unconscious, I call 1669 but they said there’s no ambulance to pick her up. I must ask my neighbor who is a nurse to drive us to a hospital. I will not call 1669 any longer.” (Relative of patients in emergency room, Sunpasitthiprasong Hospital, personal communication, September 27, 2019).

Emergency Notification and Command Center uses communication radio to ask emergency medical services units to perform the operations so that all emergency medical services units can hear thoroughly and equally. Now, Ubon Ratchathani is a pilot province to start using emergency telemedical direction system developed by National Science and Technology Development Agency (NSTDA), TOT and Kasetsart University. Operation information system (OIS) is used to help identify the scene of an incident accurately in conjunction with a system supporting decision-making to choose the emergency medical services unit located nearest to the scene of an incident and most appropriate to patients’ symptoms for performing the operations to help patients. Next, there will be a staff member who monitors the operations to give advice and coordinate with the nearest and the most appropriate hospital to the scene of an incident and patients’ symptoms until patients are delivered to the emergency room of that hospital. The information taken placed during the operations of helping patients will be sent based on real-time online, which can be used to analyze and support assistance for patients to get out emergency speedily and accurately. Digital communication radio system is used which can facilitate both analog and digital operations. Radio frequencies are arranged by NBTC Thailand for using in the tasks of emergency medicine; 4 HF, 11

VHF, 4 UHF. They are frequencies granted to emergency medicine agencies and emergency medical services personnel. It is a way to solve the old problem that NBTC granted only 11 frequencies to Ministry of Public Health while the frequencies were not specifically assigned for emergency medical services, making the frequencies were not sufficient. Many provinces received notifications of incidents, made a command, or communicated during the operations by sharing the same frequency, being unable to use it legally (Chief of Ubon Ratchathani Emergency Notification and Command Center, personal communication, September 27, 2019). The summary of communication of Ubon Ratchathani emergency medical services networks is shown in Figure 5.31.



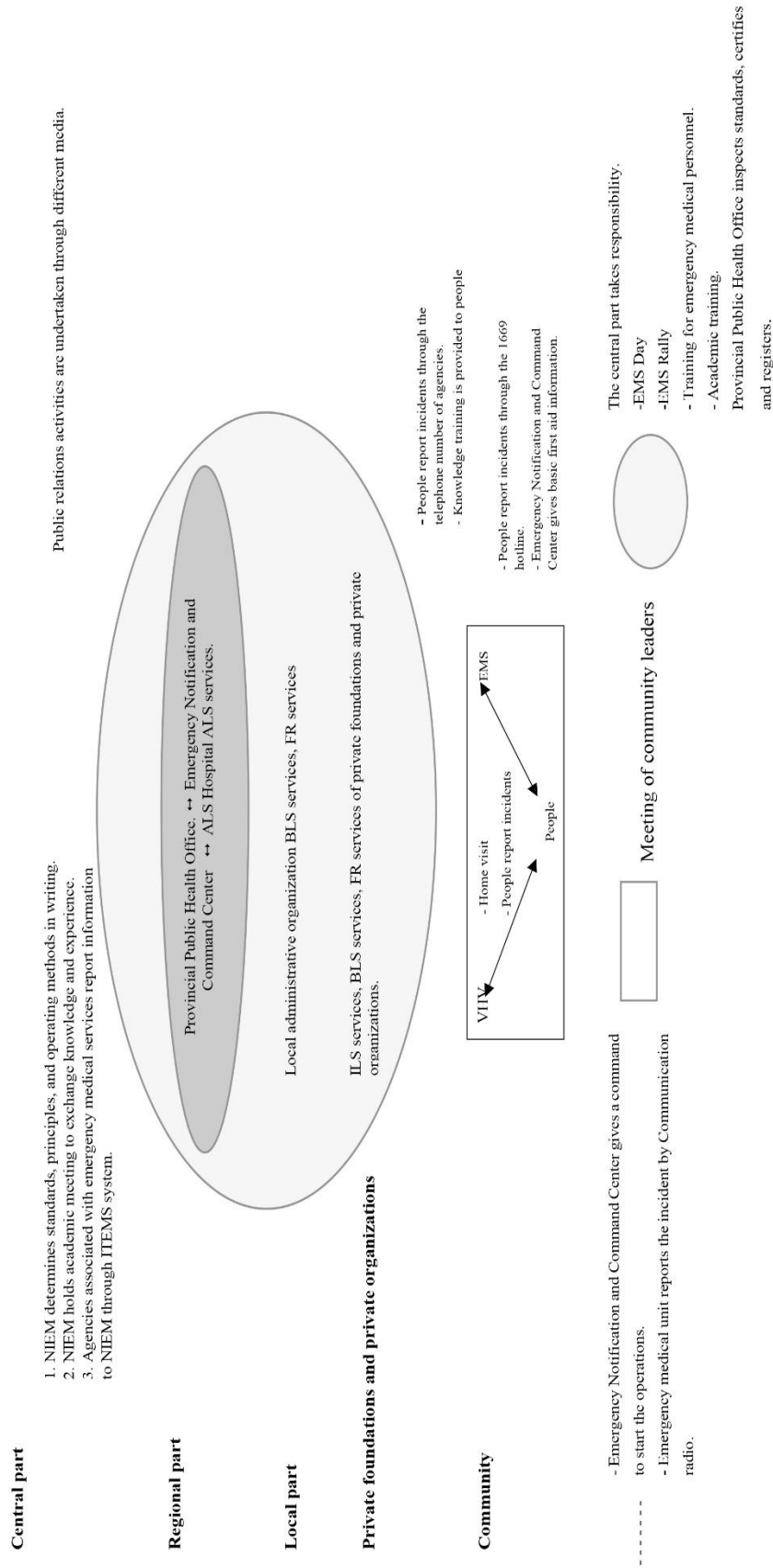


Figure 5.31 Communication of Ubon Ratchathani Emergency Medical Services Networks

5.3.2 Management Effectiveness of Ubon Ratchathani Emergency Medical Services Networks

In this research, the researcher measured management effectiveness of emergency medical services networks in Ubon Ratchathani by considering the following:

1) Access to Emergency Medical Services

Access to emergency medical services is the way that people with sudden or critical illness receive emergency medical services by a standard emergency medical unit at the scene of incident to hospital by a command of Emergency Notification and Command Center, considering from critical emergency patients through Ubon Ratchathani emergency medical services (EMS) in the past one year accounted for 16.99% (National Institute for Emergency Medicine, 2020), lower than the goal set by Ministry of Public Health and NIEM. (Ministry of Public Health set the goal in the fiscal year not lower than 26% while NIEM set it not lower than 20%. Details of percentage of critical emergency patients (at emergency room) from Ubon Ratchathani EMS, classified by fiscal years are shown in Figure 5.32.

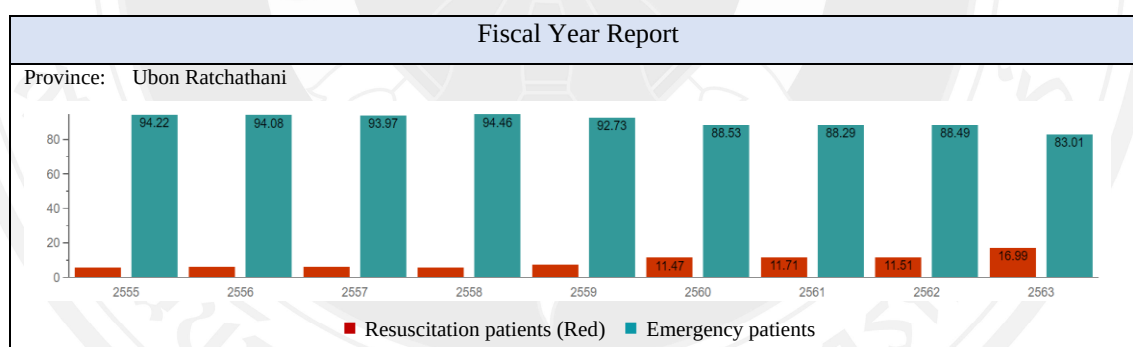


Figure 5.32 Percentage of Critical Emergency Patients (at Emergency Room) from Ubon Ratchathani Emergency Medical Services, Classified by Fiscal Years

Source: National Institute for Emergency Medicine (2020).

About coverage of emergency medical units in each area, Ubon Ratchathani has 25 districts, 220 sub-districts. ALS units are in every district. Today there are 28 ALS units, 1 ILS unit in Kaeng Kheng sub-district, 52 BLS units, and 136 FR units. The sub-districts that have FR units cover 57.73% of the whole sub-districts. There are 133 local administrative organizations registered emergency medical services, accounted for 56% but not only 46 local administrative organizations can perform the actual operations, accounted for 35% of the local administrative organizations that are registered since many local administrative organizations lack emergency ambulances. There are 31 emergency medical services units of foundations/associations that perform the operations within the province. Ubon Ratchathani has 236 vehicles for emergency medical services divided into 3 ALS pickup trucks, 1 ILS pickup truck, 48 BLS pickup trucks, 132 FR pickup trucks, 31 ALS vans, 16 BLS vans and 5 FR vans. (National Institute for Emergency Medicine, 2020).

The proportion of red triaged emergency patients delivered by ALS units in 2019 of Ubon Ratchathani was 213.83 per 100,000 population. (National Institute for Emergency Medicine, 2020).

The proportion of red triaged emergency patients, delivered by ALS units, per 100,000 population of Ubon Ratchathani, classified by fiscal years in Figure 5.32 indicates that the number of emergency patients delivered by ALS units increased rapidly from 63.64 per 100,000 population in 2015 to be 111.97 and 169.28 per 100,000 population in 2016 and 2017, respectively. But after 2017 to 2019, the proportion of red triaged emergency patients delivered by ALS units seemed to increase since emergency ambulances that PAO supported by a rental method were expired and the rental method could not be used because Office of the Auditor General of Thailand objected to the use of rental method as it was not worth, emergency ambulances should be provided by purchasing. It took time for preparing regulations and implementing, making many emergency medical services units are deprived of emergency ambulances.

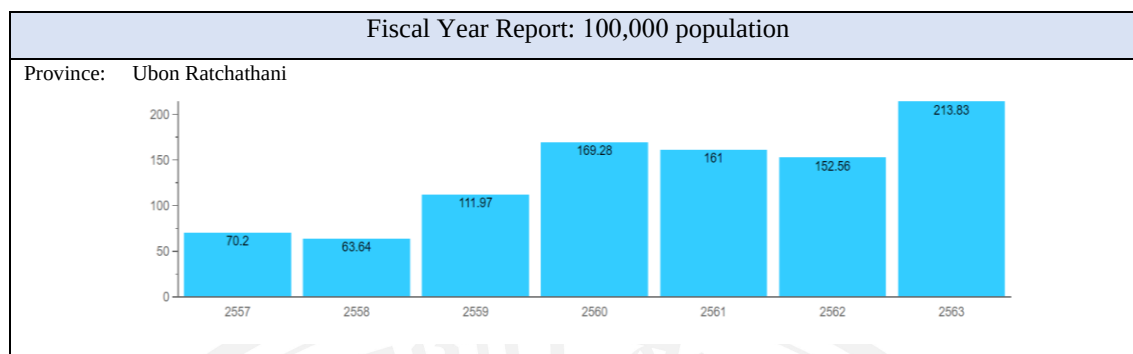


Figure 5.33 The Proportion of Red Triaged Emergency Patients, Delivered by ALS Units, per 100,000 Population of Ubon Ratchathani, Classified by Fiscal Years.

Source: National Institute for Emergency Medicine (2020).

Currently, Ubon Ratchathani has insufficient number of emergency medicine personnel. Consideration of the number of population and the size of the area found that Ubon Ratchathani is deprived of emergency medicine physicians, emergency nurse practitioners and paramedics while personnel in other positions change their jobs frequently because they are included as permanent staff, receive low remuneration and feel their jobs are insecure.

From the information mentioned above, it can be concluded that critical emergency patients in Ubon Ratchathani from the emergency medicine system are lower than the criteria set by Ministry of Public Health and National Institute for Emergency Medicine. Though PAO allocated the budget and personnel for Emergency Notification and Command Center management, supported budgets, equipment and emergency ambulances to emergency medical services units, provided training for reviewing and restoring knowledge to emergency medical service personnel regularly including preparing memorandum of understanding among local administrative organizations in order to provide emergency medical services to comprehensively cover the whole area of the province, the problem regarding regulations of renting emergency ambulances makes the support on the ambulance lack continuity. In addition, personnel in the emergency medicine system are not sufficient while some local administrative organizations registered to provide emergency medical services cannot perform the operations since they are deprived of

personnel and emergency ambulances, making the number of emergency medical services units do not cover the whole area of the province.

2) Death Rate of Emergency Patients

Consideration of effectiveness of emergency medical services networks from the death of critical emergency patients of Ubon Ratchathani in the past one year, based on the outcome of primary care treatment, it is found that 195 persons died at the scene of incidents, accounted for 0.41% and 7 persons died during delivery to hospital, accounted for 0.01%. Results from hospital treatments found that 667 persons died in hospital, accounted for 1.39%, 29 persons died at home, accounted for 0.06%. Death rate within 24 hours of patients undergoing treatment in secondary care hospitals (F2) or higher levels was 7.99% (National Institute for Emergency Medicine, 2020). The goal in the fiscal year 2019 of NIEM and Ministry of Public Health was lower than 10% (National Institute for Emergency Medicine, 2018a).

Accuracy of telephone triage in emergency patients in the past one year was found lower than severity (under triage) compared to at a hospital by 21.28% and higher than severity (over triage) compared to at a hospital by 13.95% (National Institute for Emergency Medicine, 2020). From the Figure showing percentage of telephone triage in critical emergency patients compared to at a hospital in accordance with fiscal years 2012-2020 found that they were under triage and over triage was lower than 30%. American College of Surgeons Committee on Trauma recommends an under-triage rate below 5% and an over triage rate 25-50% (Mohan et al., 2014).

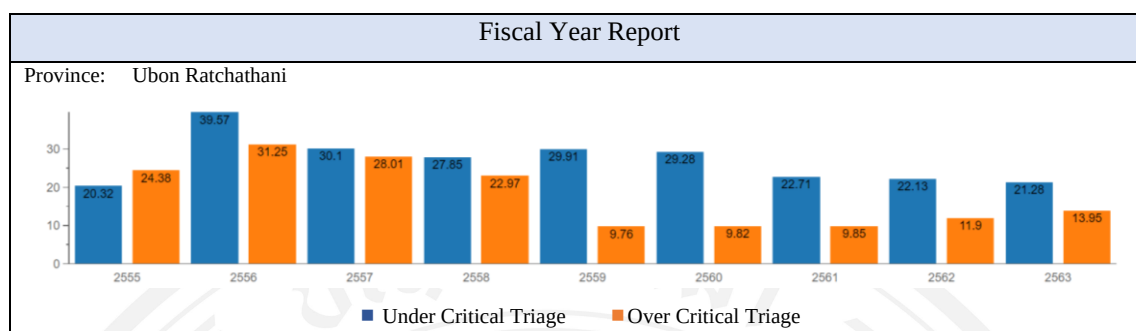


Figure 5.34 Percentage of Telephone Triage Identifying Critical Emergency Patients (Under and Over Triage) of Ubon Ratchathani, Classified by Fiscal Years

Source: National Institute for Emergency Medicine (2020).

Ubon Ratchathani critical emergency patients received emergency medical services within 8 minutes in 2019 were 48.84% (National Institute for Emergency Medicine, 2020). NIEM determines the standard of performance measurement in 5 levels: Level 1 = 43 - 45.9%, level 2 = 46 - 48.9%, level 3 = 49 - 51.9%, level 4 = 52 - 54.9% and level 5 = 55 - 100%. Details of percentage of Ubon Ratchathani critical emergency patients receiving emergency medical services within 8 minutes, classified by fiscal years are shown in Figure 5.35.

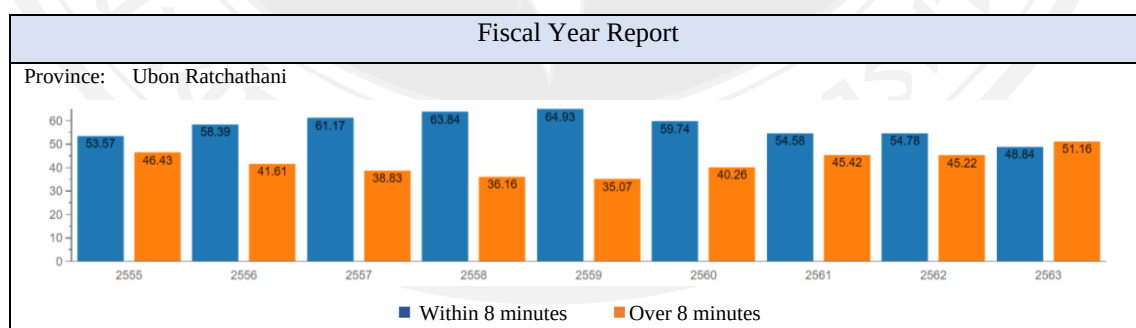


Figure 5.35 Percentage of Ubon Ratchathani Critical Emergency Patients Receiving Emergency Medical Services within 8 Minutes, Classified by Fiscal Years

Source: National Institute for Emergency Medicine (2020).

Communication between Emergency Notification and Command Center and emergency medical units to perform their operations in helping emergency patients is carried out speedily within 8 minutes. The major devices used in the communication are communication radio and telephone. Emergency telemedical direction system is used for managing receiving notification of incidents, dispatch, and medical managerial implementation. A snapshot of electrocardiography (ECG) is taken every 1 minute. Digital radio communication is used to increase communication efficiency among emergency medical services networks in the province.

3) Perception of News and Information about Emergency Medical Services

Perception of news and information about emergency medical services is considered from calling the 1669 hotline when emergency illness occurred in Ubon Ratchathani in the past one year. It was found that emergency patients called the 1669 hotline by 93.05% (National Institute for Emergency Medicine, 2020). Ubon Ratchathani was at the level 5 (NIEM determines the standard of performance measurement in 5 levels: Level 1 = 70%, level 2 = 72.5%, level 3 = 75%, level 4 = 77.5%, level 5 = 80% or higher. Ministry of Public Health determines the standard of emergency performance within 12 months in fiscal year 2019 not below 95.5%). Details of Ubon Ratchathani emergency patients reporting incidents through the 1669 hotline, classified by fiscal years 2012-2020 are shown in Figure 5.36.

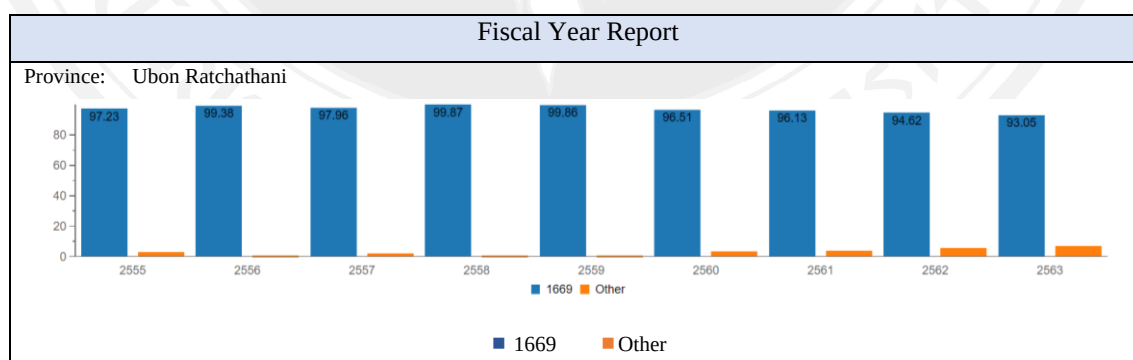


Figure 5.36 Percentage of Emergency Patients Reporting an Incident by Emergency Number 1669 in Ubon Ratchathani Province Classified by Fiscal Year

Source: National Institute for Emergency Medicine (2020).

The Provincial Public Health Office, hospitals, PAO, municipalities, SAO, foundations, and private associations publicize the notification of emergencies or accidents in the same direction. All emergencies can be notified through the 1669 hotline, making people understand and have preparedness in calling 1669 as soon as they confront emergencies by themselves or when they see other people are in an emergency incident. They are confident that calling the 1669 hotline is free and they are confident in services they are going to receive, making more than 90% of emergency patients notify incidents using the 1669 hotline.

4) Perception and Understanding of People about Emergency Medical Services

All agencies providing emergency medical services in Ubon Ratchathani conduct public relations to raise people's awareness through different channels such as preparing advertisement signs, radio communication, leaflets, television, newspaper, stickers and CD to let people know that the 1669 hotline can be used to notify all types of emergency, not only emergency illness, including notifying incidents or asking for help like fire, power outage, flood, water is not running, snake getting into house, bring a loved one back home and people are able to seek advice for health problems over the telephone from registered nurses and public health personnel. In the beginning phase of the policy, public relations were highly conducted in all types of media, but later public relations are done specifically by penetrating groups of patients with chronic diseases who frequently have an emergency chance.

“Pho Sai SAO publicizes 1669 by using leaflets, radio, sticker, calendar to get to a lot of people. VHV, community leaders prepare a community map in Paramedic services center so that they will know where there are patients with chronic diseases, where there is a chance for frequent emergency incidents or where there are frequent accidents to get to patient faster.” (Chief Executive of Pho Sai Sub-district Administrative Organization, personal communication, October 24, 2019).

“In Kokjan SAO, there are advertisement signs, public address system, mobile services give knowledge about doing first aid and CPR to people, mobile public relation units.” (Medical Emergency Staff, Khok Chan Subdistrict Administrative Organization, personal communication, October 25, 2019).

As people are made widely known that the 1669 hotline can be used to notify all types of emergency, people can easily understand. CPR training is provided to people continuously. Most people perceive, understand, and choose to call 1669 when emergency incidents occur and most of them receive good experiences from using the 1669 services.

“No matter what’s happen, call 1669, PAO will take care of us, we can call 24 hours. Call takers speak nicely. They ask a lot, but we understand. By that time, my brother’s motor bike turned upside down in front of Suree Hotel, after calling it took around 5 minutes waiting for them to pick him up and deliver him to a hospital.” (Relative of emergency patient in Ubon Ratchathani, personal communication, September 27, 2019).

“1669 can be called for every matter. They give sticker to us for attaching somewhere. When I turn on the radio in the morning, I hear the advertisement. I jot down the number on a calendar, but I’ve never called but if an emergency occurs, I think I will call.” (People in Kaeng Khoi district, personal communication, October 9, 2019).

“When my motorbike got an accident and turned upside down, I called 1669. A pickup truck picked me up. They reached me very fast. I think a pickup truck is faster than a van. I came with them and felt safe as he did not drive fast.” (Emergency accident patients in Ubon Ratchathani, personal communication, September 27, 2019).

From quantitative and qualitative data mentioned above, Ubon Ratchathani emergency medical services networks have a moderate level of effectiveness. Patients died from emergency accidents were in a small number. Most local administrative organizations give collaboration in providing emergency medical services, especially PAO gives the support in terms of budgets, equipment, devices, and ambulances. However, many local administrative organization emergency medical services units cannot perform actual operations since they are deprived of personnel, personnel are not included as permanent staff, making them their jobs are insecure and they change their jobs frequently. Besides, the rental contract of ambulances supported by PAO is ended and PAO cannot extend the contract any longer due to government regulations. Therefore, the number of medical emergency services units cannot cover the whole area of the province. Furthermore, access to emergency medical services in critical emergency patients and critical emergency patients who initially receive emergency medical services within 8 minutes is lower than the set goal.

After Ubon Ratchathani PAO is transferred Emergency Notification and Command Center management from the Provincial Public Health Office in 2014, the operations are run in a good shape. Meanwhile, notification of all types of emergency incidents given to the only one number, 1669, is easy for people to remember. Most people recognize the number and use emergency medical services when an emergency incident occurs. A budget is provided, and training projects are prepared to review and restore knowledge of personnel in Emergency Notification and Command Center regularly, making telephone triage in emergency patients more accurate. Communication equipment used in the emergency medicine system are developed to meet efficiency, up-to-date and proper to current use. In this regard, communication among Emergency Notification and Command Center, emergency medical services units and Medical Director is convenient, fast, and accurate, enabling patient to have a higher chance to survive. Moreover, nurses working in Emergency Notification and Command Center of local administrative organizations are included as permanent staff and they have a chance to grow in their career more than those who are affiliated to Ministry of Public Health, encouraging them to have willingness,

devotion, sacrifice, pride in their career, they feel secure in their career and have organizational commitment.

The success of Ubon Ratchathani emergency medical services networks is partially from executives of regional public health agencies, PAO and Ubon Ratchathani Governor who view the importance by setting emergency medical services as a policy with the support on budgets and personnel. Provincial public health physicians give importance to building emergency medical services networks to save people's lives. Collaboration is made with local administrative organizations, especially Ubon Ratchathani PAO that helps support a budget, devices and equipment, ambulances, training to increase and restore knowledge for personnel in the emergency medicine system continuously. Currently, the budget for emergency medicine management in Ubon Ratchathani comes from PAO budget.

Furthermore, importance is given to personnel in the emergency medicine system. Doctor Wuttikrai Mungmai, former Ubon Ratchathani provincial public health physician donated 200,000 baht in 2008 as a fund for establishing an emergency medicine foundation in Ubon Ratchathani. It is the first foundation in Thailand established to encourage morale and motivation of paramedics and personnel working in the emergency medicine system. It is a welfare fund giving to families of paramedics who die and personnel who have outstanding performance, commitment, great effort, sacrifice as a role model in paramedic services.

A factor affecting Ubon Ratchathani emergency medical services networks not to have effectiveness as they should do is partially from absence from a joint meeting of regional public health agencies, local administrative organizations, private foundations, and associations that provide emergency medical services, civil defense volunteers and other relevant agencies like the police. It is an important thing in building strength, maintaining, and expanding the networks. Though PAO holds a meeting of paramedic services networks every month, representatives from the Provincial Public Health Office and hospitals do not attend the meeting while Provincial Public Health Office monthly meeting is attended by hospital personnel, causing a lack of communication, participation in opinion exchange, mutual solving of ongoing problems and affecting relationship and harmony of organizations in the networks.



5.4 Sa Kaeo Province

5.4.1 Operating Process Sa Kaeo Emergency Medical Services Networks

5.4.1.1 General status of Sa Kaeo Emergency Medical Services

1) Background of Sa Kaeo Emergency Medical Services

Pre-hospital emergency medical services are carried out in collaboration with Sawang Sa Kaeo Thammasathan Foundation Rescue Service, Sawang Tiang Thammasathan Foundation, Aranyaprathet Rescue Service Foundation and Sa Kaeo Ruam Katanyu Foundation. Notification of emergency incidents are reported directly by victims of incidents or onlookers, paramedic networks, community leaders, provincial police stations and Narenthorn EMS Center through communication radio or agency telephone numbers. Later, when the Emergency Medicine Act, B.E.2551 (2008) was enforced on 7 March 2008 with the establishment of National Institute for Emergency Medicine (NIEM) to take charge of management and coordination with relevant agencies in both government and private sectors. It was determined to have one notification and command center for emergency medicine in each province. Sa Kaeo Crown Prince Hospital (Somdej Phra Yupparat Sa Kaeo Hospital), provincial general hospital, established Emergency Notification and Command Center and provided emergency medical services units to help patient outside the hospital known by the name “Yupparat Sa Kaeo Paramedic Services” (Registered nurse, Senior Professional Level, Head Nurse Emergency Medical Services, Sa Kaeo Crown Prince Hospital, personal communication, November 4, 2019).

At the early stage, the Emergency Notification and Command Center was managed by Sa Kaeo Crown Prince Hospital. It received notification of incidents through the telephone number 1669 called within Sa Kaeo province and communication radio, and ordered emergency medical services units of government hospitals, private foundations and associations to perform the operations in providing pre-hospital medical services to injured persons from accidents and emergency patients including delivering those patients to appropriate hospitals in order to have medical treatments in a timely manner (Registered nurse, Senior Professional Level,

Head Nurse Emergency Medical Services, Sa Kaeo Crown Prince Hospital, personal communication, November 4, 2019).

Later, Mr. Songyot Thienthong, Chief Executive of Sa Kaeo Provincial Administrative Organization was interested in emergency medical services. He aimed to help Sa Kaeo people who suffer from emergency illness outside hospital to be able to survive safely. He studied information about emergency medical services by himself and made an appointment to have informal discussion with Secretary-General of National Institute for Emergency Medicine and Sa Kaeo public health physicians to propose collaboration between PAO and regional public health in managing emergency medical services for people in Sa Kaeo province. Sa Kaeo public health physician agreed with this idea and was pleased that Sa Kaeo PAO would join the emergency medical services management due to the understanding of restriction of regional public health in terms of budgets and personnel that make emergency medicine system unable to be developed if it did not receive support and collaboration from local administrative organizations. From that discussion, it led to formal collaboration as PAO supported the budget for emergency medicine (Chief Executive of Sa Kaeo Provincial Administrative Organization, personal communication, November 7, 2019).

In 2010, Sa Kaeo PAO in collaboration with Sa Kaeo Provincial Public Health Office assigned Sa Kaeo PAO to be the location of the central administration center for emergency medical services and emergency life support. Provincial hospital and community hospital were the co-administration center. Sa Kaeo PAO gave a fully equipped emergency ambulance to Sa Kaeo Crown Prince Hospital Co-Administration Center, Aranyaprathet Hospital Co-administration Center, Wang Nam Yen Hospital Co-Administration Center and Ta Phraya Hospital Co-administration Center (Chief Executive of Sa Kaeo Provincial Administrative Organization, personal communication, November 7, 2019).

In 2016, Sa Kaeo PAO established Sa Kaeo PAO Paramedic Services and provided 2 fully equipped ambulances and gave to Sa Kaeo Crown Prince Hospital Co-Administration Center and Klong Hat Hospital Co-administration Center, 1 ambulance per each hospital. On 23 May 2016, Sa Kaeo Governor arranged a memorandum of understanding on implementation and management of emergency

medical services among Sa Kaeo PAO, National Institute for Emergency Medicine, Sa Kaeo Provincial Public Health Office, Sa Kaeo Provincial Police, Sa Kaeo Crown Prince Hospital, local administrative organizations and all paramedic foundations and associations in Sa Kaeo to make collaboration and support the implementation and management of the emergency medicine system according to the Emergency Medicine Act B.E.2551 (2008) (Chief Executive of Sa Kaeo Provincial Administrative Organization, personal communication, November 4, 2019).

In 2017, Mr. Jeerawut Thongtot, previously worked as a registered nurse and staff of Communication and Command Center of Samut Prakarn Hospital (now he is transferred to work at Sa Kaeo PAO as a registered nurse, professional level affiliated to Division of Public Work), was assigned to help set up the system of emergency medical services and prepare readiness of management of Emergency Notification and Command Center of Sa Kaeo PAO by using his knowledge, ability and experience accumulated by the time he worked at the Communication and Command Center of Samut Prakarn Hospital until Sa Kaeo PAO has readiness and confidence in taking charge of Emergency Notification and Command Center management. In this regard, Emergency Notification and Command Center has been moved from the supervision of Sa Kaeo Crown Prince Hospital to be under supervision of Sa Kaeo PAO since 1 November 2017. It is the Emergency Notification and Command Center managed by provincial local administrative organization, the 5th number of Thailand. It is affiliated to Division of Public Work for the convenience in managing communication technology and vehicles. Sa Kaeo Paramedic Services perform the operations to help emergency patients in the areas of responsibility. Sa Kaeo PAO specifically determines mission of Emergency Notification and Command Center in receiving notification and making command of emergency medical services for implementing basic first aid, taking care of patients outside hospitals and delivering and transferring emergency and acute patients to the most appropriate and nearest hospital only, other emergency incidents are not included such as rescue, fire or traffic since it is a province where local administrative organizations have a low level of preparedness. PAO needs to bear almost all emergency medical services. In the meantime, PAO lacks readiness in extending mission of the Emergency Notification and Command Center. Moreover, Sa Kaeo

province has the context of rural areas more than urban areas (Registered nurse, Professional Level, Chief of Sa Kaeo Emergency Notification and Command Center, personal communication, November 4, 2019).

In 2019, Sa Kaeo PAO moved Emergency Notification and Command Center to a new building at Tha Kasem sub-district, Muang district. It was built to be Emergency Notification and Command Center building and learning center for developing management and operations of the emergency medicine system in Sa Kaeo to achieve more efficiency (Registered nurse, Professional Level, Chief of Sa Kaeo Emergency Notification and Command Center, personal communication, November 4, 2019).

2) General Status about the Process of Sa Kaeo Emergency Medical Services

Sa Kaeo is a border province and a location of special economic zone. It is developed and a province being at risk of public dangers, traffic accidents, flood, landslide, chemicals, and violence along borderlines. Sa Kaeo Provincial Public Health Office determined operational strategies for emergency medicine during 2018-2021 in 4 aspects as 1) development of emergency medicine to meet standards, 2) development of potential and seamless participation of networks within the province, outside the province and international level including extending emergency medical services networks to cover the whole area, 3) public communication and channels to access emergency medical services and 4) elevation of preparedness for handling public dangers (Sa Kaeo public health physician, personal communication, November 18, 2019).

Sa Kaeo has 9 hospitals affiliated to Office of the Permanent Secretary Ministry of Public Health; 1 hospital is a provincial general hospital, 1 small-sized general hospital, 7 community hospitals. Besides, there are Sakaeo Rajnagarindra Psychiatric Hospital, Fort Surasinghanart Hospital, 2 municipality public health service centers, 107 sub-district health promoting hospitals, 3 health stations and 1 private hospital (Kasemrad International Hospital Aranyaprathet).

Sa Kaeo comprises 9 districts and emergency medical services networks are divided into 3 zones, i.e., zone 1 – Sa Kaeo Crown Prince Hospital, Wattana Nakhon, Khao Chakan; zone 2 – Wang Nam Yen, Klong Hat, Wang

Somboon; zone 3 – Aranyaprathet, Ta Phraya and Khok Soong. Hospitals, foundations, and local administrative organizations work in an integrated manner. Each hospital will oversee networks in districts using a mentor model. Sa Kaeo PAO manages the Provincial Emergency Notification and Command Center and sets up the system for being able to implement as required by standards. Provincial Public Health Office authorizes hospitals in the areas to monitor and evaluate standards and academic approach.

Health Region 6 consists of Chonburi, Rayong, Chanthaburi, Trad, Samut Prakarn, Chachoengsao, Prachinburi and Sa Kaeo. It is the region giving importance to emergency medicine system. Development strategies are determined at the regional level in 3 aspects, namely, medical direction system, maritime emergency care system and emergency aeromedical service. The important goal is to increase access to emergency medical services, to reduce death rate caused by emergency incidents and to develop the emergency medicine system to meet standards. The medical direction system management in Health Region 6 is particularly useful and important to Sa Kaeo emergency medicine system. The context of Sa Kaeo is a province that its PAO is strong. Emergency Notification and Command Center is an emergency medical service unit – managerial type managed by Sa Kaeo PAO, but it is deprived of medical directors. There is only one emergency medicine physician who is the medical director and is not being on duty at the Emergency Notification and Command Center all the time. The management of medical direction system of Health Region 6 aims to achieve the quality emergency medicine system, safety among patients and emergency medical personnel. Prachinburi is determined to be a focal point. Health Region 6 is divided into 3 zones, 1) mountain zone comprises Prachinburi and Sa Kaeo, 2) Eastern economic corridor (EEC) zone comprises Chonburi, Rayong, Chachoengsao and Samut Prakarn and 3) sea zone comprises Chanthaburi and Trad. Meanwhile, operating procedures (EMS Protocol) are prepared for caring emergency patients outside hospital with 6 significant diseases, i.e sudden cardiac arrests, chest pain, limb weakness, multiple trauma, head injury and exposure to toxins. Emergency medical service accreditation is provided (Thailand EMS Accreditation). The above-mentioned system can solve the problem of medical director shortage in Sa Kaeo.

After the Emergency Notification and Command Center was transferred to be under supervision of Sa Kaeo PAO in 2017, Sa Kaeo emergency medical services started to develop rapidly. The goal is to develop the emergency medicine system of Sa Kaeo to meet international standards and to develop the Emergency Notification and Command Center to be Smart Dispatch Center with professional management and fast rescue team full of high responsibility. Sa Kaeo province gives importance to access to people. Emphasis is placed on comprehensive public relations plans and sufficient equipment. The telephone number for receiving emergency notification of Emergency Notification and Command Center is expanded from 2 to 30 coaxial cables. Today, emergency incidents can be notified using video call so that emergency medical services units can evaluate primary injuries. Emergency incidents are also notified through 1669 Application. Development of emergency notification is conducted using “AI EMS” (AI Assistive Platform for Emergency Medical Services). It is a system that processes symptoms and screens patients from voice signal to be letters using 1-3 minutes. After that, the AIEMS will send the information to emergency call takers to prepare the nearest ambulance appropriate to patients’ symptoms classified into 3 colors, i.e. red tag means immediate-critical patient, yellow tag means semi-urgency patient, and green tag means non-urgency patient, be able to screen and process 25 groups or emergency symptoms such as difficulty breathing, dyspnea, cardiac arrest, chest pain, environmental emergency, headache, exposure to toxins, overdose, pregnancy, giving birth, unconsciousness, being assaulted, etc., reduce a problem related to insufficient number of service workers and other disturbances, enabling to provide services to patients in a comprehensive manner.

Mr.Songyot Thienthong, Sa Kaeo Provincial Administrative Organization viewed that patients or persons suffering from emergency incidents were deliver to a hospital by persons with little or no knowledge, causing them do not get help correctly according to academic principles. In this regard, they possibly have more severe symptoms or disability or die. Some patients were delivered in a delayed manner. Therefore, he thought that local administrative organizations should have ambulances to pick up injured persons or emergency patients including modern life support equipment in a sufficient number to services. Consequently, PAO provides

ambulances equipped with life support equipment to 9 hospitals, 9 districts, local administrative organizations, and foundations in the province continuously. Recently in 2020, Sa Kaeo PAO purchased ambulances equipped with modern life support equipment and installed patient monitor ECG and gave to Khao Chakan Hospital, Wattana Nakhon Hospital and Ta Phraya Hospital.

In 2019, Sa Kaeo PAO and Sa Kaeo Provincial Public Health Office made a memorandum of agreement in developing the emergency medicine system by providing and installing automated external defibrillator (AED) for all sub-district health promoting hospitals (100%). Each unit can perform self-test and report situation which can be used every day. Telemedicine system was provided and installed in ALS-ambulances and telemedicine center in emergency rooms is developed to reach standard quality, helping the only one emergency medicine physician of Sa Kaeo by that time able to assess symptoms and give a treatment through a camera installed in an ambulance and able to send information to the executives and persons related to commanding in a fast and accurate manner.

Currently, there are 99 registered emergency medical services units comprising 12 ALS units, 23 BLS units and 64 FR units (sub-district health promoting hospital-8 units, foundation/association-36 units and local administrative organization – 20 units). There are 147 registered and standard certified ambulances (21 ALS ambulances/8 BLS ambulances/ 118 FR ambulances). Four rescue service foundations are Sawang Sa Kaeo Thammasathan, Sawang Tiang Thammasathan, Aranyaprathet rescue and Sa Kaeo Ruam Katanyu. There are 1,074 members who received group accident insurance 2018 coverage (the insurance covered from 1 October 2018 to 1 October 2019), 532 staff/relatives of staff.

Network expansion to local administrative organizations-In the fiscal year 2018, there were local administrative organizations registered in the emergency medicine system by 95.45%. They passed the indicator criteria of National Institute for Emergency Medicine (indicator criteria are set at 85% or more). All local administrative organizations in Ta Phraya district and Wang Somboon district were 100% registered. However, only 28.57% of registered local administrative organizations implemented/organized emergency medical service activities. Ta Phraya network had 100% comprehensive implementation, followed by Wang Nam

Yen network-71.43% and Klong Hat network-42.86% respectively (Sa Kaeo Provincial Public Health physician, personal communication, November 18, 2019).

Percentage of local administrative organizations being able to provide emergency medical services is in a small number (19%). Though local administrative organizations asked for registration that they wish to join the networks by 95.45%, the most important reasons are a shortage of budget in providing ambulances, personnel including changes in the management team, giving rise to changes in policies and the implementation of emergency medicine that cannot be continuous. A measure to solve such problems is making an analysis of coverage in areas where the services cannot be accessed, determining proactive strategies by building relationship, identifying advantages and disadvantages directly to the management team. Principally, most local administrative organizations give collaboration which can be evaluated from their registration. Now, it is in between encouraging and supporting local administrative organizations to manage the emergency medicine system in a tangible manner (Sa Kaeo provincial public health physician, personal communication, November 18, 2019).

5.4.1.2 Sa Kaeo Emergency Medical Services Units

1) Emergency Medical Services Units – managerial Type

Sa Kaeo PAO was transferred emergency medical services units-managerial type or Sa Kaeo Emergency Notification and Command Center from Sa Kaeo Crown Prince Hospital on 1 November 2017. It is the 5th Emergency Notification and Command Center of Thailand that is implemented and managed by PAO. It is Emergency Call Center, Dispatch Center and Command and Control Center, one stop service. It performs its duty by receiving notification of all types of medical emergency, analyzing situation, commanding, and dispatching. It monitors administration and medical approaches. It is located at Emergency Notification and Command Center building, Tha Kasem sub-district, Muang district, Sa Kaeo province. Sa Kaeo emergency medical services units are classified in the advanced level (The 2019 Notification of Emergency Medicine Committee on types, levels, authority and duty, scope of responsibility and restriction of emergency medical services units, emergency medical services units – managerial type are classified into 3 levels; basic, advanced, and advisory levels: Royal Thai Government Gazette,

2019). It receives notification of emergency incidents, coordinates, dispatches, and monitors administration to enable emergency patients to receive advanced level medical services according to regular orders and medical orders. Medical Director is not available, but advice can be sought from an emergency medicine physician in Sa Kaeo Hospital (emergency medicine physician responsible for being the only one Medical Director of the province).

The vision of Sa Kaeo Emergency Notification and Command Center is “standard border emergency medical services that respond to emergency patients in a comprehensive, timely, and borderless manner”. The mission is “emergency medical services that passed the standard determined by National Institute for Emergency Medicine, connect to emergency operations, respond to emergency patients during normal and disaster circumstances in a comprehensive and timely manner by strong emergency medical services networks that mainly adhere to emergency patients”. The major goal is to reduce disability and death from emergency illness, reduce death rate of pre-hospital emergency patients and to reduce complications from improper operations of emergency medical services. Sa Kaeo Emergency Notification and Command Center has the concept and commitment to be developed to become Smart Dispatch Center.

The management team of Sa Kaeo Emergency Notification and Command Center comprises Chief Executive of the PAO, Deputy Chief Executive of the PAO, Chief Administrator of the PAO and Director of the Division of Public Work. The supervision structure of Sa Kaeo Emergency Notification and Command Center comprises Director of Division of Public Work is Chief Supervisor of Emergency Notification and Command Center, Chief of Division of Machinery is Deputy Supervisor of Emergency Notification and Command Center, registered nurse, professional level is Chief of Emergency Notification and Command Center. Personnel in Emergency Notification and Command Center consist of registered nurse, professional level, being Chief of Emergency Notification and Command Center, paramedics, communication staff, emergency call taker and emergency medical technician. Currently, there are 15 persons working in Emergency Notification and Command Center. Five persons work at the same time divided into 3 shifts. Each shift takes 8 hours. All personnel are affiliated to Division of Public

Work. However, Chief Executive of the PAO set a plan to establish Division of Public Health for Emergency Notification and Command Center management and opened a chance for the nurse being the Chief of Emergency Notification and Command Center to have career growth in management field to expert level. The number of staff working in Emergency Notification and Command Center is not enough. Consequently, some staff members need to work for more than 8 consecutive hours. The structure of administration and personnel working at Sa Kaeo Emergency Notification and Command Center is shown in Figure 5.25.

“At the moment we do not have Division of Public Health. The emergency notification and command center are under supervision of Division of Public Work. We will establish Division of Public Health soon. The nurse who is the chief of the center we will promote her to reach C9, expert level, or to work in management field.” (Chief Executive of Sa Kaeo PAO, personal communication, November 18, 2019).

“Personnel working in the center are not enough. Now we have 15 persons, 5 persons working in each shift. Each shift takes 8 hours. Persons working here do not stay long. Before they get in the job, they thought it is cool as they have a chance to appear on media or accompany Chief Executive of the PAO, have a chance to post their pictures on social media. But when they work, they meet a lot of documents, bureaucratic processes at work. They get bored and finally resign from work. They need to love and understand this job to stay here.” (Emergency call taker, Sa Kaeo Emergency Notification and Command Center, personal communication, November 18, 2019).

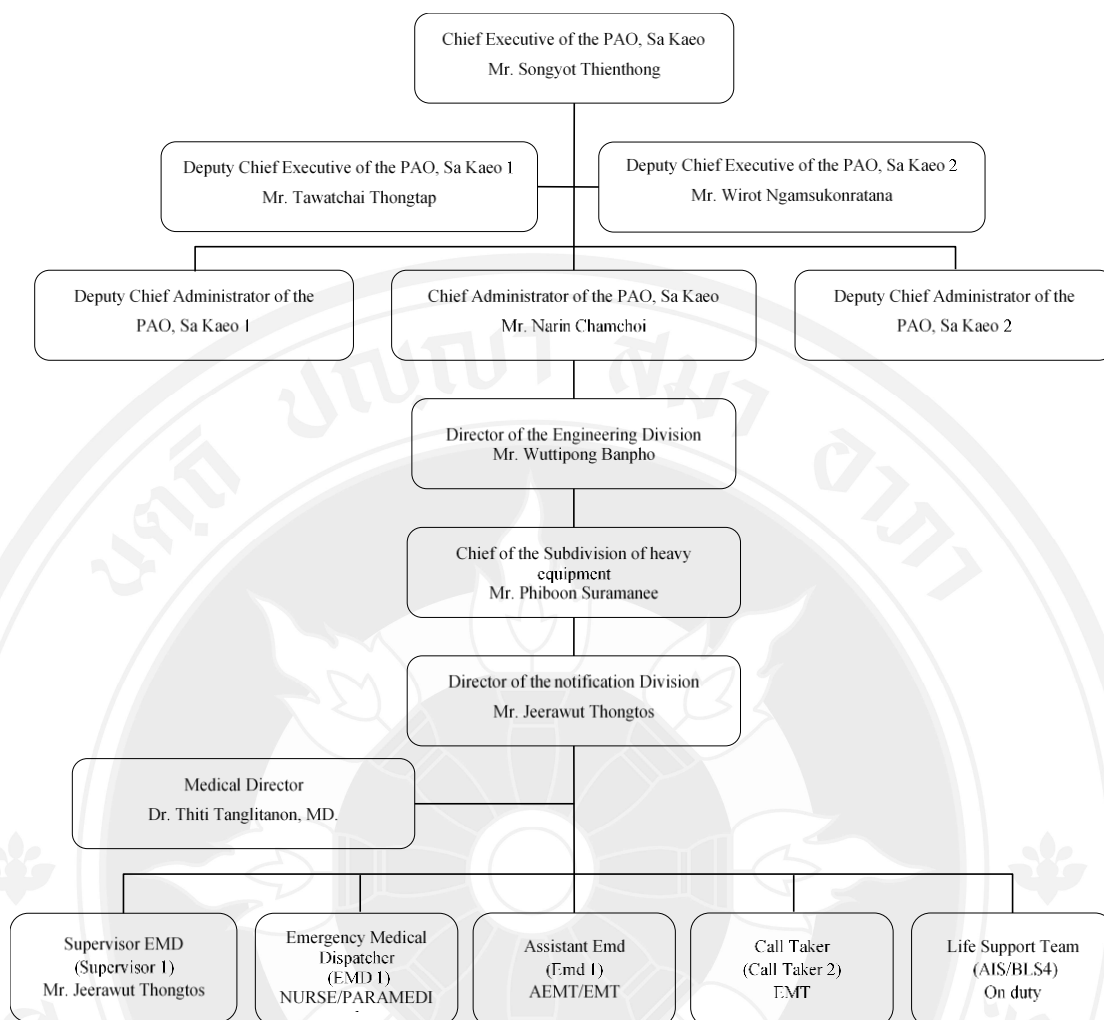


Figure 5.37 The Structure of Administration and the Number of Personnel Working at Sa Kaew Emergency Notification and Command Center

Source: Documents supplementing the establishment of Provincial Emergency Notification and Command Center, Sa Kao Provincial Administrative Organization.

Sa Kao Emergency Notification and Command Center receives notification of incidents through the number 1669, government communication radio, 245MHz two-way red walkie talkie, citizen band channel 69, and Thai EMS 1669 Application made by NIEM. Besides, video call can be used to notify emergency incidents, making the Emergency Notification and Command Center able to initially assess injury situations. Upon receiving notification of

incidents, emergency call taker will ask 5 questions as determined by NIEM, namely, take history of patient, asking for the scene of an incident, telephone number, caller's name, neighboring areas, a place to be obvious or noticeable, characteristics of incidents such as vehicle falling off the road, car collision, what type of vehicle? and ask patient's symptoms. Asking all the questions will take around 90 seconds. Each shift is provided with a paramedic or nurse who works as commander. There are 3 paramedics who take turn working in each shift at Sa Kaeo Emergency Notification and Command Center, 1 paramedic/shift. Previously, analog telephone was used for receiving notification of incidents. Commander could listen to the notification at the same time emergency call taker did and was able to make decision, making the command was fast. If commander would like to have additional information, the emergency call taker was told to ask further information immediately, but commander could not interrupt a phone conversation. Now, it is changed to digital telephone. Commander is unable to listen to a phone conversation at the same time as emergency call taker. Now it is improved by Thailand Institute of Scientific and Technological Research to enable commander to listen to a phone conversation at the same time like in the past (Registered nurse, professional level, Chief of Sa Kaeo PAO Emergency Notification and Command Center, personal communication, November 4, 2019).

When Emergency Notification and Command Center assesses patient's symptoms and commands an emergency medical services unit to perform the operations by considering the scene of an incident. The area of Sa Kaeo province is divided into 3 zones. Coordinator must know that which emergency medical service unit will be assigned to perform the operations not longer than 2 minutes starting from receiving the notification to making a command. After a command is made, it is called activate time. It takes no longer than 2 minutes for preparing personnel and equipment for performing the operations. Emergency medical services workers must start the operations immediately. All PAO emergency ambulances are installed GPS tracking system. Therefore, they can be inspected the operations. When an emergency medical services unit performs the operations, time of receiving the notification, time of the operations, ambulance's mileage will be informed. After being notified the incident, the emergency medical services units must reach the scene of the incident no longer than 8 minutes (within the 10km radius), 1 kilometer/1 minute on average. It is

called response time which starts from receiving notification of the incident to arriving at the scene of the incident. Once the emergency medical services unit arrives the scene of the incident, working time at the scene of the incident should not longer than 10 minutes. However, patient's symptoms will be taken into consideration. In case CPR is required, longer time will be spent. In case patient needs to be delivered to a hospital, time spent on hospital delivery should not longer than 10 minutes (Registered nurse, professional level, Chief of Sa Kaeo PAO Emergency Notification and Command Center, personal communication, November 4, 2019).

If an advance level emergency medical services unit is assigned to perform the operations, Emergency Notification and Command Center will not get involved with the operations but in case of BLS or FR medical services units, results must be reported to the Center every 5 minutes. If BLS or FR medical services units assess a patient has red tagged severity, they must transfer the patient to an advance ambulance. The Center will coordinate with the advance ambulance a point to transfer the patient. If the Center is notified that patient is unconscious, an emergency medical services unit will be assigned to start the operations first to access patient in a speedy manner. Additional details will be questioned more from a caller. In case an incident occurs in a redundant area between foundation emergency medical services units, after the Center made a command, it will follow up whether an emergency medical services unit performs the operations. If the assigned emergency medical services unit did not perform the operations within 5 minutes, it will assign the other foundation to perform the operations immediately (Registered nurse, professional level, Chief of Sa Kaeo PAO Emergency Notification and Command Center, personal communication, November 4, 2019).

In case relatives of emergency patient or onlookers notify an incident directly to an emergency medical services unit, the emergency medical services unit will inform Emergency Notification and Command Center every time. If the Center considers and views that the incident occurs around responsibility of that emergency medical services unit, the number of operations will be issued. After that, the emergency medical services unit will perform the operations to help the patient. If an emergency medical service unit performs the operations without receiving several the operations from Emergency Notification and Command Center, disbursement of

compensation for the operations from NIEM cannot be done. If an incident that an emergency medical services unit is notified directly from relatives of patient or onlookers is not around responsibility of that emergency medical services unit, Emergency Notification and Command Center will assign an emergency medical services unit responsible for that area performs the operations (Registered nurse, professional level, Chief of Sa Kaeo PAO Emergency Notification and Command Center, personal communication, November 4, 2019).

In addition to receiving notification of all types of emergency illness and coordinating with emergency medical service units in different levels, Emergency Notification and Command Center performs its duty in helping emergency medical services units as requested such as coordinating with the police when an emergency medical services unit requires police workforce to suppress an incident of violence, coordinating with rescue services in case an emergency medical services unit require rescue equipment. When the tasks are complete, emergency call taker will record the information of the operations in the ITEMS system for reporting to NIEM, and in Google Drive to store as information of agencies (Emergency call taker, Sa Kaeo Emergency Notification and Command Center, personal communication, November 4, 2019).

In the past communication for making command and coordinating between Emergency Notification and Command Center and emergency medical services units of volunteers or foundations required client volunteers to report to host foundations before coordinating with Emergency Notification and Command Center, but a problem of delay and redundancy in operations occurred. Today, foundations grant permission to client volunteers to make contact and coordinate with Emergency Notification and Command Center directly when they are assigned to perform the operations. After that they can report information to their host foundations (Emergency Medical Technician, Sawang Sa Kaeo Thammasathan, personal communication, November 7, 2019).

Currently, there is a problem that some emergency medical services units do not accept the status of Sa Kaeo PAO Emergency Notification and Command Center since Sa Kaeo PAO has taken charge of the management instead of Sa Kaeo Crown Prince Hospital for only 3 years. Some emergency medical

responders or emergency medical technicians of foundations feel that PAO status is the same as their status, namely, being an emergency medical services unit working under supervision of Command Center of Sa Kaeo Crown Prince Hospital. It should not have the right to make a command to their emergency medical services units to perform the operations. Besides, EMR of some foundations viewed that the way PAO provides an emergency medical services unit to people is redundancy in work, competing for income and looking down their dignity. Chief of Emergency Notification and Command Center has tried to solve this problem by holding a meeting to have discussion and make understanding among all emergency medical services units in Sa Kaeo regularly every month. Sa Kaeo PAO has helped and supported emergency ambulances, devices, and equipment to emergency medical services units of volunteers or foundations including supporting a budget to Sa Kaeo Provincial Public Health Office in organizing EMS Rally to build harmony among emergency medical services units regularly every year for more than 7 years. Coordination with emergency medical services units that do not accept the operations of Emergency Notification and Command Center is done through the host of emergency medical services units instead (Registered nurse, professional level, Chief of Sa Kaeo PAO Emergency Notification and Command Center, personal communication, November 4, 2019).

Some of the volunteers were displeased with us, they did not like to order them. However, this is a command center, so it must be ordered. If it changes to deliver for work, it cannot do that because there is a command center. Nevertheless, I help the volunteers by supporting anything that I can afford including arranging meetings, providing EMS Rally, and giving Wut to talk with others to understand so that they can understand each other.” (President of Sakaeo Provincial Administrative Organization, personal communication, November 4, 2019).

“Some volunteers still do not accept the working of Provincial Administrative Organization(PAO) that has been transferred from the emergency and command center ordered to the Provincial Administrative Organization because the volunteers thought that in the past, the PAO has an ambulance that has to work according to the order of the hospital's emergency center but now why can they order a volunteer, some volunteers think that the PAO organizing an ambulance and having

paramedics, it takes the job of the volunteers, causing his income to decrease. Some of these volunteers earn good money, some volunteers wear large pieces of gold and change pickup trucks every month. When the PAO comes to do the EMS, they cut their income. So, I tried to solve the problem and tried to talk to the volunteers, organize the EMS Day meeting every month to talk and understand each other. Moreover, the president also helped support the cars for the Foundation so he could understand that we were not going to conflict with his benefits. Now, some team members may not like the work of the center and not want to communicate directly with the center via radio. So, we use the method of contacting the original server. Then, let the server coordinate with the center again.” (Professional registered nurse, Head of the Emergency and Command Center, personal communication, November 4, 2019).

