Satisfaction of Attending Staffs and Orthopedic Residents after the Changing of the Work-System during Special Situation for the Coronavirus (COVID-19) Outbreak in Department of Orthopedic, Faculty of Medicine Vajira Hospital, Navamindradhiraj University

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Abstract

Background: Department of Orthopedics Faculty of Medicine Vajira Hospital, Navamindradhiraj University has introduced the temporarily new working system consistent with social distancing protocols during the COVID-19 pandemic situation. We would assess the effect of adjusting this system from the corporate perspective such as the attending staffs and residents to estimate satisfaction after implementation. Moreover, the system may be used again in the case of prolong COVID-19 pandemic periods or having a new wave in the future.

Materials and Methods: The organizational survey research was conducted in the Department of Orthopedic, Vajira hospital. Two researchers collected the questionnaire data from the attending staffs and residents in June, 2020 for assessing their satisfaction of the new working system in 3 aspects, operational (12 questions), academic (4 questions), and daily life (4 questions).

Results: 13 attending staffs and 16 residents were recruited in the study. The average satisfaction score was 61.06 (from 80 points). There is no statistically significant difference in terms of the satisfaction score between attending staffs and residents. In terms of the efficacy of the new working system, the resident's monthly examination results demonstrated that the scores in March and April were 18.56 and 20.25 out of full 40 scores, respectively. The average score was increasing by 1.68 points. However, this increase was no statistically significant difference.

Conclusion: The COVID-19 pandemic remains widely prevalent and without an antiretroviral medication or effective vaccine. We have introduced a novel working system which was demonstrated an effective scheme for medical personnel. It may serve as a model to use in the case of a long-term prevalence or a new wave of the COVID-19 pandemic occurs.

Keywords: Corona virus 19, satisfaction, attending staff and orthopedic residents

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ผลการศึกษาวิเคราะห์ความพึงพอใจและประสิทธิภาพในการทำงานภายหลังจากการปรับเปลี่ยนระบบการทำงานในช่วงสถานการณ์ที่มีการระบาดของเชื้อโคโรน่าไวรัสของอาจารย์แพทย์ และแพทย์ประจำบ้านของภาควิชาออร์โธปิดิกส์ คณะแพทยศาสตร์วชิรพยาบาล มหาวิทยาลัยนวมินทราธิราช

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บทคัดย่อ

บทนำ: ภาควิชาออร์โธปิดิกส์คณะแพทยศาสตร์วชิรพยาบาลมหาวิทยาลัยนวมินทราธิราช มีการปรับเปลี่ยนระบบการทำงานชั่วคราวใหม่ ให้สอดคล้องกับนโยบายการแยกห่างทางสังคมในช่วงสถานการณ์การแพร่ระบาดของ COVID-19 ทางผู้วิจัยต้องการประเมินผลของระบบงานใหม่นี้ในมุมมองของอาจารย์แพทย์ และแพทย์ประจำบ้านออร์โธปิดิกส์ นอกจากนี้ถือเป็นการเตรียมปรับปรุงระบบการทำงานไว้รับมือในกรณีที่ยังมีการแพร่ระบาดอย่างต่อเนื่องหรือมีการระบาดใหม่ในอนาคต

วิธีดำเนินการวิจัย: เป็นการวิจัยเชิงสำรวจองค์กรโดยทำการรวบรวมข้อมูลแบบสอบถามจากอาจารย์แพทย์ และแพทย์ประจำบ้านออร์โธปิดิกส์ ในเดือนมิถุนายน 2563 เพื่อประเมินความพึงพอใจของระบบการทำงานใน 3 ด้าน ได้แก่ ด้านปฏิบัติการ (12 คำถาม) ด้านวิชาการ (4 คำถาม) และด้านชีวิตประจำวัน (4 คำถาม)

