THE DEVELOPMENT OF A CLINICAL NURSING PRACTICE GUIDELINE FOR MANAGEMENT OF LIFE THREATENING CONDITIONS IN TRAUMA PATIENTS

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THE DEVELOPMENT OF A CLINICAL NURSING PRACTICE GUIDELINE FOR MANAGEMENT OF LIFE THREATENING CONDITIONS IN TRAUMA PATIENTS

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ABSTRACT

Trauma patients with life threatening conditions usually have severe injuries to vital organs within the respiratory, circulation, and nervous systems. These severe injuries cause organ dysfunctions this, in turn causes hypoxemia and an inadequate tissue perfusion. It also is a significant cause of death in trauma patients.

This study involved the development of a clinical nursing practice guideline for the management of life threatening conditions in trauma patients. An evidence-based practice model was used as a conceptual framework. It consisted of the following processes. Phase I involved the analysis of the problem. It was found that hypoxemia and inadequate tissue perfusion are clinical significant problems in trauma patients. Phase II involved searching and analyzing the evidence. A total of 19 studies, which were at level 4-7, were included in the development of a clinical practice guideline. Through the synthesis of all evidence, 3 issues arose assessment, nursing management, and continuous monitoring according to the principle of ATLS® were identified. Then the investigator developed a clinical nursing practice guideline for the management of life threatening condition in trauma patients. Phase III, content validity of the clinical practice guideline, was established by 5 experts.

It is recommended that in order to assure the effectiveness of the guidelines, a clinical trial should be held. In order to be sustainable in practice, the guidelines should be introduced to related organizations for trauma patients' care.

KEY WORDS: LIFE THREATENING CONDITIONS/ TRAUMA PATIENTS/ MANAGEMENT/ CLINICAL NURSING PRACTICE GUIDELINE

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การพัฒนาแนวปฏิบัติการพยาบาลเพื่อจัดการภาวะคุกคามชีวิตในผู้ป่วยอุบัติเหตุ

(THE DEVELOPMENT OF A CLINICAL NURSING PRACTICE GUIDELINE FOR MANAGEMENT OF LIFE THREATENING CONDITIONS IN TRAUMA PATIENTS)

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บทคัดย่อ

ผู้ป่วยอุบัติเหตุที่มีภาวะคุกคามชีวิต (life threatening conditions) เป็นผู้ป่วยที่มีการบาดเจ็บรุนแรงของระบบทางเดินหายใจ ระบบไหลเวียนโลหิต และระบบประสาท ทำให้การทำงานของอวัยวะต่างๆ สูญเสียหน้าที่จนเกิดการพร่องออกซิเจนในเลือดแดง และการกำซาบของเนื้อเยื่อไม่เพียงพอ ซึ่งเป็นสาเหตุสำคัญที่ทำให้ผู้ป่วยอุบัติเหตุเสียชีวิต

การพัฒนาแนวปฏิบัติการพยาบาลเพื่อจัดการภาวะคุกคามชีวิตในผู้ป่วยอุบัติเหตุนี้ ใช้ Evidence-based practice model เป็นกรอบแนวคิดในการพัฒนา ซึ่งมีขั้นตอนดังนี้ ระยะที่ 1 เป็นการวิเคราะห์ปัญหา พบว่าการพร่องออกซิเจนและการกำซาบของเนื้อเยื่อไม่เพียงพอ เป็นปัญหาทางคลินิกที่สำคัญของผู้ป่วยอุบัติเหตุ ระยะที่ 2 เป็นการสืบค้นและวิเคราะห์หลักฐานเชิงประจักษ์ ได้ทั้งหมด 19 เรื่อง เป็นหลักฐานเชิงประจักษ์อยู่ระหว่างระดับ 4-7 นำมาวิเคราะห์สังเคราะห์และประเมินคุณภาพก่อนนำมาพัฒนาเป็นแนวปฏิบัติการพยาบาล ข้อสรุปจากหลักฐานเชิงประจักษ์แบ่งเป็น 3 ประเด็น คือ การประเมิน การจัดการทางการพยาบาล และการเฝ้าระวังติดตามอย่างต่อเนื่อง โดยการใช้หลักการตามแนวทางของ ATLS® และได้นำข้อสรุปดังกล่าวมาพัฒนาเป็นแนวปฏิบัติการพยาบาลเพื่อจัดการภาวะคุกคามชีวิตในผู้ป่วยอุบัติเหตุ ระยะที่ 3 เป็นการนำแนวปฏิบัติที่สร้างขึ้นไปให้ผู้ทรงคุณวุฒิ 5 ท่านตรวจสอบ และนำข้อเสนอมาปรับปรุงแก้ไขแนวปฏิบัติการพยาบาล

ข้อเสนอแนะของการศึกษา เพื่อให้ได้แนวปฏิบัติการพยาบาลที่มีประสิทธิภาพควรมีการศึกษาวิจัยทดลองการใช้แนวปฏิบัติที่สร้างขึ้น เพื่อให้มีการพัฒนาได้อย่างต่อเนื่องและยั่งยืนควรมีการนำแนวปฏิบัติการพยาบาลไปใช้ในการดูแลผู้ป่วยอุบัติเหตุที่มีภาวะคุกคามชีวิตในหน่วยงาน

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CHAPTER I
INTRODUCTION

1.1 Background and Significance of the Study

Trauma patients with life threatening conditions usually have severe injuries of vital organs such as respiratory, circulation, and nervous system (Thomtithchong & Havanond, 2001). These severe injuries cause organ dysfunction, no response to the hypothalamus-pituitary-adrenal axis, immune, and metabolic systems in terms of compensation to the circulatory system (Muir, 2006). Shock leads to insufficient oxygen and nutrient supply that causes dysfunction of cells, tissues and other organs (Kneale, 2003; Unhasuta, 2007; Wattanasirichaikul, 2002a). It also is a significant cause of threat to life in trauma patients (Dow, 2005; Flavin & Driscoll, 2000; Spahn et al., 2007).

Life threatening conditions generate rapid death in trauma patients. This may be from airway obstruction in patients who have loss of consciousness, bleeding, loss of teeth, and facial and neck injuries that promote swelling or huge blood loss to obstruct airway (Cranshaw & Nolan, 2006; Dow, 2005; Khampangphun, 2001; Siritongtavorn, 2004; Walsh & Kent, 2001; Wright, 1999). Poor oxygenation in the lung generates a lower level of oxygen in blood flow and causes hypoxemia and hypoxia (Phanpakdee, 1994; Siritongtavorn, 2004). Thoracic injury may cause pulmonary pathology and loss of lung capacity and alveolar function on oxygen exchange and ventilation that cause hypoxemia (Jones, 2005; Pongnumkul, 2004; Wright, 1999; Yamamoto, Schroeder, & Beliveau, 2004). In cases of tissue and vessels disruption this may lead to hypovolemia that causes inadequate tissue perfusion (Havanond, 2001; Kneale, 2003; LaFramboise, 2005; Unhasuta, 2007; Wattanasirichaikul, 2002b). Delayed management from unidentified cause of injury (Attanavanich, 1999) makes trauma patients with life threatening conditions die in the second phase of the trimodaldeath distribution applies here (American College of Surgeons Committee on Trauma, 2004). About 60% of trauma patients die in this phase but one third of those patients can survive if immediate proper management is

offered (Sriussadaporn, 2002). The second phase is the “golden hours” for survival trauma patients. Causes of preventable death were from malpractice on respiratory management (16%) uncontrolled blood loss (16%) and mis-management of thoracic trauma (9%) (Gruen, Jurkovich, McIntyre, Foy, & Maier, 2006). These findings showed that delayed management on uncontrolled blood loss was a significant cause of death in traumatic patients with life-threatening conditions (Spahn et al., 2007; Tien & Breneman, 2004). Negative initial assessment, no standard of assessment on the respiratory system and blood loss, delayed management, improper treatment, improper intravenous fluid and blood transfusion and no good history taking are causes of malpractice for trauma patients in emergency departments in Thailand (Sakolsatayadorn, 1999; Summavaj & Jantron, 1998).

At the present, Advanced Trauma Life Support (ATLS®) of the American College of Surgeons is adopted to correct the of life threatening situations as a standard of care (Hassan & Tesfayohannes, 2006; Kanchanarin, 2004; Sakolsatayadorn, 1999; Unhasuta, 2006). The basic and systemic conceptual practice includes 4 phases (Hassan & Tesfayohannes, 2006) as follows. Primary survey assessment of ABCDE and resuscitation, re-evaluation, secondary survey and diagnostic evaluation and transfer for definitive care. These assist the patient to have appropriate care for the respiratory tract, respiration, and blood and circulatory systems. There are responses to both local and overall injuries and assessment of injury that relate to severity of injury and sequent treatment received. In Thailand, ATLS® is applied to the initial assessment to verify life threatening conditions that may help identifying injury and prioritizing nursing care with the healthcare team (Unhasuta, 2006). In addition, all patients benefit and recover morequickly with adequate oxygen (Cranshaw & Nolan, 2006; Graham & Parke, 2007; Seislove, 2006; Tunmukayakul, 2004).

Hypoxemia and inadequate tissue perfusion are significant causes of life threatening conditions in trauma patients. Initial assessment and systemic management can save traumatic patients lives and prevent complication (Khumpeangphan, 2001). In Thailand, a literature review on nursing management shows no clinical nursing practice guidelines (CNPG) to manage life threatening conditions in traumatic patients. The investigator is interested in the development of a clinical nursing practice

guideline for management of life threatening conditions in trauma patients by applying and modifying the evidence-based practice model as well as conceptual framework of this study. It is possible to develop a nursing practice from survey, problem identification, organization al data gathering, analysis, and synthesis of research and empirical data. The guidelines need to have adequate theoretical and practical knowledge of care in trauma patients to immediately and systematically manage life threatening conditions with proper priority. That will eliminate error and remedy the problems e.g. hypoxemia and inadequate tissue perfusion. Thus obvious nursing practices which can be established as an algorithm that to parallels ATLS® guidelines (Fitzgerald et al., 2006). This will increase survival rates, and decrease complications of these patients. It also promotes the way to increase quality of nursing care in the future.

1.2 Main Issues

Life threatening conditions are a significant cause of death in trauma patients because of hypoxemia and inadequate tissue perfusion to vital organs (Dow, 2005; Flavin & Driscoll, 2000; Spahn et al., 2007). Respiratory assessment, respiration, blood and circulation, correction, management and monitoring with a good system and sequence will be a guideline for nursing management on trauma patients with life threatening conditions and will assist in saving patient's lives.

1.3 Purposes of the Study

To develop clinical nursing practice guidelines for the management of life threatening conditions in trauma patients.

1.4 Expected Benefits

1. To have clinical nursing practice guidelines to manage life threatening conditions in trauma patients.
2. To develop quality of nursing care for trauma patients with life threatening conditions.
3. To reduce mortality rate of trauma patients with life threatening conditions.

CHAPTER II
LITERATURE REVIEW

Review of Existing Literature Related to Issues of Concern

This thematic paper aimed to conduct with the development of a clinical nursing practice guideline for management of life threatening conditions in trauma patients by reviewing the literature that explains significant related issues as follows:

1 Life threatening conditions of trauma patients
   - 1.1 Hypoxemia
   - 1.2 Inadequate tissue perfusion
   - 1.3 Physiological response to the injury
   - 1.4 Physiological response of the patients with life threatening conditions

2 Management on life threatening condition for trauma patients
   - 2.1 Managerial concept for life threatening conditions in trauma patients
   - 2.2 Nursing management for life threatening conditions in trauma patients

3 Development of a clinical nursing practice guideline
   - 3.1 Models of development of a clinical nursing practice guideline
   - 3.2 Development of clinical nursing practice guidelines according to the empirical-based evidence

Conceptual Framework of the study

1. Life threatening conditions of trauma patients

Trauma patients refers to people who have any kind of accident, which offer physical injuries with pathology of tissue, vascular and bone damages that is caused from extrinsic kinetic force inside the body (Autaravichien, 2005). In the patients with severe trauma, they usually have life threatening conditions from multiple injuries of respiratory system and circulatory system to have hypoxemia and inadequate tissue perfusion.