Chief Executive of Sa Kaeo PAO considerably gives importance to Sa Kaeo emergency medicine system and Emergency Notification and Command Center. He conducted a study and explored knowledge by himself. Though he did not have knowledge about emergency medicine, now he has expertise in emergency medicine management. He is the one in the committee of National Institute for Emergency Medicine, being representative committee of local administrative organizations. He oversees the management of Emergency Notification and Command Center by himself. Besides, he gives importance to personnel considered important workforce in managing and developing Emergency Notification and Command Center. He viewed ability and experience of Mr. Jirawut Thongtod, previously worked as a registered nurse and staff of Communication and Command Center of Samut Prakarn Hospital (now he is transferred to work at Sa Kaeo PAO as a registered nurse, professional level affiliated to Division of Public Work), was assigned to help set up the system of emergency medical services and prepare readiness of management of Emergency Notification and Command Center of Sa Kaeo PAO by using his knowledge, ability and experience accumulated by the time he worked at the Communication and Command Center of Samut Prakarn Hospital. In addition to the budget support, Chief Executive of PAO looks for educational institutions to produce personnel in the emergency medicine to Emergency Notification and Command Center and orders the construction of the location of Sa

Kaeo Emergency Notification and Command Center (Chief of Section of Emergency Medicine, Sa Kaeo Provincial Public Health Office, personal communication, November 18, 2019).

“I started working in the emergency medicine field since I did not know anything. I did not know what ER is. At that time, I thought how I could help people. I gradually learned by myself. I attended all training and meetings. Previously, when I attended a meeting with doctors, they talked to one another using English vocabularies, I did not know anything. I learned step by step until now what they are talking about, I know everything. We are lucky we have Jirawut in our team. He is very skillful in everything. He reports me directly. I hold communication radio at all times. I know whenever and wherever emergency incidents occur. Recently, I helped doing CPR to an emergency patient who was unconscious on an expressway (Chief Executive of Sa Kaeo PAO, personal communication, November 4, 2019).

“The emergency center must be ready for staff, nurses, and paramedics. Now, paramedics are lacking and they enroll and do not pass. So, I picked up the phone to call the secretary of the National Institute for Emergency Medicine to keep the position of my children that attended 2 positions, so that my child would not have to compete with anyone. So, they can attend the class. The secretary is doing as I tell her. So, they will be able to go to the class next year.” (President of Sa Kaeo Provincial Administrative Organization, personal communication, November 4, 2019).

“Wut is good at solving all problems and he is knowledgeable, has good support from the president. Wut had a lot of problems both from the hospital of the Provincial Public Health Office and the problem with the volunteers. The volunteers fight each other, quarrel, fight cases, but the Wut can solve the problem.” (Emergency Medical Technician, Sawang Sa Kaeo Thammasathan Foundation, personal communication, November 7, 2019).

“The center does not directly with the president but the direct head of the center is the Director of the Division of Public Works and deputy but the president said if there was something, it can report to the president directly. I'm a worker, I am embarrassed. Some problems were reported directly to the president and the president went to insult the director. and the director scolded the deputy. Then, the deputy will come to scold me and tell me if there have anything why not tell me first. But when I reported to the director with the deputy before, the matter was silent, and the problem was not solved. When the president came to know later, he came to insult me again. Now, when I have any problems, I will inform the deputy first and immediately report to the president of PAO (Sakaeo Emergency Medical Service and Command Center, personal communication, November 4, 2019).

“Sa Kaeo PAO prepared a project to develop Emergency Notification and Command Center to ensure its operations achieve continuity and the development is up to date, making the operations is fast and timely and cover the whole area of Sa Kaeo province. It will be able to help people suffering from accidents and emergency illness fast, safely, and thoroughly. The budget determined in 2018 – 2022 is as much as 10,000,000 baht per year. Therefore, most of the budget for Emergency Notification and Command Center is from Sa Kaeo PAO. Some part of the budget is from NIEM that allocates from emergency medicine fund in the part of supporting budget according to tasks at the ratio of 50:50 (Provincial Public Health Office: Emergency Notification and Command Center) (Chief of Section of Emergency Medicine, Sa Kaeo Provincial Public Health Office, personal communication, November 18, 2019).

2) Emergency Medical Services Units- Medical Operations

Type

Sa Kaeo has 3 levels of emergency medical services units – medical operations type or pre-hospital emergency medical services units, namely, ALS emergency medical services (12 units), BLS emergency medical services (17

units), FR emergency medical services (50 units), government hospitals, private hospitals, Provincial Public Health Office, PAO. Khlong Hin Pun Sub-district Administrative Organization (Khlong Hin Pun SAO) has ALS emergency medical services units responsible for pre-hospital emergency medical services. It is the first and the only sub-district administrative organization in Thailand that has ALS emergency medical services units. The reason that ALS emergency medical services are successfully managed is Khlong Hin Pun SAO was transferred sub-district health promoting hospital management from Ministry of Public Health to be under supervision of local administrative organizations. Therefore, it has registered nurse in the affiliation. Pre-hospital emergency medical services, BLS and FR levels, are under responsibility of local administrative organizations and foundations like those of other provinces.

Though there are a lot of pre-hospital emergency medical services units, many of them are unable to perform actual operations due to a high rate of employee turnover and the number of existing personnel is not sufficient. BLS emergency medical services units are not enough, making the care of patients with semi-critical emergency conditions is a duty of FR emergency medical services units. Sometimes, it is probably beyond the ability of the emergency medical services units. Furthermore, sometimes when BLS and FR emergency medical services units deliver a patient to a hospital, if the patient's symptoms are not severe and a doctor diagnosed that the patient does not need to stay at hospital, that emergency medical services unit has to wait and deliver the patient to home accordingly. In this regard, the emergency medical services unit cannot perform the operations when it is notified by Emergency Notification and Command Center.

“PAO has ALS ambulance but it has not picked up patients almost a year because there is no paramedic. Three paramedics resigned at the same time and now we cannot find the new one.” (Registered nurse, professional level, Chief of Sa Kaeo Emergency Notification and Command Center, personal communication, November 4, 2019).

“Our BLS emergency medical services units are not enough. So, FRs have to pick up yellow to red tagged patients because the ALS will pick up only red tagged patients. FRs have less experience because training is given for only 10 hours or a little bit more. FR do not pass EMT training, and their equipment is not enough. So, patient care is not good enough and patients will lose the opportunity to get better services.” (Registered nurse, professional level, Sa Kaeo Crown Prince Hospital, personal communication, November 5, 2019).

“Sometimes we take the injured to the hospital and the injured person is a descendant of the local people. When I send them, they do not have to admit it. The doctor told them to go home, we had to wait to pick them up because the hospital was not closed. Moreover, being a friendly person, if we do not pick them up, it is not okay. If the radio center told us to go out for incidents at that time, we couldn't go out and had to send other units to pick up the injured.” (Emergency Medical Technician, Sawang Sa Kaeo Thammasathan Foundation, personal communication, November 7, 2019)

Currently, Sa Kaeo PAO emergency medical services units are affiliated to Division of Public Work since the PAO does not have Division of Public Health. In this regard, there is a problem related to budget allocation and disbursement of equipment for helping patients since the middle-level management does not have public health basic, being unable to understand the necessity of equipment and medical supplies.

“Now we are affiliated to Division of Public Work. PAO does not have Division of Public Health. I find it's very difficult to work especially during disbursement. They do not understand the budget of 100,000 baht that we sked for buying supplies in ambulances. They keep asking why we have to buy those supplies. Sometimes we use our money to buy. Like paracetamol, we buy and keep it in an ambulance. When workers in PAO office get sick, they ask for medicine from us. So, it runs out of stock. They do not understand and see us like a nursing room. Actually, we buy medicines for using with patients when we perform the operations. When they ask for medicines from us, we

cannot refuse to give them but when the medicines run out, it is very difficult to ask from them to buy new ones” (Emergency call taker, Sa Kaeo Emergency Notification and Command Center, personal communication, November 4, 2019).

The Provincial Public Health Office arranges the emergency medicine system according to scope of responsibility within the province. The areas for emergency medical services are classified into 3 zones for providing comprehensive services. Pragmatically, emergency medical services networks do not cover the whole area. Associations, foundations and volunteers are not enough. Though 95% of local administrative organizations are registered pre-hospital emergency medical services, only 19% can perform actual operations (12 local administrative organizations), being unable to access emergency patients in remote areas within 8-10 minutes as determined (Public Health Technical Officer, professional level 4 overseeing the emergency medicine network management, Sa Kaeo Provincial Public Health Office, personal communication, November 18, 2019).

Though Sa Kaeo PAO supports the purchase of a lot of emergency ambulances for the operations and local administrative organizations can arrange 2 ALS emergency medical services units; Sa Kaeo PAO and Khlong Hin Pun SAO, due to the problems related to a shortage of personnel, emergency medical services units of volunteers and foundations, Sa Kaeo province has mountainous areas far away from the heart of the city and very difficult for travelling, the distribution of emergency medical services units does not cover the whole area of the province and they are not sufficient to access emergency patients within 8 minutes (within the 10 km. radius). In remote areas, the distribution of FR units is only 50.85% of the whole sub-districts. There are 80 emergency medical services units in Sa Kaeo province and most of them belong to foundations. Sa Kaeo emergency medical services units classified by affiliation are shown in Table 5.15.

Table 5.15 The Number of Emergency Medical Services Units in Sa Kaeo, Classified by Affiliation

Affiliation	Total	Percentage
SCOT	1	1.25
Army Medical Department	1	1.25
Foundation/Association	35	43.75
Private hospital	1	1.25
Provincial Emergency Notification and Command Center	1	1.25
Provincial Public Health Office	1	1.25
Subdistrict Administrative Organization	19	23.75
Sub-district Municipality	4	5.00
Community hospital	8	10.00
Crown Prince Hospital	1	1.25
Tambon Health Promoting Hospital	8	10.00
Total	80	100

Source: Sa Kaeo Provincial Public Health Office (2019).

Note: *SCOT: Special Covid-19 Operation Team is Established as a Supporting Team for the Implementation of Emergency Medicine in Delivering Patients or Persons Suspected of Having Covid-19 Including General Emergency Patients during the Situation of Disease Spread or in Case no Emergency Medical Services Units are Able to Perform the Perations.

Some emergency medical services units of foundations and volunteers in Sa Kaeo conflict with each other. They compete each other to pick patients up. Sometimes, it is violent, leading to quarrel and fight or ending up with assault. Some emergency medical services units refuse to pick patient up but choose

to pick up only patients with emergency accidents. One of the causes of conflict is income benefits. The other part is wrong attitude towards emergency medical services. Chief of Emergency Notification and Command Center has made an attempt to solve the problems by holding a monthly meeting to make discussion and understanding and mutually solve the problems. The Provincial Public Health Office held EMS Rally to build harmony among emergency medical services units in Sa Kaeo. Some but not all problems could be solved.

“There was a problem with the volunteer paramedics arguing and gunning for each other. It's an issue of dignity. It is not a money problem because the quarrel has existed since before receiving the operating fee from the National Institute for Emergency Medicine. It is a dignity about who came first, who came after and they got their area. Some people think that the Ruam Katanyu Foundation should take service in Bangkok, not having to deal with Sa Kaeo's area. Sa Kaeo is an area of Sawang Sa Kaeo Thammasathan Foundation and Ruam Katanyu Foundation should not interfere. I attempted to talk for understanding and I asked what the purpose of the paramedics was. If they answered that to save the patient's life, then look at everyone who wants to help the patient too and why are you arguing? Let the matter of dignity aside because we have the same goal to save the lives of the injured as well” (Emergency Medical Technician, Sawang Sa Kaeo Thammasathan Foundation, personal communication, November 7, 2019).

“We used to hold meetings and then quarrel at the meeting until the situation was out of control. Therefore, the sheriff saw that if the next meeting was held, it would be better to go to the police station.” (Emergency Medical Responder, Sawang Sa Kaeo Thammasathan Foundation, personal communication, November 7, 2019)

“The Foundation's paramedics sometimes fight for the case and sometimes you do not receive the real incident, you eavesdrop on the radio that other people talk and call the center to request a number of incidents. Sometimes

when we order to go out to an incident, they are not ready to issue the incident, but they hold the case to protect the case for the Foundation's friends to come out. Moreover, we ordered for 2 minutes and then 5 minutes. They say they're ready to go out but the car was not moving. We can see the location of the car from the GPS. If we see that 5 minutes and there is no movement to pick up the injured, we will inform other units to go out to the incidents instead. (Staff at Emergency and Command Center, Sa Kaeo Emergency and Command Center, personal communication, November 4, 2019)

“Some areas have a lot of problems, especially Wang Nam Yen. The foundation is quite problematic. Sometimes I radio to go out and they say that if going to pick up a sick patient at home is busy, but if going to pick up an emergency patient, they can go out, they answered me through the radio like this. Through the radio, people can hear a lot because they think that if they go to pick up the sick patient at home, they cannot turn on the siren and it is not cool. However, if they go to pick up the injured person, they can turn on the siren, keep out the car, and have people to crowd around that make it cooler. Some people have a lot of problems, so I do not pay for the case.” (Staff at Emergency and Command center, Sa Kaeo Emergency and Command Center, personal communication, November 4, 2019).

“Paramedics and volunteer have been a problem for a long time, they tried to solve the problem and build unity, organize EMS Rally to hope to break the ice, but even if there is EMS Rally, I think it is just a skill training. If the paramedics from different foundations cannot sit in the same car to go out together, they still cannot deliver the case to each other. Thus, there is no true unity.” (Emergency Medical Technician, Sa Kaeo Emergency and Command Center, personal communication, November 4, 2019).

Sa Kaeo PAO provides training to emergency medical services units for increasing knowledge and skills and building harmony among emergency medical services units both inside and outside the province according to the 2nd

strategy of Sa Kaeo PAO, namely, people enjoy a good quality of life (safety and quality of life development), in the part of social work plan and under responsibility of Division of Public Work. The 4th project meeting of local administrative organization emergency medicine at national level was held for building a body of knowledge, exchanging knowledge and strengthening emergency medicine networks of local administrative organizations. It was a forum for exchanging knowledge and passing down new innovation in emergency medicine, encouraging practitioners, executives and networks to be aware of and see the importance of emergency medicine system development to have readiness at international level. In 2018, projects for training, seminar and observatory study of emergency medicine system were held continuously to enhance knowledge and understanding about emergency medicine operations for Sa Kaeo emergency medical services units. Budgets in 2018-2022 were determined at the amount of 500,000 baht per year. Emergency medicine workshop project was held for emergency medical services units to train workers to have knowledge and skills in providing assistance when they meet an incident. The objectives are to enable trained workers to disseminate the obtained knowledge to their intimate fellows, to enable them to provide basic assistance, to enhance knowledge and understanding about emergency medicine operations to persons attending the training. Budgets in 2018-2022 were determined at the amount of 200,000 baht per year.

Another activity that will build harmony between Sa Kaeo PAO and emergency medical services units is visiting emergency medical services units and bringing the outcome from inspecting emergency medical services units to study, analyze, monitor and give suggestion at policy level to put into practice. Budgets in 2020-2022 were determined at the amount of 120,000 baht per year.

In addition to EMS Rally, the Provincial Public Health Office made an effort to reduce conflict among emergency medical services units through the disbursement of compensation for the operations given to foundations being the host of volunteers instead of paying directly to volunteers in order to reduce conflict among volunteer teams.

Chief Executive of Sa Kaeo PAO planned to increase ALS emergency medical services units for covering the whole sub-districts so that they can

access emergency patients within 8 minutes. The plan starts from transferring the management of sub-district health promoting hospitals from Ministry of Public Health to be under supervision of local administrative organizations. Next, all sub-district health promoting hospitals will be required to arrange ALS emergency medical services units to which PAO will support emergency ambulances, life support devices and equipment.

“Our current operating units are insufficient, especially ALS, which is very lacking. The remote Sa Kaeo is the countryside, not a city and not like Nonthaburi, the context is different. Even though the city is not big, it is difficult to travel. Some villages and sub-districts are in the mountains. If it can be accessed in 8 minutes, it can increase ALS. So, we plan to transfer the Subdistrict Health Promotion Hospital to the local one. If the Subdistrict Health Promotion Hospital belongs to the locality, then we allow every Subdistrict Health Promotion Hospital to have an ALS car to pick up patients. The Subdistrict Health Promotion Hospital has an ALS unit that can accept red patients because they have nurses. If moving to a local, the nurse also moved to the local department of the Ministry of the Interior. As for the car and the devices, if the hospital or which district is not ready, PAO will support it” (President of Sakaeo Provincial Administrative Organization, personal communication, November 4, 2019).

(1) Vehicles Used in Emergency Medical Services Operations

Sa Kaeo province has 313 ambulances, 3 ALS pickup truck, 26 BLS pickup trucks, 202 FR pickup truck, 34 ALS vans, 16 BLS vans, 32 FR vans (Data from ITEMS, retrieved January 11, 2019). Sa Kaeo PAO prepared a project and determined a budget for vehicle provision by purchasing vehicles according to standard price list of durable articles, Bureau of The Budget, and followed ministerial regulations of Ministry of Finance on procurement and management of government durable articles and ministerial regulations of Ministry of Interior on vehicle utilization and maintenance of local administrative organizations. Sa Kaeo PAO has

supported 14 emergency ambulances to hospitals. PAO management team viewed that renting emergency ambulances is convenient, flexible and be able to control expenditure better than buying them. However, based on the problem occurred at Ubon Ratchathani PAO that was audited by Office of the Auditor General of Thailand and proved fault in the vehicle rental and ended up with vehicle purchasing. Though Sa Kaeo purchased emergency ambulances and lent them to hospitals, Office of the Auditor General of Thailand also argued against the regulation on “lending”. Nowadays, PAO management team solved the problem by following the advice of the Office of the Auditor General, namely, making a memorandum of understanding between PAO and hospitals so that hospitals can use the emergency ambulances purchased by PAO in a way that complies to the rules.

“Actually I prefer to car rental as it can cut the expenditure problem in maintenance and car insurance. For buying cars like this, I need to keep on paying repair and maintenance expenses. The expenses are very high each year. I need to buy them because I’m afraid we will end up like the case of Ubon Ratchathani PAO. It was audited by the Office of the Auditor General and accused it did wrong. I talked to Chief Executive of Ubon PAO that rental is better. I don’t understand. Police cars can be rented, government cars can be rented, why ambulances cannot be rented. According to public health regulations of PAO, vehicles used to transfer patients (Refer) can be bought. Then I set a budget to buy 4 cars and gave to hospitals. In the beginning I “lent” them to hospitals, but the Office of the Auditor General audited and told that lending hospital a car is breaking the regulations because lending means lending exiting durable articles not buying new ones and lending them to someone. Then, I made an MOU with hospitals. PAO bought cars on behalf of PAO and gives to hospitals in order to integrate public health services and provide maximum benefits to patients.” (Chief Executive of Sa Kaeo PAO, personal communication, November 4, 2019).

“I buy cars for them every year, 3 or 4 cars. The Provincial Public Health Office will check which hospitals should be given. I have the duty to buy them

only.” (Chief Executive of Sa Kaeo PAO, personal communication, November 2019).

Currently, Sa Kaeo PAO has 1 ALS ambulance being on duty at Emergency Notification and Command Center. It is a smart ambulance using a modern system of a private company, It can monitor status and positions of the ambulance where is. CCTV are installed inside and outside the ambulance to send pictures of patient’s symptoms, vital signs, and the operations of emergency medicine workers inside the ambulance to the smartphone of Medical Director. Its communication system covers VHF and internet. It is operated on OIS 4. Many hospitals and university hospitals studied and took as a model. Telemedicine system is installed in 12 ALS ambulances. It is the first full version of telemedicine system in the country that can be actually used. OIS 4.0 and fingerprint systems are installed in all levels of emergency medical services units and all emergency ambulances so as to connect information between Emergency Notification and Command Center and emergency ambulances (Chief Executive of Sa Kaeo PAO, personal communication, November 4, 2019).

Registration of practitioners, emergency medical services units, ambulances and inspection of ambulance standard – generally it is the duty of Provincial Public Health Office, but as of today Sa Kaeo Provincial Public Health Office authorized all host hospitals in 3 zones, i.e. Sa Kaeo Hospital, Wattana Nakhon Hospital and Khao Chakan Hospital to take charge of this duty instead since the Provincial Public Health Office has a lot of tasks compared to the number of personnel responsible for emergency medicine and hospitals have a higher chance to meet emergency medical services workers. Meanwhile, the Provincial Public Health Office viewed potential and readiness of Sa Kaeo PAO and planned to authorize the duty of granting registration to practitioners, emergency medical services units, ambulances, and inspection of ambulance standard to Sa Kaeo PAO from 2020 onwards. Sa Kaeo PAO planned to facilitate this task by preparing a project for registration, training, restoration and inspection of ambulance standard at all levels in Sa Kaeo province in order to develop knowledge and skills and increase essential equipment for emergency medical services to be up-to-date and meet academic

standard for being able to monitor and measure working performance to ensure it meets efficiency and effectiveness in accordance with scheduled time using appropriate technology. Budgets for 2020 – 2022 were determined at the amount of 370,000 baht per year (Chief Executive of Sa Kaeo PAO, personal communication, November 4, 2019).

“Provincial Public Health Office empowers hospitals to inspect and register vehicles and volunteer. However, let me check every car, I can not handle all of them, the nurse had to meet with the paramedics and ambulance because they had to send cases all the time. Let them check it out and they are closer together. I am in the Provincial Public Health Office, hardly ever see a car.” (Professional Public Health Technical Officer who responsible for emergency medical services, Sa Kaeo Provincial Public Health Office, personal communication, November 18, 2019).

“Allowing the PAO to check the car for registration of an emergency vehicle is better than the hospital. It is more effective than a hospital because if the hospital checks the emergency vehicle if the volunteer car or the foundation car does not have the devices ready and they use the devices in the car to move around. Moreover, they put the tool of the car that has been checked and put it in the car that is on the way to the hospital to check. There is no way to know. Finally, the examination has passed every car, but the tool is not ready at all. Nevertheless, if the PAO is the person to check the readiness and register the car, if any emergency ambulance is not ready, PAO will support the lack of devices, which should be better than the hospital because the hospital has a way to do this.” (President of Sa Kaeo Provincial Administrative Organization, personal communication, November 4, 2019).

(2) First Responder

Sa Kaeo province has a considerable shortage of public health personnel, especially emergency medicine physician (EP), emergency nurse practitioner (ENP) and paramedic). Now, there are only 2 emergency medicine

physicians. It is deprived of 4-7 emergency medicine physicians, 88 emergency nurse practitioners, 685 first responders, 41 EMT-B, 18 EMT-I, and 2 paramedics. Most emergency medical services practitioners of Sa Kaeo province are certified emergency medical services according to the notification of emergency medicine committee or have a medical practitioner license or their certificate of emergency medical services is renewed (Chief of Sa Kaeo Emergency Notification and Command Center, 2019: Interview). Details of personnel in Sa Kaeo emergency medical services system are shown in Table 5.16.

Table 5.16 Personnel in Sa Kaeo Emergency Medical Services System

Accreditation Status	Position / Duty	Number (person)
Positions in ITEMS	EMT-B	7
Positions in ITEMS	EMT-I	4
Positions in ITEMS	EMT-P	1
Positions in ITEMS	FR	376
Positions in ITEMS	Other	58
Positions in ITEMS	Not specified	3
Being accredited by the SOT	1) นพพ. (Paramedic)	3
Being accredited by the SOT	2) จพพ. (A-EMT)	16
Being accredited by the SOT	3) พพพ. (EMT)	54
Being accredited by the SOT	4) อพพ. (EMR)	293
Professional Council	Nurse	132
Professional Council	Physician	2
Total		949

Source: Sa Kaeo Provincial Public Health Office. (2019).

Note: *SOT = Subcommittee on Organization, Operator and Training Program
Accreditation and Certificate to People Who Have Passed Education or
Training

Consideration of public health workforce of Sa Kaeo province found that there are only 127 workers in the field of medical practitioners, accounted for 57.73%, compared to the number of personnel that should be available (a high level of the frame of workforce). There is a shortage of 93 persons accounted for 42.27%. There are 925 persons working in the field of registered nurse, accounted for 68.36%, compared to the number of personnel that should be available. There is a shortage of 428 persons accounted for 31.64%. The problem of personnel shortage occurs since most of them have a domicile outside Sa Kaeo province, especially physician when they pay back the full amount of their scholarships, they most likely resign and further their studies on a specialist area by receiving original affiliation scholarships in other provinces, causing a shortage of personnel. Sa Kaeo solved the problem by allocating rotating physicians to help each other among hospitals in the province. In 2019, the province asked for a quota from Health Region 6 for 63 persons to have skill training and enhancement in Sa Kaeo community hospitals for 2 months and to be supported to receive a scholarship in the fields having a shortage of manpower of Aranyaprathet Hospital and Sa Kaeo Crown Prince Hospital more and more. Emergency medical services units assigned nursing scholarship students to study, and 218 students are able to finish their studies during 2020-2024. Therefore, it is expected that in 2023, there will be an increase in the nursing workforce by 84.18% compared to the frame of a high-level workforce (Documents supplementing Ministry of Public Health government inspection, Health Region 6 for 2020, 1st cycle, 2020).

The operations of emergency medical services in community hospitals require personnel working in hospital emergency room. Therefore, there is problem that they cannot perform the operations if they are busy with life support or CPR tasks in emergency room. Some community hospitals call nurses being on duty in wards or labor & delivery nurses from a welfare house locating in the hospital area to be on duty at the emergency room when emergency room nurses need to perform the operations outside the hospital. If a substitute nurse is not available, that nurse

cannot perform the operations of pre-hospital emergency medical services. In this regard, Emergency Notification and Command Center will order other nearest emergency medical services unit to perform the operations instead. That is why the number of ALS emergency medical services units is not sufficient.

Sa Kaeo province does not have educational institutions that produce personnel in program of nursing specialty in emergency nurse practitioner (ENP). However, Sa Kaeo PAO supports a budget to produce and develop personnel in the emergency medicine system continuously according to the capability of the province. Many projects are determined to be PAO annual projects, i.e. (1) emergency medicine workshop project for emergency medical services units to train emergency workers or practitioners to have knowledge and skills in providing assistance once incidents occur, to encourage trained workers to disseminate the obtained knowledge to their intimate fellows or persons they are familiar with for achieving basic life support, to enhance knowledge and understanding about emergency medical services to training participants for having preparedness and skills to give basic life support. for 2018-2022 were determined at the amount of 200,000 baht per year, (2) workshop project for instructors in Sa Kaeo emergency medicine system (EMS Instructor), skill enhancement for nurse instructors to achieve efficiency and effectiveness. Instructors know techniques and understand correct teaching principles and can pass down to other people in a standard manner. Instructors have an opportunity to exchange knowledge and experience in teaching both theoretically and pragmatically, instructors have knowledge and understanding academic approach and teaching techniques, being able to pass down to other people efficiently. People in Sa Kaeo province are able to access emergency medical services equally. Training is provided to emergency nurse practitioners being on duty in emergency room of every hospital in Sa Kaeo province. The budget in 2019 was determined at the amount of 154,000-baht, (3) workshop project for EMS instructor assistant in Sa Kaeo emergency medicine system to enhance skills of emergency medical technicians basic (EMT-B) who are instructors for achieving efficiency and effectiveness in teaching, to enable EMT to learn techniques and understand about theoretical and practical principles of teaching and be able to apply the obtained knowledge in the operations more successfully. EMT instructors learn techniques and understand teaching and

operations correctly and can pass down to other people in a standard manner. The budget for 2019 was determined at the amount of 154,000 baht and (4) workshop project for EMR (Emergency medical responder) to enhance medical skills for achieving teaching efficiency and effectiveness. EMT (Emergency medical technician) learn techniques and understand teaching principles and can pass down to other people in a standard manner. Training is provided to EMR being on duty in emergency medical services units in Sa Kaeo province, who play their role in coaching and developing personnel in their agencies. The budget for 2018 was determined at the amount of 300,000 baht and the budgets for 2019-2022 were determined at the amount of 60,000 baht per year. Sa Kaeo Provincial Public Health Office organized EMR 40 hours training to local administrative organizations/foundations/associations, 2 classes, 65 persons per class in 2020.

Though Sa Kaeo PAO and Sa Kaeo Provincial Public Health Office organized training that aimed to increase a number of EMR and EMT, trained personnel and personnel in the system resigned and change their jobs frequently since working as volunteers do not have regular income and their job is insecure. If they do not have readiness in financial status, they cannot be volunteers any longer. They must earn a living by having a job with regular income. Consequently, Sa Kaeo province has not only the problem related to insufficient number of emergency medicine physicians and emergency nurse practitioners, but also a shortage of EMT and EMR. Based on the context of the province that more than 40% of emergency medical services units belong to foundations or associations, when the number of EMR and EMT is not enough to provide services to people, it considerably affects Sa Kaeo emergency medical services.

“For the volunteers, we change often, leave often and they come in and leave and not stay long. Also, I understand because the word of volunteer is not sustainable, and volunteers with no income but I do not know what to do. We open training sessions to teach regularly, it is true but I am a teacher and I am attempting to select someone who looks stable, has stable status, and enough to be a volunteer to work for a long time. Some people when they come to study are very good and very talented but when teaching them for fluency. However, they do not

stay for a long time, they had to quit to do other jobs” (Emergency Nurse Practitioner, Sakaeo Crown Prince Hospital, personal communication, November 5, 2019).

With regard to personnel preparedness for emergency operations to respond to public dangers and disasters, normally it is the duty of the Provincial Public Health and provincial general hospital but for Sa Kaeo province, PAO is the supporter and operator by preparing a preparedness project for emergency medical services team to respond to public dangers and disasters, Sa Kaeo D-MERT (Disaster Medical Emergency Team) to physicians, nurses, EMT-B or EMT-I, paramedics or emergency medical staff (or those who attend EMT-B/EMT-I courses), pharmacists, communication personnel or logistics public relations officers, management personnel or financial personnel, maids or patient care assistants to enable Sa Kaeo province to achieve readiness in medical supplies, durable articles and be able to operate tasks efficiently, victims are able to receive medical treatment during disasters in an efficient manner and can live their lives in areas of disasters without being a burden to other people, training participants gain knowledge and basic first aid skills; they can help themselves and people close to them safely before arriving at hospital and reduce risks of death. The budgets for 2020-2022 were determined at the amount of 250,000 baht per year. Planning and workshop for emergency rehearsal at provincial level were prepared for rescue services, police officers, soldiers, emergency nurse practitioners, emergency room practitioners and agencies having an important role in coaching in order to test and assess readiness of the operations plan and the implementation process in response to emergency situations and to generate an opportunity to learn through experiences from the rehearsal which can develop knowledge and working skills of personnel. Training and rehearsal lead to knowing about errors, advantages and disadvantages of the existing plan including operation guidelines in response to certain situation. The budgets for 2020-2022 were determined at the amount of 300,000 baht per year.

Out-of-hospital ambulance operations – As soon as receiving emergency notification from Emergency Notification and Command Center or a patient calls an emergency medical services unit directly, an operator will ask name, telephone number, the coordinate of the scene of an incident and patient’s symptoms. During commuting to the scene of the incident, the operator is able to call for asking

additional coordinates of the scene of the incident as well as asking further about patient's symptoms as there is a telephone on each ALS ambulance as required by the standard. Preparedness or personnel and equipment used in the operations spend no longer 2 minutes each time but in most cases they cannot follow the scheduled time, especially the operations performed outside working hours of community hospitals. Emergency medical services unit will start the operations as soon as everything is ready. The Emergency Notification and Command Center is able to check the movement of the ambulance through GPS coordinates that identify the location of the ambulance. When the emergency medical service unit starts the operations, it will inform the time of receiving the notification, time to start the operations, and ambulance mileage. After that, the emergency medical services unit is expected to arrive at the scene of the incident no longer than 8 minutes (within the 10km radius), 1 kilometer per minute on average, and spend time on delivery to hospital no longer than 10 minutes. The out-of-hospital ambulance operations of Sa Kaeo Crown Prince emergency medical services unit, an advance emergency medical service unit, each time comprises 1 nurse, 1 driver, 1 EMT-I (there are 3 EMTs/shift). The farthest distance for performing the operations is 40 kilometers, spending time around 40 minutes. Sa Kaeo province has geographical restriction as it consists of high mountains. Some parts are non asphalt roads (red earth roads) and twisty, making driving difficult and spending more time. The emergency medical services unit will inform Emergency Notification and Command Center when it arrives at the scene of the incident. Once it reaches the scene, patient's symptoms will be checked and patient will receive primary assistance abruptly. It will report to Emergency Notification and Command Center every time when the patient requires CPR. In case of red tagged patient, before leaving the scene of the incident, it will report to Sa Kaeo Crown Prince Hospital directly to let physicians and emergency room have preparedness for receiving the patient since personnel of Sa Kaeo Crown Prince Hospital view that communication between nurses is easier and faster for understanding than communicating through Emergency Notification and Command Center because a coordinator is not a nurse and has never worked in hospital, the coordinator will not understand hospital patient triage. As soon as the emergency medical service unit arrives at the hospital, it will report to Emergency Notification

and Command Center again. (Registered nurse, practitioner level, working in emergency room of Sa Kaeo Crown Prince Hospital and Sa Kaeo Paramedic Services, personal communication, November 5, 2019).

“According to standards, the incident must be out within 2 minutes after being notified by the command center, but mostly they cannot do so at night shift because it needs to follow the driver from the house, it would be impossible to get a nurse to come on duty instead of the person who will go to the scene, the more, sometimes they are CPR on the patient at the ER for another 2 minutes, it is even more impossible.” (Professional registered nurse working in the emergency room at Taphraya Hospital, Sa Kaeo Province, personal communication, November 20, 2019).

“Usually, if it is a red case, we will inform ER Yuparat to prepare to pick up the patient and not inform the center, we inform by ourselves because we are nurses too and talk to ER Yuparat directly, so it is easier to understand. Their center is Triage, not the same as us. We use EMV, but their center does not use it. Moreover, they use another way when talking and they do not understand each other. So, they could not prepare for the patient, so we informed ourselves not to let the center notify us. Thus, we talked to the ER directly and the ER nurse would inform the ER doctor directly.” (Emergency Nurse Practitioner, Sakaeo Crown Prince Rescue, personal communication, November 5, 2019).

“If it is a red case, Yuparat will notify the ER of Yuparat directly, not through the center. However, when they are notified, they are on the radio. Although he did not notify the center, we will hear from the center already.” (Professional registered nurse, Head of Sa Kaeo Emergency and Command Center, personal communication, November 4, 2019).

Transfer to hospital and treatment in hospital – Once the emergency medical services unit arrives at the scene of the incident and patient’s

symptoms are assessed. EMT will report to the Emergency Notification and Command Center how patient's symptoms are. The Emergency Notification and Command Center will coordinate what to do further. Coordination over the telephone is used in most cases. If the Emergency Notification and Command Center assesses and views that the patient can be moved, the patient will be delivered to the hospital where the patient has the right of hospital treatment. In case the patient is unconscious, the patient will be delivered to the nearest hospital. Before the patient is delivered to hospital, the Emergency Notification and Command Center will notify patient's symptoms and pre-hospital treatment at the scene of the incident to the hospital in advance. In case of red tagged patient, ALS emergency medical services unit will report directly to the hospital so that physicians and nurses being on duty in emergency room will prepare everything for receiving the patient. EMT will report patient's symptoms and pre-hospital primary treatment given to the patient at the scene of the incident and during commuting to the hospital to destination hospital personnel verbally and will write a form of the patient's symptoms as required by NIEM. The emergency medical services unit will inform the Emergency Notification and Command Center verbally when the patient is delivered to the hospital. In the event that patient is delivered back since the hospital views that the patient does not need to stay in the hospital, the emergency medical services unit needs to wait and pick the patient up. The emergency medical services unit must record the information in ITEMS system within 2 hours after the emergency medical services are finished. If the emergency medical services unit cannot record the information in ITEMS system within 2 hours, it needs to inform the Emergency Notification and Command Center verbally. However, it needs to record the information in ITEMS system within 24 hours. (Group discussion-Sa Kaeo emergency medical services unit, personal communication, November 27, 2019).

5.4.1.3 Participation of Emergency Medical Services Networks in Sa Kaeo Province

Chief Executive of Sa Kaeo PAO was interested in and had intention to participate in emergency medical services, leading to collaboration among local administrative organizations, Provincial Public Health Office, provincial general hospital, community hospitals, municipalities, Sub-district administrative organizations

and foundations in Sa Kaeo in providing integrated emergency medical services to people in Sa Kaeo since 2017. Sa Kaeo PAO is considered the important force in supporting budgets, emergency ambulances with modern devices and equipment, training to increase the number of and develop the quality of emergency medical services units, Emergency Notification and Command Center management, coordination and collaboration among hospitals, Provincial Public Health Office, local administrative organizations, 4 foundation in Sa Kaeo and other relevant agencies such as police and the one that cannot be missed is people, giving rise to participation of the following sectors:

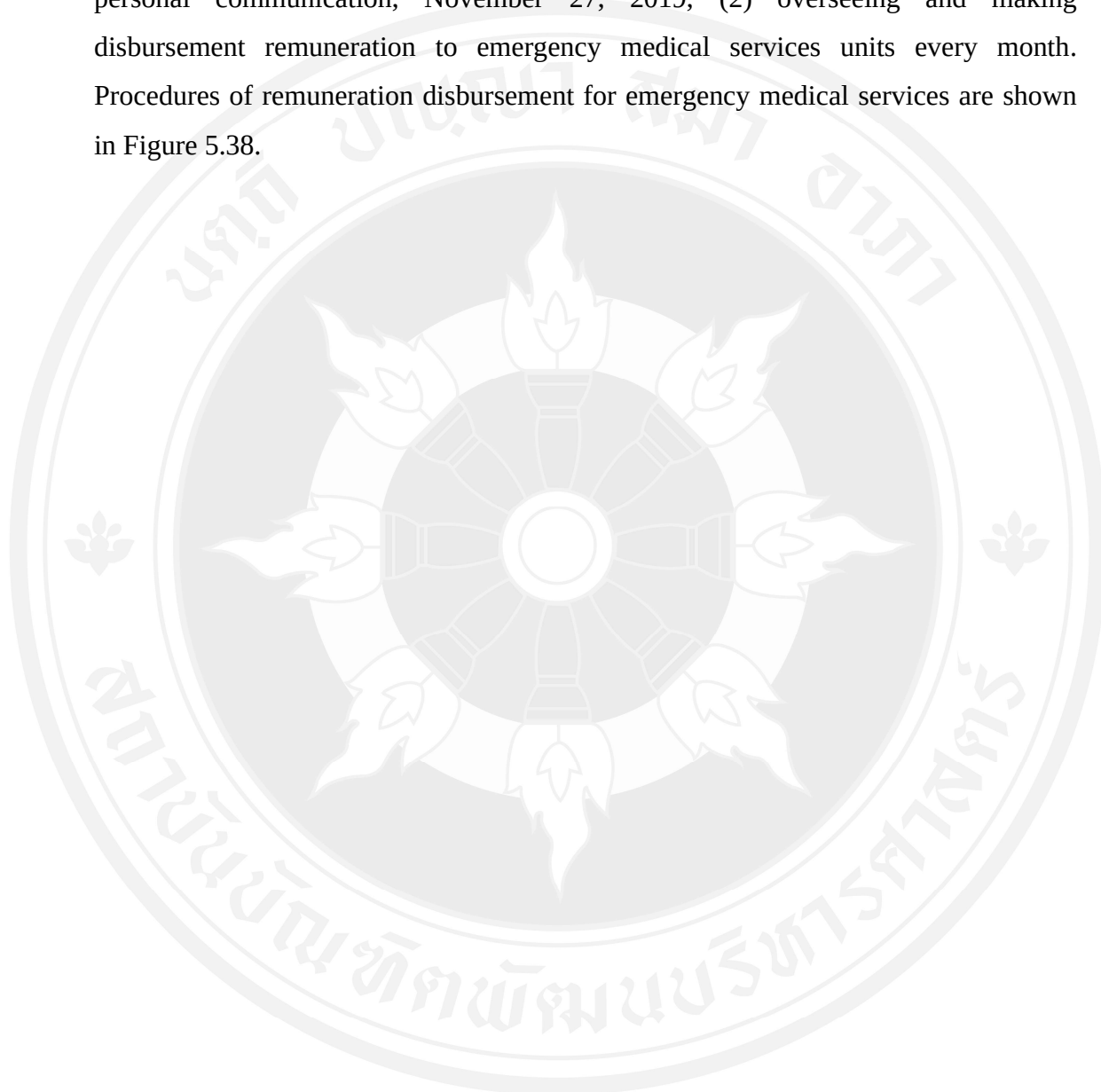
1) Regional Public Health

(1) Sa Kaeo Provincial Public Health Office

Sa Kaeo Provincial Public Health Office determines a vision in healthcare as “the role model in managing border public health city of Thailand at international level, strong health system belongs to people and associates, city of sustainable health and well-being”, and sets 4 aspects of strategy as 1) healthcare system owned by all people, 2) quality and excellence of medical services management, 3) efficient management of resources and 4) efficient management of border public health and special economic zones (SEZs) (Sa Kaeo Provincial Public Health Office, 2019).

Sa Kaeo Public Health Office requires emergency medical services to be a part of Section of Non-communicable diseases Control, Mental Health and Drug. Participatory roles of Sa Kaeo Provincial Public Health Office related to emergency medical services are as follow: (1) registering personnel in the emergency medicine system who pass the courses required by NIEM and registering of standard ambulances and submitting information to be acknowledged by NIEM. Sa Kaeo Provincial Public Health Office does not implement the tasks on its own but distributes administrative power to host hospitals. Sa Kaeo province divides its network areas into 3 zones, 3 districts per zone (Sa Kaeo has 9 districts), i.e. Mueang district zone, Wattana Nakhon district zone and Khao Chakan district zone. Each zone has its host hospital mentoring all private associations, volunteers and foundations, inspecting the quality of ambulances and qualifications of personnel to be registered

with the hospital because the hospital has closer relationship with the networks than the Provincial Public Health Office. The hospital adheres to the principles and policies set by NIEM (Public Health Technical Officer, professional level 4 managing emergency medical services networks, Sa Kaeo Provincial Public Health Office, personal communication, November 27, 2019, (2) overseeing and making disbursement remuneration to emergency medical services units every month. Procedures of remuneration disbursement for emergency medical services are shown in Figure 5.38.



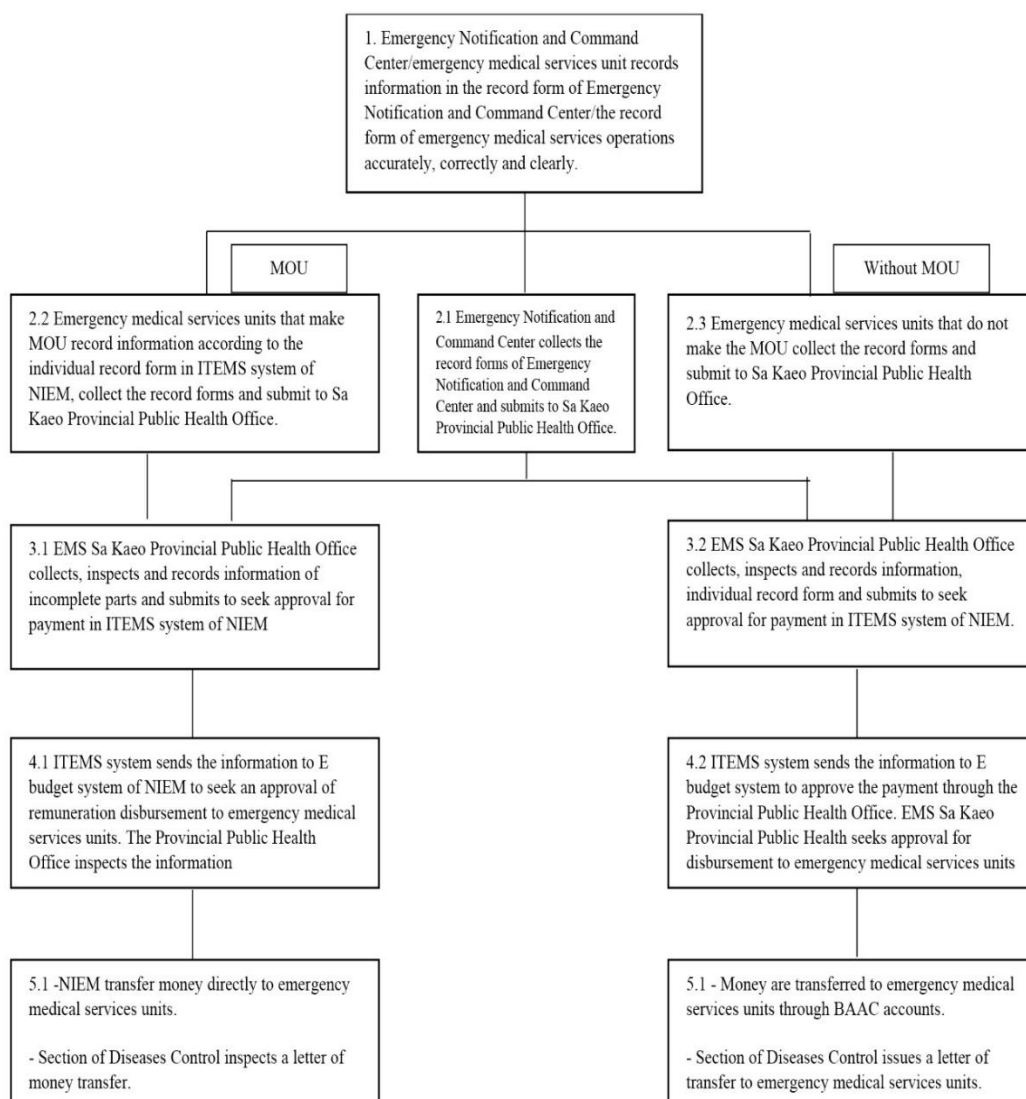
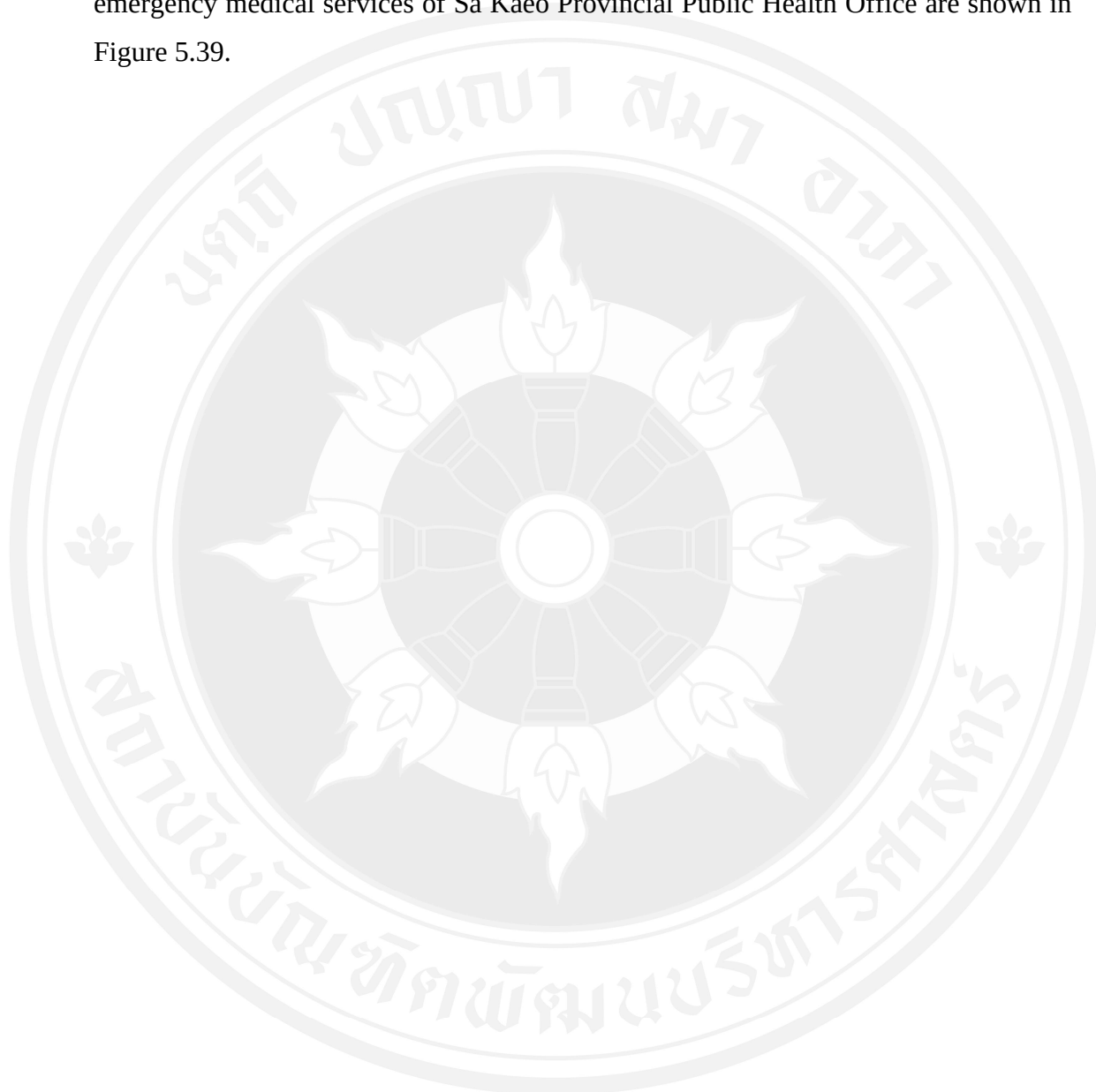


Figure 5.38 Procedures of Disbursement of Remuneration of Emergency Medical Services Units. Sa Kaeo Provincial Public Health Office Pays to Emergency Medical Services Units of Sa Kaeo Crown Prince Hospital/Community Hospitals, Local Administrative Organizations, and Private Sector

Source: Sa Kaeo Provincial Public Health Office (2019).

- (3) organizing training for knowledge development to EMR and hospital personnel who provide emergency medical services such as triage skills, (4) coordinating tasks related to emergency medical services with networks, (5)

overseeing and monitoring standards of emergency medical services, (6) organizing EMS Rally in Sa Kaeo continuously. It has been held for 7 consecutive times until now, (7) jointly developing and driving emergency medical services with Sa Kaeo PAO Emergency Notification and Command Center. Implementing procedures of emergency medical services of Sa Kaeo Provincial Public Health Office are shown in Figure 5.39.



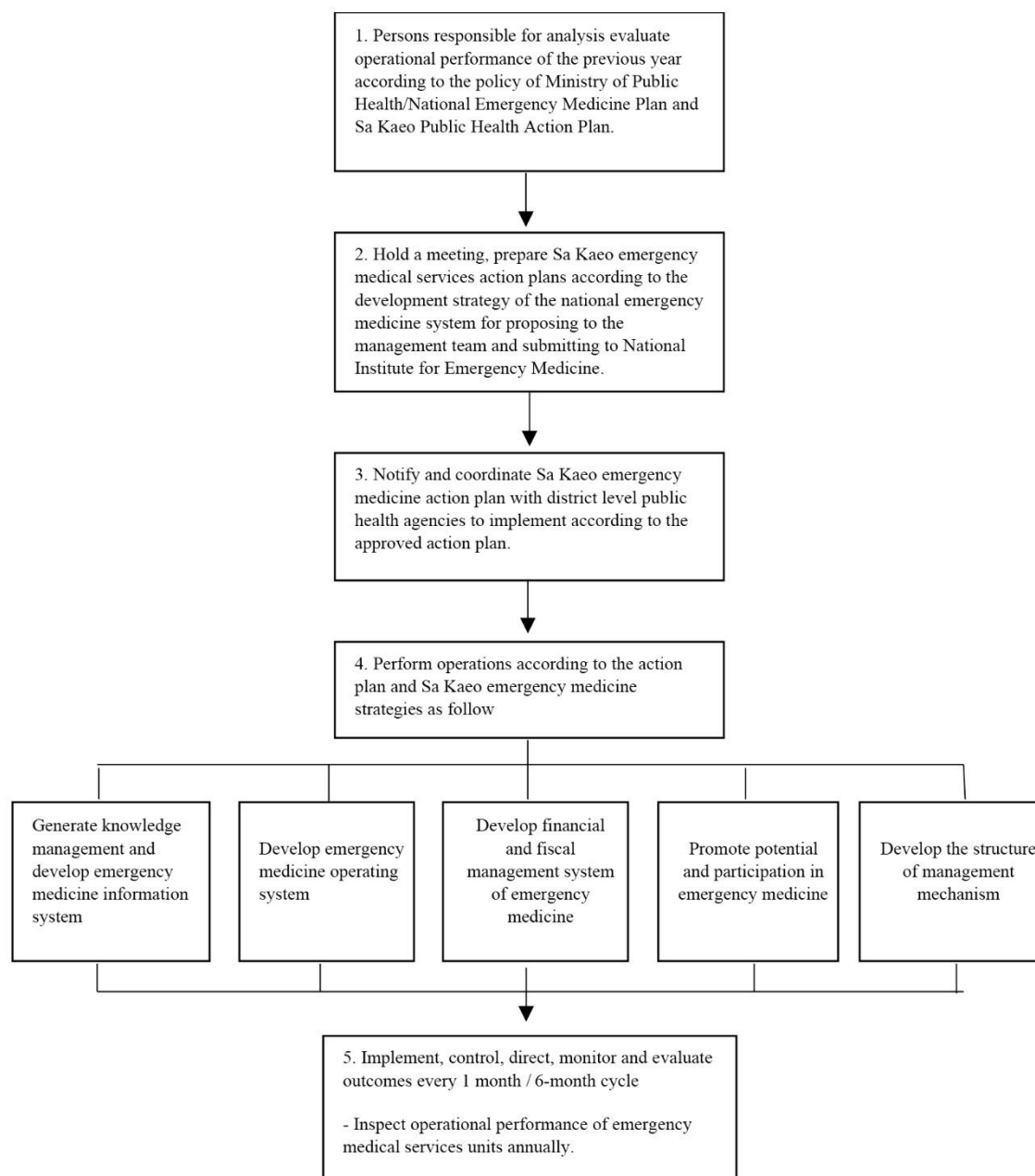


Figure 5.39 Operating Procedures of Emergency Medical Services System in Sa Kaeo, Sa Kaeo Provincial Public Health Office

Source: Sa Kaeo Provincial Public Health Office (2019).

Based on situations of emergency illness of people in Sa Kaeo province, when they are injured or have emergency illness, they receive medical assistance and are delivered to hospital by emergency medical services units registered in Sa Kaeo emergency medicine system through a command of Sa Kaeo Emergency Notification and Command Center. There is connection with the development of integrated emergency medical services (Emergency Care System: ECS) starting from pre-hospital care (EMS), emergency room care (ER), transferring between hospitals (Referral system), medical and public health response in disaster management. The Provincial Public Health Office has developed 4 major chains continuously, i.e. quality EMS, emergency rooms that meet standards; quality ER including developing referral system, refer in – refer out, that can connect to the operations of all hospital levels in the province, and quality disaster with the goal to reduce death and disability in emergency patients.

Sa Kaeo Provincial Public Health Office participates in emergency medicine system development by preparing Sa Kaeo Provincial Public Health Office emergency medicine system development plans constantly every year. The development plans in 2020 included (1) holding a meeting of 40 committee members on emergency medicine, accident and disaster to integrate the implementation of all sectors and develop the provincial emergency medicine system, solve problems and obstacles in the operations, (2) holding 4 times meeting of committee for making consideration about recruiting personnel and agencies in accordance with NIEM criteria and relevant tasks in order to have personnel and agencies required by the criteria, (3) providing EMR training, 40 hours, to local administrative organizations/foundations/ associations, 2 classes, 65 persons/class to increase the number of personnel working in the emergency medicine system and develop potential of emergency medical services units, restore knowledge and working skills, (4) collecting information of persons with emergency injuries and monitoring EMS during important festivals and reporting situations of injury during important festivals, analyzing emergency medicine information for monitoring, supervising, planning and connecting to service excellence within the province for integration of problem-solving with relevant agencies, (5) supporting potential development of emergency medicine in 9 hospitals to enable them to be able to

develop their potential in caring emergency patients in a better way, (6) developing the quality of medical treatment according to service plan and emergency guideline that covers the following: quality EMS, quality ER, quality in hospital, referral system, monitoring supervision of emergency medicine implementation and quality ECS to enable the hospitals to pass the quality ECS criteria, (7) supporting personnel in developing the emergency medicine or accident and disaster system in order to have personnel implementing disbursement of remuneration and recording information related to emergency medicine, (8) supporting expenses in meeting and training associated with emergency medicine development so that target emergency medicine personnel will receive development at least 1 time per person per year, (9) supporting development of personnel from all levels to have training and restore their working skills. Emphasis is placed on increasing efficiency of emergency medical services units, elevating life support or patient care at the scene of an incident that connects to quality ER in hospitals (Sa Kaeo Provincial Public Health Office physician, personal communication, November 18, 2019).

