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Experiences and Perceptions on Needle Stick Injuries among Staff Nurses in a Private Hospital in Singapore

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Abstract

This study identified experiences and perceptions on needle stick injuries among staff nurses in a private hospital in Singapore. A cross sectional descriptive-analytical study design was conducted from December 2016 to January 2017. Survey questionnaires were distributed to 100 nurse respondents from Accident and Emergency (n=32), Medical-surgical ward (n=30), Operation theater (n=16), and Obstetrics and Gynecology (OB-Gyne) ward (n=22) who were conveniently selected. Of the 100 self-administered questionnaires, only n=71 were used. Needle stick injuries were more affected by the hospital department (RR 1.01) followed by the age group (RR 0.99) and years of clinical practice (RR 0.88). The experience with needle stick injury was probable (p=0.02; 56.52%). There are identified perceptions on needle stick injury in this study such as adequate staff nurses in a shift (p=0.02), hospital awareness (p=0.04), injection safety equipment (p=0.04) and adequate mentor and supervisor (p≥0.05).

Keywords: *Experiences and Perceptions,Hazard, Needlestick, Nurses, Nursing, Singapore*

Introduction

This study will focus on needlestick injuries that are occupational hazards to healthcare workers (Adams, 2012). The National Institute for Occupational Safety and Health (NIOSH) (2013) defines needle stick injury as a needle that penetrates to the skin. According to Lee and Noor Hashim (2005) if the needle or sharp instrument is contaminated with blood or other body fluid, there is the potential for transmission of infection; and when this occurs in a work context, the term occupational exposure (to blood, body fluid or blood-borne infection) is used (NIOSH, 2013). Major possible problems induced by needle stick are infectious diseases such as hepatitis B, hepatitis C, and human immunodeficiency virus (HIV) infection, which are transmitted through blood pathogens from contaminated needles (Rhode et al, 2013).

Background of Study

Working shifts in this hospital where the study was conducted is 8 hours with 45 minutes for break. The nurse staffing allocation will be 4 per shift having a ratio of at least one staff nurse to 10 patients. Two staff nurses will serve medication and answer call bells and one overall in-charge. This private hospital is multidiscipline with bed capacity of 150. More than was 350 registered nurses are assigned to deliver patient care to this hospital.

Problem Statement

Needle stick injury is becoming an issue among staff nurses. As mentioned by American Nurses Association (ANA) (2010) factors affecting needle stick injuries have affected nurses for many years and continue to be a problem. Factors affecting needle stick injuries among nurses working in a hospital can have serious consequences both for them and their employers (Akeem et al, 2011). Occupational injuries such as needle stick among nurses' results to economic, physical and psychological damages and indirectly affecting health care services and resources (Gramling & Nachreiner, 2013; Prahbu et al, 2014).

Objective

On account of these issues, this study deems to identify experiences and perceptions on preventing needle stick injury among staff nurses in a private hospital in Singapore.

Significance and Justification of the Study

This study is justified to pave new ways for new policies on preventing needle stick injuries. It is also justified that this research will be significant enough to provide new knowledge for nurse managers worldwide. For the specific hospital of choice, the analysis of infection control and record-keeping will be a significant tool to provide signs of inadequate safe practices among nurses. According to the World Health Organization (WHO) (2010) this study will also be significant for nurses worldwide to be more vigilant in identifying risks of needle stick injuries to prevent hepatitis, and HIV-AIDS or other communicable diseases through blood-borne pathogens. Lastly, this study will be significant in providing awareness among nurses in Singapore by identifying associated factors that may lead to risk of needle stick injury.

Methodology

This study was conducted from December 2016 to January 2017. The responses were obtained via a self-administered questionnaire.

Samples and Sampling Technique

The sample size chosen for this study was 100 registered nurses. The specific population size (n) chosen for this study was nurses from accident and emergency (n=32), Medical and Surgical ward (n=30), Operation theater (n=16), and Obstetrics and gynecology (OB-Gyne) ward (n=22). Convenience sampling technique was used with inclusions and exclusions criteria.

Inclusion Criteria

Staff nurses who were willing to participate in the study and who were available within the period of data collection were included. However, only permanent staff nurses regardless of their experiences with needle stick injury (before or never) were conveniently selected as respondents.

Exclusion Criteria

Staff nurses who were still temporary and newly employed and part time nurses were excluded. Lastly, staff nurses on long leave, and maternity leave were also excluded.

