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Original Research Article

An analysis of the risks of COVID-19 exposure to hospital employees at a private hospital in Yogyakarta, Indonesia

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ABSTRACT

Background: The healthcare workers provide the services to reduce morbidity and mortality rates. However, they are also exposed directly to the patients. WHO reports that 88% of health workers were infected with COVID-19 while working in hospitals, and 17% got exposure from communities. This study analyzes the overview of risk exposure to COVID-19 and risk factors of COVID-19 exposure to hospital employees at a private hospital in Yogyakarta during the COVID-19 pandemic.
Methods: This study employs a quantitative approach with a cross-sectional design study. The data collecting is using an online questionnaire to assess the risk of COVID-19 exposure toward healthcare workers.
Results: From 101 employees who participated to be the respondent, 13 employees had been diagnosed with COVID-19 during work in the COVID-19 pandemic. There was a significant difference between IPC compliance with the incidence of COVID-19 (p=0.046). Meanwhile, there were no significant differences between comorbidity (p=0.205) and duration of work (p=0.125) with the incidence number of COVID-19. Based on the ANOVA analysis, there was no significant difference between; IPC compliance, comorbidity, and duration of work with the incidence number of COVID-19 (p=0.092).
Conclusion: The risk of healthcare workers exposed to COVID-19 could be through various factors within and outside the hospital. Compliance with IPC, comorbidities, and duration of work only affect as much as 6.4% of the incidence of COVID-19 among hospital employees.

Keywords: COVID-19, Healthcare worker, Risk factors

INTRODUCTION

Since it was first reported at the end of December 2019 in Wuhan, China, Coronavirus disease 2019 (COVID-19) has spread worldwide and made it a global threat with a rapidly increasing mortality rate. The case first started as a case of pneumonia, and on January 7, 2020, Chinese scientists succeeded in isolating the novel coronavirus (CoV) from a patient in Wuhan.[1] Based on characteristics of the viruses that have been identified, the international committee on taxonomy of viruses changed the name previously nCov-2019 to severe acute respiratory syndrome Coronavirus-2 (SARS-CoV-2). The name of disease caused by SARS-CoV-2 is COVID-19.[2] The first COVID-19 case in Indonesia was confirmed on March 2, 2020, and as of January 31, 2021, 1,178,314 confirmed cases of COVID-19 with 29,998 deaths reported from 507 regions in Indonesia. As many as 21,825 cases have been reported in Yogyakarta.

Healthcare workers play an essential role in detecting, controlling, and stopping the spread of disease.[3] The contribution of healthcare workers in reducing morbidity and mortality means that they will be exposed directly to patients and disease-causing agents. The level of exposure that may be received from infected patients makes them more at risk of contracting and spreading

infection.[4] During the pandemic, many healthcare workers have been infected and died due to COVID-19. The Indonesian Doctors Association (IDI) has reported 647 deaths of health workers due to COVID-19 as of January 28, 2021. A study conducted by WHO showed that 17% of healthcare workers infected with COVID-19 received exposure from the community outside the hospital. As many as 88% had exposure to the hospital where they worked and contacted confirmed COVID-19 patients.[5] Meanwhile, the description and data regarding the risk of COVID-19 infection among healthcare workers have not been widely published in Indonesia.

Understanding the description of risk factors for a source of infection is very important as part of a risk mitigation strategy. It includes infection control measures helpful in protecting health workers from possible exposure to disease and protecting patients from infections acquired in the hospital. Understanding the level of exposure to the COVID-19 virus is also critical as a guide for the hospital infection control team to prepare policies and protocols that all healthcare workers must carry out in COVID-19 treatment hospitals.[6] This study aims to analyze the risks of exposure to COVID-19 in employees at a private hospital in Yogyakarta.

