Original Research Article

Awareness and practices regarding standard precautions for infection control among the nurses during the COVID pandemic in a Medical Teaching Institute in Eastern India: a cross sectional study

Debadatta Chakrabarty[1], Saikat Bhattacharya[2], Tanjib Hassan Mullick[3], Soumitra Mondal[4*], Muktisadhan Maiti[5]

[1]Assistant Professor, Medical College, Kolkata, West Bengal India
[2] Assistant Professor, Medical College, Kolkata, West Bengal India
[3] Assistant Professor, Medical College, Kolkata, West Bengal India
[4]Demonstrator , Department of Community Medicine, Medical College, Kolkata, West Bengal, India
[5]Additional Director of Health Service, Swasthya Bhabon, Government of West Bengal, India

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Abstract

Introduction: Health-care associated infections (HAIs) is one of the serious problems that face healthcare providers. Occupational exposure to blood borne pathogens from needle sticks and other sharps injuries is a serious problem but it is often preventable. When nurses are exposed to the patient's body fluids, blood, and they may use needles that might be contaminated with several types of infectious pathogens. This may increase the risk of acquiring infections. Consequently, knowledge and compliance with standard precautions among nurses are important to reduce the incidence of those secondary infections.**Objective:** The aim of the study was to determine the level of awareness and the extent of practice pertaining to standard precautions for infection control among nurses. Relationship between awareness and infection control practice was also investigated as the predictors of infection control practices.**Methods:** Institutional based cross sectional quantitative study was conducted in a Medical college in Kolkata, India to assess knowledge and practice of standard precautions against blood borne pathogens among nurses from March 2020 to June 2020. The study was conducted as complete enumeration method among 545 nurses. A pre-designed, pretested questionnaire was used in this study. SPSS16 was used for data analysis.**Results:** Nearly one fourth (23.9 %) of the respondents did not know that inadvertent needle stick injury causes transmission of diseases. 17.2% had experienced needle stick injury during their entire service period of which nearly one fourth participants (23.4 %) had taken post-exposure prophylaxis (PEP). Around 80% (79.7%) of nurses practised satisfactory precautions.

Keywords: Needle stick injury, PEP, Standard precautions, nursing personals.

Introduction

Health-care associated infections (HAIs) considered one of the serious problems that face healthcare providers while handling patients' services. Those infections are common causes of morbidity and mortality among hospitalized patients[1].Improving patient safety has received too much attention worldwide and one of the first goals of the World Health Organization's World Alliance for Patient Safety is to reduce HAIs[2]. According to the Centre for Disease Control and Prevention in 2011, standard precautions were defined as "the minimum infection prevention measures that should be applied to all patient care" regardless of their suspicion or confirmation of infection status of the patients, which are used in any setting where health care is delivered [3-5].These precautions should be applied at any setting where health-care services are delivered and always assuming that patients' blood, body fluid, secretions, and excrements have infectivity potentials[6].Occupational exposure to blood borne pathogens from needle sticks and other sharps injuries is a serious problem but it is often preventable[7]. The World Health Organization (WHO) estimated that, of the 35 million health care workers worldwide, three million experiences percutaneous exposures to blood borne pathogens each year. Among these exposed health care professionals, two million were exposed to HBV, 0.9 million to HCV, and 170,000 to HIV [8].As a result of these exposures, 150,000 HCPs contracted HCV, 70,000 contracted HBV, and 500 contracted HIV per yearMore than 90% of these infections occurred in developing countries, especially those in sub-Saharan Africa, which account for the highest prevalence of HIV-infected patients in the world and report the highest incidence of occupational exposure to these viruses.When nurses providing nursing care for patients, they are exposed to the patient's body fluids, blood, and they may use needles that might be contaminated with several types of infectious pathogens. This may increase the risk of acquiring infections. Consequently, knowledge and compliance with standard precautions among nurses are important to reduce the incidence of those secondary infections[9-11]..However, the reality of adopting standard precautions in clinical settings is far away from what is recommended and has been proved to be somewhat problematic.In fact, despite the awareness of the importance of standard precautions in reducing the transmission of infectious agents in the workplace,