Research Instruments

A structured questionnaire comprising closed ended questions was distributed to be answered by the respondents. The questionnaire was designed with 3 sections. The content has statements, concerning the respondents' demography and perceptions and experiences on needle stick injuries. The demographic questions were age, gender, and working unit. Second part was based on experiences on needlestick injuries. The third part was the perceptions on needle stick.

Pilot Study

Only n=29 self administered questionnaires were used in the pilot study. Polit and Beck (2010) said that not more than 30% from the total population must be used for pilot study and should not be included in the pooling of evidences for the final analysis of the findings and results. Therefore, the total population in the result section will only be n=71 self-administered questionnaire in the pooling of evidences. Validity and reliability of the self-administered questionnaires are also important to be determined (Polit and Beck, 2010; Parahoo, 2006).

Validity

In order to test the validity of the pilot questionnaire the respondents must be able to answer all the sections vividly and it should not cause confusion with the sentences neither with the grammatical formulation (Lobiondo-Wood & Haber, 2010; Parahoo, 2006; Polit and Beck, 2010). Due to time constraints, face validity was not performed by letting other experts comment on the questionnaire. However, reliability was done.

Reliability

Reliability relates to the consistency of a measure (Lobiondo-Wood & Haber, 2010; Burns and Grove, 2015; Polit and Beck, 2010). The rater scale used for the reliability of the self administered questionnaire is 0.8 or 80% of the total items for the questionnaire (Lobiondo-Wood & Haber, 2010; Burns and Grove, 2015; Polit and Beck, 2010). At the same time, the n=30 respndents should be at least answering 80% of the total items asked (Lobiondo-Wood & Haber, 2010; Burns and Grove, 2015; Polit and Beck, 2010). The questions were also clearly understood and answered by the n=30 respondents, therefore making it reliable to 100% or 1.00 rater scale.

Data Collection

Data collection started with a group discussion with the n=71 nurses. The nurse respondents were informed about the topic and purpose of the study. To retrieve all the questionnaires, the researchers took a month. Within this time period we were able to collect required data for the research study.

Data Analysis

A 71 respondents represented 100% response rate (Lobiondo-Wood & Haber, 2010; Burns and Grove, 2015; Parahoo, 2006). The cleaned data was exported to ***Microsoft Excel*** for analysis. Descriptive statistics such as frequencies and percentages were used. Ordinal scaling used mean, standard deviation and probability findings and the occurrences used odds ratio. However, it does not imply that the measure is one-dimensional leading to a good result (Polit and Beck, 2010; Burns and Grove, 2015). The results were presented in tables.

Ethical Consideration

Permission to carry out this study was sought from the Research Management Centre of Lincoln University, Malaysia. Permission to conduct the study was also sought from Mount Elizabeth Novena hospital in Singapore. The respondents were on voluntary basis by reading and signing a consent form. The respondents were informed of the research objectives and assured of confidentiality of the results and findings. Participants were also allowed to withdraw in the middle of the study if they don't wish to continue. The findings at the end were shown to the respondents for checking and counterchecking before final transcription and interpretation.

Results and Findings

Factors affecting needle stick injuries are the hospital department (RR 1.01), age group (RR 0.99), and years in clinical practice (RR 0.88). Marital status and ethnicity had a lesser risk (RR≤0.1).

Table 1. *Enumerates all the demographic data of the respondents.*

Table 1. Demographic data			
	Items	**N**	**%**
Years in practice	6-10 years	2	2.82
	1-5 years	69	97.18
How do you define your ethnic background?	Black	2	2.82
	Native Singaporean	15	21.13
	Asian	54	76.06
	White	0	0.00
Age	18-24	6	8.45
	25-30	27	38.03
	31-38	32	45.07
	39-55	6	8.45
Hospital department	Operating Theatre	2	2.82
	Accident and Emergency	27	38.03
	Medical-surgical and OB-Gyne ward	42	59.15
Marital status	Single	25	35.21
	Married	46	64.79

Experiences with Needle Stick Injury

The experience with needle stick injury was probable (p=0.02; 56.52%). There were 8 questions asked on this section.

The first question was *"Did you experience a needle stick injury during your clinical and practical exposure?"* Of the 71 respondents, 45% said yes and 55% said no. The findings herewith show that it is not very probable (p≤0.05) to have experienced needle stick injury; however it was still deviated (±4.9497) at a narrow risk. Although the mean finding (35.5μ) was also narrow the experiences should be taken with caution.

The follow up question was *"If yes to Question 1, how many times?"* Most of the respondents said 1x (32.03%), followed by the ≤2x (11%), and the least was ≥3x (0.7%). Though experiences with needlestick injury was not likely to occur, and the deviation was narrow, (σ±16.87947472) the mean (μ=17.75) is high showing that the risk is likely to occur if the n=17 respondents would experience it again.

