

Needle-stick injuries in primary care

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SYNOPSIS

Needle-stick injuries in health-care workers are almost completely preventable by improving workplace practices, but when they do occur the consequences for the individual can be serious, regardless of the outcome in terms of infection. Post-exposure management includes first aid, serological testing and counselling in all cases. Immunoprophylaxis and antiviral medications are used in some cases. Advice and guidance should always be sought from local specialist services. With needle-stick injuries in members of the public the risk of transmission is extremely low. While there is usually no place for pharmacotherapy, counselling is essential.

Index words: hepatitis B, hepatitis C, HIV.

(Aust Prescr 2001;24:98-100)

Introduction

A needle-stick injury can be a devastating event. Although the risk of contracting a blood-borne pathogen is low, the psychological trauma that follows the injury can be disabling. However, where the risk is significant, the immediate administration of post-exposure prophylaxis may reduce the chance of seroconversion to some pathogens. The provision of counselling can mitigate the psychosocial consequences of the accident. While hospital workers often have immediate access to specialist support, these services may not be available to healthcare workers in the community.

Risks of transmission

The major blood-borne pathogens of concern are the human immunodeficiency virus (HIV), hepatitis C virus (HCV) and hepatitis B virus (HBV). In some settings, other infections may be relevant, for example *Treponema pallidum* and human T-cell lymphoma virus (HTLV-1) are endemic in some populations in remote Australia.

Estimating the probability of transmission following a needle-stick injury is difficult as there are many factors which contribute to the risk. These include the type of injury and the viral load of the source patient at the time of the injury. Hollow-bore needles with visible traces of fresh blood carry the highest risk, while splashes to mucosal surfaces and intact skin carry the lowest risk. The risk of acquiring infection is greatest for HBV and least for HIV, with HCV being of intermediate risk (Table 1).

Reducing the risk of transmission

Although they carry the lowest risk of transmission, exposures to skin and mucosal surfaces can be virtually eliminated by

using eye protection and gloves in any circumstance where contact with bodily fluids is possible. Safe disposal of sharps is the most important means of reducing needle-stick injuries. Sharps containers should comply with the Australian standards, should have a wide neck to avoid the need to push objects into the container and must never be overfilled. Sharps containers should not be easily accessible, as they can pose a threat to visitors to clinics, especially young children. Winged infusion needles ('butterflies') and intravenous catheters are associated with high rates of needle-stick injury and special care should be taken during insertion and disposal. Some institutions have stopped using butterfly needles or adopted newer items with safety devices fitted.^{1,2}

Post-exposure management

Following exposure to a potentially infected fluid, simple first aid measures are needed. The wound or mucous membrane should be flushed with water. There is no evidence that expressing fluid from the wound reduces the risk of transmission. The use of bleach or the injection of antiseptics or disinfectants is not recommended.

A quick risk assessment should be made. Common sense has a role here and often the risk of the patient having a transmissible infection can be easily estimated. However, the most important determinant of subsequent action is the type of exposure, rather than the source patient's risk factors. If the infectivity of the source patient is unknown, serological testing should be immediately undertaken after obtaining informed consent.

Issues relating to the so-called window-period, where viral replication is present but antibodies have not appeared, may cause concern. This concern can be dismissed in most cases where the history excludes behaviour which may have put the patient at risk of infection in the preceding three months. For medicolegal reasons, the injured worker should also have baseline serological testing.

Post-exposure prophylaxis

Hepatitis B

The source patient should be tested for hepatitis B surface antigen (HBsAg) as soon as possible. No further action is required if the test is negative. If the injured person has not

Table 1
Estimated risk of transmission per exposure*

Exposure	Hepatitis B	Hepatitis C	HIV
Puncture by contaminated needle	1:16-1:3.3	1:55	1:313

* Source: Centers for Disease Control, Atlanta, USA

been immunised and the result is likely to be delayed, a dose of HBV vaccine is given immediately, with subsequent doses at one and six months. A single dose (400 IU) of hepatitis B immunoglobulin should also be given as soon as possible (preferably within 72 hours).

