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A prospective look at the burden of sharps injuries and splashes among trauma health care workers in developing countries: True picture or tip of iceberg

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ABSTRACT

Objectives: Health care workers (HCWs) face constant risk of exposure to cuts and splashes as occupational hazard. Hence, a prospective observational study was conducted to observe the exposure of HCWs to various sharp injuries and splashes during health care and to work up a baseline injury rate among HCWs for future comparison in trauma care set ups.
Methods: A 2 year and 5 month study was conducted among the voluntarily reported exposed HCWs of the APEX trauma centre. Such reported cases were actively followed for 6 months after testing for viral markers and counselled. The outcomes of such exposed HCWs and rate of seroconversion was noted. To form a future reference point, the injury rate in trauma care HCWs based on certain defined parameters along with the rate of under reporting were also analysed in this study.
Results: In our study, doctors were found to have the highest exposure (129, 36.2%), followed by nurses (52, 14.6%) and hospital waste disposal staff (27, 7.6%). Of the source patients, a high number of them were HBV positive (11, 3.1%), followed by HIV positive patients (8, 2.2%). No seroconversion was seen in any of the exposed HCWs. Injuries by sharps (303, 85.1%) outnumber those due to splashes (53, 14.9%) which were much higher in those working in pressing situations. Underreporting was common, being maximally prevalent in hospital waste disposal staff (182, 51.1%).
Conclusions: High rates of exposure to sharp injuries and splashes among HCWs call for proper safety protocols. Proper methods to prevent it, encouraging voluntary reporting and an active surveillance team are the need of the hour.

Introduction

Health care workers (HCWs) are persistently at risk to cuts and pricks by sharps and splashes from infectious material during routine and emergency patient care. The main risks from such exposure are from blood borne viral infections like hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV). It has been estimated by the Centre for Disease Control and Prevention (CDC) that as many as 384,325 HCWs are exposed to blood and body fluids via sharp and mucocutaneous injuries per year in the United States alone [1] with an annual estimated 600,000 needle stick injuries (NSIs), of which half go unreported [2]. The risk of infections due to NSIs ranges from as high as 40% for HBV and 3–10% for HCV, to as low as 0.2–0.5% for HIV [3–7]. However, some studies based in similar regions have looked into the NSIs in terms of knowledge, attitude and practice [8] or prevention [9] but not the actual injury rates.

NSIs are wounds caused by needles that accidentally puncture the skin and are an occupational hazard for people working in such

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situations. It can occur at any time from their use to disassembly or disposal of needles [10]. Due to the increasing patient load, exposure to sharps and splashes by infectious body fluids are on a rise [11]. Voluntary reporting of such incidents are required so that timely testing and initiation of post-exposure prophylaxis can be done at the earliest.

A trauma centre represents a busy, surgical emergency health set-up, where the HCWs are constantly at risk of exposure to sharp injuries and body fluid splashes. Only few studies have been done to explore the epidemiology of such exposures in trauma-based set-ups which will help in determining the baseline injury rate of such exposures through surveillance intensification. Comparability of rates of injury and splashes to body fluid form key factors which will help in drawing conclusions from surveillance data on injuries and generalise findings from such studies. Moreover, this requires benchmarking to compare factors like injury experience and occupational risks in one institution, to a group of similar institutions or to compare HCWs safety policies [12]. With this view, this prospective study reports the results of an ongoing NSI surveillance work at a level-1 Trauma centre of India and the difference between the pre-intensification and post-intensification of the surveillance of the sharps and splashes exposure to HCWs at the trauma centre. Also, the study tried to work up a baseline sharps injury rates and underreporting rates in trauma care based on certain defined hospital based denominators for future references.

Material and methods

Jai Prakash Narayan Apex Trauma Center, AIIMS, New Delhi is a fully functional and well equipped Level I trauma care facility which has 176 functional beds out of a total of 186 beds with an average total admissions per year of 4094 during the study period. The hospital bed occupancy rate was 83% with an average bed turnover rate per day of 24. A total of 50,137 emergency visits and 4384 major surgical procedures were performed out of a total of 4850 surgical procedures during the study period per year. Hence, working in such a busy trauma care set-up exposes the HCWs to pricks from sharps and splashes by potentially infectious body fluids. We have an active post-exposure prophylaxis (PEP) programme, based on the guidelines of the National AIDS Control Organization of India (NACO) [13], since 2011. The NACO prescribes a standard proforma to be filled for each occupational exposure, which is being done at our Centre. In our PEP programme, a hospital infection control nurse and a microbiology resident actively follows and counsels each exposed HCW. As part of this programme, we have initiated intensive surveillance for needle stick injuries and injuries due to sharps/splashes of blood/body fluids since May, 2011.

