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Analysis of Risk Factors Affecting the Incidence of Covid-19 in Nurses at Dr. Rsup. Moh Hoesin (Rsmh) Palembang

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ABSTRACT

As many as 59% of nurses work on the front lines during the covid-19 pandemic which is the largest proportion of health workers (WHO, 2020) Starting from the beginning of the pandemic until March 2021, 147 nurses in RSMH have been exposed to covid-19 (31.21%) and until now incidence is still high. The purpose of this study was to identify risk factors that influence the transmission of covid-19 in nurses at RSMH Palembang. The dependent variable was covid-19 incident on nurses and the independent variable were age, gender, work experience, work area, distance-keeping behavior and compliance with wearing PPE. This research used an analytic observation design with a retrospective cohort approach on 1196 nurses who participated in the RSMH covid-19 screening during the period March 2020-March 2021. The sample selection was carried out using a consecutive sampling technique and 1131 samples were obtained that met the inclusion criteria. Covid-19 occurred in 87 nurses (7.7%). The results of the bivariate test showed that there was an effect of gender (p=0.023), work area (p=0.026) and adherence to wearing PPE (p=0.001) on the incidence of Covid-19 in nurses. The results of the logistic regression test show that compliance with wearing PPE is the most influential factor on covid-19 with a probability of 87.92%. Hospitals must pay more attention to nurses who are at risk of being exposed to COVID-19, namely nurses who are male and work in red zone areas. Guaranteeing the availability of PPE and monitoring and evaluation of PPE compliance must be routinely carried out by hospital management.

1. Introduction

Corona virus disease first appeared and becoming endemic in Wuhan, China in December 2019.[1] After that, Corona virus was declared as global pandemic by the World Health Organization (WHO) in March 2020.[2] The Indonesian government declared covid-19 as national disaster in April 2020.[3]The prevalence of Covid-19 cases in the world in mid-September 2020 reached 29,155,581 and 926,544 deaths were recorded. It was spread to 216 countries with *Case Fatality Rate* until 3.17%.[4] The accumulation of confirmed cases of Covid-19 in Indonesia as of March 5, 2021, at 12.00 p.m., there were 1,368,069 cases, with 1,182,687 recovered and 37,026 died.[3]

The incidence of covid-19 both in nurses and the public is influenced by many factors, including the increasing coverage of PCR tests for the community and socio-economic activities that have begun to gradually occur[5]. the weakening of the application of health protocols in the community is also a contributing factor increase in the spread of COVID-19. Hidayani stated in her study that there was a relationship between age, gender, nosocomial

infections from patients and hospitals, comorbid diseases (hypertension, diabetes mellitus, cardiovascular disease, and COPD) with the occurrence of covid 19 in patients.[6]

According to WHO (2020) the largest proportion of health workers in the world who work on the front lines of COVID-19 are nurses, approximately 59%.[7] *The International Council of Nurses* (ICN) reported that from the beginning of the pandemic until May 2020 there were as many as 90,000 health workers infected with COVID-19 until more than 260 people died. ICN also reported that until June 3, 2020, the number of nurses who died due to COVID-19 in the world had increased to 600 people.[8] Ran et al research in Wuhan stated that the risk factors for the occurrence of covid-19 in health workers were working in critical areas, high working hours and lack of hand washing.[9] Research by Bani-issa, Nusair, Altamimi, & Hatahet on 522 nurses stated that the risk factors for the occurrence of covid-19 in nurses included ICU nurses who helped the front lines, nurses who were less experienced and lack of infection control training.[10]

The sub risk management of quality committee RSMH reporting that from the beginning of the 2020 pandemic until March 11, 2021, there were 147 nurses who were confirmed positive for COVID-19 from 417 RSMH employees who were exposed to COVID-19 (31.21%). The fairly high incidence of COVID-19 among nurses at Dr Mohammad Hospital Hoesin Palembang (RSMH) and the absence of any research on the risk factors for the transmission of COVID-19 to nurses in Indonesia are the reasons for the need for an analysis of risk factors for transmission of COVID-19 19 on nurses at RSMH Palembang. Risk factors for age, gender, work area, work experience, compliance with wearing PPE and social distancing behavior need further research because there is no such research on nurses in Indonesia.

2. Methods

This study was a *cross sectional study* and used a retrospective cohort design. The population in this study were all nurses who filled out the Covid-19 screening at the Palembang Hospital for the period March 2020-March 2021 totaling 1196 nurses. The sampling technique was *consecutive sampling,* with a total sample of 1131 that met the inclusion criteria. The inclusion criteria were all nurses who were in the service area and screened for COVID-19, while the exclusion criteria were nurses who had a history of close contact with family members who were confirmed positive during screening.

The research location was carried out at the RSMH from April to June 2021. The instrument in this study was a *checklist* modified by the researcher according to the risk factors contained in the COVID-19 screening form for employees of RSMH Palembang. The stages of the research process are making research proposals, sending research proposals to Diklit RSMH, conducting research proposal seminars, applying for research permits, conducting ethical tests, collecting data by requesting data from K3RS, then processing the data. The results of the ethics test from the RSMH research and ethics committee stated that this study met the 7 ethical standards of eligibility from WHO. Data analysis in this study consisted of univariate analysis with frequency distribution, bivariate with *chi square* and multivariate with logistic regression.

