ARTICLE REVIEW

Occupational Sharps Injury Management in Malaysia: A Narrative Overview

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ABSTRACT

Occupational sharps injury remains a never-ending issue faced by healthcare workers (HCWs). There were several types of post-exposure management available in Malaysia. Thus, it was hoped that this narrative overview could provide an impetus towards the understanding of post-exposure management in our local healthcare setting. Working in a healthcare setting, sharps appeared to be an inevitable hazard faced every day by individual HCWs. While PEP was available for HIV and Hepatitis B, none was available for Hepatitis C. Despite that, the latter seemed to have curative treatment for it. Conclusion: Overall, most literatures had showed the benefits of adherence to post-exposure follow-up management, particularly when PEP was indicated. Occupational sharps injury remains a never-ending issue faced by healthcare workers (HCWs). There were several types of post-exposure management available in Malaysia. Thus, it was hoped that this narrative overview could provide an impetus towards the understanding of post-exposure management in our local healthcare setting. Working in a healthcare setting, sharps appeared to be an inevitable hazard faced every day by individual HCWs. While PEP was available for HIV and Hepatitis B, none was available for Hepatitis C. Despite that, the latter seemed to have curative treatment for it. Conclusion: Overall, most literatures had showed the benefits of adherence to post-exposure follow-up management, particularly when PEP was indicated. Occupational sharps injury remains a never-ending issue faced by healthcare workers (HCWs). There were several types of post-exposure management available in Malaysia. Thus, it was hoped that this narrative overview could provide an impetus towards the understanding of post-exposure management in our local healthcare setting. Working in a healthcare setting, sharps appeared to be an inevitable hazard faced every day by individual HCWs. While PEP was available for HIV and Hepatitis B, none was available for Hepatitis C. Despite that, the latter seemed to have curative treatment for it. Conclusion: Overall, most literatures had showed the benefits of adherence to post-exposure follow-up management, particularly when PEP was indicated.

Keywords Sharps injury - Post-exposure prophylaxis - HIV - Hepatitis B - Hepatitis C.

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INTRODUCTION

Within the context of a healthcare setting, sharps or specifically needles, are extensively used. Customary to the twenty-four-seven typical hustle and bustle working hours of front liner, much is at stake, particularly on the exposure towards sharps injury. Alarmingly, this put forth considerable attention, especially when almost everyone in the workplace is dealing with the risk that seems to emanate from such a hazard. According to MOH (2007),[1] more than two-thirds of HCWs' injuries came from a needlestick injury. Based on a recent study in Malaysia, doctors specifically house officers showed high percentages of sharps injury.[2]

Regionally, World Health Organisation (WHO) Western Pacific Region (2016) stated that the word sharps include "used and unused sharps such as hypodermic, intravenous or other needles, infusion sets, scalpels, knives, blades and broken glass". [3] Locally, sharps injuries were defined as needles, glass, surgical instruments or other items as stated inside the Occupational Health Unit (OHU) Sharp Injury Surveillance (SIS) notification form.[1] Alarmingly, occupational sharps injury alarmingly becomes such a burden worldwide.

Globally, WHO in Environmental Burden of Disease Series, No. 11 estimated around 66 000 HBV, 16 000 HCV and up to 5000 HIV infections among HCWs caused by sharps injuries annually.[4] These were catastrophic figures of an insidious nature, notably when the Centers for Disease Control and Prevention (CDC 2008) estimated more than a quarter-million of sharps injury cases per year.[5] In Malaysia, needlestick injury contributes to 74.9% of all HCWs injuries.[1] This proportion of needlestick injury indirectly provides us with a piece of critical information that post-exposure management such as PEP shall not be neglected.

Being hollow-bore, insidiously needles possess a hazardous ability to carry a volume of infected blood, thus put these affected HCWs at higher risk of contracting bloodborne infections such as Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and Human Immunodeficiency Virus (HIV).[6] Furthermore, the perpetuation of bloodborne infections among HCWs is also anticipated when using other sharps instruments or devices.[1,7]

Each of these bloodborne infections possess unique properties that could insidiously harm those who have been contracted the debilitating diseases. HCV for examples, posits somewhere in the middle risk of developing the disease after potential exposure with contaminated sharps as compared to HBV and HIV.[7] Though it is curable, neglecting the post-exposure follow-up especially serological test may render an infected person with persistent HCV infections that infamously known as a major risk for developing hepatocellular carcinoma (HCC).[8] While HBV posits the highest risk of transmission on the one hand, risk of HIV transmission is ranked the lowest.[7] Having said that does not mean that sharps injured HCWs should be worry-free of HIV. Even though HCWs could have the opportunity to get protection from the latter with availability of vaccine, to date, there are still no cure for both HIV and HBV.[9,10] Therefore, health authorities formulated measures to combat such bloodborne pathogens. These measures are called post-exposure prophylaxis (PEP).[10,11]