ผลการวิจัย: ในการศึกษานี้มีอาจารย์แพทย์ 13 คนและแพทย์ประจำบ้าน 16 คน มีคะแนนความพึงพอใจเฉลี่ย 61.06 (จาก 80 คะแนน) แต่ไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติของคะแนนความพึงพอใจระหว่างสองกลุ่ม ผลการสอบประจำเดือนของแพทย์ประจำบ้าน แสดงให้เห็นว่าคะแนนในเดือนมีนาคมและเมษายนอยู่ที่ 18.56 และ 20.25 จากคะแนนเต็ม 40 คะแนนตามลำดับ มีคะแนนเฉลี่ยเพิ่มขึ้น 1.68 คะแนน

สรุป: การแพร่ระบาดของ COVID-19 ยังคงแพร่หลายอย่างกว้างขวางและไม่มียาต้านไวรัสหรือวัคซีนที่มีประสิทธิภาพ ระบบงานใหม่นี้มีความพึงพอใจสำหรับบุคลากรทางการแพทย์ สามารถใช้ได้ในระยะยาวหรือมีการระบาดใหม่

คำสำคัญ: โคโรน่าไวรัส, ความพึงพอใจ, อาจารย์แพทย์และแพทย์ประจำบ้านออร์โธปิดิกส์

วันที่รับบทความ 19 มกราคม 2564 **วันแก้ไขบทความ** 10 มิถุนายน 2564 **วันตอบรับบทความ** 20 มกราคม 2565

Introduction

Corona virus disease-19 (COVID-19) led to overwhelming public health problems for developed or undeveloped countries alike[1]. On March 11, 2020, the World Health Organization (WHO) declared COVID-19 as a global pandemic. On December 2019, Wuhan city, Hubei Province in China reported unusual cases of pneumonia[2-3] with symptoms, such as severe acute respiratory syndrome (SARS). The WHO assigned the name SARS-CoV-2 to the novel coronavirus[4-7]. Initial period, the mortality rates of COVID-19 reached approximately 11%–15%. Recently, however, it decreased to 2%–3%[2,8]. COVID-19 can spread from person to person via direct contact and secretion. As such, medical personnel are considered highly likely to contract COVID-19 infection from patients[9].

The incubation period of COVID-19 takes approximately 5.2 days[10]. Symptoms begin as general non-specific symptoms of flu, such as fever, dry cough, and fatigue. The organism can destroy many organ systems, such as the respiratory system (cough, difficulty in breathing, sore throat, and angina), digestive system (diarrhea, nausea, and vomiting), and nervous system (headache and confusion). However, the most common symptoms are cough (83%–98%), dry cough (76%–82%), and difficulty in breathing (31%–55%)[2,8]. A case study from China revealed that 39% of COVID-19 positive patients experienced minor symptoms in the first week, then dramatically developed severe symptoms. Furthermore, the patients had difficulty in breathing on day 8 of infection. On the following day, the patients developed acute respiratory distress syndrome (ARDS) that require the use of a respirator on days 10–11 after infection[2]. With the presence of ARDS, the symptoms can worsen and lead to multiple organ failures[2,8]. The case study demonstrated that the lung is the most commonly targeted organ, whereas the involvement of other organs remains inconclusive. Moreover, the lack of data on co-infection from other organism continues[9]. As such, further information is required for the differential diagnosis of COVID-19 with various diseases[2,11]. Therefore, patient history, such as contact with infected persons and traveling to high-risk areas, is very important for early detection[9]. In Thailand, Suvarnnabhumi airport has employed a screening protocol for screening passengers from high-risk countries since January 2020[12]. Unfortunately, COVID-19 infection among the Thai people has been discovered from the Lumpini Boxing Stadium and nightspot in March. Therefore, people have become very concerned about the pandemic. The government introduced a campaign on wearing masks, effective hand washing, social distancing, avoiding closed community places, such as shopping malls, theaters, and restaurants, and organizing sport events.

For medical personnel, especially in hospitals, policies are in place to systemically support the preparation staffs and medical equipment, such as intensive care beds and a screening system for high-risk patients, to reduce contact as much as possible. The situation has required the medical staff to adjust to the preparation and handling of emergency situations, which tend to change any time.

