Infection Control / Bloodborne Pathogens

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Introduction

Each year, an estimated 2 million patients get a hospital-related infection. It is also estimated that 90,000 patients will die from their infection (Center for Disease Control, 2010).

Standard (Universal) Precautions

Universal Precautions were renamed to Standard Precautions in 1998 (HICPAC Guidelines). The HICPAC Guidelines help to protect the patient and the healthcare workers from exposure to potentially infectious agents. They are based on the principle that whether it is suspected or confirmed, all blood, body fluids, secretions, excretions except sweat, nonintact skin, and mucous membranes may contain transmissible infectious agents (HIV, HBV, HCV, or any other pathogen). Prevention practices include hand hygiene, use of personal protective equipment, safe injection practices, and respiratory hygiene/cough etiquette. Standard Precautions reduce the risk of cross contamination from one infected patient to another, when the caregiver consistently uses appropriate barriers and washes his/her hands. Standard Precautions should be used for all patients at all times, by all healthcare workers (CDC, 2010).

Standard Precautions are not an option. OSHA and MIOSHA monitor hospitals for compliance with this regulation. Not only must personnel be observing these precautions, the hospital MUST have a mechanism in place for discipline for those found to be noncompliant.

Hand Hygiene

Hand washing is considered the single most important procedure for preventing nosocomial (hospital-acquired) infections. Hand washing is a basic form of sanitation and a required part of all infection control measures.

WHO’s (World Health Organization) 5 Moments for Hand Hygiene:

- Before patient contact
- Before an aseptic task (manipulating invasive devices)
- After body fluid exposure risk, such as touching excretions or secretions (and following glove removal)
- After patient contact
- After contact with patient surroundings (touching items/surfaces in the immediate patient care environment, even if you don’t touch the patient)
NOTE: If you use hand lotion, you should have your own container. “Shared use” bottles should not be used as they easily become contaminated. Use only water-based products and only those that are hospital-approved. Using lanolin or oil-based lotions before donning gloves will seriously weaken the gloves. This increases the risk that germs will pass through the glove. Just because a product washes off with water does not mean it is water-based.

Techniques for Hand Hygiene

A. When using alcohol-based hand rub, apply product to palm of one hand and rub hands together, covering all surfaces of hands and fingers, rubbing until hands are dry. Follow the manufacturer’s recommendations regarding the volume of product to use.

B. When washing hands with soap and water, wet hands first with water, apply an amount of product recommended by the manufacturer to hands, and rub hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers. Rinse hands with water and dry thoroughly with a disposable towel. Use towel to turn off the faucet. Avoid using hot water, because repeated exposure to hot water may increase the risk of dermatitis.

C. Liquid, bar, leaflet or powdered forms of plain soap are acceptable when washing hands with a non-antimicrobial soap and water. When bar soap is used, soap racks that facilitate drainage and small bars of soap should be used. Multiple-use cloth towels of the hanging or roll type are not recommended for use in health-care settings.

D. If hands are visibly soiled, soap and water is recommended.

E. If hands are NOT visibly soiled, use of alcohol-based hand rubs is recommended for routine decontamination.

SOURCE: Center for Disease Control

Recommendations for Nail Hygiene & Artificial Nails

Numerous studies have been conducted on artificial nails and nail hygiene of healthcare personnel and the transmission of certain health care-associated pathogens to patients. The evidence suggests that wearing artificial nails and other nail hygiene characteristics can transmit health care-associated infections. Organizational policies on nail hygiene may differ based on which hand hygiene guidelines are followed by the facility per the National Patient Safety Goals set forth by The Joint Commission, which state healthcare facilities follow EITHER the CDC or WHO current hand hygiene guidelines.

CDC recommends the following:

• Keep nail tips less than ¼-inch long
• Do not wear artificial fingernails or extenders when having direct contact with patients at high risk (such as intensive-care units and operating rooms)

WHO guidelines state:

• No direct care providers should have artificial nails or extenders.

NOTE: In the interest of patient safety, most organizations have chosen to ban artificial nails and require natural nail tips to be less than ¼-inch long.
Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) is specialized clothing or equipment worn by an employee for protection against infectious material (OSHA, 2010). The selection of PPE is based on the nature of the patient interaction and potential for exposure to blood, body fluids, or infectious agents. It is important to understand and follow facility specific protocols and guidelines regarding PPE.

