

Preventing Transmission of Nosocomial Infections

Review of the Cesarean-section Antibiotic
Prophylaxis Program in Jordan and Workshop
on Rational Medicine Use and Infection Control

Terry Green and Salah Gammouh
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Acknowledgments

This presentation was developed by—

W. Charles Huskins, MD, MS

Assistant Professor of Pediatrics, Mayo Medical School

Pediatric Infectious Diseases, Mayo Clinic

Hospital Epidemiologist, Mayo Eugenio Litta Children's Hospital



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Outline

- Infection hazards in health care settings
- Interventions to prevent the spread of infections
- Risk of infection after exposure
- Prevention strategies



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Infection Hazards in Health Care Settings

- Patient
 - Device- or procedure-associated infection
 - Contagious diseases
 - Bloodborne pathogens
 - Colonization with antimicrobial-resistant bacteria
- Health care provider
 - Contagious diseases
 - Bloodborne pathogens
 - Colonization with antimicrobial-resistant bacteria



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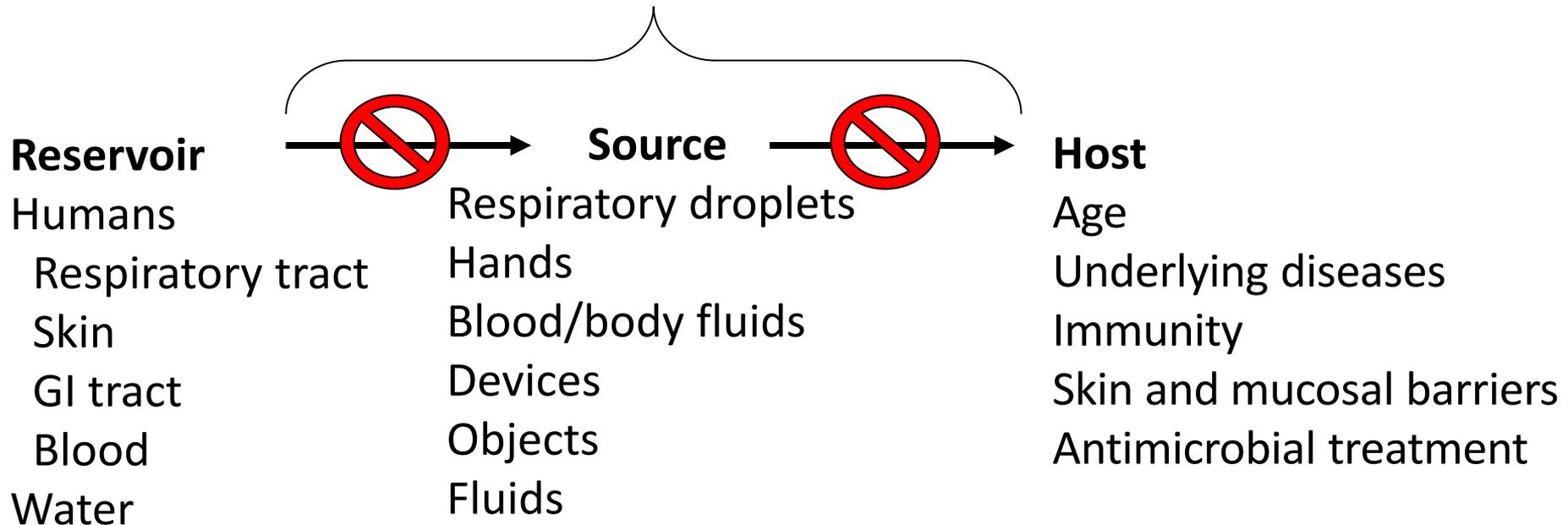
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Transmission of Infections in Health Care Settings

Mode of Transmission



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Modes of Transmission

Mode of Transmission	Examples
Airborne	Pulmonary TB, measles, varicella
Contact-Direct	Staphylococcus or HSV skin infection
Contact-Indirect	RSV bronchiolitis, AMR bacteria
Contact-Droplet	Pertussis, influenza, adenovirus infection
Common Vehicle	BSI from contaminated IV fluid Post-transfusion infection (HIV, HBV, HCV)
Vector	Malaria



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Interventions to Prevent the Spread of Infection

- Hand hygiene
 - Hand washing with soap and water
 - Hand antiseptics
- Barriers
 - Gloves
 - Gowns
 - Eye protection
 - Masks
 - Other protective apparel
- Patient placement
- Handling and laundry of linen and clothing
- Handling and reprocessing of contaminated items and equipment
- Environmental cleaning and disinfection