The next question is, *"Did you inflict the injury upon yourself, or were you injured by someone else?"* that was the third question. There were 56% who did not inflict needlestick injury at all; however, there were 40% who said that they have inflicted it upon themselves. There were 4% who said that they experienced getting inflicted by someone else. The probability of getting inflicted by needles is low (p=0.02) however, the deviation (σ±17.89785834) to a low risk is still high since the mean is wide (μ=23.66667) and needs a follow up question on the years of experience with needle stick injury (Rohde et al, 2013).

"How many years do you experience needlestick injury?" was the 4th question asked. A 56% of the respondents did not experience needlestick injury at all. Those who had experienced needlestick injury was 1yr (4%), and 2 years (15%), while 3yrs had 14%, and for 4yrs had 7% and for 5yrs, had 4%. The probability was less, (p=0.04) and the mean was also lower, (μ=11.83333). However, the deviation is still high (σ ±13.74651471).

Reporting a needle stick injury should also be asked (Norsayani & Noor Hassim, 2003). The 5th question was *"Did you report a needlestick injury incident?"* Since 55% did not experience needle stick injuries at all only 27% reported the incident. The 18% says they did not report. The probability of not reporting is low (p=0.01) however, the mean (μ=23.66667) is high and it deviated ±13.61371857. There is a chance that the awareness of being injured is not disseminated as a formal report. Sometimes, the nurses have no time to report because they are busy and after working hours. That is why it is important to ask the number of hours of duty in a week (Patrician et al, 2011).

"How many hours do you work per week when you experienced a needlestick injury?" None of the respondents answered 30 to 39 hours per week (0.00%). A 2% of the respondents said that they work 40 hours per week. While 98% of the respondents said that they work 41 to 60 hours per week. The probability is low (p=0.02) on this aspect including the narrowed mean (23.66667μ) however, it deviated to a ±38.42308334. The number of hours spent on patient care is a high risk on experiencing a needlestick injury. That is why it is likely to ask the support system of each ward during shift works (Patrician et al, 2011).

"How many nursing staff members do you work with in a shift when you experienced a needlestick injury?" A 15% said there were 3 staff nurses while 17% said there were 4 staff and 28% said there was 5 staff, while 22% there were 6 staff, 17% said there was 7 staff and lastly 0.7% said there was 8 nursing staff. The probability on the experience with needlestick injury on number of nursing staff is low (p=0.02). It was validated by the gap between the mean (μ=11.83333) and the standard deviation (±6.242328625) to be wide. If the number of nursing staff is adequate it will not lead to a deviation on the probable occurrence of experiencing another needle stick injury in the future (Patrician et al, 2011).

Lastly, it was appropriate to ask "*Were there any preventive measures provided by the hospital when you experienced a needlestick injury*?" A 45% says no and 55% says yes. Having the mean (μ= 35.5) and the standard deviation (±7.173547056) being wide may lead to a high probability (p≤0.05) that preventive measures are available.

Perceptions on Preventing Needle Stick Injury

There are identified perceptions on needle stick injury in this study. Adequate staff nurses in a shift ($p=0.02$), hospital awareness ($p=0.04$), injection safety equipment ($p=0.04$) and adequate mentor and supervisor ($p\geq0.05$).

"You handle the number of patients that you attend to per shift with ease (with adequate staff nurses) to prevent needlestick injury?" is the question addressing adequate staff nurses in a shift. A 15.49% partially agreed with this question while 61.97% neither agreed nor disagreed. A 14.08% partially disagreed

and 8.45% strongly disagreed. There are adequate staff nurses per shift and the number of patients attended to is handled with ease. However, there are more neutral answers as compared with the positive answers. Nevertheless, the nurse-patient ratio is handled with ease. *"Your mentor/supervisor is always present when you attend to patients to avoid needle stick injury?"* is the question addressing adequate mentor and supervisor. An 11.27% partially agreed and 11.27% neither agreed nor disagreed. However, 35.21% partially disagreed and 42.25% strongly disagreed. There were no adequate mentor and/or supervisor in this cohort to prevent another occurrence of needlestick injuries.

"A needle stick injury is life threatening and is prevented by our hospital using awareness programmes" is the question addressing hospital awareness. A 38.03% strongly disagreed, while 46.48% partially agreed. An 8.45% neither agreed nor disagreed while 4.23% partially disagreed and 2.82% strongly disagreed. There are hospital awareness programmes on needlestick injuries in this cohort.

