

Occupational Exposure to Human Immunodeficiency Virus in Health Care Providers: A Retrospective Analysis

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ABSTRACT

Objectives: To determine the population at risk, risk factors, and outcome of occupational exposure to blood and body fluids in health care providers. **Materials and Methods:** Retrospective review of two and half year data of ongoing surveillance of occupational exposure to blood and body fluids in a tertiary care hospital. **Results:** 103 Health Care Providers (HCP) reported an occupational exposure to blood and body fluids during the period under review. These comprised 72 (69.9%) doctors, 20 (19.4%) nursing personnel, and 11 (10.6%) cleaning staff. Of the doctors, 65% were interns. 53.4% HCP had work experience of less than one year. Circumstances of exposure included clinical procedures (48%), sweeping/handling used sharps (29%), recapping (16%), and surgery (6.9%). 74.3% of the exposures were due to non-compliance with universal precautions and were thus preventable. The device most frequently implicated in causing injury was hollow bore needle ($n=85$, 82.5%). Human Immunodeficiency Virus (HIV) status of the source was positive in 6.8% cases, negative in 53.4% cases, and unknown in remaining 39.8% cases. Postexposure prophylaxis (PEP) was indicated in 100 (97.08%) cases and was initiated within 2 h of exposure in 26.8% HCP. In 23.2% HCP, PEP initiation was delayed beyond 72 h of exposure due to late reporting. Thirteen HCP received expanded and the remaining received basic regime. Of the 82 HCP followed up, 15 completed the full course, while 55 stopped PEP after the first dose due to negative source status. Twelve HCP with exposure to blood of unknown HIV status discontinued PEP despite counseling. Complete follow-up for seroconversion was very poor among the HCP. HIV status at 6 month of exposure is not known for any HCP. **Conclusions:** Failure to follow universal precautions including improper disposal of waste was responsible for majority of occupational exposures. HCP need to be sensitized regarding hospital waste management, management of occupational exposure, need for PEP, and continued follow-up.

Keywords: Human Immunodeficiency Virus, occupational exposure, postexposure prophylaxis

Introduction

With advancement in medical technology, more and more invasive procedures and injections are used in sick patients. These place the Health Care Worker (HCP) at risk of occupational exposure to various blood borne pathogens

such as Human Immunodeficiency Virus (HIV), hepatitis B, and hepatitis C. Global estimates reveal that nearly 2% of new cases of HIV occur due to unsafe injection practices.⁽¹⁾ Risk assessment and testing for HIV are not always feasible, especially in the emergency settings. In these circumstances, following universal precautions assuming every patient as potentially infectious is critical to prevent occupational exposure to blood and body fluids related infections including HIV. However, many times breach may occur in these universal precautions. This may be due to ignorance on the part of HCP, failure to observe necessary precautions, non-availability of appropriate barrier equipment, or improper disposal of hospital waste. Even when the universal precautions are strictly adhered,

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such accidents are sometimes inevitable. According to Centre for Disease Control Prevention, approximately 384,000 needle stick injuries from hollow bore needles occur annually in United States.⁽²⁾ Self-reported occurrence of occupational exposure to blood and body fluids among HCP varies from 32.7%⁽³⁾ to 66%.⁽⁴⁾ A study from Pakistan has reported that only 18% of nurses do not have any needle stick injury (NSI) in their career.⁽⁵⁾ There are few reports on NSI from India.⁽⁶⁻⁹⁾ A report from Mumbai states that only 50% of the exposed HCP report to concerned authorities with less than a quarter of them receiving postexposure prophylaxis (PEP).⁽¹⁾ According to a World Health Organization (WHO) report, almost half of the injections used in developing countries are unsafe, for both the patient and the HCP.⁽¹⁰⁾

The HCP working in a busy hospital are usually extremely busy and overburdened. Thus, personal protection may not always remain a priority for them. They may also have constraints of resources for prevention of occupational exposures like hand gloves. Thus, HCP are very vulnerable for infections mediated by blood and blood products. The present study was prompted by an increase in the number of HCPs reporting to our hospital authorities for availing PEP services. We report the population at risk, risk factors, reporting routines, and outcome of occupational exposures of HCPs in a our Institute, which is a tertiary care teaching hospital in New Delhi, India. The aim was to see the risk factors for occupational exposures and thereby use the information for strengthening the preventive services for the HCP.

