Chapter 21

Prevention of Blood-borne Infections

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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

There are more than 100 main blood-borne viruses (BBV) which may be transmitted in health care settings. The most common are;

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

In some low to middle income countries, Ebola, Lassa, Marburg, and Dengue virus healthcare-associated infections have been reported.'[2]

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 with improved provision of safety-engineered medical devices, healthcare worker knowledge, compliance, and infection prevention and control (IPC) practice and awareness amongst patients and the community.[3]

Risks from BBV

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.[4] Transmission depends on a number of factors including the viral titre, fluid type, volume, HCW immune status for HBV, and the nature of the injury and device (i.e., hollow bored items increase risk), as well as post exposure management and sometimes prophylaxis. Exposures may occur during surgical or invasive medical/dental procedures[5] via accidental inoculation or splashes of blood or body fluids. The greatest risk is from penetrating injuries, deep in fleshy parts of the body with fresh blood.

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

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. According to the WHO guidelines on best practice, only single use injection devices should be used.[6] If medical devices are to be reprocessed, such as surgical instruments, practices must be performed according to strict and validated systems.

Unsafe injection practices can transmit blood-borne infections. The cardinal rules to reduce transmission are:

- Discard sharp immediately after use, do not leave it exposed;
- Always use safety devices if available; and
- NEVER re-sheath needles or sharp items.

Containers for sharps disposal should have the following characteristics:

1. rigid and penetration proof
2. if possible, wall or trolley mounted
3. available within arm's length when sharp items are being used

4. seal with a tamper proof lid
5. safely discard when three quarters full

Do not try to force large items into small containers.

Standard Precautions/Routine Practices[7-9] must be adopted. Good quality disposable gloves should be used by HCWs whenever exposure to blood or body fluids is likely; gloves act as a protective barrier and reduce exposure to BBVs if inoculation occurs.[10] All HCWs should be offered immunisation against HBV before commencing work in a healthcare facility; both staff in clinical and non-clinical positions.[10]

Risk Reduction – Patients

Using unsterile needles and syringes or reusing them poses a risk of transmission of infection. Inadequate supplies of equipment may lead to the reuse of single use items, such as needles and syringes, and is not recommended.[11]

Administration of medication by injection should be avoided if the oral route is possible. If injections are essential, then HCWs should ensure that the procedure does not expose a patient to a BBV.[12] Needles and syringes must be single use. Single use vials of medications are preferable to multiple use vials as the latter increase the risk of BBV infection transmission due to contamination during repeated use. Multiple use vials have been linked directly with iatrogenic transmission of BBV.[12]

Education of the community is paramount in reducing BBV transmission. If possible, patients should be encouraged to ask for a needle and syringe in a sealed package to be opened in their presence.

Reprocessed equipment must be effectively cleaned and sterilised or disinfected between patients according to manufacturer's guidelines. If decontamination processes are lacking, single use disposable items should be used to avoid the risk of transmission. 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.[13] 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 HCWs 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.[14]

Outbreaks related to injections could have been prevented by the use of proper aseptic technique in conjunction with basic IPC practices for handling parenteral medications, administration of injections, and procurement and sampling of blood.[15]

The Safe Injection Global Network (SIGN)[14] estimated that approximately 16 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. Educating 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. Eliminating use of unsterile needles, syringes, and solutions for injections.

Monitoring

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

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.[16]

Low Resource Issues

Many of the principles discussed in this chapter must be adapted to resource limited settings. Various sharps containers are readily available and should meet the recommendations listed. 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.[6]

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.

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Additional Reading

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