Post-exposure prophylaxis

PEP is defined as clinical response measures to prevent the spread of bloodborne pathogens after potential exposure. It is comprehensive management to minimise the risk of infection. In the event of HIV infection, PEP inhibits virus replication after initial exposure, thus preventing chronic infection. The golden period spans up to two hours of initiation, for which PEP is most effective. On the contrary, PEP is less effective if commenced after 72 hours.[11] Although not all HCWs who contracted with sharps injury will be prescribed PEP, follow-up at the specified given time intervals is compulsory for all. In Malaysia, there are three follow-up sessions at intervals of six weeks, three months and six months. These are mainly for serological testing.[1] Therefore, we aimed to provide a narrative overview of occupational sharps injury management and its rationale, especially within Malaysian healthcare settings.

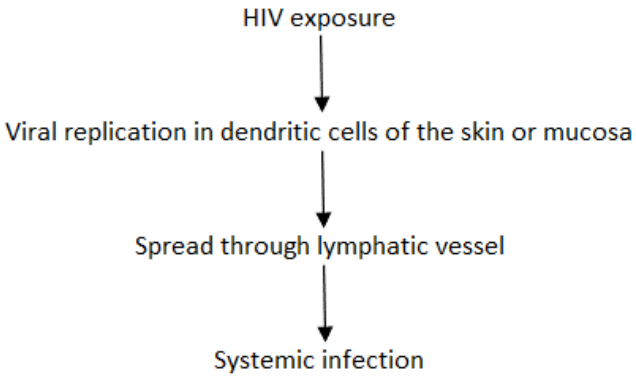
The current definition of PEP was rendered inconsistent. Whilst some propose a restricted scope of a mere antiretroviral medication,[12] other scholars had offered a broader definition encompassing whole post-exposure management.[11] The term PEP may vary, in the sense of its semantic applications, ranging from short-course antiviral therapy to the use of Hepatitis B immune globulin (HBIg) and vaccine.[10,11] The risk for bloodborne infection is higher if pathogens were transmitted from the patient to HCWs rather than the other way round.[13] Therefore, HCWs with a substantial level of exposure risk may benefit if prescribed PEP, depending on the type of bloodborne pathogens exposure (i.e., HIV & HBV).

Human immunodeficiency virus

HIV is one of the typical bloodborne pathogens that posed HCWs at risk.[14] Globally, up to 95% of workplace HIV seroconversion roots in needlestick injuries.[15] Despite having a 100 times lower risk of transmission than HBV, HIV continues to become a great source of concern as currently there is still neither cure nor effective vaccine available.[16] Furthermore, without prompt PEP administration, 1 in 300 HCWs who contract with sharps from HIV-infected patients were anticipated to develop the condition after exposure[7].

After initial exposure, PEP inhibits the virus replication, thus preventing the further establishment of chronic HIV infection. The golden period for which PEP was at the peak of its effectiveness is initiated within two hours. On the contrary, there was little benefit if the commencement starts beyond 72 hours.[11] Contemporary scholars have highlighted a window of opportunity that allows the PEP to work before establishing chronic HIV infection.[17]

The inception of the disease begins with exposure, e.g., injury from contaminated sharps. Herein, the virus undergone endocytosis by dendritic cells into vesicles-containing HIV virions causing it to be impossible for inactivation. Once matured, the cells were then migrated to regional lymph nodes, where the virus laden vesicles formed immunological synapse with CD4 T cells. Together, they facilitated the spread of HIV from regional into systemic circulation. As summarised in Figure 1, HCWs may gain benefits with prompt PEP initiation either through reduce HIV viral load in blood on the one hand, or through protection against cell-associated virus that had entered the circulation on the other.[17]



Source: Adapted from Volberding et al. 2013

Figure 1 Pathophysiology of HIV infection

An invaluable benefit of PEP was first reported in 1997 by Cardo et al.[18] Her seminal ground-breaking case-control study found an 81% reduction of HIV seroconversion among sharps-injured HCWs took zidovudine PEP within four hours for at least four weeks.[18] A plausible explanation for this was due to the benefit of a 10-fold reduction in viral load after a week of early antiretroviral therapy (ART) commencement, following tremendous 100-fold reduction after four weeks regimens.[17] Therefore, HCWs should adhere to the recommended post-exposure management even though HIV posed a significantly lower risk of transmission than HBV.

