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Original Research Article

Preventing Exposure to Blood Borne Pathogens - An Exploration of Knowledge and Practices among Nurses in India

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ABSTRACT

Blood borne pathogen exposure and needle stick injuries continue to be an important concern for health care providers especially nurses. Ongoing Training is essential for nurses to protect themselves against blood borne pathogen exposure. The objective of this study was to assess the knowledge and practices of Standard precautions among nurses. Using a non-experimental design the knowledge and practices of 100 trained nurses was determined using a self-report questionnaire and observation checklist. Most (87%) of the participants were female while only 13% of the samples were male nurses, the mean age being 24.92 years. Although 42% of the participants reported having prior history of needle stick injuries, only 24% of the study participants had received training related to preventing blood borne pathogen exposure. Many respondents agreed that a short supply of personal protective equipment (44%) and poor nurse patient ratio (80%) were the main causes for inability to practice selected universal precautions. A weak correlation (R= 0.2 & r^2 = 0.04; $p<0.05$) was observed between knowledge and practices of participants. The investigator concluded that further research is needed to examine how to influence the attitudes of nurses to improve adherence to universal precautions within the clinical practice setting.

Key Words: standard precautions, nurses, knowledge, injection practices, educational intervention

INTRODUCTION

"Standard precautions" aims to prevent transmission of human Immunodeficiency virus (HIV), hepatitis B (HBV), and other blood borne pathogens. The risk of occupational transmission of HBV, HCV, and HIV is influenced by the following factors:

1. the prevalence of infection with blood borne pathogen infection in the patient population.
2. the nature and frequency of occupational exposures to blood or other body fluids, and
3. the risk of infection transmission after exposure. [1]

Standard precautions are meant to reduce the risk of transmission of blood borne and other pathogens from both recognized and unrecognized sources. Promotion of a safety climate is a cornerstone of prevention of transmission of pathogens in health care. Standard precautions should be the minimum level of precautions used when providing care for all patients (WHO, 2007). Blood is the single most important source of exposure to HBV, HCV, and HIV in healthcare settings. Percutaneous exposures

(e.g., needlesticks and punctures or cuts with other sharp objects) are most frequently sustained by those occupational groups that handle sharps, including surgeons, but are also sustained by others, including downstream workers such as housekeepers and those disposing of waste. The greatest risk of infection transmission is associated with percutaneous exposure to blood, followed by exposure of a mucous membrane to blood, and the least risk with exposure to non intact skin. While delivery of the hepatitis B vaccine offers the best protection against HBV, preventing the transmission of HBV, HCV, and HIV to Health care providers is accomplished by preventing exposures to blood, primarily by preventing percutaneous injuries during medical procedures. [2,4] Needle stick and other percutaneous injuries are among the most common and avoidable occupational hazards in the hospital. A hospital-based retrospective study on a sample of 228 nurses involved in patient care, in two medical college hospitals of West Bengal, showed that 61.4% of them sustained at least one needle stick injury in last 12 months. Out of the most recent injuries among 140 nurses, 92.9% remained unreported to appropriate authorities; in 52.9% events hand gloves were worn by the nurses; only 5% of those nurses received hepatitis B vaccine, 2.1% hepatitis B immunoglobulin and none of them received post exposure prophylaxis for HIV. [5] Another hospital based review indicated that the commonest clinical activity to cause the NSI was blood withdrawal (55%), followed by suturing (20.3%) and vaccination (11.7%). The practice of recapping needles after use was still prevalent among Health care workers (66.3%). Some Health care workers also revealed that they bent the needles before discarding (11.4%). It was alarming to note that only 40 per cent of the Health care workers knew about the availability of Post exposure prophylaxis services in the hospital and 75 per cent of exposed nursing students did not seek Post exposure prophylaxis. [6] Standard precautions should be followed for patient care in order to protect health care providers and patients from risks associated with contact with blood and body fluids. As delivery of medical care moves increasingly to an outpatient setting, patients who require hospitalization have more acute illnesses and heightened susceptibility to nosocomial infections. These infections form a major challenge in the medical field. On an average nosocomial infection complicates 7% to 10% of hospital admissions. [7,8] Hand hygiene is the single most important procedure for preventing healthcare-associated infections. Infection control recommendations must be adhered to rigorously to minimize the risk of exposure to potentially infected blood or other body fluids. Fortunately, increased awareness of the risks and improvements in devices such as the addition of retractable protection shields on catheter stylets have resulted in a decrease in parenteral injuries over the past decade. [9,10] Proper gloving of hands is an effective prophylactic disinfection that can prevent nosocomial infections, particularly in high risk areas of the hospital like the intensive care units. Despite this, compliance with glove handling amongst health care workers, including physicians and nurses, remains under 50%, which is unacceptably low. [11,12] Educational programs to improve hand washing by health care providers by increasing their awareness about nosocomial infection have had limited success. [13] Seven months following the introduction of an institutional policy mandating compliance with universal precautions, 127 health care workers performing 1421 interventions on 155 critically ill and injured patients in an emergency department setting were observed. It was found that mandating

