New York Infection Prevention for Healthcare Professionals

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Purpose and Objectives

The purpose of this course is to provide healthcare professionals in the state of New York with infection prevention training, so they are able to proficiently apply general principles of infection prevention and reduce transmission of pathogens.

The course consists of six core elements that meet the requirements of the NY State Department of Health.

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

1. Define the professional's responsibility to adhere to infection prevention practices and to monitor infection prevention practices for those whom he or she is responsible for.
2. Describe the modes and mechanisms of transmission of pathogens and strategies for prevention and control.
3. Define "engineering controls" and "work-practice controls" and identify how they can be utilized to prevent exposure.
4. Describe the use of personal protective equipment to prevent contact with potentially infectious material.
5. Identify strategies for effective cleaning, disinfection and sterilization.
6. Identify occupational health strategies for preventing communicable diseases in healthcare workers.

Introduction

Infection prevention practices help form the backbone of nursing and healthcare professional practice.

Every day healthcare professionals (HCPs) follow procedures to protect themselves, their patients, and the public from infectious disease by washing their hands, using aseptic techniques, following detailed isolation procedures, reprocessing patient-care equipment, and overseeing the infection prevention practices of the people they supervise.

HCPs also teach patients and their visitors to follow infection prevention practices during a patient's hospitalization and to continue these practices after discharge.

These routine practices help fight a growing number of infectious diseases and can aid in controlling the dramatic rise of antibiotic-resistant organisms.

Statistics

Healthcare associated infections (HAIs) are now the fourth leading cause of death in America. Each year, hospital-acquired infections kill over 100,000 patients. Proper handwashing alone could save up to 20,000 patients each year. According to the National Healthcare Safety Network (NHSN) Surveillance System report, the following are the most common sources of hospital-acquired infections (Office of the Director Report, October 15, 2009):

Estimates of Healthcare-associated Infections in US Hospitals Annually

	Number of Infections	National Cost Billion $	Deaths
Device-related infections			
Urinary tract infections	560,000	0.4-0.5	8,000
Bloodstream infections	250,000	2-8	31,000
Pneumonia	250,000	5-7	36,000
Procedure-related infections			
Surgical site infections	290,000	3-8	13,000

CDC, 2010.

Element I: Monitoring Infection Prevention Practices

Healthcare professionals are responsible for adhering to scientifically accepted principles and practices of infection prevention and for monitoring the performance of those for whom the professionals are responsible.

Why should I follow infection prevention practices?
Infection prevention is an important and strategic part of your professional responsibilities. Failure to apply scientifically accepted principles and practices of infection prevention could lead to illness and even result in charges of professional misconduct.

What regulations apply specifically to nurses in New York?
Nurses practicing in New York are responsible for complying with the Rules of the Board of Regents, Part 29.2(a)(13) and Part 92 of Title 10 (Health) of the Official Compilation of Codes, Rules and Regulations of New York. A portion of these regulations can be found in the Appendix.

Can I be disciplined if other healthcare professionals I supervise fail to follow infection prevention standards?
Yes. Section 29.2(a)(13) of the Rules of the Board of the New York State Education Department defines unprofessional conduct in the area of infection prevention. The Registered Nurse is responsible for overseeing the care of those that they 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. Always follow your hospital's policies for reporting or disciplining employees who fail to follow the appropriate infection prevention practices.

Element I: Disciplinary Action

Can I be disciplined if I don't follow the standards of infection prevention?
Yes. Complaints are investigated, and if charges of misconduct are confirmed, individuals could receive disciplinary action that might result in having their professional license revoked, or charges of professional liability.

Section 29.2(a)(13) of the Rules of the Board of Regents of the New York State Education Department defines unprofessional conduct in the area of infection control as failing to use scientifically accepted infection prevention techniques appropriate to each profession for the cleaning and sterilization or disinfection of instruments, devices, material and work surfaces, utilization of protective garb, use of covers for contamination-prone equipment and the handling of sharp instruments.

Element I: Regulations & CDC Guidelines

How do I comply with the regulation concerning infection control governing nurses in New York?
Participating in infection control training is required to comply with New York State regulations. In addition, nurses must complete a refresher course at least every four years. By applying accepted principles and practices of infection control, (including monitoring the performance of others for whom you are responsible) you will also be adhering to New York requirements.
What are the standards of professional conduct as they apply to infection control?
The Centers for Disease Control and Prevention (CDC) has published guidelines and recommendations for the prevention of various healthcare associated infections. The guidelines are sorted by practices that protect patients, protect healthcare workers, and by assorted topics.

Element II: Modes & Mechanisms of Transmission

Modes and mechanisms of transmission of pathogenic organisms in the healthcare setting and strategies for prevention and control.

What is the "chain of infection"?
Infection prevention practices are based on a circular "chain of infection." This chain consists of 6 interlocking links, namely:
1. Any disease causing microorganism

2. The reservoir host
3. The portal of exit (escape from the reservoir)
4. The route of transmission
5. The portal of entry
6. The susceptible host

Each chain requires nursing assessments and interventions to break the process of infection. Healthcare professionals can enter this circular chain at any link.

Healthcare professionals should always remain vigilant to identify the weakest link to help prevent the spread of infection.

Element II: The Reservoir

What is a "reservoir"?

A reservoir is an environment where infectious agents find it favorable to live and multiply. A reservoir could be a person, animal or another substance where infectious agents thrive and reproduce. 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 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 YOURSELF

In hospitals, reservoirs can be:

a) **Patients**
b) **Hospital workers**
c) **The ventilation system**
d) **All of the above**

Element II: Pathogens / Infectious Agent

What kinds of pathogens cause disease?

A pathogen is any biological agent that is capable of causing disease. Examples of 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

Patients might require hospitalization to receive treatment for complications related to infectious diseases, they may become infected while hospitalized, or they may be chronically infected. You may be aware that patients are infected; however, a significant number of patients may not know that they are chronically infected with herpes simplex virus (HSV), human papilloma virus (HPV), human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), or other pathogens.

Element II: Portal of Exit

How do pathogens leave the reservoir to infect others?
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 in 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 organisms portals of exit.

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

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

Element II: Modes of Transmission

How are pathogens transmitted?
Each pathogen can be moved from a reservoir to a susceptible host by:

- Direct contact
- Indirect contact
- Droplet spread
- Aerosolized in the air
- Common vehicle
- By a vector (for example mosquitoes, ticks, etc)

Element II: Portal of Entry

How do pathogens enter a person's body?
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 that can open a portal of entry.

What's missing from the image?

PPE's!
Personal protective equipment such as gloves.

