ORIGINAL

The Journal of Palembang Nursing Studies
https://jpns-journal.com/index.php/jpns
OPEN ACCESS

The correlation between knowledge and nurse compliance in the use of personal protective equipment level 2

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Volume 1(3), 86-93

http://dx.doi.org/10.55048/jpns.v1i3.25

e-ISSN 2827-8100
p-ISSN 2827-8496

Received : March 31, 2022
Revision : April 21, 2022
Accepted : May 4, 2022
In Press : July 4, 2022
Published : September 11, 2022

ABSTRACT

Background: Personal Protective Equipment (PPE) is divided into 3 levels, the use of which is adjusted to the location of health services due to the COVID-19 pandemic. The second level of PPE is intended for health workers who work in patient care rooms. One of the causes of high cases of nurses contracting viral infections is the lack of knowledge and compliance in using PPE.
Purpose: The aim of this study was to find out the correlation between knowledge and nurse compliance in the use of PPE level 2.
Methods: This study was a quantitative research with correlational analytic type. The number of respondents was 62 nurses. Collecting data using a knowledge (8 questions) and compliance (10 questions) questionnaire of nurses in the use of PPE level 2. The analysis used was univariate and bivariate analysis with the Pearson Product Moment test with level of significance at the alpha = 0.05.
Results: The results of the univariate analysis of knowledge obtained a mean value of 6.16 with a standard deviation of 1.04 and nurses' compliance obtained a mean value of 34.67 with a standard deviation of 3.56. The results of the study concluded that there was no significant correlation between knowledge and nurse compliance in the use of PPE level 2 in Petala Bumi Hospital, Riau Province with p = 0.513 and r = 0.085.
Conclusions: This study suggests that nurses increase knowledge and compliance with the use of level 2 PPE in providing nursing services by attending training, seminars and workshops on preventing disease transmission, especially during the COVID-19 pandemic.

Keywords: knowledge; compliance; personal protective equipment; nurse

INTRODUCTION

Coronavirus disease (COVID-19) which has become a new outbreak around the world since 2019 has forced changes in all aspects of life. COVID-19 can be transmitted through close contact and droplets. Furthermore, medical procedures that trigger aerosols such as bronchoscopy, nebulization and others can also trigger the risk of airborne transmission.

Nursing and Healthcare Practices

- *Nursing coverage includes bio-psycho-socio-cultural*
- *Nurses are at the forefront of handling COVID-19 should be considering universal precaution*
- *Sense of knowledge become an important aspect for nurses and healthcare workers during impletementation of personal protective equipment*

COVID-19 is characterized by symptoms of viral pneumonia such as fever, fatigue, dry cough, and lymphopenia. The World Health Organization (WHO) in March 2020 declared COVID-19 a global pandemic. This case was first discovered in December 2019 in Wuhan, China, with 41 cases. Meanwhile, WHO in February 2020 reported and confirmed that there had been more than 80,000 cases of COVID-19 worldwide (Cucinotta & Vanelli, 2020).

Indonesia reported that the first case was detected in March 2020 and up to November 2020, 511,836 positive cases have been reported (WHO, 2021). According to the Health Office Riau Province, the number of reported COVID-19 cases was 22,082 (Pekanbaru, 2020). The number of COVID-19 cases has become the latest source of transmission in all health care facilities including hospitals, especially individuals who are in close contact with patients or health workers who treat COVID-19 patients. Several countries have reported health workers in their countries contracting COVID-19. China's National Health Commission reported that 1,716 of their health workers had contracted COVID-19 with 80% showing mild symptoms. Indonesia reported that there were 105 health workers who died in handling COVID 19 cases until September 2020 and it is estimated that this will continue to increase (Ministry of Health RI, 2020).

The existence of the COVID-19 pandemic, in handling the use of personal protective equipment (PPE) by health workers, both those who are directly or indirectly involved in handling patients, especially those who have confirmed COVID-19, are important. The emergence of policies on the use of PPE in all health facilities currently causes the price of all types of PPE increase and become scarce due to hampered supply. WHO estimates that the need for medical masks during this pandemic is around 89 million, examination gloves around 76 million and protective glasses at 1.6 million per month (Ministry of Health RI, 2020). To overcome this, WHO and CDC issued several guidelines for the rational and effective use of PPE and its alternatives for health workers. Based on this, the Ministry of Health together with the National Working Group on Infection Prevention and Control compiled technical instructions for the use of PPE in handling the COVID-19 outbreak by adopting and modifying several guidelines issued by WHO, CDC and other sources. Each health care facility can make its own standard operating procedure (SOP) by referring to these technical instructions based on local conditions while still using the principles of standard precautions and isolation precautions (Ministry of Health RI, 2020).