Hepatitis B virus

Another most common bloodborne pathogen is HBV.[14] Vaccinated HCWs may benefit up to 95% protection from the disease. However, only less than a quarter of HCWs worldwide have completed an entire course of HBV vaccination.[15] Therefore, regardless of vaccination status, exposed HCWs with inadequate antibody levels towards Hepatitis B surface antigen (HBsAg) shall not waste their privilege to access HBV PEP.[19] Particularly when one in three exposed HCWs may establish HBV infection (i.e., the highest risk of transmission compared to HIV & HCV) while a cure was far beyond reach.[7,9]

The term cure in HBV infection remains debatable. Although scholars have come out with many definitions of HBV cure, such as functional, partial or complete cure, we have a hard time accepting that there is still no cure for HBV infection amid the 21st century.[9] This situation was due to the intrinsic viral property that can form highly stable latent HBV covalently closed circular deoxyribonucleic acid (cccDNA) in the hepatocyte nucleus. Therefore, a true virologic cure would be almost impossible.[20] Hence, scientists have been left with no option other than searching for an alternative prevention mode (i.e., vaccination).

In the 1980s, worldwide HBV's prevalence among children fell drastically after introducing the vaccine.[21] After nine years, HBV became part of the Malaysian National Immunisation Programme.[22] In addition, the HBV vaccination guideline for HCWs was introduced for those born before 1989.[23] Despite being a part of vaccine-preventable diseases, not all vaccinated HCWs achieve adequate antibody levels, thus at risk of being infected (i.e., the non-responder).[19] Therefore, the use of HBV PEP may be desirable whenever indicated. Both local and international guidelines strongly recommend administering hepatitis B immune globulin (HBIG) and hepatitis B vaccine regime as PEP for any HCWs who have not yet received or completed HBV vaccination. This regime includes non-responder in the event of exposure to HBV-

contaminated sharps.[10,19,21] According to WHO (2005), up to 95% protection from HBV infection may be offered by combination between HBIG and HBV vaccination.[4]

Hepatitis C virus

Although the risk of transmission lies somewhere between HIV and HBV, HCV bears no resemblance to both those mentioned earlier most familiar bloodborne pathogens in terms of the availability of PEP. Unfortunately, neither PEP nor vaccine works against HCV.[7,24] Without these preventive measures, one in 30 HCWs were at risk of developing HCV infection after contracting HCV-contaminated sharps.[7]

Being at risk, these HCWs were advised to adhere to the recommended post-exposure follow-up. The reason behind this was that they might benefit from early detection of disease from a serial serological test given the nature of HCV's course of infection. HCV window period may last up until three months from the exposure date. Eventually, nearly all infected HCWs will have detectable antibodies by six months.[25] The presence of antibodies and other biological markers such as antigens usually signals the necessity for treatment initiation.

Fortunately, although in the absence of effective PEP, advancements in medical technology and treatment have allowed a complete cure of this disease. Surprisingly, more than a 95% cure rate was anticipated.[24] Therefore, adherence towards post-exposure follow-up shall not be taken lightly to allow for early detection and prompt treatment in combating this debilitating disease.

Post-exposure management

Management of sharps injury has thoroughly been discussed inside our national guideline, "Guidelines on Occupational Exposures to Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV), and Recommendations for Post Exposure Prophylaxis (PEP)" by MOH (2009).[19] As recommended inside the guideline, HCWs who contract with sharps injury shall be managed according to the nature of their exposure and risk of bloodborne infections.

The management includes first aid, notification, risk assessment (i.e., types of injury, sources, and exposed HCWs' status), referral, serial blood investigations, follow-up consultations, counselling, prophylaxes, treatment, and vaccinations. Being a superset, adherence to follow-up may serve as a proxy for measuring HCWs' compliance on PEP whenever indicated as the service provider prescribes. A recent review of the literature on adherence towards ART found that those who default from follow-up may not adhere to medication, thus lead to a catastrophic treatment failure. This situation occurs due to the rapid advancement of disease as reflected by individual biological markers such as CD4 counts.[26] Briefly, we have summarised the post-exposure management as depicted in Figure 2. Obviously, follow-up is the fundamental component that allows management feasibility among HCWs with sharps injury, and hence it shall not be taken lightly.

