



The Role of the HCP in Preventing Infection

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two (2.0) contact hours.**

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Purpose and Objectives

The purpose of this self-study course is to provide healthcare professionals with information regarding the general principles of infection prevention and reduction of pathogen transmission.

After successful completion of this course, you will be able to:

1. Identify the professional's responsibility to monitor infection prevention practices
2. Describe how pathogens are spread and discuss strategies for preventing transmission of these organisms
3. Describe how infection prevention concepts are applied in professional practice
4. Define "engineering controls" and "work-practice controls" and describe the causes of most common needlestick injuries
5. Identify isolation precautions and discuss the use of personal protective equipment
6. Discuss hand hygiene options for healthcare professionals
7. Identify strategies for effective pre-cleaning, chemical disinfection, and sterilization of instruments and devices
8. Identify occupational health strategies for preventing communicable diseases in healthcare workers, and discuss resources available for evaluation of healthcare workers infected with HIV, HBV, and HCV.

Introduction

On any given day one in 25 patients in the U.S. has at least one hospital acquired infection (HAI). The cost of HAIs nationally represents tens of thousands of lives and billions of dollars each year. Research shows that when healthcare facilities and healthcare providers take steps to prevent HAI, some HAIs may be decreased by more than 70% (Centers for Disease Control (CDC), 2016b). HAIs are a major, yet in most cases, preventable threat to patient safety.

Statistics

According to the HAI Prevalence Survey (2014), approximately 722,000 cases of HAI were reported and 75,000 patients died from a HAI (CDC, 2016b).

HAI Prevalence Survey (2014)

Based on 2011 Data (CDC, 2016b)	
Major Site of Infection	Estimated Number
Pneumonia	157,500
Gastrointestinal Illness	123,100
Urinary Tract Infections	93,300
Primary Blood Stream Infections	71,900
Surgical Site Infections (from any inpatient surgery)	157,500
Other types of infections	118,800
Estimated total number of infections in hospitals	721,800

The CDC monitors not only HAIs but also the number of facilities that report a higher level of standardized infection ratios (SIRs). The table below represents the number of facilities with high infections rates for each type of HAI. While these numbers may seem high; compared to the number of facilities reporting HAI data, this table represents a very small number of facilities.

Facilities with High Standardized Infection Ratio (2014) Based on 2011 Data (CDC, 2016b)	
Type of HAI	Number of Facilities
Central Line-Associated Blood Stream Infections (CLABSI)	198
Catheter-Related Urinary Tract Infections (CAUTI)	348
Surgical Site Infections (SSI) (any inpatient surgery)	258
Hospital Onset Clostridium Difficile Infections	377
Hospital Onset MRSA Bacteremia (Blood Stream Infections)	163

The CDC is working with state health departments to determine best-practice regarding effective validation standards so that the HAI information reported to the CDC's National Healthcare Safety Network (NHSN) is accurate data (CDC, 2016b).

Why should I follow infection prevention practices?

Infection prevention is an important and strategic part of your professional responsibilities. Infection prevention practices promote health and can limit disease for you, your patients, and the public. Failure to apply scientifically accepted principles and practices of infection prevention could lead to illness and even result in charges of professional misconduct.

Can a Registered Nurse be disciplined if other healthcare professionals being supervised by the nurse fail to follow infection prevention standards?

Nurse Practice Acts generally holds the Registered Nurse responsible for overseeing the care of those that they supervise. Therefore, you are responsible for other healthcare practitioners who you supervise.

Who else am I responsible for monitoring?

You are responsible for monitoring the infection prevention practices of other people involved in the care of your patients. You are also responsible for teaching visitors and family members to comply with infection prevention practices and to monitor their practices. Patients should be protected by routine infection prevention practices that will keep their environment and the equipment they need safe.

For example, if your patient is in isolation, you must monitor everyone who enters the room to ensure that they take the correct precautions. Teach them how to comply with infection prevention practices, and follow your hospital's policies for reporting or disciplining employees who fail to follow the appropriate infection prevention practices. In addition, teach the patient what he/she should expect when someone enters their room and empower them to ask the individual if they have completed the precautions necessary. If they have not, empower the patient to ask them to do so.

Infection Prevention Standards & Guidelines

The Centers for Disease Control and Prevention (CDC) has published guidelines and recommendations for the prevention of various healthcare associated infections. These guidelines are sorted by practices that protect patients, protect healthcare workers, and by assorted topics.

They include:

- Guideline for Prevention of Catheter Associated Urinary Tract Infections
(<http://www.cdc.gov/HAI/index.html>)
- 2011 Guidelines for the Prevention of Intravascular Catheter-Related Infections
(<http://www.cdc.gov/hicpac/BSI/BSI-guidelines-2011.html>)
- 2015 Update Guideline for Disinfection and Sterilization in Healthcare Facilities
http://www.idsociety.org/CDC_20151002/

- Tools for Protecting Healthcare Personnel (<http://www.cdc.gov/HAI/prevent/ppe.html>)
- 2017 Hand Hygiene in Healthcare Settings (<http://www.cdc.gov/handhygiene/>)
(Centers for Disease Control and Prevention (CDC), 2013b)

Always follow your hospital's policies and procedures to guide your infection prevention practices.

Chain of Infection

Infection prevention practices are based on a circular "chain of infection." The six links in the chain are:

- Reservoir
- Escape
- Transmission
- Entry
- Susceptible host
- Disease agent

Each chain requires nursing assessments and interventions to break the process of infection.

Healthcare professionals can enter this circular chain at any link. As the saying goes: "A chain is only as strong as its weakest link."

This self-study course examines each link and will help you apply scientific principles to help keep you and your patients safe and healthy.

Test Your Knowledge

Effective infection prevention strategies can prevent disease transmission by interrupting one or more links in the chain of infection.

- A. True
- B. False

Rationale: Each chain requires nursing assessments and interventions to break the process of infection. Healthcare professionals can enter this circular chain at any link. As the saying goes: "A chain is only as strong as its weakest link."

The Reservoir

A reservoir is a place where infectious agents find it favorable to live and multiply. A reservoir could be a person, animal, arthropod, plant, soil, or another substance where infectious agents thrive and reproduce. Bacteria and other infectious agents depend on reservoirs for their survival, and they can be transmitted from reservoirs to susceptible hosts. In hospitals, reservoirs can be patients, hospital workers, visitors, equipment, food, or the hospital itself, the building, water supply, or ventilation system.

Although patients may be hospitalized to receive treatment for infectious diseases, they may also become infected while hospitalized, or they may be chronically infected. It is not unusual for a patient to be unaware that they are chronically infected with a virus such as herpes simplex virus (HSV), human papilloma virus (HPV), human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), or other pathogens.

Test Your Knowledge

In hospitals, reservoirs can be:

- A. Patients
- B. Hospital workers
- C. The ventilation system
- D. All the above

Rationale: In hospitals, reservoirs can be patients, hospital workers, visitors, equipment, food, or the hospital itself, the building, water supply, or ventilation system.