Since the location of Sa Kaeo province is a passageway to many provinces. There are a lot of vehicles on the road driven with high speed and traffic accidents occur frequently. Sa Kaeo Provincial Public Health Office solves this problem by carrying out the implementation according to the road safety master plan 2018-2021, namely, reducing death rate caused by road accident to be no greater than 10 persons per 100,000 population within 2020. The implementation has been carried out in accordance with 4 major measures of Ministry of Public Health known as the 4x4 measures since 2016 until now. Their details are as follow: (1) Co-management measure in provincial level road safety operation center, playing an important role in driving road accident problem-solving throughout the year that connects to the operations of district health system in every district and supports the operations of district road safety center or interdepartmental conference by using information to drive preventive measures. (2) Information management measure by integrating information from 3 bases; Public Health Office, police, and Road Accident Victims Protection Company at national level and provincial level, in order to learn about the actual size of problems, analyzing the root of problems and proposing information through provincial road safety administration center or interdepartmental conference

for utilizing in work plans and assessment, developing IS online system PHER Accident. The central administration develops software, server, system and organizes training with network hospital A S M1 level. (3) Preventive measure by implementing projects to drive a mechanism to prevent road traffic injuries at provincial level and drive the implementation of road traffic injuries at district level (District Road Traffic Injury: D-RTI), Local road safety operation center supports the implementation of community checkpoint in collaboration with community network associates in preventing and suppressing risk behaviors for road traffic injuries during festivals or periods with risks for road accidents by holding community activities, making an agreement and village regulations, conducting public relations to let people acknowledge measures for training risk groups, public address system, etc. (4) Medical treatment measure – medical treatment quality is developed according to service plan and emergency guideline that covers quality EMS, quality ER, quality In-hos, referral system. Probability of survival (PS score) is reviewed. The goal is set that injured persons have PS score greater than 0.75 and die no higher than 1% (Sa Kaeo Provincial Public Health Office physician, personal communication, November 18, 2019).

After the implementation was carried out, Sa Kaeo Public Health Office analyzed problems and obstacles causing a high death rate from traffic accidents of people in the area and found that the overall implementation of network associates and the mechanism of accident prevention and reduction affecting success in civil sector did not have continuity and connectivity. Integration of information of death caused by road accidents and data analysis of Sa Kaeo as a whole were not restored to relevant persons and persons in charge. The implementation of preventing and reducing accidents with participation of locality and people in the area was not ready and did not have any movement. Making understanding at awareness level to generate behavior in accident prevention such as wearing a safety helmet, wearing a seat belt, having driving discipline were not carried out in a tangible manner. Supervising, monitoring, academic support and assessment of operational performance in road accident prevention in areas of responsibility at district level (Road safety district operations center) were not constantly and continuously. Law enforcement requires additional measures and serious and continuous implementation

in order to cover all areas thoroughly (Sa Kaeo Provincial Public Health Office physician, 1 personal communication, November 8, 2019).

The Provincial Public Health Office in collaboration with Sa Kaeo PAO increase access to emergency medical services of red tagged patients to ensure the patients receive standard pre-hospital medical care by improving the quality and standard of pre-hospital medical care to achieve efficient emergency patient care, increase people's perception of calling through the 1669 hotline to ensure they will receive standard emergency medical services, building participation of other network associates in implementing provincial emergency medicine management which must pass standard certification in all districts. People's perception of access to emergency medical services through the 1669 hotline is developed. Efficiency and standard of emergency medical services units are evaluated at the scene of an incident, which connects to quality ER. Emergency medicine information is analyzed for monitoring, supervising, planning and connecting to service excellence within the province for utilizing in integration of problem-solving with relevant agencies. Personnel are developed and supported to attend training and restoration of working skills to ensure they gain knowledge, skills and standard according to certain courses. Emphasis is placed on increasing efficiency of emergency medical services unit and elevating assistance at the scene of an incident, which connects to quality ER in hospital (Sa Kaeo Provincial Public Health Office physician, personal communication, November 18, 2019).

Participation in organizing emergency medicine activities of Sa Kaeo Provincial Public Health Office comprises a workshop of persons in charge and networks at provincial and district levels in order to learn about policies and analysis on emergency medicine implementation, to increase potential of emergency medical services units to be ready for the operations, a workshop on supervising, monitoring, restoring knowledge in the operations associated with emergency medicine system and Provincial Emergency Notification and Command Center, a meeting of sub-committee on Sa Kaeo emergency medicine in order to integrate the implementation of all sectors and develop the emergency medicine system of the province and solve problems and obstacles in the operations, a project to develop community first responders (FR), enhancement of pro-active participation

in communities and families, having community FR for receiving notification of incidents, conducting basic first aid, CPR, using AED to help emergency patients in communities, a workshop to increase personnel working in the emergency medicine system, EMT-B 40 hours training and to develop potential of emergency medical services units, to restore their knowledge and working skills to be ready for the operations. All emergency medical services units are expected to have standard operations teams, training to restore knowledge of EMR on triage, CPR and utilization of AED, training to restore knowledge of public health personnel in notification of incidents, first aid, CPR and utilization of AED for emergency patients in communities and giving knowledge to community leaders and people.

Sa Kaeo Provincial Public Health Office supports community network associates from outside to implement the process of behavior change, risk communication and manage environment to support behavior change to prevent inappropriate emergency illness, to outstandingly integrate driving plans within agencies with continuous evaluation. Supporting budgets are available such as allocation of budget for health enhancement and disease prevention (P&P Area-based services, chronic disease fund, sub-district health fund, municipality budget for supporting exercise equipment, salinity meter, etc. NCD clinic management (Non-Communicable Diseases Clinic Puls) is available, support for personnel development and training (Case manager, System manager), information system and exchange of behavior change skills in people in risk groups and ill people. Monitoring and evaluation are continually reinforced using communities of practice (CoP).

Participation in evaluation and policy making of Sa Kaeo Provincial Public Health Office emergency medical services comprises data collection of emergency medical services operational performance such as a rate of access to emergency medical services, death rate of emergency patients, monitoring system setting, seeking budgets from outside agencies to support disaster communication and early warning system of the province from local administrative organizations and strengthening a team working on monitoring and controlling standards. Policy planning is set and put into practice at provincial public health office level. District Public Health Office, hospitals and sub-district health promoting hospitals supervise and monitor the tasks of the province as a whole through official health data system of

Ministry of Public Health known as Health Data Center or HDC, a meeting of planning and evaluation committee. There are laws and social support measures proposed to Inspector-General of Ministry of Public Health, Health Region 6 for explaining to ministerial level executives for acknowledgement and giving advice and issuing operating guidelines to solve policy-based problems, 2 times per year (Sa Kaeo Provincial Public Health Office physician, personal communication, November 18, 2019).

(2) Sa Kaeo Crown Prince Hospital

Emergency medical services of Sa Kaeo Crown Prince Hospital is under supervision of emergency medicine work group. Previously it took charge of managing Provincial Emergency Notification and Command Center from the beginning of emergency medicine system of the province. Until 1 November 2017, Emergency Notification and Command Center has been under management of Sa Kaeo PAO.

Currently, there are 2 emergency medicine physicians. 1 Physician is responsible for being Medical Director of Sa Kaeo emergency medicine and giving advice to Emergency Notification and Command Center over the telephone, 2 paramedics, 3 advanced emergency medical technicians (AEMT), 22 nurses being on duty in emergency room, 6 practical nurses, 3 communication officers and 3 drivers. Sa Kaeo Crown Prince Hospital participated in forming 1 ALS emergency medical services unit called “Sa Kaeo Paramedic Services”. It has 4 ambulances used to pick up and deliver patients and provide emergency medical services. Personnel working in the emergency medical operations team working during 8.00-16.00 hrs consist of 1 paramedic, 1 emergency medical technician (EMT) and 1 driver, during 16.00-24.00 hrs and 16.00 – 8.00 hrs consist of 2 registered nurses (personnel are the same group of nurses working in emergency room), and 1 driver. Since Sa Kaeo Crown Prince Hospital does not have sufficient EMT and paramedics; therefore, those workers work outside working hours but nurses being on duty in emergency room will do it instead. In case there is no emergency situation outside hospital, paramedics and EMT are required to help work in emergency room of the hospital (Chief of Section of Emergency Nursing, Sa Kaeo Crown Prince Hospital, personal communication, November 15, 2019).

Emergency medicine work group of Sa Kaeo Crown Prince Hospital provides medical care to emergency patients of all ages with all diseases both physical and mental approaches, especially fast track STEMI/Stroke/Sepsis/Trauma/ children in critical care) to be relieved from critical and emergency situations speedily, safely in a quality manner that meets standards. It is an excellent center that passed the quality emergency room criteria. It is the coordination center for delivering and referring patients within and outside the province of Region 6 Office of Public Health that covers all dimensions starting from preventing injuries and illness, health caring and enhancement, maintenance of the function of body and life inside and outside hospital, providing medical care treatment to children and women who are violently assaulted, providing observatory studies and training to medical students, nursing students and medical personnel, being a source for training medical personnel, first responders and emergency responders, giving support to agencies of government and private sectors in providing lecturers, supervising work quality of FR, BLS and ALS teams in giving pre-hospital medical care to patients and being able to save patients' lives at the scene of an incident securely.

Sa Kaeo Crown Prince Hospital screens emergency patients receiving services at emergency room using MOPH ED triage, a screening process that enables medical resources to be used with persons who should to be saved by medical personnel in a timely manner and in an appropriate place in order to reduce death, severity of diseases, disability, torture, dissatisfaction and complaints, to increase efficiency of disease diagnosis (Early Diagnosis) and early treatment, to prevent error in diagnosis, to be able to use communication system and working as a team efficiently (Effective Communication And Effective Teamwork) based on the principle of ISBAR (Identify, Situation, Background, Assessment, Recommendation). In case of communicating important and urgent information of immediate care patients, AIDET principle (Acknowledge, Introduce, Duration, Explanation and Thank You) is used. Patient flow efficiency is increased for triage level 1,2 patients and patients staying in emergency room no longer than 2 hours according to the indicator and standard of Ministry of Public Health.

Preparedness for emergency situations and disasters response – Sa Kaeo Crown Prince Hospital prepares a plan and run a rehearsal at least

once a year. Readiness of emergency ambulances is checked to ensure they are ready for use and meet the standard, and determines a preventive measure of violence in emergency department.

Public relations for health enhancement of patients and service receivers-Advice is given to patients and their relatives for health caring at home and observing symptoms in case more severe symptoms may appear such as high fever, being downhearted, limb weakness, bell's palsy/facial palsy, dysarthria (difficulty speaking), chest pain, being unable to eat, nausea, vomit, diarrhea which they need to urgently go to hospital, giving advice to patients and their relatives for basic health caring such as take food timely, body wipe for patients to reduce fever, clean wound from dog bite with soap and lots of water before going to hospital, giving advice to people in risk groups and their relatives to participate in Member Club, a project held to increase access to emergency medical services, promoting health in communities and what to do when seeing emergency patients by calling the 1669 hotline for being picked up by EMS unit at the scene of an incident and received basic medical treatment before delivering to hospital. In addition, emergency medicine work group provides basic first aid and CPR training to various agencies in government and private sectors, holds merit ceremonies in order to be the gathering of people including inserting knowledge about basic first aid and CPR to people.

Sa Kaeo Crown Prince Hospital determines indicators for increasing access to emergency medical services of people in the province as follow:

- (1) Response time-Sa Kaeo Paramedic Services must access emergency patients being in the 10km radius no longer than 10 minutes not lower than 60% of the operations performed.
- (2) The number of critical emergency patients (red tagged/ pink tagged patients) coming from the emergency medicine is higher than 20% of all patients admitted in emergency room of Sa Kaeo Crown Prince Hospital.
- (3) Patients and their relatives understand stroke symptoms and are able to call for help through the 1669 hotline so that an emergency medical services unit can assess and activate stroke fast track no longer than 4.5 hours after symptoms occur, increasingly at least 5% compared to the previous year.
- (5) Patients with acute coronary syndrome are fast diagnosed by physicians, 100% patients are diagnosed with acute ST elevation myocardial infarction by ECG within 10 minutes.
- (6) Patients with acute coronary

syndrome receive streptokinase within 30 minutes after being diagnosed or more than 50% of patients receive primary percutaneous coronary intervention within 120 minutes. (7) More than 30% of patients with out-of-hospital cardiac arrest (OHCA) coming from EMS system receive CPR before reaching hospital and have return of spontaneous circulation (ROSC), having return of pulses longer than 20 minutes.

Sa Kaeo Crown Prince Hospital emergency medicine previously provided pre-hospital and in-hospital emergency medical services until the management of Emergency Notification and Command Center was transferred to Sa Kaeo PAO, the role of pre-hospital emergency medical services decreased to the arrangement of 1 ALS emergency medical services unit to pick up critical emergency patients in Mueang district area, training provided to personnel in the emergency medicine system, basic first aid and CPR training given to people. The earlier mentioned activities are supported by Sa Kaeo PAO. Sa Kaeo Crown Prince Hospital is a provincial hospital. It is not a tertiary care hospital. Its size is smaller, and potential is lower than Khon Kaen Hospital, Phra Nang Klao Hospital and Sunpasitthiprasong Hospital. Therefore, it refers only emergency patients from community hospitals within the province. If patients' symptoms are severe beyond the potential of Sa Kaeo Crown Prince Hospital and they need to have urgent medical treatment, community hospitals in the province will transfer the patients to have further treatment to a tertiary care hospital in neighboring provinces instead of delivering to Sa Kaeo Crown Prince Hospital; for example, patients with acute coronary syndrome who need cardiac catheterization.

“Once receiving the case, I will send the community hospital in the closest area to the accident scene first. If the community hospital cannot cure them, they will be sent to Yupparat. Nevertheless, if it is an Acute MI case and requires PCI, we will not send the patient to Yupparat because Yupparat can not do PCI, but we will consult a Cardio Med professor at Yupparat. If the professor acknowledges and agrees that PCI must be done, the patient will be sent to do PCI at King Prajadhipok Memorial Hospital (Prapokklao Hospital) at Chanthaburi or Chaophraya Abhaibhubejhr Hospital at Prachinburi not pass by Yupparat so that it will not waste time” (Registered Nurse, Head of

Emergency Nursing, Wang Somboon Hospital, personal communication, November 19, 2019).

“We have a disadvantage in Sa Kaeo Province, which is that there is no Trauma Fast Track. If we receive accident patients, they need to be sent to a community hospital first. If the community hospitals cannot heal, they will be sent to Sakaeo Crown Prince Hospital. So, it takes time for the patient to receive treatment before having surgery.” (Professional registered nurse, Head of Sa Kaeo Emergency and Command Center, personal communication, November 4, 2019).

2) Local Administrative Organizations

(1) Provincial Administrative Organization (PAO)

Sa Kaeo PAO is an agency playing an important role in emergency medical services management. Mr. Songyot Thienthong, Chief Executive of Sa Kaeo Provincial Administrative Organization is the one who pushed Sa Kaeo province forward to have a modern system of emergency medical services. Currently, he is a committee member of the national emergency medicine committee, making Sa Kaeo PAO have considerable participation in emergency medical services with regard to decision-making, participation in the operations, participation in benefits and assessment.

Participation in decision-making – As Chief Executive of Sa Kaeo PAO play his role in being a committee member in the national emergency medicine committee, Sa Kaeo PAO participates in setting policies and plans in implementing PAO emergency medical services at national and provincial levels. Furthermore, Sa Kaeo PAO performs its duty in coordinating collaboration between agencies in solving problems related to those agencies and monitoring the operations of Sa Kaeo Emergency Notification and Command Center located at Sa Kaeo PAO.

Sa Kaeo PAO participates in managing Sa Kaeo Emergency Notification and Command Center, open for services throughout 24 hours. It gives importance to access to people. Emphasis is placed on comprehensive public relations and sufficient supporting equipment. Coaxial cables were expanded from 2 to 30.

Modern technology was adopted. Now, emergency incidents can be notified through video call, making emergency medical services units able to initially assess injury situations from the video. People can notify emergency incidents through Application. Incident notification was developed using “AI EMS”. ALS emergency medical services unit outside hospital was established to perform the operations in helping red tagged emergency patients. A memorandum of understanding on emergency medicine was made between Chief Executive of Sa Kaeo PAO and Sa Kaeo Provincial Public Health Office’s physicians to allow people being at risks for heart disease and stroke (STEMI and STROKE), diabetes, hypertension, chronic kidney disease, tuberculosis (TB) to register Sakaeo EMS member through the Application. When people from those risk groups have critical emergency illness and call the 1669 hotline, Emergency Notification and Command Center will know their history and coordinates of their locations from the registered information, enabling emergency medical services units to help them fast or in a timely manner.

Sa Kaeo has areas far away from district and provincial hospitals. Travelling requires a lot of time. Therefore, response time is longer than 10 minutes including communication problems from Emergency Notification and Command Center to emergency medical services units. The problems were solved to enable people to access the services in a speedy and standard manner as much as possible. Sa Kaeo PAO held many activities and developed a lot of innovation projects such as (1) One AED (Automated external defibrillator) One Community, totally 105 units given to schools affiliated to Sa Kaeo PAO, Sa Kaeo Provincial Public Health Office, Sa Kaeo Provincial Court, Aranyaprathet Customs House, Sa Kaeo Provincial Disaster Prevention and Mitigation Office, Sa Kaeo Provincial Transport office, Sa Kaeo Provincial Bus Terminal, Sa Kaeo District Office and sub-district health promoting hospitals to enable people to access life support when going into cardiac arrest according to the policy of Sa Kaeo PAO management team that “death rate from heart disease of Sa Kaeo people must decrease.” The AEDs of Sa Kaeo PAO can indicate readiness for use and can be used at all times. Another 70 units of AED are increased in 2020. (2) Training projects for first aid, CPR and the use of AED were given to more than 2,880 persons to let victims receive life support assistance from onlookers correctly starting from notification of emergency incidents,

first aid and CPR until emergency medical services units will arrive at the scene of an incident. (3) Project to develop communication of Emergency Notification and Command Center to be able to communicate with all areas through VHF system and the internet. Emphasis is placed on being able to contact and monitor all ALS ambulances. (4) Innovation for receiving notification of incidents to allow emergency call taker, assistant EMD, emergency medical dispatcher (EMD), supervisor EMD and emergency medical commander physician (EMCP) to acknowledge notification of incidents at the same time from the existing technology worthily, reducing management cost. (5) Innovation for indicating point of death to return information to Sa Kaeo road safety committee to jointly analyze risks and frequency of areas where accidents occur so as to solve those risks every month. (6) EMS members innovation to record patients in risk groups, people in vulnerable groups so that these people can be accessed in a fast manner.

The outstanding feature of Sa Kaeo PAO emergency medicine is the way that Chief Executive of the PAO pays attention to and views the importance of emergency medical services. Various budgets and projects related to the development of emergency medical services were determined in a tangible manner according to the 2nd strategy, quality people (safety and quality of life development). About social work plan, it is under responsibility of Division of Public Work by virtue of the Emergency Medicine Act and Decentralization Act that require PAO to legally carry out management. Therefore, the management is flexible, and unity is built in the provincial emergency medicine system (Registered Nurse, Chief of Sa Kaeo Notification and Command Center, personal communication, November 4, 2019).

Direct participation in social benefits of Sa Kaeo PAO is to reduce disability and death caused by emergency illness. The other benefit is Sa Kaeo PAO is accepted by provincial emergency medical services networks, Provincial Public Health Office, hospitals, foundation emergency medical services units or among local administrative organizations or even government inspector of Ministry of Public Health, Health Region 6 in terms of system setting, support, and pre-hospital emergency patient care. It receives a subsidy from a supporting budget from NIEM emergency medicine fund. The Provincial Public Health Office shares to PAO

hospitals to be used in Emergency Notification and Command Center management by 50% of the money given by NI|EM. The other important benefit is be accepted and voted by people in the area.

“The local province of Sa Kaeo is very strong, especially the Provincial Administrative Organization. The Provincial Administrative Organization has helped a lot with emergency medical service and giving out AEDs to all the Subdistrict Health Promotion Hospital. Moreover, they also do self-tests to check the availability automatically.” (Inspector of Ministry of Public Health, Health District 6, personal communication, November 19, 2019).

“The hospital has a budget, lot of stuff and a car from the Provincial Administrative Organization, and for the hospital, they do not have a budget. Now, the Provincial Administrative Organization has come to help develop the EMS system of Sa Kaeo to be better” (Emergency Medicine Physician, Sakaeo Crown Prince Hospital, personal communication, November 5, 2019).

“The PAO has given the budget for the development of the EMS system in Sa Kaeo province for 1 hundred million. If there was no PAO to help, it probably would not have come like this. Wut was also at the 1669 Call Center and was able to help resolve a lot of problems. Now, he is going to help take responsibility for checking the car, registering the car, and registering the operator. In addition, I saw that he had already made a project to set a budget. Next, there is no need for the hospital to check the car registration, PAO will manage to complete it” (Public Health Technical Officer, Sakaeo Provincial Health Office, personal communication, November 18, 2019).

Sa Kaeo PAO monitors and evaluates emergency medicine operational performance by comparing to the determined criteria, quantitatively and qualitatively, such as response time, death rate of patients, satisfaction of service receivers and outcomes from monitoring and evaluation, to be used in planning and developing potential of Emergency Notification and Command Center. Sa Kaeo PAO

planned to hold a joint meeting among Emergency Notification and Command Center, hospitals, and emergency medical services units by bringing cases that patients died during receiving out-of-hospital emergency medical services to mutually review, study, analyze causes of the problem, to solve the problem and seek a preventive measure.

“We plan to hold a Death Case Conference with Emergency Notification and Command Center, hospitals, doctors and emergency medical services units to find any defect in the system. Then, we will learn which part we make a mistake so that we can find a way to protect it. (Registered Nurse, Chief of Sa Kaeo PAO Emergency Notification and Command Center, personal communication, November 4, 2019).

(2) Municipalities and Sub-district Administrative Organizations

Sa Kaeo PAO made an attempt to establish network associates for establishing emergency medical services units in collaboration with Sub-district administrative organizations by having the PAO as the administration center. Sa Kaeo PAO asked for collaboration with local administrative organizations to correctly follow NIEM principles and conditions in registering emergency medical services units, supported and provided assistance to local administrative organizations in developing personnel, emergency ambulances, devices and equipment necessary to emergency medical services to Sub-district administrative organizations. Though Sa Kaeo province made an MOU on mutually implementing and managing local emergency medical services in the area between the PAO and municipalities and the PAO with Sub-district administrative organizations and the PAO gives support by providing emergency ambulances and knowledge training to workers in the emergency medicine system to local administrative organizations, there is a small number of municipalities and Sub-district administrative organizations participating in out-of-hospital emergency medical services while the implementation in collaboration with local administrative organizations in the area did not comprehensively cover all sub-districts due to unreadiness of personnel. 95% of local administrative organizations (63 local administrative organizations) registered to provide emergency

medical services but only 19% of them (12 local administrative organizations) perform the operations (Information from ITEMS, retrieved on January 11, 2019). Comment show the url here Among these numbers, there are many local administrative organizations give good collaboration in providing emergency medical services such as Wang Thong Sub-district Municipality that sets up Wang Thong Sub-district Municipality emergency medical services to people in its area of responsibility and neighboring areas for serving emergency illness or accidents in a timely manner so as to reduce death and disability of injured persons including enabling people to achieve a better quality of life and a shelter during their emergency illness. The services are available throughout 24 hours. Furthermore, Wang Thong Sub-district emergency medical services unit gives knowledge about a state of emergency illness, accident/incident notification, basic first aid to people.

Thappharat Sub-district Administrative Organization (SAO), top executives of Ta Phraya district and coordinating committee on district public health jointly attended a meeting to determine emergency medical services as a major strategy, in collaboration with Ta Phraya Paramedic Services network, and integrate work of all sectors. Public policy “We are ready to help you” was set up. The model of emergency medical services is carried out through the 1669 hotline. Thappharat SAO established Paramedic Rescue Services Center at Office of Thappharat SAO and built accident/incident notification networks, namely, coordination from 1669 emergency volunteer networks, village headmen, members of Thappharat Sub-district, village health volunteers (VHV) and civil defense volunteers that comprehensively covers all villages, making accident/incident notification carried out in a fast manner.

Phra Pleung Sub-district Administrative Organization established Phra Pleung Paramedic Services Unit and has opened for services since 2004 to let people in its area of responsibility who have sudden illness or accidents be able to access hospitals or be referred to higher potential hospitals thoroughly and efficiently as prescribed by laws. Phra Pleung paramedic services team has potential and ability to give basic first aid to incident victims by assessing patients’ conditions correctly and be able to move patients correctly according to principles of nursing practice. There are practicing and reviewing of first aid under supervision of

registered nurses from Na Khan Hak Health Center, a health center whose administrative management was transferred to local administrative organizations.

Khlong Hin Pun Sub-District Administrative Organization established its Paramedic Services Center to enable to receive pre-hospital emergency medical services and have a better quality of life according to the policy of the management team of local administrative organizations. Currently, it is the first and the only sub-district administrative organization in Thailand that is able to set up ALS emergency medical services unit.

Thap Thai Sub-District Administrative Organization established One Tambon One Paramedic Service Unit in 2009 to develop personnel and build a sub-district paramedic team to perform the operations in finding and helping incident victims in an efficient manner.

Emergency medicine tasks of municipalities and sub-district administrative organizations providing emergency medical services are most likely affiliated to the structure of disaster prevention and mitigation similar to those of Khon Kaen, Nonthaburi and Ubon Ratchathani. Employees and contract employees comprise medical personnel, public health technical officers, emergency medical technicians and emergency medical responders (Sa Kaeo Paramedic Services Unit, group discussion, November 27, 2019).

Emergency medical services units of municipalities and sub-district administrative organizations as mentioned above established operations center and determined the location, personnel, emergency ambulances, materials, durable articles, and equipment to serve the communication over the telephone, radio and the internet. There are workers, emergency vehicles and equipment that meet NIEM requirement, and registered their emergency medical services units with host hospitals and provide 24 hours services, each shift has 8 hours or 12 hours. They perform the operations as soon as being notified by Sa Kaeo Emergency Notification and Command Center. A report of the operations of emergency medical services units will be prepared through a computer system on the internet within 2 hours after finishing the operations so as to make a disbursement of their remuneration. When Provincial Public Health Office checks the accuracy, the budget obtained from NIEM to pay for the remuneration will be transfer to the account of local administrative

organizations. (Emergency medical responders, Thap Thai Paramedic Services Unit, Khlong Hin Pun Paramedic Services Unit and Phra Pleung Paramedic Services Unit, group discussion, November 27, 2019).

Participation in proposing problems, exchanging, and expressing opinions to mutually solve the ongoing problems in the emergency medicine system of municipalities and sub-district administrative organizations joining emergency medical services is most likely carried out through EMS Day meeting. It is held at Sa Kaeo PAO Emergency Notification and Command Center on the last Wednesday of every month. Determination of policies and decision-making are the duties of NIEM, Provincial Public Health Office and PAO. Later, the Provincial Public Health Office and PAO will pass down to municipalities and SAO to put the policies into practice, like those of Ubon Ratchathani (Emergency medical responders, Thap Thai Paramedic Services Unit, Khlong Hin Pun Paramedic Services Unit and Phra Pleung Paramedic Services Unit, group discussion, November 27, 2019).

Sa Kaeo province made a memorandum of understanding among PAO, municipalities and sub-district administrative organizations in providing emergency medical services to people that will comprehensively cover the whole area. Sa Kaeo PAO supports emergency ambulances, devices and equipment for life support to other local administrative organizations. Most local administrative organization leaders accept that the emergency medical services implementation to people in their areas can reduce death rate and disability of people. Besides, they are accepted and gain credibility from people in their areas as well. Sa Kaeo has more than 90% of local administrative organizations registering emergency medical services. However, many local administrative organizations including PAO cannot arrange EMS units to perform the operations since workers resign and change their jobs frequently. The causes of the problems are EMT and EMR of local administrative organizations are contract workers not permanent ones and their income is not sufficient for their livelihood, especially Sa Kaeo PAO that has modern ALS ambulances but sometimes they are not able to perform the operations due to insufficient number of workers. Consequently, the existing ALS ambulances are used to show in important events of the province and publicize Sa Kaeo PAO only.

“It is true that there are still few emergency medical services in the Department of Local Administration (DLA) of Sa Kaeo Province but not every department of Local Administration that signs an MOU that will provide emergency medical services. Each Department of Local Administration that has an Emergency Operation Division will be responsible for providing emergency medical services within their area. If the Subdistrict Administrative Organizations (SAO) wants to provide emergency medical services but has no budget problems, PAO will support them. However, first, there must be a heart in volunteer work by starting with the management first. The PAO cannot force the SAO to do so because each DLA is a juristic person and operates by themselves. PAO can only ask for cooperation. Besides, everything is still stuck with budget issues and people issues. The only thing PAO can do is show the local people that they have the potential to be able to do it. At present, PAO has started an emergency medical service for 12 sub-districts in the suburb of the Muang district. Most districts are Ta Phraya Districts. The Muang District has not yet started doing so and is the most difficult because there are large foundations in Muang District that provide and supervise emergency medical services already.” (President of Sa Kaeo Provincial Administrative Organization, personal communication, November 4, 2019).

Sa Kaeo PAO participates in evaluating the big picture of operational performance of the emergency medicine of the province and other local administrative organizations that arrange emergency medical services. Monitoring and evaluating operational performance in each agency are available by conducting a satisfaction survey of service receivers in the area. Operational performance is measured and compared to the criteria, quantitatively and qualitatively. The obtained outcome from monitoring and evaluating will be used for planning and developing its potential.

3) Foundations, Associations and Private Organizations

There are 4 foundations providing emergency medical services in Sa Kaeo province, i.e., Sawang Sa Kaeo Thammasathan Foundation Rescue Service, Sawang Tiang Thammasathan Foundation, Aranyaprathet Rescue Service Foundation and Sa Kaeo Ruam Katanyu Foundation. Most of FR and ALS emergency medical services units in Sa Kaeo belong to these 4 foundations. Therefore, they

considerably participate in emergency medical services for both urban and rural areas. They give services to patients in the areas of responsibility set by the Provincial Public Health Office and PAO. Workers follow policies, requirements and standards determined by NIEM, the Provincial Public Health Office and PAO. However, the number of emergency medical services units in Sa Kaeo province is not sufficient since some parts of EMR do not have fixed income, EMS operations are their hobby that they can do during free time after they finish their routine work. In this regard, some areas are deprived of emergency medical services units.

Sa Kaeo Emergency Notification and Command Center gives a chance to allow representatives of emergency medical services from all foundations to attend EMS Day meeting held every month at Sa Kaeo PAO Emergency Notification and Command Center. Therefore, they are able to participate in expressing their opinions, mutually solving problems, giving advice, mediating disputes and exchanging experience in providing emergency medical services (Information from the researcher's non participatory observation of EMS Day meeting).

Foundation EMRs have not participated in decision-making and development of the emergency medicine of their agencies. All decision-making depends on the committee of those foundations. If decision-making does not pass an approval of the committee and when the committee acknowledges later and does not agree with that decision, the EMR will be asked to leave that foundation.

“I used to be a volunteer of Sawang Sa Kaeo Thammasathan Foundation Rescue Service. At that time I developed myself and I would like to gain more knowledge. I attended training to become and EMR. I spent my money on the training. Someone knew that I attended the training without seeking an approval from the committee, and told the committee, the committee held a meeting and asked me to leave the foundation.” (Emergency call taker, Sa Kaeo Emergency Notification and Command Center, group discussion, November 4, 2019).

Participation of private hospital in emergency medical services of Sa Kaeo province -Nowadays, there is only 1 private hospital in Sa Kaeo,

Kasemrad Aranyaprathet Hospital. It has been operated less than 1 year. Therefore, it has not participated in the provincial emergency medical services.

4) People

People participate in receiving individual benefit from calling emergency medical services when they get injured or have sudden illness for free. They receive convenience and safety in life and property. Sa Kaeo Provincial Public Health Office supports people to participate in perceiving emergency illness such as stroke, STEMI, what to do when they have accidents/incidents or see emergency situations, asking for emergency medical assistance through the 1669 hotline and 1669 Application through public relations conducted in the form of exhibition or signage in communities, sending information through radio stations, public address system, village meeting, training, community forum, and home visit. Knowledge about emergency medicine is given including training about basic skills in handling emergency situations by PAO, Provincial Public Health Office and hospitals on performing first aid, CPR and the use of AED to community leaders and community first responders (FR). Though people know they are able to call 1669 to notify when they have emergency illness, when emergency situations occur, they do not call 1669 services or they call 1669 but cannot communicate with an emergency call taker since they are nervous and scared. It would be better to have community first responders or community leaders who have basic knowledge about emergency medicine in giving first aid and giving information to 1669 emergency call taker. Most people do not know how to correctly notify emergency incidents and none of Sa Kaeo people notify emergency incidents through 1669 Application. There is a small amount of people's participation in giving basic first aid when seeing emergency patients, doing basic CPR and calling to notify emergency incidents and give necessary information required by an emergency call taker, compared to that of in another 3 provinces in the study.

“We will train both the community emergency volunteers and village health volunteers to educate students in schools. Now I will go to educate monks at the temple as well. In addition, we organized at the temple, so the people who came to the merit event made merit and also received a merit. Moreover, they

also came to listen to the knowledge of CPR and publicize 1669 as well because sometimes, it has first aid training only, they rarely come. If it is a merit event, the villagers will come more. Nevertheless, they were trained but when they were excited, he did not think of 1669 and most of them came to the hospital themselves. At the ER, I asked him if he had symptoms like this, why did he come to the hospital by himself and why not call 1669, do you know 1669? Then, he said that he knew but he was shocked, so he forgot and came to the hospital by himself.” (Operational Registered Nurse, Sakaeo Crown Prince Hospital, group discussion, November 5, 2019).

“For the villagers, when they are shocked, they do not think about 1669. Even if they call 1669, they do not know anything. In the past, I had received an incident report when the incident center was owned by Sakaeo Crown Prince Hospital. When he was shocked and called, he did not know anything, they only told me to come and pick them up quickly. When I asked a question, he cursed at me for asking a lot of questions. If there is a community leader, community emergency volunteer, or village health volunteer who can control his consciousness to help inform the circumstance, it would be great and will talk about. In addition, it can help to report an incident, it can also help provide first aid.” (Emergency Medical Technician, Sakaeo Crown Prince Hospital, group discussion, November 5, 2019).

“I regularly receive incident reports and they scold back from asking a lot of questions. Sometimes I have to say that I send the car and ask for more information. However, if the patient is unconscious, I will really send the car away. Then, ask for more information because the car has radios and telephones able to communicate with the Emergency Operation Division at any time. Additionally, I tried to publicize the use of the 1669 application of the National Institute for Emergency Medicine. If they in Sa Kaeo province, use the 1669 application, it will bounce at the Sa Kaeo command center and show the location of the patient. When they take the car to deliver the patient and sit with relatives on the way, they will try to promote the 1669 application

to relatives because most people already have smartphones. I saw him downloading it to their device. However, there is an application on the device, but no one has ever reported it by using the application to report the incident.” (Staff at Emergency and Command Center, Sa Kaeo Emergency Medical Service and Command Center, personal communication, November 4, 2019).

People, community first responders, village health volunteers and community leaders participate in perceiving emergency illness and methods to prevent emergency illness, considered a desirable emergency patient care system. Namely, it must begin with disease prevention or prevention of inappropriate emergency illness. The Provincial Public Health Office communicates and publicizes through different channels such as organizing a forum to restore information at community level, launching a campaign, articles, hospital radio, public address system, signs, role model in personal media, making great health care go viral; for example, bike riding club, preparing media, calendars, stickers to let people know about risk behaviors and warning signs of coronary artery disease and stroke in conjunction with heart disease and stroke service plan of Ministry of Public Health, measuring salinity in food for patients in risk group, exchanging knowledge and evaluating perception continually and conducting risk behaviors being determinants for early warning communication, progress of self care and health literacy, health coaching, signage, community campaign, village meeting, training, community forum, home visit, launching a campaign on important days, i.e. 29 October-World Stroke Day, 14 November-World Diabetes Day, 20 March-Village Health Volunteer Day, 17 May-World Hypertension Day, 31 May- World No Tobacco Day.

People in Sa Kaeo province participate in performance evaluation of emergency medical services by giving suggestions or filing complaints direct to local administrative organization executives. Some people evaluate the performance through the Provincial Public Health Office, hospitals and emergency medical services units by responding to a satisfaction survey questionnaire for EMS receivers similar to people’s participation in Khon Kaen, Nonthaburi and Ubon Ratchathani provinces.

Emergency medical service unit-managerial type or Sa Kaeo Emergency Notification and Command Center is classified in an advanced level. Namely, the physician certified emergency medicine is a Medical Director for both general administration and direct administration. Emergency medical service unit-medical operations type consists of 3 levels of the medical service units, i.e. ALS, BLS and FR. Government hospitals, Khlong Hin Pun PAO and SAO take charge of ALS emergency medical services units. Foundations, associations and some sub-district health promoting hospitals organize BLS and FR emergency medical services units. Operation zoning are implemented to ensure the operations comprehensively cover the whole area of the province. Chief Executive of Sa Kaeo PAO views the importance of emergency medical services very much. He devotes his time and ability for self-study about emergency medical services and manages them by himself including being a member of the National Emergency Medicine Committee. As a consequence, the PAO plays an important role in managing the Emergency Notification and Command Center, supporting budgets and emergency ambulances. Collaboration networks are built with other local administrative organizations to participate in emergency medical services, giving rise to outstanding progress of Sa Kaeo emergency medical services. However, practically many ALS, BLS and FR emergency medical services units cannot actually perform the operations due to insufficient number of personnel. Sa Kaeo is a passageway to other provinces; there are a lot of traffic causing frequent accidents. Emergency medical services units are not enough for covering the whole areas, both rural and urban areas. Though the Provincial Public Health Office and hospitals run public relations campaigns the use of the 1669 hotline and 1669 Application, most people still lack knowledge and understanding of calling the services and choose to go to hospital by themselves when they have emergency illness.

5.4.1.4 Emergency Medicine Networks Management in Locality

1) Provincial Administrative Organization

Emergency medicine networks management of Sa Kaeo PAO started from 2010. Sa Kaeo PAO worked in an integrated manner with Sa Kaeo Provincial Public Health Office and established Emergency Notification and Command Center which is located at Sa Kaeo PAO. Provincial general hospital and

community hospitals are co-administration centers. Sa Kaeo bought 4 fully equipped emergency ambulances and gave to 4 co-administration centers, i.e., Sa Kaeo Crown Prince Hospital Co-Administration Center, Aranyaprathet Hospital Co-administration Center, Wang Nam Yen Hospital Co-administration Center and Ta Phraya Hospital Co-administration Center.

In 2016, Sa Kaeo PAO established Sa Kaeo PAO Paramedic Services to provide 24 hours pre-hospital to injured persons and emergency patients and bought 4 fully equipped emergency ambulances given to 2 co-administration centers, i.e. Sa Kaeo Crown Prince Hospital Co-administration Center, Khlong Hat Hospital Co-administration Center, 1 ambulance is used in Sa Kaeo PAO Paramedic Services, and the other one is lent to Wang Somboon Hospital. Budgets have been supported continuously to Sa Kaeo Crown Prince Hospital and hospitals in Sa Kaeo province in order to develop the system to have readiness for providing services and people in Sa Kaeo province can access healthcare services confidently. On 23 May 2016, Sa Kaeo Governor held a signing ceremony of the memorandum of understanding on implementation and management of emergency medical services among Sa Kaeo PAO, National Institute for Emergency Medicine, Sa Kaeo Provincial Public Health Office, Sa Kaeo Provincial Police Station, Sa Kaeo Crown Prince Hospital, local administration organizations, and all emergency rescue foundations and associations in Sa Kaeo province to work in collaboration in supporting the implementation and management of the emergency medicine system according to the Emergency Medicine Act, B.E.2551 (2008).

Emergency Notification and Command Center has been moved from Sa Kaeo Crown Prince Hospital to be under supervision of Sa Kaeo PAO from 1 November 2017 onwards. It became the Emergency Notification and Command Center of the province that receives notification of incidents and making command, notification of incidents and making rescue command. In the meantime, Sa Kaeo PAO emergency medical services units were provided to provide services to emergency patients in areas of the responsibility as well.

The vision of Sa Kaeo Emergency Notification and Command Center is “standard border emergency medical services that respond to emergency patients in a comprehensive, timely, and borderless manner”. The mission is

“emergency medical services that passed the standard determined by National Institute for Emergency Medicine, connect to emergency operations, respond to emergency patients during normal and disaster circumstances in a comprehensive and timely manner by strong emergency medical services networks that mainly adhere to emergency patients”. The major goal is to reduce disability and death from emergency illness, reduce death rate of pre-hospital emergency patients and to reduce complications from improper operations of emergency medical services. (Chief Executive of Sa Kaeo PAO, personal communication, November 4, 2019).

Sa Kaeo Emergency Notification and Command Center has an idea and commitment to be developed to become a Smart Dispatch Center, a notification and medical command center managed in a professional manner with fast rescue teams who have self-responsibility and social responsibility. The organizational value is Smart Value; S = Sa Kaeo Emergency Notification and Command Center established by Sa Kaeo PAO to solve problems related to access to medical services under emergency situations of people in Sa Kaeo province. Emphasis is placed on being able to cover the whole area, people gain standard services in a fast and equal manner. The 2018-2022 Sa Kaeo emergency medicine strategic plans are used as a guideline to drive M = Mastery of Management, professional management, A = Accountability, self-responsibility and social responsibility, R = Rapid, T = Teamwork, working as a team in an efficient manner.

Sa Kaeo PAO expects the province to become a Smart City with professional management. Smart Eye, CCTV cameras are installed in every risk point in the province. Sa Kaeo Emergency Notification and Command Center will act as a core to perform the operations in response to disasters. D-NERT by Sa Kaeo PAO supports both equipment and money to install telemedicine system in 12 ALS emergency medical services ambulances. OIS 4.0 operating system and fingerprint system are installed in all levels of emergency medical services units and all ambulances. Emergency aeromedical service is used for patients who require a medical referral to see a specialist. Smart AED, AED is available to report readiness and location of the machine. There is warning when it is activated and warning when the machine is moved or transferred. Smart ambulance, status and positions of ambulances can be tracked, communication system covers VHF and internet. A

command is operated through the OIS 4.0 operating system. The PAO held a memorandum of understanding to allow hospitals to use the ambulances bought by the PAO to compensate for the missing ambulances. Smart QR Code Scanner, emergency patient registration system is developed by using QR Code scanner for the convenience of data collection prepared in the form of Application.

The management team of Sa Kaeo Emergency Notification and Command Center comprises Chief Executive of the PAO, Deputy Chief Executive of the PAO, Chief Administrator of the PAO and Director of the Division of Public Work. The supervision structure of Sa Kaeo Emergency Notification and Command Center comprises Director of Division of Public Work is Chief Supervisor of Emergency Notification and Command Center, Chief of Division of Machinery is Deputy Supervisor of Emergency Notification and Command Center, registered nurse, professional level is Chief of Emergency Notification and Command Center. Personnel in Emergency Notification and Command Center consist of registered nurse, professional level, being Chief of Emergency Notification and Command Center, paramedics, communication staff, emergency call taker and emergency medical technician. Currently, there are 15 persons working in Emergency Notification and Command Center. (Chief of Sa Kaeo Emergency Notification and Command Center, personal communication, November 4, 2019).

Sa Kaeo PAO integrated Emergency Notification and Command Center with Medical Rehabilitation Fund. Sa Kaeo PAO made a memorandum of understanding with NHSO Region 6 Rayong on establishing Sa Kaeo Medical Rehabilitation Fund to set up a system for long-term care of dependent persons. The budget is allocated 12 million baht per year to take care of people in the target group, persons with disability, older persons, persons with intermediate care and persons with 4 types of dependencies, 1) to compensate for medical services, support rehabilitation service expense and equipment for people with disabilities such as hearing aid devices, canes, wheelchairs, prosthetic limbs, etc., 2) to develop the service system, support expenses for implementing medical rehabilitation services to services units in the area, 3) to develop the quality of life, support the development of medical rehabilitation services, provide assistance in adjusting environment and living places for the target group, 4) to manage, implement a meeting of the committee and

sub-committee, connect Medical Rehabilitation Fund to Emergency Notification and Command Center by focusing on people in risk groups for heart diseases and stroke, diabetes, hypertension, chronic kidney disease, tuberculosis, etc, register members of “Sa Kaeo EMS Member”, register various information in the emergency medicine system through an Application for providing immediate medical services when emergency situations occur. Besides, a plan is set for developing further patient tracking wristbands to enable patient to press a command button to ask for help in case of emergency. The goal is to access patients in the fastest manner. “Sa Kaeo EMS Member” is considered caring at the beginning to prevent patients entering into homebound and bedridden status. From the opinion of global public health, prevention spends less money than treatments. In the long run, the important outcome is people are healthy and have a good quality of life. Therefore, prevention of emergency incidents/accidents to which Sa Kaeo PAO gives importance is the real integrated emergency medical services (Sa Kaeo Public Health physician, personal communication, November 18, 2019).

“Provincial Administrative Organization and Provincial Public Health Office make an MOU to jointly develop the Sa Kaeo emergency medical service system. PAO will help in 3 issues 1) Install AED for all Subdistrict Health Promotion Hospital 2) Install telemedicine system in the hospital's ALS car and develop a telemedicine center in the emergency room to meet the standards. 3) Register as a “Sa Kaeo EMS Member” through the application, focusing on people at risk of cardiovascular disease, diabetes, high blood pressure, kidney disease, and tuberculosis. If patients in the registered risk group have an emergency and call 1669, the emergency center will see the location of the accident scene and ordered the paramedics to go out to help faster” (Provincial Public Health Physician at Sa Kaeo, personal communication, November 18, 2019).

Sa Kaeo PAO dedicated a huge amount of budget to develop the emergency medicine system by setting budgets and many projects related to emergency medicine development according to the 2nd strategy – quality people

(safety and quality of life development) in the part of social work and under responsibility of Division of Public Work as per the following details:

The 4th project meeting of local administrative organization emergency medicine at national level was held for building a body of knowledge, exchanging knowledge and strengthening emergency medicine networks of local administrative organizations. It was a forum for exchanging knowledge and passing down new innovation in emergency medicine, encouraging practitioners, executives and networks to be aware of and see the importance of emergency medicine system development to have readiness at international level in 2018.

Projects for training, seminar and observatory study of emergency medicine system were held continuously to enhance knowledge and understanding about emergency medicine operations for Sa Kaeo emergency medical services units. Budgets in 2018-2022 were determined at the amount of 500,000 baht per year.

Emergency medicine workshop project was held for emergency medical services units to train workers to have knowledge and skills in providing assistance when they meet an incident. The objectives are to enable trained workers to disseminate the obtained knowledge to their intimate fellows, to enable them to provide basic assistance, to enhance knowledge and understanding about emergency medicine operations to persons attending the training. Budgets in 2018-2022 were determined at the amount of 200,000 baht per year.

Project to develop Sa Kaeo Emergency Notification and Command Center to ensure the operations are full of continuity, keeping up with the times, faster and in a much more timely manner, to develop Emergency Notification and Command Center to be convenient, fast, flexible and able to cover the whole area of Sa Kaeo province so that people experiencing accidents/incidents and emergency illness can be assisted fast, safely and thoroughly. Budgets in 2018-2022 were determined at the amount of 10,000,000 baht per year.

EMS instructor workshop project for enhancing skills of nurses who are instructors to ensure they know techniques and understand principles of teaching and are able to pass down to other people in a standard manner. By doing this, instructors have an opportunity to exchange knowledge and experience in

theoretical and practical teaching. Instructors gain knowledge and understand academic approaches and pass down to other people efficiently. People in Sa Kaeo province can access emergency medical services equally. Emergency nurse practitioners working in emergency room of all hospitals in Sa Kaeo province are trained. The budget in 2019 was determined at the amount of 154,000 baht.

Workshop project for EMS instructor assistant in Sa Kaeo emergency medicine system for enhancing skills of emergency medical technicians who are instructors to achieve efficiency and effectiveness in teaching, by doing this, emergency medical technicians will learn about techniques and understand principles of teaching, both theoretically and practically and be able to apply the knowledge to their working. The budget in 2019 was determined at the amount of 154,000 baht.

Workshop project for emergency medical responders (EMR) for enhancing medical skills efficiently and effectively, EMR will learn technique and understand principles of teaching and pass down to other people in a standard manner. They will have an opportunity to exchange knowledge and experience in teaching. They learn technique and understand correct teaching and working and are able to pass down to other people in a standard manner. Training is provided to emergency medical responders working in emergency medical services units in Sa Kaeo province who play an important role in coaching and developing personnel in their agencies. The budget in 2018 was determined at the amount of 300,000 baht and the budgets in 2019-2022 were determined at the amount of 60,000 baht.

One Tambon One AED project for the fiscal year 2018 to be installed in schools affiliated to Sa Kaeo PAO, health stations and communities in Sa Kaeo province to ensure people are able to access automatic external defibrillations (AED) and first aid correctly and speedily, reducing death rate of patients with heart diseases, people having emergency illness caused by heart diseases and being at risk of heart diseases. The budget in 2018 was determined at the amount of 30,000 baht.

Basic first aid and CPR training project for the fiscal year 2019. Training was provided to Sa Kaeo PAO personnel, students, teachers, educational personnel affiliated to Sa Kaeo PAO to ensure they have knowledge and skills in performing basic first aid. By doing this, they will be able to help themselves and

people close to them safely before arriving at hospital, reducing a risk of death and medical expenses. The budget in 2019 was determined at the amount of 600,000 baht.

Meeting project and observatory workshop of national emergency medicine (National EMS Forum) for exchanging information and knowledge about implementation of policies including monitoring performance and new policies and to develop potential and opportunities for collaboration integration with various agencies, emergency medical services networks in Sa Kaeo province learn about standards, roles and duties in providing efficient emergency medical services. Collaboration is made among Sa Kaeo Emergency Notification and Command Center and emergency medical services networks in Sa Kaeo province. The budgets in 2019-2022 were determined at the amount of 600,000 baht per year.

BLS instructor workshop project is provided for personnel in Sa Kaeo PAO emergency medicine work group or personnel working in the field of emergency medicine in Sa Kaeo province and teachers in 11 schools affiliated to Sa Kaeo PAO. The workshop project aimed to train, develop and enhance skills of CPR instructors in Sa Kaeo province to achieve efficiency and effectiveness in teaching volunteers and people. The budgets in 2019-2022 were determined at the amount of 600,000 baht per year.

Workshop project on basic nursing skills and CPR for students in Sa Kaeo province aimed to enable training participants to gain knowledge and skills in basic first aid. They will be able to help themselves and people close to them safely before arriving at hospital, reducing risks of death and medical expenses. The budgets in 2019-2022 were determined at the amount of 600,000 baht per year.

Workshop project on basic first aid and CPR for people in Sa Kaeo province aimed to enable training participants to gain knowledge and skills in basic first aid. They will be able to help themselves and people close to them safely before arriving at hospital, reducing risks of death and medical expenses. The budgets in 2020-2022 were determined at the amount of 1,100,000 baht per year.

Preparedness project of Sa Kaeo emergency medical services units in response to disasters and emergency incidents, D-MERT (Disaster Medical Emergency Team) is provided to Sa Kaeo D-MERT Team, physicians, nurses, EMT-B or EMT-I or paramedics or those who attend paramedic course EMT-B/EMT-I

levels), pharmacists, communication officers or logistics public relations officers or management officers or financial officers, maids or patient care assistants to enable Sa Kaeo province to have preparedness in medical supplies, durable articles and be able to perform the operations efficiently. Victims of disasters can receive emergency medical treatment efficiently and can live their lives in areas of disasters without being a burden on someone. Training participants are expected to gain knowledge and skills in doing basic first aid. They can help themselves and people close them before arriving hospital, reducing risks of death. The budgets in 2020-2022 were determined at the amount of 250,000 baht per year.

One Community One AED project for the fiscal year 2018, phase 2. AEDs are installed in primary-secondary schools, Provincial Public Health Office, sub-district health promoting hospitals and communities in Sa Kaeo province to allow people to access automatic external defibrillations (AED) and first aid correctly and speedily, reducing death rate of patients with heart diseases, emergency patients caused by heart diseases and at risk of heart diseases. The budgets in 2020-2022 were determined at the amount of 12,600,000 baht per year.

Project for preparation of plans and workshop on emergency rehearsal at provincial level is provided to rescue teams, police, soldiers, emergency nurse practitioners, practitioners in emergency room and agencies playing a role in coaching so as to test and assess readiness or operations plans and the process of implementation in response to emergency situations and to build a learning opportunity through experience from the rehearsal. The rehearsal will enable workers to learn about error, advantage and disadvantage of the existing plans including operating guidelines in responding to certain situations. The budgets in 2020-2022 were determined at the amount of 300,000 baht per year.

Project on visiting emergency medical services of Sa Kaeo emergency medicine system aimed to be a guideline in monitoring and evaluating operational performance following important policies to ensure it is efficient and effective as scheduled and the obtained results will be used to study, analyze, monitor and give suggestion at a policy level for putting into practice, applying to work improvement and development in the future, reducing problems and obstacles at work

and increasing effectiveness. The budgets in 2020-2022 were determined at the amount of 120,000 baht per year.

Project on developing the command system of emergency medicine system through Sa Kaeo office information system (OIS 4.0) and telemedicine aimed to enable people facing emergency incidents in Sa Kaeo to receive response in an efficient and fastest manner, reducing death rate and disability of people at the scene of incidents to the minimum- The OIS 4.0 and telemedicine are provided to all FR, BLS and ALS teams in Sa Kaeo province, Sa Kaeo Emergency Notification and Command Center, Medical Director and physicians being on duty at emergency room of all hospitals, emergency room of tertiary hospital, general hospitals and community hospitals in Sa Kaeo province. The budgets in 2020-2022 were determined at the amount of 300,000 baht per year.

Project on registration, restoration training and inspection of emergency ambulances at all levels in Sa Kaeo province aimed to develop knowledge and skills and increase necessary equipment in emergency medical services operations to be up-to-date and meet academic principles, to be able to monitor, measure and evaluate operational performance to meet efficiency and effectiveness as scheduled by using proper technologies. Workers in the emergency medicine system register and receive potential development to restore their knowledge. Emergency ambulances are inspected to ensure they meet the standard, and fully equipped for the operations. People having emergency incidents/accidents receive response in a speedy, thorough, equal and standard manner. The budgets in 2020-2022 were determined at the amount of 370,000 baht per year.

Project on making an MOU on delivering AED (Automated External Defibrillator) to primary-secondary schools, Provincial Public Health Office, sub-district health promoting hospitals and communities in Sa Kaeo province aimed to build understanding of how to use AED. Potential of workers in Sa Kaeo emergency medicine system is developed. Workers gain knowledge and understanding of how to use and maintenance of AED. Sa Kaeo emergency medicine system is more efficient. The budgets in 2020-2022 were determined at the amount of 100,000 baht per year.

Project on Smart Living for Aging Alert, Sa Kaeo Emergency Notification and Command Center aimed to enable the elderly, homebound persons and bedridden patients to access the emergency medicine system in a speedy manner and receive correct and standard medical treatment, reducing death rate in the elderly, homebound persons and bedridden patients without appropriate reasons. The elderly, homebound persons and bedridden patients who have emergency illness receive close care and gain a higher survival rate. The budgets in 2020-2022 were determined at the amount of 150,000 baht per year.

From the above-mentioned information, it can be concluded that Sa Kaeo PAO gives importance to emergency medical services. The role of local administrative organizations in emergency medicine can reduce people's risks at community level. When the committee decentralized the power to local administrative organizations to manage the matter of life and death for determining roles and guidelines in caring the quality of life of people in the areas increasingly, the memorandum of understanding on the development of Sa Kaeo emergency medical services was made among National Institute for Emergency Medicine, Sa Kaeo PAO and Sa Kaeo Provincial Public Health Office in implementing and managing the emergency medicine system throughout work integration. There is collaboration in emergency medical services operations for people in Sa Kaeo province, both living in urban area and rural area, who have sudden illness. They can receive emergency medical services in a speedy, correct and standard, thorough, and equal manner without discrimination based on race, nationality, and religion throughout 24 hours. Meanwhile, Sa Kaeo emergency medicine system is developed. Fully equipped ambulances are provided continuously. Sa Kaeo is the 5th province of Thailand that is successful in transferring the implementation of emergency medicine to local administrative organizations and establishing Emergency Notification and Command Center at Sa Kaeo PAO. The Emergency Notification and Command Center plays its role in receiving notification of incidents, managing the pre-hospital emergency medicine system through the 1669 hotline in an efficient manner. Sa Kaeo PAO works in collaboration with local administrative organizations in the area in providing knowledge training to emergency medical services workers and emergency ambulances to local administrative organizations in the area almost 100%.

