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Risk factors sharp injury among healthcare workers in Sleman State Hospital Yogyakarta province Indonesia

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Original Article

ABSTRACT

Background: The sharp injury is the most burden problem among healthcare workers. The prevalence slightly increased as consequences spreading blood-borne pathogen. Some researchers had found several variables associated sharp injury among medical workers in the hospital.
Objective: The objective of this research was to identify variables that significantly correlated sharp injury among healthcare workers in Sleman State Hospital, Yogyakarta Province, Indonesia.
Methods: A cross-sectional study was conducted with total sampling as the method to collect respondents. Total population including a doctor, nurse, midwife, laboratory assistant has been selected based on inclusion criteria such as length of work more than one year and approved to be respondents, amounted 133 samples research. The analysis used chi-square for bivariate and logistic regression test for multivariate.
Results: There were nine variables had identified that were age, gender, the level of education, the length of work, salary, occupation, employment status, body mass index, and the marital status. According chi-square analysis obtained gender, the level of education, salary, occupation, employment status and body mass index which were significantly correlated sharp injury (p-value > 0.05). Therefore, only two variables based on logistic regression had statistically related sharp injury. Those variables were salary <1.388.000 IDR (p-value 0.008, aOR 0.135, CI 0.031-10.594) and abnormal body mass index (p-value 0.000, aOR 6.218, CI 2.552-15.147).
Conclusion: In summary, there were two variables had correlated sharp injury among healthcare workers in Sleman state hospital Yogyakarta province, Indonesia; salary and body mass index.

Latar Belakang : Cedera benda tajam merupakan permasalahan kesehatan yang paling membebani tenaga kesehatan. Prevalensi cedera benda tajam meningkat sehingga dapat menularkan penyakit yang penularan melalui darah. Peneliti menemukan beberapa variabel yang berhubungan dengan kejadian cedera benda tajam pada tenaga kesehatan di rumah sakit.
Tujuan: Tujuan penelitian ini adalah untuk mengindetifikasi faktor-faktor yang berhubungan dengan kejadian cedera benda tajam pada tenaga kesehatan di RSUD Sleman, Yogyakarta, Indonesia.
Metode: Metode penelitian ini dengan menggunakan studi potong lintang dengan teknik pengambilan sampel total sampling. Total responden penelitian ini adalah dokter, perawat, bidan dan analis kesehatan yang dipilih berdasarkan kriteria inklusi yaitu lama kerja lebih dari satu tahun dan bersedia menjadi

responden penelitian, sehingga didapatkan sebesar 133 sampel. Teknik analisis penelitian dengan menggunakan chi square untuk analisis bivariat dan regresi logistik untuk analisis multivariat.

Hasil: *Terdapat sembilan variabel yang dianalisis dalam penelitian ini yaitu usia, jenis kelamin, tingkat pendidikan, lama kerja, gaji, jenis pekerjaan, status kepegawaian, indeks masa tubuh (IMT) dan status pernikahan. Berdasarkan analisis chi square didapatkan jenis kelamin, tingkat pendidikan, gaji, pekerjaan, status kepegawaian dan IMT berhubungan secara signifikan dengan kejadian cedera benda tajam (p value < 0.05), namun hanya dua variabel yang secara statistik bermakna pada analisis regresi logistik yaitu gaji < Rp. 1.388.000 (p value 0.008, aOR 0.135 , CI 0.031-10.594) dan IMT abnormal (p value 0.000, aOR 6.218, CI 2.552-15.147).*

Kesimpulan: *Terdapat dua variabel yang berhubungan dengan kejadian cedera benda tajam pada pekerja di RSUD Sleman, Yogyakarta, Indonesia yaitu gaji dan IMT.*

INTRODUCTION

The sharp injury had been one of major risk factors contributed blood-borne pathogen since decades ago and having potentially serious hazard due to contamination of blood and body fluid exposure. Several pathogens had been reported such as hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), cytomegalovirus, (CMV), parvovirus and herpes simplex virus (HSV).[1,2] Annual reports globally, healthcare workers exposed to blood-borne pathogen was 16.000 (2.6%) for HCV, 66.000 (5.9) for HBV and HIV about 0.5%. According to those data, in developing countries 40-65 % were attributed HCV and HBV-exposed by percutaneous injury but conversely in developed countries, was only 8-27% for HCV and < 10 % for HBV.[3] The prevalence of sharp injury estimates 3 million people among 35 million healthcare workers annually.[3] Healthcare workers in a provincial hospital in Kenya was obtained twenty-five percent had been exposed body fluid and percutaneous injury since the last twelve months.[4] Meanwhile, one-third participants had needle stick injury at least one accident for previous 12 months.[5] Determinants of sharps

injury are gender, region, health facility type, employment status, level of education, shift work, immunization status and so on.[6,7]