**Correspondence*
Dr. Soumitra Mondal
Demonstrator, Department of Community Medicine, Medical College, Kolkata, West Bengal, India
E-mail: drsmitramondal@gmail.com

low compliance rates among health care personnel have been reported worldwide.[12]

The differences in knowledge of standard precaution by health care workers might be influenced by their variable type of training. Absence of an enabling environment in the health institution such as lack of constant running water or shortage of personal protective equipment can lead to poor practices with standard precaution .Compliance with standard precaution practice requires appropriate attitude of health workers over long periods of time demanding motivation and technical knowledge of them.Since many cases of the novel coronavirus disease 2019 (COVID-19) first appeared in Wuhan, China, in December 2019, the virus has infected millions worldwide.On January 30, 2020, the World Health Organization (WHO) declared that the outbreak of COVD-19 constituted a Public Health Emergency of International Concern (PHEIC), calling for countries to take urgent and aggressive action against the spread of the virus.Responding to the pandemic has become a serious challenge, as little is known about the epidemiological evidence of the disease, including its transmission dynamics, epidemic doubling time, and reproductive frequency. Also, there are no vaccines or treatments clinically proven to be effective yet. In this scenario, the standard precautions for infection control measurement are difficulty to maintain properly due to huge patients load. The anxiety or fear of being infected COVID-19 among the nurses was also one of the cause of this measurement.

So, the aim of the study was to determine the level of awareness and the extent of practice pertaining to standard precautions for infection control among nurses, i.e., in terms of handwashing, safe handling of needles and other sharp devices, and proper handling and disposal of contaminated materials. Moreover, the relationship between awareness and infection control practice was investigated as well as the predictors of infection control practices.

Methods:

Institutional based cross sectional quantitative study was conducted in a Medical Teaching Institute in Kolkata, West Bengal to assess knowledge and practice of standard precautions against blood borne pathogens among nurses from March 2020 to June 2020. All categories of nursing personnel including Nursing Superintendent, Deputy Nursing Superintendents, Ward Sisters & Staff Nurses discharging services in this institute were the study population. All nursing personnel working in this institute at least one year were included in this study & those were absent during data the entire period of data collection and those were unwilling to participate were excluded from this study.

The study was conducted as complete enumeration method. At the time of completion of data collection total number of nurses working in this institute was 568 (Nursing Superintendent - 2, Deputy Nursing Superintendent -12, Ward Sister - 70 & Staff Nurse- 484). Among the staff nurses four individuals were on long leave, fourteen nurses had work experiences less than one year & five were unwilling to participate in this study. Finally sample size become 545.

A pre-designed, pretested structured interviewer administered questionnaire was used in this study. The face validity of each item and content validity of each domain were ascertained by them. Pretesting was done among 30 nursing personnel in another but similar hospital. The questionnaire included two parts.The first part involved demographic profiles of the respondents.The second part consisted of questions on awareness of standard precautions for infection control. For operational purpose, knowledge of needle stick injury (NSI) was assessed by five item of questions and practice of precautions by six item of questions. Maximum and minimum attainable score for NSI was 12 and 0 and for practice of precautions score was 9 and 1 respectively.

On the basis of attained median score, knowledge of NSI was categorized as satisfactory and unsatisfactory; respondents scored less (<) or greater than equal (≥) to median were categorized as unsatisfactory knowledge and satisfactory knowledge respectively. On the basis of obtained median score, practice of precautions scored less (<) or greater than equal (≥) to median were categorized as unsatisfactory precautions and satisfactory precautions respectively.

The Statistical Package for Social Sciences (SPSS) Version 16 was used for analysis. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to describe the demographic profiles of respondents, the level of awareness, and the extent of practice.Chi-square test was applied to study the association and p-value obtained. The p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

Approval was secured from the institution where the study was conducted, and from the institution's Ethics Review Committee. The nurses were given a detailed explanation about the nature and the purpose of the study. It was emphasized that participation was voluntary, and that participation in the study would have no influence on either their coursework grade or clinical requirements. Informed verbal consent was secured and all data sheets were kept confidential and anonymous.

