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THE RELATIONSHIP OF KNOWLEDGE, ATTITUDES, AND PRACTICES ON THE USE OF PERSONAL PROTECTIVE EQUIPMENT WITH THE INCIDENT OF WORK ACCIDENTS

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ABSTRACT

The World Health Organization (WHO) reports that more than 2 million health workers are exposed to injuries from sharp objects, including injuries from needle sticks, every year. Health workers experience more than 2 million injuries from sharp objects at work every year. This injury causes approximately 16,000 cases of hepatitis C virus (HCV) infection, 66,000 cases of hepatitis B virus (HBV), and 1,000 cases of Human Immunodeficiency Virus (HIV) infection. Objective: determine the relationship between knowledge, attitudes, and practices in the use of personal protective equipment with work accident rates among Merdeka Health Center health workers in 2025. Method: This research uses an analytical observational research type with the research design used is a cross-sectional study with a sampling technique using the Total Sampling technique. 31 respondents had data according to the inclusion criteria. The data in this study are primary data because they were collected by the researcher himself and obtained directly from the respondents. Information was collected through a digital questionnaire sheet that would be given to the respondents. Before filling out the questionnaire. Data analysis was conducted using univariate, bivariate, and multivariate methods by the spss application.Results: There is a significant relationship between knowledge and the incidence of work accidents (P value 0.015) with an Odds Ratio value of 0.111 and a Confidence Interval of 0.019-0.645. There is a significant relationship between attitude and the incidence of work accidents (P value 0.022) with an Odds Ratio analysis of 0.105 and a Confidence Interval of 0.016-0.713. There is a significant relationship between the practice of using personal protective equipment and the incidence of work accidents (P value 0.004) with an Odds Ratio analysis of 0.071 and a Confidence Interval of 0.012-0.442.Conclusions: There is a significant relationship between knowledge, attitudes, and practices of using personal protective equipment and work accidents among health workers at the Merdeka Health Center, Bogor City in 2025.

Keywords: attitude; health workers; knowledge; occupational accidents; practice

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INTRODUCTION

According to the definition by the International Labour Organization (ILO), a work accident is an unexpected and unplanned event, including acts of violence, related to work that results in injury, illness, or even death of a worker. Additionally, accidents occurring during travel, transportation, or road traffic that cause injury to a worker if they happen in the context of work, such as while engaging in economic activities, being at the workplace, or carrying out tasks assigned by the employer, are categorized as work accidents (Asilah and Yuantari 2020; Karina 2023; Martins 2015). Based on the Regulation of the Minister of Manpower of the Republic of Indonesia Number 10 of 2016, a work accident is an accident that occurs in the context of employment, including accidents that happen during travel from home to the workplace or vice versa, as well as illnesses caused by the work environment (Andryanti 2024; Nugraha and Sundary 2021). The healthcare sector is one of the most high-risk work environments, where healthcare workers and other staff frequently face threats from various occupational hazards, both biological and non-biological (Debelu et al. 2023; Tawiah et al.

2022). According to data from the International Labour Organization (ILO), an estimated 2.4 million deaths occur each year due to work-related illnesses or health disorders (Nurmalia et al. 2022; Rantanen, Muchiri, and Lehtinen 2020; Reis et al. 2019) The World Health Organization (WHO) reports that more than 2 million healthcare workers are exposed to sharp-object injuries, including needlestick injuries, every year (Amiri et al. 2024; Appiagyei et al. 2021; Bouya et al. 2020; Organization 2024). Apart from that, they are also at risk of experiencing accidents such as slipping, tripping, or facing violence from patients and their families. Other risks include ergonomic hazards such as lifting heavy loads, as well as psychosocial challenges caused by shift work and work pressure (Appiagyei et al. 2021). Health workers experience more than 2 million injuries from sharp objects in the workplace each year. This injury causes approximately 16,000 cases of hepatitis C virus (HCV) infection, 66,000 cases of hepatitis B virus (HBV), and 1,000 cases of human immunodeficiency virus (HIV) infection (Appiagyei et al. 2021; Debelu et al. 2023)

Needlestick injuries (NSIs) are one of the most common sharp-object injuries experienced by healthcare workers worldwide. A study involving 31 countries reported that the global prevalence of NSIs among healthcare workers (HCWs) in the past year reached 44.5% (95% CI: 35.7%–53.2%). Meanwhile, another study in sub-Saharan Africa found that the lifetime prevalence of NSIs ranged to 95%, with a prevalence of 39% to 91% in the past 12 (Bouya et al. 2020; Debelu et al. 2023)Exposure to blood and infectious materials due to occupational accidents poses a serious threat to healthcare workers. Incidents involving contact with blood or other body fluids have been linked to the transmission of approximately 60 different pathogens, with HBV, HCV, and HIV being the most significant. The estimated risk of disease transmission from an infected individual through sharp-object injuries is 6% to 30% for HBV, 5% to 10% for HCV, and 0.3% for HIV (Debelu et al. 2023; Reis et al. 2019).