METHODS

This study was a cross-sectional descriptive analysis of healthcare worker risks exposure of COVID-19. The study population included all medical and non-medical employees at PKU Muhammadiyah gamping hospital in Yogyakarta. This study was conducted on February-March 2021. Determination of the sample is based on a group of employees with a cluster sampling technique. Sample selection is made in each working unit by convenience. We defined the samples as an HCW as any paid or unpaid person serving in the healthcare setting and had the potential for direct or indirect exposure to patients or infectious materials and obtained as many as 101 respondents who met the criteria, either giving the health care or administrative care to the patients. Quantitative data was collected using an online questionnaire using Microsoft form distributed through the Whatsapp application. This online questionnaire was adopted from WHO interim guidance "health workers exposure risk assessment and management in the context of COVID-19 virus". A statement of informed consent is given on the first page of filling out the questionnaire. The questionnaire consisted of personal information questions, health status, occupation, work procedures, psychological conditions during work, and activities outside work-related risk factors for exposure to COVID-19.

Questions regarding personal information, health status, occupation, work procedures, and history of activities outside of work are given with multiple choice answers. The results are displayed in the form of percentages presented in the form of tables and graphs. The level of compliance in carrying out work procedures is assessed using answer choices with scores. These compliances are then analyzed using the results of the average score into categories of obedient and disobedient. This study was conducted according to ethical guidelines approved by the ethics commission of Aisyiyah university Yogyakarta (1359/KEP-UNISA/I/2021).

All statistical analyzes were performed with the SPSS program. The chi-square test was conducted to see the relationship between IPC compliance, comorbidities, and duration of work with the incidence of COVID-19. The linearity test used ANOVA to assess whether there was an effect between adherence to IPC compliance, comorbidities, and duration of work with the incidence of COVID-19. Determination analysis test to see how big the percentage of influence given by the three independent variables on the incidence of COVID-19.

RESULTS

Characteristics of research respondents

The results were from 101 respondents, 64 were medical employees (consisting of 20 males and 44 females), and 37 non-medical employees (consisting of 26 males and 11 females with an age range of most of the employees are 20-35 years old (Table 1). Most medical employees only work in one health facility (81.9%) (Table 3). According to their profession, of the 64 medical employees, the highest number are nurses (45.3%), followed by physicians (14.1%), nutrition workers (14.1%), radiology officers (9.3%), midwives (7.8%), medical rehabilitation officers (3.1%), the rest are pharmacists, laboratory workers, CSSD officers, and physiotherapists. Meanwhile, in non-medical work units, most of the respondents came from the housekeeping department (47.2%), linen and laundry department (38.9%), the rest came from the maintenance, finance, and management departments (Table 1).

Health status of respondents

From the health status (Table 2), 13 respondents have a history of smoking. Body mass index (BMI) data shows that most non-medical work units have a BMI in the normal category (32.4%) as well as medical units (42.2%). From the history of COVID-19 comorbidity, data were obtained for 18 people with a history of comorbidity. The highest number was asthma (22.2%), followed by pregnancy (16.7%), hypertension, gastritis, diabetes mellitus, bronchitis, liver disease, and hydronephrosis.

Based on their profession (Figure 2), the most infected employees were nurses (30.8%), followed by physicians (15.4%), midwives (15.4%), radiology officers (15.4%), and the rest were laboratory and finance staff. Of the 13 people infected with COVID-19, 11 people came from medical units with the highest number are from the

emergency department (30.8%), followed by delivery rooms (15.4%), radiology installations (15.4%), and the rest came from the outpatient department, isolation, and laboratory. Meanwhile, non-medical units came from management (7.6%) and finance (7.6%) (Figure 1). The status of COVID-19 vaccination shows that the majority of respondents have been vaccinated in both medical units (54.1%) and non-medical units (65.6%).

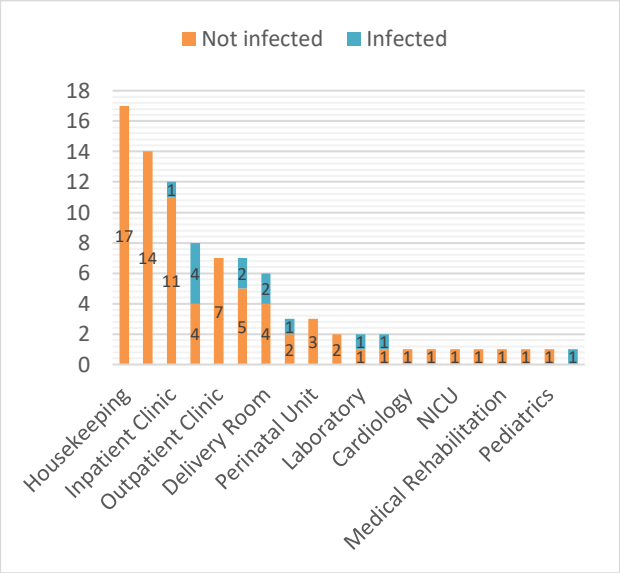

Figure 1: Hospital employees infected with COVID-19 by working unit.

