



Occupational Accidents Among Healthcare Workers in Central Java

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Abstract

Healthcare workers have a risk of experiencing occupational accidents that may lead to injury or even death. Unavailable incident reporting can negatively impact the health and safety of healthcare workers and other larger sectors. This study aimed to investigate the occupational accidents among healthcare workers. A descriptive with a cross-sectional approach was conducted. This study involved 377 participants from five public and private hospitals in Central Java. Data were analyzed with the independent t-test and logistic regression. Healthcare workers generally experienced low occupational accidents. The most frequent incidents were: exposure to blood and body fluids (68.9%), sharp objects (50.4%), and needles (47.7%). Low rates of occupational accidents were significantly correlated with females ($p=0.013$). Healthcare workers experienced occupational accidents with various frequencies. Special attention to high frequent incidents is required and a more in-depth study on the low-frequent.

Introduction

Hospitals are public service facilities that have a high risk of occupational accidents. The complexity of a hospital system that involves various technologies and resources contributes to a high potential for occupational diseases and accidents (Redjeki & Warsito, 2016). Occupational accidents happen unexpectedly and are caused by human factors and unsafe actions. Non-adherence to standard operating procedures (SOP), not wearing or incorrect use of personal protective equipment (PPE), and carelessness are some unsafe actions that promote occupational accidents.

The United States Department of Labor, as stated by Secretary Solis, revealed that in 2011, the incidence of occupational accidents in hospitals was higher than in other places (Çelikkalp & Dilek, 2019). Similarly, the National Safety Council also stated that

the prevalence of occupational accidents in hospitals is 41% higher than in other industries. In general, injuries or occupational safety cases in hospitals occur due to biological exposure, such as viruses, bacteria, and parasites from patients' body fluids, radiation, chemicals in the form of gases and drugs, sprains and back pain, psychosocial issues, and exposure to hospital wastes (Kementrian Kesehatan Republik Indonesia, 2018). Such factors threaten healthcare workers as the primary resources for hospital services.

Healthcare workers are the most significant number of human resources that make prolonged and intensive contact with patients, and this task can pose a risk that threatens work safety. The World Health Organization (WHO) reported that at least 3 million healthcare workers are exposed to pathogens from blood each year, resulting

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in 2 million infected with HBV and 170,000 with HIV (Sahiledengle et al., 2020). A study in a hospital in the Adara district showed that the prevalence of splashes of blood or body fluids from patients was 28%, and these were experienced by healthcare workers assisting births and operations; in addition, officers who washed the linen were also at double risk of being splashed with patients' body fluids (Kaweti & Abegaz, 2017).

Punctures with sharp objects or needles are other incidents that occur among healthcare workers. The 2015 American National Survey reported 71% incidents of punctures with sharp objects in 181 hospitals in 34 states (Grimmond & Good, 2017). Being punctured with sharp objects possibly occurs more in developing countries as such incidents are generally not reported (Dong et al., 2020). A previous study in Peking, China, showed that 19.33% of nurses admitted to experiencing needlestick injuries. Even though they have a health-threatening impact, only 30% of the nurses conducted a reporting mechanism (Dong et al., 2020). Some reasons preventing healthcare workers from reporting incidents include a long and complicated reporting procedure, low risk of causing health problems, and busy work.

Until now, the consequences of occupational accidents have not been drawn up precisely. Occupational accidents have resulted in death, loss of quality of life for workers, and mental health problems, such as depression and post-traumatic stress disorder (Chhabra, 2016; Gu et al., 2020). A study in the USA from 2004 to 2016 reported that healthcare workers experiencing occupational accidents were two times more likely to experience significant psychological distress than those who did not experience occupational accidents (Gu et al., 2020). The long-term effect of occupational accidents is estimated to be ten times higher than its direct effect (Leppink, 2015).

The data on occupational accidents in Indonesia, especially in the healthcare sector, has not been well reported. A previous study in Bojonegoro regional public hospital showed that the incidence of needlestick injuries among nurses in one year reached 29 times (Fitria et al., 2020). Although data related to the hazards due to occupational accidents in Indonesia have

not been clearly described, we believe there are complaints from hospital employees. Therefore, it is essential that occupational safety becomes a priority for discussion. We expect this study to be a baseline to determine directions and policies in order to prevent and deal with occupational accidents. The present study aimed to investigate more deeply the types and incidents of occupational accidents among healthcare workers.

Methods

This study used a cross-sectional design with an analytical approach and took time in 2018. The samples were healthcare workers from five regional hospitals in Semarang city, Central Java, Indonesia, with type A (highest referral hospital), B (regional/regency referral hospital), and C (public health centers or polyclinic), both public and private. A consecutive sampling method was applied to recruit the samples. The inclusion criteria were healthcare workers with at least a vocational education degree (D3) who worked in the inpatient units. This study did not have any specific exclusion criteria. A total of 377 respondents participated in this study, consisting of 32 medical personnel, 281 nurses, 21 pharmacists, five nutritionists, five public health workers, four medical therapists, and 29 medical technicians.

