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Knowledge & Prevalence of Needle Stick Injury Among Health Care Workers At Tertiary Care Hospital.

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Abstract :
Introduction: *Needle stick injuries (NSIs) is a major occupational health and safety issue faced by health-care professional's globally.*
Aims & Objectives: *To study the prevalence, associated factors of NSI among the health care workers (HCW'S) and assessment of knowledge and awareness of NSI among HCW'S.*
Materials and Methods: *A cross-sectional study was conducted at tertiary care hospital among HCWs for 2 months in the year 2016. An informed consent was obtained from each participant. The study was carried out with the help of a questionnaire to identify predictive factors associated with NSIs. Then data was compiled and analyzed as percentages in a phased manner.*
Results: *A total of 273 HCW'S were participated in the study. Among this HCWs 73 were given a history of NSI in last 12 months which included most of which are 30 nurses, Majority of injuries 31 (42.46%) were occurred at patient room while blood withdrawal 24 (32.83%) . Forty eight (65.75%) HCW's washed the site with soap and water, 12 (16.43) applied spirit at the site, 7 (9.58%) applied pressure, 3 (4.10%) didn't done anything*
Conclusion: *Needle stick injuries are most common among health care workers. Complete knowledge regarding the universal precautions guidelines among the students and HCW is very essential to avoid NSI.*
Keywords : *Health care workers, Needle sticks injuries, Questionnaire*

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I. Introduction

Needle stick injuries (NSIs) are wounds caused by needles used in health-care set-up that may accidentally puncture the skin resulting in exposure to blood or other body fluids. NSI is a major occupational health and safety issue faced by health-care professional's globally[1]. Along with NSI percutaneous injuries caused by other sharps are also a serious concern for all health care workers (HCWs). Studies show that residents, medical students, and nurses have the highest rate of needle stick injury among health care workers[2]. According to the Centers for Disease Control and Prevention, approximately 3, 84,000 percutaneous injuries occur annually in US hospitals. EPInet data for 2003 reports a rate of approximately 27 NSIs per 100 beds in teaching hospitals[3]. There are few reports on NSIs from India, and with limited data, it is not possible to estimate an annual incidence[4,5,6,7]. Around 3-6 billion injections are given per year, of which 2/3rd injections are unsafe[8]. The situation is worsened by gross under-reporting of such injuries among the HCW. Surveys of healthcare personnel indicate that 50% or more do not report their occupational percutaneous injuries[9]

Percutaneous injuries may occur not only with freshly contaminated sharps, but also with needles that carry dry blood[10, 11]. It is a significant risk factor for occupational transmission of blood borne pathogens. There are more than 20 different pathogens which can be transmitted by NSI's amongst which hepatitis due to hepatitis B virus (HBV) or hepatitis C virus (HCV) and acquired immunodeficiency syndrome (AIDS) due to human-immunodeficiency virus (HIV) are primarily significant to HCW[12]. The risk of transmission through NSIs for HBV is 1-40%, HCV is 1.8% and HIV is 0.3%[13]. NSI can be prevented by avoiding unnecessary use of needles; taking proper safety precautions while using needles and other sharps can; and by proper disposal of sharps. This study was undertaken to estimate the burden of the NSI's, to determine risk factors for injury and potential interventions for prevention in our health care set-up. Also awareness regarding universal precautions, appropriate disposal of sharps and avoidance of recapping or bending of sharps among the HCW can result in the modification of hazardous work practices, thereby creating a safe working place for them. Hence, in this study, an attempt has been made to assess the awareness among our HCW about the NSI.

I. Aims & objectives:

1.To study the prevalence and associated factors of Needle Stick Injuries (NSI) among the health care workers.
2. To assess the knowledge and level of awareness of the health care workers regarding Needle Stick Injury (NSI).