Element II: Factors Influencing the Outcome of Exposures

Host factors, factors relating to the pathogen or infectious agent itself and environmental factors all influence the

outcome of an exposure.

Host factors include:
- The presence or absence of natural barriers, such as intact skin, healthy respiratory cilia, normal digestive flora and good flow of urine.
- Host Immunity: How effective the host's inflammatory response is, the strength of the host's humoral and cell-mediated immunity and the strength of immune memory.

Pathogen / Infectious agent factors include:
- The degree of infectivity, pathogenicity and virulence of the infectious agent
- The size of the innoculum
- The route and duration of the exposure to the infectious agent

Environmental factors include:
- The contamination of the environment, fomites
- Contamination of equipment

Element II: The Disease Agent

Why do some organisms cause disease more easily than others?
The number of organisms you are exposed to 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 a large number of partners.

Element II: The Susceptible Host

Why do some people who are exposed become infected, while others remain healthy?
People 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.

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

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 particular individual may depend on whether the pathogen has simply colonized the person or caused infection.

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

Infection is the detrimental colonization of the host *with* clinical signs and symptoms of infection.

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**

Element II: Methods to Prevent Transmission

Exposure prevention is a primary strategy to reduce occupational infections.

There are several ways that healthcare professionals can prevent the spread of pathogenic organisms in healthcare settings:

- The use of standard precautions: Includes effective hand hygiene and the use of persona protective equipment (PPE).
- Appropriate isolation / cohorting of patients infected with communicable diseases: This includes the early identification, isolation and treatment of patients infected with organisms other than bloodborne pathogens.
- Control of routes of transmission.

Element II: Standard Precautions

What are standard precautions?

Standard precautions have essentially replaced universal precautions. Standard precautions apply to all patients and are intended to reduce the risk of transmission of microorganisms whether they are recognized or not.

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 PPE in anticipation of nursing activities or interventions.

Transmission-based precautions include:

- Contact
- Droplet
- Airborne precautions

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.

Standard precautions include the use of appropriate PPE when performing respiratory hygiene and the use of masks during spinal/epidural access procedures.

Element II: Vaccination & Safe Injection Practices

Vaccination will also help to protect you and your patients. Hepatitis B vaccine safely and effectively helps to prevent HBV infections in most people.

Post-exposure prophylaxis after being exposed to pathogens can also help prevent some infections from taking hold. Post-exposure prophylaxis can be effective against 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

Element II: Preventing Transmission in Non-Bloodborne Infections

Not all infections are bloodborne, yet can still present a risk of transmission.

For patients infected with organisms other than bloodborne pathogens, the healthcare professional should ensure:

- Early identification of the pathogen
- Prompt isolation of the infected patient
- The prompt initiation of treatment

All patients should be assessed regularly for signs of infection, and potentially infectious patients should be quickly isolated to reduce the risk of transmission of the disease to others.

In addition, HCPs can decrease routes of transmission by washing hands frequently and wearing PPE when appropriate. Use only sterilized or properly disinfected supplies and equipment and dispose of contaminated supplies and equipment according to facility policies and procedures. Environmental control measures, such as housekeeping, proper ventilation, waste disposal, and laundry are additional components that can help prevent the spread of disease.
Assess patients for signs of infection. Infectious patients should be identified quickly and treated appropriately.

Element II: Spread of Pathogens in the Absence of 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 chronic renal failure treated with dialysis are more likely to be colonized with *S. aureus.*

Since all patients 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.

Frequently the patient’s environment is contaminated with bacteria, such as staphylococci or enterococci that survive despite drying (CDC, 2002).

Element II: The Importance of Handwashing

Why is handwashing important?
In the United States, hospital patients get nearly 2 million infections each year. That’s about one infection for every 20 patients (CDC, 2013). Hospital-acquired infections (HAIs) can be life-threatening and hard to treat. Hand hygiene is one of the most important ways to prevent the spread of these infections.

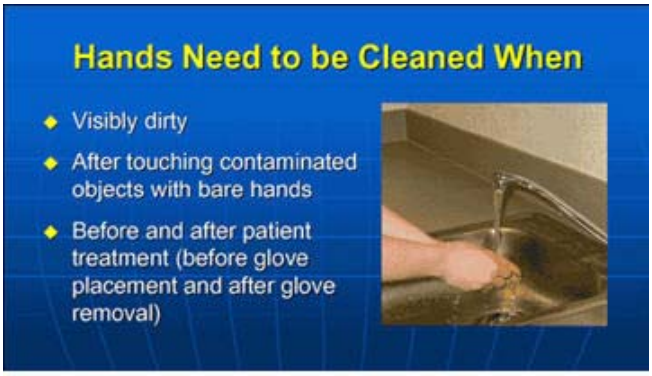
Healthcare providers should practice hand hygiene at 5 key points in time to disrupt the transmission of microorganisms to patients including:

1. Before patient contact
2. Before beginning any aseptic patient care activities
3. After exposure to blood, body fluids, or contaminated surfaces (even if gloves are worn)
4. Before invasive procedures
5. After contact with a patient and his surroundings

(WHO, 2009)

Pathogens on the hands of healthcare workers can be easily spread from one person to another. This can lead to deadly infections.

Following effective hand hygiene practices has long been recognized as the most important way to reduce the transmission of pathogens in health care settings. Many studies; however, have shown that adherence to hand hygiene recommendations remains low and that improvement efforts frequently lack substantiality (TJC, 2009).



CDC, 2003

Element II: 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 handwashing with either plain or antiseptic-containing soap and water, and the 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.

Element II: The Effect of Artificial Nails & Jewelry on Hand Hygiene

The effectiveness of hand hygiene can be reduced by the type and length of fingernails. Individuals wearing artificial nails have been shown to harbor more pathogenic organisms, especially gram negative bacilli and yeasts.

In 2002, CDC / HICPAC recommended that artificial fingernails and extenders should not be worn by healthcare personnel who have contact with high-risk patients (e.g., those in ICUs, ORs) due to the association with outbreaks of gram-negative bacillus and candidal infections as confirmed by molecular typing of isolates.

At this time such decisions are at the discretion of an individual facility’s infection control program.