2) Wang Thong Sub-district Municipality

Wang Thong Sub-district Municipality gives importance and views pre-hospital emergency medical services are basic services people should receive, being legal power and duty of local administrative organizations. Pre-hospital emergency medical services are considered front-line services in providing medical care to emergency patients in a fast manner. Therefore, Wang Thong Sub-District Municipality emergency medical services was established for people in its area of responsibility and neighboring areas for reducing death and disability in injured persons and for a better quality of life, 24-hour services.

Wang Thong Sub-District Municipality emergency medicine is under responsibility of Division of Public Health and Environment, under supervision of Municipal Clerk and Director of Division of Public Health. Chief of emergency medical services unit supervises the operations. Now, there are 15 workers, 4 workers passed EMT-B training course and 11 workers passed basic first aid training (FR). There is 1 fully equipped emergency ambulance registered with National Institute for Emergency Medicine.

Wang Thong Sub-District Municipality included emergency medicine project in the 3-year development plan to be public services for people and enable people to have a better quality of life. The services are available for 24 hours. The operations of emergency medical services are divided into 5 units, 3 workers per unit. They perform the operations from Monday to Friday, 16.30- 07.00 hrs. On Saturday-Sunday or public holidays, they work from 06.00 – 18.00 hrs. and 18.00-06.00 hrs. They receive notification of incidents through the 1669 hotline and the telephone number of emergency medical services unit, 08-0633-3513.

Operational performance and satisfaction towards emergency medical services of Wang Thong Sub-District Municipality indicated that an emergency medical services unit will perform the operations to help 1 emergency patient per day since Wang Thong Sub-district Municipality is a rural area with different routes. Time spent on the operations starting from receiving notification of an incident to arriving at the scene of an incident is averagely 5-10 minutes. A satisfaction survey of service receivers conducted by Burapha University found that people's satisfaction was at a very high level.

Furthermore, Wang Thong Sub-District Municipality emergency medical services units give knowledge to people about emergency illness status, notification of incidents, and basic first aid. Currently, the internet system is used for the implementation of Wang Thong Municipality emergency medical services units to receive notification of incidents, search for data and publicize their work.

Wang Thong Sub-District Municipality was awarded the first runner up for emergency medical service unit, FR on selection of outstanding emergency medicine performance of Sa Kaeo in 2011 from Sa Kaeo Provincial Public Health Office and received an award plaque for outstanding emergency ambulance from National Institute for Emergency Medicine in 2016 (Wang Thong Sub-District Municipality paramedic services units, group discussion, November 27, 2019).

3) Thappharat Sub-district Administrative Organization (SAO)

Most people in Thappharat SAO are poor and living away from hospital, the farthest distance is 34 kilometers. When people face emergency illness, they need to hire a car to take them to hospital. 10.4% of its population is the elderly (14,042). There are patients with non-communicable diseases, i.e. diabetes, hypertension, coronary artery disease, being at risks for emergency situations. Communicable diseases in the area are dengue hemorrhagic fever, malaria, gastrointestinal disease, etc. It is a neighboring area for travelling to Buriram province, with mountain terrain and narrow roads, causing a lot of accidents especially during long holidays. It is also an area being at risks for disaster, landslide, windstorm, fire, drought, flood, etc. Top executives at district level and the coordinating committee on district level public health and Thappharat SAO have a meeting to set up emergency medical services as a major strategy in collaboration with Ta Phraya Paramedic Services network and integrate work of all sectors. Public policy “We are ready to help you” was set up. The model of emergency medical services is carried out through the 1669 hotline. Its emergency medicine is under responsibility of prevention and mitigation of disaster, consisting of 15 workers.

Thappharat SAO emergency medicine management is carried out in accordance with executives’ policies. Paramedic Rescue Services Center was

established at Office of Thappharat SAO, which comprehensively cover all villages, making accident/incident notification carried out in a fast manner.

Thappharat SAO contained emergency medical services project in the 3-year development plan, the 3rd strategy – development of quality of life, society, education, and public health to enable people in the area to enjoy safety of life and property and live together peacefully. For budget allocation and disbursement, Thappharat SAO has sufficient budgets for managing paramedic rescue services center. Expenditure budget is set up according to annual expenditure budget regulations in hiring rescue volunteers, providing materials and equipment, medicines, medical supplies, expenses for personnel potential development and training, expenses for uniform, gasoline expense, durable article expense and maintenance and repair expenses for durable articles, and other expenses necessary to the operations of rescue services.

Thappharat SAO appointed a committee to evaluate satisfaction of persons who receive services of Thappharat SAO paramedic rescue services unit. The satisfaction survey was conducted randomly from service receivers, patients' relatives or people who notified emergency incidents, 50 persons. The result of the satisfaction survey came out at a very good level. Poor people gain benefits from being assisted when they get sick with regard to referring to hospitals, reducing death since they receive correct first aid.

Executives of Thappharat SAO give importance to, with clear policies, and considerably support public services in paramedic-rescue given to people, making Thappharat SAO paramedic rescue services unit have preparedness of ambulance, standard devices and equipment, clear and fast communication, and work team for 24 hours services. There are 5 workers working in shift per day. They work 2 days and have 2 days off. They perform the operations thoroughly and in a timely manner for both normal situation and disaster situation. The work team is patient, sacrifice their time and ability, pool their efforts to give services and perform the operations to help emergency patients willingly. Thappharat SAO paramedic rescue services unit has knowledge and ability to provide basic first aid to patients correctly and safely before the patients are delivered to hospital accordingly.

Thappharat SAO has networks for incident notification, i.e. network coordination, rescue team volunteers 1669, village headmen, members of Thappharat SAO, village health volunteers (VHV) and civil defense volunteers, covering all villages and making notification of incidents become faster. Paramedic rescue services are called more often and significant awards in emergency medical services were given such as the award for outstanding civil defense volunteer center at national level in 2009, the award for outstanding defense volunteers in 2008 and 2009, the award for outstanding disaster prevention and mitigation in 2012, the award for outstanding emergency medical services unit at provincial level – FR emergency services in 2013 from National Institute for Emergency Medicine. Besides, Mr. Pornpong Saowakon, Chief Executive of Thappharat SAO received an honorable pin for being the one who has volunteer spirit, makes sacrifices, gives devotion and support to emergency medicine in 2013. (Thappharat SAO Paramedic Rescue Services, group discussion, November 20, 2019).

4) Phra Pleung Sub-district Administrative Organization (SAO)

Phra Pleung SAO viewed the importance of implementing emergency medical services at sub-district level. Therefore, Phra Pleung Paramedic Services Unit was established and has opened for services since 2004 to let people in its area of responsibility who have sudden illness or accidents be able to access hospitals or be referred to higher potential hospitals thoroughly and efficiently as prescribed by laws under the project One Tambon One Paramedic Rescue Unit of Ministry of Interior that aimed to develop local administrative organization paramedic services.

The structure of Phra Pleung SAO emergency medicine is under responsibility of Division of Public Health and Environment. There are 15 workers who passed training and registered in the emergency medicine system. There is 1 emergency ambulance supported by private sector. Devices and equipment used in the ambulance meet FR emergency medical services standard and they are inspected to ensure their readiness for use every day. The services are available for 24 hours. In the future, it will be supported another fully equipped emergency ambulance from Department of Local Administration Promotion.

Emergency medicine is managed in accordance with legal organization. Implementation plans and commands are determined. Tasks under one's responsibility are assigned. The operations are recorded and operation performance in each month is summarized. Teamwork meeting is held to find out problems in the operations and seek solution. Vehicle, devices and equipment are inspected to ensure they are ready for the operations. The services are open for 24 hours since 2004. In addition to the medical operations, the paramedic services unit helps people to catch venomous animals and cut tree branches or falling trees blocking a road or path in its area or neighboring areas. Public relations activity of the services is conducted through activities, public address system, leaflets and village health volunteers as well as the website, <http://www.pphealthdiv.org>.

Phra Pleung SAO paramedic services team under supervision of Phra Pleung SAO has potential and ability to give basic first aid to incident victims by assessing patients' conditions correctly and be able to move patients correctly according to principles of nursing practice. There are practicing and reviewing of first aid under supervision of registered nurses from Na Khan Hak Health Center, a health center whose administrative management was transferred to local administrative organizations. (Phra Pleung SAO Paramedic Services Unit, group discussion, November 27, 2019).

5) Khlong Hin Pun Sub-District Administrative Organization (SAO)

The management team of Khlong Hin Pun SAO viewed the importance of pre-hospital medical services provided to injured persons and emergency patients at the scene of an incident, basic services that people should receive and it is legal power and duty of local administrative organizations to do so. Therefore, Khlong Hin Pun SAO established its Paramedic Services Center to provide pre-hospital emergency medical services to enable people to have a better quality of life according to the policy of the management team of local administrative organizations.

The management team will determine policies in emergency medicine operations by having Chief Executive of Khlong Hin Pun SAO, Chief Administrator of Khlong Hin Pun SAO and Director of Division of Public Health are

the ones who put the policies into practice in a tangible manner and Khlong Hin Pun SAO paramedic services unit will bring the policies and operating guidelines into the operations. Chief of the paramedic services unit supervise the operations including giving opinion, problems, obstacles from the operations of workers to the supervisor to seek solution, improvement and development to ensure the emergency medicine system is able to help people in Khlong Hin Pun SAO area efficiently.

Khlong Hin Pun SAO contained the emergency medicine project in the 3-year development plans (2018-2021). Emergency medicine of Khlong Hin Pun SAO Paramedic Services Center is under responsibility of Division of Public Health and Environment. There are 25 workers in Khlong Hin Pun SAO paramedic services unit, who are personnel being on duty in Khlong Hin Pun SAO; they are 3 ALS workers, 10 EMRs who already passed EMR training and 12 FRs who already passed basic first aid training. There are 3 fully equipped emergency ambulances, one of them registered ALS ambulance and 2 registered FR ambulances. The services are available for 24 hours. People can call for help through the 1669 hotline and Khlong Hin SAO Paramedics Services Center, telephone number 06-4654-9860.

Khlong Hin Pun SAO paramedic services unit will perform the operations to help one person with emergency illness per day on an average. The operations start from receiving notification of an incident until arriving at the scene of the incident or the patient within 5-10 minutes.

In addition to providing pre-hospital emergency medical services, workers of Khlong Hin Pun SAO paramedic services unit are speakers who give knowledge about basic first aid, CPR and how to use the 1669 hotline.

In terms of promotion and evaluation of operational performance, Khlong Hin SAO Paramedics Services Center reviews and evaluates operation performance every month. There are management system, inspection of preparedness for the operations and all equipment to ensure efficiency of the operations (Khlong Hin Pun SAO Paramedic Services Unit, group discussion, November 27, 2019).

6) Thap Thai Sub-District Administrative Organization (SAO)

Thap Thai SAO established a paramedic team from One Tambon One Paramedic Service (OTOS) in 2009 to develop personnel and build the

sub-district paramedic team to perform the operations in finding and helping incident victims in an efficient manner. In the fiscal year 2019, another one emergency ambulance was bought. Now, there are 13 workers working in disaster prevention and mitigation and paramedic rescue services; 7 workers working in disaster prevention and mitigation, 4 contract workers for a specific task, 3 general contract workers and 6 workers in paramedic rescue services. The work is based on contract services. There is 1 emergency ambulance with basic first aid equipment. Workers are assigned to work in shift, 6 workers per shift comprising office shift = 2 workers, paramedic shift = 2 workers and civil defense volunteer = 2 workers. The services are available for 24 hours. There are 2 desktop communication radios that are always efficient and ready for use. 4 communication radios are installed in the ambulances using 162775 frequency (Thap Thai SAO Paramedic Services Unit, group discussion, November 27, 2019).

To sum up, the emergency medicine system in Sa Kaeo province is seriously developed by Sa Kaeo PAO. Chief Executive of the PAO gives importance to emergency patient life support. Therefore, budgets and ambulances have been supported to government hospitals in the province continuously. Meanwhile, the transfer of emergency medical services to Sa Kaeo local administrative organization was pushed hard until the task of Emergency Notification and Command Center management is transferred to Sa Kaeo PAO. Sa Kaeo PAO has taken responsibility for Emergency Notification and Command Center management for 3 years. Throughout the 3 years, in addition to the management and support of budgets and emergency ambulances, Sa Kaeo PAO shaped up a modeled emergency medicine to Sa Kaeo province and supported other local administrative organizations to participate in emergency medical services management. However, most local administrative organizations have not succeeded in this task due to insufficient number of personnel. Thus, most emergency medical services units belong to foundations in the province and the services cannot cover the whole area, making a large number of people unable to access emergency medical services.

5.4.1.5 Communication System in Emergency Medicine of Sa Kaeo Province

1) The system of Notification of Emergency Incidents in Sa Kaeo Province

The telephone number 1669 is used in the system of notification of emergency incidents in Sa Kaeo province. It is the call center number for asking for medical assistance and paramedic rescue. Emergency Call Center, Dispatch Center, and Command and Control Center are located as One Stop Service at the building of Emergency Notification and Command Center. Sa Kaeo PAO takes charge of developing Communication and Command Center in terms of place, communication equipment, communication radio system, manual and standard of communication made to callers of emergency call takers and the system for recording operations information of networks, registered nurse, and appointing a registered nurse, professional level to be Chief of Emergency Notification and Command Center.

Sa Kaeo PAO developed its Emergency Notification and Command Center to be Smart Dispatch Center. Emergency incidents can be notified through video call to let an emergency medical services unit be able to initially evaluate injuries, and through 1669 Application (From the date that 1669 Application has been open for services, no victims notify incidents through the Application). Notification of incidents is developed to use “AI EMS” (AI Assistive Platform for Emergency Medical Services), a system that processes symptoms and screens patients from voice signal to letters instead of having emergency call takers take patients’ history or question basic symptoms. Time spent on this process is only 1-3 minutes only from normally it takes 3-5 minutes. The AIEMS will send the information to ambulance workers to prepare the nearest ambulance appropriate to patients’ symptoms while sending the information to a destination hospital as well to prepare readiness in terms of personnel and medical supplies to give treatments to patients. Currently, the AI EMS system can screen and process 25 emergency symptoms, i.e. 1) headache/backache/ pelvic pain/groin pain, 2) drug allergy, food allergy, insect sting allergy, anaphylaxis, allergic reaction, 3) animal bite, 4) bleeding without any obvious triggering event or injury, 5) dyspnea, difficulty breathing, 6) cardiac arrest, 7) chest pain, heart disease, 8) suffocation, airway obstruction, 9) diabetes, 10) environmental emergency, 11) headache, disorders of eye, ear, throat and nose, 12)

maniac, mental and emotional state, 13) poisoning and overdose, 14) pregnancy, delivery, gynecology, 15) seizure, signs of seizure, 16) illness, fatigue, chronic paralysis without specific causes, 17) paralysis, limb weakness, loss of feeling, acute inability to stand or walk, 18) unconsciousness, unresponsiveness, syncope, 19) children and pediatrics, 20) being assaulted, 21) burn or scald, injuries caused by heat, chemicals, electric shock, 22) others. Besides, the AI EMS system can be applied to screening and processing other general diseases such as diabetes, headache and fever, reducing a disturbing phone call to Emergency Notification and Command Center, being able to actually provide medical services to emergency patients thoroughly.

Sa Kaeo PAO uses iAmbulance Application to get warning of positions of emergency ambulances. It is operated by GPS system (Global Positioning System). It compares the positions between emergency ambulances and other vehicles. The information will be sent to a cloud system for evaluating where emergency ambulances are and measuring the quantity of vehicles nearby. The Application is installed in emergency ambulances for identifying their positions, connecting to traffic light signals at intersections. The traffic lights will be changed their signals when there are emergency ambulances that deliver emergency patients coming closer traffic light signal poles through the cloud system and IoT equipment (Internet of Things) and semi-automatic traffic light control system installed at intersections for sending a signal to the traffic police around those areas to change traffic signals for emergency ambulances, solving delay and easing traffic problems.

Emergency Notification and Command Center has personnel working in shift, 8 hours per shift, 3 shifts per day and 5 persons per shift. It receives notification of incidents through the 1669 hotline. Once notification of an incident is received, 5 questions will be asked as required by NIEM, namely, taking history, asking about the location of that incident, telephone number, name of the caller, neighboring areas or a place to be obvious or noticeable, characteristics of the incident such as vehicle falling off the road, car collision, what type of vehicle?, and ask patient's symptoms. Asking all of the questions will take around 90 seconds. Each shift is provided with a paramedic or nurse who works as commander. There are 3 paramedics who take turn working in each shift at Sa Kaeo Emergency Notification and Command Center, 1 paramedic/shift. Previously, analog telephone was used for

receiving notification of incidents. Commander could listen to the notification at the same time emergency call taker did and was able to make decision, making the command was fast. If commander would like to have additional information, the emergency call taker was told to ask further information immediately, but commander could not interrupt a phone conversation. Now, it is changed to digital telephone. Commander is unable to listen to a phone conversation at the same time as emergency call taker. Now it is improved by Thailand Institute of Scientific and Technological Research to enable commander to listen to a phone conversation at the same time like in the past (Registered nurse, professional level, Chief of Sa Kaeo PAO Emergency Notification and Command Center, personal communication, November 4, 2019).

When Emergency Notification and Command Center assesses patient's symptoms and commands an emergency medical services unit to perform the operations by considering the scene of an incident. The area of Sa Kaeo province is divided into 3 zones. Coordinator must know that which emergency medical service unit will be assigned to perform the operations not longer than 2 minutes starting from receiving the notification to making a command. After a command is made, it is called activate time. It takes no longer than 2 minutes for preparing personnel and equipment for performing the operations. Emergency medical services workers must start the operations immediately. All PAO emergency ambulances are installed GPS tracking system. Therefore, they can be inspected the operations. When an emergency medical services unit performs the operations, time of receiving the notification, time of the operations, ambulance's mileage will be informed. After being notified the incident, the emergency medical services units must reach the scene of the incident no longer than 8 minutes (within the 10km radius), 1 kilometer/1 minute on average. It is called response time which starts from receiving notification of the incident to arriving at the scene of the incident. Once the emergency medical services unit arrives the scene of the incident, working time at the scene of the incident should not longer than 10 minutes. However, patient's symptoms will be taken into consideration. In case CPR is required, longer time will be spent. In case patient needs to be delivered to a hospital, time spent on hospital delivery should not longer than 10 minutes (Registered nurse, professional level, Chief of Sa Kaeo PAO Emergency Notification and Command Center, personal communication, November 4, 2019).

If an advance level emergency medical services unit is assigned to perform the operations, Emergency Notification and Command Center will not get involved with the operations but in case of BLS or FR medical services units, results must be reported to the Center every 5 minutes. If BLS or FR medical services units assess a patient has red tagged severity, they must transfer the patient to an advance ambulance. The Center will coordinate with the advance ambulance a point to transfer the patient. If the Center is notified that patient is unconscious, an emergency medical services unit will be assigned to start the operations first to access patient in a speedy manner. Additional details will be questioned more from a caller. In case an incident occurs in a redundant area between foundation emergency medical services units, after the Center made a command, it will follow up whether or not an emergency medical services unit performs the operations. If the assigned emergency medical services unit did not perform the operations within 5 minutes, it will assign the other foundation to perform the operations immediately (Registered nurse, professional level, Chief of Sa Kaeo PAO Emergency Notification and Command Center, personal communication, November 4, 2019).

In case relatives of emergency patient or onlookers notify an incident directly to an emergency medical services unit, the emergency medical services unit will inform Emergency Notification and Command Center every time. If the Center considers and views that the incident occurs in the area of responsibility of that emergency medical services unit, the number of operations will be issued. After that the emergency medical services unit will perform the operations to help the patient. If an emergency medical service unit performs the operations without receiving a number of the operations from Emergency Notification and Command Center, disbursement of compensation for the operations from NIEM cannot be done. If an incident that an emergency medical services unit is notified directly from relatives of patient or onlookers is not in the area of responsibility of that emergency medical services unit, Emergency Notification and Command Center will assign an emergency medical services unit responsible for that area performs the operations (Registered nurse, professional level, Chief of Sa Kaeo PAO Emergency Notification and Command Center, personal communication, November 4, 2019).

Contact for ordering and coordinating between the emergency center and the Emergency Operation Division of volunteers or the foundation. In the past, the foundation required that the volunteers notify the host foundation first and then coordinate with the center, but there was a problem of delay and duplication in the operation. At present, the foundation allows the volunteers to contact and coordinate with the center directly when ordered to go out for the scene. After that, report the information back to the host foundation. Except for some emergency operation divisions that have not accepted the role of the Provincial Administrative Organization (PAO) in acting as an emergency and command center instead, the center will coordinate orders through the host foundation of those emergency operation divisions. (Emergency Medical Technician, Sawang Sa Kaeo Thammasathan Foundation, personal communication, November 7, 2019)

The out-of-hospital ambulance operations of Sa Kaeo Crown Prince emergency medical services unit, an advance emergency medical service unit, each time comprises 1 nurse, 1 driver, 1 EMT-I (there are 3 EMTs/shift). The farthest distance for performing the operations is 40 kilometers, spending time around 40 minutes. Sa Kaeo province has geographical restriction as it consists of high mountains. Some parts are non-asphalt roads (red earth roads) and twisty, making driving difficult and spending more time. The emergency medical services unit will inform Emergency Notification and Command Center when it arrives at the scene of the incident. Once it reaches the scene, patient's symptoms will be checked, and patient will receive primary assistance abruptly. It will report to Emergency Notification and Command Center every time when the patient requires CPR. In case of red tagged patient, before leaving the scene of the incident, it will report to Sa Kaeo Crown Prince Hospital directly to let physicians and emergency room have preparedness for receiving the patient since personnel of Sa Kaeo Crown Prince Hospital view that communication between nurses is easier and faster for understanding than communicating through Emergency Notification and Command Center because a coordinator is not a nurse and has never worked in hospital, the coordinator will not understand hospital patient triage. As soon as the emergency medical service unit arrives at the hospital, it will report to Emergency Notification and Command Center again. When helping to bring the patient to a hospital, the

center's work ends with recording and storing data to the ITEMS and Google Drive system, as well as receiving reports on the operations of the emergency operation divisions team as shown in Figure 5.40. (Registered nurse, practitioner level, working in emergency room of Sa Kaeo Crown Prince Hospital and Sa Kaeo Paramedic Services, personal communication, November 5, 2019).



Sa Kaeo PAO supports the installation of telemedicine in ASL emergency ambulances of all hospitals. In case of critical emergency patients, ASL emergency ambulances can send electrocardiography, vital signs, levels of oxygen in blood and broadcast both pictures and voice of workers in emergency ambulances to the mobile phone of Medical Director, making the physician able to diagnose patients' symptoms and make a command correctly and speedily. The software of telemedicine of Sa Kaeo PAO is from a private company. It is modern and becomes a role model for university hospitals and tertiary hospitals for future application.

Sa Kaeo PAO dedicated a huge amount of budget to develop the emergency medicine system by setting budgets and many projects related to emergency medicine development according the 2nd strategy – quality people (safety and quality of life development) in the part of social work and under responsibility of Division of Public Work as per the following details: The 4th project meeting of local administrative organization emergency medicine at national level was held for building a body of knowledge, exchanging knowledge and strengthening emergency medicine networks of local administrative organizations. It was a forum for exchanging knowledge and passing down new innovation in emergency medicine, encouraging practitioners, executives and networks to be aware of and see the importance of emergency medicine system development to have readiness at international level in 2018. 1) Projects for training, seminar and observatory study of emergency medicine system were held continuously to enhance knowledge and understanding about emergency medicine operations for Sa Kaeo emergency medical services units. Budgets in 2018 – 2022 were determined at the amount of 500,000 baht per year. 2) Emergency medicine workshop project was held for emergency medical services units to train workers to have knowledge and skills in providing assistance when they meet an incident. The objectives are to enable trained workers to disseminate the obtained knowledge to their intimate fellows, to enable them to provide basic assistance, to enhance knowledge and understanding about emergency medicine operations to persons attending the training. Budgets in 2018-2022 were determined at the amount of 200,000 baht per year. 3) Project to develop Sa Kaeo Emergency Notification and Command Center to ensure the operations are full of continuity, keeping up with the times, faster and in a much more timely manner, to

develop Emergency Notification and Command Center to be convenient, fast, flexible and able to cover the whole area of Sa Kaeo province so that people experiencing accidents/incidents and emergency illness can be assisted fast, safely and thoroughly. Budgets in 2018-2022 were determined at the amount of 10,000,000 baht per year. (4) Project on the development of emergency medical service command systems through Operation Information System (OIS) 4.0 and Telemedicine at Sa Kaeo Province. So that people that have emergencies in Sa Kaeo Province can respond as efficiently and quickly as possible and reduce the mortality and disability rates of people at the incidents in Sa Kaeo Province to a minimum. By installing for every FR / BLS / ALS team in Sa Kaeo Province, Sa Kaeo Province Emergency Medical Service and Command Center and medical director, doctor on duty at emergency room in every hospital, the emergency room center in Medical Center Hospital, general hospital, and community hospitals in Sa Kaeo Province. Setting a budget for the year 2020 to 2022 for 300,000 baht per year (5) One Community One AED project yearly, the budget in 2018, phase 2, installed in secondary schools and primary schools in Sa Kaeo province, District Public Health Office in Sa Kaeo, Subdistrict Health Promotion Hospital Province and communities in Sa Kaeo Province to provide people with quick and accurate access to the use of Automatic External Defibrillation (AED) and first aid for reducing the mortality rate of heart disease patients. The people with cardiac emergencies who are at risk of developing heart disease will receive first aid and use an AED machine. They have a higher rate of survival by setting a budget for the year 2020 to 2022, amounting to 12.6 million baht per year. (6) The project to deliver the machine and make a memorandum of MOU for Automated External Defibrillator to secondary and primary schools at District Public Health Office, Subdistrict Health Promotion Hospital Province and community in Sa Kaeo Province, to understand how to use the AED machine for officers. Moreover, developing the potential of the emergency medical service system in Sa Kaeo Province. The staff has a good understanding of the use and maintenance of AEDs. Also, developing an emergency medical service system in the Sa Kaeo area to be more effective by setting a budget for the year 2020 to 2022 for 100,000 baht per year (7) Smart Living For Aging Alert project, Emergency Medical Service and Command Center for the people of Sa Kaeo Province, the elderly group who stuck in the house and bedridden to quick access to

emergency medical services and receive standardized medical care. Additionally, to reduce the mortality rate of the elderly group who are stuck at home, bedridden without reasonable cause. The people in Sa Kaeo province, the elderly group who were stuck at home, bedridden, and having an emergency illness, received close surveillance, had a higher rate of survival. By setting a budget for the year 2020 to 2022 for 150,000 baht per year (Professional registered nurse, Head of the Emergency center, Sa Kaeo Provincial Administrative Organization, personal communication, November 5, 2019)

One community one AED project installed by the Provincial Administrative Organization (PAO) in secondary and primary schools, District Public Health Office, Subdistrict Health Promotion Hospital, and communities in Sa Kaeo Province have a test system for readiness and can send warning signals to the emergency and command center when the AED's location is moved. For the Smart Living For Aging Alert project, it is a location registration of the living of the elderly and bedridden patient in the system of the emergency and command center. It is the use of information systems in conjunction with improving the quality of life of the elderly and bedridden patients to be able to get help through the emergency medical service and command center quickly. Moreover, easy access to emergency medical services. There is a system for data storage and follow-up of treatment results. Besides, there is an appointment system for booking appointments to see a doctor in the hospital, allowing it to be convenient and quick. The Smart QR Code Scanner system registers emergency patients and collects Community Emergency Response Team information. The aforementioned project allows emergency patients in Sa Kaeo Province to access the emergency medical service system more, the emergency and command centers to receive information on emergency illnesses faster and can order the emergency operation division to reach the patient quickly and accurately, and a memorandum of cooperation in emergency medical service between the President of the Sa Kaeo Provincial Administrative Organization and the Sakaeo Provincial Public Health Doctor for people at risk of STEMI and STROKE, diabetes group, high blood pressure, chronic kidney disease, and tuberculosis to register a member of Sakaeo EMS Member through the application. If such people group has an emergency and critical illness. When calling number 1669, the emergency and command center will

be able to know the history and location of the accident scene from the registered information. This makes it possible to order the emergency operation division to assist quickly and on time. (Professional registered nurse, Head of the emergency and command center, Sa Kaeo Provincial Administrative Organization, personal communication, November 4, 2019).

Sa Kaeo Provincial Administrative Organization and Subdistrict Administrative Organization organizing emergency medical service operation division recognize the importance of providing knowledge on emergency medical services to the public so that the people will understand the use of emergency medical services and be able to report the incident correctly. This will enable the emergency and command center to send paramedics to help the patients accurately, quickly, and increase the patient's survival rate. Therefore, it has allocated a budget for public relations and educating people in the area about emergency medical services and can call for services when injured or ill in an emergency. Besides, let the public know that injuries from accidents or emergency illnesses, it has what things that can be used for service and calling to report an incident by telephone number 1669, how to report it by using leaflets, stickers, roadside signs, public relations signs, posters, screened messages on the shirts "1669 One Way to Survive", broadcast towers, community radio, training, community, public relations. and provide knowledge on emergency medical service, organized a community emergency volunteer training project to have knowledge and skills in first aid, primary resuscitation, and calling in case of an emergency. There is teaching for community volunteers to educate people in the community. So that people can describe the necessary information as the recipient desires (According to the specified Dialog) by allowing the District Public Health Office to educate about how to report the incident and how to report it. So, letting community volunteers be the intermediary in coordinating meetings with people in the community and every household to be able to help themselves and their families when an emergency occurs. Furthermore, arranging various channels that will allow people to access emergency medical services as much as possible, such as creating an application for reporting incidents. As for Sa Kaeo Public Health Provincial Office, there are public relations about emergency medical service to the public, educating the fundamentals of STROKE

STEMI illnesses and rules and regulation in the event of an accident or encounter an emergency and requesting help via the hotline 1669. (Professional registered nurse, Head of Sa Kaeo Provincial Emergency and Command Center, personal communication, November 4, 2019)

Most people know they can report an emergency through 1669 and see a variety of publicity such as stickers, P.A., posters, vinyl signs. Nevertheless, the vast majority of emergency patients still come to the hospital by private car rather than taking 1669 service, especially those who have never used the service, feel that the procedure for calling the service is unclear. In addition, most of them get excited and forget about the number 1669 when they are in an emergency. Further, another part felt that calling to report an incident via the number 1669, the staff often asked a lot of questions. Some were afraid that they could not answer the questions and did not see that call going well. Also, some feel that waiting for emergency services to pick up may be too late and dangerous to the patient. Most people who have their cars will not select emergency medical services because they believe that it will be more convenient and faster than waiting for an ambulance. In addition, some people misunderstand the 1669 emergency medical service. Relatives of patients want emergency ambulances to wait to take the patient home in case doctors deem it is not necessary to stay at the hospital. (People who receive 1669 services and relatives of emergency patients, Emergency Room at Sakaeo Crown Prince Hospital, personal communication, November 5, 2019).

2) Communication System in Emergency Medicine of Sa Kaeo Province

The telephone number 1669 is used in the system of notification of emergency incidents in Sa Kaeo province, available for 24-hour services. It is the call center number for asking for medical assistance and paramedic rescue. Sa Kaeo PAO gives importance to access to people. Emphasis is placed on public relations that are conducted thoroughly. The coaxial cables are expanded from 2 to 30. Notification of incidents can be received through communication radio or telephone. Emergency call taker will analyze information, evaluate situations and give advice to persons being at the scene on the incidents over the telephone and will make a command to emergency medical service units to perform the operations accordingly.

The operations teams will coordinate with emergency ambulances and paramedic rescue networks through communication radio.

Personnel in Emergency Notification and Command Center comprise Emergency Call Taker, Emergency Medical Dispatcher, Incident Coordinator, Emergency Medical Supervisor, and Medical Director. The Medical Director is on duty at Sa Kaeo Crown Prince Hospital (regularly not being on duty at Emergency Notification and Command Center). Communication and information systems are connected using ITEMS system and OIS 4.0. Record and fingerprint systems are installed in all levels of emergency medical services units and emergency ambulances.

There are personnel from 5 positions working at the same time in Sa Kaeo Emergency Notification and Command Center in the morning shift (8.00-16.00 hrs) and afternoon shift (16.00-24.00 hrs), and in the night shift (24.00 – 08.00 hrs). Registered nurse, professional level is Chief of Emergency Notification and Command Center. Emergency Notification and Command Center comprises 5 types of personnel, (1) 1 emergency medicine physician as Medical Director, from Sa Kaeo Crown Prince Hospital. He is not on duty at the Center at all time but gives advice over the telephone throughout 24 hours, (2) 1 Emergency Medical Supervisor, (3) 1 Emergency Medical Dispatcher, (4) 1 Incident Coordinator, (5) 2 Emergency Call Takers & Dispatchers. Seating arrangement for personnel in each position working in Sa Kaeo Emergency Notification and Command Center is shown in Figure 5.41.

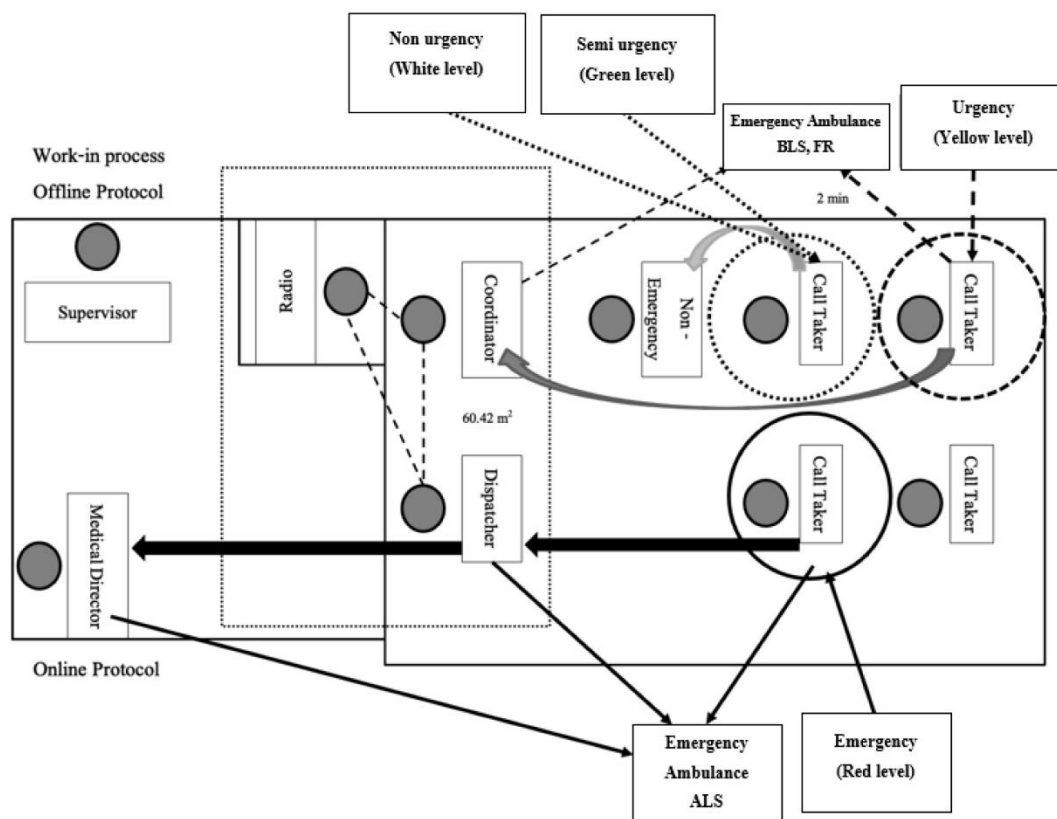


Figure 5.41 Seating Arrangement for Personnel in Each Position Working in Sa Kaeo Emergency Notification and Command Center

Sa Kaeo PAO and local administrative organizations that organized emergency medical services have office telephone number and mobile phone numbers used to coordinate with Emergency Notification and Command Center throughout 24 hours. Telephone system of Emergency Notification and Command Center is changed from the analog system to digital system, being unable to listen to a phone conversation at the same time as emergency call taker. Now it is improved by Thailand Institute of Scientific and Technological Research to enable commander to listen to a phone conversation at the same time like in the past. (Registered nurse, professional level, Chief of Sa Kaeo PAO Emergency Notification and Command Center, personal communication, November 4, 2019).

Making contact and coordinating with volunteer networks are carried out through network host using communication radio. Sa Kaeo PAO studied

all systems of EMS radio communication. Communication radios and radio masts are installed in all agencies and hospitals. Chief Executive of Sa Kaeo PAO spent his own money to buy communication radios and gave to all hospitals. The communication radio system through TRUR 4 G is used to ensure strong signal and fast communication. GPS tracking system is installed in emergency ambulances. Currently, ALS ambulances can be contacted through all areas of Sa Kaeo province. This system allows everyone in the networks to always listen to an incident in conjunction with the telephone system that can communicate details of each patient. Destination hospitals will learn about and send information abruptly.

“Sa Kaeo Provincial Administrative Organization uses a radio communication system via TRUE 4 G for most of the time. The advantage is that you can press and talk to each other. This cause the speed of communication and solve the problem of no radio signal in Ta Phraya district because there is a mountain blocking the signal and can determine the location of the movement of the car that has an outing for the incident via GPS (Staff at Emergency and Command Center, Sakaeo Provincial Administrative Organization, personal communication, November4, 2019).

“Communication between networks to report incidents and give orders will be informed via the radio communication in the same internet networks so that all emergency operation divisions, including all foundations in Sa Kaeo Province, can be heard equally. Nevertheless, community hospitals still do not pay much attention to the use of radio communication. In the past, some community hospitals did not have radios. Then, they cannot use the radio to communicate with each other and there is no radio maintenance which makes the existing radio inoperable. PAO solved the problem by purchasing a radio for the hospital which will force to test the signal whenever taking all 3 shifts to keep to turn on the device (Professional registered nurse, Head of the Emergency and Command Center, Sa Kaeo Provincial Administrative Organization, personal communication, November 4, 2019).

Sa Kaeo PAO made a memorandum of understanding with all hospitals in the province on provision and installation of telemedicine and AOC systems in ALS ambulances of all government hospitals in order to monitor the operations of emergency medical services units, analyze how the heart works and vital sign of patients in emergency ambulances, increase efficiency of the operations

and reduce death rate of patients in the emergency medicine system. All equipment and facilities are connected to reduce burden of the workers in order to develop quality emergency rooms in all districts. The PAO allocated a budget for implementation at the amount of 900,000 baht and expected the project to be complete within 2022. The telemedicine system of Sa Kaeo province is installed 4G Wi-Fi router and sim card for communication and receiving distance medicine prescription from Medical Director, being able to talk with physician and workers working at Emergency Notification and Command Center with voice signal through a camera in a real time, sending vital sign from a patient tracking device in a numeric real time. There are 2 cameras installed in the patient compartment in an ambulance and 1 camera installed in the driver's seating area. The cameras can rotate around and send pictures showing patient's symptoms and medical treatment given to the patient to Medical Director. Emergency Notification and Command Center has the system showing the number of ambulances providing services through a map, showing the status of ambulances ready for services, coordinates of the location of the scene of an incident and injury severity score (EWS: Early Warning Score) of patients (Registered nurse, professional level, Chief of Sa Kaeo Emergency Notification and Command Center, personal communication, November 4, 2019).

Emergency Notification and Command Center prepared a manual and standard of operations for personnel working in the Emergency Notification and Command Center. Nurses being on duty at the Center are appointed to work and develop the quality of the Center. Training projects are regularly providing every year for restoring and giving knowledge to personnel working at the Center including setting up a budget to purchase devices and equipment and develop the communication system of the Center. Commanding to urge emergency medical services units start the operations is clear without ambiguity. Conversation is precise, clear, and short. In the event that a message longer than 3 seconds is sent, 2-3 seconds pause will be given to let other agencies having urgency to be able to insert in the conversation. When the message is ended, identification of the ending will be given. (Emergency Call Taker, Sa Kaeo Emergency Notification and Command Center, personal communication, November 4, 2019).

The emergency center has prepared a manual and standard for the performance of the personnel in the emergency center. Moreover, appointing nurses at the Command Communications Center to perform tasks and improve the quality of the Command Communications Center. Also, managing a project to develop the Emergency Medical Service and Command Center to ensure continuity and development along with the era in the Sa Kaeo Provincial Emergency and Command Center. This makes the operation speedy and helps people who have an accident and emergency illnesses quickly, safely, timely, and thoroughly. Commanding the emergency operation division through radio communication, the incident reporting officers of the Sa Kaeo Provincial Emergency and Command Center have received training in incident reporting and commanding and the use of radio communications. Before calling, radio communication will be prepared by taking notes or pre-spoken text for speed and accuracy. Note-taking makes it possible to inspect the completeness and provide evidence of the emergency center's contact. Before speaking, one needs to listen first that the communication network is empty and ready to communicate messages so as not to interfere with the work of other units. Further, using the assumed name to give orders as specified, the command messages are short, compact, clear, and to the point. Conversations are spoken slowly and clearly, and conversations are concise in a smooth voice. It is always aware that many listeners will avoid mentioning patients' names and personal information in the broadcast. Moreover, attempt to reduce background noise while communicating. If it is necessary to send a message longer than 3 seconds, it will pause for 2-3 seconds to allow other units with an urgent need to intervene and at the end of sending the message, it will inform that end of sending messages, end of sending message is ๓.8 or terminate is ๓.6 (Staff at Emergency and Command Center, Sa Kaeo Provincial Emergency and Command Center, personal communication, November 4, 2019).

Sa Kaeo PAO has made an attempt in building good relationship with emergency medical services units of foundations to reduce communication problems. Workshop training is provided to EMR to increase their skills and open them an opportunity to exchange their knowledge and experiences yearly. A meeting of emergency medical services networks is held on the last

Wednesday of every month. Emergency ambulances and necessary equipment are supported including establishing a LINE group for communication among personnel related to the emergency medicine system of the province, are increasingly accepted by FR and EMR foundations increasingly. (Registered nurse, Chief of Sa Kaeo Emergency Notification and Command Center, personal communication, November 4, 2019.

3) Patterns of Communication among Agencies in the Emergency Medical Services Networks

Communication for sending information among National Institute for Emergency Medicine, Emergency Notification and Command Center and emergency medical services units will be carried out through ITEMS system. Emergency Notification and Command Center and Provincial Public Health Office will monitor information recording in the system after emergency medical services units perform the operations for disbursement of their remuneration, every month. Besides, hospitals will record information of all service receivers in emergency room in IS Online. The information will be sent through the file “ACCIDENT” in the 43 folders system of Ministry of Public Health.

Sa Kaeo Provincial Public Health Office has held EMS Rally to be a channel of communication and build harmony among emergency medical services networks in the province, from both government sector and private sector, every year more than 8 consecutive years. The rally is full of fun and excitement. Scenario-base competition is used. It comprises test of ability and discretion in evaluating situations, conditions of emergency patients, assistance given to patients according to the protocol, the use of various equipment and communication in simulation base in order to increase knowledge, competency, to exchange opinion, principles and problem solving guidelines, to receive good relationship, to practice decision-making including working as a team.

Sa Kaeo PAO holds EMS Day meeting by inviting all agencies in EMS networks to attend the meeting on the last Wednesday of every month to discuss, inform news or situations that personnel in the emergency medicine system should know so as to make decision on doing something related to emergency medicine, to build harmony and solve disputes or incomprehensibility arising among

emergency medical services units or agencies related to emergency medicine. The strength of EMS Day meeting of Sa Kaeo province is Medical Directors attend the meeting every time, making problems related to emergency medicine management solved in a correct and up-to-date manner. Meanwhile, knowledge about emergency medicine that changes at all times is disseminated to personnel in EMS networks, enabling Sa Kaeo emergency medical services keep pace with up-to-date knowledge and emergency patients receive quality services.

Communication between the National Institute of Emergency Medicine and the units involved in emergency medical services in Sa Kaeo Province (Provincial Administrative Organization, Public Health Provincial Office, Emergency and Command Center and Emergency medical services operation division) to use formal communication through the issuance of regulations, rules, and standards in writing, organizing academic conferences, organize a forum to exchange ideas and went to the area to visit. The communication for teaching or providing formal academic knowledge to the emergency operation division will be in the form of meetings and academic training organized by the Provincial Administrative Organization, Public Health Provincial Office, and Sakaeo Crown Prince Hospital, especially the Provincial Administration Organization has set up a project to transfer knowledge to personnel in the emergency medical service system. For example, 1) Emergency Medical Service Workshop for Emergency Medical Service Operation Division so that the trainees are ready and skilled in First Aid 2) Workshop for Emergency Medical Responder to enhance skills for Emergency Medical Responder and giving Emergency Medical Responder an opportunity to exchange knowledge and experiences. Moreover, learning the techniques and understanding how to operate properly. 3) Workshop for Trainers in the emergency medical service system for emergency medicine nurses who work in emergency rooms in every hospital in Sa Kaeo Province to enhance skills for nurses who are teachers to know techniques and understand correct teaching principles. Moreover, they can be transmitted in a standardized manner and provide opportunities for teachers to exchange knowledge and experiences in teaching both theory and practice. Also, enabling teachers to have knowledge and understanding of academic subjects and teaching techniques correctly 4) Workshop on assistant teachers in the emergency medical service system to

enhance skills for medical emergency personnel who are teachers to allow emergency medical technicians to learn and understand the principles of teaching both in theory and in practice and be able to apply the knowledge gained in the practice to benefit as well as to learn techniques and understand the correct teaching practices. Further, it can be transmitted in a standardized manner in which several pieces of training that PAO allocates a large amount of budget are held annually, which is another important communication mechanism between units in the emergency medical service network in Sa Kaeo Province. Especially training for teachers and assistant teachers is not just communication within the emergency medical service network but it is considered communication outside the network and expanding the network of emergency medical services in Sa Kaeo Province as well. The reason is it is training for those teachers to transfer knowledge about saving lives of people affected by an emergency to the general public, students, and youth to join as community emergency volunteers. Moreover, it can save the lives of emergency patients by the trainers will go to educate the people who will join the community emergency volunteers within 3 topics: 1) The process of reporting an incident for requesting the help 1669 2) The first aid at the scene of the accident and 3) Basic life support, encouraging the general public to have a better understanding of first aid in emergency medical service is critical to the lives of emergency patients that occur in the household or community before emergency operation divisions arrive and pick up a patient to send to the hospital. Especially in Sa Kaeo Province, which has an insufficient emergency operation division. So, if people have knowledge of first aid, it will increase the survival of emergency victims.

PAO conducted training to develop knowledge for officers by Public Health Provincial Office help to coordinate with the emergency medical services network, preparing speakers that are suitable for the training courses. The Public Health Provincial Office has organized a small group meeting to review the training course, network communication to carry out most of the training is via telephone and circular notice for representatives from various units to be acknowledged. (Professional Public Health Technical Officer who operates for network system administration, Sa Kaeo Public Health Provincial Office, personal communication, November 18, 2019)

Expenses spent on developing potential and personnel training by Sa Kaeo PAO are adhered to the 2014 regulation of Ministry of Interior on expenses on training and training for local officers. A budget is determined in a training project for emergency medical services workers according to the courses of National Institute for Emergency Medicine so as to restore knowledge and increase potential of the workers. (Registered nurse, professional level, Sa Kaeo Emergency Notification and Command Center, personal communication, November 4, 2019).

Conducting public relations to let people have knowledge and understanding of emergency medicine system, benefits of good emergency medicine system and how it can save their lives, access to emergency medicine system and notification of emergency incidents/illness through the 1669 hotline is most likely the duty of Sa Kaeo PAO in the form of leaflets, stickers, road signs, public address system, community radio, advertisement. Moreover, public relations activity is conducted in the form of first aid and CPR training to Sa Kaeo PAO personnel, students, teachers, educational personnel, and people in the province to ensure they have knowledge about basic first aid for helping themselves and people close to them safely before going to hospital and to reduce risks of death and medical expenses, generating community emergency volunteers and expanding civil sector emergency medical services networks. People trained to be community volunteers will be able to evaluate situations, call Emergency Notification and Command Center for help through the 1669 hotline for help, and evaluate primary conditions of patients: breathing, pulse, levels of consciousness, etc. The summary of communication among emergency medical services networks of Sa Kaeo province is shown in Figure 5.42.

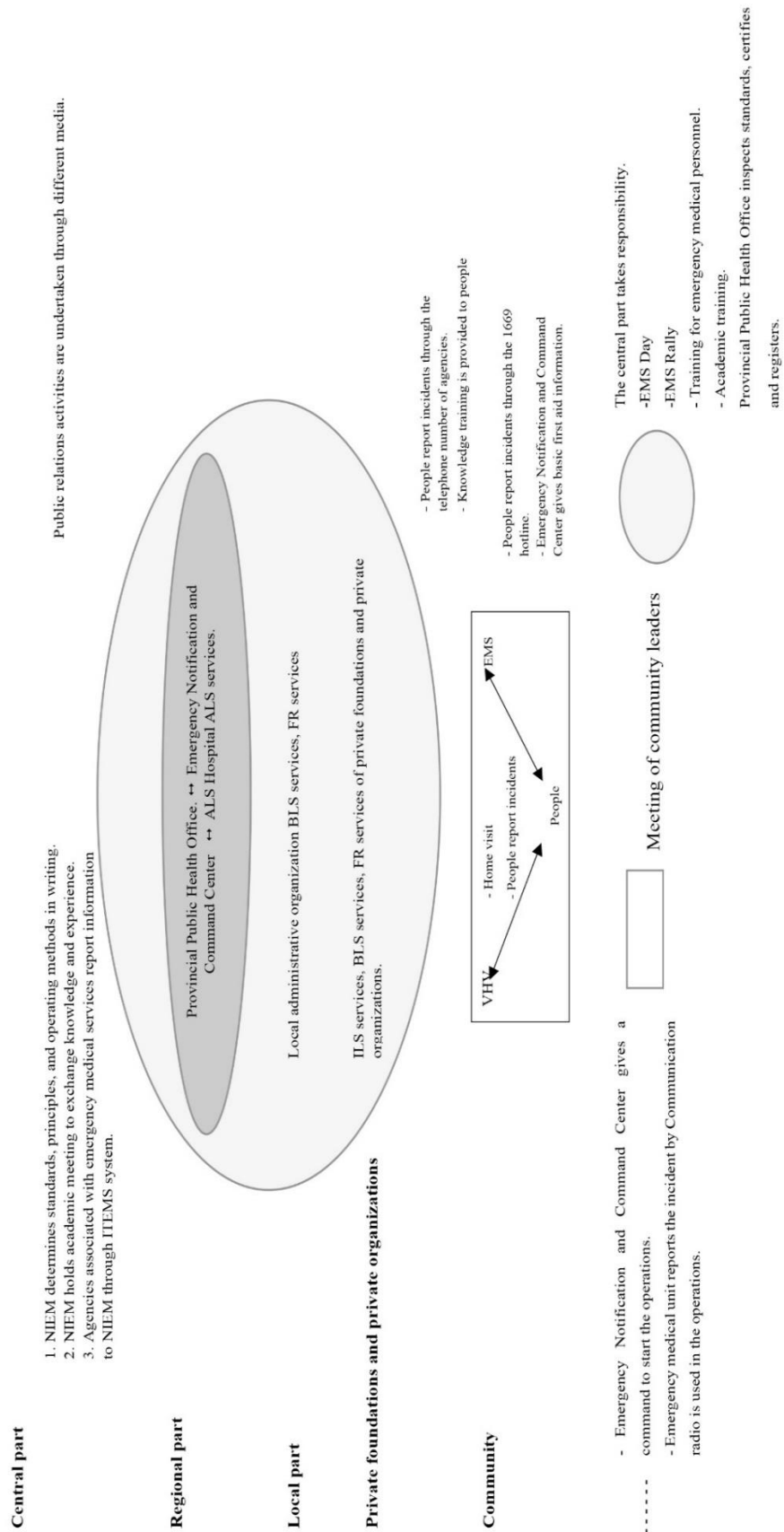


Figure 5.42 Communication among Emergency Medical Services Networks of Sa Kaeo Province

However, only a small number of people in Sa Kaeo province use the 1669 hotline to ask for help when they face emergency illness. Public relations that local administrative organizations and government agencies conducted did not reach people being at risks. People did not know the procedures of asking for help. Communication between patients and EMS operations units, hospitals and EMS operations units and hospitals and patients is not in the same direction. Sa Kaeo is a rural society. Most people do not have smart phones. They cannot call 1669. They lack skills and understanding of digital technology (Digital literacy), being unable to notify incidents through 1669 Application. The other reason is they are not confident in calling 1669. They understand that when they call 1669, an ambulance will come from Sa Kaeo PAO which is very far away from the scene of an incident and they think they will get help too late. Some areas do not have emergency medical services units available, making people think they need to wait for a long time to get help (Relatives of emergency patients in emergency room of Sa Kaeo Crown Prince Hospital, group discussion, November 4, 2019).

“Just called 1669 and the driver did not know the route and I had to go out and wait at the entrance to the side street because he could not get in.” (Emergency Medical Service recipient 1669, personal communication, November 4, 2019).

“Sa Kaeo Province still has a problem with the communication of the accident location. Yesterday, the center informed me that the incident was to be issued at Lotus, Muang District. We reached Lotus and did not find a patient. We checked again and not this Lotus; it has to be the lotus in front of the hospital over there. When I misunderstood the position, it made it slow to reach the patient.” (Medical Emergency Volunteer, personal communication, November 27, 2019).

“1669 application that I do not know anything about, I cannot download it, I have to let the children do it for me. This phone is just making calls.” (Emergency Patient Relatives, Emergency Room, in Sakaeo Crown Prince Hospital, personal communication, November 5, 2019).

5.4.2 Effectiveness of Emergency Medical Services Networks Management of Sa Kaeo Province

In this study, the researcher measured effectiveness of emergency medical services networks management of Sa Kaeo province by considering 1) access to emergency medical services, 2) death rate of emergency patients, 3) perception of information about emergency medical services, 4) people's perception and understanding of emergency medicine.

5.4.2.1 Access to Emergency Medical Services

Access to emergency medical services refers to ability of critical emergency patients to receive emergency medical services by standard emergency medical services units from the scene of an incident to hospital through commanding of Emergency Notification and Command Center, considering from patients delivered from emergency medicine system (EMS) of Sa Kaeo in the past one year, accounted for 26.30% (National Institute for Emergency Medicine, 2020). higher than the criteria determined by Ministry of Public Health and National Institute for Emergency Medicine (Ministry of Public Health set the goal in the fiscal year not lower than 26% while NIEM set it not lower than 20%). Consideration for the past 3 years found that after Emergency Notification and Command Center is managed by Sa Kaeo PAO, there is an increasing number of critical emergency patients delivered to hospital through emergency medicine system continuously. Details of percentage of critical emergency patients (at emergency room) delivered through Sa Kaeo emergency medicine system, classified by fiscal years, are shown in Figure 5.43.

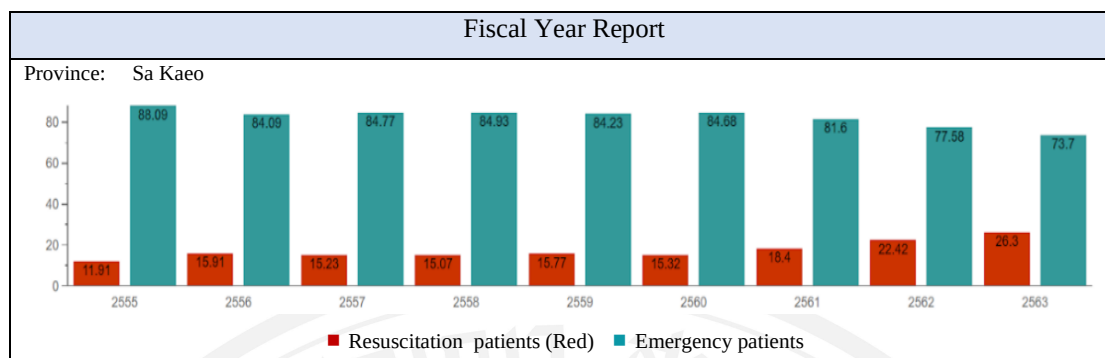


Figure 5.43 Percentage of Critical Emergency Patients (at Emergency Room)
Delivered through Sa Kaeo Emergency Medicine System, Classified by
Fiscal Years

Source: National Institute for Emergency Medicine (2020).

With regard to coverage of emergency medical services units in each area, Sa Kaeo has 9 districts and 59 sub-districts. ALS units are available in 8 districts. There are totally 30 ALS units, 17 BLS units and 212 FR units. Districts having FR units cover 50.85% of the entire districts. There are 63 local administrative organizations that registered emergency medical services, accounted for 95% but actually only 12 local administrative organizations, accounted for 19% of the registered ones can perform the operations since workers change their jobs frequently, making many local administrative organization are deprived of personnel and cannot perform the operations. There are 35 emergency medical services units belonging to foundations/associations that can perform the operations within the province. In Sa Kaeo, there are 313 emergency ambulances divided into 3 ALS pickup trucks, 26 BLS pickup trucks, 202 FR pickup trucks, 34 ALS vans, 16 BLS vans and 32 FR vans (National Institute for Emergency Medicine, 2020).