II. Materials & Method

A cross-sectional study was conducted at tertiary care hospital among HCWs (both male and female) over a period of 2 months in the year 2016. The samples were selected randomly. The study group consists of 275 HCWs including Residents, Interns, Staff Nurses, Nursing Students and Technicians, Class IV workers. The participants of the study were fully informed about the design and purpose of study. An informed consent was obtained from each participant as per the Ethics Committee guidelines and they were requested to answer the questionnaire. The study was carried out with the help of a questionnaire structured specifically to obtain both qualitative and quantitative data to identify predictive factors associated with NSIs.

The questionnaire included 3 parts;- 3.1) Part one- Included work related aspects - occupation, years of experience, department, hepatitis B vaccine status. 3.2) Part two- History of NSI in last 12 months and circumstances associated with the injury. It included the questions to record the number of needle stick injuries within the last 12 months, if any, received by the Health Care Worker, whether the injuries were reported and whether incident was filled at ICTC. Associated factors of Needle Stick Injury were also assessed. These associated factors include- type of needle responsible for needle stick injury, degree of penetration of needle, procedure & phase of use of needle during which HCW received needle stick injury, cause of needle stick injury, action taken by HCW after injury, time interval after injury upto the action taken by HCW. 3.3) Part three- It included questions regarding knowledge & awareness about NSI and post exposure prophylaxis. The questionnaire included a full range of response options designed to identify the participant's knowledge & awareness regarding Needle Stick Injury, and compliance with universal precautions in the health sector. For assessment of data regarding the knowledge and awareness of Health Care Worker about Needle Stick Injury, questions regarding, the actions to be taken by Health care worker after the injury, questions regarding CDC guidelines for post-exposure prophylaxis, guidelines about disposal of sharps are included. The questionnaire only covered the occupation & work related aspects. There were no additional questions about gender, age, or name. Thus, anonymity of the participants was maintained throughout the study. The sources of data were the persons themselves. After collection of data, it was compiled and analyzed as percentages in a phased manner.

III. Results

Out of 300 health care workers who were requested to participate in the study a total of 273 health care workers participated in the study. Among these 273 HCWs 73 were given a history of NSI in last 12 months which included 30 nurses, 14 class IV worker , 13 residents, 13 interns and 3 technicians.

Table 1: Health care workers with needle stick injuries in last 12 months

Occupation	No of Uninjured	No of Injured	Total
Nurses	123 (80.39%)	30 (19.60%)	153
Residents	26 (66.66%)	13 (33.33%)	39
Interns	39 (75%)	13 (25%)	52
Technicians	6 (66.66%)	3 (33.33%)	9
Class IV workers	6 (30%)	14 (70%)	20

Out of total 73 HCW's with NSI's, Class IV worker had the highest percentage 14 (70%) followed by residents 13(33.33%), technicians 3(33.33%), interns 13(25%) and nurses30(19.60%).