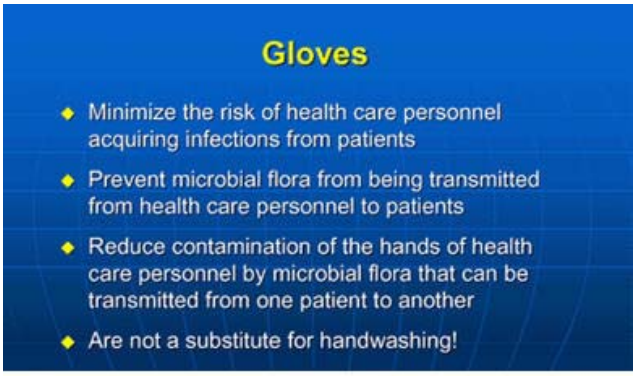
There is less evidence that jewelry affects the quality of hand hygiene. Although hand contamination with potential pathogens is increased with ring-wearing, no studies have related this practice to healthcare worker-to-patient transmission of pathogens (CDC, 2008).

Element II: Handwashing 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.

Several studies have shown the ability of microorganisms to survive on hands for differing times (CDC, 2013). Gloves reduce hand contamination by 70% to 80%, help to prevent cross-contamination, and help to protect patients and healthcare personnel from infection (CDC, 2002).



CDC, 2003

Element II: Handwashing Options

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 (vs. alcohol based rub) when your hands are visibly soiled with blood, other body fluids, or protein-rich materials (CDC, 2008).

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.

The CDC recommends handwashing with soap and water (rather than alcohol based hand rubs) after contact with a patient with *Clostridium Difficile* (*C. Diff)*.

What is the best way to use an alcohol-based hand rub?
Apply an alcohol-based hand rub on the palm of one hand, then rub your hands together covering all the surfaces of your hands and fingers until your hands are dry (CDC, 2008).

How should I wash my hands if I think I've been exposed to *Bacillus anthracis,* the bacteria that causes anthrax?
Because alcohol and other antiseptic agents don't work well against spores from this bacteria, wash your hands with soap and water. Rubbing your hands together under running water helps rinse away the spores (CDC, 2008).

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 running water, but use 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, 2010).

TEST YOURSELF

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

a) **Five seconds**
b) **Ten seconds**
c) **60 seconds**
d) **None of the above**

Element II: Special Issues with Handwashing

My skin is sensitive. What should I do?

Alcohol-based hand rubs might help. For many, 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, 2008). Also use hand lotions or creams approved and provided by your employer.

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 (CDC, 2008).

Element III: Engineering & Work Practice Controls in Healthcare Settings

Engineering and work practice controls reduce the opportunity for patient and healthcare worker exposure to potentially infectious material in all healthcare settings.

High risk practices and procedures that are capable of causing HAI with bloodborne pathogens include:

- **Percutaneous exposures**: Occur through the routine handling, disassembly, disposal and reprocessing of contaminated sharp objects, and the performance of procedures with poor visualization. These procedures may include blind suturing, procedures that produce bone spicules or metal fragments, and the use of a non-dominant hand near a sharp instrument.
- **Mucus membrane / non-intact skin exposures**: Direct blood or body fluid contact with eyes, nose, mouth or other mucous membrane via contact with contaminated hands, open lesions or splashes / sprays of blood or body fluid during procedures such as irrigation or suctioning.
- **Parental exposures**: Injection with infectious material may occur during the administration of parental medication, the sharing of blood monitoring devices (such as glucometers) and the infusion of contaminated blood products or fluids.

Element III: Engineering Controls

Use engineering and work practice controls to reduce the opportunity for patient and healthcare worker contact with potentially infectious material in all healthcare settings.

What are engineering controls?

Engineering controls remove or reduce hazards by the use of specially designed equipment, devices, or instruments. Engineering controls have helped reduce the risks of injuries from needles and other sharp instruments by developing safer devices with active safety features and mechanisms that provide continuous protection.

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 in blood collection devices, IV systems, and prefilled medication delivery systems. Puncture resistant containers are used to store sharps or to dispose of them.

Splatter-proof shields have also been fitted on medical equipment used in risk-prone procedures, and people who process reusable sharps use puncture-resistant gloves.

Please review published guidelines for the selection, evaluation and use of sharps disposal containers:
NIOSH Guidelines & NYSDOH Recommendations

Element III: Work Practice Controls

What are work practice controls?

Work practice controls are processes, procedures and equipment that changes the way you complete a task to reduce or eliminate the likelihood of exposure to pathogens.

The first step in work practice controls is the identification of:

- Those at risk for exposure
- Devices that can cause exposure (all sharp devices, including blood glucose monitoring devices)
- Areas or settings where exposures are most likely to occur
- Circumstances in which exposures occur

Examples of work practice controls include avoiding 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.

Element III: Recommended Work Practice Controls

Recommended general practice for infection control includes:

- Hand hygiene, including the appropriate circumstances in which alcohol–based hand sanitizers and soap and water handwashing should be used.
- Proper procedures for cleaning of blood and body fluid spills: Initial removal of bulk material followed by disinfection with an appropriate disinfectant, the correct handling/disposal of blood and body fluids, including contaminated patient care items, and the proper selection, donning, doffing, and disposal of personal protective equipment (PPE) as trained [see Element IV].
- Proper protection of work surfaces in direct proximity to patient procedure treatment area with appropriate barriers to prevent instruments from becoming contaminated with bloodborne pathogens.
- Preventing percutaneous exposures: By avoiding unnecessary use of needles and other sharp objects, utilizing care in the handling and disposing of needles and other sharp objects (avoid recapping unless absolutely medically necessary, and if recapping, use only a one-hand technique or safety device). Also, pass sharp instruments by use of designated "safe zones" and use forceps to disassemble sharp equipment.
- Modify procedures to avoid injury: Use forceps, suture holders, or other instruments for suturing, avoid holding tissue with fingers when suturing or cutting, and avoid leaving exposed sharps of any kind on patient procedure/treatment work surfaces.

Remember to use safety devices whenever available, and always activate the safety features.

Element III: Safe Injection Practices & Procedures

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

- Transmission of bloodborne viruses, including hepatitis B (HVB) & 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 & C, and HIV virus.
- Malpractice suits filed by patients.
- Referral of providers to licensing boards for disciplinary action.

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).

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.

Element III: Guidelines for Safe Injection Practices

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 of the infusion components from the infusate to the patient's catheter are a single interconnected unit, and all of 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.

Element III: Needlestick Injuries

How often are nurses injured each year with needles and sharps?

OSHA estimates that 5.6 million workers in the healthcare industry are at risk of occupational exposure to bloodborne pathogens (OSHA, 2013).

Bloodborne pathogens are pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and others (OSHA, 2013).

What kind of equipment leads to needlestick injuries?

According to the New York Department of Health, most needlestick injuries occur through the incorrect handling, disassembly, disposal and reprocessing of contaminated needles and other sharp objects.

