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Environmental Health Management to Prevent Infectious Diseases and Epidemics in Thailand's Southern Border Provinces

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Abstract

The purpose of this research is to study environmental health management amongst hospital staff when handling emerging infectious diseases and epidemics in emergency department of government hospitals in the three southern border provinces. This research is a quantitative study using questionnaires as a research tool. The sample group was 258 staff from the emergency department of governmental hospitals in the three southern border provinces, namely 7 in Pattani, 3 in Yala, and 6 in Narathiwat. Statistics used to analyze the collected data consisted of descriptive statistics, including frequency, percentage, arithmetic mean, and standard deviation (S.D.). Also, inferential statistics were used, including a t-test and one-way analysis of variance (one-way ANOVA).

The results of this research revealed that the staff has high level of environmental health management at ($\bar{x}$ = 4.18, S.D. = 0.07), with high level knowledge and understanding at ($\bar{x}$ = 17.35, S.D. = 2.28), high level awareness at ($\bar{x}$ = 4.28, S.D. = 0.50), high level participation at ($\bar{x}$ = 3.91, S.D. = 0.69), high level confidence at ($\bar{x}$ = 4.03, S.D. = 0.59), high level satisfaction at ($\bar{x}$ = 4.22, S.D. = 0.61), and high level performance behavior at ($\bar{x}$ = 4.44, S.D. = 0.55). Furthermore, a comparison of environmental health management in the prevention and control of emerging infectious diseases and epidemics in the emergency department of governmental hospitals in the three southern border provinces found that gender, province, level of hospital, operational duration, and average monthly income were significantly different at the .05 level.The study found that provinces, job positions, and training experiences on the prevention and control of emerging infectious diseases and epidemics are factors affecting of the environmental health management to handle emerging infectious diseases and epidemics in the emergency department of governmental hospitals in the three southern border provinces with statistical significance at the 0.05 level. These factors can explain the variation in the environmental health management to handle emerging infectious diseases and epidemics in the emergency department of governmental hospitals in the three southern border provinces by 8.2% (R^2 = .082).

Keywords: Environmental Health, Emerging Infectious Diseases, Epidemics, Emergency Department

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1. Introduction

Humans are part of the environment. Therefore, the environment exerts significant influence over human life. Environmental health management is the control of various processes and influences of physical, chemical, and biological factors that act on or may cause adverse effects on the physical, mental, and

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social health of humans, both directly and indirectly. Environmental health management must therefore consider all aspects of economic, social, physical, and biological environmental development, including public health and sustainable development, which are related to each other. Environmental health management principles should be an effective management system. It is accepted, understood, and responsive to the policy very well. The emphasis is placed on prevention rather than correction. There is development, change, and flexibility according to the current situation[1].

Nowadays, epidemics and health hazards are one of the most pressing problems due to the changing global environment and climate. Pathogens spread, and their species change all the time. The outbreak led to public health crisis affecting individuals, society, and the economy at the national and global levels [2]. During past centuries, epidemic of emerging infectious diseases has arisen periodically, including newly discovered infectious diseases with outbreaks in humans, infectious diseases in new regions, and diseases in animals that are likely to infect humans [3]. In 2019, there was the coronavirus 2019 (COVID-19) outbreak. The World Health Organization (WHO) reported in December 2019 about a group of patients with pneumonia for unknown causes in Wuhan, Hubei, People's Republic of China. Later, Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2) was reported as the cause of the disease, and it spread to other countries [4]. The outbreak is a crucial national problem affecting health, the economy, and society. Staff were ill and unable to perform their duties as usual. Business organizations closed down their businesses dui 2 the medical supply shortage crisis. Meanwhiie, the utility system was interrupted, which made people panic. All impacts alerted all authorities to respond to the pandemic and be aware of the service provided to people as well as the safety of the staff [2].

