



## Needle stick injuries among health care workers of a tertiary healthcare institution of West Bengal

Chinmaya Dash<sup>1</sup>, Sulekha Sinha<sup>2</sup>, Sudipta Bose<sup>3</sup>

### Abstract:

**Introduction:** Needle stick injuries among health care workers (HCWs) have potential hazards which include risk of transmission of blood borne pathogens such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus, (HBV) and Hepatitis C Virus (HCV). Hence, the study was done to analyze the incidence of Needle Stick Injuries (NSI) amongst them which has been reported in a tertiary health care centre.

**Materials and methods:** This retrospective study done at IQ City Medical College and Narayana Multi-speciality Hospital, Durgapur was to analyze all NSI incidents of HCWs that were reported to the infection control team from March 2014 to October 2016. Staff were divided into subgroups of Nurses, Doctors, Medical Laboratory Technicians (MLTs) and housekeeping workers. The incidence was recorded in different subgroups.

**Results:** Total number of needle stick injuries found was 41(5.42%) out of 757 participants. Females had higher incidence (73.17%) than males (26.83%). It was highest among age group 21-30 yrs (68.29%) followed by <20 yrs (19.51%) and >30 yrs (12.19%). Among subgroups divided, it was highest among nurses (58.54%) followed by housekeeping staff, MLTs and doctors. At working station levels, NSI was highest in wards (46.34%) followed by ICU, OT, emergency department, laboratory and others.

**Conclusions:** The study of the burden of needle stick injuries and transmission of blood borne diseases among health care workers may be helpful in targeting improvement at the level of its morbidity.

**Key words:** Needle stick injury, PEP, HIV

### Introduction:

According to the World Health Organization (WHO), 35.7 million health care workers (HCWs) in the world are exposed to the risk of Needle stick injury (NSIs).<sup>1</sup> Needle stick injury is defined as injury caused by objects such as hypodermic needles, blood collection needles, intravenous (IV) stylets and needles used to connect parts of IV delivery systems. The potential effects related to these injuries include risk of transmission of blood borne pathogens such as human immunodeficiency virus (HIV), Hepatitis B (HBV) and Hepatitis C virus (HCV).<sup>1,2</sup>

The risk of pathogen transmission from infected persons to non-immune persons

with a sharp instrument has been estimated to be between (6- 30) % for HBV, between (5-10) % for HCV, and 0.3% for HIV. In a WHO study, the annual global estimated proportion of HCWs exposed to these infections were 0.5% for HIV, 2.6% for HBV and 5.95% for HCV.<sup>1</sup>

Besides infections, the long term outcome of health care workers who sustained needle stick injury includes substantial psychiatric morbidity such as depression, post-traumatic stress disorder (PTSD) and adjustment disorder (AD). The attendant consequences to these effects include missed work days which directly affect the health care services and resources.<sup>3,4</sup>

Furthermore, despite the guidelines of the infection control team, compliance as regards the application of universal

precautions is rather low. Hence, the study was to analyze the incidents of NSIs among HCWs as a result of occupational hazards which were reported in a tertiary health care centre.

### Materials and Methods:

This retrospective study was to analyze all NSIs incidents of HCWs in IQ City Medical College & Narayana Multi-speciality Hospital, Durgapur that were reported to the infection control team from March 2014 to October 2016. Ethical approval was taken from Institutional Ethics Committee (IEC).

In all cases of NSIs, immediate wound management was done by washing the wound and surrounding skin with water and soap and referred to the general physician. Then as soon as possible, eligibility for PEP was established (ideally within 2hrs but certainly by 72 hrs) by assessing the exposed individuals, risk of transmission type and exposure of the source. After determining eligibility, a consent was obtained for PEP.

After establishing PEP, an epidemiologic report form for the HCW was filled out that includes personal data, conditions of the injury and direct measures that were followed after the incident. Staff were divided into subgroups of nurses, doctors, medical laboratory technicians (MLTs) and housekeeping workers. Counseling was given to both HCWs and patients (if known), and after receiving their consent, blood samples were drawn for the identification of their immune status to HBV (HBsAg, anti-HBs and anti-HBc), HCV (anti-HCV) and HIV (anti-HTV).