Element III: 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 vise versa.

Pathogens, including HCV, HBV and HIV can be present in sufficient quantities to produce infection in the absence of visible blood.

Safe 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.

Element III: 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.

Element III: Risk of Needlestick Injuries

What is my risk of contracting HCV from a single needlestick injury?
The CDC (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 (TJC, 2001).

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 are able to 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 (TJC, 2001):

- 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.

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

Element III: Needlestick Injuries

Do hospitals have responsibilities to help prevent needlestick injuries?

The federal Needlestick Safety and Prevention Act requires employers to meet the following requirements (TJC, 2001):

- Review exposure control plans yearly to incorporate changes in technology that could help reduce exposure to bloodborne infections.
- Involve nonmanagerial workers to evaluate and select safety devices.
- Maintain a log of sharps injuries that ensures an employee's privacy. The log must contain at least the type and brand of device involved in the injury, the location of the injury, and a description of the incident.

What do I do if I've been injured with a needle or another kind of sharp instrument?
If you have been injured with a needle or other sharp, immediately wash the wound with antiseptic soap and water, notify your supervisor and follow your hospital's policy for post exposure testing and treatment. Waiting until the end of a work shift may decrease the effectiveness of treatment. Antiretroviral medication may reduce the risk of infection of HIV and HBV, but to be effective, post exposure prophylaxis must begin as soon as possible after the exposure. Additional treatment may be needed for exposures to other pathogens; however, there is no preventive vaccine or post exposure prophylaxis for HCV.

What else can healthcare professionals do to reduce their risks of other kinds of percutaneous injuries?
Be especially careful when you can't fully see your fingers. Blind suturing, exploring wounds or a patient's mouth, especially when the patient is confused, uncooperative, or demented, can increase your risk.

Element IV: Personal Protective Equipment (PPE) and Barriers

PPE refers to a variety of barriers and respirators used alone or in combination to protect mucous membranes, airways, skin, and clothing from contact with infectious agents (CDC, 2008). The selection of PPE is based on the nature of the patient interaction and/or the likely mode(s) of transmission.

What personal protective equipment protects nurses from infectious hazards?
Nurses frequently use a variety of personal protective equipment (PPE) to facilitate safe practice and to avoid exposure to infectious materials. PPE such as sterile or examination gloves, cover gowns, aprons, masks, fluid shields, respirators and safety glasses are all examples of personal protective equipment.

What are barriers?
Barriers are any material objects that separate you from a hazard.

CDC, 2003

Element IV: 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 puncture-resistant gloves.
- 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.

Element IV: 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 PPE while caring for more than one patient.

Element IV: 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 surfaces.

Gloves can protect both patients and healthcare personnel from exposure to infectious material that may be carried on hands (CDC, 2008).

Nonsterile 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.

The selection of glove type for non-surgical use is based on a number of factors, including the task that is to be performed, anticipated contact with chemicals and chemotherapeutic agents, latex sensitivity, sizing, and facility policies for creating a latex-free environment (CDC, 2008).

For contact with blood and body fluids during non-surgical patient care, a single pair of gloves generally provides adequate barrier protection. During patient care, transmission of infectious organisms can be reduced by adhering to the principles of working from “clean” to “dirty”, and confining or limiting contamination to surfaces that are directly needed for patient care.

It may be necessary to change gloves during the care of a single patient to prevent cross-contamination of body. It also may be necessary to change gloves if the patient interaction also involves touching portable computer keyboards or other mobile equipment that is transported from room to room.

When gloves are worn in combination with other PPE, they are put on last. Gloves that fit snugly around the wrist are preferred for use with an isolation gown because they will cover the gown cuff and provide a more reliable continuous barrier for the arms, wrists, and hands.

Gloves that are removed properly will prevent hand contamination. Discarding gloves between patients is necessary to prevent transmission of infectious material. Hand hygiene following glove removal further ensures that the hands will not carry potentially infectious material that might have penetrated through unrecognized tears or that could contaminate the hands during glove removal.

Element IV: 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 HCPs don 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, 2003).

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; (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.

Consult your hospital's infection preventionist if you question whether a patient needs droplet precautions.

Element IV: 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, gases or vapors.

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

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

- Particulate filtering facepiece respirators are disposable respirators that are commonly referred to as “N95s.”
- Elastomeric respirators are reusable respirators because the facepiece is cleaned and re-used but the filter cartridges are replaced when needed.
- Powered air-purifying respirators (PAPRs) have a battery-powered blower that moves air flow through the filters.

What is a NIOSH-Approved N95 Respirator?

N95 respirators are a class of respirators which use N95 filters to remove particles from the air that is breathed through them. These respirators have a filter that removes at least 95% of airborne particles during testing.

Respirator filters are also rated as N, R, or P for their level of protection against oil aerosols. Respirators are rated "N" if they are not resistant to oil, "R" if somewhat resistant to oil and "P" if strongly resistant (oil proof).

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 healthcare professionals. Assistance with selection of respirators can be done through consultation with respirator fit-testing experts and from participation in advanced respiratory training courses.

Element IV: Contact Precautions and Isolation

How do contact precautions differ from standard precautions?

Patients with contact precautions are usually in private rooms, and PPE is usually worn whenever entering the room. 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.

Note! 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.

Element V: Cleaning, Disinfection & Sterilization

Universal principles can be applied to managing and reprocessing instruments, medical devices and equipment according to recommended methods regardless of a patient's diagnosis, except for cases of suspected prion disease (e.g., Creutzfeldt-Jakob disease [CJD]), as special procedures are required for handling brain, spinal, or nerve tissue from patients with known or suspected prion disease. Consultation with infection control experts prior to performing procedures on such patients is warranted.

Industry guidelines as well as equipment and chemical manufacturer recommendations should be used to develop and update reprocessing policies and procedures.

Written instructions should be available for each instrument, medical device, and equipment reprocessed.

The potential for contamination is dependent upon:

- Type of instrument (physical composition or design) of the medical device, equipment, or environmental surface, and the potential for external contamination (e.g., presence of hinges, crevices) or internal contamination (e.g., presence of lumens).
- Frequency of hand contact with instrument medical device, equipment, or environmental surface.
- Potential for contamination with body substances or environmental sources of microorganisms.
- Level of contamination, which depends on the type and number of organisms, and the potential for cross-contamination.

What is Prion Disease?
Prion disease, also known as transmissible spongiform encephalopathies (TSEs) are a family of rare progressive neurodegenerative disorders that affect both humans and animals. Special infection prevention procedures must be employed whenever dealing with brain, spinal or nerve tissue from a patient with suspected prion disease.