The provision of effective and efficient PPE for health workers is one of the efforts to prevent the spread and transmission of COVID-19. The selection of PPE used must meet certain principles, including being able to provide protection against certain hazards, the weight of PPE as light as possible so as not to cause excessive discomfort, can be used flexibly. In addition, PPE also does not pose additional hazards, is not easily damaged, does not limit movement and is easy to maintain and meets the existing standard criteria. In choosing the right PPE, it is necessary to identify the potential for exposure to transmission and understand the basis of its work (Ministry of Health RI, 2020).

The current increase in COVID-19 cases has led to the gradual use of PPE for health workers starting from the first, second and third levels. The use of the first level of PPE is intended for health workers who work in general practice places with activities that do not generate aerosols. The PPE used in this first level includes surgical masks, gowns, and gloves. The second level of PPE is intended for health workers such as doctors, nurses and laboratory workers who work in patient care rooms. The PPE used consisted of head coverings, protective eyewear, surgical masks and disposable gloves. Meanwhile, at level three, the PPE used is intended for health workers who work in direct contact with suspected or confirmed COVID-19 patients

Mardiansyah, M., Febtrina, R., Yanti, S., & Kharisna, D. (2022). The correlation between knowledge and nurse compliance in the use of personal protective equipment level 2. *The Journal of Palembang Nursing Studies*. *1*(3), 86-93. http://dx.doi.org/10.55048/jpns.v1i3.25

and perform surgical procedures that produce aerosols. The PPE used includes headgear, face shield, eye protection, N95 masks, cover all, surgical gloves and waterproof boots (Widyawati, 2020). The high risk of health workers being infected with COVID-19 can be caused by various factors, including the length of exposure to the virus and the large number of viruses (Tan, 2020). Health workers still lack knowledge about protocols for handling COVID-19 and the transmission of this new type of virus. Scarcity of PPE, lack of knowledge about the use of PPE are also risk factors for transmission (Gupta & Kakkar, 2020). Besides, the procedures for health workers in wearing the wrong personal protective equipment or not according to procedures are also a risk factor (Tan, 2020). The level of practice of applying standard precautions applied by nurses will differ from one nurse to another. This can be related to nurses' knowledge of universal precautions or can also be influenced by the type of training received by each nurse (Vaz et al., 2010). The government and professional organizations of health workers need to increase knowledge and skills in the use of PPE for health workers (Guan, Chen, & Zhong, 2020).

When treating patients, healthcare workers can protect themselves by following infection prevention and control practices. This includes administrative, environmental and engineering controls and the proper use of PPE. The use of appropriate PPE includes selecting the type of PPE, how to use it, how to remove it and how to dispose of or wash PPE (Ministry of Health RI, 2020). Several factors that influence nurses' compliance with using PPE are knowledge, education and years of service (Iriani, 2019).

Compliance with the use of PPE is very important so that health workers who are susceptible to infection in treating patients avoid viral infections. PPE used is standard PPE based on risk assessment. Matters that must be complied with in the use of PPE include determining the use of PPE by taking into account the risk of exposure and the dynamics of transmission, airborne transmission, the correct way of wearing, the correct way of removing it and the method of retrieval (disposal) afterwards (Ministry of Health RI, 2020). The hospital as a reference in its services, hospital management implements and provides the use of level 3 PPE for nurses on duty in the COVID-19 treatment room and level 2 PPE in other treatment rooms. This is done so that health workers who provide health services and nursing actions avoid the transmission of this virus. However, this is not followed by the establishment of standard operating procedures (SOPs) in the use of PPE. This study aims to determine the correlation between knowledge and nurse compliance in the use of personal protective equipment (PPE) level 2 in Petala Bumi Hospital, Riau Province.

METHOD

Design

This study was a type of correlation analytic research using a cross sectional approach.

Sample and Setting

It was undertaken at the Petala Bumi Hospital, Riau Province, with the research sample consisted of 62 nurses. The sampling method used in this study was non-probability with consecutive sampling technique. The inclusion criteria of this study were nurses who worked in the treatment room, while the exclusion criteria were nurses who were on leave and on duty in the COVID-19 treatment room.

Instruments

The instrument used in this study was an instrument that measures the knowledge and compliance of nurses in the use of PPE level 2. The instrument is developed by author and has been tested for validity and reliability on 20 respondents at Mesra Hospital Pekanbaru. The results of the test of the validity of the knowledge questionnaire obtained the value of r count > 0.4438 on 8 question items and 10 questions on the compliance questionnaire. The Cronbach Alpha value of the knowledge questionnaire is 0.846 and the compliance is 0.900, this indicates that both questionnaires are reliable.