When Do I Wear Gloves?

Gloves **MUST** be worn when there is a possibility of contact with blood and/or body fluids, mucous membranes, nonintact skin; or contact with contaminated items.

- Wear gloves that fit properly
- Do not wear the same pair of gloves for the care of more than one patient
- Do not wear gloves for the purpose of reuse
- Remove and/or change gloves after use or task and whenever gloves become soiled or damaged
- Turn the glove inside out when de-gloving and dispose of them in the proper receptacle
- Perform hand hygiene before and immediately after removing gloves
- Never wear multiple layers of gloves in order to “peel off” layers between tasks.
- Always wear the right gloves for the job. Wear heavy work gloves for cleaning.

Never wear latex gloves when caring for a patient with a latex allergy, wear a synthetic glove such as vinyl.

*Latex Allergies*

Latex is contained in a variety of products from gloves to catheters to Band-Aids to adhesive tape to the elastic on the blue head covers. It is also present in a variety of household items such as rubber (elastic) bands, balloons, condoms, and dental dams. The list is endless.

Allergic reactions range from local skin irritation and itching to life-threatening episodes of anaphylactic shock. It is the responsibility of healthcare workers to protect themselves, co-workers and patients from unnecessary exposure to latex.

Important Points to Remember About Latex Allergies

1. Ask patients questions about allergies in terms that they understand.
2. Document findings in the patient chart.
3. Inform the preoperative team so that latex can be removed from the environment and substitutions can be made.
4. The case should be scheduled first case of the day or the OR environment should be kept powder free prior to latex-sensitive patient entering the room.
5. Patients with latex allergy are premedicated preoperatively to help prevent allergic reactions.
6. All latex products, including gloves, **MUST** be kept away from allergic patients and staff.
7. Latex products release latex allergens into the air and these allergens may cause reactions in latex allergic persons.
8. Glove powder from latex gloves may carry enough latex allergen through the air to cause reactions in allergic persons.
9. If you suspect that you have a latex allergy, please contact Employee Health for an appointment to rule out this allergy.
10. If you are not sure about the latex content of a particular product, please contact your supervisor.

**When Do I Wear a Gown?**

Wear a gown that is appropriate to the task, to protect skin and prevent soiling or contamination of clothing during procedures or activities when it is likely to come in contact with blood, bodily fluids, excretions, or secretions. Do not wear the same gown for the care of more than one patient. Remove a soiled gown as soon as possible and practice hand hygiene after removal of gown (CDC, 2010).

**When Do I Wear a Mask/Goggles/Face Shield?**

Wear a mask and eye protection, or a face shield, during procedures/activities when it is likely to come in contact with blood, bodily fluids, excretions, or secretions to protect the mucous membranes of the eyes, nose and mouth (CDC, 2010). A respirator should be worn to protect the respiratory tract from airborne infectious agents such as TB.

**Safe Injection Practices**

The CDC has identified instances of improper use of syringes, needles, and medication vials during routine healthcare procedures that have resulted in transmission of bloodborne viruses (HCV, HBV, and HIV). Recommendations by the CDC for safe injection practices to protect patients include:

- Follow proper infection control practices and maintain aseptic technique during the preparation and administration of injected medications (e.g., perform hand hygiene).
- Never administer medications from the same syringe to more than one patient, even if the needle is changed.
- Never enter a vial with a used syringe or needle.
• Do not use medications packaged as single-dose or single-use for more than one patient.
• Do not use bags of intravenous solution as a common source of supply for more than one patient.
• Limit the use of multi-dose vials and dedicate them to a single patient whenever possible.
• Always use facemasks when injected material or inserting a catheter into the epidural or subdural space.

Aseptic Technique

Principles of aseptic technique should guide our daily activities whether it is in the Operating Room or any other area where procedures are performed. The purpose of basic principles is to ensure that sterile techniques are used and a sterile field is created and maintained. All persons are responsible for maintaining aseptic technique.

The Principles of Aseptic Technique are:

• Hand washing guidelines should be followed.
• All materials in contact with the wound and used in the sterile field MUST be sterile.
• Gowns are considered sterile in front from chest to the level of the sterile field. The sleeves are also considered sterile from 2” above the elbow to the stockinet cuff.
• Sterile drapes are used to create a sterile field. Only the top surface of a draped table is considered sterile.
• Items should be dispensed to a sterile field by methods that preserve the sterility of the items and the integrity of the sterile field.
• Motions are from sterile to sterile areas and from un-sterile to un-sterile areas.
• Movement around a sterile field MUST NOT cause contamination of that sterile field.
• Whenever a sterile barrier is permeated, it MUST be considered contaminated.
• Every sterile field should be constantly monitored and maintained.