The Department of Orthopedics, Faculty of Medicine Vajira Hospital, Navamindradhiraj University bears the responsibility for training the orthopedic residency program. The staff has conferenced regularly between the attending staff and residents. Moreover, the government recommends self-care through wearing masks at all times and frequent hand washing. Social distancing is very important to the department as part of the characteristics of the medical professors and residents. The

Orthopedic residents are unable to avoid contact with patients upon their works at various places e.g. the Outpatient Department (OPD), during inpatient ward rounds, or the operating room. Consequently, the regular work system is unable to impose the principle of social distancing. Therefore, the work system should be modified in response to the situation.

For this reason, the new working system consistent with social distancing protocols during the COVID-19 pandemic situation has been temporary adjusted from our Department. It also aims to keep the potential of residency training program and provide the least impact to patients. Moreover, another purpose of adjusting the working system is that the duration of the COVID-19 outbreak cannot be predicted. Although the outbreak was controlled in the first wave, a chance exists that a new outbreak may occur. However, adjusting the work system of the Department of Orthopedics is a new policy and a challenge to the management system.

The researchers surveyed the effect of adjusting the working system from the corporate perspective such as the attending staffs and residents to estimate satisfaction regarding the quality of service provided to patients and estimate the potential of regular resident's orthopedic training after implementing the new working system during COVID-19.

Materials and Methods

The study is an organizational survey research approved by the research ethics review committee, Faculty of Medicine Vajira Hospital, Thailand (approval number 063/2563). Two researchers (C.D. and N.H.) collected the questionnaire data from the attending staffs and orthopedic residents in June, 2020 using a designed survey form. The respondents were assessed on their satisfaction and efficiency in terms of the new working system in three aspects, namely, operational (12 questions), academic (4 questions), and daily life (4 questions). The survey includes 20 questions on satisfaction, and a four-point scale is used to rate each question (4 = very satisfied, 3 = satisfied, 2 = less satisfied, and score 1 = least satisfied). The highest score that can be reached is 80. The content validity index: CVI of the questionnaire was evaluated by using a panel of experts in the content area from 3 staffs and assess the average scores from score of 4 to 1 (most related to not related).

All orthopaedic attending staff and resident were eligible in this study including 30 medical personnel (13 attending staff and 17 orthopedic residents). The attending staff was excluded if they belong to the administration department position, such as administrator of the Faculty of Medicine Vajira Hospital or the head of the orthopedic department. The orthopedic residents preparing for Certificate Exam Preparation Orthopedic of Royal College Orthopedic Surgeons of Thailand were also excluded from the study.

The new working system was introduced by our department and defined as follows:

1. The operation table with new working format for the COVID-19 outbreak indicates adjustment of the working schedule of the attending staff and residents. This system was initiated on March 30, 2020 to April 26, 2020, or a total of 4 weeks (Table 1). Changes in the working format are as follows:

1.1 The attending staffs and residents were separated into four workflow lines (previously, two lines)

1.2 The attending staffs and residents worked for 2 weeks, then switched to home quarantine for 2 weeks to observe their symptoms.

1.3 The residents were required to join all academic conferences, topic presentations, journal reading, and case conferences. All activities were performed via a teleconference system (zoom program). All residents were not allowed into the meeting room but they can attend from any private room.

1.4 The job descriptions of the residents were divided into three groups and overlapping descriptions were avoided (Table 2) as follows:

1.4.1 The OPD is mainly responsible for the outpatient orthopedic clinic. They should respond to all outpatient concerns, such as examination, preparation for surgery, and scheduling of surgery for each day.

1.4.2 The Inpatient Department (IPD) is responsible for treating in-patients in all orthopedic wards. The operation includes consultation with the patients from the emergency room and being the assistance during surgery.