Knowledge questionnaire consist of yes or no choices. Each answer to a positive question if answered yes is given a value of 1 and no is given a value of 0, while for a negative question, if answered yes is given a value of 0 and no value is given a value of 1. Questions to assess compliance consist of positive statements and negative statements with answer choices of always, often, rarely and never. Positive statements are always answered with a score of 4, often a value of 3, rarely a value of 2 and never a value of 1. In a negative statement, if answered, always a value of 1, often a value

Table 1. Frequency distribution based on characteristics of respondents (n = 62)

Variables	n	%
Age		
26 – 35	34	54.8
36 – 45	22	35.5
46 – 55	5	8.1
56 – 65	1	1.6
Gender		
Female	47	75.8
Male	15	24.2
Education		
Vocational	37	59.7
Profesional (Indonesian Register Nurse)	25	40.3
Work Experience		
< 6 years	6	9.7
6 – 10 years	23	37.1
> 10 years	33	53.2

Table 2. Description of respondents' average value based on knowledge and compliance of nurses in using personal protective equipment level 2 (n = 62)

Variable	Mean	Median	SD	Min-Max
Knowledge	6.16	6	1.04	4 – 8
Compliance	34.67	35	3.56	27 – 40

Table 3. Correlation between knowledge and nurse compliance in the use of personal protective equipment level 2

Variable	Compliance		
	r	R^2	*p*
Knowledge	0.085	0.007	0.513

of 2, rarely a value of 3 and never a value of 4. The results of the compliance assessment are stated based on the average number -average or mean value.

Data Collection

The research was conducted at the Petala Bumi Provincial Hospital Riau from 03 May – 18 June 2021. Data collection was carried out by giving direct questionnaires to respondents who were selected according to the inclusion criteria.

Data Analysis

Bivariate analysis was carried out using the Pearson Product Moment statistical test to see the closeness or degree of strength of the correlation and the direction of the correlation between the independent variable, namely knowledge and the dependent variable, namely compliance.

Ethical Consideration

Before collecting data, the researcher first went through the ethical clearance process by submitting to pass the ethics test to the health research ethics unit of STIKes Payung Negeri Pekanbaru. After being declared to have passed the ethical test with letter number 0004/ STIKES PN/KEPK/IV/2021.

RESULTS

Based on table 1, it can be seen that the majority of respondents aged between 26-35 years are 34 people (54.8%). Most of the respondents were female as many as 47 people (75.8%). The majority of the respondents' last education level was vocational nurse, which was 37 people (59.7%) and work experience of

respondents who were less than 10 years and more than 10 years was the same, namely 31 people (50.0%).

Table 2 indicates the average knowledge of respondents about level 2 PPE is 6.16 with a standard deviation of 1.04. The lowest value on the knowledge variable is 4.00 and the highest value is 8.00. Based on the results of the study, the average value of respondents' compliance in the use of PPE level 2 was 34.67 with a standard deviation of 3.56. The lowest score of compliance is 27 and the highest score is 40.

Table 3 asserts the correlation between knowledge and nurse compliance in the use of PPE level 2 shows that there is no correlation or weak correlation (r = 0.085) with the direction of the correlation between the two variables being positive, it implies that the higher the knowledge value, the higher the nurse's compliance in the use of PPE level 2. coefficient with a determination of 0.007 means that the line equation explains 0.7% variation in nurse compliance in the use of PPE level 2. The statistical test results found that there was no significant correlation between knowledge and nurse compliance in the use of PPE level 2 in Petala Bumi Hospital, Riau Province (p value = 0.513).

DISCUSSION

Dealing with the research result that has been conducted on nurses, the largest age group is 26-35 years (54.8%) which is included in the category of early adulthood. In this study, the average age of the respondents was 37.20 years with a standard deviation (SD) of 5.80. This age group is an age group in the productive age range. Knowledge and obedience of an individual can be influenced by various factors both internally and externally. Age is one of the factors that can affect a person's knowledge and obedience. The use of PPE at the Sultan Imanuddin Hospital Pangkalan Bun, Central Kalimantan, which stated that 56% of respondents aged 26-35 years had good knowledge of 80% and compliance at 60% compliance. Responding to the results of the study, the most gender was female, namely 75.8%. Gender is an inherent trait of men or women that is socially and culturally constructed. Directly or indirectly, gender is related to a person's level of knowledge about something. In addition, psychologically gender states that women are more willing to obey authority and men are more aggressive (Vaz et al., 2010). Apriluana et al (2016) stated that 76.1% of 92 female respondents had good behavior and 78.8% of 33 male respondents had good behavior in the use of PPE in Banjarbaru Hospital. This implies that there is no correlation between gender and the behavior of using PPE (p = 0.940). This study is not in line with Iriani's research (2019) which shows that the gender of the respondents is 84% female with a good knowledge level of 56% and a good compliance level of 66% regarding the use of PPE at Harum Sisma Medika Hospital.