Incentive data shows that both respondents from non-medical units (62.2%) and medical units (64.1%) have received COVID-19 incentives. Respondents from the non-medical units who received incentives were primarily satisfied with the amount given (65.2%), while respondents from the medical units were mainly dissatisfied with the number of incentives (53.7%). The results of the analysis of the psychological conditions of the respondents showed that most of them felt unhappy (70.3%), anxious (76.6%), uncomfortable (71.9%), afraid (60.9%), and stressed (29.7%) while working during the COVID-19 pandemic with the majority felt more by medical employees (Table 4).

Working procedures in the era of the COVID-19 pandemic

Most medical employees (89.1%) and all non-medical employees only work in one health facility. A total of 57.8% of medical employees work for 8-10 hours in one shift, with a rest duration of only 15-30 minutes as much as 62.5% (Table 3).

Of the total 38 beds provided for COVID-19 treatment, only 25% of medical employees and 13.5% of non-medical employees provide services to COVID-19 patients. The rest admitted they did not do and were not sure about treating COVID patients. In the treatment of COVID, both medical and non-medical employees comply with the use of PPE properly (100%).

The implementation of IPC programs in hospitals consists of various interrelated practices. Researchers assessed compliance in the performance of hand hygiene and other deployments related to the IPC program, such as the use of PPE and the implementation of IPC in general. From the assessment of hand hygiene compliance, it was found that most of the employees, both medical (79.7%) and non-medical (64.9%), complied with the implementation of hand hygiene as recommended.

From compliance with PPE, researchers assessed based on the COVID-19 treatment and the non-COVID-19 treatment group. For medical employees who treat COVID-19 patients, the use of medical/surgical masks has the highest average value compared to other types of PPE. Likewise, with the non-medical group, medical/surgical masks became the PPE with the highest compliance. In the non-COVID-19 treatment group, the non-medical group showed the highest adherence to medical masks, while in the medical group, medical masks, gloves, and face shields had the same mean value for compliance.

The IPC compliance assessment was divided into the COVID-19 treatment and the non-COVID-19 treatment group (Figure 3 and 4). In the COVID-19 treatment group, most medical employees (68.75%) had complied with the IPC, while the rest are not (31.25%). On the other hand, all non-medical employees are considered compliant in implementing the IPC in the COVID-19 treatment area. In the non-COVID-19 treatment group, most medical employees (70.8%) complied with the IPC while the rest did not. Non-medical employees mainly were complied with the IPC (75%), while the rest do not.

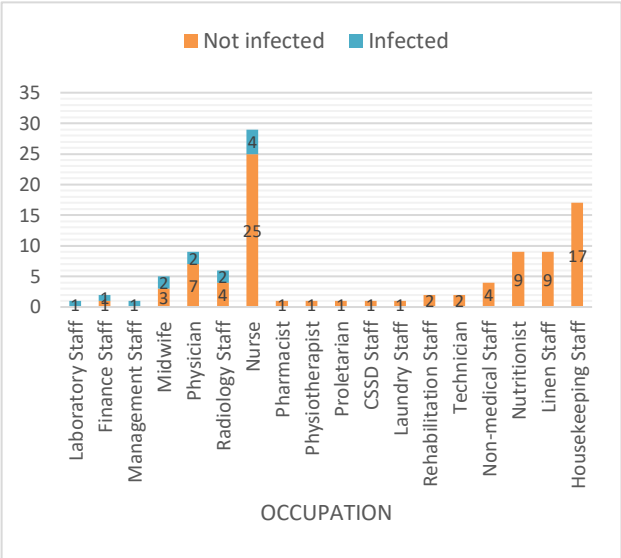

Figure 2: Hospital employees infected with COVID-19 by occupation.