The proportion of red triaged critical emergency patients delivered by ALS units in 2019 of Sa Kaeo province was 625.88 per 100,000 population (National Institute for Emergency Medicine, 2020). The proportion of red triaged emergency patients, delivered by ALS units, per 100,000 population of Sa Kaeo province, classified by fiscal years in Figure 5.44 indicates that the number of emergency patients delivered by ALS units increased rapidly from 298.36 per 100,000 population

in 2018 to be 405.86 and 625.88 per 100,000 population in 2019 and 2020, respectively.

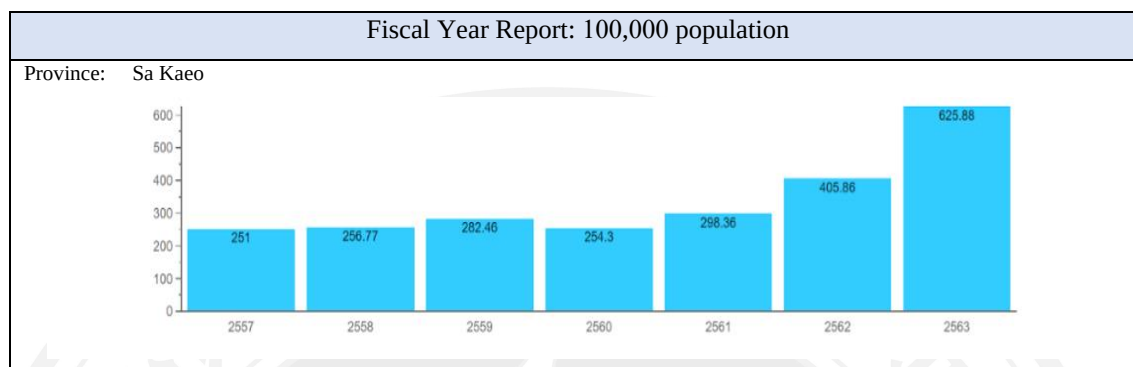


Figure 5.44 Proportion of Red Triaged Critical Emergency Patients Delivered by ALS Units per 100,000 Population of Sa Kaeo, Classified by Fiscal Years

Source: National Institute for Emergency Medicine (2020).

Though Sa Kaeo province lacks both emergency medical services units and personnel in the emergency medicine system, especially emergency medicine physician, formerly there was only 1 and now (2020) there are 2 physicians, with the support from Chief Executive of Sa Kaeo PAO, starting from emergency ambulances and equipment given to government hospitals and emergency medical services units of local administrative organizations and foundations until playing an important role in Emergency Notification and Command Center management, makes people in the province be able to access the emergency medicine system increasingly and continuously.

5.4.2.2 Death Rate of Emergency Patients

Consideration of effectiveness of emergency medical services networks from death rate of critical emergency patients in Sa Kaeo in the past one year found that 97 emergency patients died at the scene of incidents, accounted for 0.59% and 1 emergency patient died during delivery to hospital, accounted for 0.02%. Death rate within 24 hours of patients undergoing medical treatment in intermediate tertiary hospitals (F2) or higher was 6.86% (National Institute for Emergency

Medicine (2020). The goal in the fiscal year 2019 of NIEM and Ministry of Public Health was lower than 10% (<http://healthkpi.moph.go.th/kpi/kpi-list/view/?id=793>).

Accuracy of telephone triage in emergency patients in the past one year was found lower than severity (under triage) compared to at a hospital by 29.34% and higher than severity (over triage) compared to at a hospital by 23.56% (National Institute for Emergency Medicine (2020). Figure 5.45 showing percentage of telephone triage in critical emergency patients compared to at a hospital in accordance with fiscal years 2012-2020 found that Emergency Notification and Command Center made mistake in telephone triage, namely lower than severity (under triage) from lower than 20% to 30% while over triage was not different from before Emergency Notification and Command Center management was transferred to Sa Kaeo PAO. American College of Surgeons Committee on Trauma recommends an under triage rate below 5% and an over triage rate 25-50% (Mohan et al., 2014).

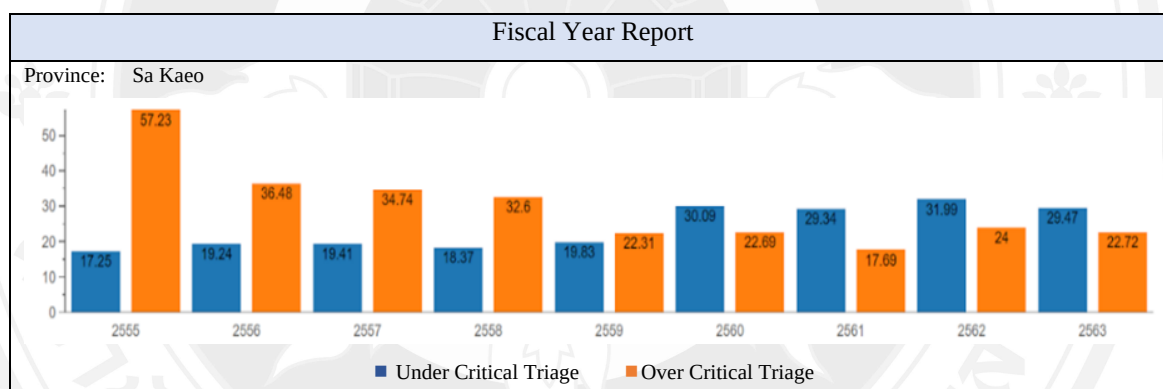


Figure 5.45 Percentage of Telephone Triage Identifying Critical Emergency Patients (Under and Over Triage) of Sa Kaeo Province, Classified by Fiscal Years

Source: National Institute for Emergency Medicine (2020).

In 2019, there were only 19.69% of critical emergency patients in Sa Kaeo receiving emergency medical services within 8 minutes (ITEMS <http://report.niems.go.th/niemsdwh/portal/link.html>, 2563). NIEM determines the standard of performance measurement in 5 levels: Level 1 = 43 - 45.9%, level 2 = 46 - 48.9%, level 3 = 49 - 51.9%, level 4 = 52 - 54.9% and level 5 = 55 - 100%. Details

of percentage of Sa Kaeo critical emergency patients receiving emergency medical services within 8 minutes, classified by fiscal years are shown in Figure 5.46.

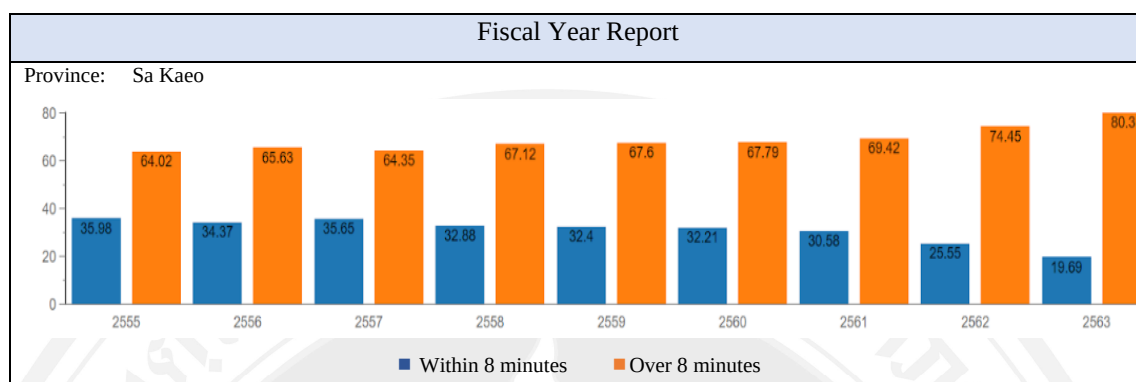


Figure 5.46 Percentage of Sa Kaeo Critical Emergency Patients Receiving Emergency Medical Services within 8 Minutes, Classified by Fiscal Years

Source: National Institute for Emergency Medicine (2020).

Sa Kaeo province does not have enough emergency medical services units to cover the whole area of the province, both inside and outside urban area. It is partially due to a small number of local administrative organizations that arrange emergency medical services units for people in their areas. Some emergency medical services units do not accept the role of Sa Kaeo PAO Emergency Notification and Command Center. They do not directly listen to commands from Emergency Notification and Command Center, making commands carried out firstly from host foundations. After that, the host foundations will command their client emergency medical services units. Therefore, communication takes time. Besides, Sa Kaeo has mountainous terrain, difficult for travelling. Therefore, most critical emergency patients do not receive emergency medical services within 8 minutes.

5.4.2.3 Perception of Information about Emergency Medical Services

Perception of information about emergency medical services is considered from calling the 1669 hotline when emergency illness occurred in Sa Kaeo province in the past one year. It was found that 93.05% of emergency patients called the 1669 hotline (National Institute for Emergency Medicine, 2020). Sa Kaeo

province was at the level 5 (NIEM determines the standard of performance measurement in 5 levels: Level 1 = 70%, level 2 = 72.5%, level 3 = 75%, level 4 = 77.5% and level 5 = 80% or higher and Ministry of Public Health determines the standard of performance within 12 months in the fiscal year 2019 to be not less than 95.5%). Details of emergency patients calling the 1669 hotline, classified by the fiscal years 2012-2020 are shown in Figure 5.47.

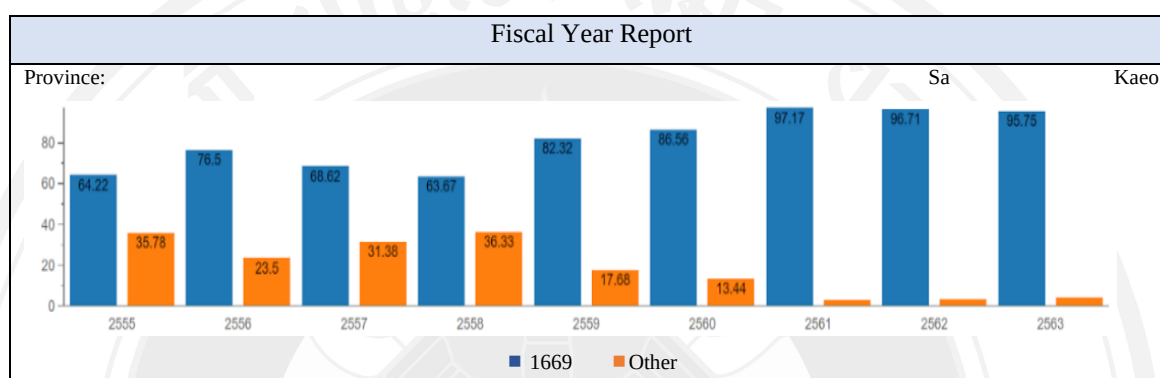


Figure 5.47 Percentage of Sa Kaeo Emergency Patients Calling the 1669 Hotline, Classified by Fiscal Years

Source: National Institute for Emergency Medicine (2020).

Other than Provincial Public Health Office, PAO, Municipalities, SAO, private foundations and associations make known to public that all emergency cases can be notified through the 1669 hotline, making people understand and get themselves ready for using 1669 services as soon as they face emergency incidents by themselves or see other people confronting emergencies. They are confident that calling 1669 is free and have confidence in the quality of services they are going to receive, training provided to increase potential of instructors playing their roles in passing down knowledge about basic first aid, correct notification of emergency incidents when calling the 1669 hotline to people, community leaders, students, and volunteers so as to develop community emergency medical responder networks is considered important part to let people know and choose to notify emergency incidents through 1669 when they found emergency illness more than 95% from 2018 onwards.

5.4.2.4 People's Perception and Understanding about Emergency Medicine

Provincial Public Health, hospitals and local administrative organizations make known to public about emergency medical services, people's rights and duty, calling for help through the 1669 hotline and administration of emergency medicine, awareness of emergency illness, knowledge about self-protection and how to protect other people, basic knowledge about first aid and receiving information related to emergency medicine. Emphasis is placed on proactive public relations through social media and community radio, being able to access all target groups and people can recognize important content of those information.

Most people in Sa Kaeo province perceive that calling 1669 for emergency medical services is free and the services are available for 24 hours. They expect to receive fast services, emergency ambulance will reach the scene of an incident within 15 minutes in all areas with skillful EMR that can give basic assistance to patients while being delivered to hospital, without disability and it has more safety than going to hospital by themselves. However, when calling the 1669 hotline, they received delayed services more than they expected. That is why they need to go to hospital by themselves. Some people misunderstand that an agency helping patients at the scene of an incident is a hospital and they expect to have an emergency ambulance pick them up in all cases.

"If there is an accident or illness, you can call 1669. They advertise on the radio that 1669 is free, but do not call for fun. I have never actually called by myself but if there is an incident, I will call 1669, to call them should be faster than going by myself because there is a doctor at the hospital with them. I think it should not wait more than 15 minutes; they should be able to pick it up." (People at Ta Phraya District, Sakaeo Province, personal communication, November 20, 2019).

"Your mother said her arms were weak, I do not know if she is going to be paralyzed or not. I am not sure, but I think she needs to go to the hospital. So, I call 1669 when I call, they ask a lot and if they ask a lot, I do not mind but I waited for almost half an hour and still had not arrived. Therefore, I have asked for help with

the neighbors to deliver.” (Relatives of Patients in the Emergency Room, Wang Somboon Hospital, Sa Kaeo Province, personal communication, November 19, 2019).

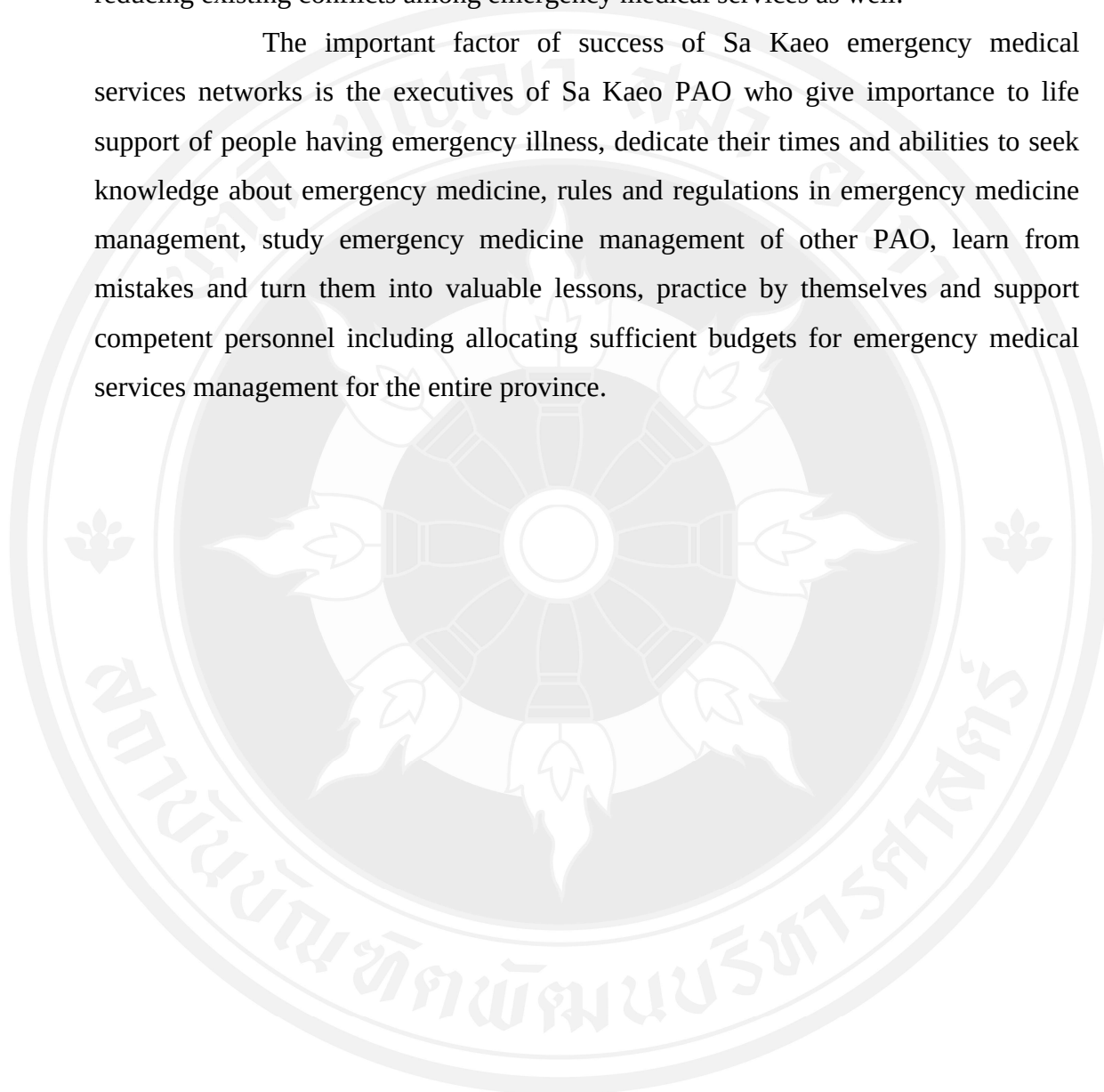
“I used to call 1669 to take my father to rehab at the hospital but when I called they said they could not pick up. They accept emergency patients only. So, I called the Subdistrict Administrative Organization. The Sub-district Administrative Organization has a car and they will pick up and send for us” (People from Thap Rat Subdistrict, Ta Phraya District, Sa Kaeo Province, personal communication, November 20, 2019)

Based on the quantitative and qualitative information, Sa Kaeo emergency medical services networks are not effective enough. Critical emergency patients receiving emergency medical services within 8 minutes are in a small number and tend to decline continuously. This shows insufficiency of emergency medical services units. Moreover, many emergency medical services units are deprived of personnel in the emergency medicine system, making them unable to perform the operations. Sa Kaeo PAO has ALS ambulance but lacks personnel, being unable to perform the operations as well. In terms of communication problems, Emergency Notification and Command Center cannot make a command directly to some emergency medical services units, the command is needed to be sent to host foundation firstly, making emergency medical services operations more time-consuming.

However, people in Sa Kaeo province tend to access the emergency medicine system increasingly. The number of critical emergency patients delivered through the 1669 hotline services increases continuously every year. The important reason is Sa Kaeo PAO plays its role in managing and developing Emergency Notification and Command Center, supporting emergency ambulances and life support devices and equipment to general hospitals, community hospitals, sub-district health promoting hospitals and local administrative organizations, making emergency medical services units in the province possess more preparedness. Furthermore, Sa Kaeo PAO expanded emergency medical services units by providing EMR training to people, community leaders, teachers and students to let people understand the emergency medicine system and call emergency medical services more and more.

Sa Kaeo province holds a meeting of agencies in emergency medical services networks every month, organizes EMS Rally, provides training to personnel in the emergency medicine system every year, being a significant mechanism in internal communication of emergency medical services networks of the province and reducing existing conflicts among emergency medical services as well.

The important factor of success of Sa Kaeo emergency medical services networks is the executives of Sa Kaeo PAO who give importance to life support of people having emergency illness, dedicate their times and abilities to seek knowledge about emergency medicine, rules and regulations in emergency medicine management, study emergency medicine management of other PAO, learn from mistakes and turn them into valuable lessons, practice by themselves and support competent personnel including allocating sufficient budgets for emergency medical services management for the entire province.



CHAPTER 6

CONCLUSION AND SUGGESTION

The research study on the effectiveness of the emergency medical services networks in Chapter 6 consists of Summary of study results, discussing the findings, and recommendations on the management of the emergency medical services networks in the future, respectively.

6.1 Summary of Study Results

The objectives of this research are: 1) to study the process of operating the emergency medical service network organization, 2) to study the effectiveness of the emergency medical services networks organization management, 3) To present a model for the management of a network organization of emergency medical services that are suitable for Thailand.

This research studied the network of emergency medical services outside hospitals in Khon Kaen, Nonthaburi, Ubon Ratchathani and Sa Kaeo provinces. Selection of this study area was determined by differences in performance, diversity, and coverage of provinces in which provincial center hospitals managed the call centers and command centers (Khon Kaen and Nonthaburi), and the provinces that transferred the emergency medical notification and dispatch center to the Provincial Administrative Organization to operate and manage emergency medicine outside the hospital (Ubon Ratchathani and Sa Kaeo). It was performed using a qualitative research methodology using two types of data: 1) Primary Data: from in-depth interviews, Group discussion, both participatory and non-participation observations. Key information providers were personnel in the emergency medical network, both from (1) central, namely the World Health Organization and the Institute of Emergency Medicine, (2) Provincial public health office, namely Provincial Public Health Office, Provincial Hospital, Community Hospital, Primary care unit, (3) Local

administrative organizations, including provincial administrative organizations, municipalities and subdistrict administrative organizations, (4) Foundations, associations and private hospitals, (5) People receiving services. 2) Secondary Data: The research of documented data was studied from the emergency medical information system and field data. The data analysis was done by descriptive and content analysis, creating conclusions from the data collected from documents, interviews, and observations, comparing it with the theoretical concepts used in the research study and then using the data. All four of these studies were compared, analyzed, synthesized, linked to conclusive.

The results of the background study of emergency medical services showed that the emergency medical service network of Khon Kaen, Nonthaburi, Ubon Ratchathani and Sa Kaeo provinces arose from the situation of illness or injury and death of an emergency accident patient outside the hospital in the area. It determined that it was necessary to use the network organization to solve the problem. The network building process of Khon Kaen and Ubon Ratchathani provinces is similar, caused by doctor's initiative (Doctor of Surgery, Khon Kaen Hospital and Doctor of Provincial Health Office, Ubon Ratchathani, respectively), realizing the need to build a network within the province, therefore, contacted the provincial governor and the local administration authorities with suitability and potential to be a network of emergency medical services and became the member of the network by building familiarity, acceptance, trust, showing the mutual benefits, as well as cultivating awareness for local government agencies with potential and readiness to come in to solve problems and develop together, create a group of people, agree to work together, share the use of resources with each other by the Provincial Public Health, Ministry of Public Health and hospitals were responsible for providing necessary knowledge to local authorities, foundations, associations and private individuals to have sufficient knowledge to provide emergency medical services. Establish a knowledge management network according to the area of responsibility by the community hospital in the area as the host for managing the network by determining the roles and responsibilities of each emergency operating unit in the network, whereby member organizations have adjusted the working process to benefit the network, but still maintains the autonomy in its internal management.

Khon Kaen Province started the network building process for a long time until the results of the network were clear and the number of organizational members in the emergency medical service network was expanded to cover the area of the province. However, the participation of the Provincial Administrative Organization of Khon Kaen Province is still low. For Ubon Ratchathani Province, it started to build a network after Khon Kaen province; therefore, there were fewer local authorities joining the emergency medical service network. However, Ubon Ratchathani Provincial Administrative Organization developed potential and readiness until being able to become a network operation center, sharing resources for other local authorities, and expand the official emergency medical network to other local authorities. As for the network building of Sa Kaeo Province, it started with the PAO leaders realizing the need to build a network showing local potential in providing emergency medical services by sharing resources with the central health public, and local authorities, making it had been accepted by both Provincial Public Health, Central Public Health, Local Administration Organization, and local people. The local government participated in managing the emergency medical service network at the highest level, with roles to play in determining the national emergency medical policy through the channel of being an emergency medical committee of PAO leaders, and Sakaeo provincial administrative organizations had been recognized as the center of network operations as well as Ubon Ratchathani. Nonthaburi Province has not established cooperation in network management, building relationships, or building a policy coalition between each executive, whether it be central health, regional health, or local government organization in building a network of emergency medical services in the common area. Nonthaburi Provincial Administrative Organization does not participate in the emergency medical service network. Provincial public health is still a key player in the provision of emergency medical services.

The success of establishing a network of emergency medical services in Khon Kaen and Ubon Ratchathani provinces began with the management of the organization. The central public health, regional public health or local government organization has the same goal: to save lives of people in emergency situations through out-of-hospital emergency medical services and initiate networking

operations by building relationships and trust with other organizations to persuade to bring together the capacity and resources that each organization has to provide emergency medical services to the people, with the central public health responsible for coordinating and solving problems in order to build a successful emergency medical service network.

Central Public Health serves to facilitate the success of local emergency medical services by relying on various sectors to ensure smooth operation of the local emergency medical service. If the Local Administrative Organization is challenged about the legitimacy of its role in joining the emergency medical service network, the administrators of the National Institute of Emergency Medicine will work to find a conclusion and find a solution, enabling the local administration to build and expand the network of emergency medical services. Moreover, NIEM is the core of information systems that are relevant to the goals, patterns, methods, achievements, barriers, and information necessary for the provision of emergency medical services that everyone can access and use and disseminate. It causes the exchange of information between each other in the network.

Khon Kaen, Ubon Ratchathani, and Sa Kaeo Province continuously organize joint activities among members of the network to build good relations and resolve conflicts. Khon Kaen Province provides resources to support network operations through the Provincial Emergency Medical Foundation, while Ubon Ratchathani and Sa Kaeo province share their own resources with members of the network.

The communication between the network of emergency medical services of the provinces studied in the four provinces was found to use a form of formal communication through a combination of meetings and informal communication via social media by Nonthaburi Province has the least frequency of formal communication. Only in Khon Kaen and Sa Kaeo that use a communication system through a meeting with all sectors in the network, with the Provincial Public Health Administrator and the Provincial Administrative Organization of the Provincial Public Health Office as the chairman, respectively. For Ubon Ratchathani and Nonthaburi provinces, most of the formal communication will be a meeting only for the emergency medical network of the local administration organization or the provincial

public health only, while the cross-sector communication in the official network still occurs irregularly.

Communication to create and exchange knowledge between various departments in the emergency medical services networks of Khon Kaen, Nonthaburi, Ubon Ratchathani and Sa Kaeo, using the same method as the Provincial Public Health Organization or Local Administration Organization organizes training, study visits, seminars and learning from the practice together by providing personnel operating the emergency medical services of provincial hospitals and personnel operating in the provincial hospital. The Emergency Call center is the importer of knowledge for mutual learning.

Khon Kaen Province has the highest emergency medical service network organization administration effectiveness. It generates and expands the number of members in the network sufficiently to cover the entire province, provides rapid inter-network coordination, enabling timely access to emergency patients. It organizes a collaborative learning system that makes it possible for the organization in the network to have appropriate knowledge. The Emergency Call Center provides treatment advice to a network of operating units under the supervision of emergency medicine physicians, capable of providing quality and life-saving services to many patients. The network administration in Nonthaburi province was the least effective due to insufficient participation of members in the network, lack of availability of communication tools and knowledge management, not covering the entire network. Sa Kaeo and Ubon Ratchathani provinces are successful in communicating with people. Local authorities can make people in the area know, understand, and decide to call emergency medical services through appropriate channels.

Public perceptions and understanding of emergency medicine in all 4 provinces are similar, i.e., lack of knowledge and understanding of emergency medical service systems, both on emergency behavior, calling for services, providing services and Pros and cons of using the service. However, people who have used the service or lived in an area with a local administrative organization, emergency medical network members will know and call for emergency medical services through the Local Administration Organization or 1669 due to the publicity of the Local Administration Organization.

6.2 Discussion

The study of the effectiveness of emergency medical services networks in Khon Kaen, Nonthaburi, Ubon Ratchathani and Sa Kaeo provinces was discussed as follows:

The network of out-of-hospital emergency medical services in Khon Kaen, Nonthaburi, Ubon Ratchathani and Sa Kaeo provinces began with helping patients in emergency accidents as well as other developed and underdeveloped countries (Lo et al. 2000, Herbosa 2005, Shah, 2006, WHO 2008, Chiang et al. 2009, Lechleuthner, 2019, Bhandari & Yadav, 2020). The development of Thailand's emergency medical system is like that of the United States of America (Shah, 2006, pp. 414-423). In the early stages, there was no legal support, lack of medical standards, no individual supervision and management of emergency medicine. The province still lacked unity until the Emergency Medicine Act B.E. 2551 was enacted, so a systematic development of emergency medicine was developed. Currently, the provision of emergency medical services in Thailand has a similar problem with underdeveloped countries such as Nepal, that has not yet been integrated into the network or departments. The provision of emergency medical services is insufficient to meet the needs of the people, lack of equality in access to services, lack of specialized personnel and the personnel operating in the system are not professionally trained, thus lacking knowledge and expertise (Bhandari, & Yadav, 2020).

Thailand's emergency medical service system focuses on bringing patients to the emergency room and the destination hospital safely and as quickly as possible, corresponding to the pattern of Anglo-American model. But a study by Al-Shaqsi (2010) found that the Anglo-American model is a national emergency medical service model where the emergency medical service system is under the responsibility of the national security organization. Countries where emergency medical services are under the responsibility of public health organizations are often used Franco-German model, emphasizes on-site treatment by emergency medicine physicians, based on hospital delivery measures. In Thailand, although the emergency medical service is under the responsibility of the public health organization, NIEM and the Ministry of Public

Health, it focuses on bringing emergency patients to hospitals by medical emergency volunteers, medical emergency workers, medical emergency responders or nurses to allow patients to be treated in the emergency room quickly rather than providing treatment at the scene. As Thailand's emergency medical system is still in the early stages of development compared to developed countries such as the United States, which has developed an emergency medical service system for more than 60 years (Shan, 2006, pp. 414-423), there are still not enough resources, as well as a shortage of emergency medicine physicians. Existing emergency medicine physicians are required to treat many patients at the emergency rooms and cannot be deployed at the scene of incidents with operations.

The management of emergency medicine in Thailand is also a centralized form of central health, legislation, standardization, system management, network coordination, supervision, supervision and evaluation are the functions of NIEM by sharing the power of regional health to provide advanced emergency medical services, and local governments to provide basic emergency medical services, in the same manner as the administration of the emergency medical service system of small countries such as Singapore (Lateef, 2006, pp. 323-328) and Hong Kong (Lo et al., 2000, pp. 283-287). Unlike large countries such as the United States (Shah, 2006, pp. 414-423), each state can legally manage its own health service systems. Germany (Lechleuthner, 2019, pp. 414-423), Japan (Tanigawa & Tanaka, 2006, pp. 365-370) and Taiwan (Chiang et al., 2009, pp. 9-13) decentralize the power to local governments. For Thailand, which has a large area, and many people live scattered in various regions; the public health organization has insufficient budget and personnel, so the management of emergency medical systems should be decentralized to local governments to provide people with equal access to emergency medical services, and timely standardized treatment for emergency patients that affect the survival rate of the patient. It is consistent with studies of Zon et al. (2017) and Santosa (2020).

Emergency Medical Service Network In the context of Thailand Currently, central, and regional governments are unable to provide adequate services to the people, and most local governments have not joined the emergency medical service networks, thus civil society plays an important role in arranging emergency medical services to people. It is a model that is consistent with the concept of new public

governance that arose because of the global society's changing variety and more complex in terms of politics, economy, society, environment that has a broad impact and involves many characters. Conventional governmental arrangements may not be able to respond to changing solutions (Bevir, 2012; Osborne, 2006, 2010; Rhodes, 1996), so it is imperative to coordinate cooperation among stakeholders and other characters, inducing individual parties to use resources to achieve the goals of the public and to manage conflicts that may arise from joint processes among networks (Loffler, 2005). Emergency medical services in Thailand are in line with four important new public governance, namely 1) Network Governance, 2) Blurring Boundary, 3) Resource Exchange and Joint Investment, 4) Maximize Civic Engagement and Co-production.

Incident reporting via telephone number 1669 of Khon Kaen, Nonthaburi and Sa Kaeo provinces will be used only for emergency reporting, which will be sent to the provincial emergency call center free of charge. Other emergency alerts still use different numbers, as well as underdeveloped countries such as Nepal use 102 for the Nepalese Ambulance Service (NAS), a non-profit organization (Bhandari & Yadav, 2020) Maldives uses number 102 (Herbosa, 2005, p. 5). Ubon Ratchathani Province includes all types of emergency declarations at a number 1669 only, which is the same as many other developed countries such as the United States and Canada use 911, the EU uses 112 (WHO, 2008), Hong Kong uses 999 (Man Lo et al., 2012, pp. 251-256), Japan (Tanigawa, & Tanaka, 2006, pp. 365-370), and Taiwan use number 119 (Chiang, Ko, Wang, Yang, Shhih, Hsiung, Ma, 2009, pp. 9-13), Singapore use number 995 (Lateef, 2006, pp. 323-328) by integrating both resuscitation, rescue, firefighting. The US, EU, and Hong Kong use the same number to cover police alerts. The use of different numbers to call for emergency calls creates confusion among people, especially in emergency situations. By integrating all types of emergency numbers into a single number, using an easy-to-remember 3-digit number can increase patient's access to emergency medical services and improve communication efficiency. It is consistent with studies (Bhandari & Yadav, 2020; Shah & Mishra, 2018; Herbosa, 2005; European Commission, 2013).

Providing emergency medical services that save lives for decision-making in uncertain and risky situations. Trust between organizations in a network is essential in

network management. The emergency call center and mutual trust operatives will transfer knowledge by the emergency call center to provide first-hand care advice, and the unit will obey and comply with the instructions of the emergency call center, resulting in the patient's survival. This is consistent with the Klijn et al., (2010) study found that mutual trust leads to the transfer of knowledge in the network. The trust between the emergency call center and the destination hospital allows the hospital to rely on the patient reporting information received from the emergency call center to prepare doctors and nurses in the emergency room properly, not having to spend time repeatedly communicating with the operating unit, which can reduce workflows and improve the quality of patient care. But to convince hospitals to trust the information received from the emergency call center, the emergency call center must be knowledgeable enough to provide accurate information to the hospital. As with the Currao (2009) study, it was found that building trust in the emergency management network requires knowledge and experience.

Organizing meetings to communicate regularly between organizations in the network, such as EMS Day, organizing joint activities between networks such as EMS Rally, is an important mechanism for each organization in the network to learn and understand each other's culture. The exchange of information will occur which helps to increase the skill of each party, reduce competition between work and create an integrated collaboration. This is consistent with the Currao (2009) study of cooperation in emergency crisis management based on trust.

The head of the emergency call center of Khon Kaen, Nonthaburi, Ubon Ratchathani and Sa Kaeo provinces is similar in that they are communicators who can resolve problems that arise appropriately, manage conflicts that arise between operations fairly, behave as an example, and they can transfer knowledge to subordinates and personnel in the emergency medical service network. This is consistent with the findings of a study of ethnic leadership traits in an emergency medical service system in Riyadh, Saudi Arabia using Leggio's qualitative research methodology (Leggio, 2014).

6.3 Problems of the Emergency Medical Services Networks Organization

The administration of Thailand's emergency medical service network is centralized and delegates some administrative decision-making powers to the provincial public health sector. Although the National Institute of Emergency Medicine tries to decentralize emergency medical management to local government organizations, most local authorities have not joined the emergency medical network. There is no support for the private sector and civil society to participate in the service. Civil society participating in the Emergency Medical Service Network is limited to participation in awareness and co-operation, but not in policy formulation or evaluation. As a result of the reasons, along with the constraints of central and regional public health with insufficient resources and budgets, it is impossible to provide comprehensive emergency medical services, and affects public access to emergency medical services.

Decentralization to the Local Administration Organization to manage the emergency medical service system according to the Decentralization Plan to Local Administrative Organizations (No.3) 2019-2022, designated to transfer the emergency medical notification and dispatch center (1669) to the PAO to be the operator and management of emergency medical care outside the hospital by 2022. But at present, the PAO operates and manages only 6 out-of-hospital emergency medicine. And the actual operation is approximately 50 percent of all local authorities. The fact that it is still not practicable in all areas is because the Local Administrative Organizations have not seen the importance of emergency medical services. Some of them do not understand the rules, regulations, decentralization, the mission of organizing emergency medical services to the local authorities, afraid that they will be examined by the State Audit Office of the Kingdom of Thailand. Some Local Administrative Organizations lack knowledge, readiness of personnel and tools, making it impossible to provide emergency medical services to residents. As a result, people living in those areas do not receive appropriate emergency medical services. Another reason for the unsuccessful transfer of the emergency call center to PAO is because doctors and personnel working in the notification center still want the hospital to manage the emergency call center. They do not want to lose their role or identity in receiving

incident and command, which has been an old pride. They fear that when the emergency center is transferred, they will lose their position and career advancement, are not confident in the knowledge and capabilities of the PAO and fear that the management of the center will be uninterrupted when replacing the person responsible for the management of local administrative organization.

Thailand still lacks the integration of emergency phone numbers. Each agency also uses its own number. Emergency notification uses 1669, police use 191, fire department uses 199, Vajira Hospital life-saving medical unit uses 1554. There is also a cardiology hotline, the Chest Institute of Cardiology, which uses 1668, and the Narcotics News Center, the Royal Thai Police, uses 1688 which number is quite like 1669. Interviews with people using emergency medical services have found that having multiple telephone numbers can be confusing and difficult to remember, especially in tight situations. Therefore, emergency numbers should be integrated into a single number, such as those in developed countries.

Thailand's infrastructure is not conducive to emergency operations, especially in remote areas such as roads and highways, electrical signs, and communications. This is a barrier preventing the operating unit from reaching emergency patients within a reasonable period. Infrastructure unavailability is also a common cause of accidents.

The loose enforcement of laws to prevent traffic accidents has resulted in an increasing number of emergency accidents every year. It is inconsistent with Thailand's limited emergency medical resources.

The creation of personnel in the emergency medical system, including emergency physicians, medical emergency practitioners, emergency personnel, and emergency medical nurses is not enough to meet the requirements. No system was created to maintain personnel within the positioning and line advancement network, causing large numbers of personnel to flow out of the system into the private sector.

Knowledge management in the emergency medical service network, the training to enhance and restore knowledge is not enough to meet the needs, whether it is training for emergency workers, medicine, or training to upgrade and renew a volunteer license for emergency medical. Personnel working in the emergency call center under the management of the local administrative organization lack experience

saving the lives of patients, failing to understand the systems and processes of emergency patient treatment in the hospital, causing communication to order errors, lack of credibility and the emergency call center is not trusted for its potential.

The Emergency Medical Operation Unit does not accept and does not trust the dispatch of emergency medical services of the emergency response center and orders that are transferred to the PAO, causing communication barriers for the operation of saving lives of emergency patients between organizations in the network, resulting in a delay in patients receiving services and poor experiences in their service calls.

6.4 Recommendations

6.4.1 Policy Recommendations

The National Institute of Emergency Medicine should create an understanding of the legitimacy of providing out-of-hospital emergency medical services to the local authorities, and join together with the Ministry of Public Health to define the main roles and duties of public hospitals in the care of hospitalized patients, provide high-level emergency operating kits, provide hospital outpatient services, and manage emergency medical services knowledge to members of the network to be in line with the personnel's competence, reduce the burden of emergency medicine from the original that have to treat many patients both inside and outside the hospital, alleviate the lack of resources of public hospitals. The Decentralization Committee for Local Administrative Organizations should designate the provision of emergency medical services and the management of the emergency medical service center as a duty of all local administrative organizations, not to do so when the localities are ready.

The central government should accelerate the transfer of public health missions. For example, the transfer of the Subdistrict Health Promoting Hospital to the Local Authority and the allocation of the security fund for the health service units transferred to the Local Authority for those Local Administrations to develop the mission of public health by organizing emergency operations at the level. Higher service to people in the area to increase access to the emergency medical service system of the people in another way.

The National Institute of Emergency Medicine should transfer its mission to the provincial public health office in each region, acting as a substitute and allocating appropriate budgets to facilitate the management of the emergency medical network in each province.

In the context of Thailand, where civil society plays a key role in the provision of emergency medical services. This can be seen from the emergence of the emergency medical system that originated from civil society assistance to people who have been involved in road accidents. This is partly due to the values of Thai society that honor individuals, organizations that carry out lifesaving activities, giving them a positive image and being recognized by society. This has resulted in many civil societies joining the emergency medical service network. Therefore, the NIEM and the Ministry of Public Health should take advantage of this point to organize emergency medical services using a new concept of public administration. NIEM and the Ministry of Public Health should decentralize the management of emergency medical systems to civil society, the private sector, or non-government agencies. NIEM should shift its role from controlling to acting as a director, promoting, and supporting the successful development of policies through various sectors. It empowers the civil society and private sectors with responsibility and independence in decision-making to create operational flexibility. The central government is responsible for regulatory and regulatory affairs, serving as an audit within the scope of the law to control the freedom of civil society and the private sector.

In addition, cooperation should be established between government agencies involved in emergency medicine from all sectors, not only in the field of medical care, but also in the prevention of emergency accidents in terms of national infrastructure development, law enforcement, finding risk points and fix them to prevent traffic accidents and support the operations of the emergency medical operations.

Integrating the same national or regional numbers as a single country or region, creating cooperation among agencies. Choose a 3-digit number that is easy and convenient to access emergency medical services, supports entering an aging society and considers vulnerable groups of society such as the visually impaired. For example, the European Union uses the number 112 for all types of emergencies. It

creates convenience and easy recognition of citizens of the country and tourists entering the European Union.

The Office of the Auditor General of Thailand should review its roles and regulations, scrutinizing the provision of emergency medical services by local authorities based on documented text rather than intentionally as a major obstacle to the development of emergency medical systems. OAG should coordinate with relevant agencies who are responsible for issuing regulations to facilitate the organization of emergency medical services of the local authorities. The inspection of emergency medical services of the local administration should focus on the safety and survival of the people in responsibility in each locality.

Central, regional, and local governments should, together with the Office of the Civil Service Commission, clearly define the position and advancement of personnel in the emergency medical system. Set compensation that is fair, consistent with current economic conditions and creates incentives to attract knowledgeable personnel entering the emergency medical system.

6.4.2 Practical Recommendations

Provincial public health office and provincial hospitals should build relationships and form a coalition of policy together with local authorities, civil society, private sector, and other related agencies such as police, fire, and rescue for the management of the network Emergency doctors by providing a platform to communicate, exchange, jointly, formulate policies and design work to be integrated regularly at least once per month. Importantly, the members attending this forum must consist of the administrative doctor, the provincial public health office, the head of the incident and command center and all the operating units in the province. Not limited to only regional public health or local administration.

Government hospitals should understand their role in treating emergency patients in hospitals. The management of the emergency medical system outside the hospital is the duty of the local administration. Government hospitals are responsible for organizing high-level emergency operations and managing emergency medical services knowledge. So that every organization in the emergency medical service network has appropriate knowledge, equality, across the network and able to work

according to the standard, which limiting their role in this section will reduce the workload of hospital personnel, prevent burnout in personnel and keep personnel in the emergency medical system.

NIEM should establish cooperation with all public health colleges to produce a 2-year medical emergency officer program. The Ministry of Public Health should require that hospitals and centers organize a 4-month emergency medicine training course once a year, at least one per health district, to increase the capacity of producing emergency medical practitioners, and emergency medicine physicians of various educational institutions.

NIEM should coordinate with educational institutions and hospitals network of the Medical Institutes of Thailand to set learning standards, organize a learning system for medical emergency volunteer and emergency medical workers in terms of theories via online media, and coordinate provincial hospitals to organize practical training after receiving theoretical training, as well as set a nationwide standardization exam at least twice a year to increase access to knowledge of personnel in the emergency medical system.

Building cooperation and unity between the local authorities and provincial hospitals to exchange resources and knowledge by giving personnel working in emergency call centers and command centers under the jurisdiction of the local authorities to have the opportunity to learn how to operate in the emergency room of the hospital at least once a year for 1 week each time to increase their experience and build emergency care skills in addition to the annual license renewal training.

PAO, as the person responsible for the management of out-of-hospital emergency medicine, should build trust in potential by developing expertise, knowledge and competence of personnel in the emergency call center and empowering the personnel of the operating unit to have the skills and expertise in the issuance of the incident by participating as a trainee for emergency medical volunteers and emergency medical workers, and at each training session should allow participants to practice and learn the operations of the emergency response center, and directing the operation to understand the operating system and to create a good relationship between the operating unit and the call center. PAO should provide reasonable resources to operating units, building trust in communication by

exchanging information with each other. The Emergency Call Center must communicate truthfulness, admit mistakes, provide, and receive feedback, confidentiality and clarify good intentions.

6.4.3 Suggestions for Research

6.4.3.1 Research Conceptual Framework: In this research, the researcher has applied the theory of network management and network effectiveness as a conceptual framework for research. As a result, Thailand's emergency medical services support this theory. Social capital and the interdependence of resources between each organization in the network are essential to the effective management of emergency medical services. Therefore, future studies should apply the concept of social capital and resource-dependence theory to the study to develop the emergency medical service system in Thailand.

6.4.3.2 An in-depth study of each organization in the Emergency Medical Services Networks: Since the management of Thailand's emergency medical service network is new for many organizations, a lot of management systems need to be developed. Therefore, researchers will be able to participate in studies to recommend the development of each of those organizations because they have a greater understanding of the emergency medical service system than the executives within that organization.

6.4.3.3 Evaluation of the effectiveness of the emergency medical service network: The outcome of emergency medical services is not solely dependent on out-of-hospital emergency services. Therefore, future studies should also consider the provision of emergency room services by collecting data from both in- and out-of-hospital stakeholders and developing indicators of success, which are widely accepted by both the medical and administrative circles. Evaluate the effectiveness of the organization that can be utilized in management.

6.5 Emergency Medical Model

6.5.1 Management Model of Emergency Medical Services Networks Organization

Based on the results of the above study, the researcher would like to present a model of the appropriate emergency medical service network for Thailand, which should be characterized as the emergency medical service network, comprising five major sectors: central government, regional public health, local governments, civil society, and the private sector. NIEM is responsible for establishing policies, regulations, standards for emergency medical services, monitoring and evaluating network performance, with all sectors directly involved in the direction, policy, and process of developing the emergency medical service system. Moreover, NIEM is responsible for coordinating with central government agencies to facilitate, solve problems and remove obstacles to the provincial public health, local governments, civil society, and the private sector can deliver emergency medical services to achieve their objectives and decentralize out-of-hospital emergency medical management to local governments.

All emergency reports are included at 1669. When people call to report an incident, they will be contacted at the provincial emergency call center, which is the responsibility of the Provincial Administrative Organization. The emergency call center can be connected to other emergency departments in addition to emergency illnesses. When an emergency is notified, it must be able to communicate directly with all operating units, including provincial hospitals, community hospitals, local authorities, civil society, and the private sector to issue operations in different areas of responsibility.

The work of the emergency call center must be close to the provincial hospital to transfer and refresh knowledge to personnel who work in the emergency call center regularly. Personnel who work in the emergency call center of the Provincial Administrative Organization, in addition to rehabilitating and reviewing their knowledge to renew their work permit, must learn about treatment and life of patients in the emergency room of the provincial hospital 1-2 times a year to gain an overview

of emergency medical services, the ability to report incidents, give advice to the public, sort out the level of severity and assign appropriate operations to units.

The allocation of areas and the scope of responsibility of the operating units must arise from a mutual agreement between the Provincial Hospital, Community hospitals, local administrations, civil society, and the private sector to achieve mutual recognition of agreements to prevent potential conflicts between networks. And most importantly, people in all areas have equal access to emergency medical services. PAO, as a large local government organization, is responsible for supporting resources for the operation of the emergency medical service network according to capacity and potential. The Provincial Public Health Division is responsible for managing knowledge in the network. So that every organization in the network is ready to provide emergency patient services according to their duties and responsibilities.

NIEM and Provincial Hospital is an organization that is considered to have personnel with knowledge and capability in emergency medicine since its members consist of a wide variety of doctors and perform tasks in providing emergency patient assistance on a regular basis. Therefore, they can use the reputation of the Organization to create a network of cooperation with foreign countries to assist, exchange resources with each other, and support the operation of the Emergency Medical Services Networks of Thailand to achieve success. A suitable medical network model providing emergency medical services suitable for Thailand can be summarized as illustrated in Figure 6.1.

factors of hospital access together with the ability and skills of emergency operations units, divided into 4 cases as shown in Figure 6.2. The details are as follows.

6.5.2.1 In the event that an emergency occurs in a location with easy access to the hospital, but the operating unit lacks the skills to treat the patient, the focus should be on bringing the patient to the hospital safely as soon as possible (Scoop and Run).

6.5.2.2 In the event that the scene of the accident is far from the hospital and the operating unit has expertise in treating emergency patients, patients should be treated at the scene until they are safe. Then take the patient to the hospital (Stay and Play).

6.5.2.3 In the event of an emergency not far from the hospital, the operation unit is experienced and skilled in treating it. If the operator considers that the emergency patient's condition at that moment deserves treatment as quickly as possible, the patient must be treated at the incident point and delivered to a potential hospital as soon as possible (Play and Run).

6.5.2.4 In case of emergencies in remote areas but hospitals and operating units lack the knowledge and expertise in treating emergency patients, let the operating unit to provide first aid emergency services according to the potential and advice of the emergency response and command center. Then rush the patient to the nearest hospital (Stabilize and Scoop).

Hospital Accessibility		High
Scoop & Run		Play & Run
Stabilize & Scoop		Stay & Play

Low

High

EMS Provider Skills

Figure 6.2 Model of Emergency Medical Services According to the Capacity of the Operating Unit and Access to the Hospital

6.6 Research Limitations

6.6.1 This Study of the Effectiveness of the Emergency Medical Service Network was Conducted Using a Qualitative Research Method

Data were collected from as many as 4 provinces, namely Khon Kaen, Nonthaburi, Ubon Ratchathani and Sa Kaeo. Field visits to collect data were important to research operations and findings, but the researcher was not local and thus may impede access to important data sources. The researcher was aware of these limitations and therefore planned before going for field visits to use the time wisely and get important and useful information. The data was collected for more than 10 days in each province, divided into 3-4 visits per province and took time to visit the area for 3-4 days at a time to resolve such restrictions.

6.6.2 Local Language Barriers

Field visits in Khon Kaen, Ubon Ratchathani and Sa Kaeo provinces where the use of local language for communication within the province sometimes prevented the researcher from comprehending the interpretation of the respondents. The researcher therefore solved the problem by asking for help from people working in government agencies to help translate and expand to achieve mutual understanding for both parties and to get the most accurate and true information.

6.6.3 Emergency Information Collection

Due to time, location, emergency and human research ethics, data collection from people who received emergency medical services to assess the effectiveness of the emergency medical service network was limited.

In short, Thailand's emergency medical services are still in their early stages compared to developed countries. The operational processes of the network organization of emergency medical services in Khon Kaen, Nonthaburi, Ubon Ratchathani and Sa Kaeo provinces are similar. The central public health service by NIEM and the Ministry of Public Health is responsible for formulating policies, goals, and guidelines. Policies that are centrally defined are characterized from the top down. Provincial Public Health Offices and government hospitals are responsible for implementing the policy. But the resources of public health organizations are limited, unable to provide adequate services to the people. Therefore, a new concept of public affairs management has been applied to create an emergency medical service network with the local government by means of decentralization laws to the local government to participate in the operation. However, participation is still voluntary. Participation in the network of local authorities is therefore limited to certain areas. As for the civil society sector, which is the starting point of emergency medical services in Thailand and is currently the main organization in providing emergency medical services to people in many areas, it is not important from the government as it should be. Most emergency reporting lacked integration between relevant agencies, except for Ubon Ratchathani Province, which included all emergency alerts at 1669 as a single number. The management of the emergency medical service network in Khon Kaen Province is most effective due to the leadership's planning to build and expand the network, to organize activities to strengthen relationships, and to have communication between all the organizations in the network, including civil society on a continuous and consistent basis to create a strong network.

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APPENDIX A

INTERVIEW GUIDELINES

Guidelines for in-depth interview questions and group discussions.

Subject: Operational processes and effectiveness of the Emergency Medical Services Networks Organization

Information provider:

Position:

Work experience in emergency medical services: years month

Agency:

Tel.:

Date:

Time:

Place:

This set of qualitative research questions is an in-depth interview questionnaire. The researcher prepared with the objective to study the operation process of the Emergency Medical Services Networks Organization, with details, questions, guidelines as follows:

Main question points

1. How did the emergency medical service in the province begin and what is its background?
2. What are the roles of you and the organization in providing emergency medical services? And what is the scope?
3. How do you and the organization participate in the local emergency medical services networks?
4. How do you and the organization participate in the provincial emergency medical services networks?

5. How do you and the organization participate in the national emergency medical services networks?
6. How do you and the organization come to join the emergency medical services networks?
7. Ideas or motives for joining the network of emergency medical services.
8. Barriers to joining the network of emergency medical services
9. How is the work process in providing emergency medical services?
 - 9.1 Emergency sickness and incident
 - 9.2 Reporting a request for help
 - 9.3 Operation of the emergency unit
 - 9.4 Medical treatment at the scene of an accident
 1. Transportation and handling during transportation
 2. Delivery to a sanatorium
 3. Hospital emergency room service
10. What is the process of you and your organization in providing emergency medical services?
11. What are the barriers to the emergency medical services work? How to fix it?
12. How is the emergency notification system? How are you and your organization involved?
13. Are there any limitations and / or barriers to reporting an incident?
14. How is the communication system in the emergency medical services networks?
15. What are the communication barriers between emergency medical services networks? Is there any solution to the problem or not?
16. Do people have an understanding and awareness of the emergency medical service system or not?
17. How to communicate, publicize with the public in order to perceive and understand the emergency medical service system?
18. Are people involved in the network of emergency medical services or not?

19. Do you provide emergency ambulance support, life support equipment, or training for emergency medical operations in the network? how? And how much?
20. Do you get emergency ambulance support, rescue equipment, or training from an organization in the Emergency Medical Services Network? How? and how much?
21. Does your organization have a policy on the development of an emergency medical service network or not?
22. How does the operation of emergency medicine go according to the role and the plan have been laid out? For what reason
23. Where did the idea or momentum for involvement in various sectors in the area come from in organizing emergency medical services?
24. What factors are important to the involvement and support of work from local, civil society and private sectors in the area?
25. How is emergency medical work integrated with local, civil society and private sectors in the province? What is the role of each organization?
26. What are the mechanisms for successful integration with different sectors?
27. What are the mechanisms for supervising, monitoring and evaluating the performance of the operating unit and the emergency call center?
28. Other problems and obstacles and solutions
29. What are the factors leading to the success of an emergency medical service network? And is there a concept and direction for further development or not?
30. Is the management of the current network of emergency medical services effective? how?
31. What are the requirements and recommendations for managing the emergency medical services network in the future?