3. Results

a. Univariate Analysis

Table 1. Characteristics of respondents (n:1131)

Variable	f (%)
Gender	
Male	125 (11.1)
Female	1006 (88.9)
Age	
≥ Mean Age of Nurse (35 years)	557 (49.2)
< Mean Age of Nurse	574 (50.8)
Working Area	
Red Zone	546 (48.3)
Non Red Zone	585 (17.8)
Work Experience	
< 5 years	201 (17.8)
≥ 5 years	930 (82.2)
Behavioral Distance Keeping	
< 2 meters	802 (70.9)
> 2 meters	329 (29.1)
Compliance Wearing PPE	
Not Adhering to Wearing PPE	651 (57.6)
Obedient to wearing PPE	480 (42.4)
Incidence of COVID -19 in Nurses	
Positive	87 (7.7)
Negative	1044 (92.3)

b. Bivariate Analysis

Table 2. Bivariate Analysis of Risk Factors Affecting the Incidence of Covid-19 in Nurses

Independent Variable	*P value*
Compliance using PPE	0.001*
Gender	0.023*
Work Area	0.026*
Behavior Keeping a distance	0.290
Age	0.481
Work experience	0.893

*Chi square

After doing a bivariate analysis (significance 5%) between the dependent variable, namely the incidence of covid-19 with the six risk factors above, the factors that influence the incidence of covid-19 are gender (p= 0.023), work area (p= 0.026) and compliance wearing PPE (p= 0.001). These three variables meet the requirements to enter the multivariate modeling because they have a p value < 0.25

c. Multivariate Analysis

Table 3. Final model

Variabel	B	SE	Wald	OR (95% CI)	ρ value
Kepatuhan APD - Tidak Patuh - Patuh	-0,708	0,227	9,776	0,492 (0,316-0,768)	0,002
Konstanta	3,547	0,374	90,131	34, 694	0,000

*bermakna pada α=0,05

After the logistic regression analysis was carried out, only PPE compliance was included in the final model. So, the most influential factor on the incidence of COVID-19 in nurses is compliance with wearing PPE. Nurses who do not comply with the use of PPE could get COVID-19 as much as 0.492 times (95% CI: 0.3160-0.768) compared to nurses who obediently wear PPE.

4. Discussion

The results of the statistical test showed that there was no effect of age on the incidence of COVID-19 among nurses at RSMH Palembang. The results of this study are in accordance with the research of Putri, Putra and Mariko, concluding that the age group <50 years is more at risk of being infected with Covid-19 than the age group 50 years. [11] Covid-19 can affect anyone and all ages. The age of the nurse who works at Dr. Mohammad Hoesin Palembang is between 21-58 years old which is an age that is widely exposed in various levels. WHO (2020) also stated that there was no relationship between the age of health workers and the risk of SARS-CoV-2 infection.[12] However, other studies suggest that old age has an effect on COVID-19. Ran et al stated that the age factor > 65 years was the most dominant with a HR of 2,563 where people or patients aged 65 years had a 2.6 times greater risk of contracting COVID-19 than those aged less than 65 years.[7] Research by Zhang, also shows that people aged > 75 years are at 1.11 times risk of getting COVID 19 compared to those under 75 years old.[13] The results of this study are different from the results of the research above because of the 1131 samples the average age of nurses at RSMH is 35 years, this research variable shows that there is no effect of age > mean (35 years) with the incidence of covid-19 because it does not include elderly age as in previous studies.

The results of the statistical test showed that there was an influence of gender on the incidence of COVID-19 in nurses at RSMH Palembang. The results of this study are in accordance with Ran L's research (2020) which shows an OR value of 1.793 (male) meaning that men have a 1.793 times greater risk of contracting COVID-19 than women.[9] Research by zhang also shows an OR value of 7.224, meaning that men are 7.224 times more likely to get COVID-19 than women.[13] This is also in line with Cumming (2020) which states that the HR value of 1.31 shows that men are at risk of getting COVID-19 as much as 1.31 times greater than women.[14] According to Ran L, men are more at risk of COVID 19 due to chromosomal factors and hormonal factors, and women are more protected from COVID-19 than men because they have an X chromosome and sex hormones such as progesterone, which play an important role in innate and adaptive immunity.[9] Men usually leave the house because of the demands of work more often than women, so they are more susceptible to this disease.[6]

The results of the statistical test showed that there was an effect of the work area on the incidence of COVID-19 among nurses at RSMH Palembang. The results showed that there were 52 nurses (4.6%) who were confirmed positive for COVID-19 working in the red zone

area. The RSMH red zone area is an area that uses level 3 PPE because of direct contact with aerosol measures, including the ICU, P1 of emergency room, bronchoscopy room and covid isolation room. The results of this study are in line with a study of 552 nurses in Arabia which stated that 51.4% of nurses working in critical areas were at risk of COVID-19, especially those who carried out a lot of aerosol action, taking secretions and body fluids of patients.[10] Ran L research on health workers in China stated that there is a relationship between work areas that perform aerosol action (operating room, infection room, ICU room) with the incidence of covid-19.[9] Zhang also mentioned that nurses who work in isolation rooms carry out direct patient care to meet the daily needs of patients and intervention in treatment programs.[13]Many aerosol treatments, such as suction, oral hygiene, swab sampling and of course intubation are very risky. Hospitals must pay more attention to the safety of nurses who work in this red zone so that occupational diseases do not occur.