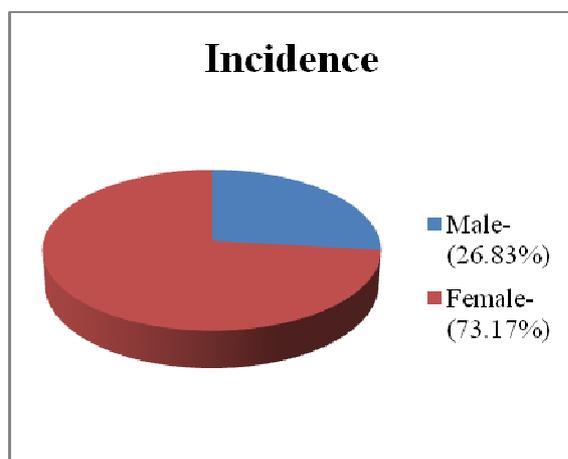
These serological tests were performed as soon as possible, the results being available within 2 hours. For serology markers of HBV, HBsAg and anti-HBs (HEPACARD by Diagnostic Enterprises<sup>®</sup>) was taken into consideration. Putative core (Structural), Protease/Helicase NS3 (Non-Structural), NS4 (Non-Structural) and Replicase NS5 (Non-Structural) antibodies

were used for detection of HCV (HCV Tri-Dot manufactured by Diagnostic Enterprises<sup>®</sup>). Antibodies to the gp41, C terminal of gp120 and gp36 representing the immunodominant region of HIV 1 and HIV 2 were tested (HIV Tri-Dot manufactured by Diagnostic Enterprises<sup>®</sup>). EIA positive results were confirmed by immunoblotting assays. Results were analysed according to the NACO guidelines. For symptomatic persons, the sample should be reactive with two different kits. For asymptomatic persons, the sample should be reactive with three different kits. The blood sample collected at one time is tested with the first kit. If it is reactive, it is then retested sequentially with the second and third kits. The above mentioned serological tests for person with NSI and source were done. Wherever PEP is indicated and source is naive or unknown: recommended three drug regimen (Tenofovir 300mg+ Lamivudine 300mg + Efavirenz 600 mg) once daily for 28 days. The first dose of PEP regular was administered as soon as possible (preferably within 2hrs). In case of exposure where source is on ART, an expert opinion was obtained from ART plus centre. To check the seroconversion, follow up serological tests of the exposed HCW was done again at 3<sup>rd</sup> and 6<sup>th</sup> month after initiation of PEP<sup>5</sup>.

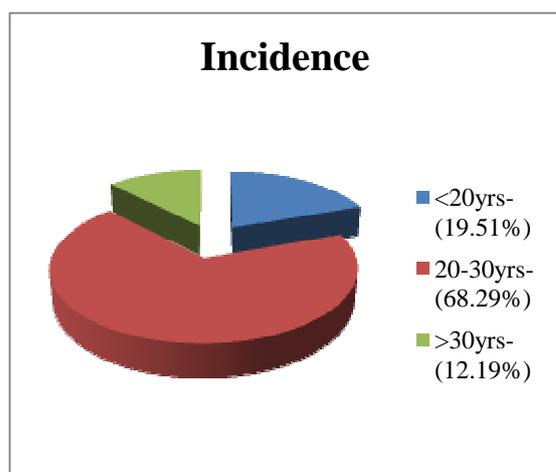
### Results:

This study was done among 757 HCWs including nursing staff (n=350), house keeping staffs (n=120), doctors (n=217) and MLTs (n=70). Total number of NSIs was found to be 41(5.42%). The distribution of needle stick injury among different gender, different age group, different job responsibility and at different working station are displayed in **Figure I, II, III** and **IV** respectively. The serological tests were repeated after 3 and 6 months for all the exposed health care workers. There were no cases of seroconversion as a result of NSI reported at our centre.

**Figure I: Incidence of needle stick injury among male and female health care workers**



**Figure II: Incidence of needle stick injury in different age groups among health care workers**

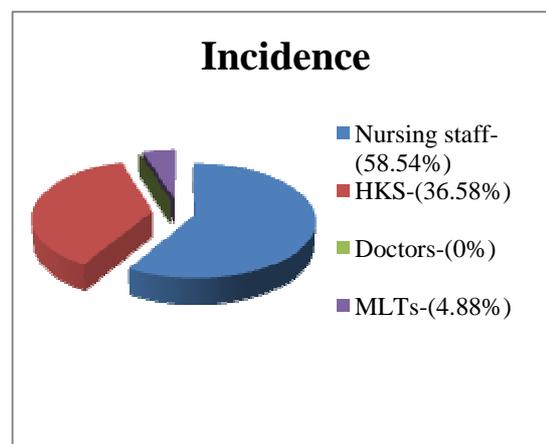


**Discussion:**

In current study, incidence of needle stick injury was found to be 5.42%. Females had higher incidence (73.17%) than males (26.83%). In age wise distribution, it was highest among 21-30 yrs (68.29%) followed by <20 yrs (19.51%) and >30 yrs (12.19%). Among subgroups divided, it was highest among nurses (58.54%) followed by housekeeping staffs (36.58%), MLTs (4.88%) and doctors. In view of At levels of working stations, NSI was

