Occupational Post-exposure Prophylaxis after Blood and Body Fluids Exposure among Healthcare Workers in Siriraj Hospital

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ABSTRACT

Objective: The present study aimed to describe the characteristics of occupational exposure to bloodborne pathogens and occupational post-exposure prophylaxis (oPEP) in Siriraj Hospital.

Materials and Methods: A descriptive, retrospective cohort study was performed of healthcare workers (HCWs) who had experienced occupational injury in Siriraj Hospital in 2015. Data were extracted from the hospital database.

Results: In total, 389 injury episodes were described; of which 293 (75.3%) involved female staff, and 112 (28.8%) involved nurses. The highest number of accidents (112, 28.8%) occurred in the operation room. Needlestick injury (210, 54%) was the most common injury.

Overall, 94 (24.1%) HCWs received oPEP; 67 (71.2%) events carried a risk of HIV acquisition, and in 27 (28.7%) cases, the patients decided to take oPEP. Common oPEP regimens were TDF/XTC/LPV/r (33, 35.1%) and TDF/XTC/RPV (32, 34%). Nearly half of the HCWs who received an LPV/r-based oPEP regimen had gastrointestinal intolerance and switched to second-line regimens. Among those who received oPEP, 52 (77.6%) returned at 1 month and 26 (38.8%) returned at 3 months after exposure for a serology test. There was no seroconversion in this cohort.

Conclusion: Occupational exposure to bloodborne pathogens is a common and increasing risk of infection among HCWs. oPEP with effective antiretroviral drugs within 72 hours after exposure is the main strategy for HIV prevention. The selection of an oPEP regimen with less toxic pills should be considered for efficacy, safety, and adherence. Interventions such as a tracking system or message reminders should be implemented to improve the follow-up rate among HCWs.

Keywords: Healthcare worker; Occupational post-exposure prophylaxis; antiretroviral drugs; HIV prevention (Siriraj Med J 2022; 74: 787-791)

INTRODUCTION

Healthcare workers (HCWs) are at risk of blood or body fluids exposure through sharp and needlestick injuries or mucocutaneous exposure during patient care or waste disposal. Many pathogens can be transmitted via blood or body fluids. The most important bloodborne pathogens in healthcare settings are human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV). Exposure to blood or body fluids poses a risk of infection of these pathogens and psychological concerns after injury among HCWs.[1,2] In Thailand, the annual incidence of occupational blood and body fluid exposure was estimated to be 10.0–51.5 events per 100 HCWs during the period 1991–1997.[3-5]

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The uptake of antiretroviral drugs for occupational post-exposure prophylaxis (oPEP) not later than 72 hours after exposure has been shown to decrease the risk of HIV seroconversion since the early 2000s.[6,7] Since early 2000s, Centers for Disease Control (CDC) and the World Health Organization(WHO) published oPEP guidelines for healthcare settings, and these guidelines have been updated regularly based on the availability of recommended antiretroviral regimens for oPEP and follow-up schedules.[8,9] oPEP courses with highly effective, less toxic, combination pills and once daily dosing regimens are currently recommended worldwide to reduce risk of HIV acquisition after exposure to blood or body fluids.

Siriraj Hospital is a 2,300-bed university hospital in Bangkok, Thailand, that has more than 13,000 clinical staff and students. Despite training and implementing strategies to prevent HCWs from being exposed to bloodborne pathogens, occupational exposure to bloodborne pathogens are frequently reported among all levels of clinical staff and workers. This study aimed to describe the characteristics of the occupational exposure to blood or body fluids and post-exposure management in Siriraj Hospital.

MATERIALS AND METHODS

Data collection

A retrospective study was conducted among HCWs who experienced occupational exposure to blood and body fluids in Siriraj Hospital between January 1 and December 31, 2015. We excluded accidents that occurred outside Siriraj Hospital. The informed consent process was waived due to this being a retrospective study.

Data were abstracted from medical records and the occupational health registry. De-identified data, including age, sex, type of HCW; hospital unit; work shift; injury details; serologic status of HIV, HBV, and HCV of the exposed persons and sources; antiretroviral regimens for oPEP; adverse effects; and follow-up visit were recorded. High risk exposure is defined as a sharp, needlestick, non-intact skin or mucosal exposure to blood or body fluid of an HIV seropositive or suspected HIV source. oPEP is eligible when an accident is defined as carrying a high risk of HIV acquisition, the injured person presents no later than 72 hours and has negative HIV serostatus at baseline.