1.1 Hypoxemia

Hypoxemia is from airway obstruction and inadequate respiration. Airway obstruction can be partial or complete. Major cause of airway obstruction is facial injury that has bleeding through nose and respiratory tract. Neck injury affects to main arteries that generate blood congestion in the pharynx, compress and obstruct the airway. In unconscious patients, pharyngeal tone dropped also cause airway obstruction. The obstruction may also come from secretion, broken tooth and vomiting (Cranshaw & Nolan, 2006; Dow, 2005). When airway obstruction, inadequate oxygen supply is occurred leading to have hypoxemia that affects to tissue hypoxia. Carbon dioxide will be gradually increased as of poor exhalation to release intrinsic pulmonary air that yields hypercapnia (Guyton & Hall, 2006; Panpukdee, 1994; Pongnumkul, 2004). Inadequate respiratory is from abnormal breathing from thoracic injury that leads to have alveolar hypoventilation from inadequate exchanged air at alveolar because the patients fail to inhale. This condition is found in the patients with flail chest, open pneumothorax, and massive pneumothorax. Oxygen in lung will be declined and blood through lung will have less oxygen generating ventilation / perfusion (V/Q) mismatch in the result of hypoxemia causing tissue hypoxia. On the other hand, the patients with tension pneumothorax can breathe in oxygen but they fail to exhale so carbon dioxide level will be raised up and hypercapnia will be found. Increased pleural pressure will compress lung tissue leading to have less lung capacity and tissue perfusion including hypoxemia (Guyton & Hall, 2006; Hassan & Tesfayohannes, 2006; Jones, 2005; Yamamoto et al., 2005) as in figure1.

Signs and symptoms of hypoxemia include restless, cyanosis at nail and lip, cheyne-stroke respiration, suprasternal notch-airway obstruction, stridor, hoarseness-

airway and pharynx obstruction (Dow, 2005; Hassan & Tesfayohannes, 2006; Walsh & Kent, 2001; Yamamoto et al., 2005).

1.2 Inadequate tissue perfusion is from hypovolemia

Hypovolemia causes hypoxemia and inadequate tissue perfusion because it is a loss of both red blood cells, which are oxygen carrier through the body and blood plasma, which offers the decreased intravascular volume. Declined blood pressure generates the decrease of returned venous blood to heart that reduces cardiac output. Inadequate oxygen and nutrient supply to body tissues cause dysfunction of cells and tissues including shock (Banasik, 2005; Dutton, 2006; Graham & Parke, 2007; Wattanasirichaikul, 2002b). External bleeding is commonly visualized but internal bleeding may not be obvious. The patients can be in shock from other cause such as cardiogenic shock, which is found in the patients with tension pneumothorax and cardiac temponade. As the cause, cardiac systole is greatly decreased that causes inadequate blood circulation throughout the body, reduced venous blood, decreased cardiac output, inadequate tissue perfusion and dysfunction of organ waste release. Neurogenic shock in spinal cord injury patients offers vasodilation and relative hypovolemia including shock (Pongnumkul, 2004; Tuntayothai & Malathum, 1994). As in figure1

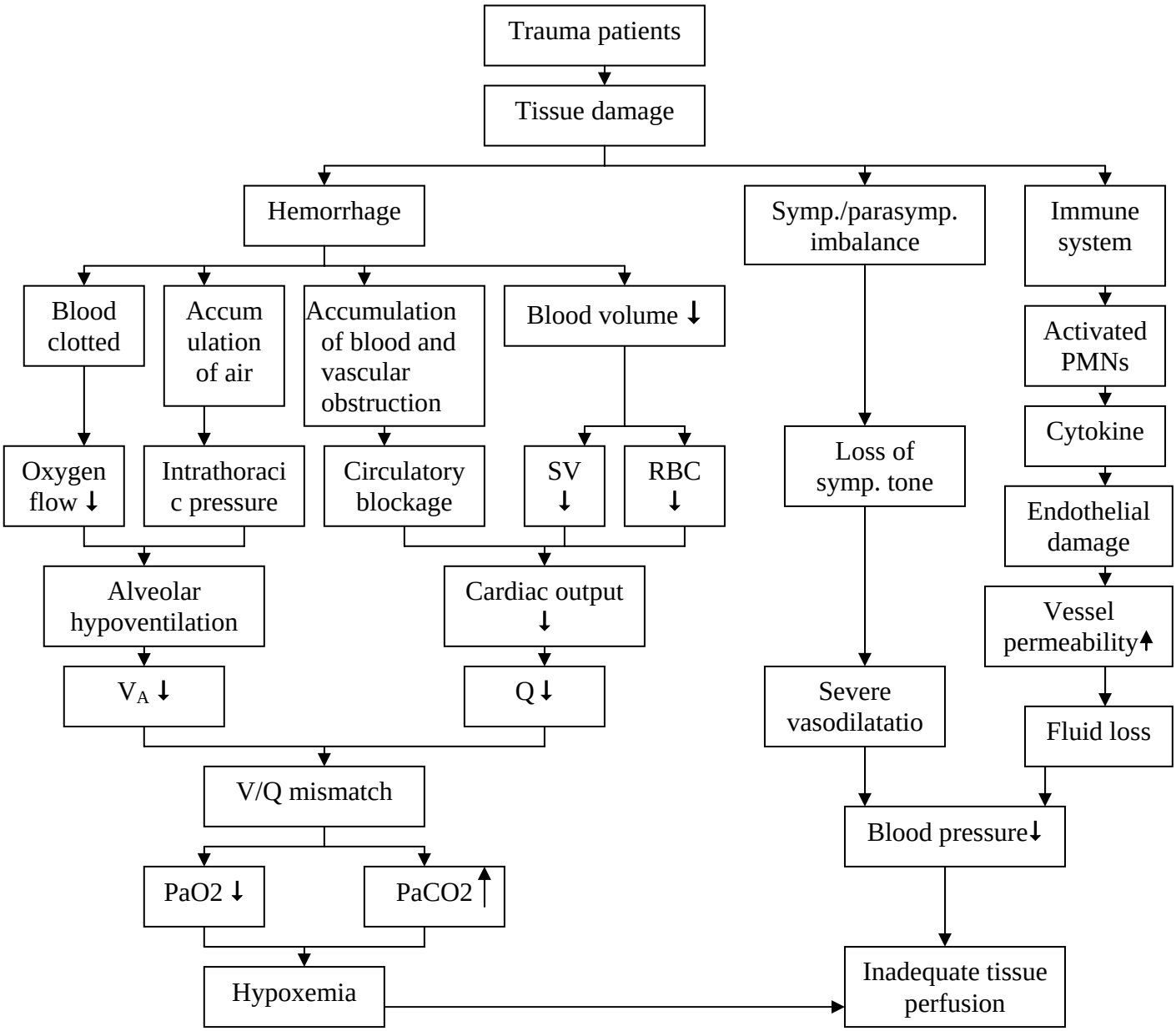

Figure 1: The pathophysiology of trauma patients (adapted from Graham & Parke, 2007; Guyton & Hall, 2006; Hassan & Tesfayohannes, 2006; Jones, 2005; Kneale, 2003; Pongnumkul, 2004; Yamamoto et al., 2005)

The body will have the compensated mechanism when peripheral hypoperfusion occurred. This mechanism will keep balance of the perfusion as follows: hypoperfusion arouses adrenergic autonomic nervous system and increases vasoconstriction, cardiac preload, and cardiac output to maintain perfusion pressure of coronary arteries and brain. Neuroendocrine substance will stimulate at kidney e.g. renin-angiotensin and aldosterone that increase accumulate fluid and sodium causing the elevated cardiac preload and cardiac output. Hence, bleeding, cardiac and vascular signs and symptoms are the primary findings followed by others (Dutton, 2006; Graham & Parke, 2007; Kneale, 2003). There are 4 phases of physical response. The initial phase involves with blood loss for 10-15%, early tissue hypoxia, declined oxygen in mitochondria that starts anaerobic process in the tissues in the result with the increased lactic acid in tissues. Hypovolemia causes the diminished capillary hydrostatic pressure but the oncotic pressure is the same. Influx of extravascular fluid from interstitial space through vessels creates hypervolemia and decreased viscidity. The second phase is the compensatory stage that includes blood loss as 15-30% but signs and symptoms are found even if the compensation mechanism is worked. Hypoxemia stimulates respiration center leading to have hyperventilation and respiratory alkalosis that generate restless and decrease of consciousness. The declined cardiac output will arouse sympathetic system causing vasoconstriction, reduction of blood circulation to heart, brain, skin, viscera and kidneys. Aroused sympathetic nervous system also increase pulse rate and heavier cardiac systolic pressure that create the elevation of cardiac output and stroke volume. Vasoconstriction and declined cardiac output reduce blood flow to kidney that arouse the renin-angiotensin system to release aldosterone generating the re-absorption of fluid and sodium and hypouresis. In the meantime, serum osmolarity will be elevated leading to have ADH released and cause re-absorption and hypouresis as mentioned. The third phase refers to the progressive stage that relates with blood loss as 30-40% and early failure of compensation mechanism. Increasing activation of glycogenolysis, lipolysis and skeletal muscle breakdown causes acidosis. Histamine released generates vessel permeability, reverse osmosis and hypovolemia. Prolonged vasoconstriction causes hypoperfusion of vital organs such as brain involving with the decrease of unconsciousness, dilated pupils, slow reaction to light, kidney dysfunction,

hypouremia < 20 ml/hr, liver failure, jaundice, ischemic stomach and bowel that relates with bacteria and endotoxin in blood circulation causing sepsis. Permeability of pulmonary capillaries cause pulmonary edema. Ischemic alveolar cells and other organs generate multi-organ failure. The final stage is Refractory stage that involves with shock without recovery, cell damage and multi-organ failure including brain damage (Kneale, 2003; Muir, 2006; Tuntayothai & Malatham, 1994). As in table 1, shows the summary of the symptoms observed at each stage.

Table 1: Summary of the symptoms observed at each stage.

Initial stage	Few obvious symptoms present external hemorrhage may be seen.
Compensatory stage	Rapid shallow breaths (hyperventilation) Tachycardia Agitation, confusion, drowsiness, restlessness Pallor of skin, cold to touch Cold clammy skin
Progressive stage	Reduced urine output Possibly oliguria Severe tachycardia Hypotension Notable changes in consciousness and responses to stimuli
Refractory stage	Unconsciousness Signs of multiple organ failure

Note: from “Understanding hypovolaemic shock” by Kneale, 2003, pp.209.

1.3 Physiological response to injury

When the body injured, the reactions of hypothalamus-pituitary-adrenal axis, immune system and metabolism are occurred to compensate blood circulation that aim to have adequate blood circulation to vital organs (Lueangchana, 2001; Muir, 2006; Wattanasirichaikul, 2002a). Stimulating of sympathetic nervous system affecting to the functions of endocrine gland, peripheral nerve ending and adrenal medulla to

release catecholamine in the result of increased respiratory rate, peripheral vasoconstriction, vasodilation, decreased bowel and stomach functions that aim to increase cardiac output. In addition, hypothalamus-pituitary-adrenal axis affect to pituitary by anterior pituitary releases ACTH, GH and TSH. ACTH stimulates adrenal medulla and adrenal cortex to release catecholamine and aldosterone and cortisol respectively. Aldosterone causes re-absorption of fluid, sodium and chloride but releases potassium to have hypervolemia. Cortisol elevates metabolism of carbohydrate, protein, and lipid. It also involves with leukocyte system and decreases inflammation. However, prolonged cortisol increases a risk of infection and reduces survival rate. Growth hormone (GH) will be elevated, particularly blood loss as a heavy arousal to increase blood sugar by prohibiting insulin release, raising gluconeogenesis and having lipolysis. TSH assists elevating metabolism of carbohydrate that generates ATP. Posterior pituitary releases ADH that cause re-absorption of water in the result of hypouresis to increase circulation volume (Leuangchana, 2001; Muir, 2006; Sathapanawat & Wattanasirichaikul, 2002).

Immune system damage will have the following responses. The initial stage: non - specific immune response is to control, reduce, and eliminate the causes before inflammation occurred that prevents the prospect harm to the tissues. However, if the immunity fails on immediate taking control on inflammation, prolonged constant extensive damage will be occurred. Immune system will expand the control and add on specific mechanism to increase efficiency of adaptive immune response. Immune inflammation earns mechanism and weapon or forces that include complicated cells and several agents, which has consistent functions at specific locations and time of inflammatory site. Increased cardiac output is from injury to release more cytokines resulting to have elevated blood flow. Cytokines affect to immune system to improve inflammation by resisting the inflammatory system. If inflammation is increased, infection will be occurred. Cytokines is a new discovered protein and produced by the defense system of the receiver that affects to the surrounding cells, its cells and others. It works as hormone and involves with Interleukin, tumor necrosis factor, interferon, eicosanoid, kallikreins-kinins and other substances from cells (Cotton, Guy, Morris, & Abumrad, 2006; Giannoudis, 2003; Hansen, 1998).

Interleukin I stimulates lymphocytes and pyrogen to promote growth of T-cell that combines with other cytokines to support acute protein production of liver, vanish muscular protein and arouse hypothalamus-pituitary axis (CRF and ACTH) (Hansen, 1998; Wattanasirichaikul, 2002a).

Interleukin II arouses the immune system. The dysfunction of interleukin II will be found in the patients injure by heat.

Interleukin VI is initially responsible to improve immune functions and support acute protein synthesis.

Tumor necrosis factor is one kind of protein cytokines. It stimulates platelets and compresses lipoprotein function by gamma interferon from T-cell aroused macrophages to release interleukin I and tumor necrosis factor.