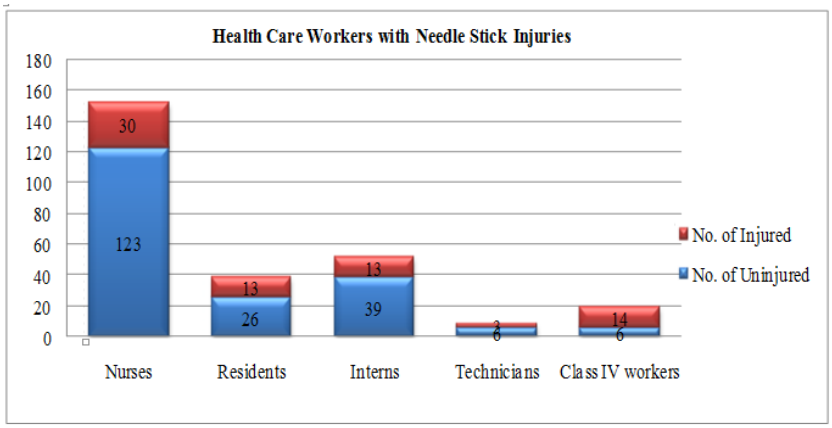

Fig 1: Health Care Workers with Needle Stick Injuries

Table 2: Factors associated with NSI

Sr No	FACTOR ASSOCIATED WITH NSI		No of HCW (N=73)
1.	Where did the injury occur? -	• Patient room	31(42.46%)
		• Injection room	11(15.06%)
		• OPD	10(13.69%)
		• ICU	7(9.58%)
		• OT	7(9.58%)
		• Labor room	6 (8.21%)
		• Blood bank	1(1.36%)
		• Clinical laboratory	0(0%)
2.	Procedure during which NSI occurred	• Blood withdrawal	24(32.83%)
		• Recapping/bending needle	21(28.76%)
		• Accessing IV line	9(12.32%))
		• Vaccination	8 (10.95%)
		• Suturing	5 (6.84%)
		• Dilution of IV drugs	4(5.47%)
		• Transfer of sample	2(2.73%)
3.	Was the needle sterile?	• Yes	36(49.31%)
		• No	14(19.17%)
		• Don't know	17(23.28%)
4.	Phase of use of needle-	• Before use	32(43.83%)
		• During use	16(21.91%)
		• After use	25(34.24%)
5.	Type of needle -	• Injecting needle	37(50.68%)
		• Blood collection needle	18(24.65%)
		• Winged IV set	9(12.32%)
		• Suturing needle	7 (9.58%)
		• Cannulas	2(2.73%)
6	How was injury treated	• Washed with soap & Water	48 (65.75%)
		• Applied spirit	12 (16.43%)
		• Applied pressure	7 (9.58%)
		• Didn't do anything	3 (4.10%)
7	Number of HCW wearing gloves at the time of NSI		35 (47.94%)

Among these 73 injured HCW, 47.94% were wearing gloves at the time of injury. Thirty one (42.46%) injuries were occurred at patient room followed by 11 (15.06%) in injection room, 10 (13.69%) in OPD, 7 (9.58%) in OT and also in ICU lastly 1 (1.36%) in blood bank. NSI occurred while performing various procedures. Most injuries occurred while blood withdrawal which accounted for 24 (32.83%) followed by recapping/ blending of needle 21 (28.76%), while accessing IV line 9 (12.32%), during vaccination 8 (10.95%), while suturing 5 (6.84%), while dilution of IV drugs 4 (5.47%) and while sample transfer 2 (2.73%) injuries. In 36 (49.31%) HCW's needle was sterile while in 14 (19.17%) it is unsterile. Seventeen (23.28%) HCW don't know the status of sterilization of needle. Thirty two (43.83%) HCW's got NSI before use of the needle, 16 (21.91%) got during its use and 25 (34.24%) got injured after its use. Types of needle included injecting needles 37 (50.68%), blood collection needle 18 (24.65%), winged IV set 9 (12.32%), suturing needle 7 (9.58%) and Cannulas 2 (2.73%). After needle stick injuries most of HCW had taken action instantly. Forty eight (65.75%) HCW's washed the site with soap and water, 12 (16.43) applied spirit at the site, 7 (9.58%) applied pressure, 3 (4.10%) didn't done anything.

Table 3: Number of reported and unreported injuries

Occupation	**Injured**	**Number of reported injuries**	**Unreported injuries**
Nurses	30	5 (16.66%)	25 (83.33%)
Residents	13	4 (30.76%)	9 (69.23%)
Interns	13	5 (38.46%)	8 (61.53%))
Technicians	3	3 (100%)	0 (0%)
Class iv workers	14	12 (85.71%)	2 (14.28%)
Total	73	29 (39.73%)	44 (60.27%)

In present study, among 73 HCW's with NSI only 29 (39.73%) were reported the injuries while 44 (60.27%) were didn't reported the injuries. Highest (83.33%) under-reporting was observed among nurses followed by 69.23% in residents, 61.53% in interns and 14.28% in class IV workers. While highest reporting 3 (100%) was observed among technicians, followed by 12 (85.71%) in Class IV workers, 5 (38.46%) in interns, 4 (30.76%) in residents and 5 (16.66%) in nurses.