Statistical analysis

Descriptive statistics were presented as a number and percentage for categorical variables and as the mean with standard deviation for continuous variables. All the statistical analyses were performed using the SPSS Statistics program, version 18.0.

IRB / IEC Certification: The study was conducted under the Siriraj Institutional Review Board's (SIRB) approval (Si 363/2016).

RESULTS

A total of 389 episodes were reported over a 1-year period. The incidence of occupational injury was 7.5 episodes per week. The majority of the exposed HCWs were female (293, 75.3%). Nurses (112, 28.8%) were the most frequently exposed, followed by residents and fellows (101, 26%). The highest incidence occurred in the operation room (112, 28.8%). Needlestick injury (210, 54%) and exposure to blood (328, 84.3%) were the most common type of injury and exposed substance, respectively. The characteristics of the occupational exposures are shown in Table 1.

HCW serologic status

All the HCWs were seronegative for HIV at baseline. Nine (2.3%) HCWs were seropositive for HBsAg. A total of 342 (87.9%) HCWs were considered immune to HBV (anti-HBs ≥ 10 mIU/mL). One HCW had HCV infection.

Source serologic status

The sources known to be positive for HIV, HBV, and HCV numbered 39 (10%), 27 (6.9%), and 12 (3.1%), respectively. Sources with unknown HIV, HBV, and HCV status were 40 (10.3%), 59 (15.2%), and 57 (14.7%), respectively.

Post-exposure management

Of the 389 episodes reported during the study period, 94 (24.2%) HCWs initiated oPEP; 24 (25.5%) discontinued oPEP earlier because of confirmation of an HIV-negative source, 3 (3.2%) were lost to follow-up before the completion of oPEP.

Of the 67 HCWs who received a 28-day course; 18 (25.7%) switched to second-line oPEP due to drug toxicities or exposure to drug-resistant HIV (15 gastrointestinal adverse effects; 1 hepatitis; 1 drug allergy; 1 exposed to an HIV-resistant source). Table 2 shows the oPEP regimens prescribed in this cohort. Fifty-two (77.6%) HCWs attended follow-up at 1 month and 26 (38.8%) attended follow-up at 3 months after exposure. There was no seroconversion in this study.

DISCUSSION

Exposure to blood or body fluids is a common injury among healthcare workers and increases the risk of HIV, HBV, and HCV acquisition. Appropriate wound care, prompt risk identification, and the administration

TABLE 1. Demographic characteristics of 389 episodes of occupational exposure to bloodborne pathogens.

Characteristics	Number (%)
Female	293 (75.3%)
Mean age in years; mean (SD)	27.8 (7.14)
Personnel type	
Nurse	112 (28.8)
Resident and Fellow	101 (26)
Medical student	91 (23.4)
Nurse assistant	29 (7.5)
Worker	20 (5.1)
Attending physician	17 (4.4)
Laboratory officer	16 (4.1)
Nurse student	3 (0.8)
Location of injury	
Operation room	112 (28.7)
Inpatient ward	97 (24.9)
Non-emergency outpatient unit	54 (13.8)
Labor room	48 (12.3)
Emergency room/Trauma	40 (10.3)
Critical care unit	16 (4.1)
Laboratory	9 (2.3)
Other workplaces (waste management, laundry, sterilization unit)	14 (3.6)
Work shift	
Morning	241 (62.0)
Afternoon	90 (23.1)
Night	58 (14.9)
Mechanism of injury	
Needlestick injury	210 (54)
Mucous membrane exposure	102 (26.2)
Sharp injury	48 (12.3)
Non-intact skin exposure	17 (4.4)
Intact skin exposure	12 (3.1)
Exposure substance	
Blood	328 (84.3)
Potential infectious body fluids	33 (8.5)
Non-infectious body fluids	28 (7.2)

TABLE 2. Initial prescribed oPEP regimens and switching oPEP regimens.

