Australian Prescriber
VOLUME 47 : NUMBER 4 : AUGUST 2024

ARTICLE

# Management of occupational exposure to blood and body fluids in primary care


## SUMMARY

Primary care workplaces where occupational exposure to blood and body fluids may occur should have policies and procedures in place to manage such incidents.

All healthcare workers should be immunised against hepatitis B and ideally should have documentation of their antibody response to vaccination. Knowledge of hepatitis B immune status helps streamline the response to any exposure.

Most occupational exposures carry a low risk of transmission of bloodborne viruses, and management can often be undertaken in general practice.

Urgent risk assessment and management is crucial. If postexposure prophylaxis for hepatitis B or HIV is required, the earlier it is given, the more likely it is to be effective.

Two-drug HIV postexposure prophylaxis is now more accessible because generic formulations of the drug combination are available, and general practitioners can prescribe this on a private prescription.



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**Keywords**
hepatitis B, hepatitis C, HIV, needlestick injuries, occupational injuries, postexposure prophylaxis

*Aust Prescr 2024;47:113–8*
https://doi.org/10.18773/austprescr.2024.037


## Introduction

Exposure to blood and body fluids is a common occurrence in healthcare workers and can be a source of significant anxiety. Most commonly, exposures occur as a result of needlestick injuries or splashes to mucous membranes or non-intact skin. Rarely, an exposure may result from a bite or scratch that penetrates the skin and involves blood (e.g. from a person with bleeding gums or with blood under the fingernails). Most exposures carry a very low risk of acquisition of bloodborne viruses; however, it is important to recognise incidents that carry a higher risk of transmission and to know when postexposure prophylaxis is required.

Prevention is important and all workplaces where healthcare workers may be exposed to blood or body fluids should ensure staff are aware of and implement standard precautions and other work practices for the safe use and disposal of sharps.[1] In addition, all healthcare workers should not only be vaccinated against hepatitis B, but ideally should have documentation of their antibody response to vaccination. Knowledge of hepatitis B immune status helps streamline the response to any exposure.

Workplaces where occupational exposure to blood or body fluids may occur should have written policies and procedures for dealing with these incidents, including documentation of responsibilities for management. The Royal Australian College of General Practitioners' Infection Prevention and Control Guidelines provide detailed advice for general practices.[1]

This article focuses on occupational exposure to blood and body fluids in primary care (e.g. general practice, dental practice, community pharmacy). Such exposures can often be managed in general practice (if the injury occurs there, or if an exposed person is referred to their own general practitioner), while some instances may require referral to a specialist physician or hospital emergency department for risk assessment and management. Urgent risk assessment and management is crucial – if postexposure prophylaxis for hepatitis B or HIV is required, the earlier it is given, the more likely it is to be effective.

Non-occupational exposures include percutaneous needlestick injuries in the community, most commonly resulting from needles discarded in public places. These injuries frequently result in significant anxiety; however, the risk of transmission of a bloodborne virus, particularly HIV, from such an injury is very low.[2-6] Further discussion on non-occupational exposures is beyond the scope of this article.

## Risk of transmission of bloodborne viruses

Hepatitis B virus, hepatitis C virus and HIV are the most likely pathogens to be transmitted from exposure to blood or body fluids. Other pathogens may be

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relevant in certain settings, such as human T-cell lymphotropic virus type I (HTLV-1) in Aboriginal and Torres Strait Islander populations in remote Australia.[7]

Risks of transmission of bloodborne viruses are only estimates and numerous factors contribute to the overall risk. Increased risk of transmission is associated with deep injuries from a hollow bore needle, particularly if it is visibly contaminated with blood.[8] Splashes of blood or blood-stained body fluid to mucous membranes or non-intact skin carry significantly less risk.[9]

The risk of transmission is greatest with hepatitis B virus. The risk of acquiring hepatitis B from an occupational needlestick injury ranges from 2 to 40% when the source (the person from whom the blood or body fluid originated) is hepatitis B surface antigen (HBsAg) positive, depending on the source viral load.[10] The risk of hepatitis C infection from occupational needlestick injury ranges from 3 to 10%.[10]

The risk of HIV transmission is significantly lower than for hepatitis B or hepatitis C. A 2006 meta-analysis estimated the risk associated with parenteral exposure at 0.23% (1 in 440) per exposure.[11,12] However, the risk is likely to be significantly lower, as those data pre-date effective antiretroviral therapy. The risk associated with mucous membrane or non-intact skin exposure is lower than for parenteral exposure, estimated at 0.1% (1 in 1000) per exposure.[9] There have not been any reports of occupational HIV transmission in the UK since 1999, and only one in the USA since 1999.[13,14] More recently there has been a case of HIV acquired in a healthcare worker in Australia who seroconverted after sustaining a needlestick injury from a source with a high viral load. Postexposure prophylaxis was started within 2 hours of exposure, but notably therapy was interrupted for a period of 4 days.[15]

