Health Care Worker
Health and Safety:
Preventing Occupational Exposure to Bloodborne Pathogens

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Occupational Hazards are the same

- Biological (SARS, TB, Hepatitis)
- Chemical (drugs, disinfectants, solvents)
- Ergonomics (lifting, transfers, sitting)
- Stress/Violence (staffing shortage, shifts)
- Physical Hazards (radiation, heat, noise)

Environment is Specific
Biological Hazards

Patient → Patient

HCW →
Exposure:

a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood, visibly bloody fluids, as well as tissues, and laboratory specimens that contain concentrated HBV, HCV, or HIV.
Estimated Impact

2 million exposures per year

- 40% of Hepatitis B
- 40% of Hepatitis C
- 4.4% of HIV

Are due to Occupational Exposure
Routes of exposure

- **Percutaneous injuries:**
  Penetration of skin by a needle or other sharp object that was in contact with blood, tissue, or other body fluid prior to the exposure

- **Mucous membrane exposures:**
  Fluid contact to the external oral, ocular, or nasal membranes with blood and/or fluids, tissues or specimens

- **Non-intact skin exposures:**
  Contact of wounds, previously opened/abraded skin with the fluids, tissues, or specimens listed above

- **Bite exposures:**
  Penetrating skin or mucosal injuries received from the mouth or teeth from patients or co-workers
The risk of occupational transmission of HBV, HCV, and HIV is influenced by:

- prevalence of infection with bloodborne pathogen infection in the patient population
- nature and frequency of occupational exposures to blood or other body fluids
- risk of infection transmission after exposure
Likelihood of Transmission Following a Needlestick

Percutaneous > Mucous membrane > Non-intact skin

#1 Deep injury
#2 High viral titer in patient
#3 Visible blood on device
#4 Device in artery/vein

CDC, MMWR 6/98
The risk of transmission after a percutaneous exposure to infected blood is 30% if the source is positive for HBeAg, but is less than 6% if the source is HBeAg-negative.

The principal modes of nosocomial HBV transmission are:

- Direct percutaneous inoculation of blood or body fluids containing HBV via needle-stick or other injuries from sharp instruments,
- Direct inoculation of blood or body fluids containing HBV onto mucous membranes, cutaneous scratches, abrasions, burns or other lesions, and
- Indirect inoculation of HBV from environmental surfaces contaminated with blood or body fluids onto mucous membranes, cutaneous scratches, abrasions, burns or other lesions.
Decline in HBV Cases Among Healthcare Workers Following Vaccination

Risk of infection transmission after exposure-Hepatitis C Virus

- HCV is the most common chronic bloodborne infection in the developed countries.
- Transmission of HCV occurs primarily through large or repeated direct percutaneous exposures to blood.
- The risk of transmission after a percutaneous exposure to anti-HCV positive blood is 1.8%, ranging from 0-6%.
- One study found that a history of accidental needle-stick injury was the only occupational risk factor independently associated with HCV infection.
- Another study identified risk factors for HCV infection after occupational percutaneous exposure: deep injury and a hollow-bore needle used in an artery or vein.
- Currently, occupational HCV transmission is only preventable through prevention of blood exposure.
The risk for HIV transmission after percutaneous exposure to infected blood is approximately 0.3%

An increased risk of seroconversion is associated with:
- a deep injury, the injection of a large quantity of blood, an injury with a hollow needle, or injury while inserting a needle into a vein or artery.
- The patient's stage of -higher titer of HIV in the blood of a person in the advanced stages of AIDS

Episodes of HIV transmission after non-intact skin exposure to blood have also been documented, but the risk of transmission by this route has not been precisely quantified

there is a documented but undetermined risk associated with HIV-infected body fluids other than blood. Fluids with potential for transmission in the occupational setting include cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids
A voluntary surveillance system developed by the CDC to systematically collect information important to the prevention of occupational exposures and infections among HCWs.