Eicosanoid is released from cells except lymphocytes. It is responsible to control vessels all over the body and affect to hormones and immune.

Kallikreins-Kinins acts as well as vasodilatation to increase capability of osmosis at capillary leading to eliminate more glucose. Other action of kallikreins-kinins is to control fluid and electrolytes.

Rotonin in platelet offers vasoconstriction and accumulation of platelets.

Histamine is a mediator of changing gastric secretion, heart rate and immune functions.

Response of other media such as endothelial cell mediator that affects to near-by cells and is responsible for controlling size of specific vessel and others are nitric oxide, endothelin, prostaglandin and peptide (Cotton et al., 2006; Hansen, 1998; Wattanasirichaikul, 2002a).

Moreover, the body will receive glucose from glycogenolysis process when the body injured. Glycogenolysis is a process of glycogen, breakdown and produce new glucose from protein and glycerol that would be called as gluconeogenesis. Cortisol is responsible to gluconeogenesis. Glucagon increases both glycogenolysis and gluconeogenesis including directly prohibits insulin actions. Insulin has two main actions, which are to accumulate fat in adipose tissue that is against the action of catecholamine, ACTH and to attach with amino acid into muscle including protein synthesis that is resisted by glucagon and cortisol (Leurmprapas and Wattanasirichaikul, 2002). In injured patients, if severe injury is found, demand of

metabolism and disintegrated tissues will be increased that lead to reduce lean body mass, fatigue and exhaustion (Cotton et al., 2006; Hansen, 1998; Havanond, 2001; Leurmprapas & Wattanasirichaikul, 2002).

In conclusion, when the body injured, physical reactions from all systems will work harmoniously. If physical reactions cannot compensate the severe physical injury, complications will be occurred that might cause of death as in figure 2.

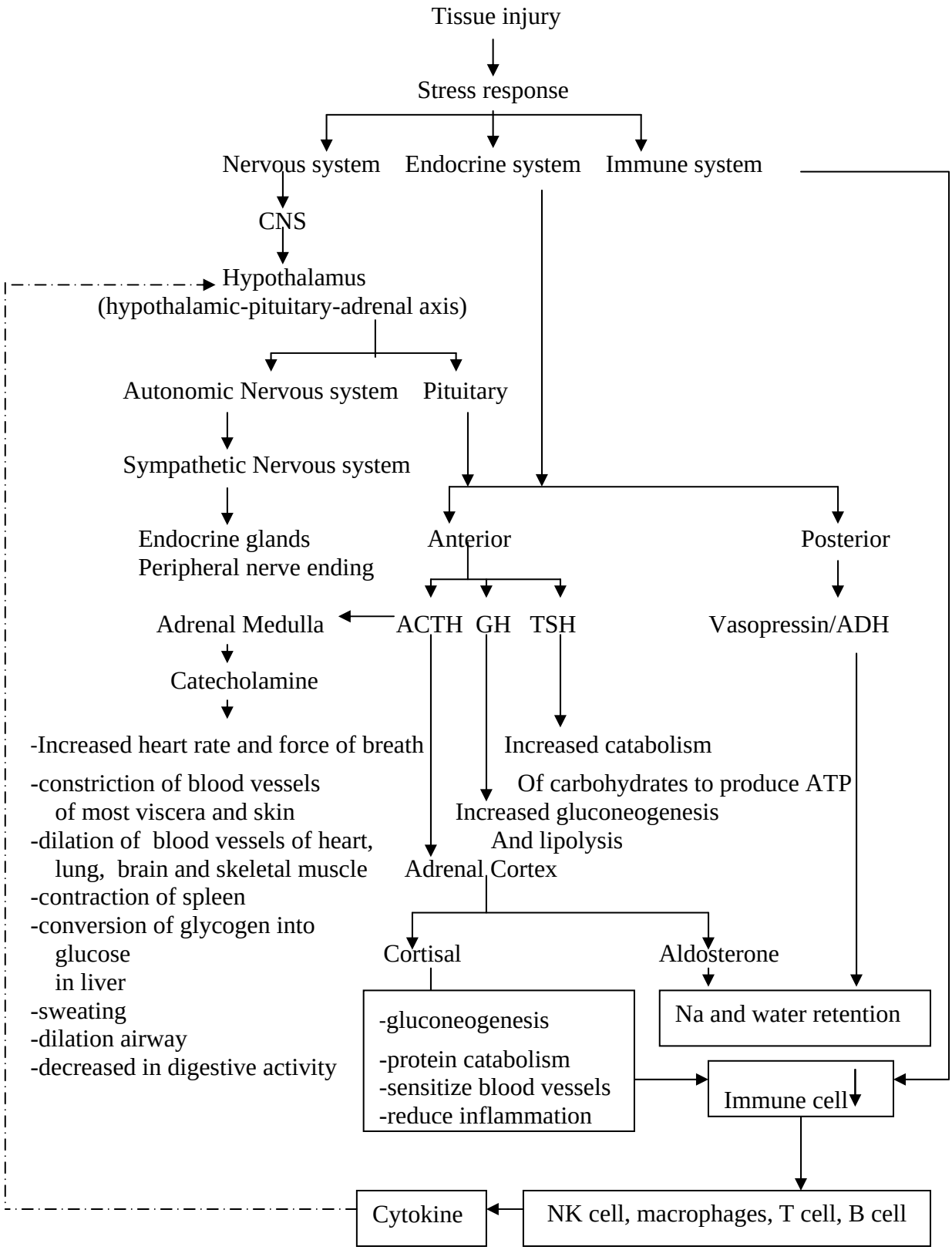

Figure 2: The physiological response to injury (adapted from Muir, 2006; Cotton et al., 2006; Giannoudis, 2003; Wattanasirichaikul, 2002a)

1.4 Physiological response of the patients with life threatening condition

1.4.1 Physical reaction toward hypoxemia: In injured patients, hypoxemia is a major life threatening cause. Hypoxemia is from airway obstruction and abnormal breathing. For airway obstruction, the patients have problem to breath air into lung that make difficulty of exchanging intrinsic and extrinsic air in lung leading to have decrease of oxygen in lung. As that cause, blood flow through lung will have less oxygen causing low oxygen saturation and tissue hypoxia. Brain can tolerate only 4 minutes for hypoxemia (Guyton & Hall, 2006; Pongnumkul, 2004). In the meantime, if the patients fail to exhale, carbon dioxide level in lung will be gradually elevated, and poor carbon dioxide (CO_2) exchange from blood to air in lung will be found. It causes high CO_2. In the patients with thoracic in jury, poor air exchange and perfusion are detected because there is significant difference of alveolar pressure and capillary pressure that increase CO_2 perfusion as CO_2 is dissolved in blood better than oxygen for 20 times and have less lung capacity. Capillary injury will generate hypoxemia. Signs and symptoms of hypoxemia are anything shows inadequate oxygen supply of the tissues. The symptom usually occurred when PaO_2 is lower than 40-50 mmHg. The organs, which are sensitive to hypoxemia, are brain, heart and lung so the reaction is the change of neurological condition for instance, restless, unconscious, and alteration of consciousness (Guyton & Hall, 2006; Phanpukdee, 1994; Pongnumkul, 2004).

Initial cardiac reaction toward hypoxemia is tachycardia, hypertension and increased cardiac output. If prolonged hypoxemia is occurred, bradycardia, hypotension, decreased cardiac output and abnormal heartbeat will be detected. In addition, hypoxemia offers pulmonary vasoconstriction. The hypoxemia outcome as inadequate tissue perfusion that create anaerobic metabolism and lactic acid including metabolic acidosis (Graham & Parke, 2007; Guyton & Hall, 2006; Havanond, 2001; Phanpakdee, 1994).

Reactions to hypoxemia include rapid breathing, dyspnea, shortness of breath and the decreased breathing. Cyanosis will be observed in case severe hypoxemia (Guyton & Hall, 2006; Phanpakdee, 1994).

The assessment of hypoxemia consists of signs and symptoms, EKG, oxygen saturation and arterial blood gas (Graham & Parke, 2007; Phanpakdee, 1994).

1.4.2 Physical reaction toward inadequate tissue perfusion: inadequate tissue perfusion is a vital cause of life threatening in trauma patients that is frequently found in the trauma patients with shock and hypovolemia (Hansen, 1998; Kneale, 2003) leading to the failure of oxygen and nutrient transfer (Graham & Parke, 2007; Guyton & Hall, 2006; Hansen, 1998; Kneale, 2003; Tuntayothai & Malatham, 1994; Wattanasirichaikul, 2002b). Normal blood circulation would need 3 major components, which are total blood volume, cardiac pumping and vascular tone (Guyton & Hall, 2006; Havanond, 2001; Tuntayothai & Malatham, 1994; Wattanasirichaikul, 2002b). Those abnormalities as mentioned can be found in trauma patients. Compensated functions from others will be for dysfunction of any organ (Guyton & Hall, 2006; Tuntayothai & Malatham, 1994) that aim to maintain adequate tissue perfusion and blood circulation. Several functions will be worked to compensate shock. Physical reactions of trauma patients are as follows:

Conscious level: in early stage of shock, overload of neurological function will release cathecolamine. The patients will be nervous, restless, and confusion. If compensated mechanism does not work properly, brain hypoxemia would be occurred with the signs and symptoms as stupor, semiconscious, and confusion. In the patients with severe shock, they are commonly found unconscious (Guyton & Hall, 2006; Havanond, 2001; Kampheangpan, 2001; Kneale, 2003; Tuntayothai & Malatham, 1994; Wattanasirichaikul, 2002b).

Skin appearance: due to the decrease of blood supply to skin, skin appearance includes cold, and pale. Cyanosis may be found that means there are many red blood cells carried inadequate oxygen in capillaries. It is found in the patients with cardiac and respiratory arrest. After skin and nail are compressed, capillary filling will be slower than normal (Guyton & Hall, 2006; Havanond, 2001; Kampheangpan, 2001; Kneale, 2003; Tuntayothai & Malatham, 1994; Wattanasirichaikul, 2002b).

Cardiovascular system: heart rate will be elevated from the stimulation of sympathetic nervous system and be decreased. In the end of shock, pulse rate is usually slow and irregular those are a significant indicator to express the volume of cardiac output per minute and capillary resistance. The patient with shock condition will have hypotension, < 90 mmHg or declined blood pressure < 50 mmHg (Guyton &

Hall, 2006; Havanond, 2001; Kampheangpan, 2001; Kneale, 2003; Tuntayothai & Malatham, 1994; Wattanasirichaikul, 2002 a/b).

Respiration: according to the decrease of blood circulation, the patient will have tachycardia and metabolic acidosis (Guyton & Hall, 2006; Havanond, 2001; Kneale, 2003; Tuntayothai & Malatham, 1994).

Renal system: The decreased urine output is a sign of less blood circulation to kidneys. Urine output should be maintained > 30 ml/hr (Guyton & Hall, 2006; Havanond, 2001; Kneale, 2003; Tuntayothai & Malatham, 1994).

Digestive system: Constriction of superior mesenteric artery causes nausea, vomiting, and abdominal pain. Prolonged inadequate blood supply to digestive organs will cause ischemic and intestinal edema (Guyton & Hall, 2006; Havanond, 2001; Kneale, 2003; Tuntayothai & Malatham, 1994).

Acid-base status: Due to anaerobic metabolism, the patient will be fatigue, stupor, confusion, kussmaul respiration, arrhythmia, and cardiac arrest. If pH of blood is lower than normal level, acidosis and BUN will be elevated (Guyton & Hall, 2006; Havanond, 2001; Kneale, 2003; Tuntayothai & Malatham, 1994).

Assessment on tissue perfusion can be done by skin appearance, pulse rate and rhythm, level of conscious, blood pressure and urine output (Kampheangpan, 2001; The American College of Surgeons, 2004).

2. Management on life threatening condition for trauma patients

2.1 Managerial concept for life threatening conditions in trauma patients.

Treatment of trauma patients with severe injury and life threatening conditions has to include the assessment and initial proper treatment e.g. proper diagnostic assessment, immediate appropriate treatment, monitoring, consultation or referral to appropriate specialists. American College of Surgeons set the Advanced Trauma Life Support (ATLS®) as a standard for care of trauma patients that is a practice guideline for trauma patients (Hassan & Tesfayohannes, 2006; Kanchanarin, 2004; Kampheangpan, 2001 Sakolsatayadorn, 1999). It will be started with initial assessment to rule out the life threatening conditions and identify the injuries including prioritize management. The principles of Advanced Trauma Life Support (ATLS®) comprise 4 phases as follows:

1. Primary survey assessment of ABCDE and Resuscitation are immediate evaluation on immediate life threatening conditions that might cause death of the patients. It involves with assessment on respiratory system and circulation within 1 minute and immediate resuscitation by the assessment of the following vital systems (Sakolsatayadorn, 1999):

1.1 Airway maintenance with cervical spine control

Airway is a significant part in trauma patients because airway obstruction can be occurred and a cause of death. In unconscious patients or patients who cannot inform about neck injury, they should be assumed to have cervical injury. Appropriate management by using collar or sand pillow to prevent progressive cervical damage should be applied. The significant things are to assess and eliminate foreign body in the patient's mouth and airway. To open it, chin-lift technique is applied by grasping mandible with fingers, pulling chin forward, and using a thumb push the lower lip to open the mouth. If chin-lift is failed, Jaw thrust should be applied by using hand to hold Angle of mandible, push forward, then use suction to suck blood and/or secretion out, and insert oropharyngeal airway or nasopharyngeal airway. Endotracheal tube will be used in case of ventilatory insufficiency with the symptoms of accessory-muscle breathing, stridor, tachypnea and cyanosis. If there is obvious ventilatory failure, Endotracheal tube has to be applied.