The emergency department provides nursing services to the injured person and/or person with physical and mental emergency and crisis illness by evaluating the illness severity stage, making decisions on first aid, using tools, equipment, and medical supplies to rescue the patient, monitoring the changing symptoms to respond to the emergency threatening the patient's life promptly at a crime scene or out-patient department in a hospital, and admitting the patient for observation at the emergency or observation room. The COVID-19 pandemic and the rapid change in the health system allow flexibility in the scope of nursing service for accident and emergency patients and environmental health to react to the changes. The crowded accident and emergency rooms, where the staff and patient have a risk of safety, and the unavailability of a separate room for the infectious patient increase the risk of infection for the staff and service users. For this reason, the development of a service system, physical structure, and management model for current and upcoming emerging infectiousdiseases and epidemics is necessary.Therefore, in the three southern border provincesthat have borders with neighboring countries such as Malaysia, travel between the two countries occurs continuously. This makes it easy to spread the infection of the coronavirus disease 2019 (COVID-19). The first patients found in the area were those who had a history of religious activities in Malaysia. Later, it was found that the number of patients continued to increase. As for the hospitals in the area, there were so many infected staff members at work that the hospital had to close.Consequently, the researcher foresees the necessity to study the environmental health management of the emergency department for the prevention and control of emerging infectious diseases and epidemics by using case studies of governmental hospitals in the three southern border provinces to determine guidelines for environmental health management to handle the current and upcoming emerging infectious diseases and epidemics.

2. Methodology

Quantitative research method was applied to examine environmental health management of staff while handling the current and emerging infectious diseases and epidemics in government hospitals in the three southern border provinces.

Population and Sample Group

The population used in this study was a total of 730 professional nurses and advanced emergency medical technicians (Advanced EMTs) who worked at the emergency department of governmental hospitals in the three southern border provinces, including 13 hospitals in Pattani, 8 hospitals in Yala, and 13 hospitals in Narathiwat. The sample group consisted of a total

of 258 professional nurses and advanced EMTs who worked at the emergency department of governmental hospitals in the three southern border provinces. The determination of the sample group with 95% reliability was done using the Taro Yamane (1967) method. The sample proportion for each province was calculated by comparing the rule of three in arithmetic. Then a simple random sampling method was performed according to the calculated probability of the sample group in each province.

Research Tools

The questionnaire used to collect data from the sample group consisted of personal information, knowledge and understanding of the coronavirus disease 2019 (COVID-19), awareness of environmental health management, participation in environmental health management, confidence in environmental health management, satisfaction with environmental health management, performance behavior in the prevention and control of emerging infectious diseases and epidemics, problems, obstacles, needs, and suggestions for management in the emergency department of governmental hospitals in the three southern border provinces.

Research Tools Validity Test

The questionnairesweretested for content validation by three experts and evaluated for the content validity index (CVI), with the proportion of questions obtained from expert consensus not less than 0.80. Moreover, the pilot study was conducted using 30 participants who were similar to the sample group to determine the reliability of the whole questionnaire by usingCronbach'salpha coefficient formula,and the questions with alpha value of 0.70 or higher were selected.

Research Ethics

The ethical approval to implement the study was obtained from the Pattani Provincial Public Health Office, RECPTN No.006/65. The researcher had declared the study's objective, the right to refuse to answer, the right to withdraw from the study, that their personal information would be kept private, and that the raw data would be immediately terminated after the study finished.

Data Analysis

The descriptive statistics used to analyze the collected data were frequency, percentage, arithmetic mean, and standard deviation (S.D.). The inferential statistics comprising the t-test and one-way ANOVA were used to compare the environmental health management to handle emerging infectious diseases and epidemics in the emergency department of governmental hospitals in the three southern border provinces. Furthermore, multiple regression analysiswas used to study factors that can predict environmental health management to handle emerging infectious diseases and epidemics in the emergency department of governmental hospitals in the three southern border provinces.

3. Results and Discussion

There were 258 professional nurses and advanced EMTs working in the emergency department of governmental hospitals in the three southern border provinces, it was found that 99 respondents (38.37%) lived in Narathiwat, 95 respondents (36.82%) lived in Pattani, and 64 of them (24.81%) lived in Yala. The majority of the respondents worked in medium-sized community hospitals (44.96%). Most of them are female, which accounted for 70.16%, and 29.84% are male. The age ranges are 31-40 years old (58.53%), and they finished a bachelor's degree as the highest education level (90.31%). Most of the respondents are professional nurses (91.86%), and they are advanced EMTs (8.14%). The operational duration of them is 11-15 years, which accounted for 55.04%. The majority of the respondents earned 30,001-40,000 Baht per month (44.19%). The major position of them is in the public health professions (having a professional license), which accounted for 91.86%, as well as another position of the executives and supervisors in the public health profession field (having a professional license), which accounted for 8.14%. The majority of them (59.30%) did not have training on emerging infectious diseases and epidemics prevention and control, while 40.70%of them had been trained.