Table 1:

New working system during the COVID-19 pandemic of the Department of Orthopedic, Faculty of Medicine Vajira Hospital

March 30, 2020 – May 24, 2020

Team	30/03-12/04	13/04-26/04	27/04-10/05	11/05-24/05
A	OPD Mon, Wed, Thu OR Tue, Fri	Stand By	OPD Mon, Wed, Thu OR Tue, Fri	Stand By
B	Stand By	OPD Mon, Wed, Thu OR Tue, Fri	Stand By	OPD Mon, Wed, Thu OR Tue, Fri
C	OPD Tue, Fri, Thu OR Mon, Wed	Stand By	OPD Tue, Fri, Thu OR Mon, Wed	Stand By
D	Stand By	OPD Tue, Fri, Thu OR Mon, Wed	Stand By	OPD Tue, Fri, Thu OR Mon, Wed
Line	A	B	C	D
Staff	Staff A1 Staff A2 Staff A3 Staff A4 Staff A5	Staff B1 Staff B2 Staff B3 Staff B4	Staff C1 Staff C2 Staff C3 Staff C4	Staff D1 Staff D2 Staff D3 Staff D4
OPD	R2#1 R3#1 FellowHK1	R2#2 R3#2 R3#3	R2#3 R3#4 FellowHK2	R2#4 R2#5 R3#5
IPD + ER + OR	R2#6 R4#1 R5#1	R2#2 R4#2 R5#2 R5#3	R2#3 R4#3 R4#5 R5#4	R2#4 R4#4 R4#6 R5#5

Table 2:

Job description of orthopedic residents based on the new working schedule during the COVID-19 pandemic

Groups	Descriptions
Outpatient department (OPD)	1. Responsible for overseeing all outpatient- and orthopedic patient-related work 2. Examining outpatients during office hours 3. Preparing or scheduling patients for surgery in advance
Inpatient department or Ward (IPD)	1. Responsible for in-patients for all orthopedic wards 2. Consultation with all orthopedic patients through the emergency room 3. Responsible for operative assistance in the operating room during office hours
Stand by or work at home	1. Take a break at home for 2 weeks 2. Responsible for preparing the topic presentations, journal club reading, and case conferences 3. Participate in academic activities via online teleconference 4. Attend an organized event by attending staff, such as academic tutoring and case conference 5. Take care of your own body. Stay at home and avoid communal places where the risk of exposure to disease is high 6. Review of orthopedic knowledge and research work

1.4.3 The home quarantine and standby groups are mainly responsible for preparing topic presentations, journal club reading, and interesting case conferences. They have to present and attend the academic activities as normal via teleconference zoom program. They also need to attend activities organized by the medical professors, such as academic tutoring and case conferences.

1.5 The standby group of attending staff and residents are not on-call duties to reduce contact with patients.

2. Satisfaction of attending staffs and residents was evaluated using a survey with scoring systems adjusted to the current situation.

3. The performance of orthopedics residents during training was defined as performance during monthly tests given by the department.

4. The impact on attending staff with the new system was defined as identifying problems and responding to the survey feedback form.

Statistical Analysis

Data were collected as two parts, namely, quantitative data presented by the mean and standard deviation and qualitative data presented by frequency distribution and percentage. Student's t-test was used to calculate the statistical differences between the satisfaction scores.

Results

Satisfaction scores were collected from the attending staffs and second, third, and fourth years orthopedic residents from June 9 to 30, 2020. The sample comprised 29 respondents (13 attending staffs [45%] and 16 residents [55%]). A total of seven attending staffs have worked in the hospital for more than 10 years (54%), 3 staffs between 5 and 10 years (23%), 2 staffs between 3 and 5 years (15%), and one staff less than 3 years (8%). The residents were grouped according to years in training as follows: five, five,

and six residents are in the 2nd, 3rd, and 4th years, respectively. The number of medical personnel was similar for the working system lines (seven persons in operation line A, eight persons in operation lines B and C, and six persons in operation line D) (Table 1).

Satisfaction results

The average satisfaction score was 61.06 (out of 80 points), which ranged from 80 and 38 points. The average satisfaction score and performance of the new system were divided into three aspects with out of 4 levels: the operational aspect, the average value was 3.08. Academic aspect, the average value was 2.9. Lastly, in daily life aspect, the average value was 3.1 (Table 3).