The occupational safety assessment instrument used adapted from the National Safety Council. This instrument consisted of 18 statements related to the types and frequencies of occupational accidents healthcare workers had experienced in the hospital. The statements assessment is by Likert scales, including 1 (more than three times), 2 (less than three times), and 3 (never experienced). This instrument was chosen because of its broad coverage and had been used globally to avoid bias. The instrument's validity examination was in a previous study with a Cronbach's alpha coefficient of 0.81 (Raeissi et al., 2015).

The data collection was by conducting a paper-based survey of the potential respondents with the help of the head of inpatient units in each hospital. A total of 377 forms were distributed and completed by the respondents. The form contained detailed information regarding the research description, roles of respondents, and

consent that respondents should complete for their voluntary participation. The respondents were also requested to complete demographic data, including age, gender, type of shift, length of work, marital status, and professional status. The research ethics committee of the related hospitals and universities has approved this study.

The statistical analysis in this study was performed using SPSS version 24 for descriptive analysis, including the frequency distribution and percentage. Occupational accidents were analyzed using a cut-off point method. A univariate analysis was conducted to determine the socio-demographic distribution. Include gender, length of work, marital status, and work shift. The different types of occupational accidents and socio-demographic factors were examined using the independent t-test. The effects of socio-demographic factors on occupational accidents were analyzed using logistic regression with a significant value of $p < 0.05$. This study has received ethical approval from the Health Research Ethics Committee

of Dr. Kariadi Public Hospital and the Faculty of Medicine, Diponegoro University, with a reference number of 207/EC/FK-RSDK/IV/018.

Table 1. Frequency Distribution of Occupational Accidents Among Healthcare Workers (n=377)

Characteristics	f	%
Gender		
Male	97	25.7
Female	280	74.3
Work experience		
>3 years	195	51.7
<3 years	182	48.3
Marital status		
Married	318	84.4
Single	59	15.6
Work shift		
Permanent	195	51.8
Rotation	182	48.2

Source: Primary Data, 2008

Table 1 shows that the majority of respondents in this study were female (74.3%), married (84.4%), had permanent shift type (51.8%), and the length of work of more than 3 years (51.7%).

Table 2. Types of Occupational Accidents

Types of occupational accidents	Mean (SD)	Never experienced	<3 times	>3 times
Cutting with sharp pointed objects	2.44 (0.59)	187 (49.6)	170 (45.1)	20 (5.3)
Needle stick somewhere in the body	2.50 (0.54)	197 (52.3)	171 (45.4)	9 (2.4)
Skin contact with blood or other body fluids	2.14 (0.68)	117 (31)	195 (51.7)	65 (17.2)
Broken dishes and sample slides	2.89 (0.32)	339 (89.9)	36 (9.5)	2 (0.5)
Jumping a foreign object in the eye	2.94 (0.27)	360 (95.5)	13 (3.4)	4 (1.1)
Spraying chemicals in the eye	2.94 (0.24)	356 (94.4)	20 (5.3)	1 (0.3)
Splashing of body fluids in the eye	2.86 (0.39)	332 (88.1)	38 (10.1)	7 (1.9)
Eye contact with vapors of disinfectants	2.81 (0.48)	321 (85.1)	41 (10.9)	15 (4)
Random exposure to radiation	2.77 (0.54)	311 (82.5)	44 (11.7)	22 (5.8)
Breathing vapors of disinfectants	2.66 (0.60)	275 (72.9)	75 (19.9)	27 (7.2)
Breathing vapors of processing agents	2.91 (0.34)	350 (92.8)	20 (5.3)	7 (1.9)
Drug or chemical poisoning	2.97 (0.18)	367 (97.3)	9 (2.4)	1 (0.3)
Toxicity with solvent	2.96 (0.23)	367 (97.3)	6 (1.6)	4 (1.1)
Fall from height	2.97 (0.21)	368 (97.6)	6 (1.6)	3 (0.8)
Slipping and falling	2.61 (0.53)	240 (63.7)	128 (34)	9 (2.4)
Strains caused by heavy object falling on a part of body	2.92 (0.27)	345 (91.5)	32 (8.5)	0
Traumatic back pain due to patient's repositioning	2.54 (0.63)	230 (61)	119 (31.6)	28 (7.4)
Being beaten or injured by the patient or visitors	2.89 (0.32)	339 (89.9)	36 (9.5)	2 (0.5)
Total	49.73 (4.03)	High accident 144 (38.7%)	Low accident 233 (61.8%)	

Source: Primary Data, 2008

Table 2 shows that the most frequent occupational accident among healthcare workers was skin contact with the patient's blood or body fluids (M= 2.14). It is shown that 17.2% of respondents experienced this incident more than three times, and the other 51.7% experienced the incident less than three times. Furthermore, 5.3% of healthcare workers experienced cutting with sharp pointed objects (M = 2.44) more than three times and 41.5% experienced it less than three times. Needlestick was also reported frequently, in which 2.4% of respondents experienced more than three times and 45.4% experienced less than three times (M = 2.50). Regarding back

pain due to patient repositioning (M = 2.54), 7.4% of respondents experienced it more than three times, and 31.6% experienced it less than three times.