1.2 Breathing

Basic physical examination techniques, which are inspection, palpation, percussion and auscultation, should be applied to assess breathing condition of trauma patients (Kampheangpan, 2001). Inspection aims to find abnormal signs of breathing such as expanding chest cavity, breathing with accessory muscle, thoracic wound, and distended neck vein. Palpation might find subcutaneous emphysema and tracheal deviation. Percussion might detect hyperresonance and dullness. Auscultation might notice the decreased breath sound in any lung. Life threatening conditions, which include tension pneumothorax, flail chest, open pneumothorax, and massive hemothorax have to be immediately managed. Tension pneumothorax needs to be corrected by needle thoracentesis which uses the needle No. 14 or 16 penetrate into second intercostal space midclavicular line to release air inside lung, and then inserting ICD. Flail chest should be treated by thoracostomy tube and pain control

management. Open pneumothorax should be covered by three dressing and inserted ICD. Massive hemothorax will be treated by insertion of ICD.

1.3 Circulation with hemorrhage control

External bleeding is mostly controlled by direct pressure to the lesion but prolonged clamping should be avoid that might cause neuro-vascular injury. Signs and symptoms of massive blood loss are the decreased consciousness or alteration of conscious, pale skin, tachycardia, and hypotension. The treatment would be intravenous fluid compensation. Diagnosis peritoneal lavage (DPL) or Focus assessment sonography in trauma (FAST) technique should be applied in case of suspected to have internal abdominal bleeding with unclear sign in the patient with hypovolaemic shock.

1.4 Disability: Neurological status

Neurological assessment can be done by Glasgow Coma Scale (GCS), pupil size and reaction to light, signs of paraplegia and tetraplegia. The neurological finding as the decreased GCS is frequently found. Repeated neurological assessment to evaluate consciousness should be provided. The assessment in this phase will take as a baseline to compare with the secondary survey.

1.5 Exposure/ Environmental control

Trauma patient has to have fine physical examination to investigate possible evidences of injured lesions. Undressing the patient is necessary but to prevent hypothermia, blanket will be used to cover the patient after the investigation. Logroll is used to change the patient's position.

Adjuncts to primary survey and resuscitation is an assessment to diagnose such as EKG monitoring, urinary catheterization to monitor haemodynamic status is routine during the primary survey. The urine output helps to assess the volume status and end-organ perfusion, particularly if aggressive fluid resuscitation was necessary. Urinary catheterization will not be done in case of patient with urethra injury with the signs of bleeding through urethra, hematoma at perineum, impalpable testis by PR, and pelvic fracture. Gastric catheterization aims to reduce gastric distension and aspiration. Radiation study e.g. chest x-ray, cervical spine x-ray, pelvis x-ray should be done. In the patient who is suspected to have abdominal injury, FAST diagnostic technique should be applied.

2. Re-evaluation will be performed after the Primary survey and resuscitation with the finding of normal vital function but it should be continuously repeated. Constant re-evaluation aims to monitor physiologic parameters for instance, pulse, blood pressure, respiratory rate, arterial blood gas, oxygen saturation, body temperature and urine output.

3. Secondary survey and diagnostic evaluation include gathering the history and detailed physical examination. Gathering the history applies the principles of AMPLE which are Allergies, Medication, past illness, last meal and Event related to injury. Detailed physical examination involves with all systems from head to toe for instance, head, face, neck, chest, abdomen, vagina or testis and anus, skeletal and muscles and nerves.

4. Definitive care: after stable patient's condition and causes of injury detected, the patient should be referred to OR, ICU and ward. To refer the patient, all details of the patients including details of treatment outcome and previous investigations have to be transferred that will assist future unit to appropriately prepare for the patient. During transfer or repatriation, medical escort with necessary medical equipment will be needed (American College of Surgeons Committee on Trauma, 2004). As in figure 3 below:

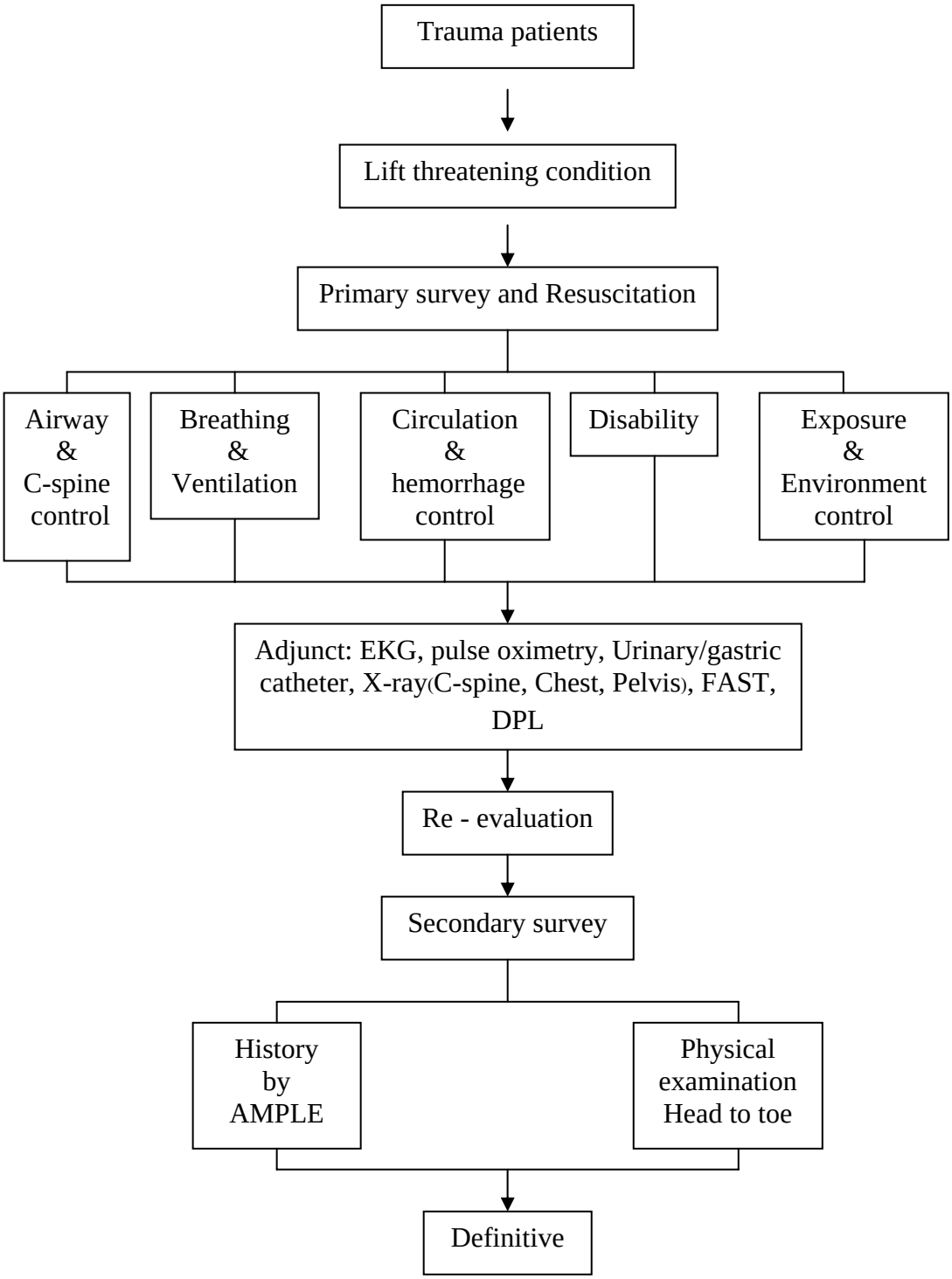

Figure 3: Flow chart for the Management on life threatening condition for trauma patients (Adapt from Advanced Trauma Life Support (ATLS®) by American College of Surgeons Committee on Trauma, 2004)

2.2 Nursing management for life threatening condition in trauma patients

2.2.1 Assessment and management: initial assessment and management have to be prioritized (Unhasuta, 2006) as follows:

1. Respiratory assessment is an evaluation of airway, breathing through airway, observing nature of breathing, palpating tracheal and detecting foreign body in mouth and trachea. Nursing management is to keep neck steady with collar, clear airway, report to physician and prepare endotracheal insertion.

2. Breathing assessment is to evaluate sufficiency of oxygen by oxygen volume and carbon dioxide release, abnormal breathing, and causes, especially thoracic injury. Nursing management includes oxygen management for all patients with severe injury by facemask with reservoir 10-12 liter/minute. Bag-valve-facemask technique should be applied prior to endotracheal insertion. Preparation on necessary equipment for chest tapping in cases of patients with thoracic injury should be provided.

3. Circulation assessment should be done by observing hypotension, particularly in the patient with shock from blood loss. If hypotension is detected, we should think about blood loss until it is eliminated. Nursing management involves with direct pressure to stop bleeding in case of external bleeding and treatment protocol for patient in shock.

4. Neurological assessment is to determine oxygen supply to brain by considering pupil size and reaction to light and conscious level. Nursing management consists of assessing on the cause of decreased consciousness and monitoring intracranial pressure and then report to physician.

5. Physical examination aims to investigate injury. Nursing management includes undressing the patient to for inspection on head-to-toe and front and back, and then covering the patient with blanket, record on evidence and wound.

2.2.2 Monitoring and evaluation comprise with EKG monitoring, urine catheterization to estimate kidney function, gastric tube to release gastric pressure and reduce risk of aspiration (Cole, 2004; Dow, 2005; Hassan & Tesfayohannes, 2006). Other investigations involve with evaluation on oxygen status from skin, consciousness, oxygen saturation > 95% (Graham & Parke, 2007; Phanpakdee, 1994), tissue perfusion from systolic pressure > 90 mmHg, pulse, skin

shade and urine output > 1ml/kg (Khampeangpan, 2001; The American College of Surgeons, 2004).

As mentioned, care for trauma patients with life threatening condition is applied Advanced Trauma Life Support (ATLS®). Nurses have to have good knowledge on pathophysiology, physical reaction to injury and appropriate nursing care aiming to help patient's life from life threatening condition. From the literature review on nursing practice guideline for trauma patents with life threatening conditions, there is no certain nursing practice guideline for this matter in either Thailand or International. As that reason, this research is to develop nursing practice guideline for trauma patient with life threatening condition that will assist nursing team at emergency room as a certain guideline with the same direction.

3. Development of a clinical nursing practice guideline

Medical, nursing and public health societies are excited with research utilization or evidence-based practice to develop quality of services that are significant key factors of quality of healthcare services. Thus best healthcare services depend on best evidence for clinical decision by using the concept of patient center. Key connection between empirical evidence, and practice that is Clinical Nursing Practice Guideline. It has the purpose to assist on the clinical decision and appropriate efficient care for the patients. In addition, if the clinical nursing practice guideline is appropriately applied, it will help clinical nursing practitioners modifying the science evidence with arts of nursing care and get the best nursing care for the patients (Tilokskulchai, 2006).

3.1 Models of development of a clinical nursing practice guideline

In the present, there are several models on the development of a clinical nursing practice guideline, such as IOWA Model, The settler Model of research utilization, and The center for Advance Nursing Practice Evidence-based Practice Model.

3.1.1 IOWA Model of Evidence-Based Practice to Promote Quality Care (Titler et al., 2001) has the belief about the projects which apply research outcomes or empirical evidence will be started the stimuli to develop the practice either clinical problems or organization problems by information from risk management, quality control units such as TQM, QA, CQI, financial unit and other arousal from realization

on innovation from researches or standards and practice in the units in terms of the following activities and steps:

1. Consideration on the problems that need development may involve with 2 stimuli e.g. Problem-focused trigger and Knowledge-focused trigger.

2. Consider about the occurred problem that organization wants to change.

3. Gather, analyze, evaluate and synthesize researches and evidences from literature review for the practice.

4. Consider on supportive researches are adequate, if there is a pilot project to implement on the changed practice. If there is an inadequate supportive researches, research team has to well design the research with adequate samples to answer research questions with reliability.