Table 3:

Frequency, mean, and standard deviation of satisfaction scores in various aspects of workflow during the COVID-19 pandemic

Question topics	Satisfaction score				Mean	SD*
	1	2	3	4		
Operational aspects						
1. Satisfaction with the new work system modification policy	0	3	11	15	3.41	0.68
2. Satisfaction toward power allocation according to the new work system	2	6	12	9	2.96	0.90
3. Satisfaction with workload assigned by the new work system	1	4	14	10	3.13	0.78
4. Satisfaction toward receiving advice regarding assistance at work from the management	0	4	16	9	3.17	0.65
5. Satisfaction with the audit from the management	0	5	15	9	3.13	0.69
6. You think you received the appropriate assignments.	1	4	14	10	3.13	0.78
7. You think the new operating system has a real advantage.	1	3	11	14	3.31	0.80
8. Is the standby activity appropriate?	1	4	14	10	3.13	0.78
9. Appropriateness of timing and organizing the new work system	1	4	15	9	3.10	0.77
10. You think that the new operating system has a clear division of labor.	1	8	12	8	2.93	0.84
11. You think that the new work system makes you work to the best of your ability.	2	6	13	8	2.93	0.88
12. You think that the new operating system will reduce performance.	2	14	8	5	2.55	0.87

Table 3:

Frequency, mean, and standard deviation of satisfaction scores in various aspects of workflow during the COVID-19 pandemic (continued)

Question topics	Satisfaction score				Mean	SD*
	1	2	3	4		
Academic Aspects						
13. You benefited by using the standby time to gain additional knowledge	1	2	15	11	3.24	0.73
14. You benefited by using the standby period for further research	3	4	15	7	2.89	0.90
15. You consider the new operating system to worsen the quality of training	4	16	5	4	2.31	0.89
16. Appropriateness of the academic activities of the home doctor via online teleconference system	0	4	16	9	3.17	0.65
Personal Daily Life Aspects						
17. You believe that the new operational management system can make you feel safe and help reduce your COVID-19 concern.	1	5	15	8	3.03	0.77
18. You believe the new operational management system can help reduce the spread of COVID-19.	1	3	15	10	3.17	0.75
19. You think the new operation management system can improve your quality of life.	1	6	14	8	3.00	0.80
20. If there is a second outbreak of COVID-19, then you would like to revert to this type of operation.	2	2	10	15	3.31	0.89

SD* = Standard deviation

Based on the overall score, the satisfaction score was classified into three groups (Table 4). Group 1 denotes the group that is satisfied and evaluated the new working system as less effective with a total score of less than 40 out of 80. This group has two responders (7% of the sample). Group 2 pertains to the group that is satisfied and evaluated the new working system as effective with total scores of 41–60 out of 80. This group consists of 11 responders (38% of the sample). Lastly, group 3 indicated satisfaction and evaluated the new working system as very effective with total scores of 61–80. This group has 16 responders (55% of the sample).

Table 4:

Percentage of overall satisfaction scores

Overall Scores	Number (%)
<40	2 (7)
41–60	11 (38)
61–80	16 (55)

In terms of the standard deviation of satisfaction, the score between the attending staffs and residents indicated no statistically significant difference in terms of average satisfaction (Table 5). This result is consistent with the comparison in the group of residents. By dividing the six residents in 4th year and 10 residents in the 2nd and 3rd years, no statistically significant differences were noted as well. Analyses of the satisfaction scores between lines A and B compared with lines C and D in terms of difference in operating time and subspecialty of attending staffs for each line, the study found no statistically significant differences between operating groups. For the assessment of content validity index (CVI), CVI was assessed by 3 staffs and found all 20 questionnaires had strong reliability with CVI 1.0 (Table 6)

Resident's monthly test results

Google Forms was used to implement a monthly examination to evaluate the knowledge of residents. During the COVID-19 pandemic, the examination was incorporated into the new working system. Therefore, data were collected and compared. The test scores for March after an examination on March 27, 2020 were evaluated before using the new working system. The examination result of a test conducted in April 24, 2020 was evaluated after the implementation of the new working system. The results show that the scores for March and April were 18.56 and 20.25, respectively, out of 40 points. The average score increased by 1.68 points. However, no statistical significant difference was observed for this increase. Scores were divided by each year of the residents for March and April. No difference was noted between the average score of the 4th-year residents, whereas the 2nd and 3rd-year residents obtained average scores of >2.6. Nevertheless, this increase in the score indicated no statistical significant difference (Table 7).