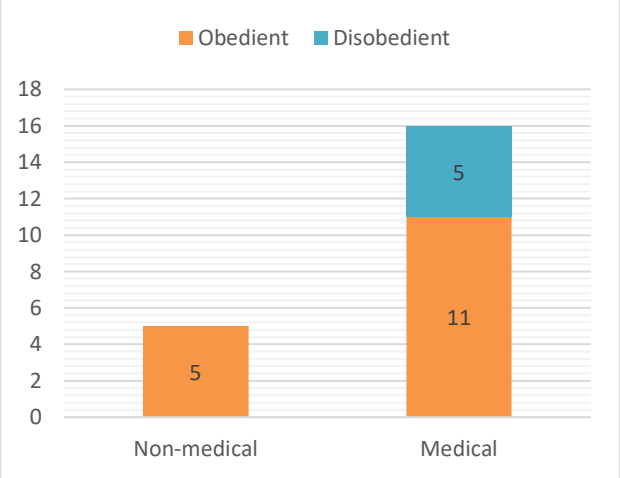

Figure 3: IPC compliance among employees in COVID-19 treatment.

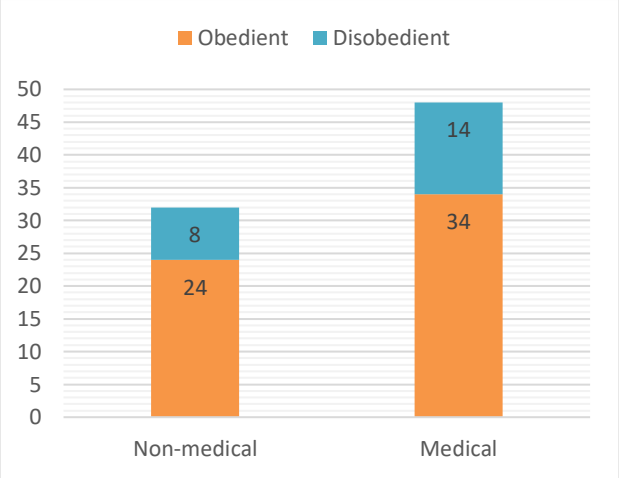

Figure 4: IPC compliance among employees non-COVID-19 treatment.

Table 1: Characteristics of respondents.

Variables	Non-medical		Medical	
	Frequency=37	Percentage (%)	Frequency=64	Percentage (%)
Gender				
Male	26	70.2	20	31.3
Female	11	29.8	44	68.7
Age (years)				
<20	2	54.1	1	1.6
20-35	20	40.5	51	79.7
>35	15	100	12	18.7
Length of employment (years)				
<1	11	29.7	5	7.8
1-3	11	29.7	21	32.8
3-5	5	13.5	11	17.2
>5	10	27.1	27	42.2
Educational background				
Elementary school	2	5.4	0	0
Primary school	2	5.4	0	0
High school	27	73	7	10.9
Diploma-3	1	2.7	26	40.6
Diploma-4	0	0	1	1.6
Bachelor	4	10.8	13	20.3
Masters	0	0	2	3.1
Profession	1	2.7	9	14.1
Specialist-1	0	0	6	9.4

Table 2: Health status.

Variables	Non-medical		Medical	
	Frequency=37	Percentage (%)	Frequency=64	Percentage (%)
Smoking history				
Yes	12	32.4	1	1.6
No	25	67.6	63	98.4
BMI				
Underweight	10	27.1	2	3.1
Normal	12	32.4	27	42.2
Overweight	3	8.1	15	23.4
Obesity I	9	24.3	17	26.6
Obesity II	3	8.1	3	4.7

Continued.

Variables	Non-medical		Medical	
	Frequency=37	Percentage (%)	Frequency=64	Percentage (%)
COVID-19 infection				
Infected	2	5.4	11	17.2
Non-infected	35	94.6	53	82.8
COVID-19 vaccination				
Given	20	54.1	42	65.6
Not given	17	45.9	22	34.4

Table 3: Characteristics of occupation.