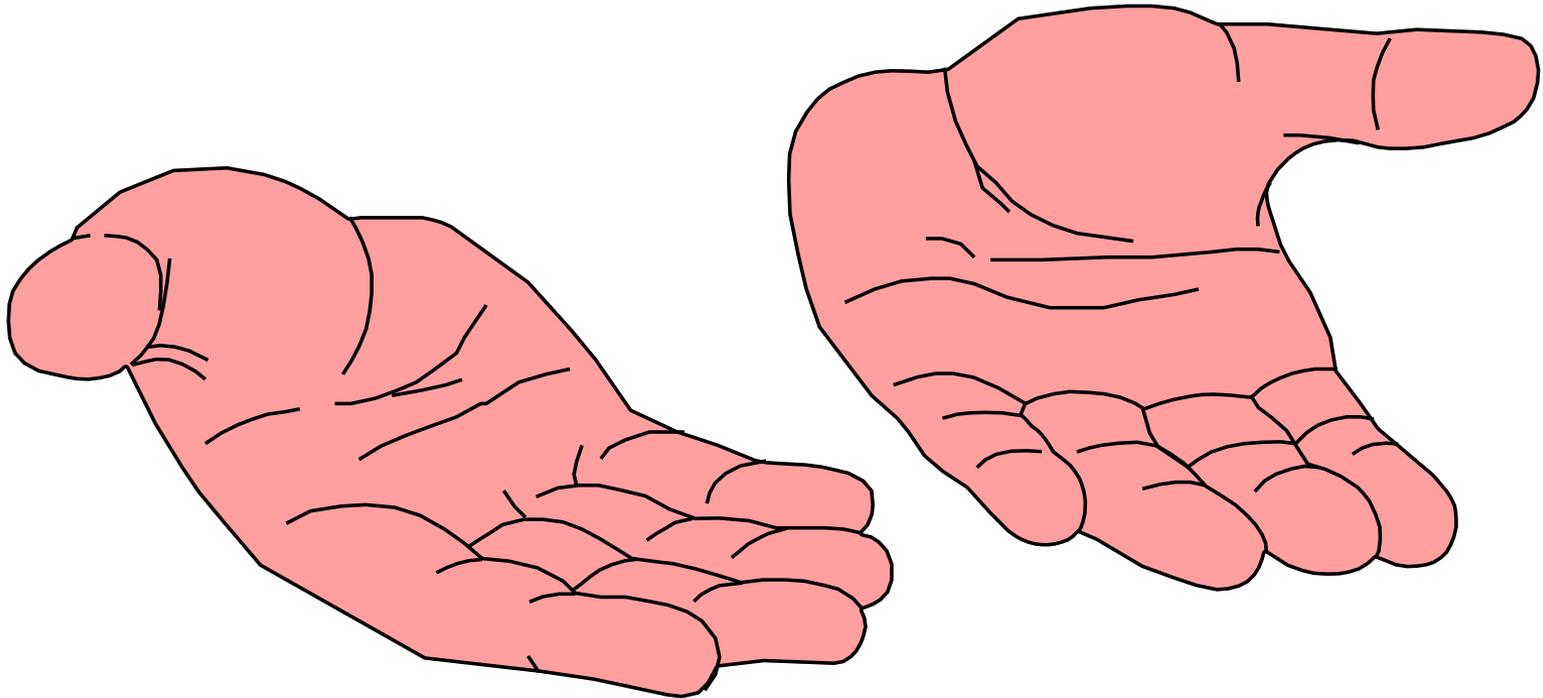
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What are the 10 most common ways that nosocomial infections spread?



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When Should I Wash with Soap and Water vs. Using Alcohol Rub?

- Wash your hands with soap and water—
 - If your hands are visibly soiled
 - After caring for patients with *C. difficile*–associated diarrhea because *C. difficile* spores are not killed efficiently by alcohol
 - Before eating
 - After using the restroom
- In all other situations, you can either wash your hands or use the alcohol rub
- But *use of the rub is preferred* for the reasons discussed in the next slide



