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Occupational exposure to viruses in health care workers (HCWs) in India: A lesser known fact in our medical fraternity

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Abstract
In our country Post exposure prophylaxis (PEP) is an ignored thing even in health care set ups. PEP usually reminds us about a dog bite but in clinical set ups due to needle stick injuries (NSI) many viruses can cause life threatening diseases like Hep B Hep C and HIV/AIDS about which our HCW(Health care workers) pose apathy and ignorance So we need to apprise and equip with the correct and adequate scientific knowledge and information about the transmission of these viruses in different clinical scenario and how to safe guard against them There should be proper policy and protocol for management of such occupational exposures.

Keywords: Post Exposure Prophylaxis (PEP) HIV, Hepatitis, B & C Needle stick Injuries (NSI) Occupational exposure

1. Introduction
In Indian set up, PEP (Post exposure Prophylaxis) means largely taking injections after bite by a dog and recently for Hepatitis B by some health professionals. PEP for HIV is more or less is a neglected thing in our medical fraternity. When we talk about occupational exposure of viral infections in India, we are looking at just the tip of the proverbial iceberg.
The World Health Report 2002 estimates that 2.5% of HIV, 40% of hepatitis B (HBV) and hepatitis C (HCV) cases among Health Care Workers (HCWs) worldwide are the result of occupational exposure. Currently, the system of reporting of needle stick injury (NSI) or exposure to infective body fluids to mucous membranes is not in place in most of the hospitals and private clinics. The real data being not available, we don't know the actual magnitude of the problem. In keeping with the adage -Prevention is better than cure, in our country of more than a billion people, the preventive aspect is of extreme importance. The flip side of this is that being a developing country, the treatment of all seroconverted people presents a huge extra burden.
The awareness levels about the importance of universal precautions are still at a rudimentary stage amongst HCWs. The policy of 'catching them young' goes a long way in educating the young minds of medical and nursing students, as do periodical drills for all the HCWs.
Extrapolating from whatever data is available from hospitals in India, the incidence of NSIs is much higher than the western countries. These are mostly tertiary care hospitals with much higher awareness levels, so we can well imagine the magnitude at less equipped rural hospitals and clinics.
This review addresses the important issue of NSI and aims at determining the occurrence of NSI among different categories of HCWs, the various factors responsible, the circumstances under which these occur and explores the availability and possibilities of measures to prevent these through improvement in knowledge, attitude and practice. It also aims at assessing the awareness levels among various categories of HCWs, on issues like NSI policy, segregation of sharps at source and the use and availability of safety devices to prevent NSI.

2. Background Information
Anonymous hospital surveys indicate that over one-third of exposed HCWs do not report needle-stick injuries, so the rate of injuries and the number of infected individuals may be much higher than that reported.
According to the Centers for Disease Control and Prevention, approximately 384,000 percutaneous injuries occur annually in US hospitals, with about 236,000 of these resulting from needle-sticks involving hollow-bore needles. Epinet data for 2003 reports a rate of approximately 27 needle stick injuries (NSIs) per 100 beds in teaching hospitals. There are few reports on NSIs from India and with limited data, it is not possible to estimate an annual incidence. Their incidence is considerably higher than current estimates, and hence a low injury rate should not be interpreted as a non-existent problem.
Needle stick injuries (NSIs) are wounds caused by sharps such as hypodermic needles, blood collection needles, iv cannulas or needles used to connect parts of iv delivery systems. The causes include various factors like type and design of needle, recapping activity, handling/transferring specimens, collision between HCWs or sharps, during clean-up, manipulating needles in patient line related work, passing/handling devices or failure to dispose of the needle in puncture proof containers. Because of the environment in which they work, many HCWs from physicians, surgeons, and nurses to house-keeping personnel, laboratory technicians and waste handlers are at an increased risk of accidental needle stick and sharps injuries. As a result, these workers are prone to occupational acquisition of various blood borne pathogens, including the microorganisms causing HIV/AIDS, hepatitis B and C, malaria, infectious mononucleosis, diphtheria, herpes, tuberculosis, brucellosis, spotted fever and syphilis. In USA 6,00,000 to 10,00,000

sustain NSIs from conventional needles and sharps every year, while in UK it is 1,00,000 HCWs/year. In India, authentic data on NSI are scarce. It is known that around 3-6 billion injections are given per year, of which 2/3rd injections are unsafe (62.9%) and the use of glass syringes is constantly associated with higher degrees of hazards. The financial impact of NSIs includes both direct and indirect costs. The average per-cutaneous transmission rates for hepatitis B (HBV) and C (HCV) are 33.3 (6-33%) and 3.3 per cent (1-10%), respectively, while the sero-conversion risk for HIV is 0.31 per cent. Although HBV exposures pose the highest risk for infection, it has an effective vaccine and post exposure prophylaxis (PEP) for HCWs, which can dramatically reduce the risk. This is not so for HCV and HIV.

Therefore, prevention is the only recourse for these. Preventing NSI is an essential part of any blood borne pathogen prevention program in the work place. Every healthcare facility should have an infection control program in place through a working hospital infection control committee.

3. Discussion

Needle stick injuries (NSI) pose significant health hazards to HCWs (Health care workers). Hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) are the three most common blood-borne viruses (BBVs) associated with occupationally acquired infections. Risk of transmission is directly related to work place conditions and practices. Surgeons, emergency doctors and laboratory professionals have been identified as having the highest risks of exposure. Most common occupational transmission is due to percutaneous injury via hollow-bore needles with vascular access, and there is a need to document their prevalence in specific health care settings. It is estimated that more than 3 million HCWs worldwide suffer an NSI from a contaminated sharp each year. The risk of HBV transmission is estimated as highest followed by HCV and then HIV due to occupational exposure.