Guidelines for in-depth interviews, citizens, emergency medical service recipients

Subject: Operation Process of the Emergency Medical Services Networks Organization

Information provider:

Age:

Gender:

Occupation:

Social status in the community:

Education background:

Literacy:

Tel.:

Date:

Time:

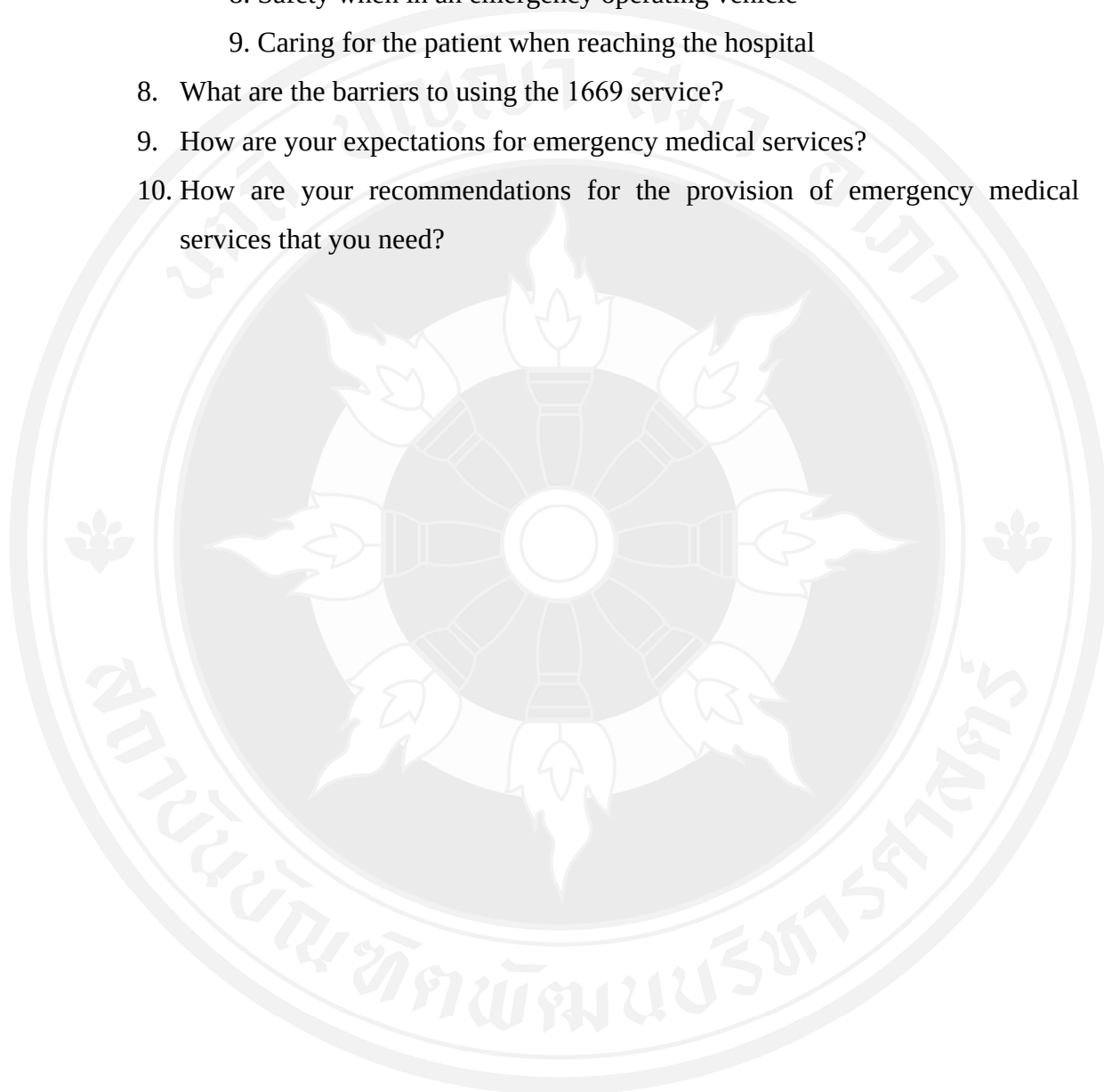
Place:

This set of qualitative research questions is an in-depth interview questionnaire. The researcher prepared with the objective to study the operation process of the Emergency Medical Services Networks Organization, with details, questions, guidelines as follows:

Main question points

1. What is it like to seek help in an emergency?
2. Do you know the telephone number 1669 or not?
3. How is the publicity about calling rescuers in the community?
4. Do you have experience using emergency medical services or not and how?
5. When calling 1669 to report the incident, what is the time required for incident reporting, clarity of communication, initial advice and assistance?
6. The speed of the operating suit to arrive at the scene of the accident.
7. Are you satisfied using the service 1669 or not and how?
 1. The speed of the action squad to the scene
 2. Emergency ambulance quality
 3. On-site medical treatment

4. Crime scene coordination
5. Support during delivery
6. Talking to the injured person or relatives
7. The speed of coordination for hospital delivery
8. Safety when in an emergency operating vehicle
9. Caring for the patient when reaching the hospital
8. What are the barriers to using the 1669 service?
9. How are your expectations for emergency medical services?
10. How are your recommendations for the provision of emergency medical services that you need?



APPENDIX B

GENERAL CONDITION OF THE CASE STUDY

1. General condition of Khon Kaen Province

1.1 Physical

- Location

Khon Kaen province is located in the central part of the Northeast. There is between 100-200 meters above the sea level. The distance from Bangkok along the Highway No. 2 (Mittraphap Road) is 445 kilometers or the distance from Bangkok-Nong Khai Railway is 450 kilometers. It has an area of 10,885.99 square kilometers or approximately 6,803,744 rai, bordering the provinces as follows:

North next to Udon Thani Province, Loei Province and Nong Bua Lam Phu Province

South next to Nakhon Ratchasima and Buriram Province

East next to Kalasin Province and Maha Sarakham Province

West next to Chaiyaphum and Phetchabun provinces

Map of Khon Kaen Province

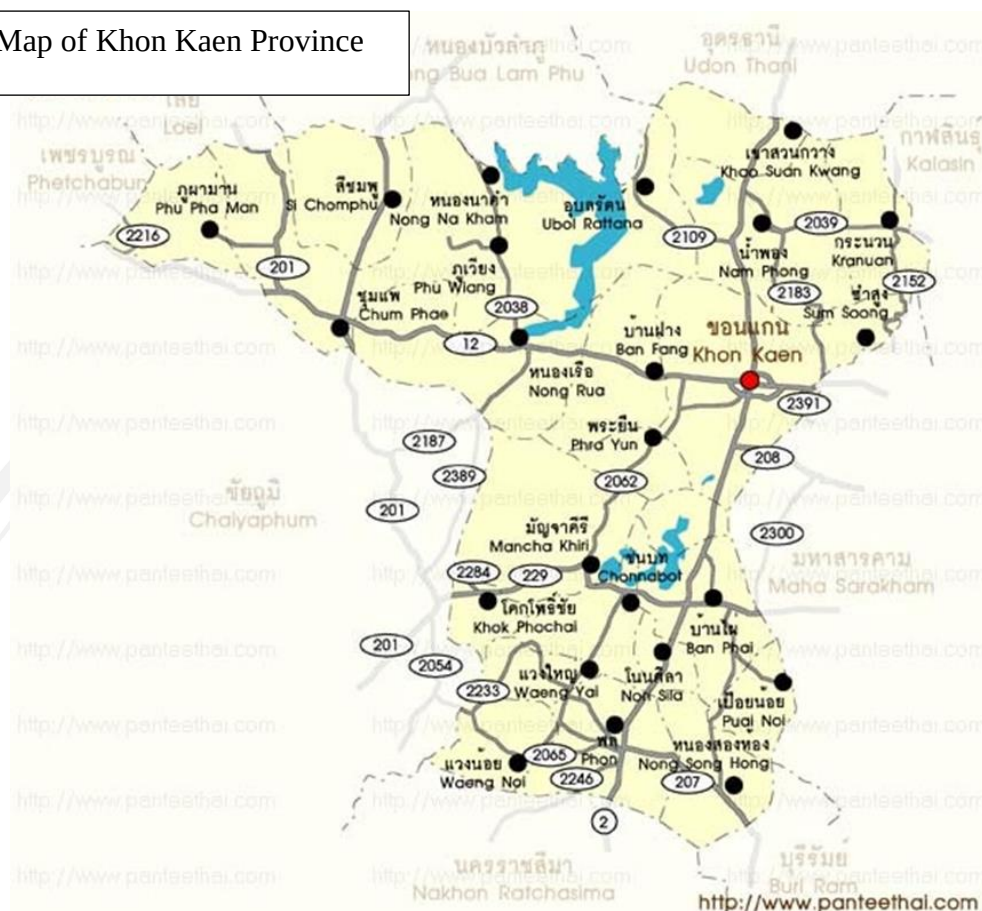


Figure B1 Map of Khon Kaen Province

Source: <http://www.panteethai.com>

1.2 Topography

The western highlands are mostly mountainous in Dong Phraya Yen Mountains. Some parts are undulating areas, shallow to small waves. This type of terrain covers Si Chompoo District, Phu Pha Man, Phu Wiang, Nong Ruea, Ubolratana and the west side of Khao Suan Kwang District, Nam Phong, Muang Ban Fang, and Petrola.

In the Central Plateau, most of the area is undulating area, with upland. Some of them are low hills. This type of topography covers the central Kranuan district, and the eastern area of Khao Suan Kwang District, Nam Phong District, and the northern part of Mueang District.

Most of the Korat Basin is a shallow undulating area with both uplands and paddy fields and some plains. some are high. Some parts of this area are in the

Chi River Basin, covering the middle to the lower part of Muang Manchakhiri District, lower part of Ban Fang District. and covers the area of Phra Yuen District, Ban Phai, Waeng Yai, Waeng Noi, Nong Song Hong, Puey Noi and Phon.

1.3 Politics/Governance

- Administrative Regions

The National Government Organisation Act, B.E. 2534 (1991) divides public administration into three parts: central government administration, regional, and local government. Khon Kaen Province has central government administration, regional, and local government as follows:

1) Provincial government

- Provincial government 33 government agencies
- The administration is divided into 26 districts, 198 sub-districts, 2,331 villages, 389 communities.

2) Local government has a total of 226 local government organizations, divided into

- Provincial Administrative Organization
- Municipality is Khon Kaen Municipality
- 6 Municipalities, namely Mueang Phon Municipality, Chum Phae Municipality, Ban Phai Municipality, Sila Municipality, Kranuan Municipality, and Ban Tum Municipality
- 77 sub-district municipalities
- Subdistrict Administrative Organization 140 locations

3) Central government and state enterprises 227 agencies

1.4 Population

The total population is 1,805,910 people, 890,486 males representing 49.3% of the total population, and 915,424 females representing 50.7% of the total population, the population living in municipalities is 511,892 people or 28.3%, the population living outside the municipality is 1,294,018 people or 71.7%, the population density of the whole province is 162 people/square kilometer, the mean population per household is 3.0 people, the number of houses 597,845 houses.

Table B1 Number of population and number of houses Khon Kaen Province in 2017

District	Total	Male	Female	Number of houses
Mueang Khon Kaen	144,972	71,763	73,209	59,469
Ban Fang	50,387	25,184	25,203	15,839
Phra Yuen	24,972	12,269	12,703	7,179
Nong Ruea	84,192	41,808	42,384	22,078
Chum Phae	83,557	41,955	41,602	24,169
Si Chomphu	74,691	37,324	37,367	21,594
Nam Phong	74,198	37,076	37,122	20,896
Ubolratana	40,709	20,449	20,260	10,153
Kranuan	68,673	34,236	34,437	19,275
Ban Phai	72,481	36,150	36,331	21,412
Pueai Noi	14,133	7,155	6,978	3,572
Phon	75,799	37,657	38,142	21,430
Waeng Yai	24,462	12,132	12,330	6,125
Waeng Noi	38,964	19,450	19,514	10,846
Nong Song Hong	72,218	36,087	36,131	19,410
Phu Wiang	69,552	34,712	34,840	19,232
Mancha Khiri	67,614	33,667	33,947	20,283
Chonnabot	40,197	19,823	19,823	11,089
Khao Suan Kwang	21,507	10,760	10,747	6,066
Phu Pha Man	19,755	9,944	9,811	5,612
Sam Sung	18,419	9,098	9,321	5,032
Khok Pho Chai	21,421	10,797	10,624	6,315
Nong Na Kham	23,882	11,890	11,992	6,321
Ban Haet	26,262	13,032	13,23	7,933
Non Sila	21,042	10,540	10,502	6,093
Wiang Kao	19,959	9,903	10,056	5,349
Total	1,805,910	890,486	915,424	607,824

Sources: The Bureau of Registration Administration (BORA), Department of Provincial Administration, compiled by National Statistical Office, National Statistical Office Thailand.

1.5 Public health

The top five causes of illnesses were:

- Pneumonia
- Other complications of pregnancy and childbirth
- Cataracts and other lens disorders
- Another anemia
- Other specific, non-specific and multiple injuries in the body.
-

Table B2 Number and rate of morbidity with the top 5 epidemiological diseases in Khon Kaen in 2017

No.	Disease	Number of sick	Sick rate
1	Diarrhea	14,672	816.21
2	Fever or Fever of Unknown Origin	6,163	342.85
3	Pneumonia	5,235	291.23
4	Food Poisoning	3,463	192.65
5	Conjunctivitis	2,200	122.39

Source: Khon Kaen Provincial Health Office (1 January 2017 - 30 June 2017)

Public health service centers under the Ministry of Public Health

- 1) Khon Kaen Hospital (Hospital Center) size 867 beds, 1 place
- 2) Sirindhorn Hospital Khon Kaen (General Hospital), size 250 beds, 1 place
- 3) Community Hospitals with size 120 beds 1 place, size 90 beds 2 places, size 60 beds 5 places, and size 30 beds 12 places
- 4) 248 Tambon Health Promoting Hospitals
- 5) 4 Mum Mueang Medical Centers (under the Khon Kaen Hospital) 4 locations
 - Chata Phadung Medical Center
 - Pracha Samosorn Clinic Medical Center
 - Mittrapap Medical Center

- Wat Nong Wang Community Medical Center (Phra Aram Luang)

6) Health Center 6 - Health Promoting Hospital, size 60 beds, 1 place

7) Thanyarak Khon Kaen Hospital, size 140 beds, 1 place

8) Khon Kaen Ratchanakarin Psychiatric Hospital, size 372 beds, 1

place

Health facilities affiliated with other ministries

1) Srinakarin Hospital Khon Kaen University, size 1,220 beds, 1 place

2) Queen Sirikit Heart Center of the Northeast, Khon Kaen University, size 200 beds, 1 place

3) Sripacharin Camp Hospital Khon Kaen Province, size 30 beds, 1 place

4) Public Health Service Centers under Khon Kaen Municipality, 3 places

- Public Health Service Center at 1 Khon Kaen Municipality

- Ban Non-Chai Health Service Center 3

- Public Health Service Center 5 at Ban Nong Yai

Private health care facilities 3 private hospitals

1) Khon Kaen Ram Hospital, size 199 beds

2) Rajapruek Hospital, size 50 beds

3) Bangkok Hospital Khon Kaen, 89 beds

Administrative agencies and academic centers under the Ministry of Public Health

1) Khon Kaen Provincial Health Office 1

2) 26 District Public Health Offices

3) Borommaratchonnani College of Nursing Khon Kaen

4) Sirindhorn Public Health College, Khon Kaen Province

5) Office of Disease Control 6

6) Khon Kaen Medical Science Center

7) Public Health Training and Development Center northeast

8) Medical Engineering Center Khon Kaen 2

9) Northeastern Child Development Institute

Health Workers

Khon Kaen province has public and private health workers: 778 doctors, 250 dentists, 336 pharmacists, 3,630 nurses, and technical nurses 579 persons. The details as shown below are as follows:

Table B3 Medical Staff, Khon Kaen Province, by district 2017

District	Medical Staff					Population per medical staff				
	Physician	Dentist	Pharmacist	Nurse	Technical Nurse	Physician	Dentist	Pharmacist	Nurse	Technical Nurse
Total	778	250	336	3,630	67	2,330	7,281	5,374	497	26,953
Mueang Khon Kaen	508	137	194	2,286	51	820	3,041	2,147	182	8,169
Ban Fang	10	4	5	44	-	5,512	13,780	11,024	1,252	-
Phra Yuen	5	3	5	45	-	6,971	11,618	6,971	774	-
Nong Ruea	11	5	7	71	-	8,519	18,743	13,388	1,319	-
Chum Phae	35	10	12	167	7	3,544	12,407	10,339	742	17,724
Si Chomphu	13	4	6	47	1	6,031	19,603	13,069	1,668	78,414
Nam Phong	20	9	12	106	-	5,715	12,702	9,526	1,078	-
Ubolratana	5	4	5	47	-	8,979	11,224	8,979	955	-
Kranuan	16	9	8	78	-	4,936	8,775	9,872	1,012	-
Ban Phai	20	4	9	95	1	5,031	25,158	11,181	1,059	100,634
Pueai Noi	5	3	4	28	-	4,022	6,704	5,028	718	-
Phon	20	6	11	84	2	4,349	14,498	7,908	1,035	43,494
Waeng Yai	4	2	4	37	-	7,403	14,806	7,403	800	-
Waeng Noi	5	2	1	35	-	8,411	21,027	42,055	1,201	-
Nong Song Hong	8	6	5	53	-	9,784	13,046	15,655	1,476	-
Phu Wiang	14	7	7	73	1	5,190	10,381	10,381	995	72,672
Mancha Khiri	15	8	8	73	1	4,766	8,936	8,936	979	71,494
Chonnabot	9	6	4	40	2	5,381	8,072	12,109	1,210	24,218

Table B3 Medical Staff, Khon Kaen Province, by district 2017 (Continued)

District	Medical Staff					Population per medical staff				
	Physician	Dentist	Pharmacist	Nurse	Technical Nurse	Physician	Dentist	Pharmacist	Nurse	Technical Nurse
Khao Suan Kwang	7	4	3	34	-	4,646	8,131	10,842	956	-
Phu Pha Man	7	3	4	24	1	3,322	7,751	5,813	968	23,255
Sam Sung	5	2	4	30	-	4,747	11,868	5,934	791	-
Khok Pho Chai	1	1	1	8	-	25,56	25,562	25,562	3,195	-
Nong Na Kham	2	1	2	6	-	11,94	23,882	11,941	3,980	-
Ban Haet	29	8	11	108	-	1,344	4,874	3,545	361	-
Non Sila	2	1	2	5	-	13,342	26,685	13,342	5,337	-
Wiang Kao	2	1	2	6	-	9,979	19,959	9,979	3,326	-

Source: Khon Kaen Provincial Public Health Office

Note: Medical staff only under Khon Kaen Provincial Health Office

1.6 Local Administrative Organization Development Strategy

Development Strategy of Khon Kaen Provincial Administrative Organization

Khon Kaen Development Plan 2018 – 2022

Provincial Vision/Development Goals

“The metropolitan area is a great place to move towards an innovative city that connects the Mekong Sub-Region trade.”

Mission

1. To develop into a sustainable city for all groups of people in society.
2. To develop competitiveness to raise standards for products and services to meet market demands and link with the Mekong Sub-Region.
3. To promote innovation and technology development to become Smart City and Mice City

Success indicators according to provincial development goals

1. Provincial gross domestic product value expansion increased by 3 percent.
2. Develop the central city of the province to be a pleasant city.
3. Improve the quality of people's life and create social stability.
4. Conserve, restore natural resources and the environment and strengthen sustainable management.

2. General Condition of Nonthaburi

2.1 Physical Aspects

- Location

Nonthaburi located in central Thailand, one of the metropolitan provinces is Nonthaburi, Nakhon Pathom, Samut Prakan, Samut Sakhon, Pathum Thani, 20 kilometers from Bangkok with an area of 622.38 square kilometers or about 388,987.5 rai. It is located at the latitude of 13° 47' to 14° 04'N, and longitude of 100° 15' to 100° 34'E. It is located at moderate sea level, averaging 1.80 meters, and has a contact territory with the following neighboring provinces:

The North is adjacent to Lat Bua Luang District, Phra Nakhon Si Ayutthaya Province, Lat Lum Kaeo District and Mueang Pathum Thani District, Pathum Thani Province.

The South is adjacent to Bang Phlat, Taling Chan, and Thawi Watthana Bangkok (Thonburi).

The East is adjacent to Don Mueang, Lak Si, Chatuchak, and Bang Sue, Bangkok (Phra Nakhon)

The West is adjacent to Phuttamonthon and Bang Sue District, Nakhon Pathom province.

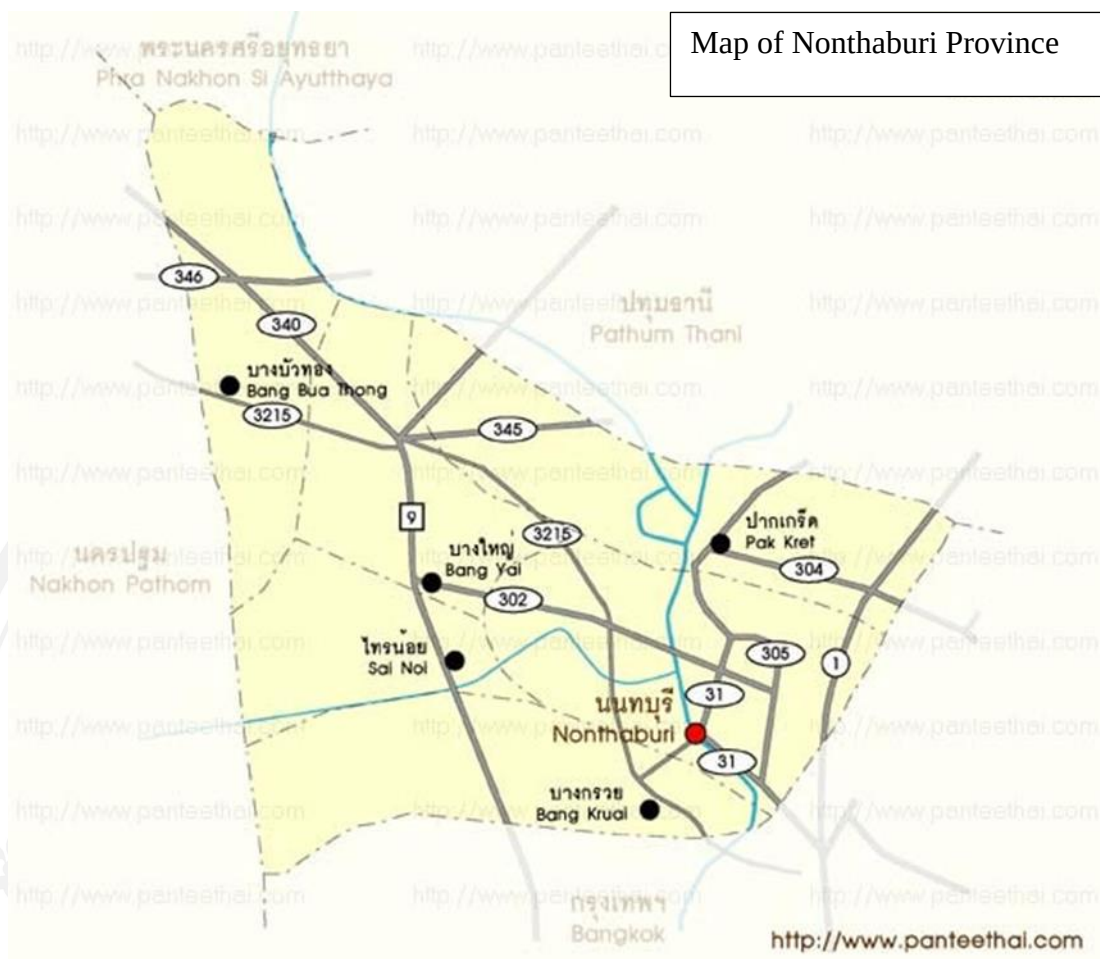


Figure B2 Map of Nonthaburi Province

Source: <http://www.panteethai.com>

Terrain

Nonthaburi is located on the banks of Mae Chao Phraya, which it divides the province into two parts: East and West. Most of the area is lowland, with many natural and re-dug canals linked consecutively. It can be used to travel between village, sub-district, dense community area. In general, the area away from river and canal is a garden and farmland, which is always flooded. However, nowadays the area of the province in some districts, which used to be an orchard and is adjacent to Bangkok, is beginning to change as residents' homes migrate from all parts of the country. In addition, some areas of some districts support industrial expansion, especially parts of Mueang Nonthaburi, Pak Kret, Bang Yai, Bang Bua Thong, where

land and industrial plants are massively allocated. It can be said that the eastern part of the area, which is adjacent to Bangkok, is part of Bangkok.

2.2 Politics/Governance

- Administrative Regions

Nonthaburi province is divided into 6 districts, 52 sub-districts, 328 villages, 317 communities, including Mueang Nonthaburi, Pak Kret, Bang Bua Thong, Bang Yai, Bang Kruai, and Sai Noi. The units are located in the following areas:

1) Central Government Agencies

- Ministry of Public Health, Department of Medical Services, Department of Disease Control, Department of Development of Thai Traditional and Alternative Medicine, Department of Medical Sciences, Department of Health Services Support, Department of Mental Health, Department of Health, Food and Drug Administration
- Ministry of Commerce, Department of Foreign Trade, Department of Insurance, Department of Intellectual Property, Department of Business Development
- Ministry of Justice, Department of Rights and Freedoms Protection, Department of Juvenile Justice and Protection, Department of Corrections
- Ministry of Defence, Royal Thai Army

2) Provincial Government Agencies

- Government offices under the Office of the Prime Minister, Provincial Public Relations Office
- Government offices under the Ministry of Finance, Provincial Treasury Office, Area Excise Office Treasury Office, Area Revenue Office, Government Lottery Office
- Government agencies under the Ministry of Social Development and Human Security Provincial Office of Social Development and Human Security
- Government offices under the Ministry of Education, Nonthaburi Primary Education Area Office District 1, District 2 and Nonthaburi Secondary Education Area Office 3
- Government offices under the Ministry of Tourism and Sports, Provincial Tourism and Sports Office

- Government offices under the Ministry of Public Health, Provincial Health Office

- Government offices under the Ministry of Industry, Provincial Industry Office

- Government offices under the Ministry of Interior, Provincial Offices, Provincial Administrative Offices, Provincial Community Development Offices Provincial Administrative Office, Provincial Land Office, Provincial Public Works and Town Planning Office, Provincial Disaster Prevention and Mitigation Office

- Government offices affiliated with the Ministry of Agriculture and Cooperatives, Provincial Agriculture and Cooperatives Office, Provincial Agriculture Office, Provincial Fisheries Office, Provincial Livestock Office, Irrigation Project, Land Development Station, Provincial Cooperative Office, Cooperative Audit Office

- Government offices under the Ministry of Commerce, Provincial Commercial Offices, Provincial Trade Offices, Provincial Business Development Offices

- Government offices under the Ministry of Transport, Provincial Transport Office, Barung Way Office, Provincial Rural Highway Office, Regional Port Authority Office

- Government offices under the Ministry of Labour, Provincial Labour Office, Provincial Labour Protection and Welfare Office, Provincial Employment Office, Provincial Skill Development Center

- Government agencies under the Ministry of Information and Communication Technology, Provincial Statistics Office

- Government agencies under the Ministry of Social Development and Human Security, Provincial Social Development and Human Security Office

- Government offices under the Ministry of Culture, Provincial Cultural Office

- Government offices under the Ministry of Energy, Provincial Energy Office

- Government agencies under the Ministry of Natural Resources and Environment Provincial Natural Resources and Environment Office, Forest Resource Management Bureau

- Government offices under the Ministry of Justice, Federal Prisons, Provincial Juvenile Justice and Protection Facilities, Provincial Law Enforcement Offices, Provincial Probation Offices

3) Local Government Offices

There are 46 local government offices, including 1 provincial administrative organization, 2 municipalities, 5 municipalities, 11 municipalities, 27 sub-district administrative organizations as follows:

Mueang Nonthaburi District: 1. Nonthaburi Provincial Administrative Organization 2. Nonthaburi City Municipality 3. Bang Si Muang Town Municipality 4. Sai Ma Subdistrict Municipality 5. Bang Krang Subdistrict Administrative Organization 6. Bang Rak Noi Subdistrict Administrative Organization 7. Bang Phai Subdistrict Administrative Organization.

Bang Yai Subdistrict: 1. Bang Muang Subdistrict Municipality 2. Bang Yai Subdistrict Municipality 3. Ban Bang Muang Subdistrict Municipality 4. Sao Thong Hin Subdistrict Municipality 5. Bang Len Subdistrict Municipality 6. Ban Mai Subdistrict Administrative Organization 7. Bang Mae Nang Subdistrict Administrative Organization 8. Bang Yai Subdistrict Administrative Organization.

Bang Bua Thong District: 1. Bang Bua Thong Town Municipality 2. Phimon Rat Town Municipality 3. Bang Bua Thong Subdistrict Administrative Organization 4. Bang Khu Rat Town Municipality 5. Lahan Subdistrict Administrative Organization 6. Lapo Subdistrict Administrative Organization 7. Bang Rak Phatthana Subdistrict Administrative Organization 8. Bang Rak Yai Subdistrict Administrative Organization.

Pak Kret District: 1. Pak Kret City Municipality 2. Bang Phlap Subdistrict Municipality 3. Khlong Khoi Subdistrict Administrative Organization 4. Koh Kret Subdistrict Administrative Organization 5. Tha It Subdistrict Administrative Organization 6. Khlong Phra Udom Subdistrict Administrative Organization 7. Bang Tanai Subdistrict Administrative Organization Nye 8. Om Kret Subdistrict Administrative Organization.

Bang Kruai District: 1. Bang Kruai Town Municipality 2. Plai Bang Subdistrict Municipality 3. Sala Klang Subdistrict Municipality 4. Bang Si Thong Subdistrict Municipality 5. Bang Khun Kong Subdistrict Administrative Organization

6. Maha Sawat Subdistrict Administrative Organization 7. Bang Khanun Subdistrict Administrative Organization.

Sai Noi District: 1. Sai Noi Subdistrict Municipality 2. Sai Noi Subdistrict Administrative Organization 3. Khlong Khwang Subdistrict Administrative Organization 4. Khun Si Subdistrict Administrative Organization 5. Sai Yai Subdistrict Administrative Organization 6. Thawi Watthana Subdistrict Administrative Organization 7. Nong Phrao Ngai Subdistrict Administrative Organization 8. Rat Niyom Subdistrict Administrative Organization

4) State enterprises such as The Government Lottery Office, Electricity Generating Authority of Thailand (Bang Kruai)

5) Independent organizations such as the National Anti-Corruption Commission

Source: Nonthaburi Provincial Website

Table B4 Description of Nonthaburi Subdivision, District Classification B.E. 2552 (2009)

District	City Municipality	Town Municipality	Subdistrict Municipality	Subdistrict Administrative Organization	Sub-district	Village
Mueang Nonthaburi	1	1	1	3	10	26
Bang Kruai	-	1	3	3	9	41
Bang Yai	-	-	5	3	6	69
Bang Bua Thong	-	4	-	6	8	73
Sai Noi	-	-	1	7	7	68
Pak Kret	1	-	1	6	12	51
Total	2	6	11	28	52	328

Source: Nonthaburi Provincial Administrative Office

2.3 Population

According to statistics from the Department of Provincial Administration at the end of December 2017, Nonthaburi has a total population of 1,229,735, 574,500 men and 655,235 women. The number of men accounted for 46.7 percent, and the number of women accounted for 53.3 percent of the total population. 54.6% of the

population lives in municipalities, while 45.4 percent live outside the municipality, the population density is 1,977 people per square kilometer.

Source: Nonthaburi Provincial Statistics Office

Table B5 It Shows the Population from Registration, by Gender, Subdivisions by District 2017-2018

District	Year 2017			Year 2018		
	Total	Male	Female	Total	Male	Female
Mueang Nonthaburi	364,543	171,196	193,347	365,710	171,569	194,141
Bang Kruai	89,737	41,426	48,311	99,267	42,549	49,718
Bang Yai	190,495	88,343	102,152	196,487	91,106	105,381
Bang Bua Thong	273,232	127,280	145,952	277,162	128,960	148,202
Sai Noi	65,516	31,486	34,030	67,285	32,250	35,035
Pak Kret	246,212	114,769	131,443	247,384	115,186	132,198
Total	1,229,735	574,500	655,235	1,246,295	581,620	664,675

Source: Registration Statistics System, Department of Provincial Administration

Table B6 Population, Number of Homes, Areas and Population Density by District, Nonthaburi Province

District	Population 2019	Number of houses 2018	Area (square km)	Population density (person: sq.km.)				
				2015	2016	2017	2018	2019
Mueang Nonthaburi	367,189	210,402	77,018	4,706	4,715	4,733	4,748	4,767
Bang Kruai	141,149	70,424	57,408	2,187	2,255	2,315	1,607	2,458
Bang Yai	156,861	82,367	96,398	1,442	1,484	1,529	2,038	1,627
Bang Bua Thong	281,766	147,370	116,439	2,264	2,306	2,347	2,380	2,419
Sai Noi	69,007	30,262	186,017	336	343	352	361	370
Pak Kret	249,415	155,210	89,023	2,702	2,740	2,766	2,778	2,801
Total	1,265,387	689,035	622,303	1,918	1,947	1,976	2,002	2,033

Source: Department of Administrative Affairs, Ministry of Interior

2.4 Public Health

Nonthaburi's public health operations are carried out in a combination of medical treatment, environmental sanitation, disease prevention and health promotion along with basic public health. The diseases that died more or less in 2015 were all types of cancers and tumors, second only to heart disease, accidents and poisoning, hypertensie and stroke.

Nonthaburi has medical facilities including: 9 government hospitals, 12 private hospitals, 89 sub-district health promoting hospitals and 667 clinics with a total of 3,112 medical staff are divided into 566 doctors, 160 dentists, 250 pharmacists, 2,117 nurses and 19 technical nurses.

Table B7 The number of medical facilities classified by district in 2017

District	Government Hospital	Private Hospital	Sub-district health promoting hospitals	Health station	All types of clinics
Mueang Nonthaburi	2	5	21	-	275
Bang Kruai	1	1	14	-	51
Bang Yai	1	1	11	-	75
Bang Bua Thong	2	2	15	-	85
Sai Noi	1	-	11	-	6
Pak Kret	2	3	17	-	175
Total	9	12	89	-	667

Source: Nonthaburi Provincial Public Health Office

Table B8 Shows the number of medical staff by district 2017

District	Physician	Dentist	Pharmacist	Nurse	Technical Nurse
Mueang Nonthaburi	344	84	139	1274	18
Bang Kruai	22	13	10	67	-
Bang Yai	52	15	24	199	-
Bang Bua Thong	38	15	28	152	1
Sai Noi	11	6	28	57	-
Pak Kret	99	27	6	368	-
Total	566	160	250	2,117	19

Source: Nonthaburi Provincial Public Health Office

Table B9 Number of 4 Personnel in Community Hospitals Under Nonthaburi Provincial Health Office compared with FTE

Hospital	Level	Active Bed	Physician			Dentist			Pharmacist			Nurse		
			Fte		Actual practice	Fte		Actual practice	Fte		Actual practice	Fte		Actual practice
			80%	100%		80%	100%		80%	100%		80%	100%	
Bang Yai	M2	33	19	23	18	12	15	11	10	12	12	56	71	111
Bang Bua Thong	M2	47	22	27	17	10	13	10	11	13	13	73	91	101
Bang Kruai	F1	30	16	20	19	10	12	11	8	10	8	44	55	55
Pak Kret	F1	35	18	21	17	12	15	10	8	10	11	57	71	81
Sai Noi	F2	65	15	18	6	5	7	6	6	8	6	49	61	59
Bang Bua Thong 2	F3	30	3	3	4	2	3	3	2	2	2	24	30	22

(Information as of 17 January 2020)

2.5 Local Government Development Strategy

Development Strategy of Nonthaburi Provincial Administrative Organization

Khon Kaen Development Plan 2018 – 2022

Provincial Visions/Development Goals

“Nonthaburi As a City’s of The Best Habitat with High Quality, And the City of Creative Economy”

Total Goals / Objectives

1. Nonthaburi Province is a city that is livable and accommodating to people of all levels.
2. Nonthaburi is a city of creative economy to add value to products and service sectors to meet international standards.
3. Nonthaburi Province is an environmentally friendly city

Nonthaburi province mission 2018-2022

1. To develop and manage Nonthaburi Province to be a livable city for the residents of all levels.
2. To develop and promote people to have a good quality of life, live according to the philosophy of sufficiency economy.

3. To strengthen and develop Nonthaburi as a city of creative economy to add value to products and service sectors to meet international standards.

4. To develop and manage Nonthaburi Province to be an environmentally friendly city.

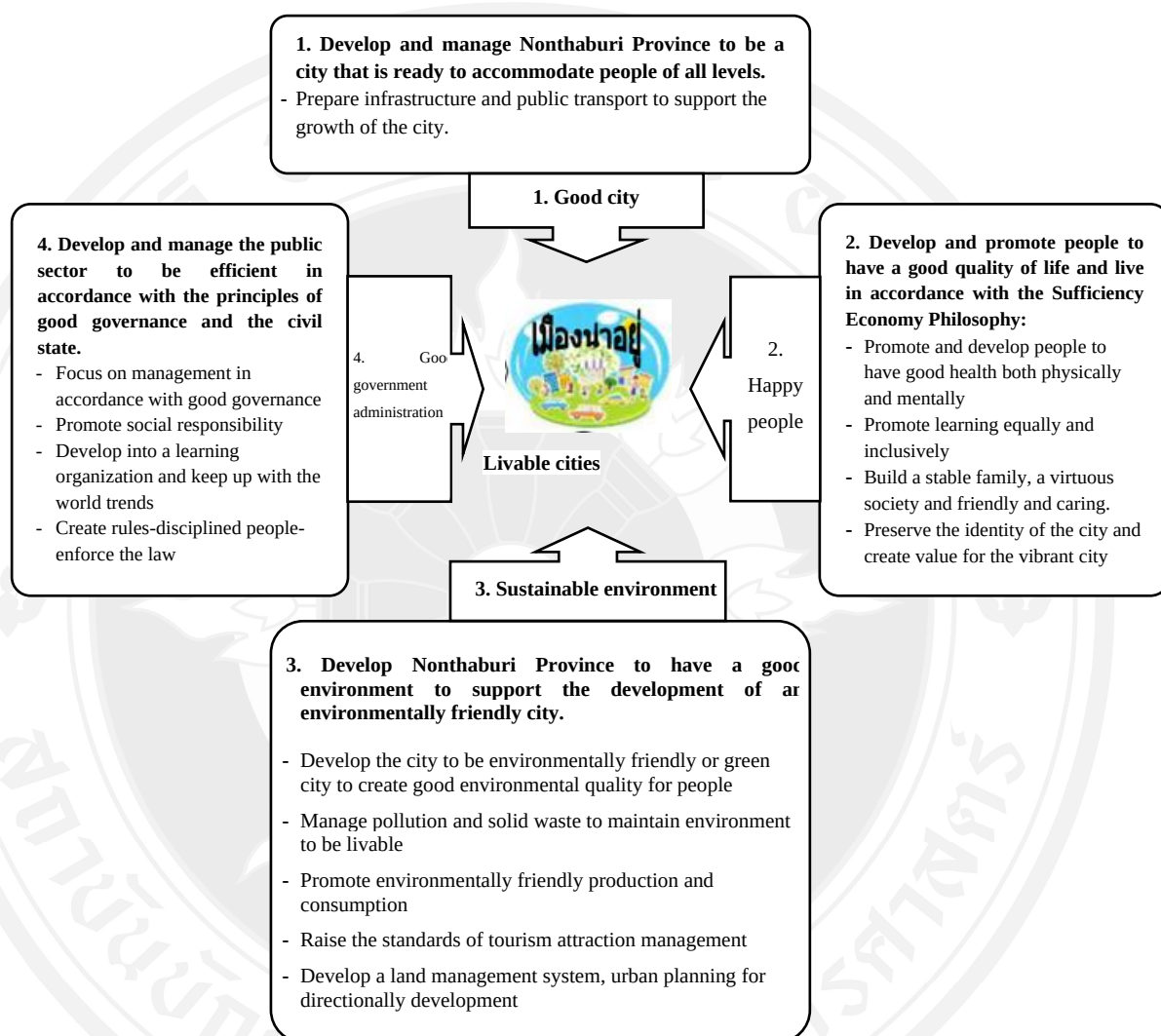


Figure B3 Summary of the conceptual framework of the Nonthaburi Provincial Development Plan 2018-2022

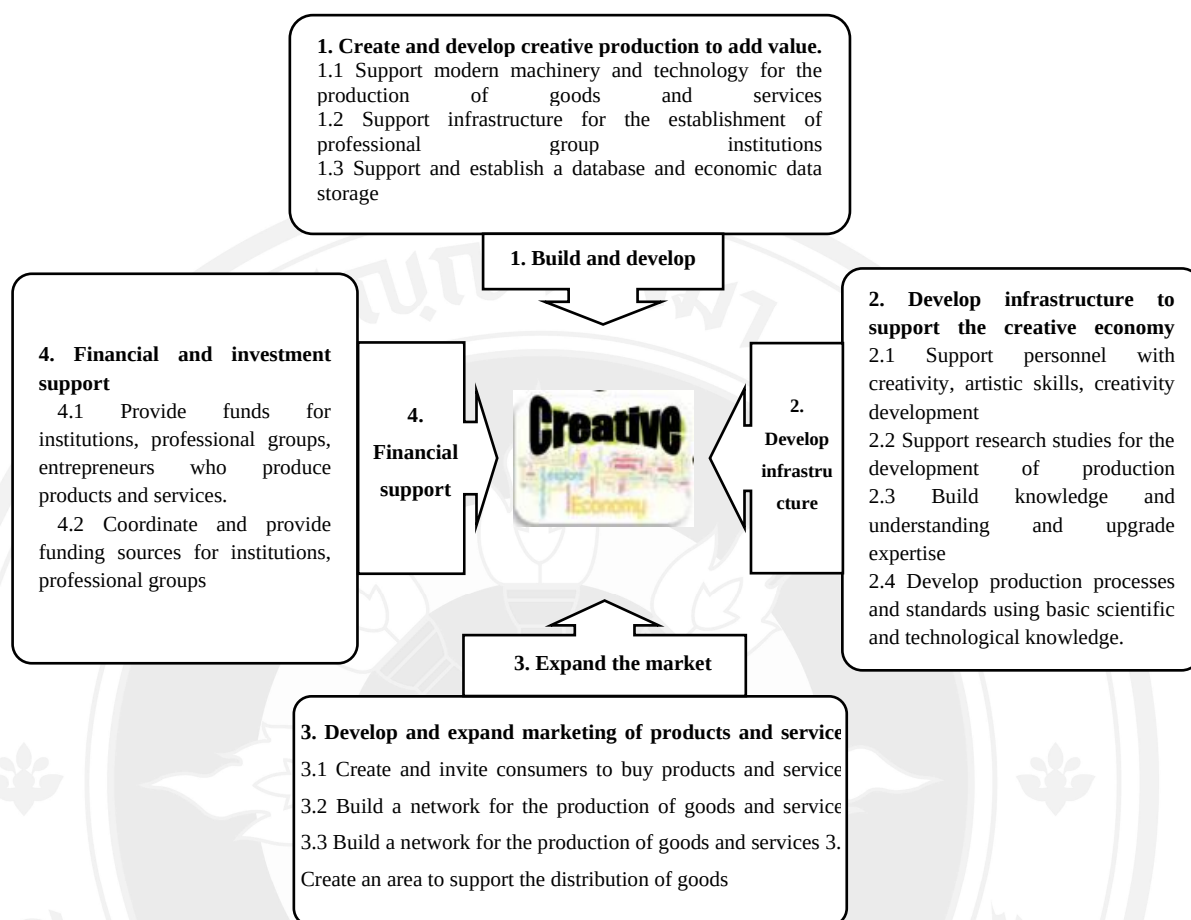


Figure B4 Outlines the Creative Economy Concept Nonthaburi Province, 2018-2022

Strategic issues / development issues For the Nonthaburi Provincial Development Plan 2018-2022

Strategic issues / area development issues

1. Develop a livable city to accommodate the residents of all levels.
2. Develop as a creative economy city for service, agriculture, commerce, investment and tourism sectors with quality and international standards.
3. Develop into an environmentally friendly city.

Local Administrative Organization Strategy Nonthaburi Province

Vision: “Education city, quality of life city, and good environment”

Strategy 1: Develop the Nonthaburi city for the living of the people with happiness.

Indicators

1. Number of populations with better quality of life
2. Number of communities / villages / sub-districts which is a more livable city

Strategy

1. Promote and support education both inside and outside the school
2. Promote and support drug problem solving
3. Promote and support social work
4. Promote and support public health, family health and medical treatment
5. Promote the maintenance of cleanliness and orderliness of the country.
6. Construction, improvement and maintenance of land, waterway, and drainage way.
7. Develop a comprehensive city planning and land use
8. Developing and expanding water supply and electricity areas
9. Develop traffic system, traffic and transport engineering
10. Construction and improvement of markets, docks, crossings, car parks
11. Promote and support prevention, maintain order in life and property

Strategy 2: Strengthen and develop sustainable management of natural resources and the environment.

Indicators

Restriction of solid waste, sewage, wastewater and other pollutants in a sanitary, better and sustainable environment.

Strategy

1. Develop waste disposal system management, sewage and pollution
2. Promote the control of cemeteries and crematoriums
3. Promote and support animal slaughter control
4. Maintenance and use of land and natural resources and environment
5. Promote global warming reduction

Strategy 3: Strengthen and develop the creative economy, meet standards and have added value.

Indicators

- Number of farmers who have been developed occupation
- Investment in agriculture and industry that have been developed and have more standards.
- Commerce and investment that is promoted and developed

Strategy

1. Promote the Sufficiency Economy Philosophy
2. Promote and support training and career
3. Promote and support commerce and investment
4. Promote and support investment in the industrial sector
5. Promote the safe and standardized agricultural sector
6. Promote and support animal husbandry

Strategy 4: Develop human and social resources to progress, safety and sustainability.

Indicators

- People are happier living in Nonthaburi.
- The people follow democracy and are united.

Strategy

1. Support family institutions
2. Promote the quality of life of children, women, the elderly, the disabled and the underprivileged
3. Promote democracy and public participation in local development
4. Support various forms of public organization network
5. Promote disaster prevention and mitigation

Strategy 5: Develop effective management and support access to the ASEAN Community

Indicators

- People are engaged in increased local development
- Effective public administration according to the needs of the people.
- Nonthaburi province is ready to enter the ASEAN Community.

Strategy

1. Support the local development plan, village/community plan and coordination of local development plan
2. Develop a modern government management system to meet the needs of the people effectively.
3. Promote the development of appropriate technology
4. Support the preparation of entry into the ASEAN Community.

Strategy 6: Develop, promote and preserve arts, culture, traditions, good local wisdom

Indicators

- Art, archaeological sites, culture, traditions, and good local wisdom of Nonthaburi province is preserved and last forever.
- Promote the development of sports and promote public health conditions in Nonthaburi province.

Strategy

1. Promote, develop, preserve ancient art, culture, traditions and good local wisdom
2. Promote religious support and important days

The Nonthaburi Provincial Administrative Organization's Local Development Plan (2018–2022) determines the strategic position in line with the vision of Nonthaburi Provincial Administrative Organization, and the strategic position of the provincial/provincial development plan to ensure that the development is in the same direction. As shown in Figure 15

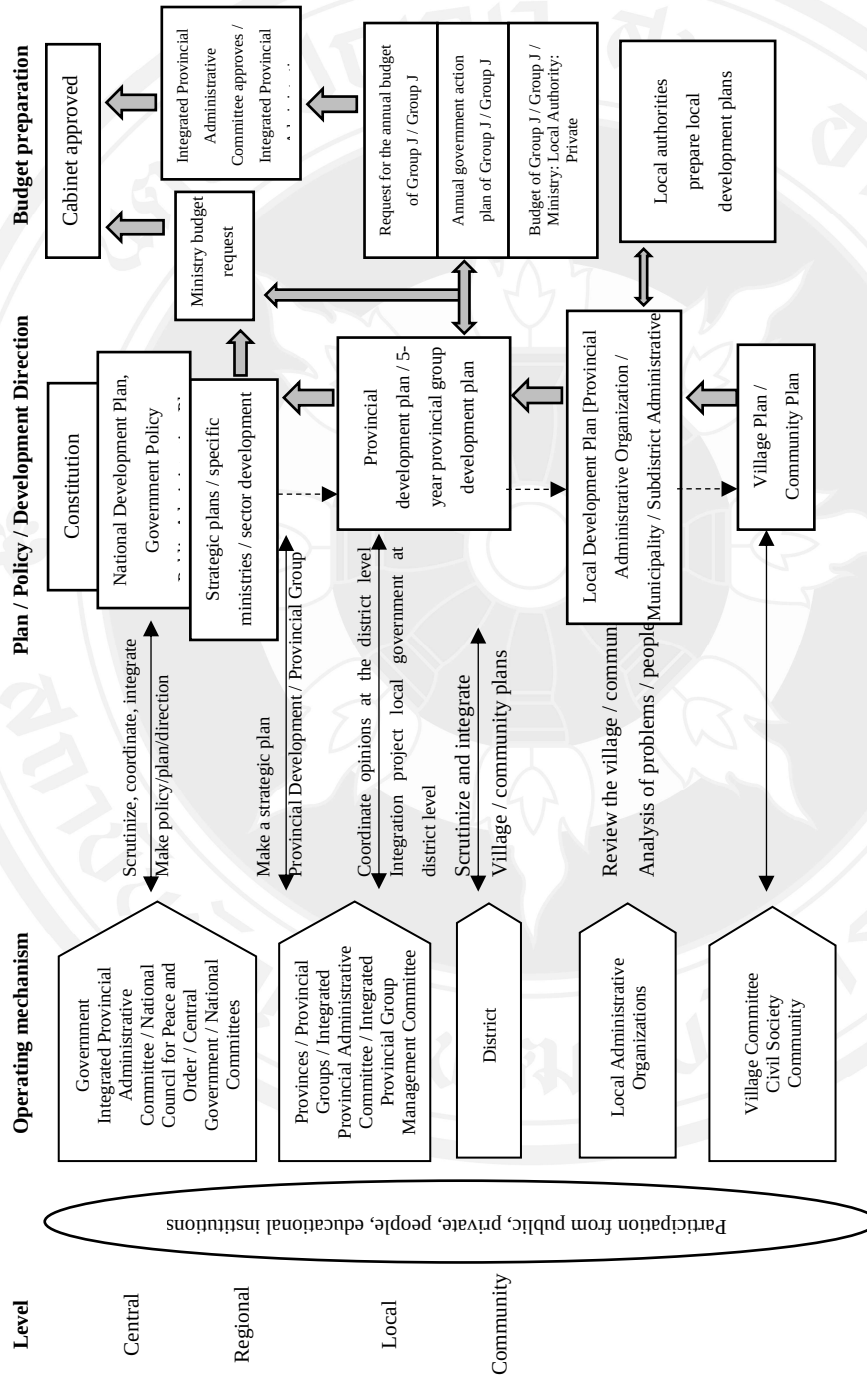


Figure B5 Linkage of National Plan Mechanisms and Processes to Area Plans

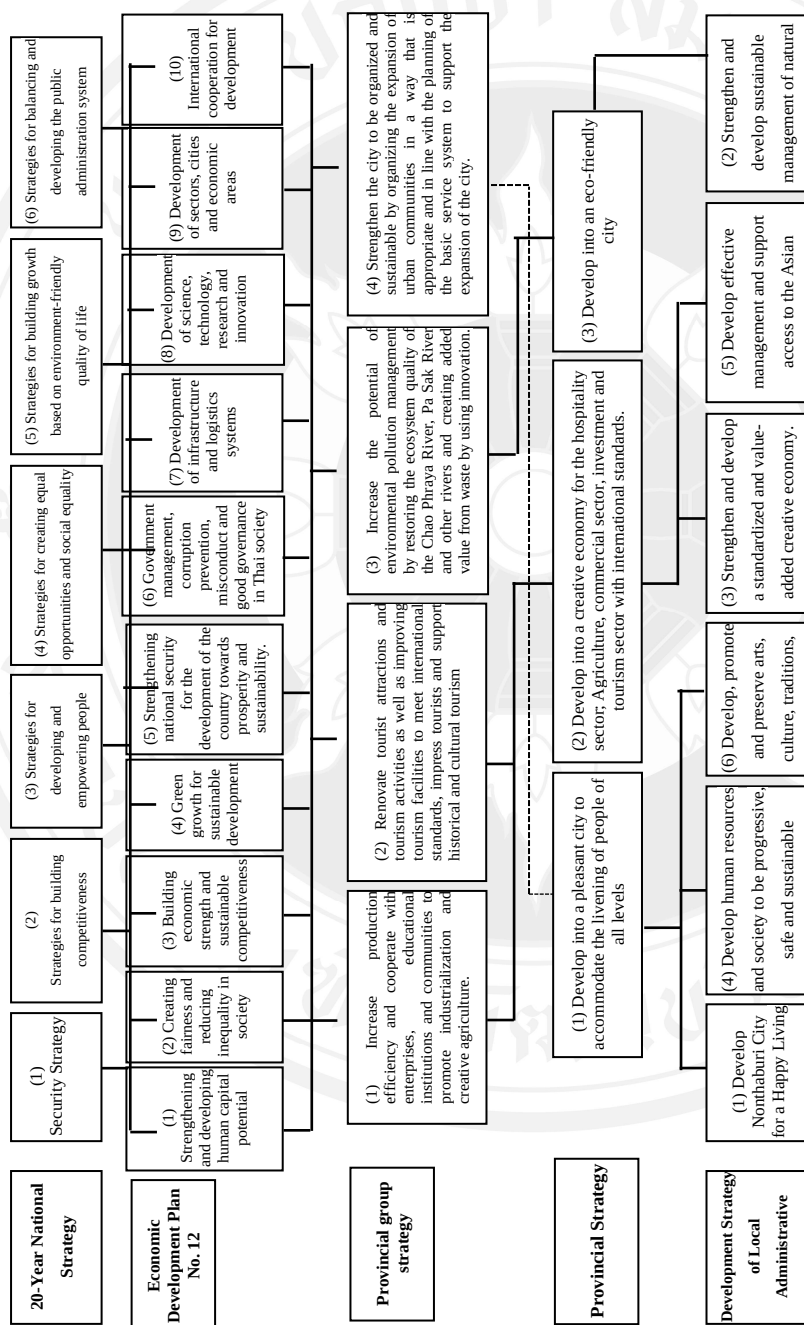


Figure B6 The structure of linkages to the local development strategic plan of the Provincial Administrative Organization Nonthaburi (2018 - 2022)

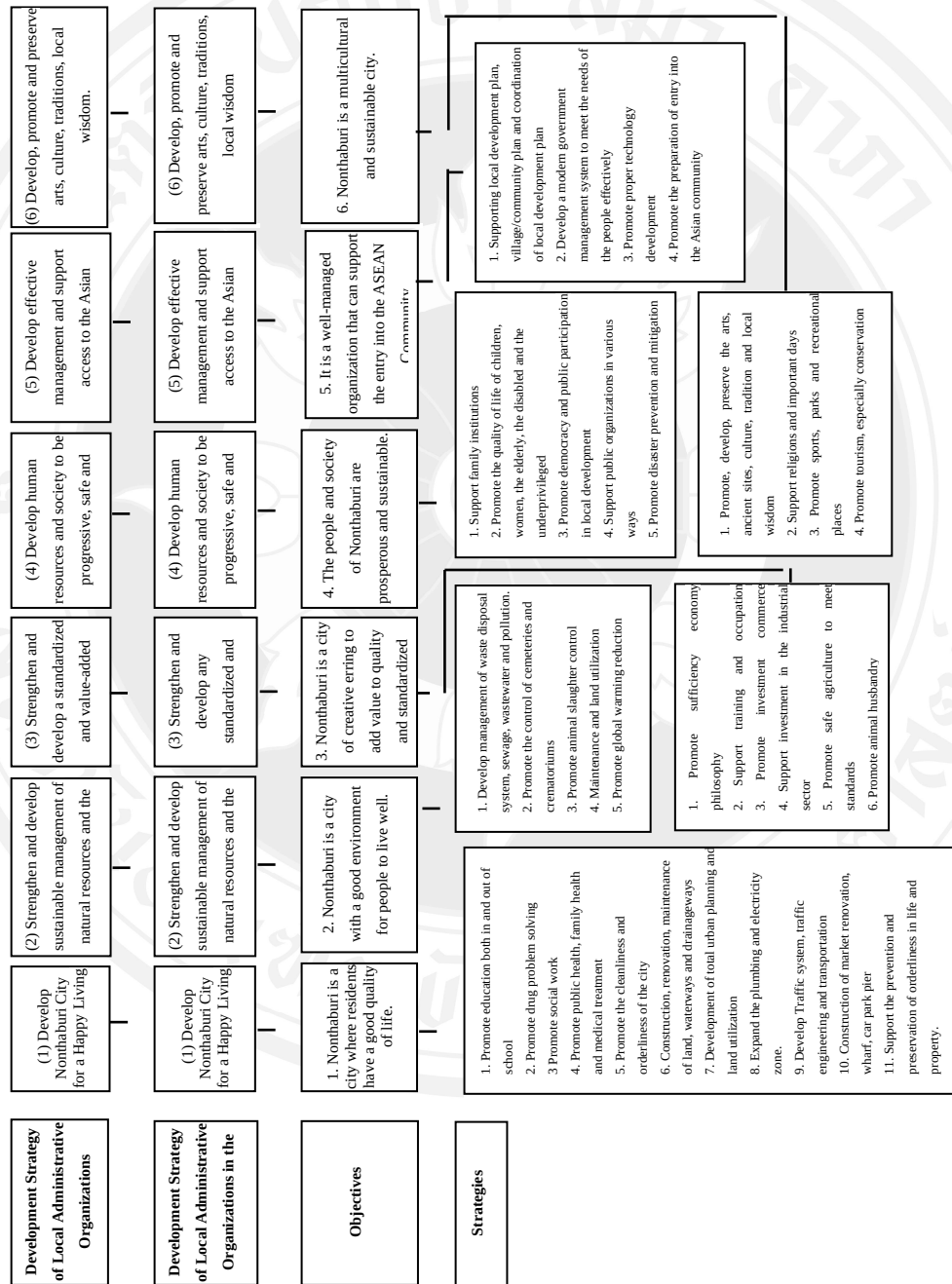


Figure B6 (Continued)

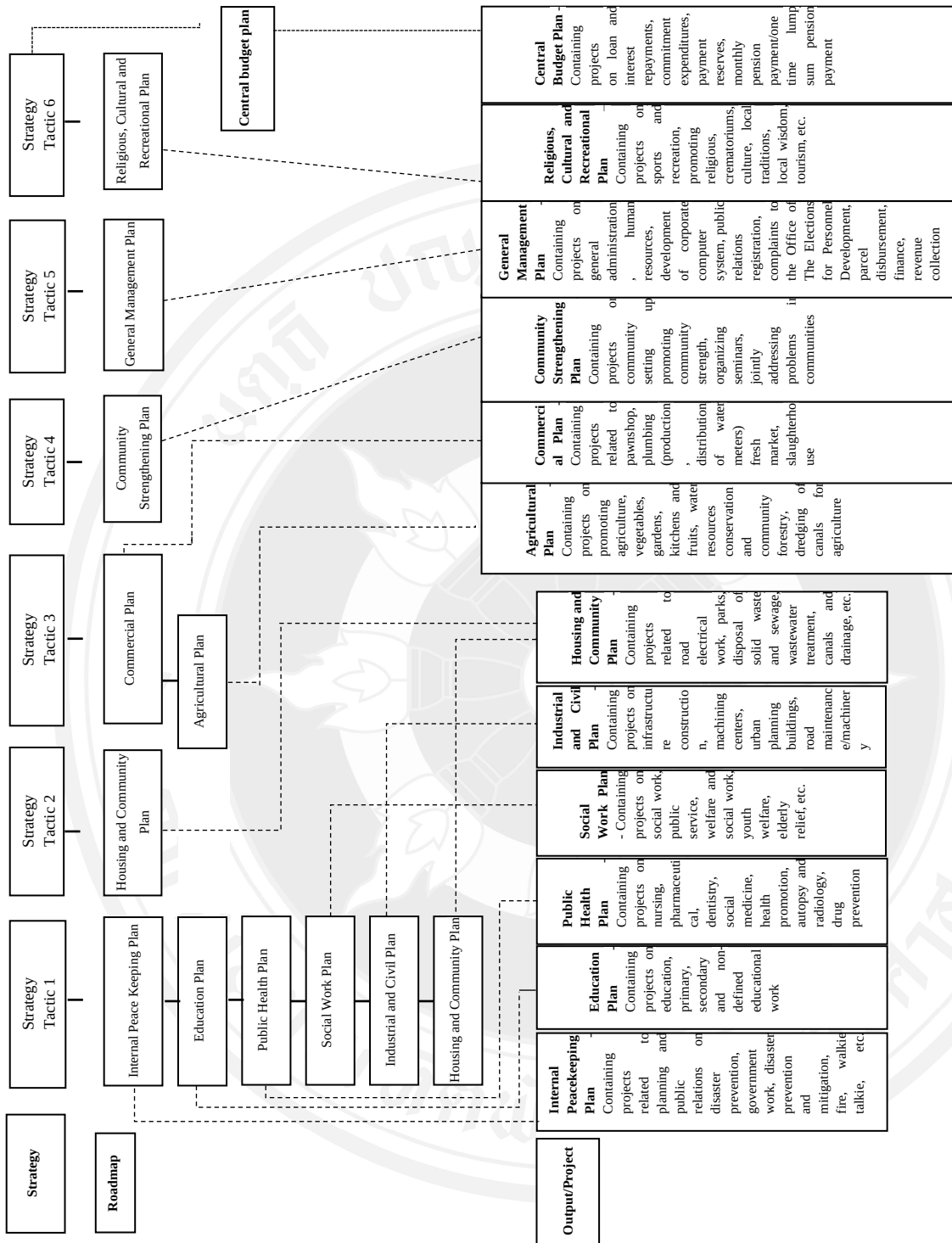


Figure B6 (Continued)

The local development project of Nonthaburi Provincial Administrative Organization (PAO) from the past until the present (2018 - 2022) has no projects related to Effectiveness of Emergency Medical Services Networks because hospitals and Ministry of Public Health never asked for help on budget or projects. However, Nonthaburi Provincial Administrative Organization (PAO) does not set a budget for projects related to emergency medical services because this is not the duty of the Nonthaburi Provincial Administrative Organization (PAO). There is no law regarding the expenditure of PAO budget on Emergency Medical Services Networks. If involved, may be checked by the Office of the Auditor General of Thailand. (President of Nonthaburi Provincial Administrative Organization)

3. General condition of Ubon Ratchathani Province

3.1 Physical

- Location

Ubon Ratchathani Province is located on the easternmost border of the northeastern region of the country, adjacent to the Lao People's Democratic Republic. The Kingdom of Cambodia is 630 kilometers from Bangkok, with an area of approximately 10.0 million rai or 15,774.00 square kilometers, accounted for 9.5 percent of the northeastern region and adjacent to territories as follows:

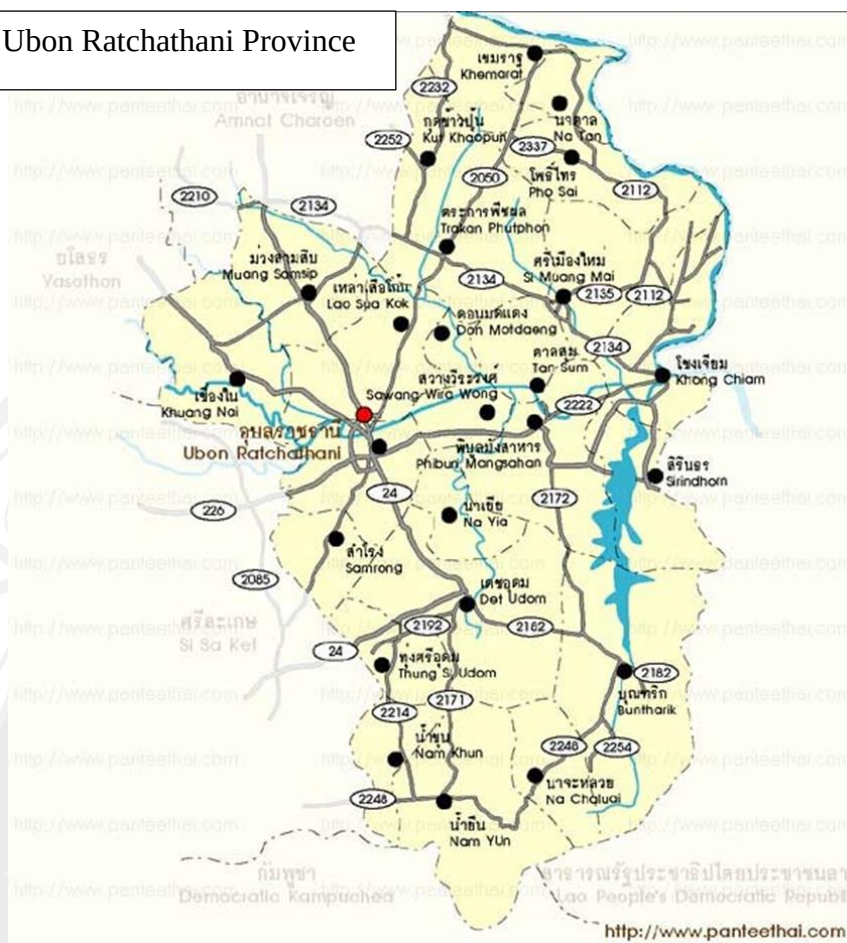
North is adjacent to Amnat Charoen Province, Yasothon Province and Lao People's Democratic Republic

South is adjacent to the Kingdom of Cambodia and Sisaket Province

East is adjacent to the Lao People's Democratic Republic

West is adjacent to Sisaket Province and Yasothon Province

Map of Ubon Ratchathani Province

**Figure B7** Map of Ubon Ratchathani Province

Source: <http://www.panteethai.com>

Terrain

Ubon Ratchathani is located in an area called the Korat basin, which is about 68 meters (227 feet) above sea level. It is generally characterized by a high, low, plateau, sloping east. The Mekong River is a barrier to Ubon Ratchathani and the Lao People's Democratic Republic. The Chi River converges with the Mun River in Mueang Ubon Ratchathani. The Mun River runs through the middle of the province from the west to the east and then into the Mekong River in Mekong Jiam district, and there are many major rivers, including Lam Se Bok, Lam Sei By, Lam Dom Yai, Lam Dom Noi. Moreover, there are several intricate mountains on the main southern border: Khao Banthat and the Phanom Dong Rak, which divides the territory between Ubon Ratchathani and the Lao People's Democratic Republic and the Democratic Republic of Cambodia.