Materials and Methods

The study was conducted at the Pediatric Anti-retroviral therapy (ART) Center, Kalawati Saran Children's Hospital, affiliated to Lady Hardinge Medical College, New Delhi. The ART Center provides PEP to HCP who have an accidental exposure to blood and body fluids from the medical college and affiliated Kalawati Saran Children's Hospital and Sucheta Kriplani Hospitals. The exposed HCP reports to the ART Center where they are evaluated by the medical officer in-charge for exposure risk. The drugs for PEP are also provided for use during nonworking hours at the hospital casualty. The exposed HCP can get up to 3-4 doses from the casualty until they can report to the ART Center on the next working day. After counseling and obtaining a written informed consent, PEP is initiated where indicated as per the National AIDS Control Organisation guidelines⁽¹¹⁾ Subsequent therapy is guided by the HIV status of the source, if it is feasible to determine. A record of all HCP reporting for PEP is maintained at ART centre.

The present work is based on a retrospective review of records of all occupational exposures reported at the ART

Center from October 2007 to May 2010. The study protocol was approved by the institutional ethical committee.

Results

During the duration of two and half years between October 2007 to May 2010, 103 HCP reported to the ART center for PEP having sustained exposure to blood or other body fluids. 85.4% of the exposure occurred in the hospital wards with emergency, operating room, labor room and others constituting the rest [Table 1]. Of the HCP exposed, 72 (69.9%) were doctors, 20 (19.4%) nursing personnel, and 11 (10.6%) sweeping staff [Figure 1]. Medical interns and nursing students constituted a large proportion of the population exposed ($n=54$, 52.4%). Thus, more than half of the injuries were sustained by HCPs with practical experience of less than 1 year. Percutaneous injury with a hollow bore needle was responsible for the majority ($n=85$, 82.5%) of occupational exposures, while injury with solid bore needles was reported in 15 (14.5%) and with other sharps in 3 (2.8%) cases. Majority of times, injury was sustained during routine clinical procedures such as phlebotomies, establishing intravenous access, suturing

Table 1: Summary of exposure characteristics

Category	Number (%), $n=103$
Work place	
Ward	88 (85.4)
Emergency	7 (6.8)
Operating room	4 (3.8)
Labor room	2 (1.9)
Outpatient department	2 (1.9)
Work experience	
<1 year	55 (53.4)
1-3 years	10 (9.7)
>3 years	38 (36.9)
Circumstances of exposure*	
Minor procedure	40 (47.8)
Surgery	05 (6.1)
Re-capping	13 (15.8)
Sweeping/discarding used sharps	24 (29.2)
Exposure type	
Percutaneous exposure	100 (97)
Solid needle	15 (14.5)
Hollow bore needle	85 (82.5)
Mucus membrane/Non intact skin	2 (1.94)
Intact skin	1 (0.97)
Source status	
HIV positive	7 (6.79)
HIV negative	55 (53.4)
Not known	41 (39.8)
Time to initiate PEP*	
<2 h	22 (26.8)
2-72 h	41 (50)
>72 h	19 (23.2)
PEP regimen	($n=100$)
Basic	87 (87)
Expanded	13 (13)
PEP stopped*	
After first dose	67 (81.7)
Completion (28 days)	15 (18.3)

* $n=82$

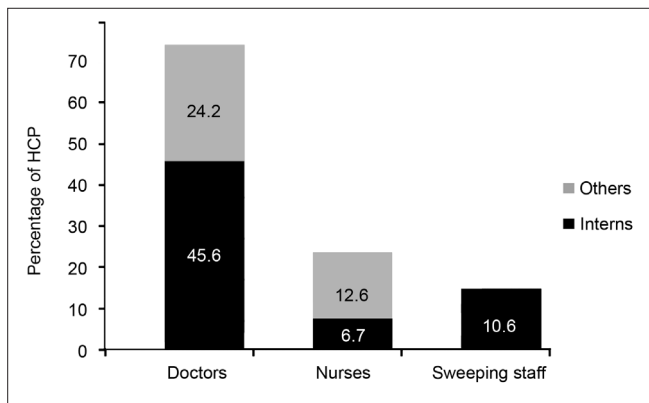


Figure 1: Category of health care providers sustaining occupational exposure

minor wounds, thoracentesis, abdominal paracentesis, and biopsies [Table 1]. Nearly three quarters of the HCP (74.3%) who had occupational exposure were not following universal precautions. A substantial number were not using gloves (24.3%), while 14.6% sustained injuries during recapping of the needles. 7.3% of the HCP were recapping needles and not wearing gloves at the same time when they sustained the NSI. 28.0% sustained injuries during sweeping/discarding sharps which were not disposed at the source site as recommended [Figure 2]. The body fluid implicated in exposure was blood in all the reported instances except for one where the exposure was to ascitic fluid during abdominal paracentesis.