Table 5:

Mean and standard deviation of satisfaction scores in different groups of study participants

Groups	Number	Satisfaction score		P-value**
		Mean	SD*	
Attending staff	13	58.84	10.81	0.29
Overall resident	16	62.87	9.66	
4th year resident	6	60.5	13.08	0.46
2nd and 3rd year resident	10	64.3	7.37	
Work schedules A and B	15	59.2	11.7	0.31
Work schedules C and D	14	63.07	8.28	

* SD = standard deviation

** P-value < 0.05 = Significant difference, t-test was used for comparison between two groups

Table 6:

Assessment of the content validity index of 20 items questionnaires by 3 staffs

No	Staff no 1	Staff no 2	Staff no 3	Average scores
1	4	3	4	3.67
2	4	4	4	4
3	4	4	4	4
4	3	3	4	3.33
5	3	4	4	3.67
6	3	4	4	3.67
7	4	4	3	3.67
8	4	4	4	4
9	4	3	4	3.67
10	4	4	4	4
11	4	3	4	3.67
12	4	3	3	3.33
13	4	4	4	4
14	4	3	4	3.67
15	4	4	4	4
16	4	3	4	3.67
17	4	4	4	4
18	4	4	4	4
19	4	3	4	3.67
20	4	4	4	4

Criteria: 1 = not related, 2 = minimal related, need to be revised, 3 = moderate related, no need to be revised, 4 = strong related

Table 7:

Results of comparing the mean and standard deviation of the monthly exam scores between March and April 2020

	March		April		Differences	P-value**
	Mean	SD*	Mean	SD*		
Total number of residents	18.56	5.3	20.25	4.66	1.68	0.34
4th year resident	22	4.04	22.16	3.6	0.16	0.91
2nd and 3rd year residents	16.5	5.01	19.1	5.02	2.6	0.26

*SD = standard deviation

**P-value < 0.05 = Significant difference, t-test was used for comparing between the two groups

Suggestion Points

Attending staffs and residents have added comments through open-ended questions to share their opinions and suggestions regarding the organization of the new work system:

- Executive increases are required as support in terms of the quantity and quality of protective equipment, such as surgical masks.
- The residents are worried about continuity of care for patients when switching lines.
- The operating rooms and related medical staff are insufficient.
- Dividing the work line leads to an imbalance in attending staffs in terms of patient quantity and degree of the patient's problem for each line of work.
- Doctors are overloaded with work by line because few doctors are assigned to each line.

Discussion

The COVID-19 outbreak continues to affect public health services and medical service providers. Thus, the service system should be modified to be consistent with the situation. The Department of Orthopedics Faculty of Medicine Vajira Hospital, Navamindradhiraj University plays a role in providing services for orthopedic issues. A specialized medical training institute is available, which is an instructional hub for residents at the orthopedic house. According to the standard of the Royal College of Orthopedic Surgeon of Thailand (RCOST), the COVID-19 dilemma will require the executives of the orthopedic department to adjust the work system in 4 years to retain the patients and instructional residents of the orthopedic houses.

The new working system will focus on social distancing, reducing interpersonal contact, and screening for diseases[13-17]. Therefore, the system requires doctors to be ready for replacement at all times in the case one of the team members becomes infected. As such, the entire team has to stop working and become subject to appropriate personal quarantine[18]. The organization of the new working system aims to provide patient services that can be performed in parallel with maintenance of the training's quality, therefore, the consideration must include the security of providers and recipients[19-20]. Thus, maintaining the quality of patient care in the standard requires a flexible, adaptive (according to immediate events), and practical working system[20]. The new working system divides the attending staffs and residents into four work lines (i.e., A, B, C, and D) (Table 1), which will work alternate to each other. Therefore, contact between members of each line is avoided. One line works for 2 weeks, then undergo a two-week home quarantine. In the event that one member of a line experiences symptoms during work within 2 weeks, then the rest of the members are also required to undergo home quarantine.