The results of the environmental health management of the staff in the emergency department of governmental hospitals in the three southern border provinces indicated that their environmental health management was at a high level ($\bar{x}$ = 4.18, S.D. = 0.07). In detail for each aspect, it was found that knowledgeand understanding about the coronavirus disease 2019 (COVID-19) was at a high level ($\bar{x}$ = 17.35, S.D. = 2.28), perception of environmental health management was at a high level ($\bar{x}$ = 4.28, S.D. = 0.50), participation in environmental health management was at a high level ($\bar{x}$ = 3.91, S.D. = 0.69), confidence in environmental health

management was at a high level ($\bar{x}$ = 4.03, S.D.= 0.59), satisfaction in environmental health management was at a high level ($\bar{x}$ = 4.22, S.D. = 0.61), and performance behavior in the prevention and control of emerging infectious diseases and epidemics were at a high level ($\bar{x}$ = 4.44, S.D. = 0.55) because the coronavirus disease 2019 (COVID-19) is a new emerging disease [5]. Moreover, the epidemic situation of COVID-19 is an outbreak that is occurring rapidly around the world. Therefore, press releases are continuously released every day through various channels, including information in the community, the center for COVID-19 situation management (CCSA), or national policy from the Ministry of Public Health, to make people aware of the disease severity, the infection spread, how to prevent infection, risk groups, etc. [6, 7]. These may affect the knowledgeand understanding of the coronavirus disease 2019 (COVID-19) among the staff in the emergency department, self-behavior adjustment, as well as behavioral adjustments for the prevention and control of emerging infectious diseases and epidemics. This is consistent with Rosenstock's belief in health [6], who believes that the key indicator to changing individual behavior is individual perception. In which individuals will show self-satisfied behavior and have a positive effect on themselves. Hence, when a person has knowledge and understanding about COVID-19, they are aware of the risks associated with their work and recognize the severity of the disease, which will act to prevent infection. Similarly, health literacy has a positive correlation with COVID-19 prevention behaviors. As health literacy increases, COVID-19 prevention behaviors will also increase. This may have been the result of the development of skills and self-management abilities that can change behaviors to prevent disease in an appropriate way [8]. In addition, the knowledge and understanding of the staff who are in close contact with the patients and the use of personal protective equipment (PPE) are very important to prevent the spread of infection. The hospitals must be equipped with personnel, health teams, and equipment to be able to care for patients safely and efficiently according to standards [5]. Knowledge and understanding, or perception of environmental health management is one of the factors influencing participation in environmental health management. Due to participation in environmental health management, staff must have knowledge and understanding of environmental health management in hospitals, such as all types of solid waste management, the development of toilets according to Thai public toilet standards (HAS) and sewage management, energy and resource management, environmental management of the hospital, food sanitation management, water management for consumption and supply, and food safety operations in hospitals to be able to manage the environment within the hospital effectively without affecting the community [9]. This finding is further supported by previous study in which knowledge in the implementation of environmental health development can predict the participation in environmental health development of hospital personnel under the Ministry of Public Health, Phetchaburi province [10].Furthermore, it is consistent with the survey of personnel under the department of Medical Services about their confidence in the academic operations and services as a whole towards the policy and management guidelines for the situation of the spread of the coronavirus disease 2019 (COVID-19) being at a high level. There is perception, expectation, and confidence in the management system, such as good management of the treatment situation, clear prevention guidelines, management to prepare the place to be ready to receive services only for patients infected with coronavirus 2019 (COVID-19) and has improved in parts that are not yet ready to be more complete, training to provide knowledge and understanding about coronavirus disease 2019 (COVID-19) for staff, patients, and relatives, dissemination of work to the public to be more informed, current information, and effective policy and practice communication. Also, the quality and expertise of personnel, such as having confidence in the potential of medical personnel and executives attach importance to managing the situation of the spread of the coronavirus disease 2019 [11]. The public health facilities in the three southern border provinces received assistance from the department of Medical Services which is an agency responsible for providing academic services and developing services to support the situation of the spread of coronavirus disease 2019 (COVID-19), helping personnel gain more confidence in their operations and environmental health management. According to the research study on factors related to the new normal lifestyles in the prevention of the COVID–19 pandemic among people in Bangkok, it was found that satisfaction with government management