Alemayehu et al.,(2015) explained sharp materials which were contacted body part, needle stick 58.7%, glass 23.4%, lancet 15.2%, hence body parts were injured, hand 86.8%, foot 10.4% and others 6.6%[8]. Lachowicz and Matthews (2009) added type of medical procedure performed when the incident occurred, taking blood 29.56%, insertion of drips 15.27%, procedure obstetric gynecology 14.29 %, in addition prevalence of injury derived from occupation were professional nurse 42%, doctor 13%, staff nurse 12%.[9] Based on location of injury, Memish et al, (2013) Out of 477 respondents, 150 (31,4%) occurred in ward, 82 (17.2%) emergency department, 70 (14.7%) intensive care unit, 55 (11.5%) operating room, 22 (4.6%) laboratory room and the rest in the other units.[10] From those variables concluded that frequency of injury is largely pivotal among health-care workers, in the future requiring preventive action for whom high-risk infections such as a nurse, working with sharp items in ward or emergency unit and taking blood sample.

METHODS

A cross-sectional study was conducted for 133 respondents in Sleman state hospital in Yogyakarta. There are eleven units around the hospital pointed by hospital ethical committee to take data, those work-place are Alamanda ward I, Alamanda ward II, Alamanda ward III, Nusa Indah ward I, Nusa Indah ward II, Nusa Indah ward III, Kenanga ward, Cendana ward, emergency unit, laboratory unit and intensive care unit. Unfortunately, the surgical department is not permitted to take data due to operation rate was increased at that moment. Total sampling found 180 respondents, however only 133 respondents which are required for research criteria.

Prior to getting research data, a preliminary study was conducted to search variables that should be taken for trial. The survey initiated nine independent variables such as age, gender, a level of education, a length of work, salary,

occupation, employment status, body mass index, and marital status. Those data were collected using questionnaire consist of three groups, informed consent, demographic data and additional data including sharp injury frequency, the incident of injury, the number of incident injury, work unit, shift work and medical activities. Unless body mass index data was measured by weight and height of respondents directly. Descriptive analysis was conducted using excel included prevalence of medical activities, the location of incident and shift work. Statistical analysis chi-square was performed using Statistical analytic software to find categories of variables which are correlated with sharp injury. Hence, multivariate analysis was conducted to predict factors influencing sharps injury. The analysis was carried out by logistic regression of dichotomous data to find the result (exp ß) presented by adjusted odds ratio.

RESULT

From 180 respondents fulfilled criteria, only 133 samples had selected for continuing research. There were 47 respondents excluded due to rejected or uncompleted filling questionnaire. According to Table 1, the average age of respondents are 26-30 years old, 50 (38%), gender female 92 (72%), the level of education diploma three 95 (71%), the length of work 1-5 years 58 (44%), salary each month ≥ 1.338.000 IDR 123 (92%), profession nurse 85 (64%), employment status civil servant 71 (54%), Body Mass Index (BMI) abnormal 73 (56%), marital status married 108 (81%) and prevalence of sharp injury among healthcare workers answered yes 94 (71%) and answered no 39 (29%). Overall variables should be adjusted to be dichotomous data to continue the next analysis, such as age (< 30, 31-40 and > 41 years old), level of education (diploma and non-diploma), length of work (< 10, 11-20 and > 21 years), profession (medic and paramedic) and employment status (civil servant and non-civil servant). Thus, four variables still remain; gender, salary, body mass index and marital status for instance.