Results

In the present study majority of population belonged to 23-35 years age group , married , Hindu , Residing in nuclear family in Urban area and had GNM (Nursing Graduate) qualification **(Table1),**

Nearly one fourth (23.9 %) of the respondents did not know that inadvertent needle stick injury causes transmission of diseases. Hepatitis B (78.8 %), Human Immunodeficiency Virus (59.5%) and Hepatitis C (44.8%) were identified as the main transmitted disease by the respondents. Few participants wrongly mentioned that Rabies, Syphilis and Gonorrhoea were also transmitted through needle stick injury. Though 96.0% respondents had knowledge on self-protection but 62.1% practised it always, 26.4% sometimes and 11.5% rarely. Half of the participants (50.4%) enriched their knowledge on self-protection from their nursing course curriculum followed by in service HIV training (17.4%), books (14.7), from seniors (11.6%) and workshop (9.4%) (**Table 2).**

Out of 545 study subjects, 17.2% had experienced needle stick injury during their entire service period of which nearly one fourth participants (23.4 %) had taken post-exposure prophylaxis (PEP).Various causes were fixed by the participants (76.6%) for not taking PEP such as carelessness/self- negligence" (31.9%), 'non availability of PEP' (27.8 %), 'patient HIV nonreactive' (26.4%), 'not advised by doctor' and 'superficial injury'. Due to 'ignorance' (76.2%), respondents who had taken PEP did not avail special leave following norms as laid down by National AIDS Control Organization (NACO). Only those who had taken PEP (23.4%) underwent serological test for HIV after 12 weeks of injury. 'Ignorance' (40.3 %) was the main cause for not undergoing this test followed by 'not advised by doctor (33.3 %), 'carelessness' (12.5 %), 'ICTC negative' (9.8%). and 'superficial needle stick injury' (4.1%),About 60% (59.4%) participants had satisfactory knowledge of NSI and rest (40.6%) had unsatisfactory knowledge of NSI. Mean score for knowledge of NSI was 5.9 (±1.9) with maximum 12 and minimum zero; nearly 60% of the participants had satisfactory knowledge and rest had unsatisfactory knowledge (**Table 3).**

Twenty two (4.0%) participants did not attend any of these patients during their whole service life. Though all nursing personnel took precaution while attending these patients but more than half (51.8%) had taken only gloves for precaution and 36.9% undertook training of PPE kit & PEP had been undertaken by 34.9% of respondents. Around 80% (79.7%) of nurses practised satisfactory precautions whereas rest (20.3%) practised satisfactory precautions. Average score for practice of precaution was 5.4 (2) with maximum 9 and minimum 1; nearly 80% of the respondents had satisfactory precautionary practices and rest had unsatisfactory precautionary practices (**Table 4).**

More than one third (34.8%) of the participants undertook training on PEP during their service period out of which more than half (66.3%) had satisfactory knowledge of needle stick injury and rest had unsatisfactory knowledge and this difference was statistically significant (p<0.05). Considering practice of precautions, out of 523 respondents more than one third (34.9%) had undergone in-service training on PEP of which majority (85.75%) had satisfactory practice of precautions and rest had not satisfactory practice of precautions (. and this difference was statistically significant (p<0.05).Out of 94 respondents who had history of needle stick injury only 23.4% undertook post exposure prophylaxis treatment of which majority (81.8%) had undergone training on PEP and rest had not and this difference was statistically significant (p<0.05). (**Table 5)**

Table 1: Socio-demographic profile of study participants (n=545)