Most occupational accidents are caused by human factors, particularly unsafe actions. Unsafe actions refer to behaviors that endanger the worker themselves or others, potentially leading to accidents. These actions may result from various factors, such as failure to use personal protective equipment (PPE), not following work procedures, violating workplace safety regulations, or working carelessly. It is estimated that for every 300 unsafe actions, one may lead to an accident resulting in lost workdays (Nailul Hikmi 2022; Suak, Kawatu, and Kolibu 2018). A study by Ardenny et al. (2015) showed a significant relationship between knowledge and occupational accidents, with an odds ratio (OR) of 3.313. Additionally, there was a significant relationship between attitude and occupational accidents, where a poor attitude increased the likelihood of experiencing a workplace accident by three times compared to a good attitude. The study also found a significant relationship between actions and occupational accidents, with poor actions increasing the risk of workplace accidents by three times compared to proper actions (Ardenny 2015)The general objective of this study is to determine whether there is a relationship between knowledge, attitudes, and practices of using personal protective equipment with the incidence of work accidents among health workers at the Merdeka Health Center in 2025.

METHOD

This research uses an analytical observational research type with the research design used is a cross-sectional study. This research was conducted at the Merdeka Community Health Center, Bogor City. The research time was carried out for 1 week, namely in December 2024 – January 2025. The population in this study was all health workers from the Merdeka Health Center in Bogor City in 2024-2025, totaling 31 people. The sample in this study was the health workers at the Merdeka Health Center in Bogor City in 2024-2025. Samples were

taken using the Total Sampling technique, namely the entire population that had been determined by the researcher based on inclusion and exclusion criteria

Inclusion Criteria

a. Health workers at the Merdeka Community Health Center, Bogor City

b. Willing to be a respondent.

Exclusion Criteria

a. The health workers from the Merdeka Health Center in Bogor City were not present.

b. Leaving some blanks on the questionnaire.

The data in this research is primary data because it was collected by the researcher himself and obtained directly from respondents. Information is collected through a digital questionnaire sheet, which will be given to respondents. Before filling out the questionnaire, participants were asked to provide their identity and answer some questions about exclusion criteria**.** The research instrument is in the form of a questionnaire to measure 1) level of knowledge, where this questionnaire contains personal data and questions regarding work accidents; next about 2) attitude, where the questionnaire consists of 10 statements of which there are 7 positive statements and 3 negative statements; and 3) Measuring how the practice uses personal protective equipment, which consists of 15 statements (8 positive statements and 7 negative statements). In this study, univariate, bivariate, and multivariate data analysis was carried out. Univariate analysis was carried out to explain the frequency distribution of each variable studied and will be presented in percentage form using a table. Bivariate analysis was carried out to find the relationship between knowledge, attitudes, and practice of using personal protective equipment and the number of work accidents among health workers at the Merdeka Health Center in Bogor City using a non-parametric statistical test, namely Chi-Square, the results of which were expressed in P value or P value using IBM Statistics SPSS version 25 software. The Fisher test was used if there were cells with an expected value of less than five. The Odds Ratio (OR) test was used to compare exposure between the 2 groups. In determining the magnitude of the risk of effects on groups who experience work accidents.

RESULT

Age Description of Merdeka Health Center Health Workers in 2025

Table 1.
Age Description of Merdeka Health Center Health Workers in 2025

Variable	f	%
Gender		
Male	2	6.5
Female	29	93.5
Age (year)		
16 – 25	0	0
26 – 35	19	61.3
36 – 45	5	16.1
46 – 55	6	19.4
56 – 65	1	3.2
Education Level		
Diploma 3	16	51.6
Diploma 4	44	12.9
Bachelor Degree	11	35.5
Magister	0	0
Doctoral	0	0
Job		
Doctor	4	12.9
Dentists	1	3.2
Nutritionist	2	6.5

Nurse	7	22.6
Midwife	8	25.8
Pharmacist	2	6.5
Health Promotion	2	6.5
Environmental Sanitation	2	6.5
Laboratory Analyst	3	9,7