The system was implemented on March 30, 2020 to April 26, 2020. Table 2 shows the roles and responsibilities of the researchers of each operating group, which has been rehearsed to be understood by the residents before using the system. No other department in the Faculty of Medicine Vajira Hospital has implemented the proposed work system. Therefore, the orthopedic department is the first and only department operating this method. The researcher collects survey from the attending staffs, except for hospital, medical, and department administrators and attending staffs involved in the research. Data were collected from residents at each year level, except for those in the last year who are preparing for the licensure examination.

The survey format used by researcher is comprehensive in three aspects, namely, operating, academic, and daily life, to reflect the results of the new working system as extensively as possible. A total of 20 questions were posed. Results indicated that the average satisfaction score is positive. Although the total average score ranges from 61 to 80, which represents 55%, the score also indicate that nearly all attending staffs and residents think that the new working system retains the efficiency of the old system. Moreover, when comparing the scores between the attending staffs and residents, no statistical difference was observed (Table 5). The result of the knowledge examination after implementing the new working system, which was conducted on April 24, 2020, indicated an increase but no statistically significant difference (Table 7).

The research conducted a survey to collect information on benefits, comments, and suggestions from the attending staffs and residents. The results are intended to improve the policy planning work system to address the lack of workers, which can cause work overload, the sufficiency of operating rooms to the quantity of patients in emergency situations and in urgent need of surgery, or arrangements for protective equipment, such as face masks or alcohol supplies. It is very interesting that this new working considers to be quite satisfied by Orthopaedic staff/resident whereas some of the suggestion points revealed that an over-workload with insufficient operating room/medical staff were confront. Moreover, an online education activity/ conference resulting in higher score in resident's monthly exam. The satisfaction from our medical personnel might be the results of the intention of head of the orthopedic department and post graduate staff team who need to fix the problem for residents and other staffs. Meanwhile, the online activity/conference stimulate our residents to have more reading the textbook resulting the higher score examination.

The study provides a summary of the advantages. First, the research analyzed the new working management system in response to the COVID-19 pandemic, which is a scenario that has never happened before. The work is challenging and unpredictable in terms of severity and how it will end. The Faculty of Medicine Vajira Hospital has not changed the working system, which is clearly similar to other departments. Only the orthopedic department proceeded with a concrete and new working system. Second, in the work management model, job descriptions are provided for the attending staffs and residents. In this manner, both groups can work on their duties independently. Third, during the collection of the survey form, analysis of the scores from two attending staffs was excluded because hold administrative positions. To reduce bias during giving the examination, the 4th questionnaire was designed to reflect all dimensions of work, such as the operational, academic, and personal aspects, of the attending staffs and residents.

However, the study has its limitations. First, the sample size is extremely small because the attending staffs with administrative positions and residents with upcoming examinations were excluded. Second, the survey was conducted after the 1-month implementation of the system. Thus, some respondents may be unable to remember all scenarios, which can lead to recall bias. Third, the residents as participants responded to certain questions, which may not make them provide honest answers. Fourth, the new working system was implemented only for 4 weeks only and is considered a short period. Therefore, the evaluation may be biased by the brevity of the implementation. In addition, the last aspect is the comparison of

examination scores for March and April, which may need comparison with scores from the previous months.

Conclusion

The COVID-19 pandemic remains widely prevalent and without an antiretroviral medication or vaccine to effectively eliminate the virus. Thus, lifestyle change is necessary to prevent the spread of infection. Medical personnel are a group exposed to high-risk of exposure to pathogens. Although the standard of patient care and quality of resident training have been maintained, the safety of medical personnel should also be considered. The Department of Orthopedics Faculty of Medicine Vajira Hospital, Navamindradhiraj University has introduced and organized a novel working system. Even within the short period of its implementation, the study demonstrated that the scheme is satisfied for and medical personnel. Therefore, it may serve as a model for other departments to use in the case of a long-term prevalence or a new wave of the COVID-19 pandemic occurs.

