

## Original article

**NEEDLE STICK AND SHARP INSTRUMENTS INJURIES AMONG HEALTH CARE PROVIDERS AT CARDIOLOGY INSTITUTE, AHMEDABAD**

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**ABSTRACT**

**Background:** Needle stick and sharp instruments injury (NSI) is one of the major occupational hazards to health care workers (HCW) and distributed to worldwide at every level of health care setting. **Objective:** To estimate true incidence, to analyze NSI of self reported cases and to know outcome of post exposure prophylaxis (PEP) for Human Immunodeficiency Virus (HIV) as well as Hepatitis B virus infection among NSI cases. **Materials and Methods:** Study Design: analysis of documents of NSI for the period from December 2008 to November 2009 and rapid cross sectional survey among all nurses for history of NSI in month of June 2010. Setting: U N Mehta institute of cardiology and research centre, Ahmedabad. Participants: 277 nurses, 150 doctors and 33 physiotherapists. **Results:** The reported incidence of NSI among nurses, doctors and physiotherapists was 0.029, 0.0066 and 0.03 per person per year respectively. 60% of injuries associated with hollow bore needles. 10% injuries were due to recapping of used syringe needle. All 100% reported injuries were self inflicted. 90% HCW immediately washed their hand with soap and water after injury. 90% of the reported injuries were associated with contaminated instruments. In 40% injuries, sources were HBsAg positive and in 20% injuries, sources were HIV positive. All at risk HCW on PEP were found sero-negative for HBsAg and HIV at 0, 1 and 6 months.

**Key words:** Needle Stick Injury, Health Care Worker, Post Exposure Prophylaxis

**INTRODUCTION:**

Needle stick injuries present the single greatest occupational hazard to medical personnel.<sup>1</sup> While as many as twenty blood borne pathogens can be transmitted through accidental needle sticks,<sup>2</sup> the potentially life threatening are Human Immunodeficiency Virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV).<sup>3</sup> The average risk of transmission of HIV to a health care worker after percutaneous exposure of HIV-infected blood has been estimated as 3 to 4 in 1000,<sup>4,5,6</sup> while the chance of contracting HBV after an accidental HBV infected needle stick is one in 20.<sup>3</sup> The chances of contracting HCV after an HCV-contaminated accidental needle stick average 3.5 in 100.<sup>7</sup> According to a WHO study, the annual estimated proportions of health-care workers (HCW) exposed to blood-borne pathogens globally were 2.6% for HCV, 5.9% for HBV, and 0.5% for HIV, corresponding to about 16,000 HCV infections and 66,000 HBV infections in HCW worldwide.<sup>8</sup> Because needle stick injuries are often under reported, health care institutions should not interpret low reporting rate as low

injury rate. Injuries recorded through standard occupational reporting systems may underestimate the true injury rate, as much as 10-fold.<sup>9</sup>

The objectives of this study were, to determine the incidence of self-reported cases of needle stick and sharp instruments (NSI), to know time gap between reporting and injuries, immediately what preventing action taken, the outcome of post exposure prophylaxis (PEP) for infectious injuries contaminated with HIV, HBV or HCV and to estimate under reporting of NSI in health care providers (HCW).

**MATERIALS AND METHODS**

The study was carried out at U N Mehta Institute of Cardiology and Research Centre, Ahmedabad. The institute carries out about 1500 open heart, 500 close heart and 6000 cardiac catheterization laboratory procedures annually. At risk study population were 150 physicians, 33 physiotherapist and 277 nursing staff. Self reported NSI cases were recorded as a part of the ongoing surveillance program of the infection control department of the institute. HCW, who had

reported with infected NSI, a baseline status for HIV/ HBsAg antibodies was carried out accordingly to status of source of infection. HCW with infected NSI were sent to medicine department for PEP.<sup>10, 11</sup> All HCW on PEP, were tested relevantly for HIV, HBsAg and HCV antibodies at 0, 1 and 6 months after reported injury. These above mentioned practices were the standard protocol of infection control department. A retrospective review of NSI cases records between December 2008 and November 2009 was conducted. To estimate true incidence of NSI, a rapid cross sectional survey was carried out among all nurses for history of NSI in month of June 2010.

## RESULTS

During December 2008 to November 2009, 10 NSI, 8 among nurses (80%), one among doctors (10%) and one among physiotherapists (10%) were self reported to the infection control department with incidence rate of 0.029, 0.0066 and 0.03 per person per year respectively.

However, subsequent rapid cross sectional survey among all nurses (n=277) of the same institute found that two nurses have a history of uncontaminated NSI during month of June 2010 with nil reporting to infection control department. It would give an estimate of 24 NSI in nurses per year, three times more than eight self reported cases in nurses per year. Thus, an estimated incidence of NSI would be 0.079 per nurse per year.