Most Ubon Ratchathani areas consist of: Sandstone, starched sandstone, and clay stones. The amorphous nature of the mountains and hills is therefore the cut peaks and the mountains of the tops, with shoulders and ridges resembling straight, not sharp lines.

3.2 Politics/Governance

- Administrative Region

Table B10 Administrative Districts, 25 Districts in Ubon Ratchathani Province, Consisting of

District	Area (square km.)	Sub-district	Local Administrative Organization
1. Mueang Ubon Ratchathani	406.385	12	14
2. Don Mot Daeng	235.000	4	4
3. Trakan Phuet Phon	1,306.000	23	23
4. Phibun Mangsahan	939.604	14	15
5. Warin Chamrap	584.000	16	17
6. Si Mueang Mai	1,310.000	11	12
7. Na Tan	194.839	4	4
8. Buntharik	1,402.000	8	9
9. Sirindhorn	706.310	6	7
10. Kut Khaopun	320.000	5	6
11. Det Udom	1,416.000	16	19
12. Thung Si Udom	307.000	5	5
13. Muang Sam Sip	917.517	14	15
14. Khong Chiam	901.800	5	6
15. Nam Yuen	845.500	7	8
16. Khemarat	522.161	9	10
17. Na Yia	229.000	3	4
18. Lao Suea Kok	284.000	4	4
19. Pho Sai	505.150	6	7
20. Sawang Wirawong	270.000	4	4
21. Samrong	416.000	9	9
22. Na Chaluai	632.000	6	7
23. Khueang Nai	772.819	18	19
24. Tan Sum	303.000	6	7
25. Nam Khun	386.500	4	4
Total	932,712.0680	219*	239

*Including municipality sub-districts

Table B11 Local Administrative Organizations Consists of:

Local Administrative Organizations	Number (places)
1. Ubon Ratchathani Provincial Administrative Organization	1
2. Municipality	59
1) 1 Municipality (Ubon Ratchathani)	
2) 4 Municipalities (Warin Chamrap Municipality, Phibun Mangsahan Municipality, Det Udom Municipality, and Chae Ramae Municipality)	
3) 54 municipalities	
3. Sub-District Administrative Organization	179
Total	239

3.3 Population

Based on statistics from the Department of Provincial Administration in 2018 (as of December 31, 2018), Ubon Ratchathani Province. It has a total population of 1,874,548, 937,766 males and 936,782 females as follows:

Table B12 Number and Percentage of Population in Ubon Ratchathani Province classified by gender (2013 - 2018)

Year	Population (people)	Male		Female	
		Number	Percentage	Number	Percentage
2018	1,874,548	937,766	50.05	936,782	49.95
2017	1,869,633	936,052	51.5	933,581	49.9
2016	1,858,618	931,169	50.10	927,449	49.90
2015	1,857,429	930,701	50.11	926,728	49.89
2014	1,844,669	925,427	50.17	919,242	49.83
2013	1,836,523	921,576	50.18	914,947	49.82

Source: Department of Provincial Administration (Year 2013 - 2018), data as of June 21, 2019.

3.4 Public Health

Public health resources of Ubon Ratchathani Province consist of

- Information on hospitals

Table B13 Shows Details of Hospitals in Ubon Ratchathani Province in 2015

List	Number	Note
1. Ministry of Public Health		
Center Hospital, Level A (Center Hospital)	1	Sunpasitthiprasong Hospital
General Hospital		The 50 th Anniversary
- Level S	1	Mahavajiralongkorn Hospital
- Level M1	2	Warinchamrab Hospital, Detudom
Community Hospital		Hospital
- Level M 2	2	
- Level F 2	15	Trakanphuetphon Hospital, Phibun
- Level F 3	5	Mangsahan Hospital
Tambon Health Promoting Hospital	317	
Community Health Centers (CHCs)	5	
Office of the National Economic and Social Development	36	
Council (NESDB) (Located outside the hospital area)		
2. Other Ministries	2	
- Hospital	10	
- Municipal services		Fort Wchirawut Hospital, Wing
3. Disease-specific service centers	3	Hospital
- Have beds for overnight patients	4	
- No bed for overnight patients		
4. Private service establishments	4	
- Hospital	205	
- Medical Clinic	63	
- Dental Clinic	8	
- Medical Technical Clinic	6	
- Physiotherapy Clinic	262	
- Nursing and Midwifery Clinic	12	
- Thai Traditional Medicine Clinic	3	
- United Clinic	300	
- Modern Pharmacy	55	
- Pharmacy/Traditional Medicine Manufacturing	5	
5. Institute of Public Health Education	5	
6. Academic Center		

- Information on medical personnel

Table B14 Details of Medical Personnel in Ubon Ratchathani Province 2015

Profession	Number	Per capita rate
Physician	416	1: 4,465
Dentist	109	1: 17,041
Pharmacist	222	1: 8,367
Professional nurse	3,344	1: 555

3.5 5-year Provincial Development Plan (2018 - 2022)

3.5.1 Provincial Development Goals

“Modern livable city, Gateway to trade and investment, Multidimensional travel, Agriculture to the world’

Objectives

1. Develop the city planning system, infrastructure and public utilities to be modern to support the expansion from the central and the life of the people in the province to be stable, safe in all dimensions.
2. Enhance the quality of people’s life to be ready for change by developing quality education and public health standards based on equality and social equality.
3. Promote and develop the province as a center for meetings and trade and investment in the region, develop tourism based on culture and community identity, and upgrade the quality of tourism personnel
4. Promote the production and processing of agricultural products by using modern technology and innovation to generate revenue and added value
5. Stability in all dimensions both in terms of economy, trade, investment, career, etc.
6. Enhance the quality of life and environment

Indicators of success in accordance with provincial development goals

1. The province's gross domestic product increased annually by 1.5 percent, a 5-year target of 7.5 percent.

2. Percentage of per capita income (Gpp) in the area increased the target by 2.5% per year.

3. Percentage of test scores in each grade, average of all subject groups, increased by 1% per year, 55% target for 5 years.

4. Crime statistics decreased by 25% per year.

Ubon Ratchathani Provincial Administrative Organization Strategy

Vision - 'It is a mechanism for local drive for sustainable development'.

Tactics 1. - Resource Management Strategy of Provincial Administrative Organization

Strategy 1. - Create a good management system 2. Develop treasury management system 3. Develop personnel skills and potential 4. Improve the quality of public service

Tactics 2. - Local Human Resource Development Strategy

Strategy

1. Develop curriculum and teaching process
2. Develop teachers and educational personnel
3. Development of buildings, innovation media and educational technology

4. Development of educational management and management system

5. Develop people's knowledge and skills

Tactics 3. Infrastructure Development Strategy

Strategy

1. Develop a transportation and transport system according to the transfer mission.

2. Develop a communication and transport system in accordance with the powers, duties and responsibilities of the Ubon Ratchathani Provincial Administrative Organization.

3. Enhance the capacity and develop the transportation and transport system

4. Water management for sustainable development

Tactics 4. Strategy for Social Development and Quality of Life

Strategies

1. Develop and promote sports

2. Development of public health and social welfare
3. Promote democracy, equality, and human rights
4. Manage natural resources and the environment
5. Conserve, restore and disseminate the arts and culture, customs and local wisdom

Tactics 5. Investment, commerce and tourism promotion strategy

Strategy

1. Promote investment and commerce
2. Tourism management

Table B16 Summary of Local Development Issues from the Workshop to Review the Local Development Plan (B.E. 2018 - 2022) of the Ubon Ratchathani Provincial Administrative Organization

No.	Development issues	percentage
1	Construction and development of roads, transportation routes	21.13
2	Dredging and developing water sources, pool mining, overflow cap construction, moisturizing cap	15.94
3	Emergency Ambulance Support (1669)	9.06
4	Promoting occupation for the people	8.71
5	Development and promotion of tourism of the province	5.98
6	Pump support/ water delivery canal/ pipeline for agriculture to the people	5.72
7	Health check-up and prevention of contagious diseases	4.92
8	Tiller support (farm tractor/ agricultural machinery to farmers)	4.50
9	Educational Support	3.95
10	Drug problem solving	3.87
11	Supporting the production of bio-organic fertilizers in agriculture to farmers	2.63
12	Promoting jasmine rice production	2.28
13	Promoting the production and distribution of community products (Otop)	2.19
14	Sports Promotion	2.02
15	Promoting economic crops for the people	1.93
16	Establishment of the Central Market for Agricultural Crops	1.67
17	Care/ Promotion of careers for people with disabilities	1.49
18	Promoting local traditions, culture and wisdom	0.79
19	Disaster Prevention and Mitigation	0.70
20	Promoting youth council network	0.52
Total		100.00

Source: Local Development Plan (2018-2022), Ubon Ratchathani Provincial
Administrative Organization



APPENDIX C

EMERGENCY MEDICAL Act, B.E. 2551 (2008)



EMERGENCY MEDICAL ACT.

B.E. 2551 (A.D. 2008)

.....

BHUMIBOL ADULYADEJ, REX.

**Given on the 23rd Day of February B.E. 2551 (A.D. 2008);
Being the 63rd Year of the Present Reign**

His Majesty King Bhumibol Adulyadej is graciously pleased to proclaim that

Whereas it is expedient to have an emergency medical law

This Act contains certain provisions concerning the restriction of rights and freedom of individuals, in respect of which Section 29 in conjunction with Section 41 and Section 43 of the Constitution of the Kingdom of Thailand so permit by virtue of the provision of law.

Be it, therefore, enacted by the King, by and with the advice and consent of the National Legislative Assembly, as follows:

Section 1. This Act is called the “Emergency Medical Act, B.E. 2551”.

Section 2. This Act shall come into force as from the day following the date of its publication in the Government Gazette.

Section 3. In this Act,

“Emergency Medical..” means any emergency operation, study, training, research and analysis in respect of the evaluation, management, treatment of emergency patients and prevention of emergency sickness;

“Emergency Patients” means an injured person or a person suffering acute sickness which threatens his/her being or the functioning of vital organs requiring prompt evaluation, management and treatment to prevent the loss of life or worsening of the injury or sickness;

“Hospitals” means Government hospitals, the Thai Red Cross hospitals, hospitals according to the Laws on Hospitals and other hospitals as prescribed by the Minister.

“Government Hospitals” means and includes hospitals under government control.

“Emergency Operations” means medical emergency operations starting from the perception of the emergency sickness up to treatment and recovery of emergency patients including the evaluation, management, coordination, control, supervision, communication, supply or transportation, diagnosis and treatment of emergency patients both inside and outside the hospitals.

“Operational units” means units or organizations operating emergency operations.

“Operators” means the persons who perform work relating to emergency medical services as prescribed by the Emergency Medical Services Board;

“Institute” means the National Institute for Emergency Medicine;

“Fund” means the Emergency Medical Fund;

“Member” means the member of the Emergency Medical Board;

“Secretary-General” means the Secretary-General of the National Institute for Emergency Medicine;

“Officer” means officers of the National Institute for Emergency Medicine;

“Employee” means employees of the National Institute for Emergency Medicine;

“Minister” means the Minister having charge and control of the execution of this Act.

Section 4. The Minister of Public Health shall have charge and control of the execution of this Act and shall have the power to issue announcements for the execution of this Act.

Such announcements shall come into force and effect after its publication in the Government Gazette.

CHAPTER 1

The Emergency Medical Board

.....

Section 5. There shall be an Emergency Medical Board, consisting of:

- (1) the Minister of Public Health as Chairperson;
- (2) four ex officio members, namely the Permanent Secretary of Ministry of Finance, the Permanent Secretary of Ministry of Public Health, the Secretary-General of the Social Security Office and the Secretary-General of the National Health Security Office;
- (3) two members as representatives of the Medical Council; at least one must be a specialist in emergency medicine;
- (4) one member as representative of the Nursing and Midwifery Council;
- (5) two members as representatives of the hospitals, being elected among themselves, one from governmental hospital and one from private hospital;
- (6) two members as representatives of local government, being elected among themselves;
- (7) two members as representatives of the non-profit private organization with a role on pre-hospital emergency medical services ,being elected among themselves;
- (8) not exceeding four qualified members appointed by the Minister from experts having proven experience and expertise in finance, and accounting, law, emergency medical services and in other fields of interest.

The Secretary-General shall be a member and secretary of the Board and shall appoint not more than two officers as assistant secretaries.

Section 6. Appointment of the members under Section 5 (5) (6) (7) and (8) shall be in accordance with the principles and methods as prescribed by the Minister.

Section 7. The members under Section 5 (5) (6) (7) and (8) shall possess the following qualifications and shall not possess the following prohibitions:-

- (1) being a Thai national;
- (2) not being under thirty-five or over seventy years of age;
- (3) not having been sentenced by a final judgment of the Court to imprisonment, except for an offence committed through negligence or a petty offense.

Section 8. The members under Section 5 (5) (6) (7) and (8) shall hold office for a term of three years, and may be re-appointed, but not for more than two consecutive terms.

At the end of the term of office according to the preceding paragraph, if a new member under Section 5 (5) (6) (7) and (8) has not been appointed the member who vacates the term shall continue performing his duty until a new member shall have been appointed.

In the case where a member is due to vacate the term by rotation, a new member of the same category shall be appointed at least ninety days before the vacancy occurs.

In the case where a member under paragraph one vacates the term before the expiration, a new member of the same category shall be appointed to replace him/her within ninety days from the date the term becomes vacant and such person shall remain in term for the unexpired term of the member he/she replaces.

In the case where the remaining term of office of a member under paragraph one who vacates the term, before the end of the term, is less than ninety days, an appointment of a member to fill such vacancy may not be necessary. In this case, the Board shall consist of the remaining members

Section 9. In addition to vacating office at the end of the term of office, the members under 5 (5) (6) (7) and (8) vacates office upon:

- (1) death;
- (2) resignation;
- (3) being disqualified or being under any of the prohibitions under Section 7;
- (4) being incompetent or quasi-incompetent;

- (5) being removed from office by the resolution of the Board by no less than two-thirds of the votes of existing members due to negligence in the discharge of duty, misconduct or incompetence.

Section 10. At a meeting of the Board, the presence of not less than one-half of the total number of the members shall constitute a quorum.

In the case where the Chairperson is not present at the meeting or is unable to perform his/her duty, the Board shall elect one among themselves to preside over at the meeting.

In the case where the Chairperson or any member has an interest, whether direct or indirect, in respect of the matter to be considered by the Board, the Chairperson or the member concerned shall notify the meeting. The meeting shall determine whether or not it shall be appropriate for the Chairperson or the member concerned to remain in the meeting or shall have the right to vote on such matter in accordance with regulations set by the Board.

The decision shall be made by a majority of votes. Each member shall have one vote. In case of an equality of votes the person who presides at the meeting shall have an additional vote as a casting vote.

Section 11. The Board shall have the following powers and duties :

- (1) to lay down standards and measures in respect of emergency medical systems;
- (2) to make recommendations to the Cabinet in respect of emergency medical policies;
- (3) to propose solutions to problems or obstacles in respect of emergency medical operations for consideration of the Cabinet;
- (4) to lay down management policies and approve the Institute's operations/action and financial plans;
- (5) to supervise the operations and general management; to establish or dissolve branch offices as well as to issue rules, regulations or announcements in respect of administration, human resources, budgetary, finance and assets; to monitor and evaluate results and other operations of the Institute;
- (6) to issue rules governing the certification of organizations and educational or training curriculum and the issuance of the certificates or academic pins to the graduates except where there already exist specific laws on medical and public health, then such laws shall apply.

- (7) to issue rules in the conferring of honorary pins to supporters of emergency medical activities;
- (8) to provide communications and information technology systems for the benefit of coordination and emergency medical operation;
- (9) to bring about coordination/collaboration among relevant work agencies to have access to information for the benefit of emergency medical operation;
- (10) to issue regulations regarding receipt of payment, payment and maintenance of the Fund and procuring benefits in accordance with Section 36;
- (11) to approve emergency medical fees and operation of the Institute;
- (12) to recruit, appoint, evaluate and remove the Secretary-General;
- (13) to perform other duties as prescribed in this Act, other laws or as entrusted by the Cabinet or the Prime Minister.

Section 12. The Board shall have the power to appoint sub-committees or advisors/consultants to perform their duties according to this Act or as assigned by the Board.

Section 10 shall apply to sub-committee meetings *mutatis mutandis*.

Section 13. The Chairperson of the Board, Board members, Chairperson of the sub-committees, or sub-committee members, shall receive fringe benefits as prescribed by the Cabinet.

CHAPTER 2

The National Institute for Emergency Medicine

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Section 14. There shall be established a National Institute for Emergency Medicine as an autonomous government agency which is non-official by virtue of the State Administration Law or which is not a state enterprise by virtue of the budgetary or other laws.

The Institute shall have a status of a juristic entity and under the supervision of the Minister.

Activities of the Institute shall not be subject to the Labor Protection Law, Labor Relations Law, Social Security Law and Laws on Severance Payments. However, benefits to officers and employees of the Institute shall not be less than the rate prescribed by such Laws.

Section 15. The Institute shall have the following powers and duties:

- (1) to draw up a master plan in emergency medical respect for presentation to the Board;
- (2) to set standards and guidelines in emergency medical respect for presentation to the Board as well as to set the criteria and emergency operations according to standards and guidelines prescribed by the Board;
- (3) to draw up emergency medical operation systems including management and communication and information technology systems development for the benefit of emergency operations;
- (4) to study, research, analyze, develop and disseminate emergency medical knowledges;
- (5) to arrange for education and training for emergency medical operators;
- (6) to coordinate, monitor and evaluate the result of emergency operations;
- (7) to act as the coordination centre for public and private agencies locally and abroad operating the emergency medical respects
- (8) to charge emergency medical fees and the operation of the Institute;
- (9) to be responsible for the administrative work of the Board or to perform other acts and things prescribed in this Act or other laws or as assigned by the Board.

Section 16. Income of the Institute comprises:

- (1) general subsidies provided by the government as appropriate;
- (2) money or property from donation;
- (3) money or other property vested in the Institute;
- (4) income from emergency medical services and operation of the Institute;
- (5) fruit of money or property described in(1) (2) (3) and (4).

Money and property or asset of the Institute shall not be required to be remitted to the Ministry of Finance to become income of the State by virtue of the Laws on Land Revenue and Budgetary Procedures.

Section 17. Property of the Institute shall not be liable to legal enforcement and no one shall raise prescription period as a defense against the Institute in the matter concerning the property of the Institute.

Property donated to or acquired by means of purchasing or exchanging out of the Institute's income shall be owned by the Institute except for the immovable property acquired by means of income according to Section 16 (1) which shall become the property of the Treasury Department but under the Institute's management, supervision, maintenance and use.

The Institute shall have the power in the management, supervision, maintenance, use and acquiring benefits from the property of the Institute.

Section 18. Maintenance and expenses of the Institute shall be according to the regulations prescribed by the Board and shall be subject to an internal audit in respect of finance and accounts and procurement shall be reported to the Board at least once a year.

The Institute shall prepare a financial statement which shall at least consist of a balance sheet and accounts to be sent to the auditors within 120 days after the end of the fiscal year on a yearly basis.

The Office of The Auditor General or an external auditor appointed by the Board with the consent of the Office of The Auditor General, shall carry out the audit and evaluate the Institute's expenses and properties and give an opinion if such expenses have been made in compliance with the objectives, cost-saving and the how much of the set target has been achieved and report to the Board.

Within 180 days after the end of the accounting year, the Institute shall present an annual report to the Board and the Minister showing the audited financial statement and accounts and auditor's report as well as the Institute's operation for the preceding year.

Section 19. The Institute shall have one Secretary-General who shall be responsible for its management and report directly to the Board, with the duties of looking after the overall work of the Institute as well as acting as the supervisor in charge of the officers and employees.

The Board shall appoint and remove the Secretary-General.

Rules and criteria for appointment of the Secretary-General shall be as prescribed by the Board.

Section 20. The Secretary-General shall possess the following qualifications and without the following prohibitions:-

- (1) being a Thai national;
- (2) not under thirty-five years and no more than sixty years of age;
- (3) being able to work for the Institute full time;
- (4) not being insane or mentally deranged;
- (5) not being bankrupt or have been bankrupt as a consequence of dishonesty;
- (6) not having been sentenced by the final judgment of the Court for properties to be vested in the States a consequence of being unusually wealthy or because of an unusual or abnormal increase in properties;
- (7) not having been sentenced by the final judgment of the Court to a term of imprisonment, except for an offence committed through negligence or a petty offence;
- (8) not being a person holding an administrative position or officer of State enterprise;
- (9) not being a civil servant, officer or employee holding a permanent position or salary of the central government, regional government or local authority or other State agencies;
- (10) not being a person holding political position, member of Parliament, senator, members of local assemblies or local administrators;
- (11) not having been discharged or dismissed from government agencies, State enterprises or public companies as a consequence of dishonesty to duty;
- (12) possessing the qualities or without other prohibitions as prescribed by the Board.

Section 21. The Secretary-General holds office for a term of four years, can be re-appointed but not for more than two consecutive terms.

In the case of vacancy and a new Secretary-General has not been appointed, the Board shall appoint one Board member or an officer of the Institute to take care of the position.

In the case where the Secretary-General is not able to perform his/her duty, the Deputy Secretary-General assigned by the Board shall take care of the position. In the case where there is no Deputy Secretary-General, or where the Deputy Secretary-General is not able to perform his/her duty, the Board shall appoint one employee of the Institute to take care of the position.

Section 22. The Secretary-General shall vacate office upon:

- (1) death;
- (2) resignation;

- (3) lacking the qualifications or possessing prohibited characteristics according to Section 20;
- (4) being removed from office by the Board as a consequence of negligence to duty, misconduct or incompetence;

Board resolution to remove the Secretary-General according to (4) shall consist of at least two-thirds of the votes of the existing members, excluding the Secretary-General

Section 23. Salary and benefits of the Secretary-General shall be determined by the Board according to the guideline set by the Cabinet.

Section 24. The Secretary-General shall have the following powers and duties :

- (1) to manage the business of the Institute in compliance with the laws, rules, regulations, announcements, resolutions or policies of the Board;
- (2) to draw up operation/action and financial plans of the Institute for Board approval;
- (3) to manage personnel, finance, budget and other administrative work of the Institute in accordance with rules, regulations or announcements of the Board;
- (4) to issue regulations concerning the operation of the Institute which are not contrary to laws, rules, regulations, announcements, resolutions or policies of the Board;
- (5) to perform other duties assigned by the Board.

Section 25. The Secretary-General shall be the representative of the Institute in dealing with outside parties. The Secretary-General may assign any person to perform any duty on his/her behalf according to regulations prescribed by the Board.

Juristic acts committed in violation of Board regulations shall not be binding upon the Institute unless ratified by the Board.

Section 26. For the benefit of the operation of the Institute, the Minister may request government officers being civil servants, officers or other workers at ministries, departments, regional government, local government, State enterprises or other governmental agencies to perform work as officers or employees of the Institute on a temporary basis, at the consent of the authority or employer of such person, as the case may.

Any government officers consented to perform work as officers or employees of the Institute according to preceding paragraph shall be deemed to have been consented to leave the governmental services and the period of work at the Institute shall be included in the computation of pension or other benefits in the same manner as if they were still with the government services full time, as the case may be.

Section 27. In the case where government officers under Section 26 return or resume their work within the approved period of time, such persons shall have the right to be installed and appointed to maintain the positions and to earn the salaries in accordance with the agreement made at the time of approval according to Section 26.

CHAPTER 3

Emergency Medical Operations

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Section 28. To protect the safety of emergency patients, the operational units, hospitals and operators shall ensure the following principles:

- (1) treat and prioritize patients according to their severity;
- (2) emergency patients shall receive the fullest treatment according to the ability of the operational units or hospitals before referral, except with a doctor consent that the referral will help prevent death or severity;
- (3) emergency operations on the emergency patients shall be based on necessity and medical indication without the concern of insurance, registered health facilities, payment ability of the emergency patients or any other conditions as a cause to delay timely treatment;

The operational units or hospitals must control and supervise the operators to adhere to and follow the above practices.

Section 29. For the benefit of emergency operations under Section 28, the Board shall have the powers and authorities to prescribe the following:

- (1) types, authority levels, powers and duties, limitations, responsibilities or restrictions of the operators, operational units and hospitals;
- (2) principles and conditions in connection with the performance of duty of the operators, operational units and hospitals;
- (3) emergency operation standards;
- (4) rules and procedures for the coordination and reporting of the operational units and hospitals including the readiness of personnel, vehicles, locations and equipments as well as the picking up emergency patients;

In the case of operational units operating according to the principles, conditions and standards set by the Board shall be approved or may be eligible for financial support from the Fund.

In the case of operational units failing to operate according to the principles, conditions and standards set by the Board shall not be approved or shall be subject to limitations on their rights or responsibilities or may also have their financial support discontinued.

In the case of hospitals failing to operate according to the principles, conditions and standards set by the Board, the Board shall notify their supervisory units to order them to take remedial action being a condition required in the operation of hospitals.

Section 30. The Board shall supervise and monitor the operators, operational units and hospitals to ensure compliance with the prescribed principles, conditions and standards.

Supervision and monitoring of the operation of the operators shall be according to Board announcement, except in the case of operators practicing medicines and public health which shall be according to the relevant laws.

Section 31. In the case where the operators, operational units or hospitals do not comply with the prescribed principles, conditions and standards, the Board shall conduct investigations according to Section 32.

In so doing, the Board shall have the power to call upon individuals to explain themselves or to notify individuals to submit documents or evidences relevant to such investigation.

Section 32. In the case the result/outcome of investigations under Section 31 shows the failure of the operators, operational units or hospitals to comply with the prescribed principles, conditions and standards, the Board shall proceed with one of the following:

- (1) notify the operator, operational unit or hospital concerned in writing to take remedial action;
- (2) notify the authority in control of the operational unit to take action;
- (3) notify the authority to take disciplinary action against the operator of State hospitals or government agencies;
- (4) notify the authority to take ethical punishment against the operator who practices medicine and public health.

CHAPTER 4

Emergency Medical Fund

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Section 33. There shall be established a fund called the “Emergency Medical Fund”, the objective of which is to support the operation of the emergency medical services and to reimburse or compensate the operators, operational units or hospitals, taking into account operations in the geographical areas where there are insufficient operators, operational units or hospitals.

To promote the readiness, suitability and the need of the people the Board shall support and coordinate with the local administrative authority to determine the principles for

such authority to operate and manage the emergency medical services at the community level with may receive a subsidy from the Fund.

Section 34. The Fund consists of:

- (1) subsidy from the Government allocated from the annual budget;
- (2) money or property from donation;
- (3) money or property derived from the operation of the Institute;
- (4) fine/penalty according to this Act;
- (5) money from government agencies or other funds with the objective of or related to the management of public health or medicine;
- (6) additional money prescribed by law;
- (7) fruit from benefits derived from money or property described in (1) (2) (3) (4) (5) and (6).

Section 35. For the benefit of the management of the Fund under Section 34 (5) the Board may enter into an agreement with government agencies or other funds having the objective of or relating to management in the field of public health or medicine to provide financial support to the Fund by taking into account the rate of operation according to the powers and duties of the Institute and the reduction in the burden of operation of the government agencies or such funds. If operating problems are encountered the Board may submit the matter for consideration of the Cabinet.

Cash payment of government agencies or other funds to the Fund according to the preceding paragraph shall be deemed to be cash payment which could be made according to the powers and duties of the government agencies or other funds according to the relevant laws.

Section 36. Cash and assets under Section 34 shall belong to the Institute to be used in accordance with its objectives.

Receiving of payment, payment and maintenance of the Fund as well as the management of the Fund shall be according to regulations as prescribed by the Board.

Section 18 shall apply mutatis mutandis with the preparation of accounts, audits and evaluation of expenses and assets of the Fund.

CHAPTER 5

Punishment

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Section 37. Whoever violates the announcements of the Board prescribed under Section 29 (1) shall be fined not exceeding the amount of one hundred thousand Baht.

Section 38. Whoever uses the communication and information technology systems provided for the emergency operation in a manner that may cause damages to the operation shall be fined not exceeding the amount of five thousand Baht.

Section 39. In determining the punishment under Sections 37 and 38, the Board shall take into consideration the severity of the behavior, damages caused according to the principles, methods and rates prescribed by the Board.

Section 40. Whoever uses the Honorary Pins without the right to do so shall be fined not exceeding the amount of fifty thousand Baht.

CHAPTER 6

Transitory Provision

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Section 41. The powers and duties, businesses, assets, rights, debts/obligations and budget of the Office of the Permanent Secretary, Ministry of Public Health, specifically pertaining to the part concerning the Office of Emergency Medical Services System shall be transferred to the Institute on the date this Act comes into force and effect.

Section 42. At the initial period, the Ministry of Public Health shall proceed to establish the Board within one hundred and twenty days from the date this Act comes into force and effect.

During the period that the Board is not as yet established according to this Act, the Board shall consist the Minister of Public Health, Permanent Secretary of the Ministry of Finance, Permanent Secretary of the Ministry of Public Health, Secretary-General of National Health Security Office, Secretary-General of Social Security Office and Acting Secretary-General of the Institute under Section 43.

Section 43. The Director of Office of Emergency Medical Services System on the date this Act comes into force and effect shall perform the duties of the Secretary-General of Institute until the appointment of the Secretary-General according to this Act, but shall not exceed one hundred and twenty days from the date this Act comes into force and effect.

Section 44. Civil servants or government employees wishing to work as officers or employees of the Institute shall submit their intention in writing to the Secretary-General and shall be required to the screening and evaluation according to principles and criteria prescribed by the Board within two years from the date this Act comes into force and effect.

Section 45. Civil servants or employees working as officers of the Institute under Section 44 shall be deemed to have resigned from government services because the government has cancelled their positions and they have already received the pension according to the law as the case may be.

Employees working as officers of the Institute under Section 44 shall be deemed to have left governmental services because the government has cancelled their positions or employment without fault and they have received the pension according to the Ministry of Finance Regulations.

For the benefit of counting the working period for the purpose of computing the rights and benefits according to regulations of the governmental institutes or governmental employees who have changed their standing under Section 44 wishing to calculate their official working period or the time during which they were civil servants or employees consecutively with the working hours of the officers or employees of the Institute, as the case may be, shall have the right to do so by showing their intention not to receive the pension.

The request not to receive the pension according to the third paragraph must be made within sixty days from the date of change of standing in the case of the civil servants according to the Law on Civil Servants pension or the Law on Civil Servants Pension Fund, as the case may. For the case of the employees to make a letter and sign the name as evidence and submit to the Secretary-General for further forwarding to the Ministry of Finance.

APPENDIX D

ANNOUNVEMENT OF THE NATIONAL INSTITUTE OF EMERGENCY MEDICINE

Re: Criteria for Assessment to Sort Out Emergency Levels and Emergency Standards B.E. 2554 (2011)

หน้า ๓๒

เล่ม ๑๒๘ ตอนพิเศษ ๑๓๑ ง

ราชกิจจานุเบกษา

๔ พฤศจิกายน ๒๕๕๔

ประกาศคณะกรรมการการแพทย์ฉุกเฉิน เรื่อง หลักเกณฑ์การประเมินเพื่อคัดแยกระดับความฉุกเฉิน และมาตรฐานการปฏิบัติการฉุกเฉิน พ.ศ. ๒๕๕๔

โดยที่เป็นการสมควรกำหนดหลักเกณฑ์การประเมินเพื่อคัดแยกระดับความฉุกเฉิน และมาตรฐานการปฏิบัติการฉุกเฉิน เพื่อให้หน่วยปฏิบัติการ สถานพยาบาล และผู้ปฏิบัติการ ดำเนินการปฏิบัติการฉุกเฉิน ในการให้ความปลอดภัยของผู้ป่วยฉุกเฉิน

อาศัยอำนาจตามความในมาตรา ๑๑ (๑) และมาตรา ๒๙ แห่งพระราชบัญญัติการแพทย์ฉุกเฉิน พ.ศ. ๒๕๕๑ ประกอบกับประกาศคณะกรรมการการแพทย์ฉุกเฉิน เรื่อง การลงนามในประกาศ ข้อบังคับ ระเบียบ หรือคำสั่ง ลงวันที่ ๒๕ สิงหาคม พ.ศ. ๒๕๕๒ คณะกรรมการการแพทย์ฉุกเฉินได้มีมติในการประชุมครั้งที่ ๗/๒๕๕๔ เมื่อวันที่ ๒๖ เมษายน ๒๕๕๔ ให้ออกประกาศไว้ ดังต่อไปนี้

ข้อ ๑ ประกาศนี้เรียกว่า “ประกาศคณะกรรมการการแพทย์ฉุกเฉิน เรื่อง หลักเกณฑ์การประเมินเพื่อคัดแยกระดับความฉุกเฉินและมาตรฐานการปฏิบัติการฉุกเฉิน พ.ศ. ๒๕๕๔”

ข้อ ๒ ประกาศนี้ให้ใช้บังคับตั้งแต่วันถัดจากวันประกาศในราชกิจจานุเบกษาเป็นต้นไป

ข้อ ๓ ในประกาศนี้

“ปฐมพยาบาล” หมายความว่า การปฏิบัติการฉุกเฉินที่เริ่มต้นกระทำเพื่อรักษาชีวิต หรือช่วยเหลือผู้ป่วยฉุกเฉินขณะรอคอยปฏิบัติการแพทย์จากผู้ประกอบวิชาชีพหรือผู้ช่วยเวชกรรม ซึ่งต้องไม่มีการทำหัตถการในร่างกายเว้นแต่การให้ยาสามัญประจำบ้านหรือยาของผู้ป่วยตามที่แพทย์สั่งไว้ และหมายรวมถึงการแจ้งการเจ็บป่วยฉุกเฉิน การปฏิบัติการฉุกเฉินที่กระทำตามคำแนะนำของแพทย์ หรือผู้ช่วยเวชกรรม และการช่วยบุคลากรสาธารณสุขที่ปฏิบัติการฉุกเฉิน ณ ที่เกิดเหตุและขณะเคลื่อนย้ายผู้ป่วยฉุกเฉิน รวมทั้งการกระทำอื่นใดที่ กพฉ. กำหนดเพิ่มเติมให้เป็นการปฐมพยาบาล

“ปฏิบัติการแพทย์” หมายความว่า การปฏิบัติการฉุกเฉินที่กระทำโดยตรงต่อผู้ป่วยฉุกเฉิน เกี่ยวกับการประเมิน การดูแล การเคลื่อนย้ายหรือลำเลียง การนำส่งต่อ การตรวจวินิจฉัย และการบำบัดรักษาพยาบาล รวมถึงการเจาะหรือผ่าตัด การใช้อุปกรณ์หรือเครื่องมือแพทย์ การให้หรือบริหารยาหรือสารอื่น หรือการสอดใส่วัตถุใด ๆ เข้าไปในร่างกายผู้ป่วยฉุกเฉิน และให้หมายรวมถึงการรับแจ้งและรายงานให้ผู้ปฏิบัติการอื่นกระทำโดยตรงต่อผู้ป่วยฉุกเฉิน รวมทั้งการปฏิบัติการฉุกเฉินที่ต้องกระทำตามคำสั่งการแพทย์ด้วย แต่ไม่รวมถึงการกระทำใดอันเป็นการปฐมพยาบาล

“ปฏิบัติการแพทย์ขั้นพื้นฐาน” หมายความว่า ปฏิบัติการแพทย์ด้วยการใช้อุปกรณ์ หรือเครื่องมือแพทย์และการบริหารยาพื้นฐาน โดยไม่ทำหัตถการในร่างกาย รวมทั้งการกระทำอื่นใดที่ กพฉ. กำหนดเพิ่มเติมให้เป็นการปฏิบัติการแพทย์ขั้นพื้นฐาน

“ปฏิบัติการแพทย์ขั้นสูง” หมายความว่า ปฏิบัติการแพทย์ซึ่งต้องมีการบริหารยา การใช้ อุปกรณ์การแพทย์ฉุกเฉินที่ซับซ้อน และการทำหัตถการในร่างกายซึ่งเป็นประโยชน์ยิ่งกว่าในการป้องกันการเสียชีวิตหรือการรุนแรงขึ้นของการเจ็บป่วยของผู้ป่วยฉุกเฉินได้ แต่หากมีการกระทำอย่างไม่ถูกต้อง หรือไม่เหมาะสมก็อาจก่ออันตรายต่อผู้ป่วยฉุกเฉินได้ยิ่งกว่าด้วย

“การบำบัดเจาะจง” หมายความว่า การบำบัดรักษาอันเป็นที่ยอมรับโดยทั่วไปของวิชาชีพ เวชกรรมว่าเป็นวิธีการเจาะจงที่ทำให้ผู้ป่วยฉุกเฉินหายหรือพ้นจากภาวะผิดปกติภาวะใดภาวะหนึ่ง หรือโรคใดโรคหนึ่งโดยเฉพาะตามหลักวิชาการของวิชาชีพเวชกรรม

“ปฏิบัติการอำนวยการ” หมายความว่า การปฏิบัติการฉุกเฉินที่ไม่ได้กระทำโดยตรงต่อผู้ป่วยฉุกเฉิน ประกอบด้วยการจัดการ การประสานงาน การควบคุมดูแล และการติดต่อสื่อสาร อันมีความจำเป็นเพื่อให้ผู้ป่วยฉุกเฉินได้รับการปฏิบัติการแพทย์ที่ถูกต้อง สมบูรณ์ และทันทั่วถึง

“คำแนะนำ” หมายความว่า คำชี้แจงให้เข้าใจและให้ทำตามเป็นลำดับขั้นตอนเพื่อผู้แจ้ง การเจ็บป่วยฉุกเฉินหรือบุคคลอื่นใดอาจปฏิบัติการฉุกเฉินตามได้

“คำสั่งการแพทย์” หมายความว่า คำชี้แจงให้เข้าใจและสั่งให้ทำตามเป็นลำดับขั้นตอน เพื่อให้ผู้ช่วยเวชกรรมปฏิบัติการแพทย์ตาม

“บริการสาธารณสุข” หมายความว่า บริการสาธารณสุขตามกฎหมายว่าด้วยสุขภาพแห่งชาติ

“บุคลากรสาธารณสุข” หมายความว่า ผู้ปฏิบัติการซึ่งเป็นบุคลากรด้านสาธารณสุข ตามกฎหมายว่าด้วยสุขภาพแห่งชาติ

“ผู้ประกอบการวิชาชีพ” หมายความว่า ผู้ปฏิบัติการซึ่งเป็นผู้ประกอบวิชาชีพตามกฎหมายว่าด้วยสถานพยาบาล ซึ่งปฏิบัติการแพทย์ตามอำนาจหน้าที่ ขอบเขต ความรับผิดชอบ และข้อจำกัด ตามกฎหมายว่าด้วยวิชาชีพนั้น

“ผู้ช่วยเวชกรรม” หมายความว่า ผู้ปฏิบัติการที่ได้รับมอบหมายให้ทำปฏิบัติการแพทย์โดยที่ไม่ได้เป็นผู้ประกอบวิชาชีพ หรือเป็นผู้ประกอบวิชาชีพซึ่งทำปฏิบัติการแพทย์นอกเหนืออำนาจหน้าที่ ขอบเขต ความรับผิดชอบ และข้อจำกัดตามกฎหมายว่าด้วยวิชาชีพนั้น

“ทรัพยากร” หมายความว่า สิ่งที่ใช้ทางการแพทย์เพื่อการทำปฏิบัติการแพทย์ ตามเกณฑ์ ที่ สผ. กำหนด

“หัตถการในร่างกาย” หมายความว่า กลวิธีเพื่อการวินิจฉัยและบำบัดรักษาผู้ป่วยฉุกเฉิน ซึ่งต้องใช้อุปกรณ์หรือเครื่องมือแพทย์ เจาะหรือผ่าตัด หรือสอดใส่วัตถุใด ๆ เข้าไปในร่างกายมนุษย์ หรือการแทรกแซงกระบวนการสรีรวิทยาของร่างกายมนุษย์ และหมายรวมถึงการให้หรือบริหารยา หรือสารอื่นเข้าไปในร่างกายมนุษย์ด้วย แต่ไม่รวมถึงการกระทำใดอันเป็นการปฐมพยาบาลและปฏิบัติการแพทย์ขั้นพื้นฐาน

ข้อ ๔ ให้หน่วยปฏิบัติการและสถานพยาบาลจัดให้มีการตรวจคัดแยกระดับความฉุกเฉินของผู้รับบริการสาธารณสุขเป็นระดับต่าง ๆ ตามหลักเกณฑ์ดังต่อไปนี้

(๑) ผู้ป่วยฉุกเฉินวิกฤต ได้แก่ บุคคลซึ่งได้รับบาดเจ็บหรือมีอาการป่วยกะทันหันซึ่งมีภาวะคุกคามต่อชีวิต ซึ่งหากไม่ได้รับการปฏิบัติการแพทย์ทันทีเพื่อแก้ไขระบบการหายใจ ระบบไหลเวียนเลือด หรือระบบประสาทแล้ว ผู้ป่วยจะมีโอกาสเสียชีวิตได้สูง หรือทำให้การบาดเจ็บหรืออาการป่วยของผู้ป่วยฉุกเฉินนั้นรุนแรงขึ้นหรือเกิดภาวะแทรกซ้อนขึ้นได้อย่างฉับไว

ให้ใช้สัญลักษณ์ “สีแดง” สำหรับผู้ป่วยฉุกเฉินวิกฤต

(๒) ผู้ป่วยฉุกเฉินเร่งด่วน ได้แก่ บุคคลที่บาดเจ็บหรือมีอาการป่วยซึ่งมีภาวะเฉียบพลันมากหรือเจ็บปวดรุนแรงอันจำเป็นต้องได้รับการปฏิบัติการแพทย์อย่างรีบด่วน มิฉะนั้นจะทำให้การบาดเจ็บหรืออาการป่วยของผู้ป่วยฉุกเฉินนั้นรุนแรงขึ้นหรือเกิดภาวะแทรกซ้อนขึ้น ซึ่งส่งผลให้เสียชีวิตหรือพิการในระยะต่อมาได้

ให้ใช้สัญลักษณ์ “สีเหลือง” สำหรับผู้ป่วยฉุกเฉินเร่งด่วน

(๓) ผู้ป่วยฉุกเฉินไม่รุนแรง ได้แก่ บุคคลซึ่งได้รับบาดเจ็บหรือมีอาการป่วยซึ่งมีภาวะเฉียบพลันไม่รุนแรง อาจรอรับการปฏิบัติการแพทย์ได้ในช่วงระยะเวลาหนึ่งหรือเดินทางไปรับบริการสาธารณสุขด้วยตนเองได้ แต่จำเป็นต้องใช้ทรัพยากรและหากปล่อยไว้เกินเวลาอันสมควรแล้วจะทำให้การบาดเจ็บหรืออาการป่วยของผู้ป่วยฉุกเฉินนั้นรุนแรงขึ้นหรือเกิดภาวะแทรกซ้อนขึ้นได้

ให้ใช้สัญลักษณ์ “สีเขียว” สำหรับผู้ป่วยฉุกเฉินไม่รุนแรง

(๔) ผู้ป่วยทั่วไป ได้แก่ บุคคลที่เจ็บป่วยแต่ไม่ใช่ผู้ป่วยฉุกเฉิน ซึ่งอาจรอรับหรือเลือกสรรการบริการสาธารณสุขในเวลาทำการตามปกติได้ โดยไม่ก่อให้เกิดอาการที่รุนแรงขึ้นหรือภาวะแทรกซ้อนตามมา

ให้ใช้สัญลักษณ์ “สีขาว” สำหรับผู้ป่วยทั่วไป

(๕) ผู้รับบริการสาธารณสุขอื่น ได้แก่ บุคคลซึ่งมารับบริการสาธารณสุขหรือบริการเพื่อผู้อื่น โดยไม่จำเป็นต้องใช้ทรัพยากร

ให้ใช้สัญลักษณ์ “สีดำ” สำหรับผู้รับบริการสาธารณสุขอื่น

ข้อ ๕ ให้หน่วยปฏิบัติการและสถานพยาบาลจัดให้มีบุคลากรสาธารณสุขเพื่อคัดแยกผู้รับบริการสาธารณสุขตามข้อ ๔ ตลอดเวลา รวมทั้งควบคุมและดูแลให้ผู้ปฏิบัติการดำเนินการให้ผู้ป่วยฉุกเฉินได้รับการปฏิบัติการฉุกเฉินตามลำดับความเร่งด่วน ดังต่อไปนี้

(๑) จัดให้ผู้ป่วยฉุกเฉินวิกฤตตามข้อ ๔ (๑) ได้รับการปฏิบัติการฉุกเฉินทันที และจัดให้ได้รับการปฏิบัติการแพทย์ขั้นสูงโดยเร่งด่วนที่สุด

(๒) จัดให้ผู้ป่วยฉุกเฉินเร่งด่วนตามข้อ ๔ (๒) ได้รับการปฏิบัติการฉุกเฉินถัดจากผู้ป่วยฉุกเฉินวิกฤตตามข้อ ๔ (๑) และจัดให้ได้รับการปฏิบัติการแพทย์ขั้นสูงโดยเร็ว

(๓) จัดให้ผู้ป่วยฉุกเฉินไม่รุนแรงตามข้อ ๔ (๓) ได้รับการปฏิบัติการฉุกเฉินถัดจากผู้ป่วยฉุกเฉินเร่งด่วนตามข้อ ๔ (๒) และจัดให้ได้รับการปฏิบัติการแพทย์ตามความจำเป็น

(๔) เลือกสรรหรือจัดให้ผู้ป่วยทั่วไปตามข้อ ๔ (๔) ได้รับการสาธารณสุขอื่นตามสมควรแก่กรณีหรืออาจอนุญาตให้ใช้ทรัพยากรได้เฉพาะในกรณีจำเป็น โดยให้ได้รับการถัดจากผู้ป่วยฉุกเฉินไม่รุนแรงตามข้อ ๔ (๓) หรือเมื่อไม่มีผู้ป่วยฉุกเฉิน

(๕) จัดหรือแนะนำให้ผู้รับบริการสาธารณสุขอื่นตามข้อ ๔ (๕) ได้รับการที่ประสงค์จากบุคลากรสาธารณสุขอื่น ในเวลาหรือบริเวณอื่น ซึ่งไม่ได้จัดไว้เพื่อปฏิบัติการแพทย์ ตามความเหมาะสม

ข้อ ๖ นอกจากการจัดให้ผู้ป่วยฉุกเฉินได้รับการปฏิบัติการฉุกเฉินตามข้อ ๕ แล้ว หน่วยปฏิบัติการ สถานพยาบาล และผู้ปฏิบัติการ มีอำนาจ หน้าที่ ขอบเขต ข้อจำกัด และความรับผิดชอบตามมาตรา ๒๘ และมาตรา ๒๙ แห่งพระราชบัญญัติการแพทย์ฉุกเฉิน พ.ศ. ๒๕๕๑ รวมทั้งการจัดให้ผู้ป่วยฉุกเฉินตามข้อ ๔ (๑) ข้อ ๔ (๒) และข้อ ๔ (๓) ได้รับการบำบัดเจาะจงอย่างทันท่วงทีด้วย

ขีดความสามารถของหน่วยปฏิบัติการหรือสถานพยาบาลในการปฏิบัติการฉุกเฉิน ให้ถือตามกฎหมาย กฎ คำสั่ง และข้อมูลข่าวสารเกี่ยวกับการจัดตั้งหรือการได้รับอนุญาต รวมทั้งการดำเนินการและภาระรับผิดชอบของหน่วยปฏิบัติการหรือสถานพยาบาลนั้น

ข้อ ๗ มาตรฐานการปฏิบัติการฉุกเฉิน ทั้งการปฏิบัติการแพทย์และการปฏิบัติการอำนวยการของหน่วยปฏิบัติการ สถานพยาบาล และผู้ปฏิบัติการ ให้ถือปฏิบัติโดยอนุโลมตามกฎหมายว่าด้วยการประกอบวิชาชีพด้านการแพทย์และการสาธารณสุข หรือกฎหมายว่าด้วยสถานพยาบาล หรือตามที่ กพฉ. กำหนดเพิ่มเติม แล้วแต่กรณี

ข้อ ๘ ให้เลขาธิการสถาบันการแพทย์ฉุกเฉินแห่งชาติรักษาการตามประกาศนี้

ประกาศ ณ วันที่ ๑๕ กันยายน พ.ศ. ๒๕๕๔

ชาติรี เจริญชีวะกุล

เลขาธิการสถาบันการแพทย์ฉุกเฉินแห่งชาติ ปฏิบัติหน้าที่แทน

ประธานกรรมการการแพทย์ฉุกเฉิน

APPENDIX E

SUMMARY OF RESOLUTIONS OF THE DECENTRALIZATION COMMITTEE MEETING FOR LOCAL GOVERNMENT ORGANIZATIONS No. 3/2017



ที่ นร ๐๑๐๗/ ๔๐ ๗๕

สำนักงานปลัดสำนักนายกรัฐมนตรี
ทำเนียบรัฐบาล กทม. ๑๐๓๐๐

๒๔ สิงหาคม ๒๕๖๐

เรื่อง การดำเนินงานและบริหารจัดการการแพทย์ฉุกเฉินขององค์กรปกครองส่วนท้องถิ่น

เรียน ผู้ว่าการตรวจเงินแผ่นดิน

สิ่งที่ส่งมาด้วย รายงานการประชุมคณะกรรมการการกระจายอำนาจให้แก่องค์กรปกครองส่วนท้องถิ่น ครั้งที่ ๓/๒๕๖๐ เมื่อวันที่ ๒๐ มิถุนายน ๒๕๖๐