The sample in this study consists of 31 respondents, with characteristics including the health workers' gender, health workers' age, health worker education level, and health worker job. Table 1 presents the distribution of health workers' gender, showing that the highest number by Females totaling 29 persons (93.5%), and the lowest by Males with number 2 persons (6.5%). Based on age, it shows that of the 31 research respondents, the majority of respondents aged 26-35 years was 61.3%, followed by the 46-55-year-old group at 19.4%, the 36-45-year-old group at 16.1% and the 56-65-year-old group at 3.2%.Based on the type of job, it shows that of the 31 research respondents, it was found that the majority of respondents worked as midwives at 25.8%, followed by nurses at 22.6%, doctors at 12.9%, laboratory analysts at 9.7%, health promotion workers, environmental sanitation workers, pharmacists, nutritionists at 6.5% and dentists at 3.2%.Furthermore, based on education level, it shows that of the 31 research respondents, it was found that the majority of respondents had diploma 3 education at 51.6%, followed by strata 1 at 35.5%, while the least had a diploma 4 education at 12.9%.

Table 2.
Description of Work Accidents Experienced by Merdeka Health Center Health Workers in 2025

Experiencing a Work Accident	f	%
Yes	10	32.3
No	21	67.7

The data in Table 2 shows that of the 31 research respondents, it was found that the number of respondents who experienced work accidents was 32.3%, while those who did not experience work accidents was 67.7%.

Description of Knowledge about Work Accidents among Merdeka Health Center Health Workers in 2025

Table 3.
Description of Knowledge about Work Accidents among Merdeka Health Center Health Workers in 2025

Knowledge about Work Accidents	f	%
Good	22	71
Enough	9	29

Table 3 shows that of the 31 research respondents, it was found that the majority of respondents had a good level of knowledge of 71%, while those who had a poor level of knowledge were 29%.

Description of Attitudes Regarding Work Accidents among Merdeka Health Center Health Workers in 2025

Table 4.
Description of Attitudes Regarding Work Accidents among Merdeka Health Center Health Workers in 2025

Attitude	f	%
Positives	24	77.4
Negatives	7	22.6

Table 4 shows that of the 31 research respondents, it was found that the majority of respondents had a positive attitude of 77.4% while those who had a negative attitude were 22.6%.

Description of Practices for Using Personal Protective Equipment among Merdeka Health Center Health Workers in 2025

Table 5.
Description of Practices for Using Personal Protective Equipment among Merdeka Health Center Health Workers in 2025

Practices for Using Personal Protective Equipment	f	%
Good	21	67.7
Enough	10	32.3

Table 5 shows that of the 31 research respondents, it was found that the majority of respondents had good practices in using personal protective equipment, amounting to 67.7%, while those who had poor practices in using personal protective equipment were 32.3%.

The Relationship between Knowledge and the Occurrence of Work Accidents among Merdeka Health Center Health Workers in 2025

Table 6.
The Relationship between Knowledge and the Occurrence of Work Accidents among Merdeka Health Center Health Workers in 2025

Knowledge	Occupational Accidents f (%)		Nilai P	*Odds Ratio* (*Confidence Interval* 95%)
	Yes	No		
Good	4 (40%)	18 (85.7%)	0.015	0.111 (0.019-0.645)
Enough	6 (60%)	3 (14.3%)		

Based on Table 6, the results of the Fisher Exact test analysis show that there is a significant relationship between knowledge and the incidence of work accidents because the P value is <0.05 (P value 0.015). From the Odds Ratio analysis, there is a significant relationship between good knowledge and the incidence of work accidents because the Odds Ratio value is 0.111 with a Confidence Interval of 0.019-0.645. This shows that someone with a good level of knowledge about work accidents is 0.111 times more likely to experience a work accident than someone who has a poor level of knowledge about work accidents and in the general population it shows that someone with a good level of knowledge about work accidents is 0.019 times to 0.645 times more likely to experience a work accident than someone who has a poor level of knowledge about work accidents so that a good level of knowledge can be a protective factor against work accidents.