Pathogens

A few of the pathogens that might infect your patients include:

- **Bacteria:** Pseudomonas aeruginosa, Mycobacterium tuberculosis (MTB), acinetobacter, clostridium difficile (C. Diff), Streptococcus pneumoniae, Staphylococcus aureus, Methicillin-resistant Staphylococcus Aureus (MRSA), Vancomycin Resistant Enterococci (VRE),
- **Viruses:** Hepatitis Simplex Virus (HSV), Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), mumps, norovirus
- **Fungi:** Cryptococcus neoformans, Candida, Histoplasma capsulatum
- **Parasites:** Entamoeba histolytica, Giardia lamblia

The Great Escape: How pathogens leave the reservoir

To infect a new susceptible host, pathogens must leave an already infected person through portals of exit specific to the kind of pathogen. For example, HIV can easily exit through the portals of blood, semen, cerebral spinal fluid, amniotic fluid, and fluids that surround organs or joints. However, HIV cannot exit through a cough, sneeze, stool, urine, or tears.

Other organisms; such as the influenza virus, exit through droplet nuclei when patients sneeze, cough, or spit. Intestinal parasites can exit in stool, and organisms, such as *cytomegalovirus* (CMV) can easily exit in urine. Isolation precautions are based in part on the organism's portals of exit.

Test Your Knowledge

HIV can exit the host in a cough, sneeze, stool, urine, or tears.

A. True

B. False

Rationale: HIV can easily exit through the portals of blood, semen, cerebral spinal fluid, amniotic fluid, and fluids that surround organs or joints.

Modes of Transmission

Each pathogen can be moved from a reservoir to a susceptible host by:

- Direct contact
- Indirect contact
- Droplet spread
- Aerosolized
- Common vehicle
- By a vector (e.g. mosquitoes, ticks, etc.)



What's missing from the image?

Answer: Personal Protection Equipment – where are her gloves?

Entry Modes

Organisms can enter the body through mucous membranes, broken skin, the gastrointestinal tract, the respiratory tract, or the genitourinary tract. Exposure to healthcare procedures can offer many opportunities for organisms to enter a person's body by breaching natural protective barriers. Surgery or intravenous catheters break normally intact skin and provide direct access to the blood stream. Urinary catheterization puts a foreign object into a normally sterile body cavity. Intubation and endotracheal suctioning bypass protective barriers in the upper respiratory tract.

The Susceptible Host

Even if you have been exposed to infectious disease, it doesn't mean you will necessarily become infected. Microorganisms can colonize a host but not actually interfere with the normal functioning of the host. When this occurs, the microorganisms lay dormant and do not cause any clinical signs or symptoms of infection or disease.

Infection may occur when the colonization of micro-organisms becomes detrimental to the host, by interfering with the functioning of the host. When this occurs, clinical signs and symptoms of disease may become apparent in the host.

The appropriate treatment of a individual may depend on whether the pathogen has simply colonized the person or caused infection.

Most healthy individuals have natural barriers that help prevent potentially infectious organisms from getting a foothold. Intact skin prevents many organisms from entering, gastric acid kills many organisms, cilia in the respiratory tract sweep organisms up so they can be expelled and tears wash the eyes.

Hospitalized patients, however, are at increased risk for infections because their immune systems might already be compromised. In addition, many treatments and procedures can undermine patients' natural barriers against infection.

The immune system fights invading organisms through the inflammatory response, antibodies, and cell-mediated immunity.

Individuals that may be at an even greater risk of infection because of weakness in their immune systems include:

- Infants
- Elderly
- Patients taking steroids or immune-modulating medications
- People infected with HIV
- People with cancer or receiving chemotherapy or radiation treatment
- People with end-stage renal disease
- People with diabetes mellitus

Did You Know?

The difference between colonization and infection is:

Colonization: the presence of micro-organisms in a host without clinical signs or symptoms of infection

Infection: the acute detrimental colonization of the host *with* clinical signs and symptoms of infection

The Disease Agent

Some organisms cause disease more easily than others. For example, HBV is easier to contract than HIV.

The number of organisms you are exposed to also increases the likelihood of infection. For example, MTB is less likely to cause infection when ample amounts of fresh air dilute the number of organisms in the air a person breathes.

Similarly, a needlestick injury that injects several mL of a patient's blood into a nurse is more likely to lead to infection with bloodborne organisms (such as HIV, HBV, or HCV) than is an injury with a blunt needle without visible blood.

The number of exposures can make a difference. Injection drug users, for example, increase their risk of infection with HIV or HCV when they share injection equipment; especially with many partners.

Test Your Knowledge

You are working on a medical/surgical floor with a patient who has been admitted from a skilled nursing home. She exhibits no fever, rashes, open wounds, or respiratory illness, yet she is placed in isolation. You recognize that she:

- A. Has an infective process that is in the early stages
- B. Is colonized with a microorganism such as MRSA**
- C. Has been treated with antibiotics
- D. Was placed in isolation by mistake

Rationale: The difference between colonization and infection is:

Colonization: the presence of micro-organisms in a host without clinical signs or symptoms of infection

Infection: the acute detrimental colonization of the host *with* clinical signs and symptoms of infection

Spread of Pathogens in the Absence of Infectious Disease

If patients haven't been diagnosed with infectious diseases and don't have draining wounds, how can pathogens spread? Patients' skin may be colonized with pathogens. For example, patients with diabetes, chronic dermatitis, and chronic renal failure treated with dialysis are more likely to be colonized with *S. aureus*.

Since patients, regardless of their diagnoses, shed skin cells carrying microbes, healthcare professionals can pick up microorganisms from a patient's intact skin, gown, bed linens, bedside

furniture, and other objects and medical equipment in the patient's immediate environment and transfer these microorganisms to other patients.

Frequently the patient's environment is contaminated with bacteria, such as staphylococci or enterococci that survive despite drying (CDC, 2015).

Preventing Transmission

When providing care to your patients, it is recommended by the CDC to consider that all your patients are infected with bloodborne pathogens.

Protect yourself and your patients by following standardized precautions and wearing personal protection equipment according to the disease process. All contact with patients should include wearing non-sterile gloves. In patients with a respiratory illness, masks should be considered until an infectious disease is eliminated.

Transmission-based precautions include:

- Standard precautions: The minimum prevention practices that should be used in the care of all patients all the time (Hand hygiene before and after patient contact, personal protective equipment, safe injection practices, safe handling of potentially contaminated equipment/surfaces, and respiratory and cough etiquette)
- Contact: Used for infections that are spread by touching the patient or contents of the room-e.g. MRSA, VRE, RSV, diarrheal illnesses, open wounds (Hand hygiene before and after patient contact, gloves and gown while in room, remove gown prior to leaving room)
- Droplet: Used for infections that are spread by tiny droplets due to coughing and sneezing-e.g. pneumonia, influenza, whooping cough, bacterial meningitis ((Hand hygiene before and after patient contact, gloves and mask while in the room, discard mask after leaving room)
- Airborne precautions: Used for infections that are spread by very small organisms spread through the air-e.g. tuberculosis, measles, chickenpox ((Hand hygiene before and after patient contact, fit tested NIOSH-approved N-95 respirator or higher, negative pressure room, discard mask after leaving room, patient must wear mask when leaving room, visitors should wear mask while in room)

(CDC, 2015)

Vaccinations

Vaccination can protect you and your patients, and is one way of preventing the spread of pathogens. Hepatitis B vaccine safely and effectively prevents HBV infections for most people.

Post-exposure prophylaxis helps prevent some infections including HBV, HIV, and meningococcal meningitis.