In India, several studies have shown the incidence of NSI in HCWs ranging from 40% to 80% and mostly seen in doctors. Implementation of standard work precautions is not only necessary for prevention of NSI at the health care settings but also regular training and education remain key preventive measures for improving HCW compliance. Safety-engineered devices are now being increasingly promoted as an approach to decreasing the rate of NSI. Recently, WHO has launched guidelines for injection safety, for improving the quality of care and to ensure safety of the health care providers.

The risk potential for the transmission of BBVs is directly proportional to the prevalence of viral strains in the patient population and the extent of exposure. Emergency setting and acute trauma care are two such health care settings where large, unplanned and sudden exposure to blood to HCW can occur any time. The article by Batra *et al.* in this context, investigates the sero-prevalence of BBV in trauma patients. The uncontrolled environment of trauma emergency department and at times urgent need for performing life-saving surgical procedures puts an increased risk of BBV transmission to the HCWs. In such settings, proper post-exposure prophylaxis (PEP) protocol as well as a well-documented program for HCW safety, education and prevention of NSI should be enforced.

Table 1: Incidence of NSI (Needle stick injuries) amongst HCWs (Health care workers) in India

Place	Sample size (*n*)	Incidence of NSI (%)	Distribution amongst HCW (%)	Reference
New Delhi	428	80.1	Nurses: 49 (100) JR: 21 (87.5) Nursing students: 64 (85.3) Technicians: 59 (84.3) Interns: 62 (82.7) SR: 48 (80) Medical students: 40 (53.3)	Muralidhar *et al.*, 2010
Karnataka	441	57	Doctors: 143 (51) Nurses: 93 (81) Technicians: 6 (27) Sanitary staff: 10 (41.6)	Radha *et al.*, 2012
Karnataka	361	47.1	Doctors: 27 (31.4) Interns: 38 (55) Nurses: 53 (45.7) Technicians: 4 (25) House-keeping: 48 (64.8)	Jahnavi *et al.*, 2014
Maharashtra	220	49	50% in nurses, 24% in doctors	Jaybhaye *et al.*, 2014

NSI: Needle stick injury, HCWs: Health care workers, SR: Senior resident, JR: Junior resident

Most HCWs in these studies were of the opinion that education, training, better safety devices, decreased patient load per HCW, positive work environment and following standard precautions can help prevent NSI. According to a CDC report, use of safety-engineered devices would reduce NSIs by 76 per cent. There is much room for improvement in protecting the HCWs from NSIs, which can be accomplished through a combination of comprehensive programs, including stress on institutional behaviour and device related factors that contribute to the occurrence of these injuries, seeking alternatives to use of needles wherever possible, using newer devices with safety features, ensuring adequate training in safe use and disposal of needles, putting in place a culture of accident reporting especially sharps-related, and following

preventive practices like vaccinations for hepatitis B. Some institutions in India have a staff-student health service facility in place, which maintains records, and registers the incidence of NSI and has protocols for PEP.

Even in tertiary care hospitals, U.P (Universal Precautions) were being compromised. Once injured, respondents did not know whom to contact. This is not new and similar findings were reported previously from India. It is important to find out why especially the medical staff did not know the reporting procedure. The absence of reporting procedure was probably the reason for the confusion. Surgeons and nurses mentioned that they did not have the time to report. It is imperative to have a simple reporting format so as to not to add to their burden in terms of time constraints. Students, (both medical and nursing) thought that it was not important to report. This could have serious consequences and efforts should be focused on students to dispel such misinformation. As found in other studies in India, there is surprisingly poor knowledge about PEP services, as evident from the finding that only 39% knew that their institutes provided PEP. After exposure, only one in four respondents was tested for blood borne infections.

4. Conclusions

Prevention of HBV transmission requires HCW immunisation through vaccination against Hepatitis B. This should be made mandatory at the time of joining the facility or institution. All HCWs should be vaccinated against HBV if they have no documented evidence of pre-existing immunity (from natural infection or prior vaccination), and the hospital administration should ensure that they are assessed for immunity post-vaccination. Although no available prophylaxis exists for HCV, it is crucial to identify HCV exposure, counsel and follow-up the HCW with correct battery of tests, so that in case of a documented infection an early anti-viral treatment may be initiated. Following exposure to HIV, use of antiretroviral PEP must be instituted promptly.

Conversely, BBVs can also be transmitted from HCW to the patient; therefore, all HCWs should be encouraged to undergo testing for BBVs, knowing that they will be given support if they have a positive test. New trainees, who embark on training in a discipline that includes exposure prone procedures (EPP), should be tested for BBVs at entry, and counselled about career options if they have a positive test. HCWs, who perform EPPs, should know their BBV status and be encouraged and supported to undergo regular testing. Annual testing is considered to be appropriate in most cases.

Protecting HCWs from NSI is an urgent requirement. NSI as a health hazard is a significant problem in most of the health care settings. At present mandatory adherence to NSI protocols is not done in most of the institutions in the country. There is currently no national policy or law regarding the HCW safety at work place, which is the need of the hour.

Setting up an effective injury surveillance system in developing countries is essential to safeguard the health of the providers. Policies addressing information dissemination and exposure reporting should be introduced immediately. Intense and regular training sessions should be conducted for all staff and students, taking into account the varying incidence of exposure among different occupation groups.

Among the accidental needle stick injuries reported, a large number is due to recapping of needles. Hence to avoid needle stick injuries, newer devices should be designed so that the HCWs hand remains behind the needle during the procedure and the needle remains covered before disassembly of the device and remains covered after disposal.

There is a dire need for

1 A set safety protocol for HCWs, which should be displayed at all places of work especially in emergency rooms.
2 A simple and hassle free post exposure reporting system
3 A backup team for general post exposure steps and the prophylaxis protocols.

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