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Assessment of compliance to standard precautions among nurses using the Health Belief Model

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ABSTRACT

BACKGROUND
The application of Standard Precautions (SP) has become a significant challenge for healthcare workers, especially in developing countries, endangering their safety and increasing their exposure to blood-related pathogens. This study was aimed at exploring the factors related to nurses' compliance with the practice of SP.

METHODS
A cross-sectional study was conducted on 120 nurses working at a hospital in Palembang. Health Belief Model components of the subjects were recorded through questionnaires. A 12-point observation form assessed the nurses' SP compliance. Multiple logistic regression models were used to explore factors associated with nurses' compliance.

RESULTS
The results showed that 56.7% of participants had good compliance, although the five moments of hand hygiene still needed to be improved. The study revealed that the proportion of the operating room and emergency room nurses who complied with the SP was larger than the proportion of those who worked at the other wards (OR=2.57, 95% CI 1.51-4.36). The nurses who had received training also showed a larger proportion of compliance with SP than those who had not been trained (OR=2.70, 95% CI 1.07-6.79).

CONCLUSION
Nurses' behavior to SP was significantly associated with the adequacy of the training and work unit. It is suggested that the practice of SP was also influenced by enabling factors and subjective norms. Adequate training of nurses, provision of infection prevention equipment, and assessment of occupational exposures need to be introduced.

Keywords: Standard precautions, compliance, health belief model, nurses

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INTRODUCTION

Standard precautions (SP) are a series of infection control practices that are used to prevent transmission of diseases that can be acquired through contact with body fluids, blood, injured skin (including rashes), and mucous membranes.[1]The components of SP include hand hygiene, injection safety, use of personal protective equipment and environmental cleanliness, as well as waste management, and respiratory hygiene and cough etiquette.[2] Healthcare workers (HCW) are exposed to needle stick injuries, contact with blood secretions, hepatitis B or C, and AIDS / HIV infections through occupational exposure to blood and other body fluids.[3] It is estimated that each year, 35.7 million healthcare workers and related professionals throughout the world are at risk of contracting diseases caused by microorganisms in the bloodstream through percutaneous contact.[4] Healthcare workers, most specifically nurses, pose the greatest risk of cross-infection among patients and fellow healthcare workers, because of their high visibility and their direct interaction with patients while performing their nursing activities.[5,6] They are at additional risk for acquiring bloodborne pathogens (BBP) when compared to any other occupational group.[7] Although occupational HIV and hepatitis seroconversion is relatively rare, the risks and associated costs of a blood exposure are serious and real. These costs include initial and follow-up treatment of the exposed health care personnel, fear and anxiety about the possible consequences of an exposure, drug toxicities and absence from work.[8]

The use of personal protective equipment (PPE) such as gloves and sterile surgical gowns, and sterile equipment, hygiene practices such as washing hands with antiseptic, and the instrument safe waste disposal procedures as described in the SP guidelines can keep healthcare workers safe from infections caused by blood.[9-11] Standard precautions are supposed to be adopted by all healthcare workers. Physician compliance with SP is extremely important.[12] In many studies, compliance with SP among healthcare professionals was reported to be inadequate with regard to eye protection, avoidance of needle recapping, glove use when required, washing hands before and after patient contact, use of face masks, and avoidance of a used needle that is disassembled from a syringe and the implementation of precautions for all patients.[13] The low adhesion to standard precautions is linked to individual aspects of workers, employers and educational institutions.[14] A study in a tertiary referral center in North-Western Nigeria found gaps in identification of knowledge and practice of infection control among doctors and nurses in the study; hence, it will be beneficial for all HCW to receive formal and periodic refresher trainings.[15]. One study in Jamaica showed that compliance with SP in the operating department is low (17%).[16]

The study conducted by Aung [17] in Myanmar concluded that there was inconsistency in some aspects of compliance with SP among Myanmar nurses. Among Health Belief Model variables, perceived susceptibility, benefits, and perceived barriers were statistically significant for the relation to compliance with SP except perceived seriousness. The Health Belief Model is a most commonly used model to explain and understand the factors that influence someone's compliance, which may consequently contribute to the adoption of certain behaviors.

