

# Chapter 20

# Prevention of Blood-Borne Infections

Annette Jeanes and Martin Bruce

## Key points

- Blood-borne transmission of viral infection is a recognised risk to both healthcare workers and the patients in their care.
- In health care, transmission of blood-borne viruses may occur by injection, infusion, transplantation, unsterile equipment, or other accidental injury/penetration.
- The risk of transmission of infections can be reduced by eliminating hazards, providing and using engineering controls, avoiding unsafe practices, using personal protective equipment, immunisation, and post-exposure prophylaxis.

## Background

The main blood-borne viruses (BBV) transmitted in health care settings are;

- HIV (Human immunodeficiency virus)
- HCV (Hepatitis C virus)
- HBV (Hepatitis B virus)

Transmission of BBVs is an important risk for patients and healthcare personnel. Studies have shown that the risk of exposure of patients and staff to BBVs can be reduced significantly.<sup>1</sup>

Healthcare workers (HCW) may acquire blood-borne infections from lacerations, punctures, and non-intact skin exposures to the blood or body fluids of infected patients. Exposures may occur during surgical or invasive medical/dental procedures.<sup>2</sup>

Patients may acquire blood-borne infections from improperly sterilised injection equipment, unsterile injection fluids, contaminated infusions, transplantation, or exposure to the blood of infected HCWs during invasive procedures.

## Risk Reduction - Healthcare Workers

To prevent sharps injuries, clinical areas must be well lit and spacious; interruptions during procedures must be avoided. Sinks or alcohol-based hand rub should be readily available to promote good hand hygiene practice.

Unsafe injection practices can transmit blood-borne infections. NEVER re-sheath needles; always use any available safety devices. Containers for sharps disposal should be available within arm's length when sharp items are being used. The containers should be sealed with a tamper proof lid and safely discarded when three quarters full.

Standard Precautions<sup>3-4</sup> must be adopted. Disposable gloves should be used by HCWs whenever exposure to blood or body fluids is likely; they act as a protective barrier and reduce exposure to BBVs if inoculation occurs.<sup>5</sup> Appropriate staff should be offered immunisation against HBV before commencing work.<sup>5</sup>

## **Risk Reduction – Patients**

Using needles and syringes which have been inadequately sterilised poses a risk of transmission of infection. Administration of medication by injection should be avoided if the oral route is possible. Inadequate supplies of equipment may lead to reuse of needles and syringes or to the multiple use of equipment without sterilisation between uses; both of which significantly increase the risk of transmission of BBVs.

If injections are essential, then HCWs should ensure that these do not expose a patient to a BBV.<sup>6</sup> Needles and syringes should be single use. Single use vials of medications are preferable to multiple use vials as they increase the risk of BBV infection transmission due to contamination during use.

Equipment must be effectively cleaned and sterilised between patients to reduce the risk of BBV transmission. Single use disposable items should be used to avoid the need for sterilisation/disinfection; single use items must never be reused.

Blood and blood products being used for transfusion should be screened for BBVs prior to infusion, and for other microorganisms if required by local protocols.<sup>7</sup> This may occur by testing the donor at the time of donation or testing the blood product itself.

## **Injection Safety**

The World Health Organization proposes that “national strategies for the safe and appropriate use of injections address behaviour change among healthcare workers and patients, provision of equipment and supplies, and sharps waste management. Such initiatives should not constitute separate programs but should be integrated with other activities, including HIV prevention and care, essential medicines, immunisation, and health system management”.<sup>8</sup>

Outbreaks related to injections could have been prevented by the use of proper aseptic technique in conjunction with basic infection prevention practices for handling parenteral medications, administration of injections, and procurement and sampling of blood.<sup>9</sup>

The Safe Injection Global Network (SIGN)<sup>10</sup> estimated that approximately <sup>16</sup> billion injections are performed annually, many of which are unnecessary. Reducing unnecessary injections may be accomplished by:

1. Developing national policies for health care facilities regarding appropriate medications and circumstances for injections. It is important to publicise the policy widely within the health care community and the country at large.
2. Educate HCWs, patients, and the public about injection risk by:
  - a. Developing teaching materials (posters, lectures) about injection risk and the importance of reducing injection frequency.
  - b. Enlisting influential institutions such as churches, mosques, universities, hospitals, and government agencies to campaign against unnecessary injections.
  - c. When available, teach how to properly use safety devices and proper disposal of all single use devices.
3. Eliminate use of unsterile needles, syringes, and solutions for injections.