PEP was not indicated in three HCP (one had exposure from known HIV negative patient and the other two had exposure of intact skin). PEP was provided to remaining 100 (97%) HCPs. It was initiated within 72 h of exposure in 76.8% of the HCPs. Initiation of PEP was delayed in the remaining because of late reporting. Basic regimen comprising of a combination of zidovudine and lamivudine was given to 87% of the HCPs with the rest receiving the expanded regimen comprising of zidovudine, lamivudine and indinavir. In 81.7% of the HCPs, PEP was stopped after the first dose of antiretroviral drugs. 67.1% subjects discontinued PEP appropriately since the source HIV status was determined to be negative. However, 14.6% of the HCP cited no specific reason for stopping their PEP. Despite counseling at time of initiating PEP, no HCP reported at the end of 6 months for reevaluation for seroconversion.

Discussion

Health care providers are constantly at a threat of contacting various infectious illnesses. These can range from mild common cold to potentially incurable illnesses such as HIV and hepatitis B. Following universal precautions, assuming each and every patient as potentially infectious is the only way to prevent the transmission of infectious agents to HCP. Despite

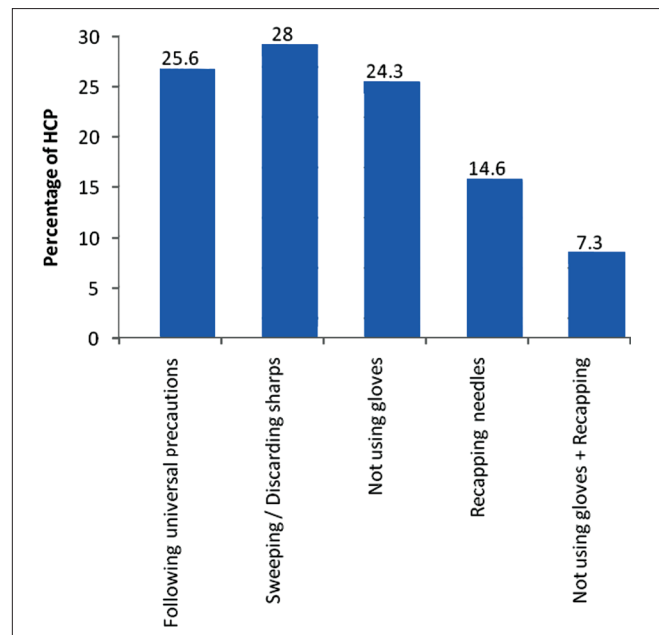


Figure 2: Universal precaution adherence among health care providers sustaining occupational

adequate knowledge, needle stick injuries remain a potential source of transmission of blood borne infection in health care providers. It is the most frequently occurring occupational injury responsible for exposure to infectious body fluids.

Needle stick injuries are very frequent among health care providers, though not many report these to concerned authorities or seek appropriate care. Aslam *et al.*⁽⁴⁾ reported that 66% of HCPs interviewed ($n=417$) had sustained an NSI sometime during their career, but none had sought medical care. Similarly, Samir *et al.*⁽³⁾ found that only 50% HCP report NSIs to concerned authorities. This is likely to be due to poor awareness among HCPs as well as lack of facilities for PEP in Institutes. At our Center 103 HCPs reported for PEP over the two and half year study period. The reporting frequency increased in proportion to the time elapsed since the Institute started offering PEP services and maintaining a systematic record of occupational exposures [Figure 3]. In the absence of active surveillance of occupational exposures, it is not possible to ascertain whether this increased reporting reflects an increase in number of exposures or, what is more likely, is a reflection of increased awareness and seeking of PEP by HCPs. In fact it is quite likely that many occupational exposures are perhaps still going unreported. In our study, maximum exposures were observed in the hospital general wards probably because of many procedures being carried out there. We found that majority of health care providers with occupational exposure were doctors followed by nurses. Interns and nursing students constituted more than half (52.4%) of the injuries. This is in contrast to a smaller