Element V: Clean, Disinfection and Sterility

What's the difference between "cleaning" and "decontamination"?
Cleaning means removing foreign material, such as blood, but cleaned items may still harbor microorganisms. Disinfection, on the other hand, removes disease-producing microorganisms and makes the object safe to use (CDC, 2008).

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 some viruses and bacteria with a chemical germicide registered as a hospital disinfectant by the EPA.
- **Intermediate-Level Disinfection***:* Kills mycobacteria, most viruses and bacteria with a chemical germicide registered as a "tuberculocide" by the U.S. Environmental Protection Agency (EPA).
- **High-Level Disinfection***:* Kills all organisms, except for high levels of bacterial spores, and is effected with a chemical germicide cleared for marketing as a sterilant by the U.S. Food & Drug Administration (FDA).

Element V: Potential for Contamination

The potential for contamination is dependent upon:

- Type of instrument, medical device, equipment, or environmental surface and its potential for external contamination (e.g., presence of hinges, crevices) and internal contamination (e.g., presence of lumens); and the physical composition, design, or configuration of the device or surface
- Frequency of hand contact with instrument medical device, equipment, or environmental surface
- The potential for contamination with body substances or environmental sources of microorganisms
- Level of contamination: Depends on the number and types of microorganisms; and the potential for cross-contamination

Designation and physical separation of patient care areas from cleaning and reprocessing areas is strongly recommended by NYSDOH.

Element V: Contaminated Equipment and Reusable Devices

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.

What happens to reusable devices after each use?
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.

Element V: Event Related Sterility

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 Association of periOperative Registered Nurses (AORN) support event-related sterility. According to AORN, the length of time an item is considered sterile depends on the following:

- 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 reprocessing and disinfecting common reusable equipment, such as electronic thermometers.

Instruments, medical devices and equipment should be reprocessed according to recommended methods, regardless of a patient's diagnosis, except for cases of suspected prion disease.

Element V: Steps for Reprocessing

What does reprocessing mean and how can I accomplish this?
Reprocessing is the cleaning, disinfecting and sterilization of all reusable equipment.

The New York State Department of Health recommends healthcare workers follow the following steps in reprocessing equipment and devices:

1. **Pre-cleaning**: Remove soil, debris and lubricants from internal and external surfaces as soon after use as possible.
2. **Cleaning**: Manual (scrubbing with brushes) and / or Mechanical (automated washers) cleaning, and the appropriate use & reprocessing of cleaning equipment (eg: Do not re-use disposable equipment & change solution often).
3. **Disinfection**: Requires sufficient contact time with chemical solution.
4. **Sterilization**: Requires sufficient exposure time to heat, chemicals or gases.

Never reprocess any equipment that is designated for single use.

A log should be maintained of all reprocessed equipment.

Responsible staff should be designated to maintain proper reprocessing procedures.

Element V: Choice & Level of Reprocessing Procedure

When deciding on the type of reprocessing procedure to use, consideration should be based on the intended use of the equipment.

According to the New York State Department of Health:

- Critical instruments and medical devices require sterilization.
- Semi critical instruments and medical devices minimally require high level disinfection.
- Noncritical instruments and medical devices minimally require cleaning and low level disinfection.

(See definitions in Terminology section).

The manufacturer's recommendations should also be taken into consideration, and compatibility among equipment components, materials, and chemicals used should be ensured.

In addition, the time and temperature requirements for reprocessing, as well as the equipment heat and pressure tolerance should be considered.

Check out the FDA regulations for reprocessing single use devices http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/ReprocessingofSingle-UseDevices/ucm121974.htm.

Element V: Effectiveness of Reprocessing

Cleaning should always be performed prior to disinfection to remove visible dirt / foreign particles.

When selecting the appropriate mode of disinfection, the correct disinfectant must be chosen; depending on if the item can be immersed in solution or requires surface-only cleaning, the presence of organic matter and biofilms, and the activity and stability of the disinfectant.

Monitoring of the effectiveness of reprocessing can be achieved with the use of:

- Biologic monitors
- Process monitors (tape, indicator strips, etc.)
- Physical monitors (pressure, temperature gauges)
- Record keeping and recall/ tracking system for each sterilization processing batch/item
- Post-sterilization handling, packaging and storage (event-related criteria)

Any break in infection control practices at any point in the reprocessing process can compromise the integrity of the equipment, and this can lead to disease transmission.

Element VI: Occupational Exposure of Infectious & Communicable Diseases

HCPs 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 factors such as:

- 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 in order 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 postexposure treatment.

Element VI: Healthcare Workers & Immunizations

Prevent and manage infectious or communicable diseases in healthcare workers.

What immunizations can help protect nurses from infectious diseases at work?
Because of their contact with patients or infective material from patients, many healthcare workers (HCWs) 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 HCWs. Optimal use of immunizing agents safeguards the health of workers and protects patients from becoming infected through exposure to infected workers (CDC, 2010).

Consistent immunization programs could substantially reduce both the number of susceptible HCWs 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.

The Advisory Committee on Immunization Practices (ACIP) has issued guidelines for tetanus toxoid, reduced diphtheria toxoid and acellular pertussis (Tdap) vaccine for adults. Healthcare personnel who have direct patient contact working in hospitals or ambulatory care settings should receive a single dose of Tdap as soon as possible if they have not previously received Tdap.

Element VI: 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. 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.
- 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. 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.

What types of TB tests are available?
There are two kinds of tests used to determine infection with TB bacteria: the tuberculin skin test (TST) and TB blood tests. The Mantoux tuberculin skin test identifies infection with TB bacteria. If positive, additional testing may be necessary to determine if the person has latent TB infection or TB disease.

Testing for TB in People with a BCG
People who have had a previous BCG shot may receive a TST. In some people, the BCG shot may cause a positive TST when they are not infected with TB bacteria. If a TST is positive, additional tests are needed.

TB Blood Tests: Interferon Gamma Release Assay (IGRA)
An IGRA is a blood test that measures how strong a person's immune system reacts to TB bacteria. Two IGRAs are approved by the U.S. Food and Drug Administration (FDA) and are available in the United States:
- QuantiFERON®–TB Gold In-Tube test (QFT–GIT)
- T–SPOT®.TB test (T–Spot)

Who can receive an IGRA?
Anyone can have an IGRA in place of a TST. This can be for any situation where a TST is recommended. In general, a person should have either a TST or an IGRA, but not both. There are rare exceptions when results from both tests may be useful in deciding whether a person has been infected with TB. IGRAs are the preferred method of TB infection testing for the following:
- People who have received the BCG shot
- People who have a difficult time returning for a second appointment to look at the TST after the test was given

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, 2010).