"Injection safety equipment is adequately provided in your hospital to avoid needle stick injury" is the question addressing injection safety equipment. A 7.04% strongly agreed and 40.85% partially agreed. A 23.94% neither agreed nor disagreed while 14.08% partially disagreed and 14.08% strongly disagreed. There was adequate injection safety equipment provided for this hospital.

Table 2. Summarizes the experiences of nurses with needlestick injuries while table 3 is the perceptions of nurses on preventing it. These experiences and perceptions are however affected by 3 demographic factors – age, years of clinical experiences, and hospital department.

Table 2. *Experiences with needlestick injurie*

Items			N	%	Mean	Probability (p)
1	**Did you experience a needle stick injury during your clinical and practical training?**	Yes	32	45	35.5 ±4.949747468	≤0.05
		No	39	55		
2	**If yes to Question 1. How many times?**	NA	39	55	17.75 ±16.87947472	0.02
		1	23	32.03		
		2	8	11		
		≥3	1	0.7		
3	**Did you inflict the injury upon yourself, or were you injured by someone else?**	NA	39	56	23.66667 ±17.89785834	0.02
		Yourself	28	40		
		Someone else	4	4		
4	**How many years do you experience needlestick injury?**	NA	39	56	11.83333 ±13.74651471	0.04
		1	3	4		
		2	11	15		
		3	10	14		
		4	5	7		
		≥5	3	4		
5	**Did you report a needle stick injury incident?**	NA	39	55	23.66667 ±13.61371857	0.01
		Yes	19	27		
		No	13	18		
6	**How many hours do you work per week when you experienced a needlestick injury?**	30 to 39 hours	0	0.00	23.66667 ±38.42308334	0.02
		40 hours	3	2		
		41 to 60 hours	68	98		

Table 3. *Perceptions on preventive measures against needlestick injuries*

	Items	Response n (%)				
		Strongly Agree	Partially Agree	Neither	Partially Disagree	Strongly disagree
1	You handle the number of patients that you attend to per shift with ease (with adequate staff nurses) to prevent needlestick injury.	0 (0%)	11 (15.49%)	44 (62%)	10 (14%)	6 (8.5%)
2	Your mentor/supervisor is always present when you attend to patients to avoid needlestick injury.	0 (0%)	8 (11.27%)	8 (11.3%)	25 (35%)	30 (42.2%)
3	A needle stick injury is life threatening and is prevented by our hospital using awareness programme	27 (38.03%)	33 (46.48%)	6 (8.5%)	3 (4.2%)	2 (3%)
4	Injection safety equipment is adequately provided in your hospital to avoid needlestick injury	5 (7.04%)	29 (40.85%)	17 (24%)	10 (14%)	10 (14%)
	Total	32 (11.26%)	81 (28.52%)	75 (26.4%)	48 (17%)	48 (17%)
	Mean	8±12.88409873	20.25±12.57974563	18.75±17.5	12±9.273618	12±12.4365054
	Probability	0.05	0.02	0.02	0.04	0.04

Discussion

The generalization of findings from this research may only be limited to the specific hospital where this study was conducted. Furthermore, there are various aspects of this research that were beyond the control in the research process because of limited exploration. The lived experiences were not reported thereby narrowing the results to mathematical expressions.

The respondents were required to recall all incidents of needle stick injuries in the past one month. It is therefore highly possible that the participants may have forgotten all the incidents. These were few challenges especially in reporting the findings. It was also emphasized to respondents to answer the questions truthfully to avoid biases.

Those who were 1-5 years in clinical practice had experienced needle stick injury more as compared with those who had 6-10 years in practice. The 88% risk should be taken with caution. However, there were more respondents who had 6-10 years in practice as compared with 1-5 years. The ratio is 98% (6-10 years) to 2% (1-5 years) that led to a widened deviation; however, the saturation of the total population of respondents is narrowed as respondents experiencing needle stick injuries are new in the practice of nursing. This leads to a questionable result of ≤100% risk for years in practice. Nevertheless, it is likely that years in practice affects the dexterity in handling sharps to avoid needle stick injuries (Cheung et al, 2012). Martins et al (2012) says that in order to be an expert in handling sharps, a nurse must repeatedly do the same procedure over and over again thus improves the skills. Spruce (2016) agreed that handling of sharps and safety precautions of sharp safety are likely relative to the years of practice. It is implied that before handling sharps, a newly employed nurse must seek guidance from those with massive years of experience. The licensure of nurses is an implication of a safe practice but not a valid evidence to ensure effective practices in the real clinical setting (Spruce,

2016; Martins et al, 2012). According to the Centers for Disease Control and Prevention (CDCP) (2015) nurses must continuously practice their skills in the clinical especially in handling needles in order to avoid needle stick injuries, if not totally curtailing its incidences and occurrences.