If the injured person has been vaccinated against HBV and seroconversion has been documented, then no further action is required. When seroconversion has not been documented, a booster dose of hepatitis B vaccine should be given immediately and, if surface antibodies cannot be measured within 72 hours, a dose of HBIG given.

Hepatitis C and HTLV-1

There is no evidence to support the use of any drugs for post-exposure prophylaxis for HCV and HTLV-1.

HIV

The rationale for antiretroviral drugs is based on observational studies which showed decreased seroconversion rates in those who received prophylaxis. No randomised clinical trials have been (or will be) performed to determine the efficacy of this approach. Prophylaxis is not a trivial undertaking as antiretroviral drugs are associated with serious, and rarely life-threatening, adverse effects; an assessment of the risks of benefit and harm should be made in all cases. Access to HIV antiretroviral medication is restricted and usually confined to major hospitals. Liaison with the local Sexual Health service or Infectious Diseases/HIV unit will facilitate the prescription of appropriate drugs.

The American Centers for Disease Control and Prevention recommend two regimens – a two drug regimen where the risk of transmission is low, or a three drug regimen where a higher risk exists or where there is a possibility of viral resistance to one or more of the drugs. Examples of three drug regimens would be zidovudine/lamivudine plus either indinavir or nelfinavir. This is a complex area and expert advice should always be sought. ‘Empiric’ HIV post-exposure prophylaxis should only be used if the risk of HIV in the source patient is high and the results of the source patient’s HIV test will not be available promptly. Testing for HIV can be done in a few hours if the laboratory is prepared to do emergency testing.

If a decision is made to commence antiretroviral prophylaxis, therapy must begin as soon as possible after the injury (preferably within two hours) but may still be indicated if a longer interval has elapsed and the risk of transmission is thought to be high. Therapy continues for four weeks. The drugs can be stopped if the HIV test of the source is negative and the patient is not thought to be in the window-period. If the status of the source patient is unknown, a decision to continue prophylaxis should be made on a case by case basis.

Syphilis

In settings where the prevalence of syphilis is high, testing of the source patient is indicated. If there is evidence of active syphilis, a single dose of benzathine penicillin (2.4 million units intramuscularly) should be administered. Interpretation of syphilis serology can be difficult and expert advice should be sought.

Needle-stick injuries in members of the public

A major source of distress is the needle-stick injury sustained by members of the community – usually from syringe/needle combinations that have been discarded in a public place. The anxiety is even higher when a child is involved. The general principles of management apply but a few points are worth noting:

- there is no role for testing dried blood in syringes as this is unreliable
- the risk of transmission is extremely low – there have been no confirmed reports of transmission of HIV from a needle-stick injury from a needle/syringe discarded in a public place
- post-exposure prophylaxis for HIV is not indicated.

The major issue to deal with is the potential for psychological trauma, and counselling is therefore essential.

Prophylaxis in pregnancy

Pregnancy or lactation do not preclude the use of prophylaxis, but the risks for the fetus or child must be discussed. Expert advice should be sought.

Post-exposure testing

HIV testing should be repeated at six and 12 weeks post-exposure (and again at six months if post-exposure prophylaxis has been given). Tests for HCV are performed at six, 12 and 24 weeks (HBV testing should be added if the injured person is not immune). Repeat testing is not routinely performed if the source case is negative for the relevant pathogens.

When the source is unknown

If the source of the needle-stick injury is unknown, for example exposure from a needle discarded in a linen bag, the protocol for hepatitis B prophylaxis and serological follow-up should be followed. Establishing the need for HIV post-exposure prophylaxis is problematic in this situation. In general, unless it is likely that the needle was associated with a patient known to be infected with HIV, post-exposure prophylaxis is not indicated. For example, in a general practice not specialising in HIV the risk that the needle is contaminated is extremely low.

In the community the source is usually unknown, but the risks of transmission are extremely low (see box).

Counselling

The knowledge that the risk of transmission of HIV from a significant needle-stick injury is 0.3% only partially comforts the injured person. Many people have varying degrees of anxiety until the serological follow-up is completed. While the majority of individuals will cope with this natural anxiety, a small number will require more intensive support. This may involve informal discussions, formal counselling or psychiatric intervention. It is important to make the arrangements for

follow-up flexible and to allow ready access to help. While most attention is usually focused on the injured person, the source patient also requires counselling and support during this process.