The results of this study indicated that the education level of the respondents was vocational nursing as much as 59.7% and profesional nursing as much as 40.3%. One of the factors that influence knowledge is education. Education will affect the learning process, the higher a person's education, the easier it is to receive information (Agus & Budiman, 2014). In addition, the level of education will affect a person's ability to work (Robbins & Judge, 2014). This ability consists of intellectual ability and physical ability. Intellectual ability has a big role in work that can shape behavior, one of which is one's obedience (Suryoputri, 2011). This is in accordance with research on nurses at the Kanjuruhan Kepanjen Hospital, Malang Regency regarding the use of PPE. The results obtained an average of 88.3% of respondents' education, namely vocational nursing having good knowledge of 68.04% and compliance to the obedient category 74.4% (Astuti, Yuliwar, & Dewi, 2018). The factors that influence nurse compliance in the use of PPE at Ulin Hospital Banjarmasin stating that the education level of respondents vocational nursing is 66.7% and Bachelor of Nursing 33.3% has a compliance level in the obedient category of 50.8 % with good knowledge 41.3%.

In this study, the average length of work of respondents was more than 10 years as many as 33 people (53.2%). The working period is divided into 3 categories, namely the new tenure of less than 6 months, the medium term of 6-10 years and the long term of more than 10 years. The working period can have a positive and negative impact on the workforce. The positive impact is that the longer a person works, the more experienced he will be in his field of work. In addition, it will also improve the knowledge and skills of these workers. While the negative impact is that the longer you work, the more bored you will be. The working period is closely related to the experience gained in

the workplace. The longer a person works, the more experience and the higher his knowledge and skills. Experience is a source of knowledge obtained by repeating the knowledge that has been obtained in solving problems encountered in the past. This can be developed by learning so that it will provide professional knowledge and skills and can develop decision-making abilities (Agus & Budiman, 2014). The results of this study are supported by (Apriluana, Khairiyati, & Setyaningrum, 2016) at the Banjarbaru Hospital stated that the respondent's service period was more than 10 years as many as 57.1% had good behavior in the use of PPE and the service period was less or equal to 10 years 84.4% had good behavior in the use of PPE. The results of this study indicate that the average knowledge of respondents is 6.16 with a standard deviation of 1.04. The lowest value on the knowledge variable is 4.00 and the highest value is 8.00. Based on the results of this study, it can be concluded that the respondents' knowledge about the use of personal protective equipment is said to be good with an average value of knowledge above 6.16 as much as 42.0% and said to be poor with an average value of less than 6.16 as much as 58.0%. This is not in accordance with research conducted by (Iriani, 2019) which states that 56% of respondents have good knowledge about the use of PPE. Knowledge is the result of knowing that is produced after the individual has sensed a certain object. This can occur through the five human senses which include the senses of sight, smell, hearing, taste and touch (Notoatmodjo, 2012).

Currently, the COVID-19 pandemic demands the use of PPE in each treatment room to be adjusted to the health service area, profession and activities of health workers. In addition, the use of PPE is also adjusted to the level of use where there are three levels, namely the first, second and third levels. The high risk of health workers being infected with COVID-19 can be caused by low knowledge of COVID-19 handling protocols and lack of knowledge regarding the use of PPE (Gupta & Kakkar, 2020). In addition, health workers do not understand correctly about how to wear PPE or use PPE that is not in accordance with procedures (Tan, 2020). Notoatmodjo (2012) states that new information about something will provide a new cognitive foundation for the formation of knowledge.

According to the researcher, the lack of knowledge of respondents in the current use of PPE level 2 is due to a change in policy where previously PPE was used not simultaneously but depending on the actions to be taken. However, currently every treatment room requires health workers to use PPE according to their level. This can be seen from the results of this study that 41.9% of respondents did not understand the types of PPE used by nurses which were included in level 2 PPE. Respondents stated that level 2 PPE consisted of head coverings, protective eyewear, surgical masks and gloves. While the use of PPE level 2 should not only use PPE, health workers are also required to wear gowns when working. In addition, there are 43.5% of respondents who do not understand that eye protection and head protection cannot be reused after being used in taking action to patients.

