

NEEDLE STICK INJURIES: A STUDY FROM PRIVATE TERTIARY CARE CENTRE OF MARATHWADA REGION IN MAHARASHTRA

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ABSTRACT:- INTRODUCTION: Needle stick injuries are one of the greatest risks faced by the front line healthcare workers in the light of HIV/ AIDS, Hepatitis B and C. Yet, these exposures have often been considered as part of the job and neglected. **OBJECTIVE:** 1. To study prevalence of needle stick injury among health care workers of a private tertiary care hospital. 2. To assess the knowledge, attitude and practices of needle stick injury among them.

METHODOLOGY: Hospital based cross sectional study was carried out with preformed pretested questionnaire on all (42) health care workers of a private tertiary care hospital. **RESULTS:** Results showed that out of 42 subjects 35(83.3%) had a history of needle-stick injury but only 11% reported the injuries to the hospital authority and received PEP prophylaxis against HIV. Only 11 HCW's (26.2%) were aware about where to report the NSI incident. 4.8% and 95.3% of health care workers, respectively, were unaware of the fact that hepatitis B and hepatitis C can be transmitted by needle-stick injuries. Only 21.5% were in the habit of using gloves for phlebotomy procedures all the time. 40.5% were of the impression that needle should not be recapped after use but 21.5% of them didn't implement it. Only 38.1% were aware of Universal Precaution Guidelines. 18 subjects (42.9%) had been vaccinated against hepatitis B; while 26 subjects (47.6%) were not vaccinated against hepatitis B. 23 subjects (54.8%) knowing their HBsAg status. Majority of HCW (95.3%) were demanding training and awareness of NSI.

CONCLUSION: The study revealed that knowledge among health care workers about the risk associated with needle-stick injuries and use of preventive measures was inadequate. Standard operating procedure (SOP) should be formulated and followed by them.

KEY WORDS: Needle stick injury (NSI), Post Exposure prophylaxis (PEP), health care worker (HCW),

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INTRODUCTION: Everyday healthcare workers are exposed to dangerous and deadly blood-borne pathogens and are at risk of occupational acquisitions of blood-borne illnesses. Occupational exposure to blood-borne pathogens among healthcare workers include percutaneous exposure to needles and other sharp objects, and mucocutaneous exposure that is contact with intact or non intact skin with mucous membranes.

In the healthcare settings, percutaneous injuries are the most common form of occupational exposures and most likely to result in infection. The level of risk depends on the number of patients with that infection in the health care facility and the precautions the health care workers observe while dealing these patients.

A needle stick injury is a percutaneous piercing wound typically set by a needle point, but possibly also by other sharp instruments or objects. Commonly encountered by people handling needles in the medical setting, such injuries are occupational hazards in the medical community^[1].

WHO'S Environmental Burden of Disease Series, No. 11 published in 2005^[2] states that Among the 35 million health workers worldwide, about 3 million experience percutaneous exposures to blood borne pathogens each year; two million of those to HBV, 0.9 million to HCV and 170 000 to HIV. These injuries may result in 15 000 HCV, 70 000 HBV and 1 000 HIV infections. More than 90% of these infections occur in developing countries.

It further notes that 37.6% of Hepatitis B, 39% of Hepatitis C and 4.4% of HIV/AIDS in Health-Care Workers around the world are due to needle stick injuries and these rates for south east Asia region are 42%, 52% and 7.9% respectively, For India, a rapid assessment survey states that 2.27 Sharps injuries per health-care worker per year.^[2]

U.S. EPINet Sharps Injury Data Report for 2011 says that among 32 hospitals that contributed data 708 total injuries had occurred; Percutaneous injury (PI) rate for all hospitals was 19.46 per 100 occupied beds; most of the incidents occurred at operation theatre 33.5% and patient ward 33.2%; majority of injuries were caused by disposable syringes (37.4%) and by suturing needle(18.6%); most of the injuries occurred during use (40.7%) of item and after use but before disposal (15.5%)^[3]

Most of the studies done in India are either done in government hospital or teaching institutions and in urban settings; this study was undertaken to estimate needle stick injuries in a private tertiary care hospital and to assess knowledge, attitude and practice related to needle stick injuries among them.