Falling from a height, toxicity with solvent, and drug and chemical poisoning were the types of accidents with the lowest frequency. The result of the study revealed that 2.4% of respondents experienced falls from height, and 2.7% experienced toxicity and drug or chemical poisoning. Most healthcare workers reported low rates of experiencing occupational accidents (61.8%), and the other party reported high occupational accidents.

Table 3. Difference between Demographic Data and Occupational Accident (n=377)

Characteristics	Mean (SD)	X2	p-value
Gender 0.016			
Male	48.57 (5.39)	5.821	0.016*
Female	50.13 (3.35)		
Work experience 0.015			
<3 years	49.78 (4.41)	5.933	0.015*
>3 years	49.66 (3.51)		
Marital status			
Married	49.60 (4.20)	0.182	0.669
Single	50.42 (2.82)		
Work shift			
Permanent	49.44 (4.50)	0.546	0.460
Rotation	50.03 (3.43)		

*significant < 0.05

Source: Primary Data, 2008

Table 3 shows the difference between the respondents' characteristics and the incidence of occupational accidents. Gender (p=0.016) and length of work experience(p=0.015)

showed significant value in the incidence of occupational accidents. Marital status and work shifts did not have a significant difference.

Table 4. Binary Logistic Regression Results

Characteristics	B	Wald	Exp(B)	Adjusted odds ratio (95% CI)	p-value
Constant	0.123	0.183	1.130		0.668
Gender	0.852	0.091	2.344	1.201 – 4.575	0.013*
Work experience	-0.123	0.091	0.885	0.399 – 1.962	0.763
Work experience by gender	-0.551	1.320	0.576	0.225 – 1.476	0.251

*significant < 0.05

Source: Primary Data, 2008

Table 5. Interaction between gender and work experience

Variable	Exp (B)
Male and < 3 years experience	1.13
Male and > 3 years experience	1.00
Female and < 3 years experience	2.65
Female and > 3 years experience	1.36

Source: Primary Data, 2008

Table 4 shows that gender showed a partial significant correlation (p < 0.05) with occupational accidents. A woman had a risk of 2.344 higher to experience low occupational accidents compared to a man (p=0.013). Yet healthcare workers working experience had

no partial significant correlation with the occupational accident. Table 5 shows healthcare workers with more than three years of work experience tend to have a high occupational accidents than those with shorter years of work experience. Man with less than three years of experience had 1.13 higher experience low rates of an occupational accident than one with more than three years of experience (1.00). A woman with working experience of fewer than three years had a higher possibility (2.65) to experience a low occupational accident than one with a longer (1.36).

This study showed that all healthcare workers experienced a low occupational accident in frequency, less than three times. Exposure to patients' blood and body fluids occurred most frequently, followed by punctures with sharp objects and back pain due to patient repositioning. The highest frequency of occupational accidents among healthcare workers was skin exposure to patients' blood or body fluids. Exposure of the skin to blood or body fluids is a major factor in transmitting blood-borne infections experienced by healthcare workers. This study revealed that exposure to blood and body fluids mainly occurred at a frequency of fewer than three times. A different result was reported in previous studies that the exposure of healthcare workers to blood and body fluids occurred more frequently, namely more than three times (Raeissi et al., 2015; Samaei et al., 2015).

Exposure to body fluids can occur through splashes on the skin or eyes, nose, and mouth. Previous research reported that 80.5% of respondents, consisting of nurses and nursing students, had experienced splashes in their faces and eyes from patients' saliva or blood (Kuru et al., 2014). Other research also showed a similar finding that the face is a common area of exposure to body fluids. Healthcare workers reported that they generally had splashes from patients' body fluids in the eye area, while others reported fluids in the mouth and nose areas (Kasatpibal et al., 2016; Kaweti & Abegaz, 2017; Sahiledengle et al., 2020).

In addition to exposure to blood and body fluids, another occupational accident frequently experienced by healthcare workers was the puncture of sharp objects and needles.