A total of 81 facilities that participated in NaSH for at least one year during 1995-2007. Information was gathered from nearly 130,000 HCW adverse events.
Percutaneous, 82%

Mucous membrane, 14%

Non-intact skin, 3%

Bite, 1%
Preventing transmission from patients to HCWs

**Employer responsibilities:**

- Have an occupational health plan for the prevention and treatment of exposures to bloodborne pathogens
- Comprehensive training programs for HCWs
  - general information about bloodborne pathogens
  - mechanisms of transmission,
  - methods to prevent exposure to blood and other potentially contaminated fluids and ways to implement those methods during various procedures.
- all HCWs who may be exposed to blood or other body fluids should receive the hepatitis B vaccination series
Patient history and serological testing:

- Increased risk of infection with bloodborne viruses is associated with a history of one or more of the following:
  - injecting drug use
  - high-risk sexual behaviors
  - sexually transmitted diseases
  - receipt of blood transfusions before 1985
  - incarceration
  - hepatitis

- Serological testing may be useful to determine a patient's bloodborne pathogen status
Preventing transmission from patients to HCWs

Recommendations for safety during procedures and examinations:

- Gloves should be worn during any procedure that may result in contact with a patient's blood or other body fluids. It has been shown that the volume of blood transmitted by a needle-stick is reduced by 50% when the needle first passes through a glove. Double gloving is recommended.

- Protective eye cover, masks

- Sharp instruments should always be handled carefully and should not be left unattended.

- Safe use of numerous types of equipment, example, the exposed ends of all orthopedic pins should be securely covered.
preventability of percutaneous injuries involving hollow-bore needles (NaSH)
preventability of percutaneous injuries involving hollow-bore needles (NaSH)
Reporting Is Important

- 46% of injuries reported (NaSH)
  - Technicians, 66%
  - Nurses, 53%
  - Non-surgical medical staff, 53%
  - Surgeons, 30%

- Reporting Endures:
  - Proper treatment & follow-up
  - Financial compensation, if necessary
  - Engineering or procedure changes
Barriers to Reporting

- Fear of being punished or fired
- Lack of awareness of risk of infection
- Lack of assurance of confidentiality
- Emphasis on patient care (unable to leave patient care area for follow-up)
Incidents of exposures to blood or other potentially infected fluids should be reported immediately.

A system designated by the health care institution for the management of occupational exposures to blood

Both the source patient and exposed HCW should be tested for HBsAg, HCV antibody, and HIV antibody.
Treatment decisions for exposed HCWs

- Immediate treatment - wash immediately
- Serological testing - HCW and source
- Risk assessment
- Post-exposure treatment
The source patient was identified in 92% of reported blood and body fluid exposures.

12% of all exposures involved a source patient testing positive for one or more bloodborne viruses.

- 4.5% HIV-positive patients
- 8.4% HCV-positive patients
- 1.4% HBV-positive patients
Appropriate immunoprophylactic treatment can generally prevent infection

mainstay of post-exposure immunoprophylaxis is the hepatitis B vaccine

single dose of hepatitis B immune globulin (HBIG) is also recommended preferable to give the HBIG within 24 hours of the exposure.

If the exposed individual has previously been vaccinated with the hepatitis B vaccine, post-exposure blood tests should ensure that the individual's HBV antibody levels are appropriate
Hepatitis C Virus Post-exposure Treatment

- Currently there is no post-exposure prophylaxis available for HCV
- A HCW who may have been exposed to HCV should be tested and monitored for evidence of seroconversion so that treatment for chronic liver disease can be initiated as soon as possible
- Studies indicate that interferon treatment begun early in the course of HCV infection is associated with a higher rate of resolved infection
Human Immunodeficiency Virus Post-exposure Treatment

- PEP be used for exposures that pose a risk of HIV infection, but is not justified for exposures that do not pose a known risk.
- Exposures that pose a high risk include those involving a deep injury, visible blood on the device that caused the injury, injury from a needle that was placed in a source patient's vein or artery, or an exposure from a source patient who died of AIDS within 60 days after exposure (indicating a high titer of HIV present in the blood).
- Treatment of healthcare workers with AZT following needlesticks involving an HIV positive source patient have been shown to decrease the risk of HIV transmission by 80%.