5. In case there are adequate supportive researches and pilot project is implemented, research team has to consider the changes that are appropriate for actual practice. If the changes are appropriate, actual implementation with monitoring and analysis on structure, process and outcomes covering all factors including education will be provided.

3.1.2 The Stetler Model of Research Utilization (Stetler, 1994) is a model to promote and support the thinking analysis about modification on the research outcomes to the practice model which is modified and continuously developed in 2001 for more extensive coverage that includes 5 phases as follows:

1. Preparation. In this phase, nurses define the underlying purpose and outcome of the project: search, sort, and select sources of research evidence; consider external factors that can influence potential application and internal factors that can diminish objectivity; and affirm the priority of perceived problem.

2. Validation. This phase involves a utilization focused critique of each source of evidence, focusing in particular on whether it is sufficiently sound for potential application in practice.

3. Comparative, Evaluation, and Decision Making. This phase involves a synthesis of finding and the application of four criteria that, teken together, are used to determine the desirability and feasibility of applying findings from validated sources to nursing practice. The end result of the comparative evaluation is

making a decision about using the study finding. If the decision is a rejection, no further steps are necessary.

4. Translation. These phases involve activities to (1) confirm how the finding will be used, and (2) spell out the operational details of the application, and implement them.

5. Evaluation. In the final phase, the application is evaluated, Informal use of the innovation versus formal use would lead to different evaluative strategies.

3.1.3 The center for Advance Nursing Practice Evidence-based Practice Model (Soukup, 2000) is a model, which is introduced to Nursing Practice Executive in Nebraska, USA. It earns certain process and covers phases of development that are related I the whole thinking process and synthesis. It emphasizes on the development that offers changes in the organization and constant development. It consists of 4 phases if developing process as follows:

1. Evidence-trigger phase refers to arousal generates clinical problem, which is occurred from practice or research.

2. Evidence-supported phase involves with re-checking and investigation on empirical evidences for the best practice.

3. Evidence-observed phase involves with research proposal throughout the practice with appropriate measurable methods.

4. Evidence-based phase is a phase including analysis based on data in evidence-supported phase and evidence-observed phase.

Each model has similar phases with different advantages and disadvantages. As this research on the development of a clinical nursing practice guideline for trauma patients with life threatening condition, the investigator applies evidence-based practice model (Soukup, 2000) to modify as a conceptual framework for this study.

3.2 Development of a clinical nursing practice guideline according to the empirical evidence

Nursing practice evidence-based practice model of The Center of Advance Nursing Practice Evidence-based Practice Model (Soukup, 2000) includes with 4 phases as follows:

Phase 1: Evidence-triggered phase involves with survey and problem identification by gathering intrinsic data that involve with clinical problems, which need the solution. Problem identification will be done with 2 arousal.

1. Practice triggers are stimuli that occurred from problems and gathered data from actual practice. The problems are often found in the real practice.

2. Knowledge triggers are the stimuli that are occurred from knowledge of development on clinical practice, advance technology and development of practice program.

Phase 2: Evidence-supported phase involves with the utilization of reliable data from empirical evidence related with this matter for instance, literature review and analysis-synthesis of researches and empirical evidences for the best evidences of innovation of effective practice. Emphasized points are to seek relevant data, evaluate each data and integrate them to be knowledge. To bring out the best evidences, some questions are established. Some evidences, which are useful to establish as mentioned are principle of population setting, operation/certain treatment, comparison and measurement of the results-called PICO as follows:

Patient population or problem is a phase of population or interested problem identification.

Intervention or area of interest includes with operation, treatment or interests that have to be specific.

Comparison intervention (if available) is the comparative identification to set up the framework of the investigation.

Outcome has to be definite and measurable. To limit the outcome, it sometimes is necessary because the literature review is specific in population, operation/treatment and comparison of the interest. Immeasurable outcome cannot be used.

Those data should be synthesized and developed to be a clinical practice guideline (Melnyk & Fineout-Overhott, 2005).

Phase 3: Evidence-observed phase is to implement the clinical practice guideline with appropriate and measurable method. Clinical practice guideline, which is introduced, may be a pilot study, clinical study or evaluation on the actual practice

performance based on the outcomes. To evaluation on feasibility of the practice, the concept of Polit and Beck (2004) is applied as follows:

1. Transferability: Key of transferability is to apply the clinical practice guideline into the working units and evaluate the appropriation of the practice. Questions about transferability are:

Is the clinical practice guideline related to the unit?

Is the population group similar to the population in the unit?

Is the numbers of the patients who receive the benefits from the practice adequate?

How long will the process and the evaluation take?

2. Feasibility: The concerns should be staffs and facility, authorization of the nurses on the clinical practice guideline, the need of coalition from other units. Questions about feasibility are as follows:

Does the nurse have freedom to proceed along with the clinical practice?

Does the executive give full support?

Does organization atmosphere support the feasibility?

Are there sufficient essential tools and accessories for the implementation of the clinical practice guideline?

3. Cost-benefit ratio: It involves with the evaluation on the cost and benefit of the clinical practice guideline, risk and complications.

Phase 4: Evidence-based practice includes the analysis based on data from the Evidence-supported phase and the Evidence-observed phase aiming to have the best clinical practice model that can be actually implemented and planned for new changes.

Conceptual Framework of the Study

The conceptual framework of this study comprises hypoxemia and inadequate tissue perfusion that cause life threatening conditions in trauma patients. Life threatening conditions may be from pathology of tissue and vascular damage or bone fracture that yield the changed kinetic force from extrinsic to intrinsic one (Autravichien, 2005). Hematoma will be found at the injured site, which has tissue

and vascular damage or bone fracture. Facial and neck injury may cause airway obstruction from bleeding that bar the regular ventilation of the patient from outside lung to alveolar. It makes alveolar hypoventilation that leads to hypoxemia and hypercapnia. Alveolar hypoventilation is detected while normal blood circulation through alveolar is existed that causes the mixed venous blood as well as low-oxygen blood. It combines with the blood with normal oxygen saturation that will generate the reduction of PaO_2 and then hypoxemia. If thoracic injury produces internal abdominal bleeding and pneumothorax, alveolar hypoventilation will be occurred that will offer the decrease of blood oxygen leading to have hypoxemia. Pneumothorax increases pulmonary pressure in lung cavity from blood and air that will compress lung tissue, mediastinum to the opposite side and compress the superior vena cava leading to have less cardiac output and dropped blood pressure including inadequate tissue perfusion. Hemorrhage at myocardium affects to cardiac systole and cardiac dysfunction that lead to have the consequence of low blood circulation to heart, less cardiac output, hypotension and inadequate tissue perfusion. In addition, internal and external bleeding cause hypovolemia, hypotension, less cardiac output and inadequate blood circulation that generate poor nutrition and oxygen to cells. Injury has physical reactions to compensate for keeping the balance. If the body fails to compensate on oxygen and nutrient, the trauma patients will finally die. Hence, assessment, nursing management and constant monitoring will save the trauma patients from life threatening conditions.

CHAPTER III
METHODOLOGY

Selected Model for Implementation

The development of a clinical nursing practice guideline for management life threatening conditions in trauma patients applies the Evidence-based Practice Model of Soukup (2000) to be a model for implementation. As the reason, the model has strength on effectiveness of quality development and problem identification including corrective plan for the problem, which is actually implemented. Process of development has 4 phases as follows.

1. Evidence-triggered phase. This phase involves a investigation and problem identification by gathering intrinsic data that related to clinical problems that are in concern and need correction. The investigation focuses with 2 stimuli, which are practice triggers and knowledge triggers. Practice triggers are the arousal from problem and actual gathered data from the practice. Knowledge triggers refer to the arousal from knowledge that is from the development of clinical practice, technology, and operating program.

2. Evidence-supported phase. This phase of utilizing reliable data to support. The reliable data comes from reviewing the empirical evidence that related to the concern and relevant researches, analyzing and synthesizing the researches and empirical evidences to get the best evidence for new innovation of the effective nursing practice guideline.

3. Evidence-observed. This phase involves with the trial of the established clinical nursing practice guideline for feasibility of implementation. It is a pilot study.

4. Evidence-based phase. In the final phase, is to utilize the innovation to analyze and modify for the best practice that can be applied with the actual practice. Action plan for innovation is required.

Process of development the clinical nursing practice guideline

Details of the development of a clinical nursing practice guideline to manage life threatening conditions in trauma patients applies the Evidence-based Practice Model are as follows.

Phase 1 Evidence-triggers phase

It is a process of problem identification. In this study, it involves with the analysis on life threatening conditions of trauma patients in the practice and knowledge review.

1.1 Practice triggers

The problems analyzed by observing nursing practice. This study observes the life threatening conditions in trauma patients at emergency room of Siriraj Hospital from 22 November 2007 to 21 February 2008. There were 4 patients of life threatening conditions being observe the description and detail are present in Appendix A. The cause of life threatening was from blood loss that generates inadequate tissue perfusion. The patient will show with the following signs and symptoms: tachycardia, sweating, cold skin, pale, hypotension and poorer consciousness. Facial injury with bleeding in nose, mouth and airway also causes life threatening conditions in trauma patients, which yield airway obstruction, hypoxemia. The signs and symptoms of airway obstruction and hypoxemia are the increased respiratory rate, tachycardia, poorer consciousness and oxygen saturation < 95%, see in Table 2.

To analyze the unit from the actual clinical nursing practice to manage life threatening conditions in traumatic patient of Siriraj Hospital, SWOT analysis was applied. The findings showed both physicians and nurses have capability to provide care for trauma patients with life threatening conditions. The nurses have the support on constant training about nursing care for trauma patients and review on the practice via videoconference for development and lesson learning. The nursing record has to be completed in details that will help quality control for the development of professional standard. However, the unit did not have the clinical nursing practice guideline to manage life threatening conditions in trauma patients. For management on life threatening conditions, assessment and management are in physician's role but nurses have no clinical nursing practice guideline at this moment. Due to no clinical

nursing practice guideline as mentioned, actual nursing practice is various with uncertain steps of nursing care, not followed the steps of ABCDE in ATLS®, and no continuous monitoring.

Table 2: Signs and Symptoms of 4 trauma patients with life threatening conditions.

Sign& Symptoms	Case I	Case II	Case III	Case IV
Pulse rate / bpm	146	96	40	140
Respiratory rate / bpm	22	16	20	28
SBP / mmHg	80	110	120	Can not be assesses
MAP / mmHg	53.3	76.67	86.67	Can not be assesses
Level of conscious	drowsiness	drowsiness	drowsiness	drowsiness
GCS	$E_3V_4M_6$	$E_3V_5M_6$	$E_3V_5M_6$	$E_3V_4M_6$
	13	14	14	13
Capillary refill / (sec)	>2	<2	<2	>2
Sweating	yes	no	no	yes
Skin color	pale	not pale	not pale	pale
Skin temperature	cool	cool	cool	cool
O_2 saturation / %	93	92	86	87

1.2 Knowledge triggers

1.2.1 Hypoxemia of trauma patients comes from partial or completed airway obstruction. Airway obstruction is from patient's upper airway relax and tongue can prolapsed in unconscious patients, facial injury with bleeding in nose, mouth and airway, pharyngeal edema, residual food and blood clot. Poor or no air exchange in alveolar cause low oxygen in lung that offer hypoxia. Brain can tolerate only 4 minutes in situation of no oxygen supply. Failure of exhalation and carbon dioxide exchange will elevate carbon dioxide level in blood. Physical compensation will be rapid breathing. The muscles helping breathing will work harder than before

and can be noticed such as sternocliedomastoid muscle. If airway obstruction is persisted with failure of correction, suprasternal notch, supraclavicular fossae, intercostals space, and epigastrium will be compressed backward. Abnormal breathing and paralyzed diaphragm can be found in the patients with thoracic injury who have severe flail chest, open pneumothorax and massive pneumothorax and usually have alveolar hypoventilation leading to have hypoxemia and hypoxia. In addition, even if the patients with tension pneumothorax can breathe in pleural cavity but the air is trapped during expiration. The result of it is gradual increase of carbon dioxide and poor carbon dioxide exchange from blood to air in pleural cavity that cause hypercapnia. Increased intrathoracic pressure will compress the lung that generates poor tissue perfusion and hypoxemia.

1.2.2 Inadequate tissue perfusion of the trauma patients is from huge blood loss and the patients can be in shock. The compensating mechanism includes peripheral hypoperfusion to keep balance of blood volume. The significant compensating mechanism of blood loss involves with the hypoperfusion that arouses Adrenergic autonomic nervous system to increase vasoconstriction, and preload of cardiac output to balance perfusion pressure of coronary arteries and brain. Neuroendocrine activation of kidney, which consists of renin-angiotensin, and aldosterone to increase sodium and fluid accumulation that elevate cardiac preload and output. Blood loss as a sign of cardiovascular system will be the first ones detected. Other symptoms will be followed. If blood loss is continued and failed control, the patient will be in shock status. The consequence of shock will affect to all organs and yield abnormal function and dysfunction.

