Preparedness of Nurses for Controlling and Preventing the COVID-19 Infection: A Study from Referral Hospitals in Banda Aceh, Indonesia

Cut Husna[1]*, Muhammad Furqan[2], Laras Cyntia Kasih[1], Devi Darliana[1], Riski Amalia[1]

[1]Department of Medical and Surgical Nursing, Faculty of Nursing, Universitas Syiah Kuala, Banda Aceh, Indonesia; [2]Faculty of Nursing, Universitas Syiah Kuala, Banda Aceh, Indonesia

Abstract

BACKGROUND: The spread of COVID-19 infection has led to high morbidity and mortality rates worldwide. Nurses are the frontline health workers in handling COVID-19 infections, so adequate preparedness is needed for them to contribute to controlling and preventing the infections.

AIM: This study examines the differences in nurses' preparedness to control and prevent COVID-19 infection at the two hospitals in Banda Aceh, Indonesia.

METHODS: This study is a comparative study with a cross-sectional study approach. The sample were nurses in the COVID-19 ward at hospitals A (n = 75) and B (n = 36). Data collection was conducted by administering a questionnaire consisting of 39 items in a 5-point Likert scale through Google Forms. The questionnaire satisfied the content validity by experts and reliability test using Cronbach alpha ($\propto$ = 0.968). Mann–Whitney U-test was conducted for analyzing the data.

RESULTS: The results revealed no significant difference in the preparedness of nurses in controlling and preventing the COVID-19 infection in both hospitals (p = 0.860).

CONCLUSION: The study findings indicate that respondents' demographic data, such as working experience, nurse education, working experience in the COVID-19 ward, and participation in COVID-19 management training, contributed to the nurses' preparedness.

Introduction

Coronavirus disease 2019 (COVID-19) is a new type of respiratory disease of coronavirus with a serious impact on the physical and mental health of the patients [1]. In severe cases, COVID-19 caused pneumonia, acute respiratory syndrome, kidney failure, and death [2]. At present, there are 128,540,982 confirmed cases of COVID-19, and 2,808,308 people have died [3]. Based on the data from the Indonesian Health Ministry [4], on April 2021, reported 1,523,179 people were confirmed positive for COVID-19 in Indonesia, and 41,151 people died. Data in Aceh Province reported that 9912 were confirmed positive for COVID-19, with 1453 people were being treated, 8064 have recovered, and 395 people died [5]. Recently, the number of COVID-19 cases has continued to increase globally. The COVID-19 pandemic has resulted in hundreds of thousands of people dying, including health care workers [6].

Nurses are the largest frontline health workers responding to the COVID-19 pandemic infection [7].

Nurses have a higher risk of contracting COVID-19 which can increase the risk of transmission to patients, colleagues, and family members. Nurses working in intensive care units, emergency departments, infection control, and inpatient ward are vulnerable to COVID-19 infection [8]. COVID-19 has infected more than 3300 health workers in China, and at least 22 have died. Data in Italy showed that almost 20% of health workers involved in the treatment of COVID-19 were infected, and some died. In Indonesia, 4056 nurses were infected with COVID-19, and 702 died by December 2021 [9].

The COVID-19 has spread rapidly worldwide, and nurses should be prepared as the frontline health workers in response to the pandemic. Preparedness is defined as the knowledge and capacity developed by governments, response professionals, and recovery organizations, communities, and individuals to effectively anticipate, respond to, and recover from the impact of current and potential hazard events or conditions [10].

A previous study showed that 67.9% of nurses in Australia were completely unprepared to deal with COVID-19 [11]. A study in Yemen also reported that

the health workers were not unprepared to deal with COVID-19 [12]. Another study showed that around 37% of nurses in 21 hospitals in Libya stated that they were also not ready to handle cases of COVID-19 infections at the hospital level. Therefore, nurses should pay major attention to their preparedness in controlling and preventing COVID-19 infection due to its urgency in the COVID-19 pandemic. Furthermore, the study also reported that 13.3% of nurses showed confidence in handling COVID-19 patients, and 86.7% of nurses did not. It showed that 31.7% of nurses know the symptoms of COVID-19 infection, and 70% of nurses are aware of how COVID-19 infection is transmitted. The study also reported that 45.3% of nurses knew about personal protective equipment. These previous studies showed that the understanding in controlling and preventing the COVID-19 should be major attention among health care workers, including nurses [13].