The risk of HIV transmission is highly dependent upon the source viral load. It is now clear that if an individual with HIV infection takes daily antiretroviral therapy and maintains an undetectable viral load (HIV viral load less than 200 copies/mL), there is no risk of sexual transmission.[16-19] This is referred to in public health messaging as U=U (undetectable = untransmissible).[20] While it is likely the same would apply for other risk exposures (occupational exposure, sharing injecting equipment), there is a lack of data to support this.

## First aid

For any penetrating injuries with sharp objects that are contaminated with blood or body fluid, human bites that penetrate the skin, or splashes to intact or non-intact skin with blood or body fluid, wash the site with soap and water, and apply an occlusive dressing if appropriate. Wounds should not be squeezed to express blood.[21]

If there is a splash to the eye with blood or body fluid, flush eyes with water or saline immediately and remove contact lenses, if applicable. For a splash inside the nose or mouth, rinse repeatedly with water.

## Reporting

The incident should be reported immediately to the person nominated responsible for managing occupational exposures at the workplace. This person must ensure the exposed staff member is managed appropriately, and all steps outlined in the policy are followed. In some instances, the same person may be managing both the source and the exposed person. Whenever possible, the exposed person should not manage the source.

There may also be legislative requirements to report sharps injuries, exposures to blood or body fluids that require treatment, and acquisition of a bloodborne virus to jurisdictional authorities; readers should be aware of local requirements.[1,22] Contact details for the work health and safety regulator in each jurisdiction are available on the Safe Work Australia website.

## Assessment of risk

It is important to accurately assess the risk of exposure to determine if source blood testing is required.

Testing of the source is only necessary if there is potential transmission of blood or other potentially infectious body fluid from the source to the healthcare worker. In the occupational setting, the source is usually able to be identified and tested for bloodborne viruses.

Incidents that require blood testing of the source are:

- penetrating injury involving blood or blood-stained body fluid (e.g. urine, saliva, amniotic fluid)
- splash to mucous membrane, eyes or non-intact skin with blood or blood-stained body fluid (e.g. urine, saliva, amniotic fluid)
- human bite or scratch that penetrates skin and involves blood (e.g. source with bleeding gums or blood under the fingernails).

Source blood testing is not required for:

- exposures to intact healthy skin
- exposures to mucous membrane, eyes or non-intact skin with non–blood-stained body fluid (e.g. urine, saliva, amniotic fluid)
- an injury with a clean sharp (i.e. one that has not been in contact with a patient).

If the source results are all negative and the person has no known risks for bloodborne viruses, no further

follow-up to exclude transmission in the exposed person is required.

If the source has any positive results, the level of risk is related to the source viral load and the type of exposure that occurred. Management is outlined in the sections on hepatitis B, hepatitis C and HIV below.

If the source is unknown or cannot be tested, consider the balance of risk probabilities; regardless of whether postexposure prophylaxis is prescribed, it is important to follow up the exposed person and perform repeat serology.

## Counselling and testing

Counselling and baseline blood testing (if required) of the exposed person and the source should be carried out as soon as possible.

In remote and regional areas without access to pathology testing facilities, consider seeking specialist advice and transferring the exposed person and source to a larger regional centre with appropriate facilities.

### *Exposed person*

The exposed person should be counselled about the level of risk of the exposure, the reasons for serological testing, and the need for follow-up. Referral to (or seeking advice from) an infectious diseases physician may be helpful to discuss the level of risk and, if relevant, explain what is being done to minimise the risk. The exposed person may need to take precautions to prevent transmission during the follow-up period (e.g. if definitely exposed to HIV, the exposed person should avoid unprotected sex until follow-up testing is complete).

For significant exposures requiring blood testing of the source, the exposed person should provide consent for the following baseline tests to be performed:

- hepatitis B surface antibody
- hepatitis C antibody
- combined HIV antigen and antibody.

If no record of the exposed person's hepatitis B status is available, also test for HBsAg and hepatitis B core antibody to exclude hepatitis B infection.[21]

If the hepatitis C antibody test is positive, follow-up testing for hepatitis C RNA polymerase chain reaction [PCR] test) is required to exclude current infection.