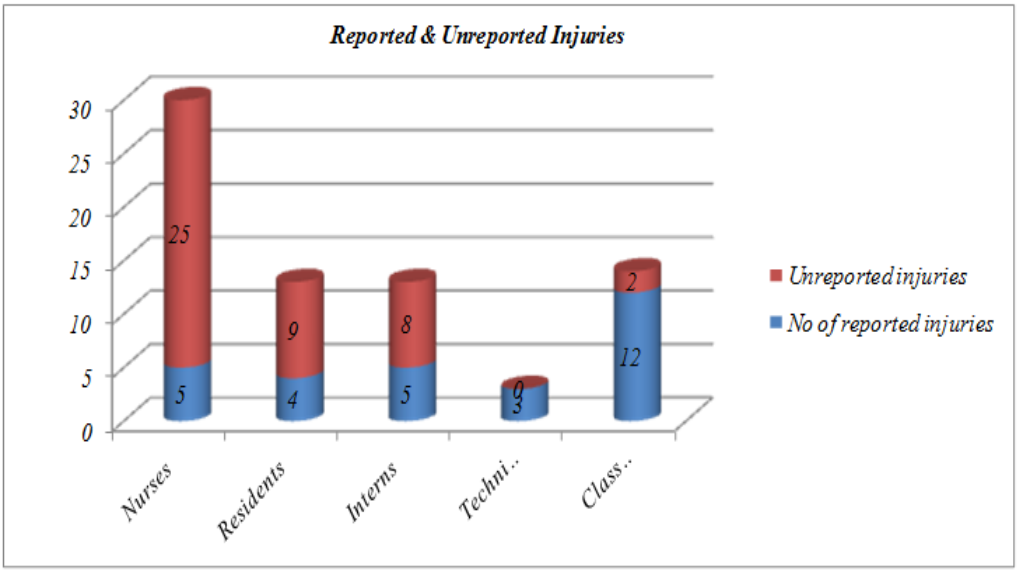

Fig 2: Reported & Unreported Injuries

Table 4: Assessment of knowledge of HCW's about universal precaution guidelines and awareness of NSI.

Sr No.	Correct statement	Number (n=275)
1.	Knowledge of universal precaution guidelines	255 (92.72%)
2.	Needle should not be recapped after use	127 (46.18%)
3.	Hypodermic needle increases chance of NSI	151 (54.90%)
4.	Milking out blood from site of injury doesn't decrease chances of infection	146 (53.09%)
5.	CDC doesn't recommend practice of milking out of blood from site of injury	138 (50.18%)
6.	>20 different pathogens are transmitted through NSI	208 (75.63%)
7.	Which pathogen carries highest risk of transmission after NSI?	
	° HIV	113 (41.09%))
	° HBV	118 (42.90%)
	° HCV	7 (2.54%)
	° Don't know	35 (12.72%)
8.	HCV vaccine is not available	141 (51.27%)
9.	Hepatitis b vaccine protects against HBV infection	184 (66.90%)
10	PEP should be started within 1hr of NSI	124 (45.09%)
11	Risk of transmission of HIV is 0.3%	216 (78.54%)
12	Sharps are disposed in blue color coded bag*	103 (37.45%)
13	Bag of sharps is disposed when it is 3/4th filled	248 (90.18%)

Inpresent study, only 46.18% HCW's know that needle should not be recapped after use. Fourty five percent HCW's knows that PEP should be started within 1 hour of NSI. Knowledge regarding the disposal of sharp is also very poor. Only 37.45% HCW's knows that sharps are disposed in color coded bags.

