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Original Research Article

Post exposure prophylaxis for HIV among healthcare workers due to occupational exposure: a record based study at a tertiary care teaching hospital of Kolkata

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ABSTRACT

Background: Healthcare workers (HCWs) regularly face the risk of exposure to sharp injuries and splashes as an occupational hazard, which presents major risk for acquiring blood-borne infectious agents like human immunodeficiency virus (HIV) which can be minimized by taking post exposure prophylaxis (PEP) measures. There are limited studies from India documenting details of PEP for HIV. This record-based study aimed to determine the occurrence of needle stick injuries (NSIs) and other high-risk occupational exposures to blood and body fluids (BBFs) among HCWs in a tertiary care hospital, Kolkata. We aimed to study details of PEP regimens used among HCWs exposed to HIV.
Methods: Hospital record was analyzed from reported incidences of occupational exposures to BBFs occurred during the period of October 2013 to March 2019. Information on self-reported incidence of occupational exposure, and post-exposure management were collected.
Results: A total of 105 incidents of occupational exposure were registered during study period. Interns (37, 35.2%) were most frequently exposed, followed by physicians (22, 21.0%) and nurse (21, 20.0%). 88 (83.8%) of the personnel sustained NSIs, and 17 (7.2%) had splashes to skin, mucus membranes. There was no significant difference between subjects with splashes to skin, mucus membranes and needle-stick cases regarding discontinuation of post exposure prophylaxis (PEP) (11.8% versus 19.3%, $p<0.548$). No cases of sero-conversion were reported.
Conclusions: In spite of high incidences of exposures to HIV source, good efficacy of PEP was observed with no sero-conversion. PEP for HIV was well tolerated. Study emphasized the need for creating awareness about timely reporting of incidence.

Keywords: Health care worker, Hospital record, Needle stick injuries, Occupational exposures, Post exposure

INTRODUCTION

Occupational transmission of potentially infectious viruses such as human immunodeficiency virus (HIV) is one of the important health hazards to health care workers (HCWs). The World Health Organization (WHO) reported 2.5% of all HIV infections are due to occupational transmission.[1] Following guidelines for standard precautions (earlier known as universal precautions) plays important role in minimizing incidences of occupational exposures; effective post exposure prophylaxis (PEP) helps in reducing chances of transmission if exposure has already occurred. Various guidelines from national and international bodies are available for effective PEP.[2-4] Yet, various studies reported from India and other countries have observed poor awareness about PEP for HIV among various categories of HCWs.[5-15] While various studies reported from countries other than India have described detailed analysis of PEP for HIV, only limited studies are available from India focusing on these aspects to the best of our knowledge.[11–28] The detail includes important

aspects like timing of starting PEP for HIV, regimens used, sero-conversion, follow-up testing etc. Our objective was to study details of PEP for HIV from the reported incidences over the period of three years especially among health care worker as they are frequently exposed to blood and body fluids of patient while performing their job. We believe observations of this study, will be useful to HCWs in increasing their awareness about PEP.

METHODS

Study design and setting

The record-based observational study was done at R. G. Kar Medical College and Hospital, Kolkata West Bengal. Hospital record from anti-retroviral therapy (ART) center was obtained after taking proper ethical clearance from institutional ethical committee. Records of all incidences of accidental exposures reported to designated physician at ART center were available since March 2016.

Our study included details of all reported incidences of accidental occupational exposures and injuries occurred to HCWs between periods from March 2016 to March 2019. One hundred and nine such incidences were reported during this period. Among which four incidents were reported due to non-occupational exposure (condom rupture) to HIV sources. These cases were excluded from the study. Thus one hundred and five incidences were included in the study. Ethical permission was taken from institutional ethical committee and from in-charge of ART center of the institution. Confidentiality of source patients and exposed HCWs was maintained at all levels. In the situation of exposure to HIV designated physician decided the need for PEP, baseline HIV, and other laboratory testing and also provided counseling to all exposed HCWs after an accidental exposure. Selection of basic or expanded regimen for PEP for HIV was decided by designated physician; which was based on guidelines given by National AIDS Control Organization (NACO) of India and centers for disease control and prevention (CDC).[2,3,29,30]

Repeat testing for HIV of exposed HCW was done at three months and six months. The category of HCWs, mode of exposure as well as details of PEP were maintained in the records. This detail was comprised of baseline HIV status, type of PEP for HIV indicated, time of initiation of PEP for HIV after the exposure, regimens used, PEP completed or not and follow-up results of HIV testing for all exposures to HIV. For our study, information was collected about category of exposed HCW, mode of exposure and about PEP for all 105 incidences of occupational exposure to HIV. Missing information was mentioned as 'details not available'. Descriptive analysis was done of collected data in the form of frequencies and percentage. Data were entered in MS excel and analysis was done in statistical package for the social sciences (SPSS) version 16.