### *Source*

The source should be informed about the incident and the need for urgent testing for bloodborne viruses. If sensitively counselled, they will usually provide consent. If the person discloses that they have HIV, hepatitis B or hepatitis C infection, they should be asked for consent to have their history discussed with their treating doctor.

Ideally, testing of the source should be performed within 60 minutes of exposure. This is not always practical, but it should be done as soon as possible.

When blood testing of the source is indicated (see 'Assessment of risk' above) and the person is competent and consents to a blood test, perform the following tests:

- HBsAg
- hepatitis C antibody, or hepatitis C RNA if known to be hepatitis C positive
- combined HIV antigen and antibody.

If the hepatitis C antibody test is positive, follow-up testing for hepatitis C RNA is required to exclude current infection.

When the source is incompetent, unconscious or deceased, approval to test the source must be obtained from an authorised person (e.g. Chief Health Officer), as directed in the state or territory legislation.

## Management of hepatitis B virus exposure

If the source is negative for HBsAg and they have no known risks for bloodborne viruses, no further follow-up of the exposed person to exclude transmission is required. However, if at this time it is found the exposed person is unvaccinated or has not had an effective response to hepatitis B vaccination in the past, this is an opportune time to provide vaccination (see Table 1).

If the source is positive for HBsAg or their hepatitis B status is unknown, recommendations for management of the exposed person are provided in Table 1.

Healthcare workers who cannot provide evidence of 3 doses of hepatitis B vaccine should be considered unvaccinated. Healthcare workers who do not have evidence of protective hepatitis B surface antibodies (10 mIU/mL or higher) at any time after vaccination should be managed as for people with an inadequate response to vaccination.

If hepatitis B immunoglobulin (HBIG) is required for postexposure prophylaxis, it can be ordered through Lifeblood if a general practice is registered. Alternatively, refer the person to the nearest emergency department.

## Management of hepatitis C virus exposure

If the source is negative for hepatitis C antibodies and they have no ongoing risks for bloodborne viruses, no further follow-up of the exposed person to exclude transmission is required.

## Table 1 Management of a healthcare worker exposed to hepatitis B virus[23,24]

| | Exposed person is immune [NB1] | Exposed person is not immune | | |
|---|---|---|---|---|
| | | Unvaccinated [NB2] | Hepatitis B 3-dose vaccination completed but inadequate response (anti-HBs less than 10 mIU/mL) [NB3] | Hepatitis B vaccine nonresponders (after 6 doses of vaccine) |
| **Source is HBsAg negative** | No further action required. | Offer opportunistic vaccination:<br>• immediately: 1st dose of hepatitis B vaccine<br>• 1 month: 2nd dose of hepatitis B vaccine<br>• 6 months: 3rd dose of hepatitis B vaccine, followed by anti-HBs testing 1 to 2 months later. | Offer opportunistic booster vaccination:<br>• immediately: 1st booster dose of hepatitis B vaccine<br>• 1 month: check anti-HBs. If less than 10 mIU/mL, give 2nd booster dose of hepatitis B vaccine, followed by a 3rd booster dose 1 month later (ie at 2 months). | No further action required. |
| **Source is HBsAg positive or status unknown** | No further action required. | Manage exposure:<br>• immediately: 1st dose of hepatitis B vaccine and one dose HBIG (at separate injection sites) [NB4] [NB5]<br>• 1 month: 2nd dose of hepatitis B vaccine<br>• 6 months: 3rd dose of hepatitis B vaccine, followed by anti-HBs testing 1 to 2 months later. If negative, test for HBsAg and anti-HBc to exclude acquired hepatitis B infection. | Manage exposure:<br>• immediately: 1st booster dose of hepatitis B vaccine and one dose HBIG (at separate injection sites) [NB4] [NB5]<br>• 1 month: 2nd booster dose of hepatitis B vaccine<br>• 6 months: 3rd booster dose of hepatitis B vaccine, followed by anti-HBs testing 1 to 2 months later. If negative, test for HBsAg and anti-HBc to exclude acquired hepatitis B infection. | Manage exposure:<br>• immediately: 1st dose of HBIG [NB5]<br>• 1 month: 2nd dose of HBIG<br>• 3 months: test for HBsAg and anti-HBc to exclude acquired hepatitis B infection<br>• 6 months: test for HBsAg and anti-HBc to exclude acquired hepatitis B infection. |

anti-HBc = hepatitis B core antibody; anti-HBs = hepatitis B surface antibody; HBsAg = hepatitis B surface antigen; HBIG = hepatitis B immunoglobulin; mIU/mL = milli-international units/mL

NB1: Exposed person has protective hepatitis B surface antibodies (10 mIU/mL or higher), or had a documented protective response (10 mIU/mL or higher) at any time after vaccination.