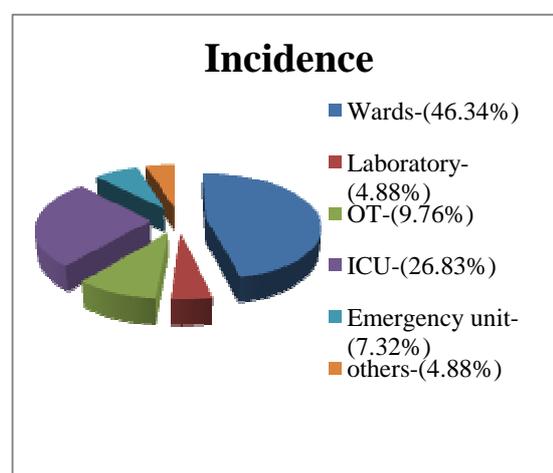
highest in wards (46.34%) followed by ICU (26.83%), OT (9.76%), emergency department (7.32%), laboratory (4.88%) and others (4.88%).

**Figure III: Incidence of needle stick injury among different groups of health care workers**



HKS = House Keeping Staffs,  
MLTs = Medical Laboratory Technicians

**Figure IV: Incidence of needle stick injury at different working stations**



In the study done by S Pournaras et al <sup>6</sup> at a Greek hospital, Greece, incidence of sharp injury among HCWs was found 2.4% per 100 HCWs per year. In contrast, a study done by Sumathi et al <sup>7</sup> at Safdarjung Hospital, Delhi, a busy tertiary care centre, had a very high incidence of NSIs (80.1%). Singh B et al <sup>8</sup> also reported

prevalence of NSIs at a tertiary care centre, Nepal as 70.3%. These studies by Sumathi et al<sup>7</sup> and Singh B et al<sup>8</sup> were history and questionnaire based rather than documented reporting to the hospital. This implies that there may be lack of practice of reporting of NSIs to the infection control committee in spite of proper training.

The incidence was found highest for nurses (52.8% of total incidence) in study by S Pournaras et al<sup>6</sup> (similar to our study) followed by housekeeping staff and Medical Laboratory technicians. Sumathi et al<sup>7</sup> also reported highest NSI was among nurses followed by junior residents, nursing students, MLTs, interns, senior residents and undergraduate students. The high incidences among nurses may be attributed to phlebotomy practices done for laboratory investigations.

In our study, we found no doctor and nursing staff (age > 30yrs) having NSI during this period. In the study of Bhardwaj et al,<sup>9</sup> nearly 15% of respondents did not take any post-exposure measures due to fear of blame, perceived low risk of infection and exposure. There was lack of knowledge as well of the reporting system.<sup>10</sup> This may be due to lack of clear guidelines on the reporting process. Bernard et al<sup>11</sup> stated that it was because of their concerns of negative effects on their evaluation, they were to interrupt a case in the pursuit of reporting the exposure.

In the study done by S Pournaras et al,<sup>6</sup> female incidence was higher than that among males (similar finding in the current study). Of all ages, sharp injuries were highest in 21-30yrs (similar in our study). Among working places, it was highest in wards (48.9%, similar to current study) followed by OT, ICU, laboratory and outpatient department. In wards, blood withdrawal for laboratory investigations are done by nurses. The highest NSI was found among nurses of all HCWs which may be the reason for highest NSIs in wards as well related to phlebotomy

practices for indoor patients.

In view of clinical activity, Sumathi et al<sup>7</sup> reported highest NSIs during blood withdrawal (55%) followed by suturing and vaccination.

### Conclusion:

The study of the burden of needle stick injury and transmission of blood borne diseases among health care workers may be helpful in targeting improvement at the level of its morbidity. To decrease prevalence of needle stick injury and associated co-morbidity, serial education and training are required (to be organised by infection control committee).

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#### Authors details:

1. **Corresponding author:** Associate Professor, Department of Microbiology, IQ City Medical College, Sovapur, Bijra Road, Jemua, Durgapur-713 216, West Bengal, India; Email: [drchinmaya@gmail.com](mailto:drchinmaya@gmail.com)
2. Assistant Professor, Department of Biochemistry, IQ City Medical College, Sovapur, Bijra Road, Jemua, Durgapur-713 216
3. Professor, Department of OBG, Medical Superintendent and Facility Director, IQ City Medical College, Sovapur, Bijra Road, Jemua, Durgapur-713 216