Variable	Non-medical		Medical	
	Frequency=37	Percentage (%)	Frequency=64	Percentage (%)
Employment status				
Regular employee	12	32.4	51	79.7
Contract employee	2	5.4	8	12 5
Interns	0	0	3	4.7
Outsourcing	23	67.2	0	0
Part-time employee	0	0	2	3.1
Number of workplaces				
One	37	100	57	89.1
Two	0	0	1	1.6
Three	0	0	6	9.3
Working hours				
<8	23	62.2	27	42.2
8-10	14	37.8	37	57.8
Rest duration (minutes)				
<15	4	10.8	10	15.6
15-30	10	27	40	62.5
30-60	13	35.2	12	18.8
>60	10	27	2	3.1
Night shift				
Yes	12	32.4	42	65.6
No	25	67.6	22	34.4
Dining place				
Workspaces	11	29.7	18	28 1
Special room	26	70.3	46	71.9
Dining companion				
Alone	8	21.6	29	45.3
With other officers	29	78.4	35	54.7
COVID-19 incentives				
Yes	23	62.2	41	64.1
No	14	37.8	23	35.9

Table 4: Workers psychological conditions during COVID-19.

Variable	Non-medical		Medical	
	Frequency=37	Percentage (%)	Frequency=64	Percentage (%)
Happy				
Yes	11	29.7	21	32.8
No	26	70.3	43	62.2
Anxious				
Yes	24	64.9	49	76.6
No	13	35.1	15	23.4
Comfortable				
Yes	13	35.1	18	28.1
No	24	64.9	46	71.9

Continued.

Variable	Non-medical		Medical	
	Frequency=37	Percentage (%)	Frequency=64	Percentage (%)
Afraid				
Yes	14	37.8	39	60.9
No	23	62.2	25	39.1
Stress				
Yes	4	10.8	19	29.7
No	33	89.2	45	70.3

Table 5: Characteristics of working procedures.

Variable	Non-medical		Medical	
	Frequency=37	Percentage (%)	Frequency=64	Percentage (%)
IPC training				
Provided	15	40.6	54	84.3
Not given	11	29.7	4	6.3
Forgot	11	29.7	6	9.4
Number of training in a year				
More than twice	3	8.1	5	7.8
Twice	4	10.8	14	21.9
Once	14	37.8	34	53.1
Never	16	43.2	11	17.2
Training on work procedure during COVID-19 pandemic				
Given	30	81.1	53	82.8
Not given	6	16.2	9	14.1
Not sure	1	2.7	2	3.1
COVID-19 care training				
Provided	9	24.3	42	65,6
Not given	25	67.6	19	29.7
Not sure	3	8.1	3	4.7
PPE training				
Given	27	73	54	84.3
Not given	10	27	10	15.7

Table 6: Characteristics of risk exposure of COVID-19 after working hours.

Variable	Non-medical		Medical	
	Frequency=37	Percentage (%)	Frequency=64	Percentage (%)
Presence of family members at home				
Stay alone	0	0	2	3.1
Stay with family	37	100	62	96.9
Presence of other HCW at home				
Yes	2	5.4	25	39.1
No	35	94.6	39	60.9
I had contact with COVID-19 patients				
Yes	1	2.7	3	4.7
No	36	97.3	61	95.3
Use of public transportation				
Frequently	0	0	1	1.6
Rarely	0	0	2	3.1
Never	37	100	61	95.3
Traveling history				
Yes	3	8.1	8	12.5
No	34	91.9	56	87.5
Social interaction				
Often	6	16.2	8	12.5
Rarely	25	67.6	11	17.2
Never	6	16.2	45	70.3

To assess the relationship between; IPC compliance, comorbidity, and duration of work with the incidence of COVID-19 in employees, we conducted a bivariate analysis. There is a significant difference between compliance with the IPC implementation and the incidence of COVID-19 ($p<0.05$). However, there were no significant differences between comorbidity ($p>0.05$) and duration of work ($p>0.05$) with the incidence of COVID-19. In the multivariate analysis, the ANOVA test was used to see the effect of these three things on the incidence of COVID-19, and the results showed that there was no significant effect between adherence to IPC implementation, comorbidity, and duration of work with the incidence rate of COVID-19 ($p>0.05$). Overall, these 3 things only affect 6.4% of COVID-19 incidence rate.