The results of the statistical test showed that there was no effect of less than 5 years of work experience on the incidence of COVID-19 among nurses at RSMH Palembang. This is different from the research of Zhang et al which said that <5 years of work experience had an effect on the risk of COVID-19 in nurses[13]. Experienced nurses are considered more confident in taking action so that the risk of exposure is lower. Bani Issa's research also states that nurses who are inexperienced are at risk of being exposed to covid 19 because they do not have work experience in a covid isolation room. In the pandemic era, many ordinary ward nurses were forced to work or transferred to critical area rooms due to the increasing demand for ICU beds, these new nurses do not have critical nursing experience, so they are more at risk of contracting.[10] This difference can occur because all new nurses at RSMH have been oriented to 4 mandatory trainings including infection control training (PPI) for new nurses who enter the Covid room. In the PPI training, standard precautions and transmission precautions have been taught including hand washing, PPE removal, disinfection, waste treatment, linen and others. This is very influential in increasing the knowledge of nurses in preventing cross infection from patients. In addition, in 2020 RSMH has not accepted volunteer nurses and nurses who are on duty in the isolation room are nurses with at least 5 years of experience clinical nurses' level 2 (PK 2).

The results of the statistical test showed that there was no effect of social distancing behavior on the incidence of COVID-19 among nurses at RSMH Palembang. CDC and WHO recommend the implementation of social distancing to limit the transmission of the virus that spreads through respiratory droplets.[16] There is no effect of social distancing behavior on the incidence of covid-19 at Dr. RSUP. Mohammad Hoesin Palembang can be caused by other factors such as the condition of immunity from the nurses themselves. A good immune system will help the body fight pathogenic viruses so that they are not infected.[17] In addition, there is a regulation on the use of PPE level 3 which really protects nurses in carrying out their duties and the division of shifts for the isolation ward where the night watch is only one day making the immune system quickly increase again. Even though nurses do not keep their distance because full PPE is used so that it can prevent transmission.

The results of the statistical test showed that there was an effect of compliance with wearing PPE on the incidence of covid-19 among nurses at RSMH Palembang. Compliance with wearing PPE is the most influential risk factor with OR 0.492. The magnitude of the risk of COVID-19 for nurses who do not comply with wearing PPE is 0.492x with a probability of 87.92%. This condition is in accordance with a retrospective study conducted by Bai which states that the risk factors that cause exposure to COVID-19 in health workers include the lack of use of personal protective equipment.[15] The results of this study are also in accordance with the WHO statement (2020), that inconsistent use of PPE is associated with an increased risk of corona virus infection in health workers.[12] Nurses are at risk of contracting COVID-19 when performing aerosol procedures such as intubation, extubation, cardiopulmonary resuscitation, sputum sampling and bronchoscopy. If they don't wear PPE properly, nurses

who are in direct contact with patients can get COVID-19.[8]

PPE non-compliance in this study occurred where nurses did not wear PPE completely. At the beginning of the pandemic, RSMH made efficient use of PPE for fear that at the peak of the COVID-19 outbreak, PPE was still available, N95 masks were only used in isolation wards and surgical masks were limited to each shift divided by the number of nurses. Some nurses do not use PPE according to their level because they are not in the red zone area, they do not use face shields, N95 and hazmat. Even though there were many confirmed patients in the regular ward. Therefore, as the most influential factor in the occurrence of COVID-19 incidents in hospital nurses, they must ensure the availability of PPE for nurses, such as the ICN recommendation.[8]

5. Conclusion

The risk factors that influence the incidence of COVID-19 in nurses at RSMH Palembang are gender, work area and compliance with wearing PPE. Of the three factors above, the most influential factor on the incidence of COVID-19 in nurses is adherence to wearing PPE. The probability of the risk of COVID-19 occurring in nurses who do not comply with wearing PPE is 0.492 times with a probability of 87.92%. Contamination of COVID-19 through the respiratory tract is the most common means of infection with COVID-19. If you do not comply with the use of PPE, nurses who are in direct contact with patients can contract COVID-19. Hospital management must pay more attention to nurses who are at risk of COVID-19, namely those who work in the red zone area and are male. Hospitals must ensure the availability of PPE in accordance with standards and needs. Monitoring and evaluation of compliance with the use of PPE must continue to be carried out by K3RS and PPI RS.

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