Respiratory Hygiene/Cough Etiquette

This infection control practice is targeted at patients and accompanying family members and friends with undiagnosed transmissible respiratory infections. It applies to any one with signs of illness including cough, congestion or increased production of respiratory secretions.

Elements of Respiratory Hygiene/Cough Etiquette include:

• Education of staff, patients, and visitors.
• Post signs with instructions to patients and visitors.
• Source control measures: Covering mouth/nose with a tissue; Prompt disposal of used tissues; Using surgical masks on coughing person when tolerated and appropriate.
• Hand hygiene after contact with respiratory secretions.
• Spatial separation (ideally greater than 3 feet) of persons with respiratory infections in common waiting areas if possible.

When examining or caring for patients with signs and symptoms of respiratory infections, healthcare personnel are advised to observe Droplet Precautions and hand hygiene practices.

**Bloodborne Pathogens**

Bloodborne pathogens include, but are not limited to, Hepatitis B (HBV), Hepatitis C (HCV), and human immunodeficiency virus (HIV). These pathogens are infectious microorganisms in human blood that can cause disease in humans.

**OSHA’s Bloodborne Pathogens Standard requires employers to:**

• Establish an exposure control plan
• Update the plan annually
• Implement the use of **Standard Precautions** (treating all blood and other potentially infectious material as if known to be infectious for bloodborne pathogens)
• Identify and use engineering controls (sharp disposal containers, self sheathing needles, and safer medical devices such as sharps with engineered sharps-injury protection and needleless systems)
• Identify and ensure the use of work practice controls (appropriate practices for handling and disposing of contaminated sharps, handling specimens, handling laundry, and cleaning contaminated surfaces and items)
• Provide personal protective equipment (PPE)
• Make available hepatitis B vaccinations to all workers with occupational exposure
• Make available post-exposure evaluation and follow-up to any occupationally exposed worker who experiences an exposure incident
• Use labels and signs to communicate hazards
• Provide information and training to workers, and maintain worker medical and training records

Healthcare workers are at risk for exposure through needle sticks or other sharps related injuries. All used sharps are considered contaminated, therefore:

• Needles and other used sharps **MUST NOT** be bent, broken, or otherwise manipulated by hand after use
• Contaminated needles should never be recapped
• Never carry a used sharp in a pocket
• Do not attempt to remove anything from a sharps disposal container
• Properly dispose of all sharp objects (e.g. syringes with needles, broken glass, scalpels) after use
• Use appropriate sharps counts protocols (count the number of sharps on a sterile field, place them where always visible, and count before clean-up minimize accidental injury from unseen sharps)
• Dispose of sharps in designated sharps disposal containers
• Sharps disposal containers are to be sealed and removed when ¾ full to avoid overflow

Hepatitis

Hepatitis is a serious disease of the liver, an organ necessary for life. Hepatitis B (HBV) and C (HVC), the two most serious kinds of hepatitis, are similar kinds of liver infection that are caused by different viruses. Although there are fewer new Hepatitis C infections each year compared with Hepatitis B, there are more deaths in the long term due to Hepatitis C, which is a more serious chronic disease.

Symptoms of Hepatitis

About 50% of Hepatitis B infections and 75% of Hepatitis C infections cause NO initial symptoms. When symptoms are present, they include:

- Jaundice
- Loss of appetite
- Dark urine
- Nausea
- Vomiting
- Fever
- Fatigue
- Clay-colored bowel movements
- Joint pain
- Abdominal pain

Testing & Diagnosis

Clinical presentations of all types of acute viral hepatitis are similar, therefore the specific cause of the illness cannot be determined solely on the basis of signs, symptoms, history, and risk factors, and must be verified by specific serologic testing. Accurate detection techniques were developed for Hepatitis B in 1972, and for Hepatitis C in 1992. Before these dates, the virus could not be detected reliably, so some people could receive infected blood in blood transfusions.

Modes of Transmission

Hepatitis B and Hepatitis C viruses are transmitted through blood and body fluids. Infected blood can be transmitted from one person to another through openings in the skin, or through contact by both individuals with a sharp tool. About one third of Hepatitis C patients never find out how they contracted the virus.