There were three (30%) injury cases due to syringe needle, three (30%) injury cases due to intravenous canula/winged butterfly type intravenous needle, and three (30%) injury cases due to surgical blades and one (10%) injury was due to suturing needle. One (10%) injury was associated with recapping of used syringe needle. All 10(100%) injuries were self inflicted. Nine (90%) HCW immediately washed their hand with soap and water after injury. Seven (70%), two (20%) and one (10%) of the reported injuries occurred during, after and before clinical procedure. Thus nine (90%) of the reported injuries were more or less contaminated with patient's blood. Out of these injuries, four (40%) were from HBsAg positive patient, two (20%) were from HIV positive patient. In one (10%) contaminated injury, the source of infection was unknown whereas one (10%) injury was with sterile syringe needle. Four HCW, who had a risk of developing HBV infection and two HCW, who had a risk of developing HIV infection were treated with PEP. All HCW on PEP were followed up and found sero-negative for HBsAg and HIV antibodies at 0, 1 and 6 months.

The median time between injury incident and reporting to infection control department was 10 minutes. Whereas mean time between injury incident and reporting to infection control department was 10.37 hours with a range of 5 minutes to 54 hour (s.d.=21.46 hours).

## DISCUSSION

In present study, the incidences of NSI among nurses and doctors were 0.029 per nurse per year and 0.0066 per doctor per year respectively. These finding were much lower than a study by Saulat Jahan, in which he found the incidence of NSI in nurses was 0.11 per nurse per year and in doctors was, 0.06 per doctor per year.<sup>12</sup> For these highly significant differences among nurses ( $p=0.0006$ ) and doctors ( $p=0.0146$ ), one explanation is that the later study was conducted in year 2002-2003 whereas present study was carried out in year 2008-2009 and more attention paid towards universal precaution in recent years. In our study, overall incidence of NSI among HCW was 2.17% per year comparable with study by Pournaras et al, who had found the incidence of NSI to be 2.4% per year.<sup>13</sup> NSI have historically been underreported. In present study, the estimated under reporting of NSI among nurses was about 64%. The magnitude of underreporting in published studies has ranged from 40% to as high as 90%.<sup>14,15,16,17,18,19,20,21</sup>

Nurses were most commonly injured among HCW, constituting 80% of all reported incidences. The predominance of injuries occurring in nursing staff is a common feature of studies around the world.<sup>22,23,24</sup> In two state funded teaching hospitals in USA, nurses accounted for 40% of victims of needle stick injuries.<sup>25</sup> In studies published by Ruben et al and Saulat Jahan, nurses were involved in about 66% of instances.<sup>26, 12</sup> This may be due to major population of nurses among HCW and nurses are involved comparatively more frequently in procedure that carries risk of injury i.e. administration of injections by nurses are outnumbered to surgical cut/suturing/injections by doctors. Besides this, most of times, patients handle by doctors are under anesthesia and doctors are often assisted by HCW where as patients handle by nurses are conscious/restless and usually unassisted, which is added risk for injury contribution.

In present study, 30% of injuries were because of syringe needle. A study conducted by Saulat Jahan found that the syringe needle was the most common pricking agent (55%).<sup>12</sup> Data from an EPINet study of 77 hospitals showed that by far the largest numbers of NSI are caused by disposable syringes.<sup>27</sup> Current study found that 60% were associated with hollow bore needles. Of

nearly 5000 percutaneous injuries reported by hospitals participating in National Surveillance System for Hospital Health Care Workers (NaSH) between June 1995 and July 1999, 62% were associated with hollow-bore needles.<sup>28</sup> Another study by Rahul Sharma et al found 70% injuries were from a hollow bore needle where as in the study of McGeer et al, the injuries with hollow-bore needles were as high as 98%.<sup>29,30</sup> Again, it may be due to injection procedures are far outnumbering to other invasive procedures.

In present study 10% of injuries were happened while recapping of used syringe needles. Referring some previous studies, injuries due to recapping of syringe needles were between 8% and 34%.<sup>12, 26, 29 31, 32, 33, 34, 35</sup> According to current guidelines, recapping itself or recapping of used syringe needles using both hands is a forbidden practice. HCW are trained for correct practices and are also aware the risk associated with recapping used syringe needles. Even though, injuries due to recapping used syringe needles were observed constantly and comparatively more throughout the worldwide. This behavior may be due to recapping practice in day to day activities such as recapping of writing pen, containers etc. Even a two year child has a tendency to cap and recap writing pen, containers etc. To lower incidence of such injuries, apart from implementation of universal precaution practices, the shape of syringe needle's cap should be modified in a way so that needle negotiate quite accurately while recapping. Instead of parallel opening, 'Trumpet' like opening of needle cap is one of solution and might lower the incidence of injuries.

In our study, 90% of the reported injuries were more or less contaminated with patient's blood whereas a study among nurses by Bilski B found that instruments contaminated with infectious material accounted for 73.8% of the injuries.<sup>36</sup> The higher proportion of contaminated injuries in current study may be due to more underreporting of clean injuries in self reported system. Whereas in a study of Biliski B, methodology was cross sectional questionnaire and it had a little scope for underreporting of uncontaminated injuries.

## CONCLUSION

Posters and banners on 'Universal Precaution Practices' and immediate injury notification should be displayed at proper places of hospital. There should be a system for active search of under reported injuries among HCW by cross sectional survey at regular interval. Ward in charge nurse or appropriate authority should ask and encourage to report injuries among HCW every third day so that effective PEP could be start within 72 hours. As nurses are most affected

victim of NSI, more emphasis should be given toward them for reducing NSI. There should be 'Trumpet' like open end of needle cap to lower NSI.

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