Conflict of Interests

All of the authors declare that there are no conflicts of interest to declare.

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References

1. New York City Department of Health and Mental Hygiene (DOHMH) COVID-19 Response Team. Preliminary Estimate of Excess Mortality During the COVID-19 Outbreak - New York City, March 11-May 2, 2020. MMWR Morb Mortal Wkly Rep 2020;69(19):603-5.
2. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395(10223):497-506.
3. Mahase E. China coronavirus: what do we know so far? BMJ 2020; 368:m308.
4. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. N Engl J Med 2020;382(8):727-33.
5. Du Toit A. Outbreak of a novel coronavirus. Nat Rev Microbiol 2020;18(3):123. doi: 10.1038/s41579-020-0332-0.
6. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. Lancet 2020; 395(10223):470-3.
7. Munster VJ, Koopmans M, van Doremalen N, van Riel D, de Wit E. A Novel Coronavirus Emerging in China - Key Questions for Impact Assessment. N Engl J Med 2020; 382(8):692-4.
8. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet 2020; 395(10223):507-13.
9. Wu YC, Chen CS, Chan YJ. The outbreak of COVID-19: An overview. Journal of the Chinese Medical Association: JCMA 2020;83(3): 217-20.
10. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. N Engl J Med 2020; 382(13):1199-207.
11. Chan JF, Yuan S, Kok KH, To KK, Chu H, Yang J, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. Lancet 2020; 395(10223):514-23.

12. Okada P, Buathong R, Phuygun S, Thanadachakul T, Parnmen S, Wongboot W, et al. Early transmission patterns of coronavirus disease 2019 (COVID-19) in travellers from Wuhan to Thailand, January 2020. Euro Surveill 2020;25(8):2000097. doi: 10.2807/1560-7917.ES.2020.25.8.2000097.
13. Schwartz AM, Wilson JM, Boden SD, Moore TJ Jr, Bradbury TL Jr, Fletcher ND. Managing Resident Workforce and Education During the COVID-19 Pandemic: Evolving Strategies and Lessons Learned. JB JS Open Access 2020;5(2):e0045. doi: 10.2106/JBJS.OA.20.00045.
14. Riou J, Althaus CL. Pattern of early human-to-human transmission of Wuhan 2019 novel coronavirus (2019-nCoV), December 2019 to January 2020. Euro Surveill 2020;25(4):2000058. doi: 10.2807/1560-7917.ES.2020.25.4.2000058.
15. Meo SA, Alhowikan AM, Al-Khlaiwi T, Meo IM, Halepoto DM, Iqbal M,et al. Novel coronavirus 2019-nCoV: prevalence, biological and clinical characteristics comparison with SARS-CoV and MERS-CoV. Eur Rev Med Pharmacol Sci 2020; 24(4):2012-9.
16. Liu Y, Gayle AA, Wilder-Smith A, Rocklöv J. The reproductive number of COVID-19 is higher compared to SARS coronavirus. J Travel Med 2020;27(2):taaa021. doi: 10.1093/jtm/taaa021.
17. Zhao S, Zhuang Z, Cao P, Ran J, Gao D, Lou Y, et al. Quantifying the association between domestic travel and the exportation of novel coronavirus (2019-nCoV) cases from Wuhan, China in 2020: a correlational analysis. J Travel Med 2020;27(2):taaa022. doi: 10.1093/jtm/taaa022.
18. MacIntyre CR. On a knife's edge of a COVID-19 pandemic: is containment still possible? Public Health Res Pract 2020;30(1):3012000. doi: 10.17061/phrp3012000.
19. Koh D. Occupational risks for COVID-19 infection. Occup Med (Lond) 2020; 70(1):3-5.
20. Chopra V, Toner E, Waldhorn R, Washer L. How Should U.S. Hospitals Prepare for Coronavirus Disease 2019 (COVID-19)? Ann Intern Med 2020; 172(9):621-2.