Universal precautions as policy with a monitoring component is effective in ensuring a reasonable level of adherence. The aim of the present study was to determine the knowledge and practices of universal precautions among nurses with prevention of exposure to blood borne pathogens during parenteral administration of medication and provide remedial measures to improve adherence. The study also examined the factors influencing the knowledge and practices of nurses.

MATERIALS AND METHODS

A quantitative study using non-experimental cross sectional research design was conducted in selected acute care settings. The staff roll randomly generated a sample of 136 nurses working in medical surgical wards. 100 nurses were selected as per the inclusion criteria. Only registered nurses working at the bedside for more than 6 months and involved in administering parenteral medications were included in the study. Ethical approval was sought from the hospital research board and ethics review committee. Participants who signed the consent were included in the study. A 25 item self administered questionnaire pertaining to use of standard precautions was used to determine knowledge. The questionnaire was based on the key components of standard precautions given by the WHO. Participant observation technique was used. Each participant was observed three times and scored on a observation schedule developed by the investigators. Observations were made while giving intramuscular, subcutaneous, intravenous injections and collecting blood samples. Each nurse was observed from the start till the end of the procedure. Observations were carried out by three observers who were trained. An inter-rater reliability analysis using the kappa statistic was performed to determine the consistency among raters. The inter-rater reliability for the raters was found to be Kappa = 0.76 (p <.0.001), 95% CI

RESULTS

More females (87%) participated than males (13%). Most (67%) of the participants were in the age group of 20 - 25 years. Maximum (71%) number of participants had had average of 34.4 months of experience. Of the 100 study participants, only (24%) had received training in infection control. A large number (85%) of participants stated that they had received informal training from their senior colleagues and unit managers. An analysis of the previous history of needlestick injuries indicated that (42%) respondents had previous history of needle stick injuries. Of those forty two participants who had received needle stick injuries (62%) reported having injury while recapping needles after injections. A majority (95%) of the forty two respondents had received needle stick injuries at least 2 – 3 times while only (5%) had received needle stick injuries more that five times (8 – 9 times) in the course of their work. It was interesting to note that (21%) of the study samples had not even received hepatitis B vaccine for protection. Nurses reported that they would wash their hands with sterilium (33 %) and inform the unit manager (9.5%). A few (9.5%) samples reported that they had not taken any action following needle stick injury. Few (9.5%) respondents reported that they checked the patient's report to see whether he was positive for HIV, HBV etc. It was seen that a majority (79%) of samples had received protective hepatitis B vaccines from the hospital. A large number (73%) of the participants already had satisfactory knowledge with the average score being 15 (maximum score possible = 25). The mean observation score for practices was 4.99 (maximum score possible = 16) indicating