Variable	Category	No. (percentage)
Age (in years) [Median: 35; IQR (46); Mean (SD): 37.5 (±10.4); Range: 23 -59]	23 - 35 36 - 45 46 - 55 56 - 59	283 (51.9) 121 (22.2) 95 (17.5) 46 (8.4)
Educational status	GNM B Sc (Nursing) M Sc (Nursing) ANM	449 (82.4) 82 (15.0) 12 (2.2) 2 (0.4)
Religion	Hindu Muslim Christian Others	500 (91.7) 07 (1.3) 19 (3.5) 19 (3.5)
Caste	Schedule Caste Schedule Tribes Other Background Classes Others	94 (17.2) 35 (6.4) 23 (4.2) 393 (72.1)
Permanent place of residence	Urban area Rural area	497 (91.1) 48 (8.9)
Type of family	Nuclear Joint	382 (70.1) 163 (29.9)
Marital status	Married Unmarried Widow Separated Divorced	403 (73.9) 132 (24.2) 4 (0.7) 2 (0.4) 4 (0.7)
Age of Marriage (in years) [Median: 27.0; Mean (SD): 27.1 (±3.4); Range: 20 - 45] (n=413)	20 - 25 26 - 30 31 - 35 36 - 40 41 -45	154 (37.5) 199 (48.2) 54 (13.1) 4 (1.0) 2 (0.4)
Age of 1st child birth (in years) [Mean (SD): 29.2 (± 3.1); Range: 20 - 40] (n=316)	22 – 27 28 – 32 33 – 37 38 - 40	97 (30.7) 172 (54.4) 42 (13.3) 5 (1.6)
Number of living children (n=413)	0 1 2	97 (23.5) 236 (57.1) 80 (19.4)
Addiction	Yes No	10 (1.8) 535 (98.2)

Table 2: To assess the awareness and practices of standard precautions for blood borne infection control among the nurses

Questions on awareness & practices	Response	Number (%)
Do you know needle stick injuries (NSI) cause disease? If 'yes', name the diseases. (n = 415) (multiple response)	Yes No Hepatitis B HIV Hepatitis C AIDS Hepatitis Blood borne disease Communicable disease Syphilis, Gonorrhoea Rabies	415 (76.1) 130 (23.9) 327 (78.8) 247 (59.5) 186 (44.8) 43 (10.3) 28 (6.7) 2 (0.4) 2 (0.4) 2 (0.4) 5 (1.2)
Do you know the measures to protect yourself? If 'yes', do you practice (n = 523)	Yes No	523 (96) 22 (4.0)*

If 'yes', mention the source of your knowledge. (n= 523) (multiple response)	Rarely	60 (11.5)
	Sometimes	138 (26.4)
	Always	325 (62.1)
	Nursing course curriculum	264 (50.4)
	Workshop/ Seminars	49 (9.4)
	Books	77 (14.7)
	Journals	5 (09)
	Ward experience/ From seniors	61 (11.6)
	HIV training	91 (17.4)

* They mentioned 'no training' as the cause of not undertaking measures to protect themselves.

Table 3: Distribution of study subjects according to history of needle stick injury and related variables

History of needle stick injury	Response	Number (%)
Occurrence of needle stick injury (n=545)	Yes No	94 (172) 451(82.8)
Post Exposure Prophylaxis taken (n=94)	Yes No	22 (234) 72(76 6)
Cause of PEP not taken (n=72)	Carelessness/self -negligence PEP not available ICTC negative Not advised by doctor Superficial needle stick	23 (31.9) 20 (27.5) 19 (264) 8 (11.1) 2 (2.8)
Availing leave during PEP taken (n=22)	Yes No	1(4.5) 21(95 5)
Reason for not taking leave (n=21)	Ignorance Not necessary	16 (76.2) 5 (23.8)
Necessary test after 12 weeks (n=94)	Yes No	22(23.4) 72(76.6)
Case of not undergoing test (n=72)	Ignorance Not advised by doctors Carelessness ICTC negative Superficial needle stick injury	29 (403) 24 (333) 9 (12.5) 7(9.8) 3(4.1)
Knowledge of NSI: Score: Mean, ±SD:5.9, (±1.9) Median (IQR): 6 (5,8) Range: 0-12	Category Satisfactory (≥6) Unsatisfactory (< 6)	No (%) 324 (59.4) 221 (40.6)

Table 4: Distribution of study participants according to practice of precautions & training on PEP (n=523)*