1.2.3 Emergency care emphasizes on saving life of the trauma patients in the golden period. The patients with life threatening conditions require immediate effective management by well-trained healthcare team to prevent and reduce mortality from error. The American College of Surgery provides the Advanced Trauma Life Support (ATLS®) to be a practice guideline that carries 4 phases as follows (Hassan & Tesfayohannes, 2006):

1. Primary survey assessment of ABCDE and resuscitation
2. Re-evaluation
3. Secondary survey and diagnostic evaluation

4. Transfer for definitive care

From nursing experience and knowledge review, the etiology of life threatening conditions in trauma patients includes hypoxemia and inadequate tissue perfusion causing hypoxia and insufficient nutrient supply to vital organs. Hence, physical reactions are occurred, which are the reaction of hypothalamus-pituitary-adrenal axis, immune system and metabolism to keep balance. Balance of blood circulation aims to promote adequate blood supply to cells and vital organs. The patients have to receive immediate appropriate management for life threatening conditions. The nurse is a healthcare provider in emergency care team who generally spends time with the patients the most and plays a big role in the early detection to prevent or reduce complication that promote patient's safety from disability and complication (Sararatch, 2003). From higher statistic and complicated management for life threatening conditions in trauma patients, the investigator conducts the development of a clinical nursing practice guideline for life threatening conditions in trauma patients aiming to have a standard practice guideline for all nurses and improve nursing care quality.

Phase 2 Evidence-supported phase

This phase involves with the reliable supportive data that includes evidences or empirical data in the concerned issue. The relevant evidence and empirical data have to be analyzed and synthesized for the best evidence that can assist achieving the innovation of more effective nursing practice. Details of this phase are as follows:

1. Selection criteria

The criteria is to select the evidences from PICO framework (Melnyk & Fineout-Overholt, 2005), relating to the topic of this study using identified population, method, and outcome evaluation. The detail can be explained as following:

P (Population): Traumatic patient with life threatening conditions

I (Intervention): Airway control, breathing and ventilation, circulation, monitoring

C (Comparison): not available

O (Outcome): The traumatic patient is survived without hypoxemia and inadequate tissue perfusion

Inclusion criteria

Inclusion criteria of the review on researches and empirical evidences are as follows:

1. Researches and empirical evidences that are related with the management of life threatening conditions in trauma patients

2. Researches and empirical evidences in all levels

3. Publications from 2000-2007 in both English and Thai language

2. Key word identification

- Life threatening conditions in trauma and management
- Trauma and management
- Trauma and airway
- Trauma and shock
- Trauma and bleeding
- Trauma and monitoring

3. Searching Database

- Databases which offer systemic review: www.evidencebenrsing.com, www.joannabrigges.edu.aau and www.cochrance.org
- Databases which offer guidelines: www.guideline.gov
- Databases which carry individual researches: OVID, CINAHL, PubMed, Medline, Blackwell synergy, and Science direct

4. Searching result

From the review or investigation of this study, there are totally 19 researches and empirical evidences, which include 2 researches, 1 systemic review, 5 articles and 11 expert opinions. Numbers of database, keywords and empirical evidences are shown in Figure 4.

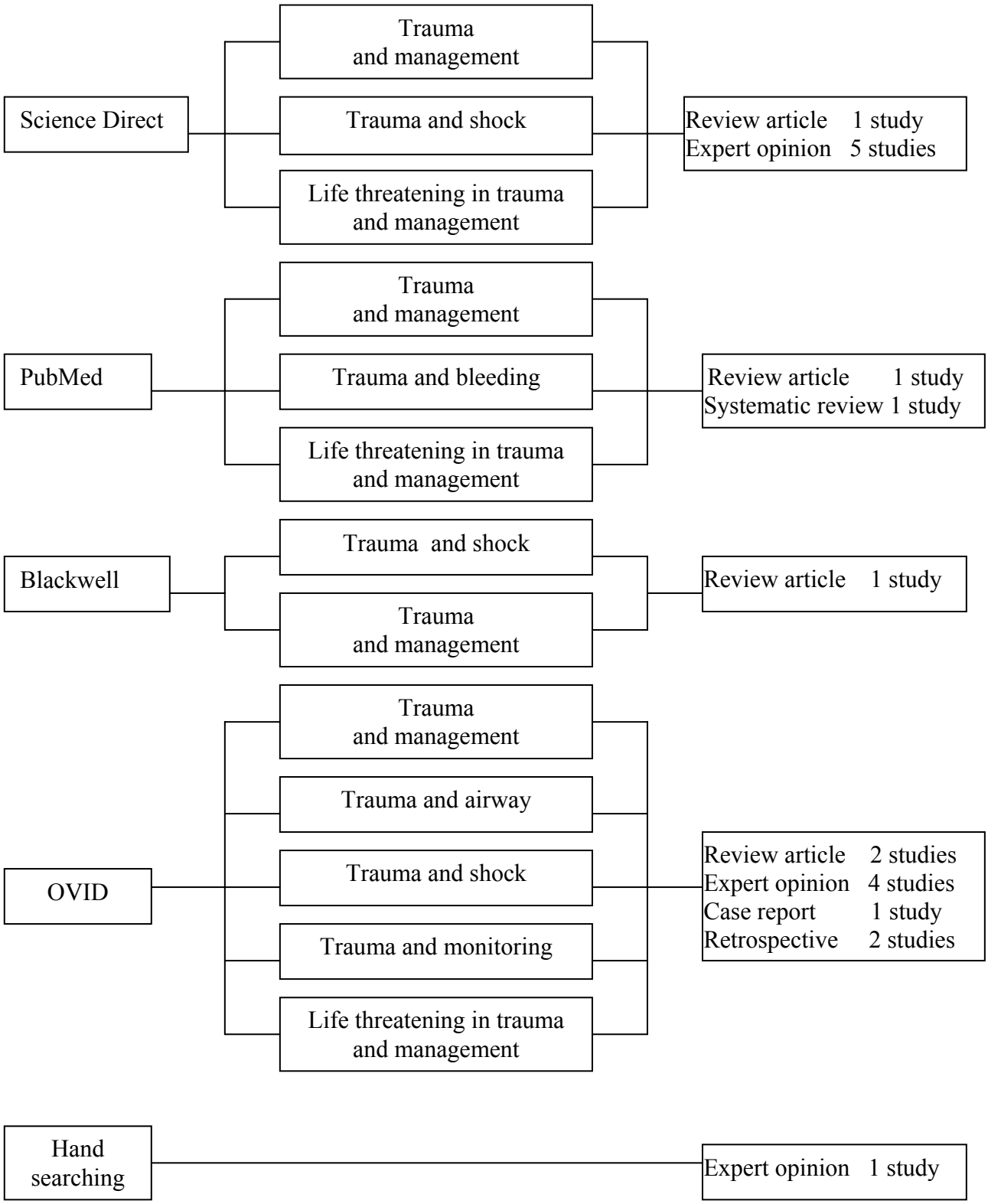

Figure 4: Searching result diagram

The level of evidences is very important to criteria a clinical nursing practice guideline, it is refer to scientific merits. In this study, the criteria of Melynk and Fineout-Overholt (2005) were used to decide the importance of evidence. All of the levels are shown in table 3.

Table 3: Rating system for the hierarchy of Evidence

Level	Source of evidence
Level I	Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs), or evidence-based clinical practice guidelines based on systematic reviews of RCTs
Level II	Evidence obtained from at least one well-designed RCT
Level III	Evidence obtained from well-designed controlled trials without randomization
Level IV	Evidence from well-designed case-control and cohort studies
Level V	Evidence from systematic reviews of descriptive and qualitative studies
Level VI	Evidence from a single descriptive or qualitative study
Level VII	Evidence from the opinion of authorities and/or reports of expert committees

The summary of empirical evidences used and level of evidence by the criteria of Melynk and Fineout-Overholt (2005) is shown in Table 4.

Table 4: Summary and classification of level of the findings

Database	Title	Research design	Level
OVID	Airway management after major trauma.	Expert opinion	7
OVID	Critical care in the emergency department: shock and circulatory support.	Review article	7
OVID	Fluid management for trauma; where are we now?	Expert opinion	7

Table 4: Summary and classification of level of the findings (continued)

Database	Title	Research design	Level
Science direct	Clinical assessment of major injuries.	Expert opinion	7
OVID	Airway management Rapid-sequence intubation in trauma patient.	Expert opinion	7
PubMed	Key issues in advanced bleeding care in trauma	Review article	7
OVID	Preventable deaths from hemorrhages at a level I Canadian trauma center	Retrospective	4
Science direct	Management of patients with major trauma.	Expert opinion	7
Science direct	Organizing and training the emergency department in the reception of major trauma.	Expert opinion	7
OVID	The Core of Resuscitation.	Expert opinion	7
OVID	Tongues, Tubes, and Teens Body Piercing and Airway Management.	Case report	7
Blackwell synergy	Trauma reception and resuscitation.	Review article	7
OVID	Assessment and management of the trauma patient.	Review article	7
PubMed	Management of bleeding following major trauma: a European guideline.	Systematic review	5
Hand searching	Initial assessment for nursing management in trauma patients.	Expert opinion	7
Science direct	Diagnosis and monitoring of hemorrhagic shock during the initial resuscitation of multiple trauma patients: a review.	Review article	7
Science direct	Early management of the acute severe trauma patient.	Expert opinion	7
OVID	Heart rate: Is it truly a vital sign?	Retrospective	4
Science direct	Chest trauma.	Expert opinion	7

The nineteen studies were summarized and classified into different levels in level IV-VII such as two studies are in level IV, one study is in level 5, and sixteen studies are in level VII. (Melynk and Fineout-Overholt, 2005)

5. Analysis and Synthesis

For this study, analysis and synthesis evidences are performed to develop the clinical nursing practice guideline for management of life threatening conditions in trauma patients by applied the implementation potential concept (Polit & Beck, 2004). The detail as follow:

Clinical relevance

According to the finding of nineteen evidences, all were relevance and can be utilized in; solving for life threatening conditions in trauma patients.

Scientific merits

These finding evidences were reliable since the evidence criteria out the studies base on their experience and expertise as they were doctor and nurses. Two studies are in level IV, one study is in level 5, and sixteen studies are in level VII.

Implementation potential

Transferability of the findings s appropriate for emergency department implementation since the characteristics of trauma unit in the studies and setting were nursing analogous, population in the evidences also similar. High Feasibility of implementation by nurse in setting. Cost-benefit ratio offers more benefits and enhance trauma patients outcome, patients and caretaker is satisfaction.

After used implementation potential in all evidences, the empirical evidences and quality assessment. The description and detail are present in appendix B. Main issue from analyzed and synthesized in the following:

1) Assessment of trauma patients is a primary evaluation to rule out life threatening conditions. It has to be immediate and accurate (Cranshaw & Nolan, 2006; Dow, 2005; Flavin & Driscoll, 2000; Seislove, 2006; Tien et al., 2007). The assessment of airway, breathing and circulation is necessary for the management of life threatening conditions (Fitzgerald et al., 2006; Graham & Parke, 2007; Jones, 2005; Wilson, Davis, & Coimbra, 2003; Spahn et al., 2007).

2) Management of life threatening conditions will use the ATLS® principles (Cole, 2004; Cranshaw & Nolan, 2006; Dow, 2005; Dutton, 2006; Griggs, 2001; Hassan & Tesfayohannes, 2006; Unhasuta, 2006).

3) Monitoring should be periodically repeated to closely observe the treatment outcomes by physiological and clinical variables and complete record (Cole, 2004; Dow, 2005; Dutton, 2006; Flavin & Driscoll, 2000; Hassan & Tesfayohannes, 2006; Jagim, 2003; Rossaint et al., 2006; Spahn et al., 2007).

4) The development of a clinical nursing practice guideline for instance, Algorithm is for life saving of trauma patients that will assist eliminating error and reducing time of saving life (Fitzgerald et al., 2006). Clear assignment and delegation of tasks will decrease the time used for saving life of traumatic patient (Flavin & Driscoll, 2000).

5) Transfer to definitive care requires complete information of the patient and previous nursing care given including the nurse notes that will help the patient to receive the continuous care (Cole, 2004; Hassan & Tesfayohannes, 2006).

6. Summary of relevant concepts

The relevant issues from the review of empirical evidences can be categorized into 3 groups as assessment, management and continuous monitoring:

1. Assessment

Assessment is a major action which requires the nurse who can provide immediate effective assessment for proper management (Dow, 2004; Flavin & Driscoll, 2000; Seislove, 2006; Tien et al., 2007) by using the initial assessment according to the principle of ATLS® for traumatic patient. Primary survey will be started to detect the life threatening conditions (Cole, 2004; Dow, 2005; Fitzgerald et al., 2006).