ACKNOWLEDGEMENTS

The author is grateful to Ashley Watson, Di Dreimanis, Rick Creech and Wendy Beckingham for their comments on the manuscript.

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FURTHER READING

Immunization of health-care workers: recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). *MMWR* 1997;46 (RR-18):1-42.

Public health service guidelines for the management of health-care worker exposures to HIV and recommendations for postexposure prophylaxis. *MMWR* 1998;47(RR-7):1-28.

Recommendations for prevention and control of hepatitis C virus (HCV) infection and HCV-related chronic disease. *MMWR* 1998;47(RR-19):1-39. (These documents are available through the CDC website <http://www.cdc.gov/mmwr/>)

The Australian Immunisation Handbook. 7th ed. Canberra: Commonwealth of Australia; 2000.

Self-test questions

The following statements are either true or false (answers)

9. Hepatitis C is more likely to be transmitted by a needle-stick injury than hepatitis B.
10. Health workers who have seroconverted after hepatitis B vaccination still require hepatitis B immunoglobulin if they have a needle-stick injury with a high risk of hepatitis B infection.

New drugs

Some of the views expressed in the following notes on newly approved products should be regarded as tentative, as there may have been little experience in Australia of their safety or efficacy. However, the Editorial Board believes that comments made in good faith at an early stage may still be of value. As a result of fuller experience, initial comments may need to be modified. The Board is prepared to do this. Before new drugs are prescribed, the Board believes it is important that full information is obtained either from the manufacturer's approved product information, a drug information centre or some other appropriate source.

Desonide

Desowen (Galderma)

0.05% cream, lotion and ointment

Approved indication: dermatoses

Australian Medicines Handbook Section 8.1.2

Desonide is a topical non-fluorinated steroid which has been available overseas for many years. It has a similar structure to triamcinolone (see 'The role of corticosteroids in dermatology' *Aust Prescr* 1998;21:9-11).

Patients apply desonide two or three times a day. Systemic absorption occurs, so continuous treatment is limited to a maximum of eight weeks.

Desonide has been compared with hydrocortisone 1% in the treatment of children with atopic eczema. Although it is more potent than hydrocortisone and had greater efficacy, desonide had a similar safety profile.¹ Topical treatment for four weeks does not significantly affect the hypothalamic-pituitary-adrenal axis.² Desonide should not be used on children younger than two years.

The adverse effects of desonide resemble those of other topical steroids. These are more likely to occur if occlusive dressings are used. Patients may complain of burning, itching, irritation or dryness of the skin.

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2. Lucky AW, Grote GD, Williams JL, Tuley MR, Czernielewski JM, Dolak TM, et al. Effect of desonide ointment, 0.05%, on the hypothalamic-pituitary-adrenal axis of children with atopic dermatitis. *Cutis* 1997;59:151-3.

Galantamine hydrobromide

Reminyl (Janssen-Cilag)

4 mg, 8 mg and 12 mg tablets

Approved indication: Alzheimer's disease

Australian Medicines Handbook Section 16.5

There is now a choice of acetylcholinesterase inhibitors (donepezil, rivastigmine and tacrine) for the treatment of mild to moderate Alzheimer's disease. Galantamine is a new inhibitor of acetylcholinesterase which has been extracted from flower bulbs such as daffodils and snowdrops. In addition to increasing acetylcholine concentrations by inhibition galantamine is also thought to modulate nicotinic receptors. Activation of presynaptic nicotinic receptors can increase the release of acetylcholine.

Patients begin treatment with a twice daily dose of 4 mg. This can be increased to a total daily dose of 16 mg and then 24 mg at monthly intervals according to the patient's response and their ability to tolerate galantamine. The drug is rapidly absorbed. Although food slows the rate of absorption, it is recommended that galantamine is taken with meals. Approximately 20% of the drug is excreted unchanged in the urine. The metabolism of galantamine involves cytochrome P450 2D6 and 3A4, so there is a potential for drugs which inhibit these enzymes, for example paroxetine and