MATERIAL AND METHODS: A hospital based cross sectional study carried out at a Nanded city, which is second largest city in Marathwada region of Maharashtra. As city is strategically located at Maharashtra-Andhra Pradesh and Karnataka border; flow of patients seeking care is much more and to deliver health care many private tertiary care hospital erupted in this city. We have randomly selected one private tertiary care centre and after due permission from management of the hospital, study was carried out. This tertiary care hospital is 70 bedded hospital having specialties in general medicine, orthopedics, obstetrics and gynecology department. There were 42 health care workers (HCWs), working in the hospital. All of the HCWs were fully explained regarding pattern and purpose of the study and agreed to participate in the study with duly written informed consent. A predesigned and pretested semi closed ended questionnaire was administered

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to collect the data about their demographic information, needle stick injury experience and knowledge, attitude and practice about needle stick injuries. Data was entered in Microsoft's office excel sheet and analyzed.

Case definition of NSI in the present study included injuries caused by sharps such as hypodermic needles, blood collection needles, I.V. cannula, suture needles, winged needle I.V. sets and needles used to connect parts of the I.V. delivery systems.

RESULT: Demographic profile of health care worker shows that out of 42 subjects enrolled in study 21 were male HCW and 21 were female health care workers; in which 6(14.2%) were consultants, 8(19%) Residential Medical Officers while others include 14(33.4%) nursing staff and 14(33.4%) technical staff.

Majority of HCWs 22 (52.38%) belongs to 18 to 25 years age group, 17 (40.47%) healthcare workers were in 26 to 35 age groups and only 3(7.15%) were in 36 to 45 years age group.

In this tertiary care center 10(23.8%) HCWs were having work experience of less than one year, 20(47.6%) HCWs have work experience between 1-5 years and 12(28.6%) HCWs have work experience of more than 5 years.

Out of 42 HCW's, 38(90.4%) HCWs were aware about the fact that HIV/AIDS and 40 (95.2%) hepatitis B were transmitted by needle stick injury (NSI). Only 2 (4.7%) healthcare workers know that diseases like Hepatitis C and others were transmitted by NSI.

Many of the healthcare workers 31 (73.8%) do not know where to report the NSI incident in Nanded district while 11 (26.2%) HCWs were aware about the NSI reporting center.

Only 24 (57.1%) HCWs were fully aware of the term post exposure prophylaxis (PEP) and 11 (26.1%) HCWs not fully aware of PEP while 7(16.6%) were totally blank about PEP term.

Out of 35 healthcare workers who were aware about PEP only 7(20%) know basic regime of PEP received for HIV and 28 (80%) HCWs unaware of basic regime for HIV post exposure prophylaxis.

Out of 42 HCWs, 16(38.1%) were completely aware of Universal Precaution Guidelines (UPG), 16 (38.1%) were partially aware of UPG and 10 (23.8%) HCWs were totally unaware about UPG recommended by CDC authority.

Most of the healthcare workers i.e. 35 (83.4%) had experienced needle stick injury in the past while only 7 (16.6%) were not having experience of NSI.

Job category wise consultants doctors has incidence of NSI i.e. 4 (66.66%) while RMO's having 7(87.5%) and nursing staff 11(78.57%) and other technical staff 13(92.85%).

Gender wise risk of NSI is high among males 19 (90.47%) compared to females in which it is 16(76.19%).

Out of 35 healthcare workers who had past experience of NSI, 25(71.42%) HCWs experienced 1-2 times, 5 (14.29%) were 3-4 times and 5 (14.29%) were more than 5 times NSI per year.

Out of 35 healthcare workers who had past experience of NSI, only 4(11%) HCWs reported NSI incident to reporting authority and received PEP for HIV prophylaxis

Almost 31(89%) HCWs had not reported it and not received any PEP for HIV and HBV.

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Out of 42 HCWs, 18(42.9%) have taken complete course of HBV vaccination, 4(9.5%) HCWs had not completed three doses schedule of HBV vaccine and 20 (47.6%) HCWs were not received HBV vaccine at all.