For additional information on vaccinations for healthcare professionals, visit the CDC's site at: <http://www.cdc.gov/vaccines/spec-grps/hcw.htm>

Standard Precautions

The minimum prevention practices that should be used in the care of **all patients all the time**. Standard precautions apply to all patient encounters involving blood; all body fluids, except sweat, regardless of the presence of visible blood; non-intact skin; and mucous membranes. The healthcare professional must select appropriate personal protective equipment (PPE) in anticipation of nursing activities or interventions.

Consider all patients to be potentially infected with bloodborne pathogens, and protect yourself and your patients by following standard precautions, including wearing personal protective equipment (PPE) whenever exposure is anticipated.

Elements of Standard Precautions:

- Hand hygiene before and after patient contact
- Personal protective equipment (PPE)- gloves, gown, mask as indicated by infection)
- Safe injection practices
- Safe handling of potentially contaminated equipment/surfaces
- Respiratory and cough etiquette

(CDC, 2016)

Hand Hygiene

Hand hygiene has been cited frequently as the single most important practice to reduce the transmission of infectious agents in healthcare settings and is an essential element of Standard Precautions.

The term “hand hygiene” includes both hand hygiene with either plain or antiseptic-containing soap and water; and use of alcohol-based products (gels, rinses, foams) that do not require the use of water.

In the absence of visible soiling of hands, approved alcohol-based products for hand disinfection are preferred over antimicrobial or plain soap and water because of their superior microbicidal activity, reduced drying of the skin, and convenience.

Hand hygiene and Gloves

If I wash my hands, do I still need to wear gloves?

Gloves don't eliminate the need for hand hygiene. Likewise, the use of hand hygiene does not eliminate the need for gloves.

Gloves reduce hand contamination by 70% to 80%, help to prevent cross-contamination, and help to protect patients and healthcare personnel from infection (CDC, 2016).

Hand hygiene: Soap Versus Alcohol Rubs

When should I wash my hands with soap and water or use alcohol-based hand rubs?

According to CDC guidelines, you should wash your hands with soap and water or use alcohol based hand rubs at the following times:

- Before having direct contact with patients
- Before donning sterile gloves to insert a central intravenous catheter
- Before inserting an indwelling urinary catheter, peripheral vascular catheter, or another invasive device that does not require a surgical procedure
- After contact with a patient's intact skin, such as taking a pulse, measuring a blood pressure, or lifting
- After contact with body fluids or excretions, mucous membranes, non-intact skin, and wound dressings if your hands don't become visibly soiled
- Before moving from a contaminated-body site to a clean-body site during patient care
- After contact with an inanimate object, such as medical equipment, in the patient's immediate vicinity
- After removing gloves

Important Note:

The CDC endorses the use of soap and water after contact with a patient with *Clostridium difficile*. Alcohol -based solutions do not eliminate the C. diff spores from hands or surfaces. Additionally, rooms must be cleaned with an approved spore-killing disinfectant such as bleach (CDC, 2015b).

How to Wash Hands Effectively

How should I clean my hands before and after I eat or after I use the bathroom at work?

Wash your hands with soap and water. First wet your hands. Then apply soap to your hands and rub your hands together vigorously for at least 15 seconds.

Make sure to cover all the surfaces of your hands and fingers with soap and rub them together.

Remember to use the amount of soap recommended by the manufacturer.

Rinse your hands with warm or tepid water because very hot water can irritate your skin. Dry your hands thoroughly with a disposable towel and use the towel to turn off the faucet (CDC, 2017).

Test Your Knowledge

After applying soap to your hands, how long should you rub your hands together?

- A. 10 seconds
- B. 15 seconds**
- C. 30 seconds
- D. 60 seconds

Rationale: Wash your hands with soap and water. First wet your hands. Then apply soap to your hands and rub your hands together vigorously for at least 15 seconds. Make sure to cover all the surfaces of your hands and fingers with soap and rub them together. Remember to use the amount of soap recommended by the manufacturer. Rinse your hands with warm or tepid water because very hot water can irritate your skin. Dry your hands thoroughly with a disposable towel and use the towel to turn off the faucet (CDC, 2017).

Hand hygiene Options: FAQs

Are there times when I must wash my hands with soap and water?

Yes. The CDC recommends that you wash your hands with soap and water when your hands are visibly soiled with blood, other body fluids, protein-rich materials, or when caring for a patient with *C. difficile* or *Bacillus anthracis* (CDC, 2017).

What is the best way to use an alcohol-based hand rub?

Apply an alcohol-based hand rub on the palm of one hand, and then rub your hands together covering all the surfaces of your hands and fingers until your hands are dry. Use the amount of alcohol-based hand rub recommended by the manufacturer (CDC, 2017).

Special Options for Hand hygiene

My skin is sensitive. What should I do?

Alcohol-based hand rubs might help. Also use hand lotions or creams approved and provided by your employer. For many people, hand rubs cause less skin irritation than traditional soap and water. Although allergic contact dermatitis due to alcohol hand rubs is rare; watch for signs of allergies and consult your hospital's infection prevention department for recommendations for alternative ways to wash your hands (CDC, 2017).

Do I have to cut my fingernails?

The CDC endorses that healthcare professionals should avoid wearing artificial nails and to keep your natural nails less than one quarter of an inch long (CDC, 2017).

What about surgical suites and special care areas?

Surgical suites, special care nurseries, and some other areas call for specific techniques for cleaning your hands and covering your clothes. Follow your hospital's policies and procedures before entering these areas.

Engineering Controls

Engineering controls remove or reduce hazards using specially designed equipment, devices, or instruments. Engineering controls have helped reduce the risks of injuries from needles and other sharp instruments (Infectious Diseases Society of America (IDSA), 2015).

What engineering controls have been used to reduce the risks of needlestick injuries?

To reduce the dangers of injury to healthcare workers, engineers have developed new styles of needles—or eliminated the need for needles—in blood collection devices, IV systems, and prefilled medication delivery systems. Puncture resistant containers are used to store sharps or to dispose of them. People who process reusable sharps use puncture-resistant gloves.

Other engineering controls ensure adequate ventilation or prevent transmission of pathogens by maintaining droplet or airborne precautions. HEPA filtration, positive-pressure or negative-pressure ventilation systems, and ultraviolet irradiation also prevent transmission.

Work Practice Controls

Work practice controls mean changing the way you complete a task to reduce or eliminate the likelihood of exposure to pathogens. For example, disposing of used syringes with their needles still attached / uncapped into a puncture-proof container.

Other examples of work practice controls include; to avoid leaving sharps in a patient care area, using forceps or suture holders when suturing, maintaining isolation precautions, using tools rather than your hands to disassemble sharp equipment, properly disposing of body fluids or cleaning spills of body fluids, and using personal protective equipment. Many of the recommendations included in this course involve work practice controls.

Infection Control Program Goals

- Provide a safe working environment
- Reduce health care-associated infections
- Reduce occupational exposures

Needlestick Injuries

Most needlestick injuries occur through the incorrect handling, disassembly, disposal and reprocessing of contaminated needles and other sharp objects. Most of these injuries occur after use and before disposal.

The CDC estimates that 5.6 million workers in the health care industry and related occupations are at risk of occupational exposure to bloodborne pathogens, including human immunodeficiency virus

(HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and others. All occupational exposure to blood or other potentially infectious materials (OPIM) places workers at risk for infection from bloodborne pathogens (Occupational Safety and Health Administration (OSHA), ND).