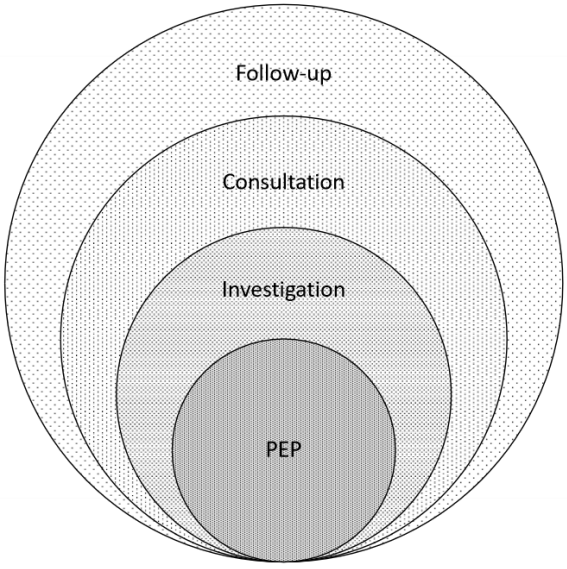


Figure 2 Post-exposure management

The rationale of the follow-up interval

The Malaysian guideline has concisely outlined follow-up sessions to be conducted in a sequence of six weeks, three months and six months.[19] This seems to favour the flow in the pathogenesis of HIV disease and acknowledge the importance of the other two most common bloodborne pathogens. For brevity, the rationale of post-exposure follow-up interval will be explained with regards to HIV exposure.

Basically, HCWs without previous history of exposure to HIV will have no antibody towards HIV in their blood. Once contracted with sharps injury, the earliest antibody may be detected after three weeks.[27] However, a vast amount of literature recommends continuing PEP until 28 days.[28] Therefore, the management mentioned above was justifiable given the unpredictable nature of the window period for this disease.

The window period was an interval of inconclusive test results with successive infections due to failure in detecting antigen or antibodies. Because of this event, enzyme-linked immunosorbent assay (ELISA) or fourth-generation test was widely used to shorten this period. In addition, the test can detect both antigen and antibodies.[29] Given these capabilities, the window of opportunity was wide open for detecting seroconversion via serial follow-up among HCWs contracted with HIV-contaminated sharps.

After six weeks of serial follow-up, up to 95% HCWs that have been infected with HIV may have an adequate antibody level that was detectable. Next, at another three-month follow-up interval, 99% of these HCWs will have detectable antibodies.[30] Eventually, as depicted in Figure 3, nearly all of these HCWs will have enough antibody level (i.e., IgG) that was detectable by HIV test after six months from the date of exposure.[17] Hereafter, the rationale of adherence to these recommended follow-up intervals coming to its sense side-by-side.

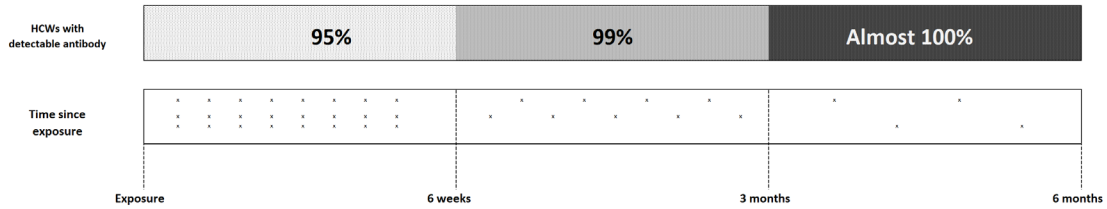


Figure 3 Percentage of HCWs with detectable seroconversion

CONCLUSION

The conclusions of this narrative overview had provided us with an impetus towards the understanding of occupational sharps injury, the risk of bloodborne infections it possessed, the post-exposure follow-up management and the rationale behind it. Overall, references and studies referred here showed us the benefits of adherence to post-exposure follow-up management, especially PEP, whenever indicated. These findings may add to the growing body of literature regarding occupational sharps injury management. In light of hope, our findings may offer useful information to policymakers, healthcare providers, and HCWs themselves when formulating, implementing and adhering to the post-exposure follow-up services offered in our local healthcare settings. Our recommendation for future researcher is to perform intervention study particularly with the aim of improving adherence to follow-up after the event of sharps injury among HCWs.

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The authors declare that there is no conflict of interest.

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Consent
Not Applicable.

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