The difference of the present study with previous studies is found in the fact that nurses' compliance with SP was objectively assessed by a direct observational approach by an observer. We therefore aimed at exploring the factors related to nurses' compliance with the practice of SP at a hospital in Palembang based on the Health Belief Model.

METHODS

Research design

A cross-sectional study was conducted in a hospital at Palembang, Indonesia, from September to December 2019.

Research subjects

Sample size was determined by total sampling.The study population were all nurses who were on duty in the Isolation Room, Intensive Care Unit (ICU), Emergency Department, and Operating Room of the hospital at the time of the study. Those who were off-duty were excluded. Other medical and nonmedical personnel were also excluded. Study participants were recruited by convenience sampling. A total of 120 eligible nurses were included in this study.

Data collection

This study used a questionnaire adapted from Aung[18] with content validity (index range 0.306 – 0.756) and reliability (Cronbach α range 0.671 – 0.807).The questionnaire was an adaptation of the original questionnaire from a study in Myanmar, because it has the similar aim of explaining the predictors of compliance with SP using the Health Belief Model. The following information was recorded: subject's demographies, HBM components, age, gender, education, nurse group, work unit, infection control training, history of blood exposure, history of needle stick injury, history of hepatitis B vaccination, and history of post-exposure prophylaxis.

Instruments

The Health Belief Model consists of perceived threats, perceived benefits, and perceived barriers. The scores of perceived threats (8 items), perceived benefits (8 items), and perceived barriers (8 items) were rated on a Likert scale (1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree). The total number of items was 24. In determining the cut-off score for the HBM component, considering that the number of question items is eight and the respondent answers a score of 3 or 4 (agree/ strongly agree) for the good HBM component, the total score is 24. For this reason, the good HBM component was defined as a total score of ≥24 and poor HBM component as a total score of <24. These categories were determined by mutual agreement between the researchers prior to the start of the study.

Nurses' compliance towards the implementation of SP was measured by using a 12-point observation form. The observer was the head of the work unit of the 120 subjects from the Emergency Department, Intensive Care Unit (ICU), Isolation Room, and Operating Room. The observation was made once without the subjects knowing that they were being observed. The categories for compliance with SP were: poor = <12, good = 12 (if participants comply with all 12 points in the observation form). These categories were also determined by mutual agreement between the researchers prior to the start of the study.

Data analysis

Statistical analyses were performed using the Statistical Package for the Social Science (SPSS) program, version 20. Initial bivariate analyses were done using simple logistic regression to determine the associations between potential variables and nurses' compliance with SP. Variables with p-values of <0.20 in the simple logistic regression were selected for multivariate analysis. Multiple logistic regression analysis was used to calculate the odds ratio (OR) of each selected independent variable on nurses' compliance.

Ethical clearance

Ethical clearance was obtained from the Faculty of Medicine Universitas Indonesia - Cipto Mangunkusumo National Hospital (FKUI-RSCM) Research Ethics Committee under No. KET-453/UN2.F1/ETIK/PPM.00.02/2019.

RESULTS

In this study, 120 subjects were obtained. Data in this study showed that there were more females (82 or 68.3%) than males. The age of the subjects ranged from 26 years to 54 years. The education of the subjects varied with the largest proportion being found at the diploma program level (71.7%). Research subjects who had attended infection control training were 80 in number (66.7%). Information was also obtained that 81 subjects (67.5%) had been exposed to blood or body fluids and that 52 people (43.3%) had been exposed to a needle stick/ sharp object. Detailed information on the basic characteristics of the subjects can be seen in Table 1.