Can I safety receive a Mantoux TB skin test if I'm pregnant?
Yes. The tests are safe and reliable throughout pregnancy (CDC, 2010).

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.

For additional information on TB testing, please see Appendix III.

Element VI: Other Communicable Diseases

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 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.

Element VI: HIV Exposure

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

Provide immediate care to the exposure site, by washing wounds and skin with soap and water, and flushing mucous membranes with water. 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. Counseling should be provided.

Testing is usually performed for HBsAG, anti-HCV and HIV antibodies (rapid testing). Exposed individuals should be advised to use precautions to prevent secondary transmission during the follow-up period.

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 Postexposure Prophylaxis," available at:
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5409a1.htm

TEST YOURSELF

Post-exposure prophylaxis usually lasts for approximately___ weeks.

- **a) Two**
- **b) Four**
- **c) Six**
- **d) Eight**

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, 2010).

Element VI: HBV Exposure

HCPs that have received hepatitis B vaccine and developed immunity to the virus are at virtually no risk for Hepatitis B infection. While there is a risk for Hepatitis B Virus (HBV) infection from exposures of mucous membranes or non-intact skin, there is no known risk for HBV infection from exposure to intact skin.

Hepatitis B vaccine is available to prevent HBV infection. All healthcare personnel who have a reasonable chance of exposure to blood or body fluids should receive hepatitis B vaccine. Vaccination ideally should occur during the HCP's training.

HCPs should be tested 1-2 months after the vaccine series is complete to make sure that vaccination has provided immunity to HBV infection. Hepatitis B immune globulin (HBIG) alone or in combination with vaccine (if not previously vaccinated) is effective in preventing HBV infection after an exposure.

TEST YOUSELF

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

- **a) True**
- **b) False**

The decision to begin treatment is based on several factors, such as:

- **Whether the source individual is positive for hepatitis B surface antigen**
- **Whether you have been vaccinated**
- **Whether the vaccine provided you immunity**

Element VI: HCV Exposure

The average risk for infection after a needlestick or cut exposure to HCV-infected blood is very small, and there is no known risk from exposure to intact skin.

There is no vaccine against hepatitis C and no treatment after an exposure that will prevent infection. Neither immune globulin nor antiviral therapy is recommended after exposure. For these reasons, following recommended infection control practices to prevent percutaneous injuries is imperative.

TEST YOURSELF

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

a) **True**
b) **False**

Element VI: Post Exposure Prophylaxis

The New York State Department of Health (NYSDOH) guidelines recommend that post exposure prophylaxis (PEP) should be initiated as soon as possible, ideally within two (2) hours and generally no later than 36 hours post-exposure.

If the patient's HIV status is not known, consent of the patient needs to be obtained for a rapid HIV test. Rapid test results are usually available within 30 minutes of testing.

Rules regarding confidentiality and consent for testing are identical to those for other HIV tests. Hospitals should review and update its policies and procedures to ensure that they are in compliance with section 63.8(m) by notifying individual staff of the procedures to be followed in cases of possible exposure.

NYSDOH AIDS Institute recommendations for PEP following occupational exposure are available for review on the NYSDOH HIV Guidelines Website.

NYSDOH Policies to Prevent Transmission of Bloodborne Pathogens to HCPs

The NYSDOH recommends the following policies to prevent infected health care personnel (HCP) related bloodborne pathogen transmission (HIV, HBV, HCV):

The most effective means of preventing bloodborne pathogen transmission in health care settings is through strict adherence to Standard Precautions (Siegel, et al, 2007), and established infection prevention and control practices that decrease the opportunity for direct exposure to blood and body fluids for both health care workers and patients.

Voluntary testing without fear of disclosure or discrimination is the best means of encouraging people at risk for bloodborne pathogens to seek counseling and testing.

Mandatory screening of New York HCP for bloodborne pathogens is not recommended. All patients and health care workers who have been potentially exposed to bloodborne pathogens should be strongly counseled to seek testing so they may benefit from medical management.

Health care workers should also seek screening for bloodborne diseases per CDC recommendations as part of their own health care.

Bloodborne pathogen infection alone does not justify limiting a health care worker's professional duties.

Limitations, if any, should be determined on a case-by-case basis.

Health care workers are not required to inform patients or employers that they have a bloodborne pathogen infection. Such disclosure might serve as a deterrent to workers seeking voluntary testing and medical evaluation.

Evaluation of Healthcare Workers Infected with Bloodborne Pathogens

Under NYSDOH regulations, all health care facilities are responsible for establishing a mechanism for evaluating health care professionals (HCP) with bloodborne pathogen infection to ensure that they do not pose a risk. This requirement should not be misconstrued to condone involuntary or mandatory screening of employees for bloodborne pathogens by health care facilities.

HIV testing can only be performed with the individual's written and informed consent. All HCPs should be counseled about the importance of learning their bloodborne pathogen status.

Institutional evaluations of individual workers known to be infected with bloodborne pathogens should involve consultation with experts who can provide a balanced perspective. All matters related to such evaluations must be handled confidentially.

Any modifications of work practice must seek to impose the least restrictive alternative in accordance with disability laws.

Conclusion

New York State regulations regarding infectious diseases, infection control, 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.

The primary strategy for reducing occupational blood borne pathogen infections is exposure prevention.

Appendix I: Rules of the Board

Rules of the Board of Regents of the State of New York
Part 29, Unprofessional Conduct & 29.2 General provisions for health professions.

a. Unprofessional conduct shall also include, in the professions of: acupuncture, athletic training, audiology, certified dental assisting, chiropractic, dental hygiene, dentistry, dietetics/nutrition, licensed practical nursing, massage therapy, medicine, midwifery, occupational therapy, ophthalmic dispensing, optometry, pharmacy, physical therapist assistant, physical therapy, physician assistant, podiatry, psychology, registered professional nursing, respiratory therapy, respiratory therapy technician, social work, specialist assistant, occupational therapy assistant, speech-language pathology, except for cases involving those professions licensed, certified or registered pursuant to the provisions of Article 131 or 131-B of the Education Law in which a statement of charges of professional misconduct was not served on or before July 26, 1991, the effective date of Chapter 606 of the Laws of 1991:

13. failing to use scientifically accepted infection prevention techniques appropriate to each profession for the cleaning and sterilization or disinfection of instruments, devices, materials and work surfaces, utilization of protective garb, use of covers for contamination-prone equipment and the handling of sharp instruments. Such techniques shall include but not be limited to:

i. wearing of appropriate protective gloves at all times when touching blood, saliva, other body fluids or secretions, mucous membranes, nonintact skin, blood-soiled items or bodily fluid-soiled items, contaminated surfaces, and sterile body areas, and during instrument cleaning and decontamination procedures;

ii. discarding gloves used following treatment of a patient and changing to new gloves if torn or damaged during treatment of a patient; washing hands and donning new gloves prior to performing services for another patient; and washing hands and other skin surfaces immediately if contaminated with blood or other body fluids;

iii. wearing of appropriate masks, gowns or aprons, and protective eyewear or chin-length plastic face

shields whenever splashing or spattering of blood or other body fluids is likely to occur;
iv. sterilizing equipment and devices that enter the patient's vascular system or other normally sterile areas of the body;
v. sterilizing equipment and devices that touch intact mucous membranes but do not penetrate the patient's body or using high-level disinfection for equipment and devices which cannot be sterilized prior to use for a patient;
vi. using appropriate agents, including but not limited to detergents for cleaning all equipment and devices prior a sterilization or disinfection;
vii. cleaning, by the use of appropriate agents, including but not limited to detergents, equipment and devices which do not touch the patient or that only touch the intact skin of the patient;
viii. maintaining equipment and devices used for sterilization according to the manufacturer's instructions;
ix. adequately monitoring the performance of all personnel, licensed or unlicensed, for whom the licensee is responsible regarding infection control techniques;
x. placing disposable used syringes, needles, scalpel blades, and other sharp instruments in appropriate puncture-resistant containers for disposal; and placing reusable needles, scalpel blades, and other sharp instruments in appropriate puncture-resistant containers until appropriately cleaned and sterilized;
xi. maintaining appropriate ventilation devices to minimize the need for emergency mouth-to-mouth resuscitation;
xii. refraining from all direct patient care and handling of patient care equipment when the healthcare professional has exudative lesions or weeping dermatitis and the condition has not been medically evaluated and determined to be safe or capable of being safely protected against in providing direct patient care or in handling patient care equipment; and
xiii. placing all specimens of blood and body fluids in well-constructed containers with secure lids to prevent leaking; and cleaning any spill of blood or other body fluid with an appropriate detergent and appropriate chemical germicide.

Appendix II: General Provisions for HCPs

Education Regulations: § 29.2. General provisions for health professions:

Unprofessional conduct shall include the failure to use scientifically accepted infection prevention techniques, appropriate to each profession, for the cleaning and sterilization or disinfection of instruments, devices, materials and work surfaces, utilization of protective garb, use of covers for contamination-prone equipment and the handling of sharp instruments. Such techniques shall include but not be limited to:

i. wearing of appropriate protective gloves at all times when touching blood, saliva, other body fluids or secretions, mucous membranes, non-intact skin, blood-soiled items or bodily fluid-soiled items, contaminated surfaces, and sterile body areas, and during instrument cleaning and decontamination procedures;
ii. discarding gloves used following treatment of a patient and changing to new gloves if torn or damaged during treatment of a patient; washing hands and donning new gloves prior to performing services for another patient; and washing hands and other skin surfaces immediately if contaminated with blood or other body fluids;
iii. wearing of appropriate masks, gowns or aprons, and protective eyewear or chin-length plastic face shields whenever splashing or spattering of blood or other body fluids is likely to occur;
iv. sterilizing equipment and devices that enter the patient's vascular system or other normally sterile areas of the body;
v. sterilizing equipment and devices that touch intact mucous membranes but do not penetrate the patient's body or using high-level disinfection for equipment and devices which cannot be sterilized prior to use for a patient;
vi. using appropriate agents, including but not limited to detergents for cleaning all equipment and devices prior a sterilization or disinfection;
vii. cleaning, by the use of appropriate agents, including but not limited to detergents, equipment and devices which do not touch the patient or that only touch the intact skin of the patient;
viii. maintaining equipment and devices used for sterilization according to the manufacturer's instructions;
ix. adequately monitoring the performance of all personnel, licensed or unlicensed, for whom the licensee is responsible regarding infection control techniques;

x. placing disposable used syringes, needles, scalpel blades, and other sharp instruments in appropriate puncture-resistant containers for disposal; and placing reusable needles, scalpel blades, and other sharp instruments in appropriate puncture-resistant containers until appropriately cleaned and sterilized;
xi. maintaining appropriate ventilation devices to minimize the need for emergency mouth-to-mouth resuscitation;
xii. refraining from all direct patient care and handling of patient care equipment when the health care professional has exudative lesions or weeping dermatitis and the condition has not been medically evaluated and determined to be safe or capable of being safely protected against in providing direct patient care or in handling patient care equipment;
xiii. placing all specimens of blood and body fluids in well-constructed containers with secure lids to prevent leaking; and cleaning any spill of blood or other body fluid with an appropriate detergent and appropriate chemical germicide.

(NYSDOH Infection Control Training Syllabus 2010).

Appendix III: TB 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, 2010).

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

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

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, 2000).

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.

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, 2010).

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 health care 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 as a result of low mitogen response or high background response.

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 health care 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).

Terminology & Glossary of Terms

Alcohol-Based Hand Rub: An alcohol-containing preparation designed for application to the hands to reduce the number of viable microorganisms on the hands. Such preparations in the United States usually contain between 60% to 90% ethanol or isopropanol.

Antimicrobial Soap: A soap or detergent that contains an antiseptic agent.

Antiseptic Agent: Antimicrobial substances that are applied to the skin to reduce the number of microbial flora. Examples of antiseptic agents include alcohol, chlorhexidine, chlorine, hexachlorophene, iodine, chloroxylenol (PCMX), quaternary ammonium compounds, and triclosan.

Antiseptic Hand Rub: Applying an antiseptic hand-rub product to all surfaces of the hands to reduce the number of microorganisms present.

Antiseptic Handwash: Washing hands with water and soap or other detergents containing an antiseptic agent.

Barrier: A material object that separates a person from a hazard.

Biofilm: Is created when microorganisms attach to a surface and develop resistance to infection control practices.

Cell-mediated Immunity: Acquired immunity in which the role of T lymphocytes is predominant.

Cleaning: The removal of all foreign material (soil, organic debris) from objects by using water and detergents / soap and washing and scrubbing the object.

Colonization: Is the presence of a micro-organism on / in a host, with growth and multiplication of the organism. However, there is no interaction between the host and the micro-organism, and thus there are no clinical signs and symptoms of the disease.

Common Vehicle: Contaminated material, product, or substance that serves as an intermediate means by which an infectious agent is transported to two or more susceptible hosts.