Antiretroviral regimens for oPEP	Number (%)
First oPEP regimens	
TDF+XTC+LPV/r	33 (35.1)
TDF+XTC+RPV	32 (34.0)
TDF/FTC	12 (12.7)
TDF+XTC+RAL	12 (12.7)
TDF+XTC+ATV/r	1 (1.1)
TDF+AZT+RAL	1 (1.1)
TDF+RAL+DRV/r	1 (1.1)
AZT+RAL+DRV/r	1 (1.1)
3TC+LPV/r	1 (1.1)
Second oPEP regimens	
TDF+XTC+RAL	8 (44.4)
TDF+XTC+RPV	4 (22.2)
TDF+XTC+ATV/r	3 (16.6)
TDF+XTC+LPV/r	1 (5.6)
TDF+AZT+RAL	1 (5.6)
TDF+RAL+DRV/r	1 (5.6)

Abbreviations: TDF, tenofovir disoproxil fumarate; XTC, lamivudine or emtricitabine; LPV/r, lopinavir/ritonavir; RPV, rilpivirine; FTC, emtricitabine; RAL, raltegravir; ATV/r, atazanavir/ritonavir; AZT, zidovudine; DRV/r, darunavir/ritonavir; 3TC, lamivudine

of post-exposure prophylaxis with an effective oPEP regimen in a timely manner are important measures to mitigate the risk of acquiring an infection.

The present study demonstrated a similar incidence of occupational exposure to blood or body fluids compared with other reported studies in Thailand.[3-5,10] Nurses and in-training physicians are at an increased risk of exposure due to their more frequent involvement in direct patient care and performing medical procedures. Medical students were the third most common personnel type at risk of exposure, possibly due to them practicing medical procedures while still having less experience. Needlestick injuries were more common than mucocutaneous exposure, which was similar to reported in other studies.[3,4,10-13] Several studies reported needle stick injuries occurred commonly among medical students during perineorrhaphy and reported time pressure and lack of skills as perceived causes.[14,15]

Recommended antiretroviral drugs for oPEP have changed over time in order to improve the efficacy to drug-resistant HIV, toxicities, and adherence. In early 2000s, overall adverse effects were reported between 64-76%.[16-18] The common prescribed drugs at that time were AZT, ritonavir-boosted nelfinavir or indinavir or lopinavir, which are not used as first-line drugs for HIV treatment and prevention due to their toxicities and pill burden. The overall adverse effects led to oPEP discontinuation in approximately 34% of cases in a study in Thailand[19], confirming that oPEP regimen selection with less toxic pills should be considered to improve tolerability and adherence. Currently, integrase inhibitor-based, rilpivirine-based, and DRV/r-based in combination with with tenofovir disoproxil fumarate or tenofovir alafenamide (TXF)/lamivudine or emtricitabine (XTC) are recommended for oPEP.[20,21] These regimens are potent, less adverse effects, less drug-drug interactions, and convenient compared to previous regimens and hence adherence improves.

Our study reported a poor follow-up rate (38.8%) at 3 months after exposure among those who were eligible for 28-day oPEP. Compared to another study from Thailand, the follow-up rates were higher than in our study, 89% at 6 weeks and 77% at 3 months, respectively.[10] However, we did not explore the reasons for the loss to follow-up. We did not have a tracking system or send reminders via a text message or phone call to HCWs. Thus, strategies to improve adherence, such as a tracking system or reminders, should be implemented as part of an occupational injury care system.

We also found that some HCWs in this study did not have immunity to HBV. In our hospital, pre-placement evaluation of HBV vaccine status and a quantitative anti-HBs antibody test are required for clinical staff. Nevertheless, some HCWs are employed as general workers but they have to work with medical instruments during disposal or waste management, which pose a risk of blood or body fluid exposure. The local pre-placement evaluation policy for HBV vaccine and immune status to HBV should be customized with details of the job description, not only the position.

This study has several limitations to note. First, some data that might affect the incidence, such as work experience and personal protective equipment use, were not recorded. Second, the incidence was probably underreported because we did not collect data from the central occurrence report system. Those who were exposed to a known negative source may not have visited the occupational clinic for a proper risk evaluation.

In conclusion, occupational exposure to blood and

body fluids is common and poses a risk of acquiring bloodborne pathogens among HCWs. Antiretroviral regimens with highly effective, less toxicity, combination pills that are applied in a timely manner can mitigate the risk of HIV infection and improve adherence to oPEP. Despite training and policy implementation on safety procedures to prevent injury, occupational exposure to bloodborne pathogens occurs frequently. A regular training program for common medical procedures and safety practices should be implemented for all HCWs that may be exposed to blood or body fluids. In addition, interventions such as a tracking system or message reminders should be further studied and implemented to improve the follow-up rate among HCWs.

Conflict of interest: The authors declares no conflict of interest.

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