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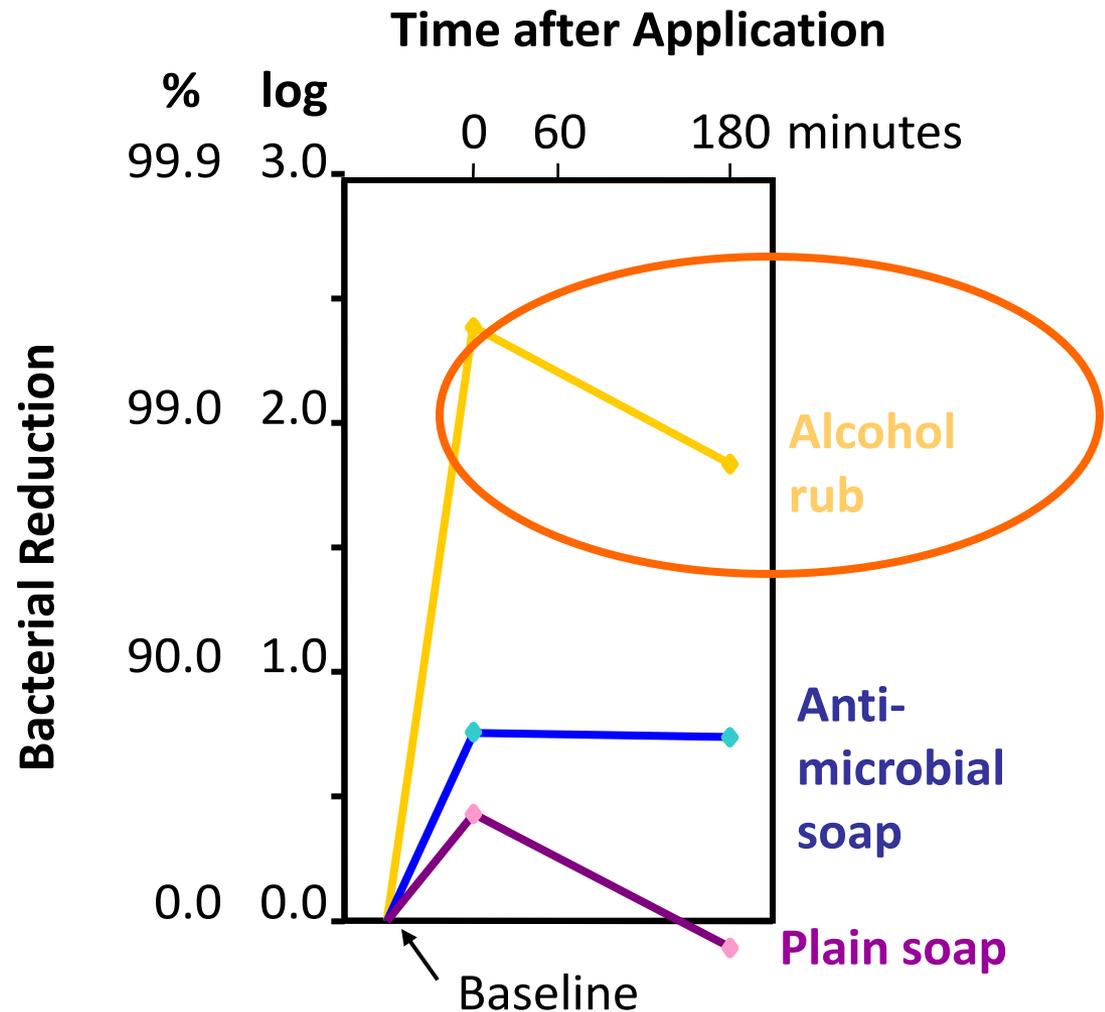


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Alcohol Kills Bacteria Very Effectively

- An alcohol rub or gel is more effective in reducing the number of bacteria on your hands than hand washing with plain or antimicrobial soap