Table 1. Distribution of demographic characteristics and clinical features of nurses (n=120)

Characteristics	n (%)
Age (years)	
≥30	80 (66.7)
<30	40 (33.3)
Gender	
Male	38 (31.7)
Female	82 (68.3)
Highest education	
High school	3 (2.5)
Diploma	86 (71.7)
Bachelor	31 (25.8)
Nurses' group	
Clinical nurse II	43 (35.8)
Clinical nurse III	75 (62.5)
Clinical nurse IV	2 (1.7)
Work unit	
Isolation room	8 (6.7)
Intensive care unit	39 (32.5)
Emergency department	43 (35.8)
Operating room	30 (25.0)
Total duration of working as nurse (years)	59 (49.2)
≥15	61 (50.8)
<15	
Infection control training	
Yes	80 (66.7)
No	40 (33.3)
Exposure to blood/ body fluids	
Yes	81 (67.5)
No	39 (32.5)
Needlestick injury	
Yes	52 (43.3)
No	68 (56.7)
Hepatitis B vaccination	
Yes	73 (60.8)
No	47 (39.2)
Post exposure prophylaxis (PEP n=52)	29 (55.7)
Yes	23 (44.3)
No	
Compliance	56.7
Good	43.3
Poor	

* There were no subjects in the group of Clinical Nurse (PK) I and Clinical Nurse (PK) II

Determinant factors of nurses' SP compliance

Table 2 shows the results of simple logistic regression and multiple logistic regression analysis of compliance with SP and the associated independent variables. Based on the multiple logistic regression analysis, this study found that work unit and infection control training had a statistical relationship with behavior after being controlled for age, gender, education, nurse group, history of blood/body fluid exposure, history of needle stick injury, history of hepatitis B vaccination, and history of receiving post-exposure prophylaxis (PEP). The proportion of the operating room and emergency room nurses who complied with SP was larger than the proportion of those who worked at the other wards (OR=2.57, 95% CI 1.51-4.36). The proportion of nurses who had received training also showed a larger proportion in compliance with SP than those who had not been trained (OR=2.70, 95% CI 1.07-6.79).

DISCUSSION

In this study, the overall compliance of nurses with SP practices was 56.7%. This figure showed that the compliance was low because the Indonesian hospital accreditation board requires compliance of more than 85% for SP practices. This finding is almost identical with the study conducted by Beyamo et al.[18] which showed that 65% of healthcare workers complied with SP practices. In the present study, when each of the specific components of non-compliance with SP practices was analyzed, the proportion of hand hygiene compliance

Table 2. Simple and multiple logistic regression of determinants associated with SP compliance

Independent Variables	Simple Logistic Regression			Multiple Logistic Regression		
	Crude OR	(95% CI)	p-value	Adjusted OR	(95% CI)	p-value
Age (years)						
≥ 30	2.38	(1.09-5.17)	0.027	3.89	(0.72-20.82)	0.113
< 30	1					
Gender						
Male	1.26	(0.58-2.76)	0.561			
Female	1					
Education						
Bachelor	1		0.055	0.66	(0.18-2.38)	0.657
Diploma III*	0.45	(0.19-1.03)				
High school*						
Nurses' classification						
Clinical nurse IV*	1.64	(0.77-3.49)	0.196	0.52	(1.22-2.22)	0.377
Clinical nurse III*						
Clinical nurse II	1					
Work unit						
Operating room*						
Emergency department*	9.61	(4.10-22.5)	<0.001@	2.57	(1.51-4.36)	<0.001@
Intensive care unit†	1					
Isolation room†						
Work duration (years)						
≥ 15	2.15	(1.03-4.49)	0.040	1.16	(0.34-4.01)	0.817
< 15	1					
Infection control training						
Yes	2.79	(1.28-6.09)	0.009‡	2.70	(1.07-6.79)	<0.001@
No	1					
Exposure to blood/ body fluids						
Yes	1		0.723			
No	0.87	(0.40-1.89)				
Needle stick injury						
Yes	1.64	(0.78-3.43)	0.189	1.46	(0.52-4.07)	0.469
No	1					
Hepatitis B Vaccination						
Yes	2.24	(1.06-4.73)	0.034	1.56	(0.58-4.20)	0.381
No						
Post exposure prophylaxis (n=52)						
Yes	1.99	(0.82-4.84)	0.163	1.66	(0.47-5.92)	0.432
No	1					
Perceived treats						
Yes	1.23	(0.48-3.18)	0.663			
No	1					
Perceived benefits						
Yes	1					
No	0.93	(0.45-1.91)	0.853			
Perceived barriers						
Yes	1					
No	0.75	(0.32-1.76)	0.50			