Figure 1 describes the distribution of medical procedures. It was found that healthcare workers which were injured by sharps items amount 94 (71%). Out of 71%, the most affecting medical procedures are opening vial or ampoule for injecting, about 44 (46%), followed by recapping 15 (16%) and 13 (14%) injection procedure. Based on the location of injury in figure two, obtained that medical procedure in ward was the most influencing site, 39 (41%) out of 94 respondents. Following site (Figure 2) was emergency unit 20 (21%) and delivery room 13 (14%). The last figure (Figure 3) was shift work where the incident happened, mostly in morning shift 38 (40%), night shift 32 (34%) and afternoon shift 25 (26%). However, between afternoon and night shift was not significantly different with morning shift.
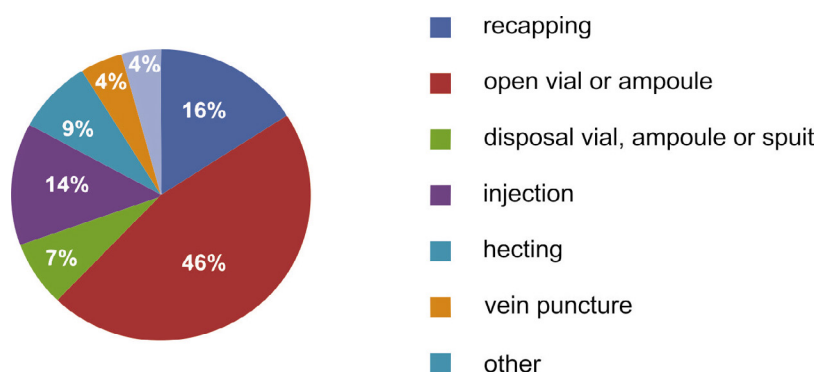

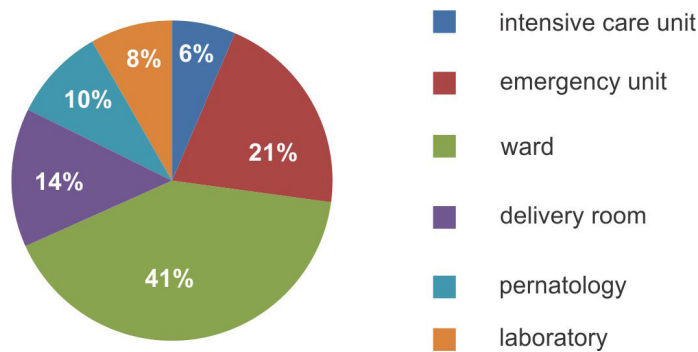Figure 1. Distribution of sharp injury incidents in medical procedures

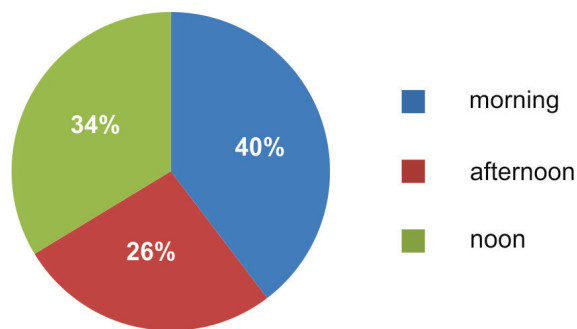Figure 2. Distribution of location sharp injury among healthcare workers

Figure 3. Distribution of shift work sharp injury among healthcare workers

Chi-square analysis attained six variables significant statistically, gender (p-value 0.029, OR 2.418 and CI 95 % 1.085-5.391), the level of education (p-value 0.012, OR 0.353 and CI 95 % 0.154-0.812), salary (p-value 0.027, OR 4.091 and CI 95% 1.086-15.414), occupation (p-value 0.027, OR 0.218 and CI 95% 0.066-0.715), employment status (p-value 0.002, OR 3.252 and CI 95% 1.498-7.060) and body mass index (p-value 0.000, OR 4.932, CI 95% 2.177-11.171). Nevertheless, three variables are not significantly (p value > 0.05) so that it cannot be maintained to multivariate analysis (Table 2).

After five steps calculated logistic regression, four variables excluded for analysis like gender, the level of education, salary and occupation. Therefore, only two variables that can be used as predictor sharp injury. Salary (p-value 0.008,

aOR 0.135, CI 95% 0.031-10.594) and body mass index (p-value 0.000, aOR 6.218 and CI 2.552-15.147). Adjust odd ratio for salary 0.135 means the amount < 1.338.000 IDR correlated sharps injury among healthcare workers than salary ≥ 1.338.000 IDR. Adjust odds ratio of body mass index found 6.218, means abnormal BMI had 6.218 times against sharps injury than normal BMI. Model summary from both variables found 0.23, means those had percentage 23% to predict sharps injury and 77 % from outside variables. Hosmer Lameshow test found 0.840 (p-value > 0.05), means logistic regression test is appropriate to be a predictor of sharps injury among healthcare workers.