RESULTS

Total incidence of occupational exposure was 105 [male: 54 (51.4%), female: 51 (48.6%)] between the year 2016 to 2019. Table 1 and Figure 1 shows the category of HCWs exposed to blood and other body fluids. Among them 37 (35.2%) of them were interns, followed by 22 doctor (21%) and 21 nursing staffs (20.0%).

Table 1: Distribution of different categories of HCWs exposed to blood and other body fluids (n=105).

Category	Frequency	Percentage
Sex		
Male	54	51.4
Female	51	48.6
Total	105	100.0
Designation		
Doctor	22	21.0
PGT	10	9.5
Intern	37	35.2
Staff nurse	21	20.0
BSc nursing students	4	3.8
Group D staff	3	2.9
Lab technician	3	2.9
Nursemaid	2	1.9
Sweeper	3	2.9
Total	105	100.0

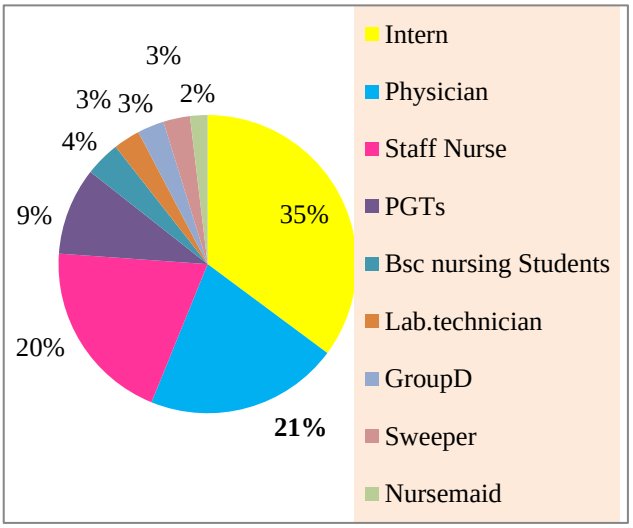

Figure 1: Pie diagram showing distribution of different categories of HCWs exposed to blood and other body fluids

Circumstances during which exposure occurred to HCWs are shown in Table 2 and Figure 3. Of the 105 occupational exposures to blood and other body fluids; PEP was warranted to all exposures. The commonest mode of exposure was needle prick [80 (83.8%)] followed by skin contact with blood [13(12.4%)]. Among needle prick injuries, 51.1% were mild injuries but 14 (15.9%) were categorized as severe injury. Rests were categorized as

moderate injury (33%). Among skin contact with blood, 2 (15.4%) exposure were categorized as severe exposure.

Baseline HIV testing of these HCWs done in 95 cases was found to be negative; but in rest of the ten cases report was not available. In all cases PEP for HIV was warranted, PEP for HIV was started within 24 hours in 45 (42.9%) exposures, and after 24 hours in 60 (57.1%) exposures. Of the 105 exposures in whom PEP for HIV was warranted, 84 (80%) received basic regimen with two anti-retroviral drugs and 21 (20%) received expanded regimen with three anti-retroviral drugs (Table 3).

HIV source status was positive in 33 (31.4%) case of exposure, whereas it was negative in 10 (9.5%) cases of exposures and in remaining 62 (59.0%) cases of exposure source status for HIV were unknown. Among 33 HCWs who were exposed to HIV positive source, 24 (0) completed PEP for 28 days, 9 (0) were lost to follow-up by the end of completion of PEP course. Among 24 HCWs exposed to HIV positive source and took full course of PEP for 28 days, 12 (50%) documented as no sero-conversation at the end of 6 month, whereas for remaining 12 (50%) data were not available. Overall, at the end of 6 month, 21 out of 33 cases of exposure were lost to follow-up and only 12 showed no sero-conversation post 6month follow-up as documented (Table 4).

Among all 105 HCWs exposed to BBF and in whom PEP for HIV was started, 42 (41.0%) came for follow-up and sero-conversion test and remaining 63 (59.0%) were lost to follow-up.