Methods of blood-borne transmission of both Hepatitis B and C include:

- Blood splashes from minor cuts and nosebleeds
- Procedures that involve blood (especially in healthcare)
- Hemodialysis (using kidney machines)
• Sharing personal items like nail clippers, razors, and toothbrushes
• Sharing needles for intravenous drug use
• Body piercing and tattoos.

Hepatitis B and, to a lesser extent, Hepatitis C can also be transmitted as a result of:
• Close household contact with an infected person
• Unprotected sex with multiple partners
• Childbirth (from mother to baby)

**Risk of Transmission**

Persons most at risk for developing these diseases are IV drug users, people with multiple sex partners, and people who have direct exposure to infected blood or body fluids. Body piercing needles, tattoo needles, and even sharing toothbrushes or razors can spread the disease.

**Precautions for Healthcare Workers**

• Although rare, healthcare workers are at risk of transmission through percutaneous or mucous membrane exposure to blood or body fluids. Even exposure to a small amount of blood from an infected person can cause hepatitis, and healthcare workers can transmit or receive the virus.
• To prevent transmission healthcare workers must assume that blood and other body fluids from all patients are potentially infectious.
• Routinely use barriers (gloves/goggles/masks) when anticipating contact with blood or body fluids
• Immediately wash hands and other skin surfaces after contact with blood and body fluids
• Carefully handle and dispose of sharp instruments during and after use.
• The Advisory Committee on Immunization Practices recommends that all health care workers at risk for exposure to blood or blood-contaminated body fluids receive the Hepatitis B vaccination.
• Follow the rules of your facility, get vaccinated if you are not immune to Hepatitis B, and practice good personal hygiene to prevent the spread of hepatitis.

**HIV / AIDS**

HIV (Human Immunodeficiency Virus) is the virus that causes AIDS (Acquired Immune Deficiency Syndrome). Once this virus enters and infects the body, the person is said to be “HIV Positive.” However, the person may be infected with the virus for up to 10 years or more before developing AIDS. Most people who are HIV positive will eventually develop AIDS.
HIV / AIDS Statistics

- The CDC estimates that there are 1.2 million individuals living with HIV in the United States. Of those, 12.8% do not know they are infected.
- Approximately 50,000 new HIV infections occur each year in the United States.
- 70% of new infections are in men and 30% are in women.
- According to WHO by the end of 2014, worldwide there were approximately 36.9 million people living with HIV.
- In 2014, worldwide 2 million people became newly infected with HIV.
- In the 2014, an estimated 1.2 people died from AIDS-related illnesses. 39 million people worldwide have died of AIDS-related causes since epidemic began.

AIDS or AIDS-related diagnosis

HIV specifically attacks the CD4 cells, which help the immune system fight off infections. This weakens the immune system making the person more likely to get other infections or infection-related cancers. An HIV positive person may not feel sick or even know they have the virus for ten or more years. During that time, the virus (a bloodborne pathogen) can infect other people. A person may only know they are HIV positive by having specific blood tests.

A positive HIV test does not mean that a person has AIDS. A diagnosis of AIDS is made under either of two conditions and is considered the last stage of HIV infection:

1. If the CD4 cell count (normally 800-1000/microliter of blood) falls below 200/microliter, whether or not symptoms of the disease are present
2. If a person shows signs of having infections that healthy people are usually able to fight off such as tuberculosis, Kaposi’s Sarcoma, Pneumocystis Carinii Pneumonia.

People today, with antiretroviral therapy (ART), can be treated before the disease progresses and have a nearly normal life expectancy, however ART treatment is a lifetime therapy that has to be strictly followed.

Precautions for Healthcare Workers

- To prevent transmission healthcare workers must assume that blood and other body fluids from all patients are potentially infectious.
- Routinely use barriers (gloves/goggles/masks) when anticipating contact with blood or body fluids
- Immediately wash hands and other skin surfaces after contact with blood and body fluids
- Carefully handle and dispose of sharp instruments during and after use.
- Follow the rules of your facility.
Transmission-Based Precautions

There are three specific Transmission-Based Precautions to be used when Standard Precautions alone are not enough to interrupt the route(s) of transmission. In some instances more than one Transmission-Based Precaution can be used depending on if the disease has multiple routes of transmission, for example SARS. Regardless if one or more category is used, Transmission-Based Precautions should always be used in addition to Standard Precautions. The three categories for precautions are: Contact Precautions, Droplet Precautions, and Airborne Precautions.