The Relationship between Attitudes and Occupational Accidents among Merdeka Health Center Health Workers in 2025

Table 7.
The Relationship between Attitudes and Occupational Accidents among Merdeka Health Center Health Workers in 2025

Sikap	Occupational Accidents f (%)		Nilai P	*Odds Ratio* (*Confidence Interval* 95%)
	Yes	No		
Positive	5 (50%)	19 (90.5%)	0.022	0.105 (0.016-0.713)
Negative	5 (50%)	2 (9.5%)		

Based on Table 7, the results of the Fisher Exact test analysis show that there is a significant relationship between attitude and the incidence of work accidents because the P value is <0.05 (P value 0.022). From the Odds Ratio analysis, there is a significant relationship between a positive attitude and the incidence of work accidents because the Odds Ratio value is 0.105 with a Confidence Interval of 0.016-0.713. This shows that someone with a positive attitude about work accidents is 0.105 times more likely to experience a work accident than someone who has a negative attitude about work accidents and in the general population it shows that someone with a positive attitude about work accidents is 0.016 times to 0.713 times more

likely to experience a work accident than someone who has a negative attitude about work accidents so that a positive attitude can be a protective factor against work accidents.

The Relationship between the Practice of Using Personal Protective Equipment and the Occurrence of Work Accidents among Merdeka Health Center Health Workers in 2025

Table 8.
The Relationship between the Practice of Using Personal Protective Equipment and the Occurrence of Work Accidents among Merdeka Health Center Health Workers in 2025

The Practice of Using Personal Protective Equipment	Occupational Accident n (%)		Nilai P	*Odds Ratio* (*Confidence Interval* 95%)
	Yes	No		
Good	3 (30%)	18 (85.7%)	0.004	0.071 (0.012-0.442)
Enough	7 (70%)	3 (14.3%)		

Based on table 8, the results of the Fisher Exact test analysis show a significant relationship between the practice of using personal protective equipment and the incidence of work accidents because the P value was <0.05 (P value 0.004). From the Odds Ratio analysis, there is a significant relationship between the practice of using good personal protective equipment and the incidence of work accidents because the Odds Ratio value is 0.071 with a Confidence Interval of 0.012-0.442. This shows that someone with good practice of using personal protective equipment is 0.071 times more likely to experience a work accident than someone who has poor practice of using personal protective equipment and in the general population it shows that someone with good practice of using personal protective equipment is 0.012 times to 0.442 times more likely to experience a work accident than someone who has poor practice of using personal protective equipment so that good practice of using personal protective equipment can be a protective factor against work accidents

DISCUSSION

Overview of Workplace Accident Incidents

Based on the analysis results, needlestick injuries were reported in 12.9% of cases (4 out of 31 respondents), while skin contact with patient blood or bodily fluids occurred in 22.6% (7 out of 31 respondents). When compared to other studies, these figures tend to be lower.In a study by Appiagyei et al. in 2021 in Ghana, needlestick injuries accounted for 27.4% of the total reported injuries, with an incidence rate of 0.88 incidents per person per year. However, this study did not provide specific data on contact with patient blood or bodily fluids. On the other hand, it revealed that most healthcare workers in Ghana had received occupational safety training, although gaps remained in reporting and awareness of available resources to prevent accidents.A study by Nurmalia et al. in 2022 in Central Java showed that 47.7% of respondents experienced needlestick injuries, though most incidents occurred less than three times. Additionally, 68.9% of respondents reported skin contact with patient blood or bodily fluids, making it the most frequently encountered risk. These figures were significantly higher compared to other studies, possibly due to a broader respondent coverage (377 individuals from five hospitals) and more detailed data collection.

In a study by Toktaş et al. in 2022 in Turkey, needlestick injuries accounted for 72% of 100 workplace accidents reported over five years, making them the most common cause of hospital workplace incidents. Contact with blood or bodily fluids contributed to 8% of total accidents. This study also emphasized that accident reporting was often low, and new workers faced a higher risk (Toktaş and Çavuş 2022)Overall, the researcher's findings indicate a lower incidence rate compared to the three studies mentioned. This could be due to differences in the number of respondents, work environments, or reporting mechanisms. However, all studies highlight that needlestick injuries and contact with patient bodily fluids pose

significant risks to healthcare workers, reinforcing the importance of safety training and effective reporting to prevent workplace accidents.(Anandadiva and Hidayah 2024; Motulo, Kawatu, and Mantjoro 2022; Nailul Hikmi 2022)

Relationship Between Knowledge and Workplace Accidents

The results of the bivariate analysis on the relationship between knowledge level and workplace accidents align with the study by Yanifi et al., which found that a lack of occupational health and safety (OHS) knowledge leads to unsafe actions that can result in workplace accidents. A similar study by Fatma et al. also stated that knowledge about occupational safety and health (OSH) includes a sufficient understanding of accident hazards, potential risks, and work-related illnesses. It is also closely related to work experience, where workers with higher knowledge and experience tend to experience workplace accidents less frequently. Additionally, research by Dian and Munawir has indicated that the higher a worker's knowledge about workplace safety efforts, the more compliant they are in using personal protective equipment (PPE) as a preventive measure against workplace accidents (Ardenny 2015; Arifuddin, Hardi, and Kalla 2023; Suak et al. 2018)