1.1 Airway assessment can be done by look, listen, and feel to find the signs of airway obstruction as follows: Agitation, use of accessory muscle, snoring, stridor, hoarseness, no movement of chest wall (Cole, 2004; Dow, 2005; Griggs, 2001; Hassan & Tesfayohannes, 2006; Unhasuta, 2006).

1.2 Breathing assessment can be done by look, listen, and feel to find the signs of ventilation required as follows: bruising/abrasion of the chest wall leading to movement, tracheal deviation, bradypnoea or tachypnea, hypoxia, prominent neck

veins, surgical emphysema of the chest wall and reduced or absent breath sound (Cole, 2004; Dow, 2005; Griggs, 2001; Hassan & Tesfayohannes, 2006, Unhasuta, 2006).

1.3 Circulation assessment can be evaluated by pulse rate, blood pressure, confusion, heart rate, skin, peripheral cyanosis, capillary refill (Brasel, Guse, Gentilello, & Nirula, 2007; Cole, 2004; Dutton, 2006; Graham & Parke, 2007; Griggs, 2001; Rossaint et al., 2006; Unhasuta, 2006; Wilson et al., 2003).

2. Management

2.1 Management of airway and breathing

- Prevent cervical displacement in all trauma patients until no cervical injury confirmed by using preventive equipment such as collar (Cole, 2004; Cranshaw & Nolan, 2006; Dow, 2005; Griggs, 2001; Hassan & Tesfayohannes, 2006; Unhasuta, 2006).

- Eliminate foreign body in mouth and airway by suction in case of having blood, food residual and secretion. For denture or piece of material, using macgrill forceps to remove them is recommended (Cole, 2004; Cranshaw & Nolan, 2006; Hassan & Tesfayohannes, 2006; Unhasuta, 2006). It is necessary to remove denture and tongue pin from traumatic patient to prevent airway obstruction (DeBoer, 2006).

- Oxygen mask with reservoir bag 12-15 liter for all trauma patients with normal breathing is suggested to prevent hypoxia (Cole, 2004; Cranshaw & Nolan, 2006; Dow, 2005; Dutton, 2006; Griggs, 2001; Graham & Parke, 2007; Hassan & Tesfayohannes, 2006; Unhasuta, 2006).

- In case the patient has alteration of consciousness, dropped tongue to obstruct airway will be found. To open airway, chin life is advised by using fingers to hold lower mandible and lift chin up and using a thumb to press at lower gum and open the mouth. Jaw thrust is another method to open mouth by using hands to hold lower mandible and push forward that is applied in case of suspected neck injury (Cole, 2004; Cranshaw & Nolan, 2006; Griggs, 2001; Unhasuta, 2006).

- Insert Oropharyngeal airway for unconscious patients or the patients with the suspicious of basal skull fracture. It will not be used in good conscious patients because it stimulates to have vomiting or aspiration. For conscious patients, nasopharyngeal airway is recommended because there is smaller chance of

aspiration. To insert the nasopharyngeal airway, lubricant is required. The nasopharyngeal airway supposes to be inserted through one nasal cavity until the end of the tube. The nasopharyngeal airway should be seen when the patient opens the mouth I the position of attaching to pharyngeal wall (Cole, 2004; Cranshaw & Nolan, 2006; Griggs, 2001; Unhasuta, 2006).

- In case the patient cannot breath or has inadequate ventilation, the nurse has to immediately report to physician for resuscitation. The indications for airway insertion are Glasgow coma scale ≤ 8, no breathing, no safety ventilation, prevent blood aspiration, and tracheal edema (Cranshaw & Nolan, 2006; Graham & Parke, 2007; Hassan & Tesfayohannes, 2006).
- Prior to insert airway, holding the facemask with reservoir bag with 100% oxygen is recommended. Holding the facemask requires 2 people by the first one holds the facemask with the patient's face and no leakage of air and the second one compresses bag. 3-Lead EKG, pulse oximeter and blood pressure should be monitored (Cranshaw & Nolan, 2006; Hassan & Tesfayohannes, 2006; Jagim, 2003; Unhasuta, 2006).
- Prepare definite airway. There are 3 definite airways such as orotracheal tube, nasotracheal tube and tracheostomy tube that should be inserted by tracheostomy or cricothyroidotomy surgery. Other equipment include mask ventilation, oro/nasotracheal tube, laryngoscope, suction and accessory, ventilator, equipment for airway surgery, paralyze drug: Succinycholine, sedative drug: Etomidate (Cranshaw & Nolan, 2006; Jagim, 2003).
- Assist physician holding neck in manual in-line to prevent worse cervical damage (Cole, 2004; Cranshaw & Nolan, 2006; Dow, 2005).
- Assist providing Cricoid pressure during the physician inserts the airway (Cranshaw & Nolan, 2006; Dow, 2005; Jagim, 2003).
- After airway insertion completed, blowing cuff, inspecting the airway in proper location and listen to the flowing air in both lungs are the must. It is necessary to use the equipment such as colorimetric CO_2 monitoring to evaluate carbon dioxide with expiration. Stabbing tube at the mark is recommended (Cranshaw & Nolan, 2006; Griggs, 2001; Jagim, 2003).

- After successful airway insertion, ventilation resuscitation is used positive pressure breathing technique by bag or ventilator (Cranshaw & Nolan, 2006; Dow, 2005).
- If the physician provides Rapid-sequence insertion (RSI), it is necessary to prepare tracheostomy equipment in case RSI failed (Cranshaw & Nolan, 2006; Griggs, 2001; Jagim, 2003).
- If the patient has sign and symptom of thoracic ijury, the equipment for ICD should be prepared (Cole, 2004; Griggs, 2001; Hassan & Tesfayohannes, 2006; Jones, 2005).

2.2 Circulation management

- Provide good care of airway and adequate oxygen and keep O_2 saturation > 95% (Cranshaw & Nolan, 2006; Dutton, 2006; Graham & Parke, 2007; Hassan & Tesfayohannes, 2006).
- In case of having external bleeding, direct pressure and/or vessel ligation has to be applied to the bleeding lesion (Cole, 2004; Dutton, 2006; Graham & Parke, 2007; Griggs, 2001; Hassan & Tesfayhannes, 2006; Rossaint et al., 2006; Spahn et al., 2007; Unhasuta, 2006) and lift the end up (Cole, 2004; Unhasuta, 2006).
- Open veins at upper-lesion location with large needle for intravenous fluid resuscitation (Cole, 2004; Dutton, 2006; Graham & Parke, 2007; Griggs, 2001; Hassan & Tesfayhannes, 2006; Rossaint et al., 2006; Spahn et al., 2007; Unhasuta, 2006).
- Temperature of intravenous fluid should be closely 37ºC (Dow, 2005) with speed 1-2 liter by using Crystalloid such as Ringer's lactate (Dow, 2005; Dutton, 2006; Graham & Parke, 2007; Hassan & Tesfayhannes, 2006; Rossaint et al., 2006; Spahn et al., 2007; Unhasuta, 2006).
- Provide blood tests such as arterial blood gas, serum lactate, Hct and reserve extra blood (Cole, 2004; Griggs, 2001; Hassan & Tesfayhannes, 2006; Rossaint et al., 2006; Spahn et al., 2007; Unhasuta, 2006; Wilson et al., 2003).
- Evaluate fluid volume by measuring blood pressure, pulse rate, respiratory rate, conscious level, and pupil react-to-light. Those

information will express about cerebral perfusion (Cranshaw & Nolan, 2006; Dutton, 2006; Graham & Parke, 2007; Hassan & Tesfayhannes, 2006; Rossaint et al., 2006; Unhasuta, 2006).

- If the patient shows the sign of hemorrhagic shock with no trace, immediate reporting to physician is strong recommended to evaluate chest, abdomen and pelvic (Dutton, 2006; Hassan & Tesfayohannes, 2006; Spahn et al., 2007).
- Control systolic blood pressure at 80-100 mmHg to keep tissue oxygenation (Graham & Parke, 2007; Spahn et al., 2007).
- Consider blood resuscitation in case the patient has massive blood loss with unstable conditions after intravenous fluid resuscitation done (Dutton, 2006; Graham & Parke, 2007; Rossaint et al., 2006; Spahn et al., 2007, Unhasuta, 2006).
- Keep warm to prevent hypothermia and reverse vasoconstriction (Cole, 2004; Dutton, 2006; Graham & Parke, 2007; Rossaint et al., 2006; Spahn et al., 2007, Unhasuta, 2006).
- Retain urine catheter to monitor urine output and renal hypoperfusion (Dow, 2005; Unhasuta, 2006).
- Retain nasogastric tube through nose or mouth to prevent aspiration from gastric dilation (Dow, 2005; Hassan & Tesfayohannes, 2006; Unhasuta, 2006).

3. Evaluation and monitoring

Monitoring and evaluation should be constantly repeated with monitor EKG 3 lead, pulse oximetry, BP (Brasel et al., 2007; Cranshaw & Nolan, 2006; Hassan & Tesfayohannes, 2006; Unhasuta, 2006; Wilson et al., 2003), pulse pressure, skin, conscious level, urine output, O_2 saturation and laboratory (Cranshaw & Nolan, 2006; Dow, 2005; Graham & Parke, 2007; Hassan & Tesfayohannes, 2006; Rossaint et al., 2006).

7. Pattern of clinical nursing practice guideline

The development of a clinical nursing practice guideline for management of life threatening conditions in trauma patients applies the conceptual framework of Titler (1997, pp 115) with the following major issues:

1) Purpose: A brief statement describes the patients care problem addressed.

2) Definition of key terms: Operational definition of major terms or concepts in the protocol; it is important that everyone know the meaning of the concepts.

3) Patients at risk: A brief statement or listing of patient populations that is most likely to benefit from protocol; this include a care definition, symtomatology, age or developmental level, and type of disease or condition.

4) Assessment: Example of patient and environment assessments indicate the patients who are likely to benefit from the use of the research based practice.

5) Description of practice: A description or step-by-step guideline on how to carry out the practice indicates what part is research based by referencing and footnoting the research reports: Algorithms, flowcharts, and table are useful.

6) Evaluation: The description of the process and outcome variables is used to evaluate the change in practice. Inclusion of the tools used to measure these variable is favorable.(Appendix D)

- Outcome variable: Through audit of patient record, incidence of problem.
- Process variable: Evaluation incidence of problem to implement clinical practice guideline.

7) Reference: Bibliography of research reports use to develop the research-based practice.

The descriptions and detail are present in appendix C

Phase 3 Evidence-observed phase

It is to introduce the clinical nursing practice guideline with appropriate method and measurability. The introduced clinical nursing practice guideline may be a pilot study, clinical study or operating assessment, retrogressive study, and feasibility of implementation. It is to confirm that the established clinical nursing practice guideline to manage life threatening conditions in trauma patients is standard and feasible to implement with the sampling group. The investigator will take it to be tested o

language validation from 5 experts. Five experts include 4 emergency nurses and 1 surgeon (Appendix E). The clinical nursing practice guideline is modified according to the advice of the experts as follows:

1. Definition of hypoxemia defines parameter of oxygen saturation and inadequate tissue perfusion defines parameter of systolic blood pressure.

2. Objective of the clinical practice guideline is clear with no redundancy and relates with the context of the practice.

3. Details of the clinical nursing practice guideline are related to the objective. The redundancy on the management of huge blood loss and shock should be eliminated. The guideline of the management of blood loss should be in the same direction.

4. The last item in the questionnaire should be modified and evaluate on the satisfaction in the evaluation on the clinical nursing practice guideline.

In assessing implement potential, the investigator applied assessing criteria and procedure on Polit and Beck (2004) as follows;

1) Transferability of the findings

The established clinical nursing practice to manage life threatening conditions in trauma patients is suitable for the unit because it was developed from empirical evidences which carried similar target characters with the existing management of life threatening conditions e.g. assessment, management and constant monitoring that assist saving the patients' lives.

2) Feasibility of implementation

Be able to implement the established clinical nursing practice guideline to manage the life threatening conditions I trauma patients that is in a role of nurse with physician. It is necessary to have systemic simple management of life threatening conditions in trauma patients without special equipment used but nursing tasks and nursing manpower should be considered.

3) Cost-benefit ratio of innovation

A clinical nursing practice guideline to manage life threatening conditions in trauma patients will promote certain procedure with no risk of utilization and gain more benefit than previous practice.

This thematic paper had first to third phase but does not bring it to pilot study. However, the investigators plan to pilot study in trauma patients at Emergency Department, Bangkok Metropolitan Administration Medical College and Vajira hospital.