Communicable Disease: An illness due to a specific infectious agent or its toxic products that arises through transmission of that agent from an infected person, animal, or inanimate source to a susceptible host.

Contamination: The presence of microorganisms on an item or surface.

Critical Device: An item that enters sterile tissue or the vascular system, and must be sterile prior to contact with tissue. A semi critical device is an item that comes in contact with mucous membranes or non intact skin and minimally requires high level disinfection. A non critical device is an item that contacts intact skin but not mucous membranes. It requires low level disinfection.

Cumulative Effect: A progressive decrease in the numbers of microorganisms recovered after repeated applications of a test material.

Decontamination: The use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on the surface or item to the point where they are no longer capable of transmitting infectious particles.

Decontaminate Hands: To reduce the bacterial counts on hands by performing antiseptic hand rub or antiseptic handwash.

Detergent: Compounds that possess a cleaning action. They are composed of both hydrophilic and lipophilic parts and can be divided into four groups: anionic, cationic, amphoteric, and nonionic detergents. Although products used for handwashing or antiseptic handwashing in healthcare settings represent various kinds of detergents, the CDC uses the term "soap" to refer to such detergents in its guidelines.

Disinfection: The use of a chemical procedure that eliminates all recognized pathogenic micro-organisms but not necessarily all microbial forms (such as bacterial endospores) on inanimate objects.

Engineering Controls: Controls that isolate or remove the bloodborne pathogens hazard from the workplace. Examples include sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems.

Fomites: An inanimate object or material on which disease-producing agents may be conveyed.

Hand Antisepsis: Refers to either antiseptic handwash or antiseptic hand rub.

Hand Hygiene: A general term that applies to either handwashing, antiseptic handwash, antiseptic hand rub, or surgical hand antisepsis.

Handwashing: Washing hands with plain (non-antimicrobial) soap and water.

Healthcare Associated Infection (HAI): A localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s). There must be no evidence that the infection was present or incubating at the time of admission to the acute care setting. Formerly known as nosocomial infections.

- **High-Level Disinfection:** Disinfection that kills all organisms, except high levels of bacterial spores, and is effected with a chemical germicide cleared for marketing as a sterilant by the U.S. Food and Drug Administration (FDA).
- **Intermediate-Level Disinfection:** Disinfection that kills mycobacteria, most viruses, and bacteria with a chemical germicide registered as a "tuberculocide" by the U.S. Environmental Protection Agency (EPA).
- **Low-Level Disinfection:** Disinfection that kills some viruses and bacteria with a chemical germicide registered as a hospital disinfectant by the EPA.

Hospital Acquired Infections (HAIs): Infections associated with healthcare delivery in any setting.

Humoral Immunity: Acquired immunity in which the role of circulating antibodies is most important.

Infection: An infection is the detrimental colonization of a host organism by a foreign species. In an infection, the infecting organism seeks to utilize the host's resources to multiply, usually at the expense of the host. The infecting organism, or pathogen, interferes with the normal functioning of the host. An infection however, is not synonymous with an infectious disease, as an infection may not cause important clinical symptoms or impair host function.

Infectious Disease: A clinically manifest disease of humans or animals resulting from an infection.

Infectivity: The ability of a pathogen to spread rapidly from one host to another.

Injection Safety: Injection safety (or safe injection practices): A set of measures taken to perform injections in an optimally safe manner for patients, healthcare personnel, and others. A safe injection does not harm the recipient, does not expose the provider to any avoidable risks and does not result in waste that is dangerous for the community. Injection safety includes practices intended to prevent transmission of bloodborne pathogens between one patient and another, or between a healthcare worker and a patient, and also to prevent harms such as needlestick injuries.

Multi-dose Medication Vial: Bottle of liquid medication that contains more than one dose of medication and is often used by diabetic patients or for vaccinations.

Occupational Health Strategies: As applied to infection prevention, a set of activities intended to assess and prevent infections and communicable diseases in healthcare workers.

Pathogen or Infectious Agent: A biological agent capable of causing disease.

Pathogenicity: The ability of a pathogen to spread rapidly from one host to another.

Persistent Activity: Prolonged or extended antimicrobial activity that prevents or inhibits the proliferation or survival of microorganisms after application of a product to the hands. This property is also called "residual activity."

Personal Protective Equipment (PPE): Specialized clothing or equipment worn by healthcare workers for protection against a hazard.

Plain Soap: Detergents that do not contain antimicrobial agents or contain low concentrations of antimicrobial agents that are effective solely as preservatives.

Portal of Entry: The means by which an infectious agent enters the susceptible host.

Portal of Exit: The path by which an infectious agent leaves the reservoir.

Reservoir: Place in which an infectious agent can survive but may or may not multiply or cause disease. Healthcare workers may be a reservoir for a number of nosocomial organisms spread in healthcare settings.

Single-Use Medication Vial: A bottle of liquid medication that contains more than one dose of medication, and is often used by diabetic patients or for vaccinations.

Susceptible host: A person or animal not possessing sufficient resistance to a particular infectious agent to prevent contracting infection or disease when exposed to the agent.

Standard precautions: A group of infection prevention and control measures that combine the major features of Universal Precautions and Body Substance Isolation and are based on the principle that all blood, body fluids, secretions, excretions except sweat, non-intact skin, and mucous membranes may contain transmissible infectious agents.

Sterilization: The use of a physical or chemical procedure to destroy all microbial life, including highly resistant bacterial endospores.

Substantivity: An attribute of certain active ingredients to adhere to the stratum corneum and remain on the skin after rinsing or drying to provide an inhibitory effect on the growth of bacteria remaining on the skin.

Susceptible Host: A person or animal lacking effective resistance to a particular infectious agent.

Surgical Hand Antisepsis: Antiseptic handwash or antiseptic hand rub performed preoperatively by surgical personnel to eliminate transient and reduce resident hand flora. Antiseptic detergent preparations often have persistent antimicrobial activity.

Transmission: Any mechanism by which a pathogen is spread by a source or reservoir to a person.

Virulence: The ability of a pathogenic agent to produce a disease. The capacity of a microorganism to cause disease.

Visibly Soiled Hands: Hands showing visible dirt or visibly contaminated with proteinaceous material, blood, or other body fluids, urine, or fecal material.

Waterless Antiseptic Agent: An antiseptic agent that does not require you to add water. After applying such an agent, the hands are rubbed together until the agent has dried.

Work Practice Controls: Controls that reduce or eliminate the likelihood of exposure by altering the manner in which a task is performed.

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