IV. Discussion

Occupational disease burden in India is growing at an unprecedented pace. Proportionate training of human resources in occupational health and safety has not taken place in our country. The importance of occupational health and safety and disaster management in teaching, training and epidemiological research has ignored by medical fraternity. Out of 300 health care workers who were requested to participate in the study a total of 273 health care workers participated in the study. Among these 273 HCWs 73 were given a history of NSI in last 12 months which included 30 nurses, 14 class IV worker , 13 residents, 13 interns and 3 technicians.

In present study out of total 73 HCW's with NSI's, Class IV worker had the highest percentage 14 (70%) followed by residents 13 (33.33%), technicians 3 (33.33%), interns 13 (25%) and nurses 30 (19.60%) (Table 1, Figure 1). In a study performed by Jayanth et al [26] (43.2%) and Muralidhar et al[8] (100%) nurses had the highest percentage of NSI. In Rele et al[6] it was observed that residents are most common group of HCW accounted for 76% followed by nurses 11%, interns & housekeeping staff 5% each and technicians 3%.

Among these 73 injured HCW, 47.94% were wearing gloves at the time of injury. In a study performed by Muralidhar et al[8] 74% HCW's were wearing gloves. Thirty one (42.46%) injuries were occurred at patient room followed by 11 (15.06%) in injection room, 10 (13.69%) in OPD, 7 (9.58%) in OT and also in ICU lastly 1 (1.36%) in blood bank (Table 2). Jayanth et al[14] observed that most of the NSI occurred in ward 128 (43.24%) followed by casualty 34 (11.49%), OR 44 (14.86%), peripheral hospitals 43 (14.53%), ICU 19 (6.42%) and others 28 (9.46%) NSI occurred while performing various procedures. Most injuries occurred while blood withdrawal which accounted for 24 (32.83%) followed by recapping/ blending of needle 21 (28.76%), while accessing IV line 9 (12.32%), during vaccination 8 (10.95%), while suturing 5 (6.84%), while dilution of IV drugs 4 (5.47%) and while sample transfer 2 (2.73%) injuries (Table 2). In a study performed by Muralidhar et al[8] blood withdrawal (55%) was a most common clinical entity to cause NSI followed by recapping of the needle (39%), suturing (20.3%) and vaccination (11.7%). In Jayanth et al[14] the most common procedure was blood collection (59.3%) followed by recapping of the device 14.86% .

In 36 (49.31%) HCW's needle was sterile while in 14 (19.17%) it is unsterile. Seventeen (23.28%) HCW don't know the status of sterilization of needle. Thirty two (43.83%) HCW's got NSI before use of the needle, 16 (21.91%) got during its use and 25 (34.24%) got injured after its use. The majority of health care workers (56.15%) received NSI after use and before its disposal (Table 2). Similar findings were also observed in Muralidhar et al[8]. 60% HCW received injury after the use and before the disposal of needle. In present study types of needle included injecting needles 37 (50.68%), blood collection needle 18 (24.65%), winged IV set 9 (12.32%), suturing needle 7 (9.58%) and Cannulas 2 (2.73%). Injecting needle was most common type of needle causing NSI in Muralidhar et al[8] study. After needle stick injuries most of HCW had taken action instantly. Forty eight (65.75%) HCW's washed the site with soap and water, 12 (16.43) applied spirit at the site, 7 (9.58%) applied pressure, 3 (4.10%) didn't done anything (Table 2). In Salekar et al[15] 71.5% of HCW's applied antiseptic lotion at the site, 52% HCW washed the site with soap and water.

In present study, among 73 HCW's with NSI only 29 (39.73%) were reported the injuries while 44 (60.27%) were didn't reported the injuries. Highest reporting 3 (100%) was observed among technicians, followed by 12 (85.71%) in Class IV workers, 5 (38.46%) in interns, 4 (30.76%) in residents and 5 (16.66%) in nurses. While highest (83.33%) under-reporting was observed among nurses followed by 69.23% in residents, 61.53% in interns and 14.28% in class IV workers (Table 3, Figure 3). When assessment regarding knowledge of HCW about universal precaution guideline and awareness of NSI was done then it was observed that only 46.18% HCW's know that needle should not be recapped after use (Table 4). In a study performed by Shah et al[16] 78% HCW knew that needle should not be recapped after use. Forty five percent HCW's knows that PEP should be started within 1 hour of NSI. Knowledge regarding the disposal of sharp is also very poor. Only 37.45% HCW's knows that sharps are disposed in color coded bags.