Table 1. Socio-demographics characteristic of healthcare workers in Sleman state hospital, Yogyakarta, Indonesia

Variable	Category	Number (n)	Percentage (%)
Age	21 – 25 years	22	16
	26 – 30 years	50	38
	31 – 35 years	8	6
	36 – 40 years	20	15
	41 – 45 years	7	5
	46 – 50 years	21	16
	> 50 years	5	4
Gender	Male	36	28
	Female	92	72
Level of Education	Senior high school	4	3
	Diploma 1	4	3
	Diploma 3	95	71
	Diploma 4	7	5
	Nurse profession	11	8
	Doctor profession	13	10
Length of Work	1 – 5 years	58	44
	6 – 10 years	30	23
	11 – 15 years	10	7
	16 – 20 years	16	12
	21 – 25 years	11	8
	≥ 26 years	8	6
Salary	< 1.338.000 IDR	10	8
	≥ 1.338.000 IDR	123	92
Profession	Laboratory assistant	13	10
	Nurse	85	64
	Midwife	22	16
	Medical doctor	13	10
Employment Status	BLUD	43	32
	Civil servant	71	54
	Honorer	7	5
	Contract	11	8
	On the job training	1	1
Body Mass Index	Normal	60	45
	Abnormal	73	56
Marital Status	Married	108	81
	Unmarried	25	19
Sharp Injury	Yes	94	71
	No	39	29

Table 2. Chi square analysis factors associated sharp injury among healthcare workers

Variable	Category	Sharp injury		p value	OR	CI 95 %
		Yes	No			
Age	< 30 years	21	51			
	31-40 years	10	18	0.525	0.741	0.294-1.869
	> 41 years	8	25			
Gender	Male	16	21	0.029*	2.418	1.085-5.391
	Female	23	73			
Level of education	Diploma	24	77	0.012*	0.353	0.154-0.812
	Non diploma	15	17			
Length of work	< 10 years	28	60			
	11-20 years	8	18	0.919	1.050	0.408-2.704
	> 11 years	3	16			
Salary	< 1.338.000 IDR	6	4	0.027*	4.091	1.086-15.414
	≥ 1.338.000 IDR	33	90			
Occupation	Paramedic	31	89	0.007*	0.218	0.066-0.715
	Medic	8	5			
Employment status	Civil servant	24	31	0.002*	3.252	1.498-7.060
	Non civil servant	15	63			
Body mass index	Normal	24	31	0.000*	4.932	2.177-11.171
	Abnormal	15	63			
Marital status	Married	14	21	0.106	1.947	0.862-4.396
	Unmarried	25	73			

* p value statistically significant < 0.05

Table 3. Multivariate analysis factors associated sharp injury among healthcare workers in Sleman state hospital, Yogyakarta, Indonesia

Variable	Category	p value	aOR (CI 95%)
Salary	< 1.388.000 IDR	0.008*	0.135 (0.031-10.594)
	≥ 1.388.000 IDR		
Body mass index	Normal	0.000*	6.218 (2.552-15.147)
	Abnormal		

* p-value statistically significant < 0.05

DISCUSSION

Distribution of medical procedure incident is almost similar to another research. Bekele et al. (2015) obtained most influenced medical procedures from 126 respondents are during recapping 58 (46%), opening needle cap 27 (21.4%), during disposal 21 (16.7%).[11] Similar to this research, found recapping, opening vial or ampoule and disposal are the most often activities sharps injury occurred. Hence, location sharps injury happened, the most frequently are the emergency room, medical ward and operating ward.[12] In our research attained similar with that research, unfortunately, operating room is not allowed by a chief of a department due to operating rate was high at

that moment. According to shift work, most incident of injury in the morning shift. It can be explained that overall medical procedure such as drugs injection, taking blood samples, dressing wound had conducted in the morning shift. In addition, doctor visited patients in the ward every morning. As the accumulation of those activities, enhanced risk factors of sharps injury.