ด้วยสถาบันการแพทย์ฉุกเฉินแห่งชาติมีหนังสือขอหารือคณะกรรมการการกระจายอำนาจให้แก่องค์กรปกครองส่วนท้องถิ่นว่า เนื่องด้วยพระราชบัญญัติการแพทย์ฉุกเฉิน พ.ศ. ๒๕๕๑ มีเจตนารมณ์ที่จะให้องค์กรปกครองส่วนท้องถิ่นเข้ามามีส่วนในการบริหารจัดการระบบการแพทย์ฉุกเฉินในระดับพื้นที่ ประกอบกับมาตรา ๓๓ วรรคสอง พระราชบัญญัติดังกล่าวระบุให้สถาบันการแพทย์ฉุกเฉินแห่งชาติสนับสนุนและประสานองค์กรปกครองส่วนท้องถิ่นดำเนินงานและบริหารจัดการระบบการแพทย์ฉุกเฉินในระดับท้องถิ่น หรือพื้นที่ โดยอาจได้รับการสนับสนุนจากกองทุนการแพทย์ฉุกเฉิน แต่อย่างไรก็ตามยังปรากฏว่ามีอุปสรรคและปัญหาในการดำเนินงานเรื่องอำนาจหน้าที่ ระเบียบการเบิกจ่าย การตรวจสอบของสำนักงานการตรวจเงินแผ่นดินเกิดขึ้นในหลายจังหวัด สถาบันการแพทย์ฉุกเฉินแห่งชาติจึงขอให้คณะกรรมการการกระจายอำนาจให้แก่องค์กรปกครองส่วนท้องถิ่น ได้พิจารณาออกประกาศแนวทางให้องค์กรปกครองส่วนท้องถิ่นดำเนินงาน และบริหารจัดการระบบการแพทย์ฉุกเฉิน เพื่อสนับสนุนการดำเนินงานและบริหารจัดการระบบการแพทย์ฉุกเฉินขององค์กรปกครองส่วนท้องถิ่นให้สามารถบริการประชาชนที่เจ็บป่วยฉุกเฉินได้ครอบคลุมทุกพื้นที่

สำนักงานปลัดสำนักนายกรัฐมนตรี โดยสำนักงานคณะกรรมการการกระจายอำนาจให้แก่องค์กรปกครองส่วนท้องถิ่น ได้นำเรื่องดังกล่าวเสนอที่ประชุมคณะกรรมการการกระจายอำนาจให้แก่องค์กรปกครองส่วนท้องถิ่น ในการประชุมครั้งที่ ๓/๒๕๖๐ เมื่อวันที่ ๒๐ มิถุนายน ๒๕๖๐ ที่ประชุมได้มีมติว่า การแพทย์ฉุกเฉินเป็นส่วนหนึ่งของการรักษาพยาบาล มุ่งแลการรักษาพยาบาลตั้งแต่เกิดเหตุจนถึงโรงพยาบาล เพื่อให้ผู้ป่วยเสียชีวิตระหว่างทางอันเป็นอำนาจหน้าที่ขององค์กรปกครองส่วนท้องถิ่น ตามมาตรา ๑๖ มาตรา ๓๗ แห่งพระราชบัญญัติกำหนดแผนและขั้นตอนการกระจายอำนาจให้แก่องค์กรปกครองส่วนท้องถิ่น พ.ศ. ๒๕๔๐ โดยมีได้บังคับให้องค์กรปกครองส่วนท้องถิ่นต้องดำเนินการ ขึ้นอยู่กับความพร้อมขององค์กรปกครองส่วนท้องถิ่น

จึงเรียนมาเพื่อโปรดทราบขอเขตอำนาจหน้าที่ขององค์กรปกครองส่วนท้องถิ่นในการปฏิบัติงานการดังกล่าว

ขอแสดงความนับถือ

(นายจรัญ มูลทองโรย)
ปลัดสำนักนายกรัฐมนตรี

สำนักงานคณะกรรมการการกระจายอำนาจ

ให้แก่องค์กรปกครองส่วนท้องถิ่น

โทรศัพท์ ๐ ๒๒๘๓ ๔๖๑๓

โทรสาร ๐ ๒๒๘๓ ๔๖๔๒

APPENDIX F

ANNOUNCEMENT OF THE NATIONAL INSTITUTE OF EMERGENCY MEDICINE

Re: Guidelines for Local Government Organizations to Operate and Manage Emergency Medical Systems at the Local Level (No. 2)

B.E. 2561 (2018)

หน้า ๒๘

เล่ม ๑๓๕ ตอนพิเศษ ๑๖๕ ง

ราชกิจจานุเบกษา

๑๒ กรกฎาคม ๒๕๖๑

ประกาศคณะกรรมการการแพทย์ฉุกเฉิน

เรื่อง หลักเกณฑ์ให้องค์กรปกครองส่วนท้องถิ่นเป็นผู้ดำเนินงานและบริหารจัดการ

ระบบการแพทย์ฉุกเฉินในระดับท้องถิ่น

(ฉบับที่ ๒) พ.ศ. ๒๕๖๑

โดยที่เป็นการสมควรแก้ไขหลักเกณฑ์เกี่ยวกับการจัดการด้านงบประมาณขององค์กรปกครองส่วนท้องถิ่นขนาดเล็กให้สามารถดำเนินงานระบบการแพทย์ฉุกเฉินท้องถิ่นได้สอดคล้องกับกฎหมายจัดตั้งขององค์กรปกครองส่วนท้องถิ่น

อาศัยอำนาจตามความในมาตรา ๓๓ แห่งพระราชบัญญัติการแพทย์ฉุกเฉิน พ.ศ. ๒๕๕๑ และข้อ ๑๙ แห่งระเบียบคณะกรรมการการแพทย์ฉุกเฉิน ว่าด้วยการประชุมของคณะกรรมการและคณะอนุกรรมการ พ.ศ. ๒๕๖๑ คณะกรรมการการแพทย์ฉุกเฉินจึงได้มีมติในการประชุม ครั้งที่ ๖/๒๕๖๑ เมื่อวันที่ ๒๐ มิถุนายน ๒๕๖๑ ให้ออกประกาศไว้ ดังต่อไปนี้

ข้อ ๑ ประกาศนี้เรียกว่า “ประกาศคณะกรรมการการแพทย์ฉุกเฉิน เรื่อง หลักเกณฑ์ให้องค์กรปกครองส่วนท้องถิ่นเป็นผู้ดำเนินงานและบริหารจัดการระบบการแพทย์ฉุกเฉินในระดับท้องถิ่น (ฉบับที่ ๒) พ.ศ. ๒๕๖๑”

ข้อ ๒ ประกาศนี้ให้ใช้บังคับตั้งแต่วันที่ ๒๐ มิถุนายน ๒๕๖๑ เป็นต้นไป

ข้อ ๓ ให้ยกเลิกความใน (๓) ของข้อ ๕ แห่งประกาศคณะกรรมการการแพทย์ฉุกเฉิน เรื่อง หลักเกณฑ์ให้องค์กรปกครองส่วนท้องถิ่นเป็นผู้ดำเนินงานและบริหารจัดการระบบการแพทย์ฉุกเฉินในระดับท้องถิ่น พ.ศ. ๒๕๖๐ และให้ใช้ความต่อไปนี้แทน

“(๓) จัดให้มีงบประมาณ เพื่อให้สามารถดำเนินงานระบบการแพทย์ฉุกเฉินท้องถิ่นนั้นได้อย่างต่อเนื่อง”

ประกาศ ณ วันที่ ๙ กรกฎาคม พ.ศ. ๒๕๖๑

เรืออากาศเอก อัจฉริยะ แพ่งมา

เลขาธิการสถาบันการแพทย์ฉุกเฉินแห่งชาติ

APPENDIX H

ANNOUNCEMENT OF THE NATIONAL INSTITUTE OF EMERGENCY MEDICINE

Re: Type, Level, Authority, Scope of Responsibility and Limitations of Operational Units B.E. 2562 (2019)

หน้า ๒

เล่ม ๑๓๖ ตอนพิเศษ ๕๘ ง

ราชกิจจานุเบกษา

๑๑ มีนาคม ๒๕๖๒

ประกาศคณะกรรมการการแพทย์ฉุกเฉิน

เรื่อง ประเภท ระดับ อำนาจหน้าที่ ขอบเขตความรับผิดชอบ และข้อจำกัดของหน่วยปฏิบัติการ
พ.ศ. ๒๕๖๒

โดยที่เป็นการสมควรให้มีการกำหนดประเภท ระดับ อำนาจหน้าที่ ขอบเขตความรับผิดชอบ และข้อจำกัดของหน่วยปฏิบัติการ เพื่อคุ้มครองความปลอดภัยของผู้ป่วยฉุกเฉินตามหลักการในมาตรา ๒๘ แห่งพระราชบัญญัติการแพทย์ฉุกเฉิน พ.ศ. ๒๕๕๑

อาศัยอำนาจตามความในมาตรา ๒๙ (๑) แห่งพระราชบัญญัติการแพทย์ฉุกเฉิน พ.ศ. ๒๕๕๑ และข้อ ๑๙ แห่งระเบียบคณะกรรมการการแพทย์ฉุกเฉิน ว่าด้วยการประชุมของคณะกรรมการ และคณะกรรมการ พ.ศ. ๒๕๖๑ คณะกรรมการการแพทย์ฉุกเฉินจึงได้มีมติในการประชุม ครั้งที่ ๑๑/๒๕๖๑ เมื่อวันที่ ๒๑ พฤศจิกายน ๒๕๖๑ ให้ออกประกาศไว้ ดังต่อไปนี้

ข้อ ๑ ประกาศนี้เรียกว่า “ประกาศคณะกรรมการการแพทย์ฉุกเฉิน เรื่อง ประเภท ระดับ อำนาจหน้าที่ ขอบเขตความรับผิดชอบ และข้อจำกัดของหน่วยปฏิบัติการ พ.ศ. ๒๕๖๒”

ข้อ ๒ ประกาศนี้ให้ใช้บังคับตั้งแต่วันถัดจากวันประกาศในราชกิจจานุเบกษาเป็นต้นไป

ข้อ ๓ ในประกาศนี้

“วุฒิแพทย์ฉุกเฉิน” หมายความว่า ผู้ประกอบวิชาชีพเวชกรรมที่ได้รับหนังสืออนุมัติหรือวุฒิบัตร แสดงความรู้ความชำนาญในการประกอบวิชาชีพเวชกรรมสาขาเวชศาสตร์ฉุกเฉิน และสาขาอื่นที่เป็น วุฒิบัตรที่วิทยาลัยแพทย์ฉุกเฉินแห่งประเทศไทย

“แพทย์เฉพาะทาง” หมายความว่า ผู้ประกอบวิชาชีพเวชกรรมที่ได้รับหนังสืออนุมัติ หรือวุฒิบัตรแสดงความรู้ความชำนาญในการประกอบวิชาชีพเวชกรรมสาขาหนึ่งสาขาใดที่เกี่ยวข้องกับ การแพทย์ฉุกเฉิน

ข้อ ๔ หน่วยปฏิบัติการ มีประเภทและระดับ ดังนี้

(๑) ประเภทปฏิบัติการแพทย์ มีระดับดังต่อไปนี้

ก. ระดับพื้นฐาน ได้แก่ หน่วยปฏิบัติการซึ่งดำเนินการปฏิบัติการแพทย์ขั้นพื้นฐาน ตามการอำนวยการ ให้แก่ผู้ป่วยฉุกเฉินที่มีความเสี่ยงต่อการเสียชีวิตหรือการรุนแรงขึ้นของ การบาดเจ็บ หรืออาการป่วยนั้นในห้วงเวลาขณะทำการปฏิบัติการฉุกเฉินนั้น

ข. ระดับสูง ได้แก่ หน่วยปฏิบัติการซึ่งดำเนินการจัดการปฏิบัติการแพทย์ขั้นสูง ตามการอำนวยการ ให้แก่ผู้ป่วยฉุกเฉินที่มีความเสี่ยงสูงต่อการเสียชีวิตหรือการรุนแรงขึ้นในห้วงเวลา ขณะทำการปฏิบัติการฉุกเฉินนั้น

ค. ระดับเฉพาะทาง ได้แก่ หน่วยปฏิบัติการซึ่งดำเนินการจัดการปฏิบัติการแพทย์ เฉพาะทางให้แก่ผู้ป่วยฉุกเฉินที่มีความเสี่ยงสูงต่อการเสียชีวิต การเกิดภาวะแทรกซ้อน หรือ การรุนแรงขึ้นของการบาดเจ็บหรืออาการป่วยนั้นอย่างรวดเร็วในห้วงเวลาขณะทำการปฏิบัติการฉุกเฉินนั้น

(๒) ประเภทปฏิบัติการอำนวยการ มีระดับ ดังต่อไปนี้

ก. ระดับพื้นฐาน ได้แก่ หน่วยปฏิบัติการซึ่งดำเนินกิจการปฏิบัติการอำนวยการในการรับแจ้งและประสานงาน รวมทั้งอำนวยความสะดวกแก่การดำเนินการตามการอำนวยการทั่วไปได้ตลอดเวลา เพื่อให้ผู้ป่วยฉุกเฉินได้รับการปฏิบัติการแพทย์ขั้นพื้นฐานตามเกณฑ์วิธีและคำสั่งประจำ

ข. ระดับสูง ได้แก่ หน่วยปฏิบัติการซึ่งดำเนินกิจการปฏิบัติการอำนวยการในการรับแจ้งประสานงาน อำนวยความสะดวกแก่การดำเนินการตามการอำนวยการ ทั้งการอำนวยการทั่วไปและการอำนวยการตรงได้ตลอดเวลา เพื่อให้ผู้ป่วยฉุกเฉินได้รับการปฏิบัติการแพทย์ขั้นสูงตามเกณฑ์วิธี คำสั่งประจำ และคำสั่งการแพทย์

ค. ระดับที่ปรึกษา ได้แก่ หน่วยปฏิบัติการซึ่งดำเนินงานจัดการปฏิบัติการอำนวยการในการอำนวยการ ทั้งการอำนวยการทั่วไปและการอำนวยการตรง โดยดูแลแพทย์ฉุกเฉิน แพทย์เฉพาะทางสาขาต่าง ๆ หรือแพทย์อำนวยการปฏิบัติการฉุกเฉินให้แก่ผู้ปฏิบัติการ หน่วยปฏิบัติการ และสถานพยาบาล เพื่อให้ผู้ป่วยฉุกเฉินได้รับการปฏิบัติการฉุกเฉินที่ถูกต้องอย่างเหมาะสมและทันท่วงที

ข้อ ๕ ให้หน่วยปฏิบัติการทุกประเภทและทุกระดับ มีอำนาจหน้าที่ ขอบเขต ความรับผิดชอบ และข้อจำกัด ดังต่อไปนี้

(๑) ดำเนินการจัดการปฏิบัติการฉุกเฉิน เพื่อคุ้มครองความปลอดภัยของผู้ป่วยฉุกเฉินให้เป็นไปตามหลักการ ดังต่อไปนี้

ก. ตรวจสอบระดับความฉุกเฉินและจัดให้ผู้ป่วยฉุกเฉินได้รับการปฏิบัติการฉุกเฉินตามลำดับความเร่งด่วนทางการแพทย์ฉุกเฉิน

ข. จัดให้ผู้ป่วยฉุกเฉินได้รับการปฏิบัติการฉุกเฉินจนเต็มขีดความสามารถของหน่วยปฏิบัติการนั้นก่อนการส่งต่อ

ค. ส่งต่อผู้ป่วยฉุกเฉินตามที่แพทย์ให้การรับรองว่าการส่งต่อผู้ป่วยฉุกเฉินจะเป็นประโยชน์ต่อการป้องกันการเสียชีวิตหรือการรุนแรงขึ้นของการเจ็บป่วยของผู้ป่วยฉุกเฉินนั้น

ง. ปฏิบัติการฉุกเฉินต่อผู้ป่วยฉุกเฉินให้เป็นไปตามความจำเป็นและข้อจำกัดทางการแพทย์ฉุกเฉิน โดยมีให้น้ำสิทธิการประกัน การขึ้นทะเบียนสถานพยาบาล หรือความสามารถในการรับผิดชอบค่าใช้จ่ายของผู้ป่วยฉุกเฉินหรือเงื่อนไขใด ๆ มาเป็นเหตุปฏิเสธผู้ป่วยฉุกเฉินที่ไม่ได้รับการปฏิบัติการฉุกเฉินอย่างทันท่วงที

(๒) ควบคุมและดูแลผู้ปฏิบัติการให้ดำเนินการปฏิบัติการฉุกเฉินเป็นไปตามหลักการ ใน (๑) และตามการอำนวยการหรือคำสั่งการแพทย์ โดยไม่เกินกว่าประเภท ระดับ อำนาจหน้าที่ ขอบเขต ความรับผิดชอบ และข้อจำกัด รวมทั้งหลักเกณฑ์และเงื่อนไขเกี่ยวกับการปฏิบัติหน้าที่ และมาตรฐานการปฏิบัติการฉุกเฉินของผู้ปฏิบัติการนั้น

(๓) จัดให้มีอุปกรณ์ เครื่องมือ สิ่งอำนวยความสะดวก และองค์ประกอบอื่น ให้ผู้ปฏิบัติการสามารถปฏิบัติการฉุกเฉินได้อย่างเต็มขีดความสามารถตามประเภท ระดับ อำนาจหน้าที่ ขอบเขต และข้อจำกัด รวมทั้งหลักเกณฑ์และเงื่อนไขเกี่ยวกับการปฏิบัติหน้าที่ รวมทั้งมาตรฐานการปฏิบัติการฉุกเฉินของผู้ปฏิบัติการนั้น

(๔) จัดให้มียานพาหนะเพื่อใช้ในการปฏิบัติการฉุกเฉิน ที่ถูกต้องตามกฎหมายว่าด้วยจราจรทางบก กฎหมายว่าด้วยการเดินเรือในน่านน้ำไทย กฎหมายว่าด้วยการเดินอากาศ หรือกฎหมายอื่นที่เกี่ยวข้อง

(๕) ดำเนินการตามหลักเกณฑ์และวิธีการเกี่ยวกับการประสานงานและการรายงานของหน่วยปฏิบัติการในการปฏิบัติการฉุกเฉิน รวมทั้งรายงานความพร้อมเกี่ยวกับบุคลากร พาหนะ สถานที่ และอุปกรณ์ ในการปฏิบัติการฉุกเฉินและการรับผู้ป่วยฉุกเฉิน และข้อมูลอื่นที่เกี่ยวข้อง ให้ สผ. หรือหน่วยงานหรือองค์กรที่กำหนดทราบอย่างทันทั่วทั้งที่ตามเกณฑ์และวิธีการที่ สผ. กำหนด หรือตามสมควรแก่กรณี

(๖) จัดให้มีผู้บริหารการแพทย์ฉุกเฉินมีหน้าที่ดำเนินงานหรือบริหารจัดการระบบการแพทย์ฉุกเฉินของหน่วยปฏิบัติการ โดยผู้บริหารการแพทย์ฉุกเฉินดังกล่าวต้องเป็นผู้ปฏิบัติการที่เป็นผู้ประกอบวิชาชีพ หรือผู้ช่วยเวชกรรมหรือผู้ช่วยอำนวยความสะดวกและระดับไม่ต่ำกว่าระดับสูงสุดที่หน่วยปฏิบัติการนั้น ดำเนินกิจการ

(๗) จัดให้มีระบบการบริหารจัดการองค์กร แนวทางการปฏิบัติการฉุกเฉิน การจัดการความปลอดภัย การจัดการข้อมูลและสารสนเทศ และการเตรียมความพร้อมรับภาวะฉุกเฉิน ตลอดจน จัดให้มีเครื่องมือและอุปกรณ์สื่อสารและเทคโนโลยีสารสนเทศที่สามารถเชื่อมต่อการปฏิบัติการฉุกเฉิน รวมทั้งบริหารจัดการผู้ปฏิบัติการ สิ่งอำนวยความสะดวก อุปกรณ์ เครื่องมือ ลักษณะ และองค์ประกอบอื่น ทั้งนี้ ตามหลักเกณฑ์การรับรองมาตรฐานหน่วยปฏิบัติการที่ กพฉ. กำหนด

(๘) ส่งเสริม สนับสนุน และควบคุมดูแลให้ผู้ปฏิบัติการยังคงมีใบอนุญาตประกอบวิชาชีพ หรือประกาศนียบัตรตามกฎหมายว่าด้วยการแพทย์ฉุกเฉินที่ยังไม่หมดอายุในขณะปฏิบัติการฉุกเฉินแล้วแต่กรณี

(๙) ดำเนินการให้ผู้ปฏิบัติการเป็นเจ้าหน้าที่ตามกฎหมายว่าด้วยความรับผิดชอบละเมิดของเจ้าหน้าที่ เพื่อให้ผู้ปฏิบัติการนั้นได้รับความคุ้มครองความรับผิดชอบต่อผู้เสียหายในผลแห่งละเมิดที่ผู้ปฏิบัติการของหน่วยปฏิบัติการนั้นได้กระทำการปฏิบัติหน้าที่

(๑๐) แจ้งต่อ สผ. และผู้มีอำนาจหน้าที่ รวมทั้งหน่วยงานหรือองค์กรหรือเจ้าหน้าที่ที่เกี่ยวข้อง ในกรณีพบว่าผู้ป่วยฉุกเฉินไม่ได้รับการปฏิบัติการฉุกเฉินตามหลักการในมาตรา ๒๘ แห่งพระราชบัญญัติการแพทย์ฉุกเฉิน พ.ศ. ๒๕๕๑

(๑๑) ปฏิบัติหน้าที่อื่นตามที่กำหนดไว้ในประกาศนี้หรือกฎหมายอื่นหรือตามที่ กพฉ. กำหนดเพิ่มเติม

ข้อ ๖ ให้หน่วยปฏิบัติการประเภทปฏิบัติการแพทย์ทุกระดับ มีอำนาจหน้าที่ ขอบเขต ความรับผิดชอบ และข้อจำกัด เพิ่มเติมจากข้อ ๕ ดังต่อไปนี้

(๑) ดำเนินกิจการปฏิบัติการแพทย์ตามระดับของหน่วยปฏิบัติการนั้นในเขตท้องถื่นหรือพื้นที่ที่ได้รับมอบหมายจากผู้มีอำนาจหน้าที่ในการดำเนินงานและบริหารจัดการระบบการแพทย์ฉุกเฉินในเขตท้องถื่นหรือพื้นที่นั้น

(๒) จัดให้มีชุดปฏิบัติการที่พร้อมปฏิบัติการแพทย์ตลอดเวลาทำการในเขตท้องถื่นหรือพื้นที่ที่ได้รับมอบหมายจากองค์กรปกครองส่วนท้องถิ่นหรือผู้มีอำนาจหน้าที่ในการดำเนินงานหรือบริหารจัดการระบบการแพทย์ฉุกเฉินในเขตท้องถื่นหรือพื้นที่นั้น ประกอบด้วยยานพาหนะ ผู้ปฏิบัติการ อุปกรณ์ระบบสื่อสารและสารสนเทศ และองค์ประกอบอื่น ตามหลักเกณฑ์ เงื่อนไข และมาตรฐานที่ กพฉ. กำหนดตามประเภทและระดับของผู้ปฏิบัติการในหน่วยปฏิบัติการนั้น

(๓) ควบคุมดูแลการปฏิบัติการฉุกเฉินให้เป็นไปตามการอำนวยความสะดวกหรือคำสั่งการแพทย์ภายใต้การรายงานและกำกับการตามการอำนวยความสะดวกของหน่วยปฏิบัติการประเภทอำนวยความสะดวกในเขตท้องถื่นหรือพื้นที่นั้น โดยไม่ให้เกินกว่าอำนาจหน้าที่ ขอบเขตความรับผิดชอบ และข้อจำกัดของผู้ช่วยเวชกรรมที่กำลังปฏิบัติการฉุกเฉินอยู่ขณะนั้น

(๔) บูรณาการความร่วมมือกับสถานพยาบาล หน่วยปฏิบัติการอื่น และหน่วยงานหรือองค์กรอื่นที่เกี่ยวข้อง เพื่อดำเนินงานหรือบริหารจัดการปฏิบัติการแพทย์ให้เป็นไปตามหลักเกณฑ์และเงื่อนไขเกี่ยวกับการปฏิบัติหน้าที่ และมาตรฐานการปฏิบัติการฉุกเฉินที่ กพฉ. ประกาศกำหนด

(๕) ปฏิบัติหน้าที่อื่นตามที่กำหนดไว้ในประกาศนี้หรือกฎหมายอื่นหรือตามที่ กพฉ. กำหนดเพิ่มเติม ให้เป็นหน้าที่ของหน่วยปฏิบัติการแพทย์ระดับนั้น

ข้อ ๗ ให้หน่วยปฏิบัติการประเภทปฏิบัติการอำนวยความสะดวกทุกระดับ มีอำนาจหน้าที่ ขอบเขต ความรับผิดชอบ และข้อจำกัด เพิ่มเติมจากข้อ ๕ ดังต่อไปนี้

(๑) ดำเนินกิจการปฏิบัติการอำนวยความสะดวกตามระดับของหน่วยปฏิบัติการนั้นในเขตท้องถื่นหรือพื้นที่ที่ได้รับมอบหมายจากผู้มีอำนาจหน้าที่ในการดำเนินงานและบริหารจัดการระบบการแพทย์ฉุกเฉินในเขตท้องถื่น หรือพื้นที่นั้น

(๒) จัดให้มีบุคลากร สถานที่อุปกรณ์ ยานพาหนะ ระบบสื่อสารและสารสนเทศ รวมทั้งองค์ประกอบอื่น เพื่อการปฏิบัติการอำนวยความสะดวก ตามหลักเกณฑ์ เงื่อนไข และมาตรฐานที่ กพฉ. กำหนดอย่างน้อย ดังต่อไปนี้

ก. จัดให้มีสถานที่ที่มีพื้นที่เพียงพอต่อการจัดตั้งศูนย์รับแจ้ง ประสาน จำงาน หรือกำกับการ ในการปฏิบัติการช่วยอำนวยความสะดวก โดยมีการจัดพื้นที่สำหรับการรับแจ้ง ประสาน จำงาน หรือกำกับการ รวมทั้งมีพื้นที่สำหรับติดตั้งอุปกรณ์สำนักงาน อุปกรณ์สื่อสารและสารสนเทศ มีพื้นที่สำหรับพัก ห้องน้ำ ตลอดจนดำเนินการทางอาชีวอนามัยและความปลอดภัย และองค์ประกอบอื่นอย่างเพียงพอ

ข. จัดให้มีครุภัณฑ์และอุปกรณ์สำนักงาน อุปกรณ์การปฏิบัติงาน อุปกรณ์สื่อสาร และเทคโนโลยีสารสนเทศ ระบบสื่อสารและสารสนเทศ รวมทั้งองค์ประกอบอื่นที่เหมาะสมต่อการรับแจ้ง ประสาน จำหน่าย หรือกำกับการ

ค. จัดให้มีผู้ช่วยอำนวยการที่เพียงพอต่อการรับแจ้ง ประสาน จำหน่าย หรือกำกับการ ได้แก่ พนักงานรับแจ้งการเจ็บป่วยฉุกเฉิน ผู้ประสานปฏิบัติการฉุกเฉิน ผู้จำหน่ายปฏิบัติการฉุกเฉิน หรือผู้กำกับการปฏิบัติการฉุกเฉิน แล้วแต่กรณี โดยอาจจัดเป็นเจ้าหน้าที่ประจำภายในหน่วยงาน หรือเจ้าหน้าที่ภายนอกหน่วยงานก็ได้ ที่สามารถดำเนินงานได้ตลอด ๒๔ ชั่วโมงทั้งวันทำการและวันหยุด

ง. จัดให้มีระบบการดำเนินงานและบริหารจัดการที่สามารถเชื่อมโยงกับการอำนวยการ รวมทั้งการรักษาพยาบาลของสถานพยาบาล เพื่อให้ผู้ป่วยฉุกเฉินได้รับการปฏิบัติการฉุกเฉินอย่างต่อเนื่องตั้งแต่สถานพยาบาลจนถึงสถานพยาบาล

จ. มีการประสานความร่วมมือกับหน่วยปฏิบัติการต่าง ๆ ที่เกี่ยวข้องกับการปฏิบัติการฉุกเฉิน ในท้องถิ่นนั้น

(๓) จัดให้มีงบประมาณเพื่อดำเนินกิจการปฏิบัติการอำนวยการได้อย่างต่อเนื่อง

(๔) มีข้อกำหนดการดำเนินงานและบริหารจัดการระบบการปฏิบัติการอำนวยการของหน่วยปฏิบัติการนั้นเป็นเอกสาร

(๕) บูรณาการความร่วมมือกับสถานพยาบาล หน่วยปฏิบัติการอื่น องค์กรปกครองส่วนท้องถิ่นอื่น และหน่วยงานหรือองค์กรอื่นที่เกี่ยวข้อง เพื่อดำเนินงานหรือบริหารจัดการปฏิบัติการอำนวยการ ได้อย่างต่อเนื่องตลอดเวลาโดยเป็นไปตาม หลักเกณฑ์และเงื่อนไขเกี่ยวกับการปฏิบัติหน้าที่ และมาตรฐานการปฏิบัติการฉุกเฉินที่ กพฉ. ประกาศกำหนด

ข้อ ๘ ให้หน่วยปฏิบัติการประเภทปฏิบัติการอำนวยการระดับพื้นฐาน มีอำนาจหน้าที่ ขอบเขต ความรับผิดชอบ และข้อจำกัด เพิ่มเติมจากข้อ ๗ ดังต่อไปนี้

(๑) รับแจ้ง ประสาน จำหน่าย และกำกับการปฏิบัติการฉุกเฉิน ตามหลักเกณฑ์และเงื่อนไข เกี่ยวกับการปฏิบัติหน้าที่ของหน่วยปฏิบัติการ รวมทั้งมาตรฐานปฏิบัติการฉุกเฉินที่ กพฉ. ประกาศ กำหนด

(๒) จัดให้มีการอำนวยการทั่วไปในเขตท้องถิ่นหรือพื้นที่ที่รับผิดชอบ โดยมีผู้ดูแลฉุกเฉิน หรือแพทย์อำนวยการปฏิบัติการฉุกเฉินอย่างน้อยหนึ่งคนมีหน้าที่ให้คำแนะนำในการอำนวยการทั่วไป ดังต่อไปนี้

ก. กำหนดมาตรการให้มีการปฏิบัติตามมาตรฐานการปฏิบัติการฉุกเฉิน ทั้งในการบริหาร ผู้ป่วยฉุกเฉิน การสื่อสาร และเกณฑ์วิธีช่วยเหลือเวชกรรม

ข. กำหนดขอบเขตและข้อจำกัดในการปฏิบัติการฉุกเฉินตามเกณฑ์วิธี นโยบาย และหลักการ ตั้งแต่การรับแจ้ง การจำหน่าย การตรวจคัดแยก การบำบัดรักษา และการลำเลียง หรือไม่ลำเลียงผู้ป่วยฉุกเฉินของผู้ช่วยเหลือเวชกรรมและผู้ช่วยอำนวยการนั้น

ค. ให้คำแนะนำแก่ผู้มีอำนาจในการให้ ต่ออายุ และเพิกถอนประกาศนียบัตร รวมทั้งการสั่งจำกัดสิทธิหรือขอเบี่ยงเบนความรับผิดชอบในการปฏิบัติการฉุกเฉินของผู้ช่วยเวชกรรมหรือผู้ช่วยอำนาจการในกรณีไม่ปฏิบัติตามหลักเกณฑ์เงื่อนไขและมาตรฐานที่กำหนด ของผู้ช่วยเวชกรรมและผู้ช่วยอำนาจการที่ปฏิบัติการฉุกเฉินในเขตท้องถิ่นหรือพื้นที่ที่รับผิดชอบ

ง. กำหนดเกณฑ์ขั้นต่ำในการเริ่มตอบสนองของผู้ช่วยเวชกรรมต่อการเจ็บป่วยฉุกเฉิน

จ. กำหนดขั้นตอนวิธี เกณฑ์วิธี และคำสั่งประจำในการปฏิบัติการฉุกเฉินของผู้ปฏิบัติการทั้งในกรณีที่ต้องลำเลียงและไม่มีการลำเลียงผู้ป่วยฉุกเฉิน

ฉ. กำหนดอุปกรณ์และองค์ประกอบอื่นที่ต้องใช้ในการปฏิบัติการฉุกเฉิน

ช. ให้คำปรึกษาแนะนำแก่ผู้บริหารการแพทย์ฉุกเฉินของหน่วยปฏิบัติการทุกระดับเกี่ยวกับนโยบายด้านการแพทย์ฉุกเฉิน

(๓) จัดให้มีทะเบียนผู้ปฏิบัติการ หน่วยปฏิบัติการ และสถานพยาบาลที่มีขีดความสามารถในการปฏิบัติการฉุกเฉินให้แก่ผู้ป่วยฉุกเฉินในท้องถิ่นหรือพื้นที่นั้น

(๔) จัดให้มีการอำนาจการทั่วไป ขั้นตอนวิธี เกณฑ์วิธี และคำสั่งประจำ รวมทั้งควบคุมดูแลผู้ปฏิบัติการให้ปฏิบัติการฉุกเฉินตามการอำนาจการทั่วไป ขั้นตอนวิธี เกณฑ์วิธี และคำสั่งประจำดังกล่าวด้วย

(๕) จัดให้มีผู้แพทย์ฉุกเฉินหรือแพทย์อำนาจการปฏิบัติการฉุกเฉินตามข้อ (๒) สามารถเข้าถึงข้อมูลทั้งปวงทางการแพทย์ฉุกเฉินที่บันทึกไว้ เฉพาะเพื่อประโยชน์ในการดำเนินการและกำกับดูแลกระบวนการปฏิบัติการฉุกเฉิน ตลอดจนการพัฒนาคุณภาพการปฏิบัติการฉุกเฉินของท้องถิ่นหรือพื้นที่นั้นให้มีประสิทธิภาพ

(๖) แจ้งต่อ สพฉ. และผู้มีอำนาจหน้าที่ รวมทั้งหน่วยงานหรือองค์กรหรือเจ้าหน้าที่ที่เกี่ยวข้องเพื่อดำเนินการต่อหน่วยปฏิบัติการที่ปฏิบัติการฉุกเฉินในท้องถิ่นหรือเขตพื้นที่ที่รับผิดชอบ ตามมาตรา ๒๙ วรรคสองและวรรคสาม แห่งพระราชบัญญัติการแพทย์ฉุกเฉิน พ.ศ. ๒๕๕๑

ข้อ ๙ ให้หน่วยปฏิบัติการประเภทปฏิบัติการอำนาจการระดับสูง มีขอบเขตความรับผิดชอบและข้อจำกัด เช่นเดียวกับหน่วยปฏิบัติการประเภทปฏิบัติการอำนาจการระดับพื้นฐานตามข้อ ๘ และเพิ่มเติม ดังนี้

(๑) จัดให้มีผู้แพทย์ฉุกเฉินหรือแพทย์อำนาจการปฏิบัติการฉุกเฉินที่พร้อมให้การอำนาจการตรงได้ตลอดเวลา

(๒) จัดให้มีการอำนาจการทั่วไปในเขตท้องถิ่นหรือพื้นที่ที่รับผิดชอบ โดยมีคณะผู้แพทย์ฉุกเฉินหรือแพทย์อำนาจการปฏิบัติการฉุกเฉินมีหน้าที่ให้คำแนะนำในการอำนาจการทั่วไป ดังต่อไปนี้

ก. กำหนดและจัดการปฏิบัติการฉุกเฉินของหน่วยปฏิบัติการทุกหน่วยในท้องถิ่นหรือพื้นที่นั้นให้เป็นไปตามเกณฑ์วิธีที่สอดคล้องต้องกันตามมาตรฐานการสื่อสาร เกณฑ์วิธีจ่ายงาน และเกณฑ์วิธีปฏิบัติการแพทย์ ตามหลักเกณฑ์ เงื่อนไข และมาตรฐานที่ กพฉ. กำหนด

ข. กำหนดสถานพยาบาลในการนำส่งผู้ป่วยฉุกเฉิน ให้สอดคล้องกับระดับขีดความสามารถตามความจำเป็นและข้อบ่งชี้ทางการแพทย์ฉุกเฉิน โดยมีให้นำสิทธิการประกัน การขึ้นทะเบียนสถานพยาบาล หรือความสามารถในการรับผิดชอบค่าใช้จ่ายของผู้ป่วยฉุกเฉินหรือเงื่อนไขใด ๆ มาเป็นเหตุปฏิเสธผู้ป่วยฉุกเฉินให้ไม่ได้รับการปฏิบัติการฉุกเฉินอย่างทันด่วนที่

ค. กำหนดคุณสมบัติเฉพาะของผู้ช่วยเวชกรรมและผู้ช่วยอำนวยการที่จะรับขึ้นทะเบียนให้ปฏิบัติการฉุกเฉินในท้องถิ่นหรือเขตพื้นที่ที่รับผิดชอบ โดยไม่เกินกว่าอำนาจหน้าที่ ขอบเขตความรับผิดชอบ และข้อจำกัดของผู้ปฏิบัติการนั้น

ง. กำหนดมาตรการให้มีการปฏิบัติตามมาตรฐานการปฏิบัติการฉุกเฉิน ทั้งในการบริหารผู้ป่วยฉุกเฉิน การสื่อสาร และเกณฑ์วิธีช่วยเวชกรรม

จ. กำหนดเกณฑ์วิธีหรือวิธีปฏิบัติสำหรับผู้ป่วยที่ไม่ต้องลำเลียง

ฉ. กำหนดการบันทึกข้อมูลการปฏิบัติการฉุกเฉินทางเวชกรรมทุกขั้นตอน

ช. กำหนดเครื่องมือ อุปกรณ์ และองค์ประกอบอื่นที่จะนำมาใช้ปฏิบัติการฉุกเฉินกับผู้ป่วยฉุกเฉินโดยตรง รวมทั้งตรวจสอบให้เป็นไปตามมาตรฐานการปฏิบัติการฉุกเฉิน

ซ. กำหนดขอบเขตและข้อจำกัดในการปฏิบัติการฉุกเฉินตามเกณฑ์วิธี นโยบาย และหัตถการ ตั้งแต่การรับแจ้ง การรายงาน การตรวจคัดแยก การบำบัดรักษา และการลำเลียงหรือไม่ลำเลียงผู้ป่วยฉุกเฉินของผู้ช่วยเวชกรรมและผู้ช่วยอำนวยการนั้น

ฌ. กำหนดเกณฑ์ขั้นต่ำในการเริ่มตอบสนองของผู้ช่วยเวชกรรมต่อการเจ็บป่วยฉุกเฉิน

ญ. สั่งจำกัดสิทธิหรือขอบเขตความรับผิดชอบในการปฏิบัติการฉุกเฉินของผู้ช่วยเวชกรรมหรือผู้ช่วยอำนวยการในสังกัดกรณีไม่ปฏิบัติตามหลักเกณฑ์เงื่อนไขและมาตรฐานที่กำหนด

ฎ. กำหนดมาตรฐานอุปกรณ์และองค์ประกอบอื่นที่ต้องใช้ในการปฏิบัติการฉุกเฉินภายใต้การอำนวยการ

ฏ. ให้คำปรึกษาแนะนำเกี่ยวกับนโยบายด้านการแพทย์ฉุกเฉิน แก่ผู้บริหารการแพทย์ฉุกเฉินระดับหน่วยปฏิบัติการหรือสถานพยาบาลในเขตท้องถิ่นหรือพื้นที่ที่รับผิดชอบ

(๓) จัดให้วุฒิแพทย์ฉุกเฉินหรือแพทย์อำนวยการปฏิบัติการฉุกเฉินตามข้อ (๑) และ (๒) สามารถเข้าถึงข้อมูลทั้งปวงทางการแพทย์ฉุกเฉินที่บันทึกไว้ เฉพาะเพื่อประโยชน์ในดำเนินการและกำกับดูแลกระบวนการปฏิบัติการฉุกเฉิน ตลอดจนการพัฒนาคุณภาพการปฏิบัติการฉุกเฉินของท้องถิ่นหรือพื้นที่นั้นให้มีประสิทธิภาพ

(๔) รับรอง ต่ออายุ พัก หรือเพิกถอนการรับรององค์การการฝึกอบรมการปฐมพยาบาล และช่วยปฏิบัติการแพทย์ขั้นพื้นฐาน หรือองค์การการฝึกอบรมผู้ปฏิบัติการประเภทและระดับอื่นตามที่ กพฉ. มอบหมาย รวมทั้งอนุมัติให้ ต่ออายุ พัก หรือเพิกถอนประกาศนียบัตรอาสาสมัครฉุกเฉินการแพทย์ หรือประกาศนียบัตรประเภทและระดับอื่น ตามที่ กพฉ. มอบหมาย ในเขตท้องถิ่นหรือพื้นที่ที่รับผิดชอบ

ทั้งนี้ โดยคำแนะนำของคณะวุฒิแพทยฉุกเฉินหรือแพทย์อำนวยการปฏิบัติการฉุกเฉินตาม (๒) ตามเกณฑ์และวิธีการที่ อศป. กำหนด

(๕) มีความร่วมมือกับหน่วยงานหรือองค์กรอื่นในการช่วยเหลือระหว่างกัน รวมทั้งการวางแผนและการจัดการสาธารณสุข ตลอดจนการตอบสนองต่ออุบัติภัยอันตรายและกิจกรรมอื่นที่เกี่ยวข้อง

ข้อ ๑๐ ให้หน่วยปฏิบัติการประเภทปฏิบัติการอำนวยการระดับที่ปรึกษา มีขอบเขตความรับผิดชอบ และข้อจำกัด เช่นเดียวกับหน่วยปฏิบัติการประเภทปฏิบัติการอำนวยการระดับสูงตามข้อ ๙ และเพิ่มเติม ดังต่อไปนี้

(๑) จัดให้มีการอำนวยการตรงสำหรับโรคหรือภัยเฉพาะด้านหรือพื้นที่เฉพาะที่รับผิดชอบหรือทั้งประเทศตลอดเวลา

(๒) จัดให้มีการอำนวยการทั่วไปสำหรับโรคหรือภัยเฉพาะด้าน หรือพื้นที่เฉพาะที่รับผิดชอบหรือทั้งประเทศ โดยมีคณะวุฒิแพทยฉุกเฉินหรือแพทย์เฉพาะทางสาขานั้น มีหน้าที่ให้คำแนะนำในการอำนวยการทั่วไป ดังต่อไปนี้

ก. กำหนดและจัดการปฏิบัติการฉุกเฉินของหน่วยปฏิบัติการสำหรับโรคหรือภัยเฉพาะด้านหรือพื้นที่เฉพาะที่รับผิดชอบ หรือทั้งประเทศ ให้เป็นไปตามเกณฑ์วิธีที่สอดคล้องต้องกันตามมาตรฐานการสื่อสาร เกณฑ์วิธีรายงาน และเกณฑ์วิธีปฏิบัติการแพทย์ตามหลักเกณฑ์ เจื่อนไข และมาตรฐานที่ กพฉ. กำหนด

ข. กำหนดสถานพยาบาลในการนำส่งผู้ป่วยฉุกเฉิน ให้สอดคล้องกับระดับขีดความสามารถตามความจำเป็นและข้อบ่งชี้ทางการแพทย์ฉุกเฉินสำหรับโรคหรือภัยเฉพาะด้าน หรือพื้นที่เฉพาะที่รับผิดชอบหรือทั้งประเทศโดยมีให้น้ำสิทธิการประกัน การขึ้นทะเบียนสถานพยาบาล หรือความสามารถในการรับผิดชอบค่าใช้จ่ายของผู้ป่วยฉุกเฉินหรือเจื่อนไขใด ๆ มาเป็นเหตุปฏิเสธผู้ป่วยฉุกเฉินให้ไม่ได้รับการปฏิบัติการฉุกเฉินอย่างทันท่วงที

ค. กำหนดคุณสมบัติเฉพาะของผู้ปฏิบัติการที่มีขีดความสามารถในการปฏิบัติการฉุกเฉินสำหรับโรคหรือภัยเฉพาะด้าน หรือพื้นที่เฉพาะที่รับผิดชอบ หรือทั้งประเทศ

ง. กำหนดมาตรการให้มีการปฏิบัติตามมาตรฐานการปฏิบัติการฉุกเฉินสำหรับโรคหรือภัยเฉพาะด้าน หรือพื้นที่เฉพาะที่รับผิดชอบ หรือทั้งประเทศ

จ. กำหนดเกณฑ์วิธีหรือวิธีปฏิบัติสำหรับการปฏิบัติการที่ไม่ต้องมีการลำเลียงผู้ป่วยฉุกเฉินสำหรับโรคหรือภัยเฉพาะด้าน หรือพื้นที่เฉพาะที่รับผิดชอบ หรือทั้งประเทศ

ฉ. กำหนดให้มีการบันทึกข้อมูลการปฏิบัติการฉุกเฉินทางเวชกรรมทุกขั้นตอน ตลอดจนเข้าถึงข้อมูลทั้งปวงที่บันทึกไว้ดังกล่าว เพื่อดำเนินการและกำกับดูแลกระบวนการปฏิบัติการฉุกเฉินและแผนงานพัฒนาคุณภาพการปฏิบัติการฉุกเฉินสำหรับโรคหรือภัยเฉพาะด้าน หรือพื้นที่เฉพาะที่รับผิดชอบ หรือทั้งประเทศให้มีประสิทธิภาพ

ข. กำหนดเครื่องมือ อุปกรณ์ และองค์ประกอบอื่นสำหรับโรคหรือภัยเฉพาะด้าน หรือพื้นที่เฉพาะที่รับผิดชอบ หรือทั้งประเทศ ที่จะนำมาใช้ปฏิบัติการฉุกเฉินกับผู้ป่วยฉุกเฉินโดยตรง รวมทั้งตรวจสอบให้เป็นไปตามมาตรฐานการปฏิบัติการฉุกเฉิน

(๓) รับรอง ต่ออายุ พัก หรือเพิกถอนการรับรององค์การฝึกอบรมการปฏิบัติการแพทย์ ขั้นพื้นฐานและช่วยปฏิบัติการแพทย์ขั้นสูง หรือองค์การฝึกอบรมผู้ปฏิบัติการประเภทและระดับอื่น ตามที่ กพฉ. มอบหมาย รวมทั้งอนุมัติให้ ต่ออายุ พัก หรือเพิกถอนประกาศนียบัตรพนักงานฉุกเฉิน การแพทย์ หรือประกาศนียบัตรประเภทและระดับอื่นตามที่ กพฉ. มอบหมาย ในเขตท้องถิ่นหรือพื้นที่ ที่รับผิดชอบ ทั้งนี้ โดยคำแนะนำของคณะวุฒิแพทย์ฉุกเฉินหรือแพทย์อำนวยการปฏิบัติการฉุกเฉิน ตาม (๒) ตามเกณฑ์และวิธีการที่ อสป. กำหนด

(๔) ให้คำแนะนำแก่ กพฉ. ในการดำเนินการต่อหน่วยปฏิบัติการภายใต้การอำนวยการ ตามมาตรา ๒๙ วรรคสองและวรรคสาม แห่งพระราชบัญญัติการแพทย์ฉุกเฉิน พ.ศ. ๒๕๕๑

(๕) แจ้งต่อผู้มีอำนาจหน้าที่ ในกรณีที่พบว่าผู้ปฏิบัติการ หน่วยปฏิบัติการ หรือสถานพยาบาลใด ไม่ปฏิบัติตามประเภท ระดับ อำนาจหน้าที่ ขอบเขตความรับผิดชอบ และข้อจำกัดในการปฏิบัติการฉุกเฉิน

(๖) ให้คำปรึกษาแนะนำแก่ผู้บริหารการแพทย์ฉุกเฉินในระดับต่าง ๆ และองค์การปกครอง ส่วนท้องถิ่นที่เป็นผู้บริหารจัดการระบบการแพทย์ฉุกเฉินในระดับท้องถิ่นหรือพื้นที่ เกี่ยวกับนโยบาย การบริหารจัดการและการดำเนินงานการแพทย์ฉุกเฉิน

(๗) ให้คำแนะนำในการกำหนดเกณฑ์การศึกษา ฝึกอบรม ทดสอบ และการคงไว้ ซึ่งคุณสมบัติและขีดความสามารถ เพื่อการต่ออายุการขึ้นทะเบียนของผู้ช่วยเวชกรรมและผู้ช่วยอำนวยการ ในการปฏิบัติการฉุกเฉินสำหรับโรคหรือภัยเฉพาะด้าน หรือพื้นที่เฉพาะที่รับผิดชอบ หรือทั้งประเทศ

(๘) กำหนดและปรับปรุงแก้ไขเกณฑ์วิธี นโยบาย และวิธีปฏิบัติการฉุกเฉินที่เกี่ยวข้องกับ การดูแลรักษาผู้ป่วยฉุกเฉินทั้งปวง ตั้งแต่การสื่อสารและการรายงาน จนถึงการคัดแยก การบำบัดรักษา และการลำเลียงผู้ป่วยฉุกเฉินสำหรับโรคหรือภัยเฉพาะด้าน หรือพื้นที่เฉพาะที่รับผิดชอบ หรือทั้งประเทศ

(๙) มีความร่วมมือกับหน่วยงานหรือองค์กรอื่นในการช่วยเหลือระหว่างกัน รวมทั้งการวางแผน และการจัดการสาธารณภัย ตลอดจนการตอบสนองต่ออุบัติภัยอันตรายและกิจกรรมอื่นที่เกี่ยวข้อง

ข้อ ๑๑ การใดที่อ้างถึงหน่วยปฏิบัติการประเภทช่วยเวชกรรม หรือหน่วยปฏิบัติการประเภท ช่วยอำนวยการให้หมายความถึงหน่วยปฏิบัติการประเภทปฏิบัติการแพทย์หรือหน่วยปฏิบัติการประเภท ปฏิบัติการอำนวยการตามประกาศนี้

หน้า ๑๑

เล่ม ๑๓๖ ตอนพิเศษ ๕๘ ง

ราชกิจจานุเบกษา

๑๑ มีนาคม ๒๕๖๒

ข้อ ๑๒ บรรดาอำนาจหน้าที่ของ กพฉ. ตามประกาศนี้ กพฉ. อาจแต่งตั้งคณะกรรมการขึ้นหรือมอบหมายคณะกรรมการคณะหนึ่งคณะใดให้ปฏิบัติหน้าที่แทนก็ได้

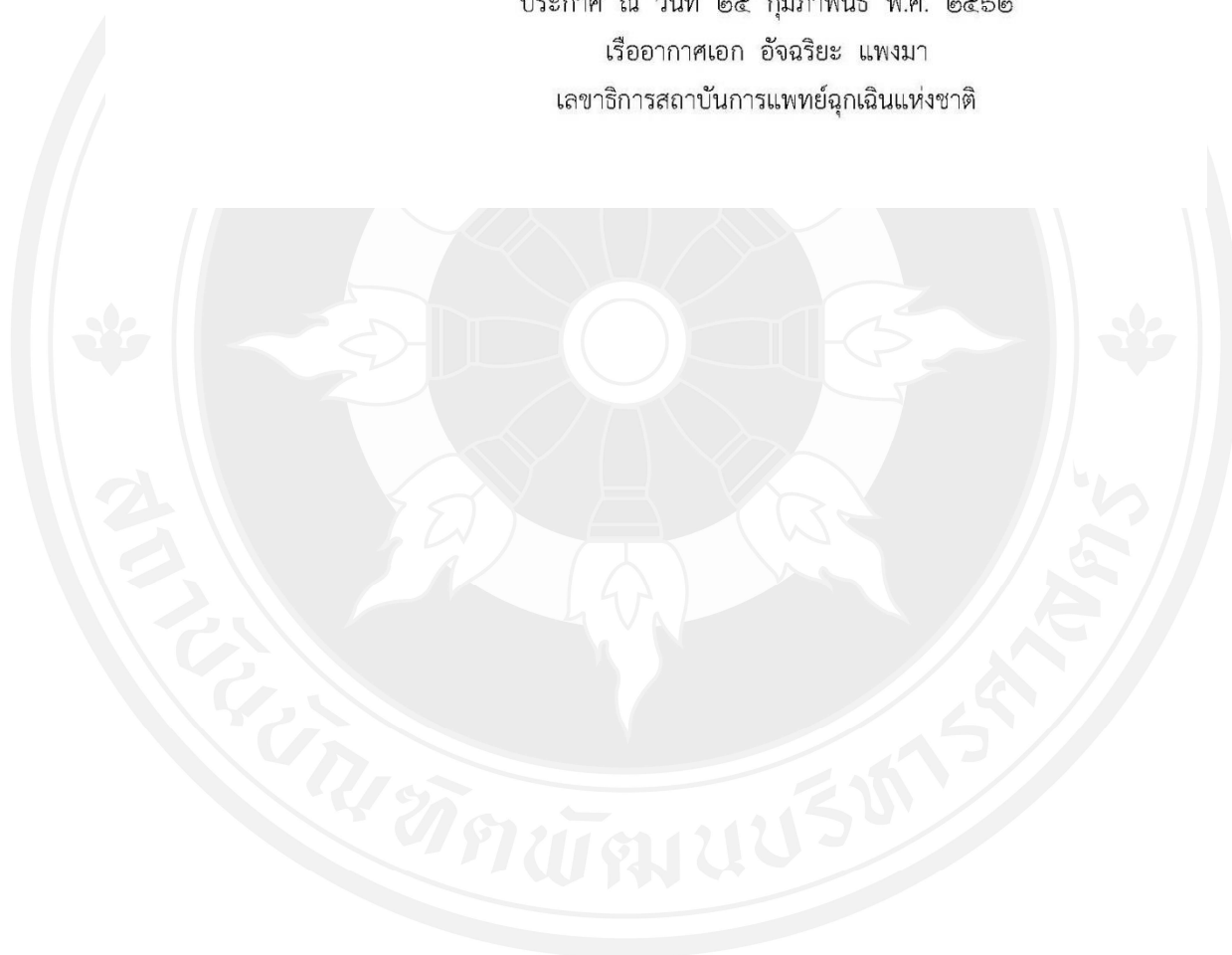
ข้อ ๑๓ กรณีอื่นใดที่ในประกาศนี้ไม่ได้กำหนดไว้เป็นการเฉพาะ ให้นำความตามข้อบังคับประกาศ และระเบียบคณะกรรมการการแพทย์ฉุกเฉินที่ได้ตราและประกาศไว้ในราชกิจจานุเบกษาแล้วมาบังคับใช้โดยอนุโลม

ข้อ ๑๔ ให้เลขาธิการรักษาการตามประกาศนี้

ประกาศ ณ วันที่ ๒๕ กุมภาพันธ์ พ.ศ. ๒๕๖๒

เรืออากาศเอก อัจฉริยะ แพงมา

เลขาธิการสถาบันการแพทย์ฉุกเฉินแห่งชาติ



BIOGRAPHY

Name-Surname	Ms. Chatrchanok Karnasuta
Academic Background	2003 Bachelor of Medicine (MD.) Faculty of Medicine Srinakarinwirot University 2009 Certificate of Thai Board of Physical Medicine and Rehabilitation Faculty of Medicine King Chulalongkorn Memorial Hospital 2009 Master of Public and Private Management (MPPM) National Institute of Development Administration 2010 Intensive Advanced Course in Basic Aesthetic Dermatology Mae Fah Luang University 2013 Fellowship in Cardiac Rehabilitation Imperial College, London 2015 Traditional Chinese Medicine and Acupuncture Department of Thai Traditional and Alternative Medicine, Ministry of Public Health 2016 Diploma of the Thai Board of Preventive Medicine (Public Health) 2017 Preventive Cardiology, Cardiac Rehabilitation & Sports Cardiology from Set-Up to New Frontiers, Inselspital University Hospital, Bern, Switzerland 2018 Harbor-UCLA Practicum in Cardiopulmonary Exercise Testing Harbor-UCLA Medical Center, California, United Stage of America 2018 Diploma of Anti-Aging and Regenerative Medicine Dhurakit Pundit University 2019 Certificate of Board of American Board of Anti-Aging & Regenerative Medicine
Experience	2003-2006 Internist, Central Chest Institute of Thailand

2006-2009

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2009-Present

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