NB2: Healthcare workers who cannot provide evidence of 3 doses of hepatitis B vaccine should be considered unvaccinated.

NB3: Healthcare workers who do not have documented evidence of protective hepatitis B surface antibodies (10 mIU/mL or higher) at any time after vaccination should be managed as for people with an inadequate response.

NB4: The first dose of hepatitis B vaccine should be given as soon as possible after exposure. There is limited evidence on the maximum time interval following exposure for which postexposure vaccination is effective, but it is likely no more than 7 days for percutaneous exposures.

NB5: HBIG should be given as soon as possible after exposure (within 72 hours).

If the source is positive for hepatitis C antibodies, test the source for hepatitis C RNA (via a PCR test), then:

- if source hepatitis C RNA is negative and they have no ongoing risks for bloodborne viruses, no further follow-up of the exposed person is required
- if source hepatitis C RNA is positive, the exposed person should be tested for hepatitis C antibodies and hepatitis C RNA at 6 weeks, and hepatitis C antibodies at 3 months and 6 months.[25] If a test result is positive for hepatitis C antibodies, follow-up testing for hepatitis C RNA (via PCR test) is required.

If the hepatitis C status of the source is unknown, the exposed person should be followed up as if the source was positive.

There is no postexposure prophylaxis available for hepatitis C, but infection can be successfully treated with direct-acting antiviral drugs.

## Management of HIV exposure

If the source is HIV negative and they have no ongoing risks for bloodborne viruses, no further follow-up of the exposed person to exclude transmission is required.

If the source has had a recent high-risk exposure (and could be in the window period), start HIV postexposure prophylaxis (PEP) in the exposed person even if the source result is negative.

If the source cannot be tested immediately, consider starting HIV PEP in the exposed person without waiting for the source test results.

If the source is known to have HIV infection, take additional blood in an EDTA tube from the source for HIV viral load testing. Further management depends on whether the person is taking antiretroviral therapy and whether the HIV viral load is detectable in plasma.

The decision to prescribe HIV PEP should be made on a case-by-case basis, taking into account the nature of the injury and preferences of the exposed person. Any healthcare worker with a significant exposure to a source with HIV infection should be offered PEP, particularly those who are anxious about the risk. For detailed information about prescribing HIV PEP, refer to the Australian HIV PEP guidelines.[21]

When HIV PEP is required it should be started as soon as possible, ideally within 24 hours and no later than 72 hours after the exposure.[21]

If further advice is required on HIV risk assessment or the use of HIV PEP, contact the infectious diseases service at your local public hospital.

### *2-drug versus 3-drug HIV PEP*

The recommendation about the number of drugs used for HIV PEP was previously based on the estimated risk of exposure, with 3 drugs reserved for higher-risk exposures. Newer antiretroviral drugs are better tolerated and have less toxicity; however, there remains a lack of evidence to support the choice, and recommendations in international guidelines vary.[26,27] In Australia, recommendations for 2-drug or 3-drug HIV PEP are provided in the Australian HIV PEP guidelines.[21]

Traditionally, access to 2-drug PEP (tenofovir disoproxil+emtricitabine) was limited by the cost of the treatment; however, this combination is now available in generic formulations, so any prescriber can provide a private prescription for treatment, available at a reasonable cost (approximately $50). If 3-drug PEP is required, refer the person to a sexual health or infectious diseases physician at a public hospital because generic formulations are not currently available for the recommended third drug (dolutegravir or raltegravir).

### *Follow-up HIV testing*

If the exposed person does not receive HIV PEP, a final HIV test at 6 weeks after exposure is sufficient to exclude HIV infection. In those who receive HIV PEP, follow-up HIV testing should occur at 6 and 12 weeks after exposure. There is substantial evidence that commencing antiretroviral therapy during primary infection can potentially alter the serological response and impact detection of HIV infection, hence the need to test at 6 and 12 weeks.[28]

## Conclusion

Occupational exposure to blood and body fluids in primary care can often be managed in general practice. Effective management includes provision of first aid, risk assessment, counselling, baseline testing, provision of postexposure prophylaxis if indicated, and follow-up testing if required. Referral to a specialist or hospital may be required in some cases.

*Conflicts of interest: Anna Pierce is a member of the Expert Reference Group for ASHM Health's Australian HIV PEP guidelines (3rd edition).*

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