Dealing with the results of the study the average value of compliance was 34.67 with a standard deviation of 3.56. The lowest score of compliance is 27.00 and the highest score is 40.00. This study shows that nurses compliance consist of 51.6% and it is asserted to be obedient with an average value above 34.67 and 48.4% are said to be non-compliant. with a value below the average of 34.67. This is in accordance with Astuti's research. et al (2018) which states that 74.4% of respondents have a level of compliance in the obedient category. Compliance is a form of behavior that can be measured from individuals who obey or obey because they have understood the meaning of an applicable provision. Compliance is also a form of obedience to rules or discipline in carrying out established procedures (Mariana, Miswan, & Andri, 2018).

According to the researcher, the good level of respondent compliance in the use of PPE level 2 is due to policies from hospitals to protect nurses at work and reduce the increasing number of cases of medical personnel exposed to the current COVID-19 virus. Many factors can affect the level of compliance of nurses, including communication patterns with other professions that will affect compliance in carrying out actions, one of which is the use of level 2 PPE. Support from the hospital also affects nurse compliance, including the internal community of nurses, namely other health workers, patients, as well as support from health service leaders and nurses who provide PPE facilities so that nurses are obedient in their use. This can be seen from the respondent's statement, namely 53.2% of respondents always use PPE starting from the

antero room and removing PPE in the antero room and 33.9% of respondents often use PPE even though they are not in direct contact with patients.

The bivariate analysis in this study based on the results of statistical tests of the correlation between knowledge variables and nurse compliance in the use of PPE level 2 showed no correlation or weak correlation (r = 0.085). The results of statistical tests found that there was no significant correlation between knowledge and nurse compliance in the use of PPE level 2 in Petala Bumi Hospital, Riau Province (p = 0.513). This is in accordance with Mariana's research. et al (2018) stated that there was no correlation between knowledge and the use of PPE for nurses at Mokopido Hospital, Tolitoli Regency with (p value = 0.099; = 0.05). Knowledge is a result of curiosity obtained through sensory processes, especially the eyes and ears for certain objects. Knowledge is an important domain for the formation of open behavior (Anugrahwati & Hakim, 2019). Meanwhile, compliance is a form of obedience to rules or discipline in carrying out established procedures. An individual's compliance can be influenced by gender, type of work, profession, length of work, education level, individual ability and motivation (Suryoputri, 2011). In addition, compliance can also be influenced by the attitude of the individual.

According to the researcher, there is no correlation between knowledge and nurse compliance in the use of PPE level 2 is because compliance is not only influenced by one's knowledge. Although respondents have poor knowledge of 58.0% with an average value of less than 6.16, respondents remain obedient in using level 2 PPE. One of the factors that affect a person's compliance is attitude. Attitude is a behavior related to a person's perception, personality and motivation. Attitude plays an important role because it can change and be shaped so that it affects a person's behavior. In addition, the compliance shown by nurses in using PPE level 2 can be seen from the attitude of nurses as much as 61.3% stated that they never did not use masks and face shields when they did not take care of patients. Good respondent compliance in using PPE is due to the motivation of nurses to protect themselves so as not to contract the disease with 59.7% of nurses stating that they always use eye protection at certain times to avoid the risk of being splashed or sprayed when performing procedures that produce aerosols. The existence of the COVID-19 pandemic makes nurses have good experience while working to avoid the risk of transmission so that they comply with the current use of PPE level 2. Furthermore, the availability of sufficient PPE can also be the basis for nurses to comply with existing policies in using level 2 PPE to protect themselves from contracting COVID-19.

CONCLUSION

The results of this study indicated that there was no significant correlation between knowledge and nurse compliance in the use of PPE level 2 in Petala Bumi Hospital, Riau Province. Nurse compliance in using PPE level 2 can be influenced by the motivation, experience, and underlying attitude of the nurse itself. The results of this study are expected to be used as basic data for further research with a different research design by adding variables related to knowledge and compliance in the use of personal protective equipment at level 1 or level 3 such as the availability of information sources, the availability of SOP in agency and the availability of management support.

Declaration of Interest

No conflict of interest

Acknowledgment

The researcher would like to thank the Chairperson of the STIKes Payung Negeri Pekanbaru, the Head of Research and Community Service STIKes Payung Negeri Pekanbaru, and the Director of Petala Bumi Hospital in Riau Province who have facilitated this research.

Funding

None

Data Availability

The datasets generated during analyzed the current study are available from the corresponding author on reasonable request.

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