The study has been divided into two phases:

Phase I—It was the period before the actual intense surveillance started (January, 2008–April, 2011). The findings seen in the time period before this study started was included for better work up and comparison with those of the Phase II period.

Phase II—This is the ongoing routine and intense surveillance activity for NSIs and exposure to potentially infectious body fluids. This study describes the results of the intense surveillance over a period of 2 years and 5 months (May, 2011–September, 2013).

The findings between the post intensification (May, 2011–September, 2013, Phase II) and pre intensification (January, 2008–April, 2011, Phase I) of NSIs surveillance were compared and analysed. The resultant findings helped to plan out modifications or implementation of certain changes in those sections of the hospital or HCWs which were at high risk/where higher exposure rates or certain lacunae were observed.

Voluntarily reported injuries to all HCWs by sharps (solid needles, hypodermic needles) and other sharps like canulas, broken vials and splashes on cuts and mucous membranes by potentially infectious materials like blood and other body fluids (BBFs) were enrolled in the surveillance. Also, the sources of the exposure, if known, were also monitored.

The exposed HCWs were asked to fill up a proforma which included information regarding the type of injury or splashes, the source of injury (known/unknown), what type of work/duty the HCWs does, use of personal protective equipments at the time of injury or splashes, the severity of the injury, his/her hepatitis B vaccination status, the duty hours, emergency/routine health care, immediate post-exposure measures like washing of hands, status of source of exposure regarding HIV/HBV/HCV positivity etc. Based on this information, the severity of the injury was graded and they were followed up for 6 months.

Serum samples from such exposed HCWs were collected along with the patient's (if source was known) after taking informed consent. Screening for HIV 1&2 were done as per NACO guidelines [13]. Also, HBsAg for HBV and anti-HCV for HCV screenings was done immediately by rapid tests (HCV Tri-Dot, Diagnostic Enterprises, HP, India and Hepaguard for HBV, Diagnostic Enterprises, HP, India). All these tests were performed in duplicate and confirmed by immunoassay (MiniVidas®, BioMérieux, Lyon, France, based on ELIFA) irrespective of the results of preliminary screening. HCWs who got exposed to HIV seropositive patients were immediately referred to the Anti-retroviral therapy clinic of AIIMS hospital where they were given Zidovudine and Lamividine for 4 weeks. Those exposed to HBV seropositive patients were asked to relate details of their vaccination history and advised accordingly. All exposed HCWs were followed up and checked for seroconversion till 6 months post-exposure. The serum samples of patients from whom the HCW got exposed, if known, were also tested for HIV, HBV and HCV. All the serological testings were done as per the methods described above.

The study also tried to work up baseline injury rates and changes in it based on the following hospital-based denominators [12] that met these criteria: (1) number of staffed beds (2) number of admissions (3) number of personnel (based on full time equivalents or FTEs) (4) at-risk employees (5) total procedures performed (6) major procedures performed requiring anaesthesia and (7) patient-days. These denominators reflect the hospital size, patient turn over and staff size which influence the injury rates. FTEs include all personnel employed by the institution, irrespective of risk to blood exposure [12]. The denominator values were obtained from the Medical Record Section, JPNATC, AIIMS, New Delhi for each year.

Since this study was based on voluntary reporting of such exposures by the HCWs, the team conducting the study tried to estimate the rate of underreporting by actively tracing any missed out cases and also looked into the reason of their failure to report such an incident voluntarily.

Statistical analysis was done using SPSS 17.0 version software especially in the analysis of the injury rates. A standard of $p < 0.05$ was taken as statistical significance.

Results

During the 29 months study period, a total of 356 exposures were reported, of which 272 were from male and 84 female HCWs with a mean age of 30 (SD 10) years. The findings described below are those observed during Phase II.

Results based on the job categories: The distribution of exposure according to the job profile of the HCWs and unknown staff who got exposed to NSIs or BBFs is shown in Table 1. Of the total, 18 (5.1%) of the HCWs gave history of repeated exposures from

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