*and † In the data analysis group merging was carried out; ‡ Variables with p<0.20 were included in the multiple logistic regression; @Significant at p<0.05 on multivariate analysis

according to the 5 moments was the highest (17.5%). Washing hands is one of the most important procedures in preventing nosocomial infections. According to the WHO, it is necessary to wash hands to reduce the number of nosocomial infections through the 5 moments, namely before touching a patients, before clean/ aseptic procedures, after contact with body fluids

exposure/risk, after touching a patients and after touching patient surroundings.[19] The finding in the present study seems to reflect the Indonesian situation which is that hand hygiene has seldom been adopted and encouraged in Indonesia.

Logistic regression analysis was used to identify determinants of compliance with SP. This study found that nurse working unit and previous infection control training are associated significantly with and are determinants of the compliance with SP. This finding is consistent with the study conducted by Luo et al.[20] In terms of nurse working unit, the compliance of nurses in the medical departments was lower than that in the surgical departments. This difference was found to be statistically significant, and is probably the result of the greater numbers of chronic internal medicine and elderly patients in the medical departments. Also, there is no obvious presence of blood in the medical department, which may result in protection being neglected. These results indicate that the administration departments should focus on comprehensive monitoring, especially the monitoring of hospital infections in primary level hospitals.

Training is also factor that continues to play an important role in the compliance with SP. Motaarefi et al.[21] stated that training was the most important factor related to the prevention of needle sticking behavior among nurses. Nurses who did not participate in any training session regarding the prevention of needle stick injury in their workplaces faced a higher risk of suffering from these injuries compared to those who participated in several types of training.

The suboptimal compliance with SP hightlights the need for interventions to enhance the occupational safety of nurses. To improve compliance of nurses with SP, we suggest to also include other factors, such as enabling factors and subjective norms. Enabling factors can be in the form of availability and affordability of facilities such as safety boxes and personal protective equipment (PPE), while subjective norms can be in the form of norms that apply in both work units that encourage subjects to conduct SP. The study of Balozi et al.[22] in Tanzania showed that subjective norms had a positive influence and a significant mediating effect on knowledge sharing behavior among healthcare workers. Their study showed that the higher the subjective norms, the higher the knowledge sharing behavior among healthcare workers.

The main strength of the current study is the use of a direct observational approach where nurses are observed objectively by an observer to determine their SP compliance. Some limitations should be acknowledged and considered. First, the study was of cross-sectional design that does not allow an examination of the temporal nature of the association. Second, the use of self-filled questionnaires may cause self-reported bias, while observation bias may also have occurred in this study. However, this limitation has been taken into consideration and overcome.

The significant implications of this study were for nursing practice and education because it can explore the factors related to nurses' compliance with the practice of standard practices. In addition, to the extent of our knowledge, this is the first study assessing compliance with standard practices which is available in Indonesia. This can help to plan and evaluate new interventions in order to increase and ensure stringent compliance with standard practices. Further research is needed to better explain the determinants of nurse compliance with standard practices in a better research design namely a cohort study.

CONCLUSIONS

Nurses' behavior to SP was significantly correlated with the adequacy of the training and work unit. It is suggested that the practice of SP is also influenced by enabling factors and subjective norms. Health authorities in the study area need to improve the training of nurses and provision of infection prevention equipment.

CONFLICTS OF INTEREST

All authors declare that there is no conflict of interest in this research

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CONTRIBUTORS

NTR contributed to conceptualization and methodology. NTR and MM contributed to preparing and writing the original draft. MM, AK, AS, and RAW contributed to supervision. NTR contributed to review and editing. All authors have read and approved the final manuscript.

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