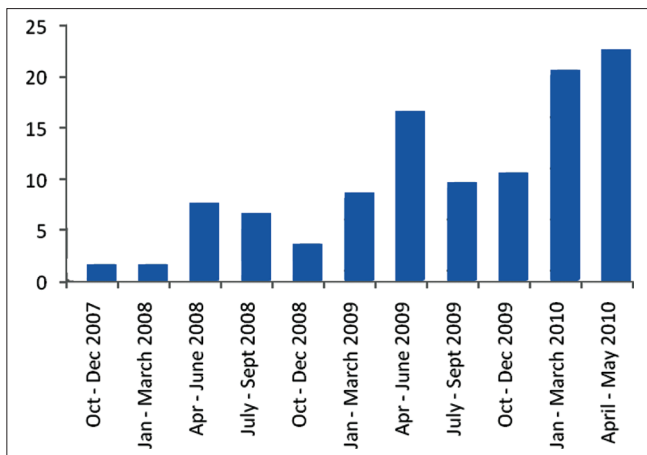


Figure 3: Number of occupational exposures reported during the study period

proportion of interns and nursing students in the hospital as compared to other medical or nursing staff. This may be a reflection of the larger number of exposure-prone procedures conducted by these HCP and their relative inexperience. The latter fact is supported by the fact that 53.4% of the injuries involved HCPs with less than one year of work experience. Jayanth *et al.*⁽¹⁾ also found that 49.7% of the HCP who sustained NSI had experience of less than 1 year. Thus, training on infection control and sharp injuries needs to be given due emphasis in the basic medical curriculum. Taimur *et al.*⁽¹²⁾ have reported that only 16.4% of the 3rd year medical students knew the details of the NSI prevention protocols.

We found that despite availability of all barrier equipment, universal precautions were not adequately followed in nearly three fourth cases reporting exposure. 40% of the HCPs sustaining exposure were not wearing gloves. In a self reporting questionnaire among HCP at a tertiary care hospital in Delhi, Muralidhar *et al.*⁽¹³⁾ noticed that 66.3% of HCP admitted recapping needles. Only 40% of the HCP knew about availability of PEP services in their hospital and 75% of the exposed nurses did not seek PEP. Our findings emphasize the need for ongoing surveillance of practices of HCPs and hospital waste management. In-service training should also focus on adherence to universal precautions and appropriate hospital waste disposal. Further, PEP services need to be made available at all health care facilities and the providers need to be made aware of these.

Source status was positive for HIV serology in 6.79% of the cases. Shah and Katira⁽¹⁴⁾ have found 2.96% seroprevalence of HIV infection among pediatric patients at a tertiary care centre in western India. The estimated prevalence of HIV infection in the general population of Delhi is 0.3%. The higher prevalence of HIV infection in hospitalized patients is likely to be due

to higher probability of HIV-infected patients to fall sick and get hospitalized. It may be prudent to study HIV seropositivity among hospitalized patients in larger studies for a better risk estimation.

PEP should be initiated as soon as possible after the exposure. Although animal studies suggest that it is probably substantially less effective when started more than 24–36 h postexposure,⁽¹⁵⁾ the interval after which no benefit is gained from postexposure prophylaxis for humans is not clearly defined. The longer the interval from the exposure to start of PEP, the lesser effective it becomes. In our study PEP was delayed beyond the critical initial period of 72 h in 23.2% of the cases.

We acknowledge that the data presented in the study are not complete in all aspects, this being a retrospective review of records. A major limitation is poor follow-up information on the subjects despite PEP counseling. The seroconversion status at 6 months was not available for any of the HCPs. We also do not have a good information on reasons for stopping PEP among our subjects. Despite these shortcomings, the study highlights that even in a tertiary-level teaching Institute, with no constraints of resources and adequate training and monitoring opportunities, the HCP are not following universal precautions adequately. Improper adherence to universal precautions, improper handling, and disposal of biomedical waste especially sharps were responsible for the majority of occupational exposures. Thus most exposures are preventable. Significance of proper adherence to PEP and follow-up for seroconversion also needs to be emphasized among the HCPs. An ongoing surveillance and continuing in-service education can help in bringing down the incidence of occupation exposures to infections.

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