With regards to age, there are more nurse respondents who are young (RR 0.99) who answered the questionnaires again addressing the biases. Nevertheless, Martins et al (2012) says that age is a factor associated with needle stick injuries because of the categorical job description. Job descriptions such as supervisory that are more likely among older in age do not perform or deliver one-on-one patient care and are more into managerial and paper works (Spruce, 2016; Martins et al, 2012). The younger the nurses are, the more exposed they are to one-on-one patient care. That is why the young nurse respondents in this account had more experiences with needle stick injuries. The age bracket shows 25-30 (27%) and 31-38 (32%) years old being more prone than 39-55 (6%) years old. The bracket of 39-55 years old is more likely into managerial works and it is very rare that they are exposed into one-on-one patient care reaching the age of 45 years and above.

Needle stick injury was identified more on the Medical-surgical department (59%), secondly on the Accident and Emergency department (38%), and finally on the operating theatre (3%). There were no occurrences of needle stick injuries in the Obstetrics and Gynecology department (0%). In this study, patient care was seen on the Medical-surgical and Accident and Emergency Departments. There was limited occurrence of needle stick injuries on operating theatres because of the awareness to aseptic techniques among nurses. While none on obstetrics and gynecology since patients are mostly taking oral medications.

In the medical surgical department of this hospital, there are more patients having diabetes requiring insulin injections and sometimes capillary blood glucose testing. These protocols require handling of sharps and needles. Therefore, nurse respondents who are in charge of these patients are skilled. Dexterity on handling needles can be trained by mentors, preceptors, and/or supervisors (Trinkoff et al, 2007; Smith and Leggat, 2005). That is why in this department, nursing staff must be adequate in every shift duties in order to facilitate mentor-mentee relationships thus avoid potential litigation for occupational hazards to occur such as sharp injuries. In addition, sharp bins that are hand carried or portable must be brought along by nursing staff on bedsides so that after performing injections, the sharps may be disposed immediately (NIOSH, 2013; CDCP, 2015).

In the Accident and Emergency department, it is surprising that in this hospital, it was not as high as the Medical-surgical department. However, it was still ranked second on the departments where high percentage of needlestick injuries occurred. The nurse respondents must have been well concentrating when handling sharps since this department has a fast paced environment and it is likely for nurses to expect more hazards in addition to needlestick injuries. ANA (2010) says that in a fast paced environment, nurses must possess the dexterity on using needles since gloving will not be able to avoid needle stick injuries and therefore it is not recommended. Usually, recapping is the problem in this department, since needles are useful in a fast paced environment and in order to recycle the sharps it will require recapping. In addition, it will also save the hospital costs if equipment is recycled. However, recapping needles should be avoided in the Accident and Emergency department in order to decrease the potential occurrences of needlestick injuries.

Operating theater nurse respondents are lesser in the percentage of experiencing and perceiving needle stick injuries because there are only few patients who are scheduled for operation. Suzuki et al (2005) agreed that there is less needle stick injury for operating theatre nurses because they always have the consistent schedule at daytime. Self-directed learning by reading the Toolkit provided by the WHO (2010), NIOSH (2013) and CDCP (2015) is also practiced in the operating theatre in this hospital. Therefore, in practice, the self-preparation is very helpful to avoid occupational hazards such as needle stick injuries.

The obstetrics and gynecology department on the other hand, had 0% needle stick injuries. However, there were incidences that says “yes” belonging to the n=30 in the pilot study at about 1%. Nurse respondents who have experienced needlestick injuries in this department were due to lack of training (Cheung et al, 2012) however it was not mentioned in the final results of the full scale research.

The strength of this study on the other hand is its design – an observational retrospective analytical cross sectional study. Selecting subjects from different sections can lead to a more interesting discussion (Burns and Grove, 2015; Parahoo, 2006). Furthermore, the questionnaire was divided into 2 independent variables – experiences and perceptions – in order to have a more interesting outcome.

Conclusion

The experience with needle stick injury was probable. Secondly, there are identified perceptions on needle stick injury in this study such as adequate staff nurses in a shift, hospital awareness, injection safety equipment and adequate mentor and supervisor. However, experiences and perceptions on needle stick injuries were affected by the hospital department, age group, and years of clinical experiences of the respondents.

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