V. Conclusion

Needle stick injuries are most common occupational hazard which occurs in health care workers. Hence to avoid the NSI, it is very necessary to have the complete knowledge regarding the universal precautions guidelines among the students and HCW. Well designed seminars, programs and workshop should be conducted to improve and update the knowledge of universal precautions and NSI particularly in students as they are the future soldiers of healthy India.

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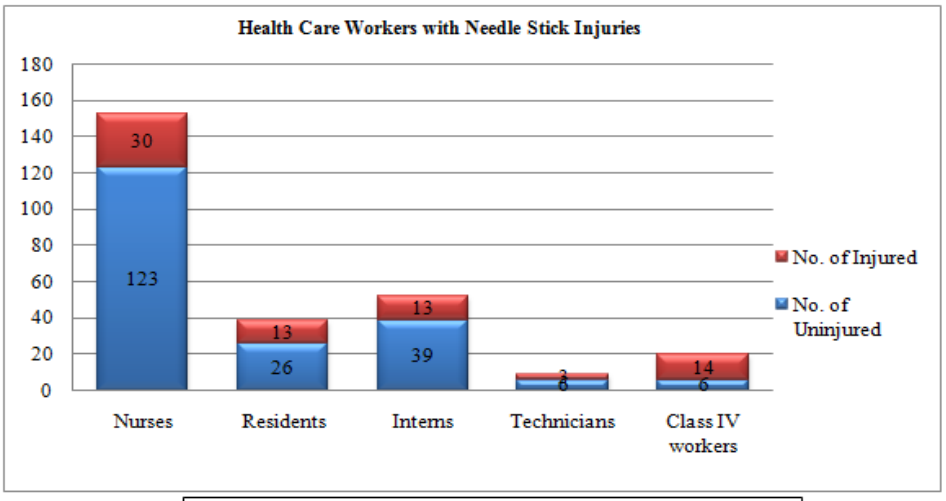

Fig 1: Health Care Workers with Needle Stick Injuries

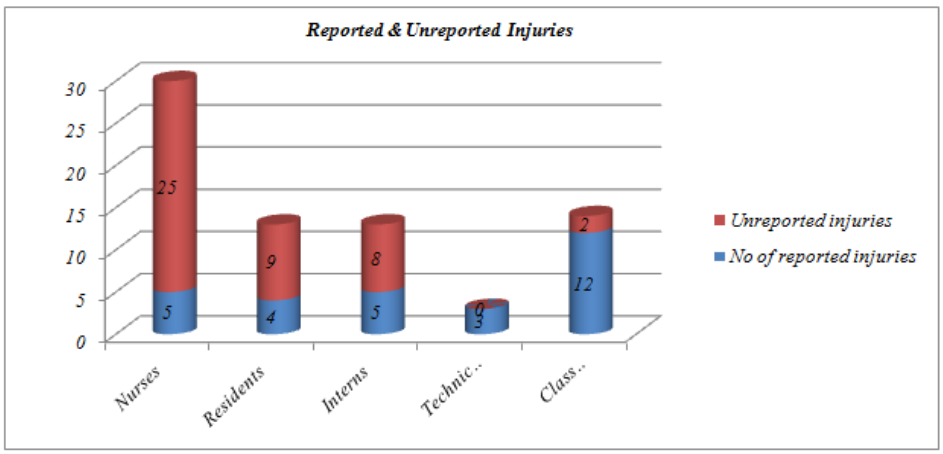

Fig 2: Reported & Unreported Injuries

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