Risk of Needlestick Injuries

What is my risk of contracting HCV from a single needlestick injury?

The Centers for Disease Control and Prevention estimates that each year, health care workers sustain more than 600,000 injuries involving contaminated needles or sharps, and approximately one-half of these injuries go unreported.

The risk of infection from a contaminated needlestick or sharp is dependent upon the pathogen involved, the severity of the injury, and the availability and use of appropriate prophylactic treatment.

What can nurses do to reduce their risk of needlestick injuries?

Many hospitals can provide safer equipment than what has been used in the past. Safe devices include needleless IV systems, retractable needles, closed blood collection systems, and prefilled syringes. The National Institute for Occupational Safety and Health recommends the following strategies to help prevent needle-stick injuries.

- Eliminate needles when safe and effective alternatives are available
- Use devices with safety features and evaluate their effectiveness
- Analyze injuries from needles and other sharps to identify hazards
- Train healthcare workers to safely use and dispose of sharps
- Modify work practices that put healthcare workers at risk
- Encourage timely reporting and follow up of all sharps-related injuries
- Evaluate the effectiveness of prevention practices and provide feedback on performance
- Stay up to date about risk factors and ways to prevent injuries
- Encourage all employees to report hazards for sharps-related injuries
- Encourage vaccination with HBV vaccine

(OSHA, ND)

Did You Know?

Needlesticks and other sharps-related exposures are the most common route of HIV transmission in healthcare settings.

Needlestick Injuries & Bloodborne Pathogens

Which needlestick injuries are more likely to result in the injured nurse becoming infected with bloodborne pathogens?

All sharp devices can cause injury and disease transmission if not used and disposed of correctly. Injury with hollow bore devices carries a higher risk of disease transmission. Devices with butterfly type IV catheters or devices with recoil action have higher injury rates.

According to the National Institute of Occupational Safety, all infections are more likely when:

- The needle or sharp is visibly contaminated with blood
- The needle had been directly in the patient's vein or artery
- The injury to the healthcare worker is deep
- A relatively large amount of blood or infected body fluid is injected into a healthcare worker, or contaminated a healthcare worker's open wounds
- The patient was terminally ill

Preventing Needlestick Injuries

What actions should I avoid when dealing with needles and other sharp objects, to prevent a needlestick injury?

- Avoid manipulating needles and sharp instruments by hand, such as removing scalpel blades from holders and needles from syringes
- Do not delay the disposal of sharp instruments by leaving them on counters / workspaces. Also ensure that they are disposed of correctly, in puncture resistant sharps receptacles
- Avoid recapping contaminated needles and other sharp objects using a two-handed technique
- Avoid performing procedures where there is poor visualization, such as blind suturing, non-dominant hand opposing or next to a sharp or performing procedures where bone spicules or metal fragments are produced

What are safe injection practices?

Safe injection practices and procedures prevent disease transmission from patient to healthcare worker, and vice versa.

Safe Injection Practice includes:

- Avoid recapping needles
- Pass sharp instruments by use of a designated Safe Zone
- Disassemble sharp equipment by use of forceps or other devices

Safe Injection Practices & Procedures

Proper infection control technique requires healthcare providers to maintain aseptic technique throughout all aspects of injection preparation and administration. This includes:

- The use of "clean" medication prep area
- Proper hand hygiene and use of sterile technique in preparing medications
- Discarding expired vials or vials with questionable sterility
- Avoidance of "spiking" (inserting a needle into a vial or IV bag for multiple usages)

Unsafe injection practices may result in one or more of the following:

- Transmission of bloodborne viruses, including hepatitis B (HVB) and hepatitis C (HVC)
- Exposure of thousands of patients to bloodborne pathogens. If this occurs, it is recommended that the exposed patients be tested immediately for hepatitis B and C, and HIV virus
- Malpractice suits filed by patients
- Referral of providers to licensing boards for disciplinary action

Did You Know?

Pathogens including HCV, HBV & HIV can be present in sufficient quantities to produce an infection even in the absence of visible blood. Bacteria and other microbes can also be present without clouding or visible evidence of contamination. Thus, all injection supplies and materials that are *potentially* contaminated should be discarded in a designated waste management container.

Guidelines for Preparing & Administering Injections & Infusions

To avoid potential contamination and infection, all healthcare providers should adhere to the following guidelines when preparing and administering injections and infusions:

- Never administer medications from the same syringe to more than one patient, even if the needle is changed
- Never use the same syringe or needle to administer IV medications to more than one patient, even if the medication is administered into the IV tubing, regardless of the distance from the IV insertion site
- Remember that all the infusion components from the infusate to the patient's catheter are a single interconnected unit, and all the components that are directly or indirectly exposed to the patient's blood and cannot be used for another patient
- Syringes and needles that intersect through any port in the IV system also become contaminated and cannot be used for another patient or used to re-enter a non-patient specific multi-dose medication vial
- Separation from the patient's IV by distance, gravity and/or positive infusion pressure does not ensure that small amounts of blood are not present in these items

- Never enter a vial with a syringe or needle that has been used for a patient if the same medication vial might be used for another patient
- Dedicate vials of medication to a single patient, whenever possible, and medications packaged as single-use must never be used for more than one patient
- Never combine leftover contents for later use; medications packaged as multi-use should be assigned to a single patient whenever possible
- Never use peripheral capillary blood monitoring devices packaged as single-patient use on more than one patient, and restrict use of peripheral capillary blood sampling devices to individual patients
- Never reuse lancets. Use single-use lancets that permanently retract upon puncture whenever possible

Personal Protective Equipment (PPE) and Barriers

What personal protective equipment (PPE) protects nurses from infectious hazards?

Healthcare professionals frequently use a variety of personal protective equipment to make practice safer and to avoid exposure to infectious materials. Personal protective equipment includes sterile or examination gloves, cover gowns, aprons, laboratory coats, masks, fluid shields, safety glasses and goggles.

What are barriers?

Barriers are any object that separates you from a hazard.

Choosing PPE

How do I choose PPE?

To choose the proper equipment, ask yourself the following questions:

- Am I performing a sterile procedure? If so, you must wear sterile gloves instead of examination gloves.
- Am I allergic to latex? If so, then use vinyl or any other recommended type of gloves.
- Are my hands in danger of being cut by contaminated sharps, especially during cleaning instruments or disassembling equipment? If so, then wear stronger gloves reinforced with puncture-resistant material.

- Will blood or other potentially infectious body fluids splash or spray? If so, you need shields to protect your eyes and mouth and gowns to cover your body. You may also need head and shoe covers. If you expect a large volume of blood or drainage, use personal protective equipment that is fluid resistant.
- Will I be exposed to airborne pathogens? If so, you need to wear a N95 or particulate respirator.

Protection from PPE

How do I know that personal protective equipment is still working to protect me?

Only use personal protective equipment that fits properly and is free of holes. Don't use disposable equipment that has been worn by another person and make sure that non-disposable equipment has been properly cleaned and disinfected since its last use.

Can you wear personal protective equipment too long?

Yes. Remember to remove your gloves and wash your hands after caring for a patient, before charting, or touching other environment surfaces or equipment. Avoid cross contaminating patients by not using the same personal protective equipment while caring for more than one patient. Put disposable gloves, gowns, shields and other personal protective equipment in the biohazard trash. Store reusable equipment per equipment instructions and facility policy before it is disinfected.