DISCUSSION

Some employees who were the most infected with COVID-19 came from the Emergency Department. This most likely due to the higher visits of patients and their families if they need immediate help. Data showed that 13.3% of the hospital visits were visits to the emergency department, which causes a higher risk of spreading infection in this unit.[7] Based on their profession, nurses are the most infected with COVID-19. Consistent with the results of a study conducted by Al Maskari et al that most of health workers infected with COVID-19 were nurses. In contrast to Sabetian et al, nurses and emergency room staff had the highest infection rate.[8,9] Nurses have a longer contact time with patients than other professions, such as physicians.

Most of healthcare workers work for 8-10 hours in one shift, with a mostly rest duration of only 15-30 minutes (Table 3). In the era of the COVID-19 pandemic, the period of working in a shift of >8 hours will allow for burnout or work fatigue for medical employees. Another reason is that PPE makes them feel uncomfortable while working, especially those who work with level 2-3 PPE. They are also required to withstand thirst, heat, hold urination/defecation while using PPE.

Assessment of hand hygiene compliance found that compliance of medical employees was higher than the compliance of non-medical employees. In line with a study conducted by Asinyo ME et al, hand hygiene compliance in non-medical employees is lower than in medical employees.[10] The emphasis on IPC behavior usually only focuses on medical services, even though the risk of COVID-19 infection is the same between the two working units.

In compliance with PPE use, medical/surgical masks have the highest average as the type of PPE that medical and non-medical employees always use in the treatment of COVID-19 as we know that the transmission of COVID-19 originates through droplets/contact with the source of infection. Hence, medical/surgical masks are min step that HCW must take to avoid such transmission.

In general, compliance with the IPC implementation shows satisfactory results for both medical and non-medical employees. We obtained the significant relationship between IPC implementation compliance with the incidence of COVID-19 ($p<0.05$). In the era of the COVID-19 pandemic, all HCWs are required to increase knowledge, awareness, and compliance with IPC implementation to protect the patient, themselves, and their families.

There was no significant relationship between comorbidity and duration of work with the incidence of COVID-19 ($p>0.05$). Both employees with and without comorbidity have the same chance of being exposed to COVID-19. Several other influencing factors include PPE availability, exposure to infected patients, excessive work duration, and low adherence to IPC implementation.[11] In following up on employees with comorbidities, hospitals need to establish several applicable regulations to reduce the risk of exposure to COVID-19 for vulnerable people. Include placing vulnerable employees in zones at low risk of COVID-19 or adjusting the duration of work shifts to prevent them from being exhausted at work in the era of the COVID-19 pandemic.

Although there was no significant relationship between work duration and the incidence of COVID-19, in this study, most of the employees infected with COVID-19 had a work duration of 8-10 hours. In reality, the period of work is one factor that HCW is exposed to COVID-19. The longer the period, the higher the workload and the possibility of health workers being exposed to patients. In addition to long working duration, lack of hours of sleep, high-stress levels allow burnout in health personnel and increase the risk of exposure to infection COVID-19.

Based on the results of the linearity test using ANOVA, it was found that the value $p>0.05$ concluded that there was no influence between; IPC compliance, comorbidities, and duration of work on the incidence of COVID-19. However, we cannot deny that many factors need to be reviewed regarding the risk of exposure to COVID-19 infection for health workers. These factors include the possibility of exposure outside the hospital and the habit of maintaining health protocols for fellow health workers, which in this study were not analyzed for these factors.

This study still has many weaknesses, including the lack of the number of respondents who participated in the survey, so it does not represent the overall picture of hospital employees. In addition, the duration of data collection is short in only one month.

CONCLUSION

Health workers play a critical role in health services. It is crucial to ensure their safety and security due to the increasing cases of infection and mortality caused by COVID-19. Many risk factors influence COVID-19

disease in health workers, such as compliance with the IPC implementation, the use of PPE, and procedures carried out during work. Meanwhile, health protocols between individuals in the community are important risk factors for exposure to COVID-19 outside the hospital, such as masks wearing and social distancing. Understanding the risk factors for exposure to COVID-19 is needed to prevent transmission and protect HCWs and serve as a guideline for making health policies and protocols in hospitals.

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