Table 2: Distribution of type of occupational exposure and severity of exposure among HCWs.

Type of exposure	Severity of exposure			Total
	Mild	Moderate	Severe	
Needle prick	45 (51.1)	29 (33.0)	14 (15.9)	88 (100)
Eye contact with body fluid	3 (100)	0 (0)	0 (0)	3 (100)
Skin contact with blood	9 (69.2)	2 (15.4)	2 (15.4)	13 (100)
Ascitic-fluid splashed in body	1 (100)	0 (0)	0 (0)	1 (100)
Total	58 (55.2)	31 (29.5)	16 (15.2)	105 (100)

Table 3: Distribution of types of PEP regimen prescribed among different type of occupational exposure.

Types of exposure	Type of PEP regimen used		Total N (%)
	Basic n (%)	Expanded n (%)	
Needle prick	69 (78.0)	19 (22.0)	88 (100)
Eye contact with body fluid	3 (100)	0 (0)	3 (100)
Skin contact with blood	11 (84.0)	2 (16.0)	13 (100)
Ascitic fluid splashed in body	1 (100)	0 (0)	1 (100)
Total N (%)	84 (80.0)	21 (20.0)	105 (100)

Table 4: Sero-conversion status of all exposed HCWs to HIV positive source.

Numbers of HCWs exposed to HIV positive source	Details of PEP given/not given and completion status	Numbers in each subdivision	Sero-conversion status at the end of 6 months	Total
PEP given in 33 exposures	PEP was completed for 28 days	24	No seroconversion	12
			Lost to follow-up	12
	PEP was not completed	0	No seroconversion	0
	Lost to follow up at the end of course	9	Lost to follow-up	9
Total 33 exposures	-		No seroconversion	12
			Lost to follow-up	21

DISCUSSION

In majority of the exposures (80%) to blood and body fluids, basic (two drugs) regimen was used regimen expanded (three drugs) Total 33 (31%) incidences of exposure to HIV positive source were reported during the period of 3 years. In 59% cases the status of HIV remained unknown. No cases of sero-conversion were reported for those cases exposed to HIV positive source. Total 105 incidences of exposure to blood and body fluids and 33 incidences of HIV positive source were reported during the period of 3 years. Among exposed, more than one third were interns, followed by doctor and nursing staffs. PEP for HIV was started in all cases in whom it was warranted but more than half of the incidents were reported on next day for which starting of PEP for HIV was after twenty four hours in those cases of exposures. This was in contrast to other studies from India and elsewhere; various

guidelines clearly recommends to start PEP preferably within two hours to have its best efficacy.[2,3,11,14,21,22,25,26,28,30] Not able to start within two hours, emphasizes the need for Hyderabad international convention centre (HICC) and hospital administrators to analyze reasons for this delay and to focus its efforts to start PEP at the earliest. Choice between basic or expanded regimens was based on severity of exposure as per recommendations in guidelines of NACO, India and CDC; more recent guidelines by CDC and WHO recommend expanded regimen (three drugs) irrespective of severity of exposure.[2-4,30,32] While study by Mehta et al and Malhotra et al have described use of two or three drugs regimens depending upon severity of exposure, study by Juan and Shriyan et al have mentioned use of three drugs in all exposures as a part of hospital protocol.[24,26,27,33] In our study also basic regimen was used in more than half of the indicated cases of exposure. NACO, India guidelines, updated in 2009, also recommends choice of PEP regimen based on severity of exposure.[29] No sero-conversion was reported from available data but more than half of the HCWs exposed to HIV positive did not come for follow up testing after 6 month. Similar observations were made in other studies.[21,26-28,36]

Limitations

There were certain limitations also of our study. This study was done from reported incidences to HICC; unreported exposures were not included. No details were available on HIV viral load and CD4 count of source patients. No details were available on baseline as well as follow-up blood investigations of HCWs exposed to HIV positive sources; side effects of PEP for HIV could not be studied cause of data unavailability. It has made an attempt to represent actual scenario from resource limited health care centers especially of developing countries. The information derived will be useful at least to some extent while forming policies related to infection control and PEP management by hospital administrators.

CONCLUSION

Choice of basic or expanded regimens was made according to severity of exposure rather than expanded regimen in all exposed to HIV. No cases of sero-conversion were reported. Along with PEP, round the clock availability of system to manage occupational exposures also probably played an important role in preventing occupational transmission as observed in our study.

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