PPE: Gloves

Gloves are used to prevent contamination of healthcare personnel hands when:

- Anticipating direct contact with blood or body fluids, mucous membranes, non-intact skin and other potentially infectious material
- Having direct contact with patients who are colonized or infected with pathogens transmitted by the contact route e.g., VRE, MRSA, RSV
- Handling or touching visibly or potentially contaminated patient care equipment and environmental surface

Gloves can protect both patients and healthcare personnel from exposure to infectious material that may be carried on hands (CDC, 2017).

Non-sterile disposable medical gloves made of a variety of materials (e.g., latex, vinyl, nitrile) are available for routine patient care. Latex or nitrile gloves are preferable for clinical procedures that require manual dexterity and/or will involve more than brief patient contact. Heavier, reusable utility gloves are indicated for non-patient care activities, such as handling or cleaning contaminated equipment or surfaces.

Respirators

A respirator is a personal protective device that is worn on the face, covers at least the nose and mouth, and is used to reduce the wearer's risk of inhaling hazardous airborne particles (including dust particles and infectious agents), gases or vapors.

Air-purifying respirators (APR) include particulate respirators, which filter out airborne particles, and "gas masks," which filter out chemicals and gases.

The classification of particulate respirators can be subdivided into three categories:

- Particulate filtering facepiece respirators - Sometimes called disposable respirators, are commonly referred to as "N95s"
- Elastomeric respirators - Sometimes referred to as reusable respirators because the facepiece is cleaned and reused but the filter cartridges are discarded and replaced when they become unsuitable for further use
- Powered air-purifying respirators (PAPRs) - A battery-powered blower moves the air flow through the filters

N95 Respirators

What is a NIOSH-Approved N95 Respirator?

N95 respirator is a term used to describe the class of respirators which use N95 filters to remove particles from the air that is breathed through them. The NIOSH term N95 refers to a filter class that removes at least 95% of airborne particles during "worst case" testing. Respirator filters that collect at least 99.97% (essentially 100%) receive a "100" rating.

Respirator filters are also rated as N, R, or P for their level of protection against oil aerosols. This rating is important because some industrial oils can reduce the filter efficiency performance.

Respirators are rated "N" if they are not resistant to oil, "R" if somewhat resistant to oil and "P" if strongly resistant (oil proof).

Thus, there are nine types of particulate respirator filters:

- N95, N-99, and N-100
- R-95, R-99, and R-100
- P-95, P-99, and P-100

The overall effectiveness of respiratory protection is affected by the:

- Level of respiratory protection selected (e.g., the assigned protection factor)
- Fit characteristics of the respirator model
- Care in using the respirator
- Adequacy of the training and fit-testing program

The most essential attribute of a respirator is the ability to fit the varying facial sizes and characteristics of health-care workers (HCWs). Assistance with selection of respirators can be

done through consultation with respirator fit-testing experts and from participation in advanced respirator training courses.

If respirators are used in a health-care setting, the Occupational Safety and Health Administration (OSHA) require the development, implementation, administration, and periodic reevaluation of a respiratory protection program. The most critical elements of a respiratory protection program include training, and fit testing. All HCWs who use respirators should be included in the respiratory protection program.

Droplet Precautions

Droplet transmission occurs when respiratory droplets carrying infectious pathogens transmit infection from the respiratory tract of the infectious individual to susceptible mucosal surfaces of the recipient, generally over short distances (<3 feet), necessitating facial protection.

The CDC recommends that healthcare workers wear a mask when within 6 to 10 feet of the patient with an airborne infection, especially when exposure to emerging or highly virulent organisms (CDC, 2015).

Preventing the spread of pathogens that are transmitted by the airborne route requires the use of special air handling and ventilation systems to contain and then safely remove the infectious agent; infectious agents (such as *Mycobacterium tuberculosis*), rubeola virus (measles), and varicella-zoster virus (chickenpox).

In addition to the use of special air handling and ventilation systems, respiratory protection with NIOSH certified N95 or higher level respirator is recommended for HCPs entering a room in which a patient with an airborne infectious disease is being cared for.

For certain other respiratory infectious agents, such as influenza and rhinovirus, and even some gastrointestinal viruses (e.g., norovirus and rotavirus) there is some evidence that the pathogen may be transmitted via small-particle aerosols. Such transmission has occurred over distances longer than 3 feet but within a defined airspace (e.g., patient room), suggesting that it is unlikely that these agents remain viable on air currents that travel long distances.

Isolation Precautions: FAQs

How many kinds of isolation are used in hospitals?

- Standard precautions
- Airborne precautions
- Droplet precautions
- Contact precautions

What's the difference between airborne precautions and droplet precautions?

The choice of airborne precautions and droplet precautions depends on the size of the particles that must be contained; particles smaller than 5 microns call for airborne precautions, while particles larger than 5 microns require droplet precautions.

What kind of microorganisms must be contained by airborne precautions?

Airborne precautions are designed to prevent transmission of very small particles: either airborne droplet nuclei (less than 5 microns in size) or evaporated droplets that can stay suspended in the air for long periods of time or infectious agents riding in the air on dust particles. Airborne microorganisms eventually cause new infections after being inhaled. Examples of microorganisms that require airborne precautions include measles, varicella, or tuberculosis. Consult your hospital's infection preventionist if you question whether a patient needs airborne precautions.

Standard precautions are applied to all patient encounters where contact with body fluids is anticipated.

Isolation precautions (contact, airborne and droplet precautions) are employed when dealing with an infectious or communicable disease.

Test Your Knowledge

You are caring for a patient who was admitted with a respiratory virus, you place this patient in what type of precautions?

- A. Standard
- B. Contact
- C. Droplet**
- D. Airborne

Rationale: Droplet transmission occurs when respiratory droplets carrying infectious pathogens transmit infection from the respiratory tract of the infectious individual to susceptible mucosal surfaces of the recipient, generally over short distances (<3 feet), necessitating facial protection.

The CDC recommends that healthcare workers wear a mask when within 6 to 10 feet of the patient with an airborne infection, especially when exposure to emerging or highly virulent organisms (CDC, 2015).

Isolation Precautions: FAQs

How do contact precautions differ from standard precautions?

In both instances, you need to wash your hands, wear non-sterile gloves, and protect yourself from splashes. But patients with contact precautions are usually in private rooms, and you need to wear a gown and gloves whenever you enter the room. Patients infected with methicillin resistant *staphylococcus aureus* or vancomycin resistant *enterococci* (VRE) may need additional precautions. Consult your hospital's infection preventionist for more information.

What do I do if I think a patient needs to be isolated, but the doctor hasn't ordered isolation? Notify the physician of your findings, provide the appropriate precautions until the patient can be fully evaluated, and consult your hospital's infection preventionist.

Cleaning, Decontamination and Sterilization

Cleaning means removing foreign material, such as blood, but cleaned items may still harbor microorganisms. Decontamination, on the other hand, removes disease-producing microorganisms and makes the object safe to use (IDSA, 2015).

Are disinfected instruments, equipment, or supplies also sterile?