On history, only 1(2.4%) healthcare worker was found to be HBsAg positive and 18 (42.8%) HCWs were negative for HBsAg while 23 (54.8%) HCWs had not tested there HBsAg status.

Majority of HCWs i.e.25 (59.5%) were still in favor and only 8(19%) were against of recapping the needle after phlebotomy while 9 (21.5%) HCWs were still practicing of recapping of needle after phlebotomy even after they were aware about not to do so.

Out of 42 HCWs only 9(21.5%) always wears gloves while phlebotomy and other procedures, while majority of HCWs 27(64.3%) not practice it always and only 6 (14.2%) HCWs don't practice wearing of gloves at all.

Most of the healthcare workers 40 (95.3%) was in demand for increasing awareness of Needle stick injury (NSI) and only 2(4.7%) no more awareness regarding NSI.

DISCUSSION: Avoiding occupational blood exposures is the primary way to prevent transmission of hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) in healthcare settings. [5]

However, hepatitis B immunization, universal precautions and postexposure management are integral components of a complete program to prevent infection following bloodborne pathogen exposure and are important elements of workplace safety. [6]

In this study total 42 healthcare workers were participated including consultants 6 (14.2%), RMO's 8(19%) and nursing & technical staff 28(66.6%), Many similar studies has been carried out such as Gurubhacharya et al^[7], Wig et al^[8] and Chogle et al^[9] on the needle sticks injuries causing as a part of occupational hazard of HCW including doctors, interns, technicians and nurses.

In this study, majority of HCW's were working in the healthcare more than three years 32(76.2%) and 10 health care workers were working experience of less than one year while Salekar et al^[10] did not included any HCW having working experience less than one year. Factors such as Working experience, adequate training, type of procedure, action taken following injury are helpful for HCW in preventing transmission of infection through NSI. In this study, the 42 HCWs who participated 90.4% were aware of the fact that HIV/AIDS can be transmitted by needle-stick injury, but 4.8% for HBV and 95.3%for HCV not aware of transmission through NSI, where as in Gurubhacharya et al^[7] study it is 4% and 61% for HBV and HCV transmission.

A data combined from more than 20 prospective studies worldwide of health care workers exposed to HIV-infected blood through percutaneous injury revealed an average transmission rate of 0.3% per injury.^[11] Majority of HCW in this study 38(90.4%) aware that HIV/AIDS is transmitted by NSI but 4 (9.6%) HCW's were still not aware of this fact.

The present study shows that 35(83.4%) HCWs have had occupational exposure of NSI. This figure is matching with 79.4% stated in the study by Wig et al^[8] ,80% of HCW having NSI in Murlidhar et al^[4] and much higher than the 18.09% in the study of Baheti et al^[12] and 34% documented by Scoular et al^[13] .

Stein et al^[14] stated that 37% of the respondents (doctors and nurses) had suffered a needle-stick injury with a used needle, with doctors more likely to be injured than nurses.

Our study also showing similar results that incidence of NSI is found to be highest with RMO's 87.5%(7) while it is lower in nursing & technical staff i.e.85.71%(24) and lowest in

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consultants 66.66%(4) in contrast to this *Baheti et al*^[12] study showing higher rate in nurses(19.4%) than doctors(18%). Several other studies had also shown high occurrence of NSI among nurses. ^[15-16] Apart from nurses the NSIs were more among nursing students, interns and resident doctors.

As far as gender distribution our study shows prevalence of NSI is more in males 90.47% (19) than females 76.19% (16) similar to *Salelkar et al* ^[10] showing NSI in males 36.2% and in females 34.2%. Though the working environment and opportunity are equal to both the genders, this gender variation is unexplained and requires more studies.

In Gurubhacharya et al ^[7] study, Of the 52(74%) health care workers with a history of needle stick injuries, 41(79%) never reported the incident to hospital authority to get post-exposure treatment because they were not aware of the importance of post-exposure prophylaxis. Similarly in our study, large amount of HCW's (89%) not reported NSI incident to reporting authority where as in *Makary et al* ^[17] study this percentage of not reporting of NSI is less i.e.50%. The reason behind not reporting NSI to reporting center is lack of time for consultant doctors and lack of awareness in nursing staff as almost 42.8% HCW in this study were not fully aware of post exposure prophylaxis, hence educating HCW regarding NSI may be useful for their better healthy working pattern. This lack of awareness of PEP is not only seen in our study but also proved by other studies done across many corners of the world.