Practice of precautions	Number (%)
Gloves only	271 (51.8)
Personal Protective Equipment (PPE)	193 (36.9)
Barrier Nursing	13 (2.6)
HIV Kit	11 (2.1)
Gloves & Hand Washing	10 (1.9)
Gloves & Mask	9 (1.8)
Gloves & Vaccine	7(1.3)
Hand Washing	5 (0.9)
Vaccine	4 (0.7)
Training on Post Exposure Prophylaxis (PEP) (n=545)	
Yes	190 (34.9)
No	355 (65.1)
Practice of precautions: Score: Mean, ±SD: 5.4, (±2.0) Median (IQR): 5 (4,7) Range: 1.9	Category Satisfactory (≥ 5) Unsatisfactory (< 5)	Number (%) 417 (79.7) 106 (20.3)

*22 nurses never attended Hepatitis B, Hepatitis C and HIV infected patients

Table 5: Association between training on post exposure prophylaxis (PEP) with knowledge of needle stick injury (NST), practice of precautions and PEP taken

Variables	Training on PEP			Chi Square value (p- value)
	Yes Number (%)	No Number (%)	Total Number (%)	
Knowledge of NSI: (n=545) Satisfactory (≥median) 64 (29.0) (33.7)	126 (38.9) (66.3)	198 (61.1) (55.7) 157 (71.0) (44.3)	324 (100) (59.4) 221 (100) (40.6)	5.70 (0.01)* df = 1

Unsatisfactory (< median)				
Total	190 (34.8)	355 (65.2)	545	
Total Practice of precautions (n=523) Satisfactory (> median) Unsatisfactory (< median)	157 (37.6) (85.7) 26 (24.5) (14.3)	260 (62.4) (76.4) 80 (75.5) (23.6)	417 (100) (79.7) 106 (100) (20.3)	6.39 (0.01)* df = 1
Total	183 (34.9)	340(65.1)	523	
PEP taken (n= 94) Yes No	18 (81.8) (31.6) 39 (54.2) (68.4)	04(18.2) (10.8) 33 (45.8) (89.3)	22 (100) (23.4) 72 (100) (76.6)	5.39 (0.02)* df = 1
Total	57 (60.6)	37(39.4)	94	

*Significant at 95% level of confidence interval

Discussion

Nearly one fourth (23.9 %) of the respondents did not know that inadvertent needle stick injury causes transmission of diseases. Similar findings were seen in a study conducted at Ethiopia. But, a study conducted at Palestinian Hospital showed lower knowledge compare to this study. In a study conducted by Paramarthi .K et al in a tertiary care hospital of Visakhapatnam Andra Pradesh, India about 97% of study participants were aware of HIV being transmitted by NSI. Though 96.0% respondents had knowledge on self-protection in present study but in a study by Sreedhran .Jet al in a teaching hospital of United Arab Emirates revealed only 45.9% had agreed that standard precautions aimed to protect both health care workers and patients. In present study 17.2% had experienced needle stick injury during their entire service period but In a study conducted by Paramarthi .K et al in a tertiary care hospital of Visakhapatnam Andra Pradesh 54.5% nurses had needle stick injuries .In a study by Paramarthi .K et al about 49.1% nurses used strile gloves for giving injections which is similar to present study findings. About 60% participants had satisfactory knowledge of NSI. Unfortunately this findings were very low compare to other studies. Though all nursing personnel took precaution while attending these patients but more than half (51.8%) had taken only gloves for precaution and 36.9% undertook universal precautions. This was quite low comparing to other studies. Training on HIV & PEP had been undertaken by 34.9% of respondents. This was low compare to Ethiopia study .Statistical significant association was found with training of PEP and knowledge of NSI and practice and consumption of PEP. Similar findings was observed in a Nigerian study[12].

36.9% of the nursing personnel were trained on PPE usage; such low finding may be attributed to the initial phases of COVID-19 as at that time training procedure was still ongoing and not completed yet for the whole group of nursing personnel.

Conclusion

Knowledge regarding standard precaution needs to be improved. Proper training should be given all nursing staffs. Practice regarding PEP and hand washing should be corrected by proper training and supportive supervision.

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