was positively correlated, which means that this factor will help people in Bangkok practice more self-protection [12]. Consequently, if there is a high level of satisfaction with environmental health management, the work behavior will also be in the same direction.

A comparative study of the environmental health management to handle emerging infectious diseases and epidemics in the emergency department of governmental hospitals in the three southern border provinces demonstrated that gender, province, level of the hospital, operational duration, and average monthly income were significantly different at the .05 level. When considering each item, it was found that males had higher mean scores than females. This may be due to a smaller proportion of male staff than females. Also, males are more flexible in preparation for accepting patients,as they must wear personal protective equipment (PPE) and a powered air purifying respirator (PAPR). Moreover, to accept each patient, especially severely ill patients, it is necessary to observe the symptoms closely, which takes a long time. Therefore, males are more appropriate and have more experience receiving patients, resulting in higher average scores for environmental health management in dealing with emerging infectious diseases and epidemics. This result is contradictory to another study about the successful implementation of the novel coronavirus (COVID-19) in the community of village health volunteers (VHVs) in Thailand [6], which revealed that knowledge and understanding of preventing the spread of COVID-19 were higher among females than males. As a result, females are more successful in implementing COVID-19 disease control in their communities.For the operating provinces, it was found that Yala province had the highest mean score, followed by Narathiwat province and Pattani province, respectively. It may be possible that the first outbreak of coronavirus disease 2019 in the three southern border provinces came from neighboring countries because it is an area bordering Malaysia where there was a severe COVID-19 outbreak during this period. Due to Malaysia's lockdown measures, many Thai workers are forced to return to their country, especially those who smuggle into Thailand through natural channels. The consequences were that they did not pass the screening and quarantine system before entering the country. Hence, the three southern border provinces, especially Yala and Narathiwat, are at high risk of spreading the disease. The management's efforts to support the spread of the coronavirus disease 2019 in the area have received support and priority, as well as being more stringent. Subsequently, staff working in Yala province have better environmental health management to handle emerging infectious diseases and epidemics.It is also supported by similar findings in the study of public health emergency management during the COVID-19 pandemic: recommendations for the national level and the 8 specific contextual areas of Thailand [13], which indicated that 7 main elements of the implementation process of public health emergency management among the 8 specific contextual areas were completed following the WHO's toolkit consisting of 1) management and good governance; 2) the health workforce; 3) medicines, supplies, and health technology; 4) the health information system; 5) the health financial system; 6) the health service system; and 7) community participation, village health volunteers, and people. Thus, any area that is not classified as a risk area should also have strict preparations to prepare for the outbreak situation. The result found that staff with more than 25 years of operational duration and earning more than 50,000 baht were the group with the highest average score. Most of them are senior-level and have high operational experience, resulting in environmental health management that can handle emerging infectious diseases and epidemics well.These findings were consistent with previous study[6] that the working period of village health volunteers (VHVs) was statistically significantly different in the successful implementation of the novel coronavirus (COVID-19) in the community. This may have been due to the reason that the increased time spent working in the role of VHVs has promoted personal experience and hence possess the ability in environmental health management when dealing with emerging infectious diseases and epidemics. Another study also showed that average monthly income affects the performance of biomedical engineers during the COVID-19 pandemic crisis[14]. However, there were no differences in professional fields or positions. This may be due to the coronavirus 2019 disease, which is an emerging infectious disease that has never happened before. Professional nurses or medical emergency workers in different positions, both supervisors and practitioners, have no previous experience