Source: www.cdc.gov/handhygiene/materials.htm



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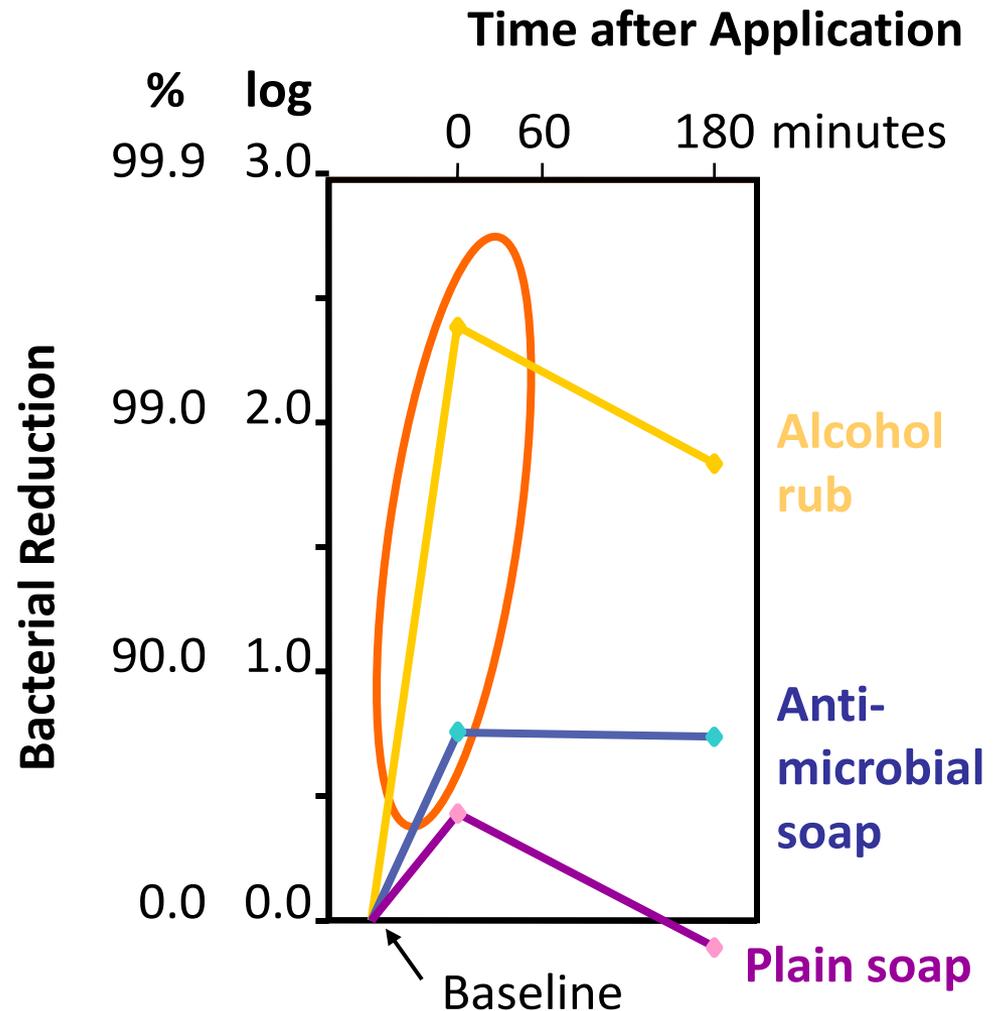


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Alcohol Kills Bacteria Very Quickly

- An alcohol rub or gel reduces the number of bacteria on the hands by 100-fold or more in just 15 seconds



Source: www.cdc.gov/handhygiene/materials.htm



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When Should I Practice Hand Hygiene?

- Before
 - Touching a patient, especially if you will perform an invasive procedure
 - Manipulating an invasive device
 - Changing a wound dressing
- After
 - Touching a patient
 - Touching contaminated items
 - Removing gloves
 - Leaving the patient's bedside or room



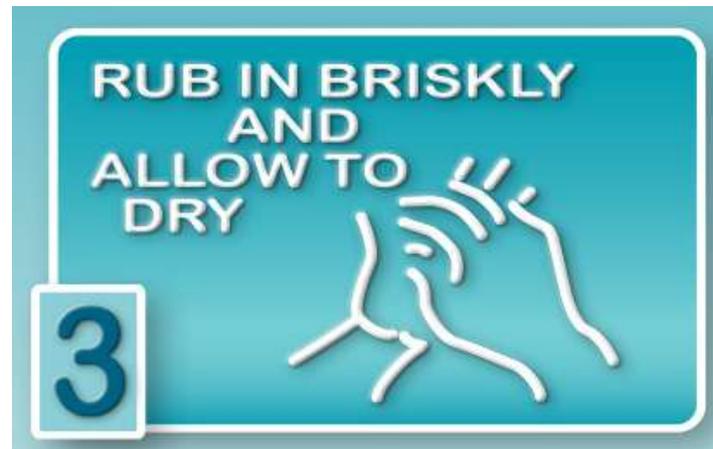
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Using an Alcohol Rub is as Easy as 1, 2, 3...



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But I didn't touch the patient!

Why do I have to do anything?

- Many surfaces in the patient-care environment—including bedrails, IV pumps, and even computer keyboards—are often contaminated with antibiotic-resistant bacteria like MRSA, VRE, and multidrug-resistant *Acinetobacter*.



- These bacteria can survive for *days* on these surfaces.
- It's important to practice hand hygiene after you leave the room, even if you touched only these surfaces.