This kind of accident generally occurred less than three times. Needlestick puncture generally occurred in the inpatient units (31.4%) and was caused by single-use needles (64.1%); it mainly occurred in the hands (95.5%) (Memish et al., 2013). Previous studies have stated that nurses are the healthcare workers with the highest percentage of punctures with sharp objects and needles. Such incidence often occurs due to the process of collecting specimens, recapping needles, inserting intravenous lines, assisting childbirth, or lack of personal protective equipment (PPE) (Kwanzaa et al., 2020; Motaarefi et al., 2016).

Healthcare workers often experience muscle and bone disorders due to occupational accidents. A previous study showed that healthcare workers having direct contact with patients are reported to have higher muscle and bone problems due to work (Amin et al., 2020). Muscle and bone disorders are often experienced by nurses and midwives, in which back, neck, and shoulder pain are commonly reported (Amin et al., 2020; Okuyucu et al., 2020). Previous research stated that at least 60% of nurses experience a musculoskeletal problem every 14 working days (Bragazzi et al., 2019). The present study reported a similar finding in which more than 38% of healthcare workers experienced back pain due to patient repositioning. Another study showed that back pain due to repositioning was highly prevalent (more than 68%); 21% of respondents experienced it more than three times, and 43% experienced it less than three times (Samaei et al., 2015). Such a situation may result in absences from work and burnout, which can affect work productivity (Amin et al., 2020; Okuyucu et al., 2020).

Occupational accidents may occur due to chemical substances. Chemicals or irritants can get splashed or inhaled. The result of this study showed that occupational accidents due to chemicals were at the lowest prevalence; more than 90% of respondents did not experience it. Inhalation of disinfectants is a common type of accident due to chemicals that irritate the upper respiratory tract to pulmonary obstruction. The types of chemicals reported to be inhaled by healthcare workers include sprays of cleaning products and disinfectants (Clausen et al.,

2020).

Injuries can also happen due to acts of violence. Violence is a form of aggressive attitude towards someone while on duty; it can be offensive actions or threats. Violence can occur physically, emotionally, and even verbally. Research showed that 25% of violent acts, such as sexual, physical, and verbal violence occur in healthcare services. Healthcare workers are reportedly 16 times more likely to experience such violence than workers in other industrial sectors. A study in Iran showed that 91.6% of nurses in teaching hospitals had experienced physical and verbal abuse within one year of their working period (Hassankhani et al., 2017). Another study in Africa showed that the incidence of violence at work was 9-100%, while South Africa (54-100%) and Egypt (59.7-86.1%) showed the highest percentage (Njaka et al., 2020). Although the prevalence of violence at work among healthcare personnel in this study was reported to be smaller, it still shows an incident.

Gender was found to have a significant correlation with occupational accidents. Although this study found women have a lower tendency to have occupational accidents than men. In another study, women are more vulnerable. Previous studies have stated that women often experience musculoskeletal problems such as back pain and needlesticks (Çelikkalp & Dilek, 2019; Okuyucu et al., 2020). Such incidents can occur because gender also plays a vital role in shaping experiences and events of exposure. Women are more dominant in the health sector of the working population. Generally, women are placed in the nursing and midwifery divisions while men sometimes occupy pharmacy, medical, dentistry, and management. The proportion ratio between male and female employees also affects the placement of the job sector and the risks of the job itself. There is a possibility that the imbalanced number of men and women could have influenced the results of this study, so further studies are needed in this regard.

This study indicated that the length of work is significantly correlated with the incidence of an occupational accident. A previous study found that exposure to body fluids and punctures with sharp objects or

needles is associated with health workers' ability or knowledge regarding preventing occupational accidents (Motaarefi et al., 2016). A longer working period is associated with increased clinical experience and knowledge. It supports significantly in completing tasks efficiently and safely. Although, a recent study found that increased knowledge is not always in line with good attitudes. It could be why more than 50% of healthcare workers experienced exposure to the patient's blood and body fluids. A study in New Zealand showed that one out of three nurses experienced violence in the first year of their working period. It is possible because an individual with less work experience tends to experience direct confrontation. However, a study in Iran reported no significant effect on the length of work and the incidence of violence against nurses (Chalosthari & Ghodousi, 2017). There are limited studies regarding violence at work among healthcare workers. Therefore, more in-depth management and studies are needed.

Conclusion

Healthcare workers in this study generally experienced occupational accidents with various frequencies and types. Exposure to patient blood and body fluids and punctures with sharp objects, such as needles, are types of occupational accidents with the highest frequency. Meanwhile, occupational accidents resulting from exposure to chemicals or drugs via splashes, inhalation, or ingestion are the incidents with the lowest frequency. The length of work and gender had a significant correlation with high occupational accidents. Further studies that consider a balanced proportion of gender are necessary to provide more accurate results. Further studies and concerns on low-frequency occupational accidents are needed to explore any certain hidden phenomena.

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