No. Sterilization completely kills or eliminates all forms of microbial life. Disinfection doesn't kill everything. It eliminates many or all pathogenic microorganisms on inanimate objects, but even high-level disinfection kills only some bacterial spores. There are three levels of disinfection:

- **Low-Level Disinfection:** Kills most bacteria, some fungi, and some viruses. Will not kill bacterial spores and is less active against gram-negative rods (*pseudomonas*) and *mycobacteria*.
- **Intermediate-Level Disinfection:** Kills bacteria, *mycobacteria* (TB), most fungi, and most viruses. Does not kill resistant bacterial spores.
- **High-Level Disinfection:** Kills bacteria, *mycobacteria* (TB), fungi, viruses, and some bacterial spores (IDSA, 2015).

Cleaning, Decontamination & Sterilization: FAQs

How do outbreaks of infections result from contaminated equipment?

Sometimes hospital personnel mistakenly reuse disposable equipment or the devices are improperly cleaned, disinfected, or sterilized. For example, putting too many instruments into a sterilizer may allow some pathogens to survive, as will operating the sterilizer for too short a time or at too low of a temperature.

Sometimes unwanted pathogens contaminate the cleaning solutions, water supply, hemodialysis equipment, or automated cleaning systems. Sometimes the incorrect disinfecting solution is used, it is diluted improperly, or it becomes cross-contaminated. All aspects of the process must be monitored to ensure quality.

What happens to reusable devices after each use?

First, they are kept in covered containers and stored in dirty utility areas until they can be processed. Many are soaked in a "pre-soak" enzymatic solution. Some devices can't be pre-soaked or pre-soaked for only a limited time, because they will be corroded by the solution. After pre-soaking, they are cleaned with a detergent.

Devices used on a normally sterile body cavity are sterilized with steam or chemicals. Devices used on parts of the body that aren't sterile (such as the upper respiratory tract and gastrointestinal tract) undergo high-level disinfection following the manufacturer's guidelines to make the equipment safe without damaging it. Devices used on intact skin are cleaned with solutions recommended by their manufacturers to kill vegetative bacteria and viruses. After they're disinfected or sterilized, devices are wrapped and stored in a clean and dry environment.

How do I know if a "sterile" item is still sterile or a disinfected item is still safe?

The sterility of equipment is now event related, as opposed to the former standard of a pre-determined time frame in which sterility could be ensured. This standard is known as Event Related Sterility (ERS).

The length of time an item is considered sterile depends on:

- Type and configuration of packaging materials used
- The number of times a package is handled before use
- Environmental conditions of the storage area (e.g., cleanliness, temperature, humidity)
- Use of dust covers and method of sealing

Before using sterile equipment, check the processing date and ensure that the wrap hasn't been damaged. Follow your hospital's policy concerning rotating stock. When opening a sterile supply, check the indicator inside the pack to ensure that it has passed through the sterilization process. Make sure that rooms, beds, examining tables, and counters are adequately disinfected between patients.

Follow your hospital's policies for disinfecting common reusable equipment, such as electronic thermometers and sphygmomanometers.

Occupational Exposure to Infectious & Communicable Diseases

Health care providers are at risk for occupational exposure to bloodborne pathogens, including hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). Exposures occur through needlesticks or cuts from other sharp instruments contaminated with an infected patient's blood or through contact of the eye, nose, mouth, or skin with a patient's blood.

Important factors that influence the overall risk for occupational exposures to bloodborne pathogens include the number of infected individuals in the patient population and the type and number of blood contacts. Most exposures do not result in infection. Following a specific exposure, the risk of infection may vary with:

- The pathogen involved
- The type of exposure
- The amount of blood involved in the exposure
- The amount of virus in the patient's blood at the time of exposure

Your employer should have in place a system for reporting exposures to quickly evaluate the risk of infection, inform you about treatments available to help prevent infection, monitor you for side effects of treatments, and determine if infection occurs. This may involve testing your blood and that of the source patient and offering appropriate post exposure treatment.

Healthcare Workers: Immunizations

Because of their contact with patients or infective material from patients, many healthcare workers are at risk for exposure to and possible transmission of vaccine-preventable diseases.

Maintenance of immunity is therefore an essential part of infection prevention programs for healthcare workers. Optimal use of immunizing agents safeguards the health of workers and protects patients from becoming infected through exposure to infected workers (CDC, 2016).

Consistent immunization programs could substantially reduce both the number of susceptible healthcare workers in hospitals and health departments and the attendant risks for transmission of vaccine-preventable diseases to other workers and patients

The American Hospital Association (AHA) has endorsed the concept of immunization programs for both hospital personnel and patients. Nurses are usually screened for antibodies or a history of immunization for rubella, measles, varicella and hepatitis B. Depending on the kinds of patients you care for, you may also be screened for, and choose to be immunized against other infectious diseases, such as hepatitis A.

Healthcare Workers: TB Testing

Is the BCG Vaccine effective against TB?

There is a lot of confusion about TB skin testing in persons who have received the BCG Vaccine (either recently or as a child). The following information reflects current medical standards.

- The BCG Vaccine is NOT 100% effective against TB. The vaccine is designed to prevent the more severe childhood forms of TB and their concurrent problems. It is usually administered to children in high risk areas to decrease the risk of infection with TB, but is not 100% effective.
- The BCG Vaccine loses its effectiveness over time. Generally, the vaccine is ineffective after 5 years.

Is BCG Vaccine a contra-indication for the TB Skin Test?

- The BCG Vaccine is NOT a contra-indication to having a TB Skin Test. It is recommended that persons who have had the BCG vaccine have a TB skin test as well.
- The ONLY contraindication to a TB skin test is a previous positive result. Once a positive result is seen, the test will always remain positive. A positive PPD in a person who has been vaccinated with BCG needs to be interpreted carefully.

How often do I need to have a TB skin test?

The CDC recommends that all healthcare workers who have the potential for exposure to *M. Tuberculosis* should be included in a TB surveillance program (CDC, 2013). In high risk occupations, such as respiratory therapy, testing should be more frequent. Your hospital's infection preventionist or your local health department may request that nurses be tested sooner if they were exposed to a patient with unusual or very communicable TB infections (CDC, 2013).

What types of TB tests are available?

There are two kinds of tests that can be used to help detect TB infection – the TB skin test (TST) and special TB blood tests. A positive TB skin test or TB blood test only tells that a person has been infected with TB bacteria. It does not tell if the person has progressed to TB disease. Other tests, such as a chest x-ray and a sample of sputum, are needed to see whether the person has TB disease.

What kind of TB skin test do nurses get?

Healthcare workers receive Mantoux TB skin tests that inject 0.1 mL (5 units) of purified protein derivative (PPD) tuberculin intradermally, raising a wheal 6 to 10 mm in diameter (CDC, 2013).

Can I safely receive a Mantoux TB skin test if I'm pregnant?

Yes. The tests are safe and reliable throughout pregnancy (CDC, 2013).

Can people who recently received live-virus vaccines be tested using Mantoux TB skin tests? Live-virus vaccines may cause falsely negative TB skin tests. For live-virus measles vaccine, the most common live-virus vaccine, either place the Mantoux TB skin test on the day of vaccination or wait 4 to 6 weeks after vaccination.

Mantoux TB Skin Testing

When must a Mantoux TB skin test be read?

Have the Mantoux test read between 48 and 72 hours after it's injected (CDC, 2013).

What classifies a Mantoux TB skin test as positive?

For most healthcare workers, a raised area (induration) of > 10 mm indicates a positive TB skin test, but induration > 5 mm indicates a positive result for people with:

- HIV infection
- Recent contact with people with TB
- Chest x-ray findings consistent with old healed TB
- Organ transplants
- Other forms of immunosuppression

Mantoux TB Skin Testing

Does a negative Mantoux TB skin test always mean that the person is free of TB?