However, this study also found that 40% of respondents who experienced workplace accidents had a good level of knowledge. This finding is consistent with research by Wibowo and Lestari, which showed that OHS knowledge alone is not sufficient to avoid workplace accident risks. Training for workers and the implementation of an Occupational Safety and Health Management System (SMK3) are necessary to prevent workplace accidents. Febriana's study also emphasized that education is not only formal but informal education can also influence changes in behavior. For example, respondents with only an elementary school education or no formal education at all, but with longer work experience, tend to develop a better understanding of safe work practices (Lubis et al. 2024; Motulo et al. 2022; Saragih et al. 2023; Terok, Doda, and Adam 2020)

Relationship Between Attitude and Workplace Accidents

Research on the relationship between attitude and workplace accidents among workers aligns with the study by Matulo et al., which stated that workers who experience workplace accidents tend to evaluate or assess the incident with the belief that workplace accidents should be preventable. Healthcare workers should have awareness and vigilance in preventing workplace accidents, which can be achieved by using personal protective equipment (PPE) to avoid such incidents (HAREFA 2023; Motulo et al. 2022)A study by Arifuddin et al. in 2023 is consistent with these findings, showing that work attitude has an impact on workplace accidents (**p=0.007**). A positive work attitude is influenced by experience gained while performing healthcare duties. Newer workers with limited experience are at higher risk of workplace accidents. This is related to the increasing awareness of workplace accidents as workers age and gain more experience in their respective workplaces. Additionally, excessive shift durations also contribute to workplace accidents, as workers may lose focus, fail to use PPE, or improperly perform **needle recapping** (one-handed method of re-capping a syringe) (Arifuddin et al. 2023; Nastiti and Munawir 2021).

However, this study contradicts the research by Anandadiva and Euis (2024), conducted in a hospital in Bogor Regency. Their findings indicated that work attitude does not have a significant effect on workplace accidents. Although medical staff in that hospital demonstrated awareness of occupational health and safety (OHS), operational challenges—such as time constraints, pressure to handle a large number of patients, and inadequate supervision and enforcement of OHS standards—hindered optimal implementation. A positive attitude towards workplace safety tends to encourage more cautious behavior and

adherence to safety procedures. Despite this, fostering a strong safety culture in the workplace remains essential (Anandadiva and Hidayah 2024).

Relationship Between the Practice of Using Personal Protective Equipment (PPE) and Workplace Accidents

The results of the bivariate analysis on the relationship between PPE usage and workplace accidents align with the study by Ardenny (2015), which found that 49 workers (68.1%) who consistently used PPE never experienced workplace accidents. Statistical tests using the chi-square method yielded a p-value of 0.005 (<0.05), indicating a significant relationship between PPE usage and workplace accidents. The odds ratio (OR) was 3.089, with a 95% confidence interval (CI) of 1.452–6.572, meaning that workers who did not properly use PPE were three times more likely to experience workplace accidents compared to those who used PPE correctly. Other influencing factors include workers' knowledge levels and attitudes, which determine their compliance with safety regulations, consistent with findings by Sitorus et al. Their study found that nurses' compliance with PPE standard operating procedures (SOPs) was as follows: 75% were compliant (18 nurses), 17% were moderately compliant (4 nurses), and 8% were non-compliant (2 nurses).[51,52]

The findings of this study also align with research by Nailul Hikmi, which showed that a higher proportion of respondents who did not fully use PPE had experienced workplace accidents (88.5%) compared to those who used complete PPE (31.2%). A Chi-Square test in that study produced a p-value of 0.0001 (<0.05), indicating a significant relationship between PPE usage and workplace accidents at PT. Kunango Jantan in 2022. Similarly, research by Meilindah et al. (2018) on the relationship between PPE usage and workplace accidents among construction workers at the new Faculty of Law building project at Sam Ratulangi University, Manado, found a significant correlation between PPE use and workplace accidents. Unsafe worker behaviors, lack of experience, and insufficient skills contributed to a high risk of workplace accidents. A study by Bastian et al. (2023) further supports these findings, showing that workers who did not use PPE had a 3.9 times higher risk of experiencing workplace accidents compared to those who wore full protective gear.[53-55]

CONCLUSION

Based on data analysis and discussion, this study concludes that There is a significant relationship between knowledge, attitudes, and practices of using personal protective equipment against work accidents among health workers at the independent health center in Bogor City in 2025

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