This conceptual framework of this study adopted from Kementerian Kesehatan RI about preparedness to control and prevent the COVID-19 infection, consisting of (1) pandemic prevention strategies and indicators (strategies applied to control transmission), (2) epidemiological surveillance, (3) laboratory diagnosis, (4) clinical management, (5) control and prevention of transmission, (6) risk communication and community empowerment, (7) provision of resources, and (8) essential health services [2]. This concept is a guideline for hospitals and health care workers in the hospital based in controlling and preventing of COVID-19 infections.

Hospital is a center of health-care services. Hospitals provide inpatient, outpatient, and emergency health services [14]. Hospitals A (provincial hospital) and B (regional hospital) in this study are referral and transfer hospitals for patients infected with COVID-19. These two hospitals have adequate facilities and apply the control and prevention of COVID-19 standards based on the guidelines from the WHO and the Ministry of Health of the Republic of Indonesia. These two hospitals are also equipped with new emerging and re-emerging infectious disease installation service facilities to treat COVID-19 patients. Therefore, health workers, especially nurses, are required to control, prevent the spread, and care for the patients infected with COVID-19 appropriately.

Research Methods

Research design

The research is descriptive comparative with a cross-sectional study conducted at provincial and regional hospitals referral for COVID-19 patients at Banda Aceh.

Population and sample

Nurses in the COVID-19 ward of hospitals A and B were the population used in this study. The sampling method employed was a total sampling, with 111 nurses who met the inclusion criteria. The inclusion criteria were the willingness to be a respondent, a nurse working in the COVID-19 ward, a minimum education of diploma in nursing, not on leave or studying leave, and having a smartphone (as the questionnaire administered using G-form).

Instrument

The instrument was a questionnaire developed by the researchers based on a literature review, consisting of 39 statements on a 5-point Likert scale. This questionnaire was tested for its validity and reliability. The validity test was the content validity by an expert from the Faculty of Nursing at Universitas Syiah Kuala, Banda Aceh, Indonesia. The reliability test was carried out on ten nurses at the Emergency Department of the Meuraxa Hospital, Banda Aceh, using Cronbach alpha (α= 0.968).

Data analysis

Univariate data analysis was done to determine frequency, percentage, mean, and standard deviation. The bivariate analysis, a Mann–Whitney U-test, was conducted to compare the two groups of nurses at hospitals A and B in preventing and controlling the COVID-19 infection.

Ethical considerations

This study has been approved by the Health Research Ethics Committee from the Faculty of Medicine, Universitas Syiah Kuala, and a Hospital of Dr. Zainoel Abidin, Banda Aceh (approval number: 255/EA/FK-RSUDZA/2021).

Results

Demographic data

The demographic data of nurses include gender, age, religion, marital status, working experience (years), education, working experience in the COVID-19 ward (months), and participation in COVID-19 PPE (personal protection equipment) workshop.

Table 1 shows that nurses in the COVID-19 ward of hospital A are mostly females (82.7%), while hospital B is dominated by males (61.1%). The average age of nurses is 31.32 and 32.47 years, with the majority

having 2 years of working experience in hospitals A and B. The latest education of most nurses was a diploma, and more than 60% of nurses in hospitals A and B had experience in caring for the COVID-19 patients for less than a month. In addition, more than 80% of nurses in both hospitals had participated in personal protective equipment (PPE) workshop.

Table 1: Respondent demographic data (n = 111)

Demographic characteristics	Hospital A (n = 75)		Hospital B (n = 36)	
	f	%	f	%
Gender				
Male	13	17.3	22	61.1
Female	62	82.7	14	38.9
Age (M ± SD)	31.32 ± 4.1	-	32.47 ± 4.7	-
Working experience (year)				
<2	10	13.3	3	8.3
≥2	65	86.7	33	91.7
Highest education				
Diploma	40	53.4	26	72.2
Bachelor	35	46.6	10	27.8
Working experience in the COVID-19 ward (month)				
<1	22	29.3	13	36.1
≥1	53	70.7	23	63.9
Attendance at PPE workshop:				
Yes	61	81.3	31	86.1
No	14	18.7	5	13.9

PPE: Personal protective equipment

Table 2 shows that the highest preparedness of nurses in controlling and preventing COVID-19 infection is control and prevention of transmission (62.7% and 61.1% for hospitals A and B), and the lowest preparedness is the ability to conduct laboratory diagnoses (54.7% and 52.8% for hospitals A and B).