Contact Precautions

These precautions would be used to prevent the spread of infectious agents by direct or indirect contact with the patient or patient’s environment. Contact Precautions would be used for patients infected or colonized with multi-drug resistant organisms (MDRO’s) and for situations where excessive wound drainage, fecal incontinence (may include patients with norovirus, rotavirus, or Clostridium difficile), or other discharges from the body suggest an increased potential for environmental contamination or increased risk of transmission. Healthcare personnel caring for patients on Contact Precautions should wear appropriate PPE (gown and gloves) for all interactions that may involve contact with the patient or potentially contaminated areas in the patient environment. PPE should be donned upon entry and discarded before exiting the patient room to contain pathogens, and a single patient room is preferred.

Droplet Precautions

These precautions are intended for transmission prevention of pathogens spread through close respiratory or mucous membrane contact with respiratory secretions. Since the pathogens are not infectious over long distances, special air handling and ventilation are not necessary, however a single patient room is preferred. Pathogens that would qualify for Droplet Precautions include: B. pertussis influenza virus, adenovirus, and group A streptococcus. Healthcare personnel caring for patients on Droplet Precautions should wear a mask (a respirator is not necessary) for close contact with an infectious patient, which should be donned upon entry to the patient room. Patients who must be transported outside of the room should wear a mask if tolerated and follow Respiratory Hygiene/Cough Etiquette.

Airborne Precautions

Pathogens that remain infectious over long distances when suspended in the air would require the use of Airborne Precautions. Infectious agents that would require Airborne Precautions include: measles, chickenpox (varicella), M. tuberculosis, and smallpox. An airborne infection isolation room (AIIR), which is a room with special air handling and ventilation equipment, is preferred when Airborne Precautions are necessary. Any facility with AIIR rooms are required to have a respiratory protection program that includes education about use of respirators, fit-testing, and user seal checks. Healthcare personnel caring for patients on Airborne Precautions should wear a mask or respirator, depending on
the disease-specific recommendations, which is donned prior to room entry. Whenever possible, non-immune healthcare workers should not care for patients with vaccine-preventable airborne diseases (measles, chickenpox, and smallpox).

**More information on CDC recommendations for specific infections can be found here:**

**Multi-Drug Resistant Organisms (MDRO)**

MDRO’s are microorganisms, primarily bacteria, that are resistant to one or more antimicrobial agents and therefore can be difficult to treat. The most common MDRO’s are MRSA and VRE.

**The CDC recommends Standard and Contact Precautions for patients with MDRO’s.**

**VRE (Vancomycin Resistant Enterococcus)**

Vancomycin is an antibiotic used to treat certain infections, including those caused by most strains of Enterococcus. It is an organism found normally in the intestinal tract and in females, in the vaginal tract. When Vancomycin is unable to kill this organism it is called VRE.

**Risk Factors for VRE**

People who have been ill that have been taking many antibiotics or have weakened immune systems due to illness or age are at higher risk for VRE.

**Transmission**

It is found most often in the stool, but it can be found in the blood, urine, and wounds, or wherever it can be carried by blood.

It can be spread to other people by contact between persons. To prevent this from happening, VRE precautions are used when VRE colonization or infection is identified. Everyone who comes into the hospital room of a patient with VRE will wear a gown and gloves. If it is in the spectrum of the respiratory tract, they will wear a mask.

**Precautions for VRE**

VRE is a very hardy organism. It can survive on hard surfaces for 7-10 days and on hands for hours. It is easy to kill with hand washing and a proper use of disinfectants.

1. Private room – necessary
2. Personal protective equipment
   a. GLOVES – **MUST** be worn by healthcare workers before or upon entry to patient’s room. Hands **MUST** be washed following glove removal.
b. MASKS – standard surgical mask necessary if organism is in the spectrum of the respiratory tract for close contact with the patient, suctioning, and performance of other cough inducing procedures. (Close contact defined as within 2-3 feet of the patient).

c. GOWNS – MUST be worn by all persons having contact with patients or articles that the patient may come in contact with.