## Monitoring

A monitoring system to track occupational exposure to BBVs should be introduced. Surveillance for occupational blood exposures can provide useful data to focus local prevention efforts. An occupational health department can centrally collate trends of incidents and make recommendations for improving practice.

Routine accident reports may not provide adequate information; therefore focussed studies may be required.<sup>11</sup> Studies in departments where the risk for occupational blood exposures is high have shown that personnel could reduce the frequency of HCW exposure more than half by changing practices and increasing barrier precautions.<sup>12</sup>

## Low Resource Issues

Many of the principles discussed in this chapter may be adopted in resource limited settings. Various sharps boxes are readily available. Health care facilities should ban reuse of single use items; inappropriate reuse increases the risk to both HCWs and patients. Education and training packages may

be initiated and should be encouraged as a strategy to prevent infection spread.

## Summary

Whilst BBVs are a significant risk both in the community and health care settings, they can be prevented by strategies aimed at minimising risk to those giving and receiving care. If these strategies are universally adopted, a significant reduction in BBV transmission can be achieved.

## Acknowledgement

This chapter is an update of an earlier one by Patricia Lynch.

## References

1. Australian Government, Department of Health and Ageing (2005) *Economic Evaluation of Hepatitis C in Australia Report*. [http://www.health.gov.au/internet/main/publishing.nsf/Content/B24AB78E97822CACCA2571CA0000E270/\\$File/hepc-econeval.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/B24AB78E97822CACCA2571CA0000E270/$File/hepc-econeval.pdf) [Accessed July 26, 2011]
2. Fry DE. Occupational risks of blood exposure in the operating room. *Amer Surgeon* 2007; 73(7):637-46
3. Siegel JD, Rhinehart E, Jackson M, Chiarello L, the Healthcare Infection Control Practices Advisory Committee. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. <http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf> [Accessed July 1, 2011]
4. Practical Guidelines for Infection Control in HealthCare Facilities. WHO. 2004. [http://www.wpro.who.int/NR/rdonlyres/006EF250-6B11-42B4-BA17-C98D413BE8B8/0/practical\\_guidelines\\_infection\\_control.pdf](http://www.wpro.who.int/NR/rdonlyres/006EF250-6B11-42B4-BA17-C98D413BE8B8/0/practical_guidelines_infection_control.pdf) [Accessed July 1, 2011]
5. World Health Organisation (March 2008), Geneva, Hepatitis B (Fact sheet No. 204) <http://www.who.int/mediacentre/factsheets/fs204/en/index.html> [Accessed July 1, 2011]
6. World Health Organisation (2010), Geneva, Best practices for injections and related procedures toolkit [http://whqlibdoc.who.int/publications/2010/9789241599252\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241599252_eng.pdf) [Accessed July 1, 2011]
7. World Health Organisation (2010), Geneva, Screening Donated

- Blood for Transfusion <http://www.who.int/bloodsafety/ScreeningDonatedBloodforTransfusion.pdf> [Accessed July 1, 2011]
8. Injection Safety, World Health Organisation, Geneva, [http://www.who.int/injection\\_safety/en/](http://www.who.int/injection_safety/en/) [Accessed July 1, 2011]
  9. Dolan SA, Felizardo G, Barnes S, Cox TR, Patrick M, Ward KS, Arias KM. APIC position paper: safe injection, infusion, and medication vial practices in health care. *Amer J Infect Control* 2010; 38(3):167-72. [http://www.apic.org/Content/NavigationMenu/PracticeGuidance/PositionStatements/AJIC\\_Safe\\_Injection0310.pdf](http://www.apic.org/Content/NavigationMenu/PracticeGuidance/PositionStatements/AJIC_Safe_Injection0310.pdf) [Accessed July 1, 2011]
  10. Hauri AM, Armstrong GL, Hutin YJF. The Global Burden of Disease Attributable to Contaminated Injections Given in Health Care Settings. *Int J STD AIDS* 2004; 15:7-16.
  11. Herwaldt LA, Pottinger JM, Carter CD, Barr BA, Elyse D, Miller MA. Exposure Workups. *Infect Control Hosp Epidemiol* 1997; 18:850-871.
  12. Heffernan R, Mostashari F, Das D, et al. Syndromic surveillance in public health practice, New York City. *Emerg Infect Dis* 2004; 10:858-864.