dealing with the COVID-19 outbreak.Nevertheless, a previous study [15] has shown thatadministrative positions held by group leaders, head nurses, and assistant head nurses had opinions on the development of the nursing organization management model in the coronavirus 2019 disease outbreak situation at Samutsakhon hospital and were more effective than those who were assigned special duties. This may have been the result of the fact that the group leaders and the head nurses have had a primary role in managing the COVID-19 epidemic since the beginning of the outbreak. Most of them received online training and skills training from the first generation of infection control nurses. They are also responsible for supervising, following up, and continually evaluating the performance on a weekly basis. As a result, there were opinions that applying the nursing organization management model in the coronavirus 2019 disease outbreak situationwould be more effective than assistant head nurses and assigned special duties.In addition, the positions of assistant head nurses and assigned special duties are not officially appointed administrators in the nursing mission group, and they are assigned by the head nurse to perform occasional supervision duties when the head nurse is engaged in other tasks causing no experience in nursing administration before. The highest education level and training experience in the prevention and control of emerging infectious diseases and epidemics are not different because environmental health management for handling emerging infectious diseases and epidemics is a skill and related performance. Thus, receiving a short training period may not be as effective as on-the-job learning that will help you acquire a skill.The results from this study are further supported by the previous study [16], in which front-line nursing administrators [FLNAs] in the community hospitals located in the five border provinces of southern Thailand with different education levels, management training, and experience of crisis management had no different average scores of crisis management during the COVID-19 pandemic.Despite the results of this study being inconsistent with other studies, there were statistically significant differences in education levels, with the community of village health volunteers (VHVs) having a bachelor's degree or higher, contributing to the access to knowledge on various aspects of COVID-19. As a result, they had more implementation to control the novel coronavirus (COVID-19) in their communities [6]. Additionally, the development of knowledge and skills training for medical personnel appropriate to the prevention and control of coronavirus 2019 disease will result in the efficiency and effectiveness of COVID-19 nursing system management[17].

The study found that provinces, job positions, and training experiences on the prevention and control of emerging infectious diseases and epidemics are factors affecting of the environmental health management to handle emerging infectious diseases and epidemics in the emergency department of governmental hospitals in the three southern border provinces with statistical significance at the 0.05 level. These factors can explain the variation inthe environmental health management to handle emerging infectious diseases and epidemics in the emergency department of governmental hospitals in the three southern border provincesby 8.2% (R^2 = .082). The prediction equation can be written in terms of raw scores as shown in equation 1 as follows:

$$\text{Environmental health management} = 4.676 + (0.112)(\text{Province}) + (-0.298)(\text{Job position}) + (-0.141)(\text{Training experience})$$

In addition, the prediction equation can be written in the standard score formas in equation 2 as follows:

$$Z_{\text{Environmental health management}} = (0.189)(Z_{\text{Province}}) + (-0.159)(Z_{\text{Job position}}) + (-0.135)(Z_{\text{Training experience}})$$

4. Conclusions

Based on the study,this research revealed that the staff had overall environmental health management capability at a high level ($\bar{x}$ = 4.18, S.D. = 0.07).A comparison of environmental health management in the prevention and control of emerging infectious diseases and epidemics in the emergency department of governmental hospitals in the three southern border provinces found that gender, province, level of hospital, operational duration, and average monthly income were significantly different at the .05 level. While there were no statistically significant differences in the professional field, position, training experience in the prevention and control of emerging infectious diseases and epidemics, age, and highest education level.The results of this study can be used as a guideline in preparation for handling emerging infectious diseases and epidemics at present and in the future.The development of environmental health management models for handling emerging infectious diseases and epidemics should be systematically organized by 1) setting policies to monitor, prevent, and control emerging infectious diseases and epidemics in working personnel;2) monitoring, prevention, and control of emerging infectious diseases and epidemics among working personnel; 3) developing anaction plan to prepare in the event of an outbreak and the plan is constantly updated so that it can be carried outaccordingto the desired goals;4) training to working personnel in the prevention of emerging infectious diseases and epidemics; and 5) supervision, monitoring, and evaluation for the effectivenessof environmental health management to deal with emerging infectious diseases and epidemics.

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