No. Between 10% to 25% of people with TB disease still have negative TB skin tests when they are diagnosed by other methods. The test may have been administered or read incorrectly. Some people are unable to mount adequate immune responses to show delayed-type hypersensitivity to the TB antigen. People with the following conditions are likely to be either temporarily or chronically immunosuppressed and have false-negative TB skin tests:

- HIV infection
- Other viral infections
- Overwhelming TB disease
- Severe or febrile illnesses
- Live-virus vaccinations
- Immunosuppressive therapy

Booster TB Skin Test

What is a booster or two-step TB skin test?

For their first screening, healthcare workers usually receive two-step skin tests using Mantoux TB skin tests. If the first test result is negative, a second Mantoux TB skin test is administered one to three weeks later. This is called boosting.

People who react positively on the second TB skin test are considered to have a past infection and treated appropriately. Those with negative results of the second TB skin test are considered uninfected. If they show a positive skin test on screening tests months or years later, they will be considered newly infected and treated accordingly (CDC, 2013).

TB Blood Tests

How does the special TB blood test work?

The special blood tests (interferon-gamma release assays [IGRAs]) measure how the immune system reacts to the bacteria that cause TB. Blood samples are mixed with antigens (substances that can produce an immune response) and controls. After incubation of the blood with antigens for 16 to 24 hours, the amount of interferon-gamma (IFN-gamma) is measured. The QuantiFERON®-TB Gold test (QFT-G) and T-SPOT®.TB test are two examples of special TB blood tests.

If the patient is infected with *M. tuberculosis*, their white blood cells will release IFN-gamma in response to contact with the TB antigens. The QFT-G results are based on the amount of IFN-gamma that is released in response to the antigens. Since they are relatively new, few health departments offer these blood tests (CDC, 2013).

Can the special TB blood test be used to confirm a diagnosis of TB?

Clinical evaluation and additional tests (such as a chest radiograph, sputum smear, and culture) are needed in addition to the TB blood test to confirm a diagnosis of latent TB infection or TB disease.

What are the advantages of the special TB test?

- It requires a single patient visit to draw a blood sample.
- Results can be available within 24 hours.
- Does not boost responses measured by subsequent tests, which can happen with tuberculin skin tests (TST).
- Is not subject to reader bias that can occur with TST.
- Is not affected by prior BCG (bacille Calmette-Guérin) vaccination.

What are the disadvantages and limitations of the special TB test?

- Blood samples must be processed within 12 hours after collection while white blood cells are still viable.
- There are limited data on the use of QFT-G in children younger than 17 years of age, among persons recently exposed to *M. tuberculosis*, and in immunocompromised persons.
- Errors in collecting or transporting blood specimens or in running and interpreting the assay can decrease the accuracy of QFT-G.
- Limited data on the use of QFT-G to determine who is at risk for developing TB disease.

When should you use the test?

QFT-G can be used in all circumstances in which the tuberculin skin test (TST) is currently used, including contact investigations, evaluation of recent immigrants who have had BCG vaccination, and TB screening of healthcare workers and others undergoing serial evaluation for *M. tuberculosis*. However, caution should be used when testing certain populations because of limited data in the use of QFT-G.

Before the QFT-G is conducted, arrangements should be made with a qualified laboratory and courier service, if needed, to ensure prompt and proper processing of blood.

What are the steps in administering the test?

- Confirm arrangements for testing in a qualified laboratory and arrange for delivery of the blood sample in time for the laboratory to initiate testing within 12 hours of blood collection.
- Draw a sample of whole blood from patient into a tube with heparin anti-clotting agent, according to manufacturer's instructions.
- Schedule an appointment for the patient to receive test results and, if needed, medical evaluation and possible treatment for TB disease or LTBI.

How do you interpret test results?

Interpretation of QFT-G results is based on IFN-gamma concentrations in test samples. Each QFT-G result and its interpretation should be considered in conjunction with other epidemiological, historical, physical, and diagnostic findings.

A positive result suggests that *M. tuberculosis* infection is likely; a negative result suggests that infection is unlikely; and indeterminate result suggests QFT-G results cannot be interpreted because of low mitogen response or high background response.

BCG Vaccine

What is the BCG Vaccine?

BCG, or bacille Calmette-Guerin, is a vaccine for tuberculosis (TB) disease.

Many foreign-born persons have been BCG-vaccinated. BCG is used in many countries with a high prevalence of TB to prevent childhood tuberculous meningitis and miliary disease.

Is the BCG vaccine used in the United States?

The BCG Vaccine is not generally recommended for use in the United States for several reasons. First, the risk of infection with Mycobacterium tuberculosis is very low in the US today. Second, the effectiveness of the vaccine against adult pulmonary TB is variable, and lastly, the vaccine has the potential to interfere with tuberculin skin test reactivity.

When should healthcare workers in the US receive the BCG vaccination?

HCPs in the US should be considered for the BCG Vaccine on an individual basis when:

- There is ongoing transmission of drug-resistant *M. tuberculosis* strains to healthcare workers and subsequent infection is likely; or
- Comprehensive TB infection prevention precautions have been implemented, but have not been successful.

Healthcare workers considered for BCG vaccination should be counseled regarding the risks and benefits associated with both BCG vaccination and treatment of latent TB infection (LTBI).

Test Your Knowledge

You are orienting a new nurse to the facility and she tells you she does not need to get a TB skin test because:

- A. She has had a positive chest x-ray
- B. She has received the BCG vaccine
- C. She has had a positive TB skin test**
- D. She has had TB in the past

Rationale: The ONLY contraindication to a TB skin test is a previous positive result. Once a positive result is seen, the test will always remain positive. A positive PPD in a person who has been vaccinated with BCG needs to be interpreted carefully.

Other Communicable Diseases: FAQs

What happens if I'm exposed to a communicable disease, such as TB, varicella, rubella, rubeola, pertussis, mumps, or meningococcal meningitis?

You will need to be evaluated. If you are susceptible, you may receive treatment, such as prophylactic antibiotics after exposure to meningococcal meningitis. You may not be able to work until you are shown to be noninfectious.

If you are diagnosed with an infectious disease, consult with your hospital's infection prevention department or occupational health clinic to determine whether you can work.

Are there general symptoms that I should have evaluated?

Yes. You should be evaluated if you have a fever, cough, rash, vesicular lesions, draining wounds, weeping dermatitis, vomiting, or diarrhea.

Which bloodborne pathogens are nurses commonly exposed to?

Evaluation usually focuses on HIV, HBV, and HCV. But depending on the patient's diagnoses, you may be tested for other infectious diseases as well.

HIV Exposure

What should I do if I think I've been exposed to HIV?

Seek treatment as soon as possible. To be effective, post-exposure prophylaxis (PEP) must start within hours of exposure. The decision to start antiviral treatment and which medications to use, depends on the kind of injury, the severity of the exposure and the patient source.

If PEP is started and tolerated, it usually lasts for approximately four weeks. Follow-up HIV antibody testing should be repeated periodically during the first six months, if previous tests results were negative.

During the first six months, exposed nurses should :

- Abstain from sexual activity or use condoms
- Avoid pregnancy

- Discontinue breastfeeding
- Avoid donating blood, plasma, semen, tissue, or organs

(CDC, 2016)

For the latest guidelines for testing and treatment following an occupational exposure, see the "Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Post exposure Prophylaxis."