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Fingernails

- Fingernails can harbor large numbers of pathogenic bacteria.
- Artificial fingernails may not be worn by people with direct patient care duties.
- Natural fingernails must be 1/4 inch or less in length.
- Nail polish must be kept in good condition (no cracks or chips).
- Focus on your fingertips when you apply the alcohol gel or wash with soap and water.



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Standard Precautions (1)

- These precautions apply to the care of *all* patients.
- Health care workers should limit contact with all secretions or biological fluids, skin lesions, mucous membranes, and blood or body fluids.
- Health care workers should wear gloves for each contact that may lead to contamination, and gown, mask, and eye protection where contamination of clothes or the face is anticipated.



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Standard Precautions (2)

- Gowns should be made of washable material, buttoned or tied at the back, and protected, if necessary, by a plastic apron.
- Gloves can be inexpensive plastic gloves.
- Masks can be surgical masks made of cloth or paper.



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Airborne Precautions

- Tuberculosis, measles, chickenpox (combined with contact precautions)
- Individual room with adequate ventilation
 - Door closed
 - Negative pressure, if possible
 - At least six air exchanges per hour
 - Exhaust to outside away from intake ducts
- Health care workers wear high-efficiency masks when entering the room
- Patient to stay in room, patient wears a mask when leaving the room



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Droplet Precautions

- Bacterial meningitis, diphtheria, respiratory viral infections (combined with contact precautions)
- Individual room for the patient, if available
- Health care workers wear a surgical mask, with eye/nose protection if possible, within 3 feet of the patient
- Patient to stay in room, patient wears a mask when leaving the room



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Contact Precautions (1)

- Enteric infections in which diarrhea cannot be controlled; skin lesions in which drainage cannot be contained
- Individual room for the patient if available
- Cohorting of patients, if possible
- Health care workers wear gloves when entering the room
- Health care workers wear a gown for patient contact or contact with contaminated surfaces or material



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Contact Precautions (2)

- Health care workers practice hand hygiene before and after contact with the patient and on leaving the room
- Patient to stay in room
- Environmental and equipment cleaning, disinfection, and sterilization



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Viral Hemorrhagic Fever Precautions (1)

- Individual room in an isolation ward, if possible
- Health care workers wear a scrub suit, gloves (2 pairs), gowns, apron, mask, head cover, eye protection, and boots when entering the room
- Health care workers practice hygiene at entry to and exit from the room
- Patient to stay in room



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Viral Hemorrhagic Fever Precautions (2)

- Incinerate needles, syringes
- Disinfect medical instruments
- Incinerate excreta, body fluids, and nasopharyngeal secretions
- Disinfect linen
- Restrict visitors and staff
- Daily disinfection and terminal disinfection of room



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Risk of Infection from Exposure to Blood Products

- HIV: 1:200,000–2,000,000
- Hepatitis B virus (HBV): 1:30,000–250,000
- Hepatitis C virus (HCV): 1:30,000–150,000
- HTLV I/II: 1:250,00–2,000,000
- Others documented: bacteria, cytomegalovirus, hepatitis A, malaria, Chagas disease
- Others possible: prions, hepatitis G virus, TT virus, and parvovirus B19



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Estimates of Risk of Bloodborne Infection after Exposure

- Hollow-bore needle stick
 - HBV: 30% (20–40%)
 - HCV: 2%
 - HIV: 0.3%
- Blood splash into mucous membranes:
HIV 0.1%
- Blood exposure onto skin:
HIV <0.1%



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Risk of Infection after Occupational Exposure to Blood or Body Fluids

The risk of infection depends on—

- Type of exposure
 - Parenteral > Nonparenteral
- Type of body fluid exposed to
 - Blood > Other body fluid
- Concentration of virus in fluid
 - HBV > HCV > HIV
- Volume of exposed fluid entering the body



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Prevention Strategies

Strategies for preventing occupational transmission of bloodborne pathogens include the following—

- Use standard precautions consistently
- Avoid sharps injuries and needle sticks
- Use safety devices
- Immunize against HBV
- Postexposure prophylaxis program



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Preventing Sharps Injuries

- Proper handling and disposal of needles and sharps—
 - Do not directly manipulate
 - Dispose into a puncture-proof container
- Use needleless intravenous systems
- Use safety needles/devices
- Practice safe surgical techniques



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Treatment of Exposure Site

Following an exposure, immediate treatment should be initiated—

- Mucous membrane exposure: rinse with water
- Skin exposure: wash with soap and water
- Needle/sharps puncture site: wash with soap and water



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