Phase 4: Evidence-based phase

This phase has objectives to maintain the clinical nursing practice guideline in the setting after improving, developing, and analyzing the problems that occurred during implement the clinical nursing practice guideline**.** This study had plan to maintain the clinical nursing practice guideline as following:

1. Present the clinical nursing practice guideline for management of life threatening conditions in trauma patients to ward committee and plan to present it in the care team conference for developing quality of care.
2. Plan to announce the developed clinical nursing practice guideline to other settings that have the similar life threatening conditions in trauma patients at the inside and/ or outside hospital because quality developing team has a plan to make it a standard policy.

CHAPTER IV
CONCLUSION AND RECOMMENDATION

Conclusion

This thematic paper aimed to develop a clinical nursing practice guideline for management of life threatening conditions in trauma patients that can be a standard nursing practice for the unit and improve nursing quality including reduce the mortality rate. The investigator used model of the Evidence-based practice model (Soukup, 2000) to develop a clinical nursing practice guideline for management of life threatening conditions in trauma patients. The detail is described as follows:

Phase 1 refers to the problem identification that trauma patients with serve injury usually have the life threatening conditions, which are hypoxemia and inadequate tissue perfusion. Assessment, nursing management and continuous monitoring are necessary and significant to save the patient's life from the life threatening conditions.

Phase 2 involves with the review of relevant empirical evidences on quality and reliability of the evidences including feasibility of utilization. There were totally 19 empirical evidences that can be used for this study. To determine 7 levels of empirical evidences, the criteria of Melynk and Fineout-Overholt, (2005) was applied. The evidences include two retrospective researches (level 4), one descriptive systematic research (level 5), and sixteen empirical evidences from experts and/or specialty committee (level 7). The synthesis of this study carries 3 issues, which are assessment, nursing management, and continuous monitoring. The investigator developed a clinical nursing practice guideline for management of life threatening conditions in trauma patients from the review of all 19 evidences.

Phase 3 includes the test of the established clinical nursing practice guideline for management of life threatening condition in trauma patients validity by 5 experts as shown in appendix F. The clinical nursing practice guideline is modified according to the advice of the experts as follows:

1. Definition of hypoxemia defines parameter of oxygen saturation and inadequate tissue perfusion defines parameter of systolic blood pressure.

2. Objective of the clinical practice guideline is clear with no redundancy and relates with the context of the practice.

3. Details of the clinical nursing practice guideline are related to the objective. The redundancy on the management of huge blood loss and shock should be eliminated. The guideline of the management of blood loss should be in the same direction.

4. The last item in the questionnaire should be modified and evaluate on the satisfaction in the evaluation on the clinical nursing practice guideline.

This thematic paper includes only phase 1 - 3. The development of a clinical nursing practice guideline but the trial with the sampling group was not done. However, the plan for continuous development of a clinical nursing practice guideline is raised. The established clinical nursing practice guideline and utilizing process are proposed to the working unit to use to manage the life threatening condition in trauma patients.

Phase 4 involves with the prudential analysis to have the best practice model by integrating to actual practice and planning for changing to new model. The clinical nursing practice guideline for management of lift threatening conditions in trauma patients is proposed to the investigator's working unit with the implementing plan.

Recommendations

The process of development clinical nursing practice guideline for management of lift threatening conditions in trauma has many recommendations as follows:

1. Pilot testing the clinical nursing practice guideline

Since the ultimate gold of this study was to develop a clinical nursing practice guideline the investigator could not clearly demonstrate potential outcome of the integration the guideline in actual practice. Therefore, it is crucial to pilot the guideline to ensure its appropriateness and effectiveness as well as to obtain nurses' approval.

2. Introducing the clinical nursing practice guideline

It is beneficial to introduce the clinical nursing practice guideline to personal of related department to gain feedback and approval of applying the guideline in actual

practice, it should be introduced to nurses. Furthermore, it is a way to sustain the application of the clinical nursing practice guideline. It could be done as follows:

1) Promote the realization on the significance of the nursing quality improvement by using the evidences-based practice.

2) The modification between the established clinical nursing practice guideline and the previous one should be performed through the CQI process, which is a model to develop nursing quality.

3) Promote the training of utilizing the established clinical nursing practice guideline to manage the life-threatening conditions in trauma patients for nurses.

4) The presentation to public meeting or conferences inside and outside hospital is suggested.

3. Develop and modify the clinical nursing practice guideline continuously that should be consistent with the unit, context of services and new researches every 1-3 years.

4. Should provide the outcome research to test the effectiveness of the clinical nursing practice guideline.

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APPENDIX

APPENDIX A
OBSEVATION PRACTICE

รายละเอียดของผู้ป่วยอุบัติเหตุ จากการขึ้นฝึกที่หน่วยตรวจโรคอุบัติเหตุ โรงพยาบาลศิริราช ตั้งแต่วันที่ 22 พฤศจิกายน 2550 ถึง วันที่ 22 กุมภาพันธ์ 2551จำนวนผู้ป่วย 4 ราย มีดังนี้คือ

Case ที่ 1

ชายไทย อายุ 42 ปี

อาการแรกรับ : ผู้ป่วยซึม $E_3V_4M_6$ pupil 2 mm RTLBE ริมฝีปากซีด แขนขาเย็น SBP 80 mmHg, PR 146/min, RR 22/min, $SatO_2$ 93% มีแผลฉีกขาดที่แขนซ้าย ยาว 6 cm. โลหิตไหลมาก

การวินิจฉัย : Cut wound at left forearm with tear flexor carpiradialis with shock class. II

การจัดการและการรักษา : ……..

Case ที่ 2

ชายไทย อายุ ….. ปี

อาการแรกรับ : …….

การวินิจฉัย : ……...

การจัดการและการรักษา : ……..

Case ที่ 3

ชายไทย อายุ ….. ปี

อาการแรกรับ : …….

การวินิจฉัย : ……...

การจัดการและการรักษา : …….

Case ที่ 4

ชายไทย อายุ ….. ปี

อาการแรกรับ : …….

การวินิจฉัย : ……...

การจัดการและการรักษา : …….

APPENDIX B

SUMMARY AND ASSESSMENT OF EVIDENCES QUAILITY

1. ชื่อผู้แต่ง ……...

เรื่อง ……...

แหล่งที่ตีพิมพ์ ……...

Summary of evidence	Assessment of evidence quality
Objective ……	Clinical relevance ……...
Research design ……	Scientific merits ……...
Sample ……	Transferability ……...
Setting ……	Feasibility ……...
Result ……	Cost-benefit ratio ……...

APPENDIX C
CLINICAL NURSING PRACTICE GUIDELINE

แนวปฏิบัติการพยาบาลเพื่อจัดการภาวะคุกคามชีวิตในผู้ป่วยอุบัติเหตุ

1. วัตถุประสงค์ (Purpose)

……...

2. คำจำกัดความ (Definition of key terms)

……...

3. ผู้ป่วยกลุ่มเสี่ยง (Patients at risk)

……...

4. เกณฑ์การประเมินผู้ป่วย (Assessment)

……...

5. ข้อตกลงในการปฏิบัติ (Description of practice)

……...

6. การประเมินผล (Evaluation)

……...

7. เอกสารอ้างอิง (References)

……...

APPENDIX D

PATIENT' S RECORD

ตอนที่1 แบบประเมินการตอบสนองของร่างกายผู้ป่วยต่อภาวะ Hypoxemia และ Inadequate tissue perfusion

Date_____, Time_____

HN,_____, Age_____, Sex_____

Physiological response	**แรกรับ**	**….**	**….**	**….**	**….**	**….**	**….**	**….**	**….**	**….**	**….**	**….**	**….**
Respiratory rate (bpm)													
Pulse rate (bpm)													
SBP (mmHg)													
……...													
……...													
……..													
……...													
……..													
……..													
……...													
……...													

Definite care time_____, Diagnosis_____

☐OR ☐ Ward____ ☐Refer ☐ Dead ☐D/C

ตอนที่ 2 แบบประเมินการใช้แนวปฏิบัติการพยาบาล เพื่อจัดการภาวะคุกคามชีวิตในผู้ป่วยอุบัติเหตุ

เวลาแรกรับ_____, เวลาเริ่มใช้แนวปฏิบัติ_____, เวลาออกจากER_____ไป_____

กิจกรรม	ไม่ได้ปฏิบัติ	ปฏิบัติ						หมายเหตุ
		เวลาปฏิบัติ	ผู้ปฏิบัติ				ปฏิบัติแต่ไม่ถูกต้อง	
			N1	N2	N3	N4		
Primary survey & Resuscitation 1.ประเมินทางเดินหายใจและป้องกันกระดูกส่วนคอ ตามแนวปฏิบัติ								
2. ให้ Oxygen mask with reservoir bag 12-15 LPM ในผู้ป่วยอุบัติเหตุที่ไม่มีทางเดินหายใจอุดกั้น								
3. เปิดทางเดินหายใจโดยทำ Chin lift, Jaw thrust								
4. ……								
5. ……								
6. ……								
27……								

สรุป: ระยะเวลาที่ผู้ป่วยอยู่ ER_____นาที

ได้รับการดูแลตามแนวปฏิบัติ_____นาที

ผู้ปฏิบัติทั้งหมด_____คน คือ _____

กิจกรรมที่ไม่ได้ปฏิบัติ_____

กิจกรรมที่ปฏิบัติไม่ถูกต้อง_____

***หมายเหตุ ข้อที่ 1, 6, 11, 15, 17, 25 ประเมินจากการสัมภาษณ์

ข้อที่ 2-5, 7-10, 12-14, 16-24, 26-27 ประเมินจากการสังเกต

ตอนที่ 3 แบบสอบถามความเป็นไปได้ในการใช้แนวปฏิบัติการพยาบาล เพื่อจัดการภาวะคุกคามชีวิตในผู้ป่วยอุบัติเหตุ

คำชี้แจง ให้ใส่เครื่องหมาย ✓ลงในช่องที่ตรงกับความคิดเห็นของท่านมากที่สุด และสามารถแสดงความคิดเห็นเพิ่มเติมในช่องหมายเหตุ

ข้อความ	ความคิดเห็น					หมายเหตุ
	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด	
1. แนวปฏิบัติมีความง่ายและ ความสะดวกในการนำไปปฏิบัติ						
2. แนวปฏิบัติมีความชัดเจน เข้าใจง่าย						
3. ……..						
4. …….						
5. ……..						
6. ……..						
7. ……..						

ข้อเสนอแนะ

.....

.....

.....

.....

APPENDIX E

(LISTS OF EXPERT)

รายนามผู้เชี่ยวชาญในการตรวจสอบแนวปฏิบัติ

1. นายแพทย์สุภกานต์ เตชะพงค์ธร พบ. วุฒิบัตรศัลยศาสตร์ทั่วไป
   นายแพทย์ 7 วช. ภาควิชาศัลยศาสตร์
   วิทยาลัยแพทยศาสตร์กรุงเทพมหานครและวชิรพยาบาล
2. นางสาวเรวดี ลือพงศ์ลัคณา พย.ม.
   หัวหน้าตึกเวชศาสตร์ฉุกเฉิน
   วิทยาลัยแพทยศาสตร์กรุงเทพมหานครและวชิรพยาบาล
3. นางสาวปฏิพร บุณยพัฒนกุล พย.ม.
   ผู้ชำนาญทางคลินิกด้านอายุรศาสตร์และศัลยศาสตร์
   วิทยาลัยแพทยศาสตร์กรุงเทพมหานครและวชิรพยาบาล
4. นางสาวเพ็ญศรี กอบเพ็ชรหยก พย.ม.
   หัวหน้าหน่วยตรวจโรคอุบัติเหตุ
   โรงพยาบาลศิริราช
5. นางสาวอุไรพร พงศ์พัฒนาวุฒิ พย.ม.
   หัวหน้าตึกอุบัติเหตุและฉุกเฉิน
   โรงพยาบาลแพร่

APPENDIX F

EXPERT' S OPINION

รายการ	ความสอดคล้องกับวัตถุประสงค์ของแนวปฏิบัติ		ความสอดคล้องกับเนื้อหาของแนวปฏิบัติ		ความซ้ำซ้อนของเนื้อหาในแนวปฏิบัติ		ความชัดเจนของเนื้อหาในแนวปฏิบัติ	
	สอดคล้อง	ไม่สอดคล้อง	สอดคล้อง	ไม่สอดคล้อง	สอดคล้อง	ไม่สอดคล้อง	สอดคล้อง	ไม่สอดคล้อง
1. คำจำกัดความ								
2. ผู้ป่วยกลุ่มเสี่ยง								
3. เกณฑ์การประเมินผู้ป่วย								
4. ข้อตกลงในการใช้แนวปฏิบัติ								
5. การประเมินผลการใช้แนวปฏิบัติ								
6. แหล่งอ้างอิงและบรรณานุกรม								
7. การนำไปใช้								

ข้อเสนอแนะ

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BIOGRAPHY

NAME	Miss Waraporn Deenamjued
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PLACE OF BIRTH	Samuthprakan, Thailand
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