that the practices were poor. A weak correlation was noted between the knowledge and practices (R= 0.2 & r^2 = 0.04; $p<0.05$) was noted. An observation of the practices indicated that basic principles of asepsis like hand washing and gloving were not being practiced conscientiously by the nurses. Hand washing during the interventions was practices only by (50%) of the nurses and gloving by (22%) of the nurses. It was noted that very few (3%) nurses discarded used needles in appropriate containers immediately after the intervention. Needles were collected in a tray and discarded later when time was available. While clinical experience and qualifications had a statistically significant relationship with the knowledge score at $p < 0.01$, they were not related to practice. An analysis of the factors influencing knowledge and practice indicated a variety of factors as causes of poor practice. Many respondents agreed that a short supply of personal protective equipment (44%) and poor nurse patient ratio (80%) were the main causes for inability to practice selected universal precautions during administration of parenteral medications and fluids in the clinical area. Few (29%) nurses reported that there was no occupational health department to offer personalized guidance in event of an accidental exposure. Also adequate disposal equipment at the bedside was not available which forced the nurses to carry used syringes and needles to the nurse's station. It was noted that 17 (17%) of the participants felt that the hospital policy of reserving personal protective equipment for therapeutic and diagnostic use was a cause of poor practices. Several participants (42%) reported lack of knowledge regarding safe injection practices while 33% reported that a lack of time was the reason for inability to perform universal precautions. A few (17%) participants quoted a "nothing will happen attitude" as the cause for not practicing selected universal precautions.

Table 1: ***Description of Sample Related to History of Needle Stick Injuries***

S No	Characteristics	Sample distribution	
		Frequency	**%**
1.	**Previous history of Needle stick injuries during parenteral administration of medications**	**N=100**	
	Yes	42	42
	No	58	58
2.	**Frequency of NSI before**	**N=42**	
	<5 times	40	95
	> 5 times	2	5
3	**Action taken when NSI occurred**	**N=42**	
	Hand washing with sterilium/spirit	14	33.3
	Removed blood by pressing the part and washed hand	10	23.8
	Informed ward sister/ doctor	4	9.5
	No action taken	4	9.5
	Got blood tested immediately after the injury	3	7.1
	Got patient's blood tested	1	2.4
	Took prophylaxis	1	2.4
	Checked patient's reports	4	9.5
4	**Time of occurrence of NSI**	**N=42**	
	While recapping needles after injection	26	61.9
	While giving injection	16	38.1
5.	**Vaccination status**	**N=100**	
	Received hepatitis B vaccine from hospital	47	47
	Taken hepatitis B vaccine on their own	32	32
	No vaccines taken	21	21

Table 2: Personal Factors Affecting the Knowledge and Practice of Selected Universal Precautions

N = 100

S no	Item	Frequency
1	Lack of knowledge	42
2	Lack of time	33
3	Fear of possibility of being diagnosed with a disease	3
4	Nothing will happen attitude	17
5	Pre and post exposure prophylaxis is not free	26
6	I just don't practice, no particular reason	6

Table 3: Organizational Factors Affecting the Knowledge and Practice of Selected Universal Precautions

N = 100

S No	Item	Frequency
1	Short supply of personal protective equipment	44
2	Lack of safe injection devices``	1
3	Poor nurse patient ratio	80
4	Lack of written guidelines for safe injection practices	3
5	Lack of in-service education	8
6	Lack of separate occupational health department	29
7	Institutional policy of saving equipment for diagnostics and therapeutics	17
8	Disposal equipment not available	10
9	No labelling of biohazard patients or equipment	1

DISCUSSION

Nurses who were knowledgeable of the standard precautions to be used during parenteral administration of medications were found to have poor practices. The findings of this study indicated that although nurses were aware of standard precautions as a method of preventing blood borne pathogen exposure during administration of parenteral medications they did not follow the standards due to various reasons. Actions taken by nurses after a needle stick injury are varying and indicate a lack of awareness of the post exposure prophylaxis and procedures to be followed. Practice behaviour can be modified with ongoing education and implementing standards and policies of practice.

Results have emphasized the need for an educational model developed in collaboration with the organisational policies to ensure compliance with practices. As compared to another study regarding nursing student's awareness of risk of HIV transmission through blood exposures, the nurses being trained, had more knowledge regarding universal precautions before teaching. Of the 290 students studied, 38 (13.1 %) were not even aware that the virus could be transmitted through infected needles. [13] The findings of this study have indicated that knowledge alone cannot bring behavioural change but factors such as organizational climate, work environment monitoring, personal interest and attitudes also play an important role in behavioural change. To ensure continued compliance with innovative practices, professional support is essential. Institutional policies also play an important role in ensuring adherence with practices.

CONCLUSION

This study raises many questions. Further research is needed to identify methods to improve adherence to standard procedures and protecting nurses from succumbing to occupational hazards. Education has been a universal method of improving practice but it is essential to identify means to ensure long term compliance with practices.

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