The fact that PEP should be started as soon as possible (within 2 hours after exposure as per hospital guidelines) was known by 74.01% doctors, as against 36% and 64% reported by *Wig et al* ^[8] and *Chogle et al* ^[9], In our study maximum HCW's 78.57% were in favor of starting PEP within 24 hrs of exposure, 11.9 say in 48 hrs and 9.8% told in 72 hrs. Similarly, *Siwach et al* ^[18] surveyed 123 residents of various surgical specialties at the Post Graduate Institute of Medical Education and Research, Chandigarh and found that 70% of the respondents were not aware of the availability of post-exposure prophylaxis, and most of them were not sure of the timing of its administration. This suggests that inspite of clear guidelines HCW's are ignoring to report the incident of NSI and receiving PEP.

Knowledge about the basic regimens of PEP was only 20% in our study where as *Baheti et al*^[12] shows it is 35.19%. This is more than the 8% reported by *Chen et al*^[19] similarly *Chogle et al*^[9] documented that 42% were aware of the use of zidovudine but none were aware of the second (basic) or third (expanded) drugs used for PEP. *Scoular et al* too reported that only 13% respondents knew that a regimen consisting of more than one drug is now recommended. strategies for the betterment in knowledge about basic regime of PEP for HIV in HCW's should include better sensitization of availability of institutional guidelines, prior experience of self/ peers as well as training on the subject of PEP.

Our study indicates that 73.8% HCWs are aware of whom to contact after a needle-stick injury to obtain PEP. In the study conducted by *Chogle et al*^[9] less than 33% ,*Baheti et al*^[12] 55.95% were aware of this fact, while in that carried out by *Duff et al*^[20] 7.6% knew about whom to contact . The reasons for better knowledge base in our study population might include availability of institutional guidelines, rising incidence of HIV, prior experience. Availability of institutional guidelines and wide publicity of PEP available in the institution premises is a must for reducing the time interval between the occupational exposure and the first dose taken.

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Our study shows that only 42.9% HCW's were vaccinated against HBV. This is comparably less than the 87.7% reported by Wig *et al*^[8] in their study and 87.17% in Baheti *et al*^[12] study probably due to large number of untrained staff and less awareness regarding importance of HBV vaccine.. The policies should be adapted by the hospital to educate and vaccinate the HCWs regarding HBV vaccination which is more fatal than HIV as for as transmission is concerned. In our study it is found that the healthcare workers were not even keen to test their HBsAg status neither hospital administration as a routine checkup hence almost 54.8% HCW's working in this hospital remains untested for HBsAg status. The available IEC material in this hospital does not adequately address the issue of PEP knowledge base of HCWs regarding modes of transmission and PEP for Hepatitis B and C viruses.

The circumstances leading to needle stick injury depends upon the type and design of device and certain work practices. This survey revealed that only 21.5% HCW's always use gloves while phlebotomy and related procedure where as majority 64.3% were not using regularly and 14.2 % were not using it at all. These findings matches with Gurubhacharya *et al*^[7] study in which 23% using always and 61% using sometimes. Salekar *et al*^[10] also reported in his study that 58% HCWs wearing gloves at the time of injury. Gloves usage was lowest in nurses (46.3%) and highest amongst consultants (100%) which is similar to reports of our study in which doctors uses gloves highest (35.7%) than nursing staff(14%)but the prevalence of using gloves is remarkably less than Salekar *et al*^[10] study group indicating less awareness of NSI and universal precaution guidelines (UPG).