Table 2: Distribution of nurses' preparedness to control and prevent COVID-19 infection (n = 111)

Sub-scales/sub-variables	Category	Hospital A		Hospital B	
		f	%	f	%
Epidemiological surveillance	Good	42	56.0	19	52.8
	Fair	33	44.0	17	47.2
Laboratory diagnostics	Good	41	54.7	19	52.8
	Fair	34	45.3	17	47.2
Clinical management	Good	42	56.0	20	55.6
	Fair	33	44.0	16	44.4
Control and prevention of transmission	Good	47	62.7	22	61.1
	Fair	28	37.3	14	38.9
Risk communication and community empowerment	Good	45	60.0	21	58.3
	Fair	30	40.0	15	41.7

Table 3 shows that more than half of the nurses are well-prepared in controlling and preventing COVID-19 infection (57.3% and 55.6% for hospitals A and B).

Table 3: Preparedness of nurses for control and prevention of COVID-19 infection (n = 111)

Preparedness of nurses	Hospital A		Hospital B	
	f	%	f	%
Well prepared	43	57.3	20	55.6
Lack prepared	32	42.7	16	44.4
Total	75	100	36	100

Table 4 indicates no significant difference in the preparedness of nurses for the control and prevention of the COVID-19 infections between hospitals A and B (p= 0.860).

Table 4: The differences in nurses' preparedness for controlling and preventing COVID-19 infections (n = 111)

Variable	f	Mean rank	p-value	α
Nurses in hospital A	75	55.68	0.860	0.05
Nurses in hospital B	36	56.67		

Discussion

Preparedness is several activities to anticipate disasters through organizing and using appropriate and effective strategies to increase the capacity and capability of all potential resources in dealing with emergencies and disasters. These activities aim to reduce the risks, hazards, and negative impacts of disasters [15]. Nurses are among the frontline health workers for controlling and preventing COVID-19 infections [16]; hence, they need to have the preparedness competencies to adequately deal with the COVID-19 pandemic.

The COVID-19 preparedness control and prevention are consisted of: (1) Pandemic prevention strategies and indicators, the strategies applied to control transmission, (2) epidemiological surveillance, observing the development of cases and deaths through epidemiological analysis and intervention, (3) laboratory diagnosis, rapid retrieval specimens of patients suspected of COVID-19 infection, (4) clinical management, activities to establish a diagnosis, carrying out treatment procedures for COVID-19 patients, (5) controlling and preventing transmission by activities done to prevent or break the chain of transmission of COVID-19 infection, (6) risk communication and community empowerment, strategies to involve the community preparedness for developing interventions to stop the spread of COVID-19, (7) provision of resources, efforts to support the implementation of medical and laboratory measures, and (8) essential health services, basic health services in the community during a pandemic [2]. Based on the conceptual control and prevention of COVID-19, this study only is limited to five components, namely: (1) Epidemiological surveillance, (2) laboratory diagnosis, (3) clinical management, (4) control and prevention of transmission, and (5) risk communication and community empowerment.

The Mann–Whitney U-test results conducted in this study indicate no significant difference in nurses' preparedness to control and prevent the COVID-19 infection between hospitals A and B (p=0.860). This finding explains that the nurses in both hospitals have similar preparedness to control and prevent the COVID-19 infection because they implemented similar health protocol and guidelines from the Indonesian Ministry of Health and World Health Organization in 2020. The results revealed that more than half of the nurses (57.3% and 55.6% for hospitals A and B) were well prepared to control and prevent the COVID-19 infection. Both hospitals are referral hospitals for the COVID-19 patients. Hospital A is a provincial referral hospital, and hospital B is a district referral in Banda Aceh, Indonesia. Hospitals A and B, both teaching hospitals in Aceh Province, have the COVID-19 control and prevention facilities with adequate human resources and equipment to control and prevent the COVID-19 infection.

This study found that nurses' preparedness in controlling and preventing the COVID-19 infection was similar in both hospitals because they used a similar protocol for COVID-19 prevention techniques. The highest preparedness was for the variable of the control and prevention of transmission (62.7% and 61.1% for hospitals A and B) through isolation precautions for all the patients, administrative controls, and education and training. Meanwhile, the lowest was laboratory diagnosis (54.7% and 52.8% for hospitals A and B), involving specimen collection and laboratory diagnosis to support clinical management of the COVID-19 patients. The results of this study are in line with the previous study stated that the implementation of infection control measures, diagnostic testing, and efficient response could protect health workers and facilities from SARS-CoV-2 infection [17].