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5011a1.htm>.

Test Your Knowledge

Post-exposure prophylaxis usually lasts for approximately ___ weeks.

A. Two

B. Four

C. Six

D. Eight

Rationale: If PEP is started and tolerated, it usually lasts for approximately four weeks. Follow-up HIV antibody testing should be repeated periodically during the first six months, if previous tests results were negative.

HIV Exposure: FAQs

Can HIV-infected nurses continue to practice?

Yes. The patient-care responsibilities of an exposed person do not need to be modified based solely on an HIV exposure, to prevent transmission to patients. If HIV seroconversion is detected, the person should be evaluated according to published recommendations for infected healthcare professionals (CDC, 2016).

Nurses infected with HIV should continue to follow standard precautions, wash their hands, use gloves, and handle sharps carefully. Nurses with advanced HIV disease, certain opportunistic infections, or HIV-related dementia may require additional evaluation and may be furloughed or practice with restrictions (CDC, 2016).

Can I be forced to be tested for HIV?

No. Healthcare workers must provide written informed consents before they can be tested for HIV. If they agree, their test results will remain confidential. If they refuse, they can't be disciplined, terminated, demoted, or promoted based on their decision; however, their practice may be evaluated and changed based on the degree of potential risks to patients.

Can patients be forced to be tested for HIV following a healthcare worker's exposure to their blood or body fluids?

HIV screening is recommended for patients in all healthcare settings after the patient is notified that testing will be performed, unless the patient declines (opt-out screening).

Separate written consent for HIV testing should not be required; general consent for medical care should be considered sufficient to encompass consent for HIV testing.

However, certain states require written informed consent for all HIV testing; others specifically exempt healthcare providers from this requirement, and several explicitly state that no separate consent for an HIV test is necessary when a general consent for care is in effect.

Certain states, jurisdictions, or agencies may have statutory or other regulatory requirements for pretest counseling, written consent, confirmatory testing, or communicating HIV test results. CDC recommendations for HIV testing in healthcare settings also differ from guidelines for nonclinical settings, and state requirements may differ as well. Providers should become familiar with the regulations that apply in their practice setting (CDC, 2016).

Did You Know?

Opt-out screening means performing an HIV test after notifying the patient 1) that the test will be performed and 2) that the patient may elect to decline or defer testing.

Opt-in screening means testing is offered and the patient is required to actively give permission for testing (CDC, 2016).

Hepatitis B Exposure

What treatments / testing can I expect if I've been exposed to hepatitis B?

If you haven't already been immunized against the Hepatitis B Virus (HBV), expect to receive Hepatitis B Immune Globulin (HBIG) to boost your immune system to help prevent infection with HBV. For the best protection, HBIG should be administered within 24 hours of the exposure. To provide long-term immunity, nurses may also receive a simultaneous dose of hepatitis B vaccine administered in another injection site.

Nurses, who were previously vaccinated against HBV, but show inadequate antibodies, also receive a single injection of HBIG and a HBV vaccine booster.

Nurses exposed to HBV can expect the following:

- Baseline measurement of HBV to determine previous HBV infection or antibody titers, if previously vaccinated
- Follow-up testing of HBV three to six months after the exposure for a previously uninfected nurse to determine infection that resulted from the reported exposure
- If infected, ongoing monitoring by primary healthcare provider
- No need to change sexual activities, defer pregnancy, or stop breastfeeding

(CDC, 2016)

Can nurses infected with HBV continue to practice?

Usually nurses infected with HBV don't need to modify their patient care responsibilities; however, nurses who develop symptoms of acute hepatitis B need further evaluation of their ability to practice. Nurses infected with HBV should continue to follow standard precautions, wash their hands, use gloves, and handle sharps carefully. Check your facility's policy regarding this issue.

Test Your Knowledge

For the best protection, HGIB should be administered within 24 hours of an exposure to HBV.

- A. True
- B. False

Rationale: If you haven't already been immunized against the Hepatitis B Virus (HBV), expect to receive Hepatitis B Immune Globulin (HBIG) to boost your immune system to help prevent infection with HBV. For the best protection, HBIG should be administered within 24 hours of the exposure. To provide long-term immunity, nurses may also receive a simultaneous dose of hepatitis B vaccine administered in another injection site.

Hepatitis C Exposure

What treatment / testing can I expect if I've been exposed to hepatitis C?

Neither immune globulin nor antiviral medications prevent infection with HCV following a needle-stick injury or other significant occupational exposure. Healthcare workers who become infected and develop chronic hepatitis C will probably receive treatment later. If you're exposed to HCV, you can expect the following, although your employer may require additional measures (CDC, 2016):

- Baseline measurement of HCV and ALT (alanine aminotransferase) to determine previous HCV infection and liver damage
- Follow-up testing of HCV and ALT four to six months after the exposure for a previously uninfected nurse to determine infection that resulted from the reported exposure
- If infected, ongoing monitoring by primary healthcare provider
- No need to change sexual activities, defer pregnancy, or stop breastfeeding
- Instructed not to donate blood, semen, or organs until shown to be free of HCV infection

Can nurses infected with HCV, continue to practice?

Generally, nurses infected with HCV don't need to modify their patient care responsibilities, but they should continue to follow standard precautions, wash their hands, use gloves, and handle sharps carefully (CDC, 2016).

Test Your Knowledge

Immune globulin and antiviral medications prevent infection with HCV following a needle-stick injury or other significant occupational exposure.

A. True

B. False

Rationale: Neither immune globulin nor antiviral medications prevent infection with HCV following a needle-stick injury or other significant occupational exposure. Healthcare workers who become infected and develop chronic hepatitis C will probably receive treatment later.

Developing an Infection: FAQs

What happens if I think I have an infectious disease?

Each of the hundreds of infectious diseases requires distinct treatments and measures to protect others. Consult your primary-care provider and your hospital's occupational health clinic or infectious disease department to determine whether you can continue to practice or must practice with restrictions.

In some instances, federal, state, and local public health guidelines determine treatment and work furloughs. The decision is based in part on the scope of your practice, the invasiveness of the procedures you perform, the kinds of patients you care for, your overall physical health, and whether your infection impairs your cognitive functioning. Some infectious diseases must be reported to your state department of health.

Are patients notified if they've been exposed to an infectious disease from a healthcare worker? Yes. Patients are entitled to know about exposures and to receive appropriate testing and treatments; however, the healthcare worker's name and details of their health status remains confidential. Patients must provide written consent before some tests are performed.

What about weeping dermatitis or skin lesions?

Consult your primary-care provider and your hospital's occupational health clinic or infectious disease department to determine whether working puts you or your patients at risk.

What if I disagree with my employer about my ability to practice safely after exposure to an infectious disease?

Hospitals are expected to consult an expert panel to evaluate employees exposed to or infected with infectious diseases. They should follow federal guidelines and impose the least restrictive alternatives. You or your employer can also consult your local or state Department of Health.

Conclusion

Regulations regarding infectious diseases, infection prevention, and related issues are designed to protect both the patient and the healthcare professional.

Basic knowledge of guidelines and how they impact your practice will assist in prevention of infection and reduce the chances of transmission of disease.

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suctioning bypass protective barriers in the upper respiratory tract.

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