It is documented that 10%-25% injuries occurred while recapping a used needles.^[21] The recapping of needles has been prohibited under the Occupational Safety and Health Administration (OSHA) blood borne pathogen standard.^[22] In our study 59.5% were of the impression that needle should be recapped after use, while these figures less than 79% in Gurubhacharya *et al*^[7] study. In 1985, in order to increase awareness among health care workers of the dangers of sharp injuries and other types of disease transmission, the Centre for Disease Control (CDC) and the Occupational Safety and Health Administration (OSHA) in the United States introduced the "Universal Precaution Guidelines", which have been the worldwide standard in both hospital and community care settings^[23]. In the present survey, only 16 (38.1%) HCW's less than Gurubhacharya *et al*^[7] study 46 (66%) workers were aware of the Universal Precaution Guidelines.

All hospitals should establish a protocol for reporting, counseling and treating of needles tick injuries. Our survey suggests that most respondents were ignorant of its existence, and that knowledge of the protocol needs to be disseminated more widely and effectively. After gauging the level of ignorance in this survey, a copy of the CDC guidelines on post-exposure prophylaxis should be distributed to all health care personnel in local language. In this study 40 (95.3%) HCW's were demanding detail awareness programme in the hospital as an educational tool for the betterment of HCW. Healthcare employers should establish exposure control protocols for reporting, registration, evaluation, counseling, treatment and follow up of occupational exposure to pathogens including HIV and HBV. Hospital infection control committees must formulate, implement and monitor recommendations, and impart frequent training and education to HCW.

This survey revealed that knowledge of health care workers about the risk associated with needle-stick injuries and use of preventive measures was inadequate. Health care workers should

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be made aware of hazards, preventive measures and post-exposure prophylaxis to needle-stick injuries.

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TABLE NO.1 Demographic profile of health care workers:

Variables	Demographic Characteristics	Number of HCWs	Percentage (%)
1. Age	18 - 25 yrs	22	52.38%
	26 - 35 yrs	17	40.47%
	>35 yrs	03	07.15%
2. Sex	Male	21	50%
	Female	21	50%
3. Job work	Consultant	6	14.2%
	RMO	8	19.0%
	Nursing staff	14	33.4%
	Technical staff	14	33.4%
4. Work experience	≤ 1 yrs	10	23.8%
	1 - 3 yrs	08	19.0%
	3 - 5 yrs	12	28.6%
	≥ 5 yrs	12	28.6%

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TABLE NO.2: Characteristics of needle stick injuries (NSI) in health care workers.

Needle stick injury experience		Number of HCWs	Percentage (%)
	Yes	35	83.4%
	No	7	16.6%
Gender wise NSI	Male	19	90.5%
	Female	16	76.2%
	Consultants	4	66.6%
	RMOs	7	87.5%
	Nursing & technical staff	24	85.7%
NSI /person/ Year	1-2 times	25	71.42%
	3-4 times	5	14.29%
	≥ 5 times	5	14.29%
Reporting of NSI	Yes	4	20.0%
	No	31	80.0%
Treatment after NSI	PEP received	4	11.0%
	PEP not received	27	78.0%
	Symptomatic	4	11.0%

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TABLE NO.3: Knowledge, attitude and practices regarding needle stick injuries and variables.

1. Diseases transmitted by needle stick injury		Number of HCWs	Percentage (%)
	HIV/AIDS	38	90.4%
	HBV	40	95.2%
	HCV & others	2	04.7%
2. Awareness of Universal precaution guidelines	Complete	16	38.1%
	Partial	16	38.1%
	Unaware	10	23.8%
3. Use of Gloves	Always	9	21.5%
	Sometimes	27	64.3%
	Not at all	6	14.2%
4. Needle recapping	Against	8	19.0%
	In favour	25	59.5%
	Against but still do	9	21.5%
5. NSI reporting centre	Know	11	26.2%
	Don't know	31	73.8%
6. PEP	Fully aware	24	57.2%
	Partially aware	11	26.2%
	Unaware	7	16.6%
7. Basic regimen of PEP for HIV	Know	7	20.0%
	Don't know	28	80.0%
8. HBV vaccination status	Complete	18	42.9%
	Incomplete	4	9.5%
	Not taken	20	47.6%
9. HBs Ag status	Positive	1	2.4%
	Negative	18	42.8%
	Don't know	23	54.8%
10. NSI awareness	Require	40	95.3%
	Doesn't require	2	4.7%