Controlling and preventing the transmission of the COVID-19 infection are priority efforts by implementing the several steps of health protocols, such as washing hands, maintaining distance, using masks, avoiding crowds, and limiting mobility. Meanwhile, other efforts to control and prevent the COVID-19 infection are (1) prevention efforts (promote and protect), (2) case finding efforts (detect), and (3) fast and effective handling (response) [2]. The nurses in both hospitals carried out these control and prevention efforts by increasing their competencies in handling the COVID-19 pandemic by attending training and education programs. This finding is supported by the previous study, argued that health education about controlling and preventing the spread of disease, and increasing awareness about the reliability of personal protective equipment, could improve nurses' performance [7]. Further, also believed that it is necessary to emphasize the clinical and dynamic nature in increasing critical insight among nurses into infection prevention control (IPC) efforts, including time, staff knowledge, adherence to health protocols, work procedures, hospital facilities, organizational/hospital context, and environmental hygiene in order to preventing and controlling the COVID-19 infection [18].

Furthermore, the results of this study are also in line with reported that 76.8% of nurses had adequate preparedness in dealing with the COVID-19 patients [19], but in contrast to the study revealed that only 45.3% of the nurses were adequately prepared to care the COVID-19 patients [11], and also showed that the overall preparedness of nurses in dealing with COVID-19 is moderate level [20]. Another previous study found that the nurses' preparedness knowledge about the COVID-19 was adequate. The nurses' readiness for personal protective equipment showed was moderate levels, with nurses' knowledge of preparedness being 76.8%, facility readiness and response being 92.4%, and supplies of personal protective equipment being 87.3%. The study results suggested that the nurses have adequate knowledge regarding preparedness and response to handle the COVID-19 pandemic [21].

This study also presents demographic data of the respondents, such as working experience, with an average of 2 years (80.6% and 91.7% for hospitals A and B). In relation to the preparedness of nurses in this study, the working experience of nurses seems to contribute to preparedness. It is also in line with study reported that working experience significantly relates to disaster preparedness [22]. Furthermore, the nurses with 3 years of working experience had better disaster preparedness, and more senior nurses were considered to have better performance [23], and length of work could significantly influence disaster preparedness [24]. The duration of working experience will increase the experience and work productivity in preparedness for health services, such as anticipating disaster events [25]. The years of experience are in line with the experience gained, thus affecting the knowledge and attitudes of nurses in preparedness for disasters, such as the COVID-19 pandemic.

Most nurses in both hospitals in this study are diploma of nursing (58.3% and 72.2% in hospitals A and B). The level of education plays an important role in realizing disaster preparedness [26]. This is in line with study explained that higher education could support the nurses' preparedness for disasters. Education is one of the best media to prepare nurses with proper knowledge and attitudes related to disaster preparedness and response capabilities [27].

In addition to formal education, non-formal education such as training related to disaster preparedness is also needed. Training is a process outside the formal education system that could increase knowledge and skills in a short time [28]. Furthermore, education and regular training had a significant impact on increasing the ability of nurses, especially in infection prevention control [29]. Increasing the knowledge of nurses is critical to developing better nurses' performance and preparedness in dealing with disasters, such as the COVID-19 pandemic.

Finally, the results of the study also indicate that PPE training has a significant effect on nurses' preparedness in infection prevention control of the COVID-19 infection in these hospitals. This is in line with a study reported that after being given training and videos on PPE, the average nurses' knowledge reached 81.4% [29]. Furthermore, this is also supported argued the need to build an appropriate infection control system for monitoring, controlling, and correcting the work and duties of the nurses [30]. Applying the principle of continuous infection prevention could increase awareness and concern in dealing with various viruses, such as the COVID-19 pandemic.

Limitations

This study was conducted in the 2nd year of the COVID-19 pandemic, so the results obtained show the preparedness of nurses to control and prevent the

COVID-19 infection in both hospitals are similar. These results are related to nurses who have been able to adapt in controlling and preventing the COVID-19 infection based on their experience and, therefore, have a better level of competencies than at the beginning of the pandemic.

Conclusion

The emergence of the spread and infection of the COVID-19 worldwide has demanded proper preparedness from the frontline health-care system to control and prevent infection. Preparedness is an activity to anticipate disasters by organizing and applying appropriate and effective strategies to reduce the risks, hazards, and negative impacts of disasters, such as the COVID-19 pandemic.

This study results conclude no significant difference in the preparedness of nurses to control and prevent the COVID-19 infection at hospitals A and B. Several factors, such as demographic data of respondents: Working experience, education, participation in PPE training workshops, working experience in caring for the COVID-19 patients, facilities, and human resources at the two hospitals, may also contribute to the results findings. The main findings in this study emphasize the control and prevention of the COVID-19 infection. Nurses must be able to implement the control and prevention of infection transmission through strict health protocols, showing protective and preventive attitudes and behaviors are the main roles needed during the COVID-19 pandemic.

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