Chi-square analysis from nine variables found six items correlated (gender, the level of education, salary, occupation, employment status, body mass index) and the rest (age, the length of work, and marital status) are uncorrelated against sharps injury. The statistical analysis indicates male workers are the most victims as compared to a female. This perhaps due to female workers more careful in safety procedure than male workers, similar to research which is conducted by Aderaw (2013).[13] According to the level education, as explained before, diploma education is level pastime from senior high school to diploma three, however, non-diploma is worker who studying professions such as diploma four, a nurse and doctor profession. Level education statistically significant against sharp injury, for this reason almost diploma workers are nurse, midwife, a laboratory assistant who did a medical procedure in patients than non-diploma. There was study explained the magnitude of level and type of study for healthcare workers associated patient's outcome. Lehwaldt (2016) describes the role level of degree education improved outcome and satisfaction through verbal communication, behavior, and attitude.[14] Moreover, Aiken et al. (2003) correlated level of pastime among nurse decreased mortality rate for surgical patients in ward.[15] The nurses who are having attitude and knowledge regarding sharps injury prevention, they are more enabled to act appropriate medical procedure safely.[16]

Salary endorses human performance through motivation pathway, the more stipends they get the more influence work performance, respectively. In this case, amount 1.388.000 IDR decided based on minimum regional wage Sleman regency received by workers. Statistically

found correlation take home pay with sharp injury, means for who having a lower wage, increase risk factors of sharp injury. According to Ojokuku and Salami (2011) showed motivational system (monetary or nonmonetary) positively affect the performance of healthcare workers if implemented consistently.[17] But on the other hand, age variable showed no correlation with incident sharps injury. This result may happen due to sample size is lesser enough to prove the hypothesis or could be the difference of socio-economic life of workers.[19] This result was varying by Yoshikawa et al. (2013) that age variable < 40 years old had significantly risk factors sharp injury.[18] In addition research by Leggat et al. (2009) suggested age-related injury among veterinarians.[19]

The length of work literally connected with sharp injury. For workers who work longer in hospital enhanced risk factor injury, conversely, in this research, there is nothing association of that variables. It may have a reason that mostly length of work employees less than ten years and according to characteristic, 58 respondents (44%) had the length of work 1-5 years. For whom less than ten years, are having less work experience than longer ones. Honda et al. (2011) had similarity, regarding his trial found duration work 20 years significantly needle-stick injury.[20] Statistically, occupation is related to a sharp injury. The category divided into medic and paramedic. For this reason, almost medical procedure was accomplished by paramedics such as nurse, midwife and laboratory assistants as result the prevalence of sharp injury was significantly correlated against sharps injury among them. Nsubuga and Jaakkola (2005) detailed job title as a predictor of needle stick injury, which was nurses and midwives as victims of injury.[21]

The next variable is employment status. According to analysis found that variable notably associated sharp injury. There is common pathway according to psychology theory clearly explain the reason, motivation endorses to work properly. Workers who have civil servant status are more motivated than noncivil servant one.

In the case in Indonesia, overall civil servants acquire lifetime guarantee from the government such as health insurance, death insurance and retirement insurance. Performance-based motivation system can be effective in low-income countries in stimulating important changes in service efficiency, organizational accountability, setting incentives at an organizational and individual level to change attitudes towards work and also improvement of quality health care employees.[22,23] However, the marital status which is having similar pathway with employment status is not related to sharps injury. This is can be explained that sample size is lesser to prove the hypothesis and socio-economic of respondents widely different. Unfortunately, there is nothing specific data for this reason.

Body mass index (BMI) describes physical quality among workers. Physical quality gives energy for workers to work procedurally. It is giving more energy to do daily activities in a hospital such medical instrumentation. Workers who have abnormal BMI, either lower or higher status, increasing risk factors of sharp injury. Lower BMI status improved risk factor due to lack of energy and higher BMI status, occasionally fewer activities so that accumulated fat and other substances under the skin. Overweight among workers stimulated cardiovascular disease and cognitive performance finally decreasing work productivity.[24-26]

Unfortunately, some laxities had identified that can be researched bias. First, the disproportionate sample size which was the variable of age, the length of work and the marital status were uncorrelated. Some units in the hospital have few workers and the others over. The second is controlling outside variables such training sharps instrument application that ever conducted by hospital policy maker. This variable is not analyzed in this research so that it could be uncontrolled bias. Nevertheless, this study can be generalized only in the state hospital because it has a similar characteristic. State hospital owned by local government and entire policy including role and responsibility, salary rate and employment status depend on the government decision. Yet, the private hospital has distinction policy related those items.

CONCLUSION

In summary, the prevalence of sharps injury was slightly improved based on medical procedure, a shift work and location of medical instrumentation. Some factors attributed such salary of employees and body mass index were proven statistically as predictor variables. The general precaution should be intended by policy maker in the hospital to prevent damaging effects of sharps injury. Specific intervention is increasing stipends based on minimum regional wages of Sleman regency and correction of abnormal BMI in workers through nutrient and vitamin supplementation and regularly exercise to prevent obesity.

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