3. HAND WASHING – hands MUST BE WASHED after removal of gloves, and before leaving the room.

**MRSA (Methicillin Resistant Staphylococcus Aureus)**

It is a strain of the germ, Staphylococcus aureus that has developed resistance to most of the antibiotics commonly used to treat Staphylococcus infections.

**Modes of MRSA transmission**

MRSA is passed from person to person by contact with someone who has MRSA. A person who is infected or colonized with MRSA may have it in their nose as well as on their hands, and whenever they touch others, they can pass the germ along. MRSA can be transmitted from a person in contact with a MRSA patient to another patient. Therefore, it is CRITICAL that you wash your hands.

**Precautions for MRSA**

1. Private room – necessary

2. Personal protective equipment
   a. GLOVES – MUST be worn by healthcare workers before or upon entry to patient’s room. Hands MUST be washed following glove removal.
   b. MASKS – standard surgical mask necessary if organism is in the spectrum of the respiratory tract for close contact with the patient, suctioning, and performance of other cough inducing procedures. (Close contact defined as within 2-3 feet of the patient).
   c. GOWNS – MUST be worn by all persons having contact with patients or articles that the patient may come in contact with.

3. HAND WASHING – hands MUST be washed after removing gloves, and before leaving room.

**Tuberculosis**

Tuberculosis (TB) is a disease that is caused by bacteria called *Mycobacterium tuberculosis* (*M. tuberculosis*). This bacterium is carried through the air by tiny droplet nuclei. Primarily TB attacks the lungs, but any part of the body can be affected such as the kidney, spine, and brain. It is the largest single cause of death among people diagnosed with AIDS. Tuberculosis is curable, but it involves taking medication for a very long time.
Symptoms of TB include:

- Chest pain
- Prolonged productive cough (3 weeks or longer)
- Coughing up of blood or sputum
- Fever and chills
- Night sweats
- Weight loss
- Weakness or fatigue
- No appetite

Transmission

TB is transmitted through the air when a person with TB of the lungs or throat coughs, sneezes, speaks/shouts, or sings, infecting those nearby by inhaling the infectious airborne droplet nuclei. Shaking someone’s hand, sharing food or drink, touching bed linens or toilet seats, sharing toothbrushes, or kissing does NOT spread TB.

Latent TB Infection

In most cases the body is able to fight the bacteria and keep it from growing in people who become infected. This condition is referred to as Latent TB Infection. People with latent TB infection do not feel sick and do not have symptoms, nor are they infectious and cannot spread TB bacteria to others.

Active TB Disease

When the immune system can’t stop the bacteria from growing, the TB bacterium becomes active. People with Active TB disease will be symptomatic and be able to spread the bacteria to others.

Risk Factors of TB

Once infected with TB bacteria, the chance of developing Active TB Disease increase if the person:

- Has HIV infection
- Has been infected with TB bacteria in the last 2 years
- Has other health problems, like diabetes which make it hard for the body to fight bacteria
- Abuses alcohol or uses illegal drugs
- Was not treated correctly for TB infection in the past

Testing for TB

There are two types of tests for TB – a skin test or TB blood test. The skin test consists of injecting a small amount of fluid (called tuberculin) into the lower part of the arm. The skin test must be read by a healthcare professional within 48 to 72 hours to assess for a reaction on the arm.
A positive TB skin test only tells if a person has been infected with TB bacteria. Other tests are necessary to determine whether the person has TB disease, such as a chest x-ray and sample of sputum. The TB blood test measure how a person’s immune system reacts to the bacteria that cause TB.

People working in healthcare settings should receive an initial TB skin test upon hire, and then annual tests depending on the type of setting.

**Treatment of TB**

Treatment for latent TB infection is based on the chances of developing TB disease. However, to effectively control and eliminate TB in the United States it is essential to treat latent TB infection.

Treatment for Active TB Disease consists of taking several drugs, usually for 6 to 9 months. It is critical to take the medication exactly as prescribed for the full length of prescribed treatment. If the medication is stopped too soon, the bacteria that is still alive may become resistant to those drugs. Drugs previously used will no longer be effective. This condition, referred to as Multi-Drug Resistant (MDR) TB, is extremely difficult to cure.

**Special Precautions for TB patients**

- Place TB patients in private rooms, keep door closed.
- For pulmonary TB patients, place patient in a negative pressure ventilated room or an AIIR (Airborne Infection Isolation Room).
- Wear a special “fit-tested” mask such as an N-95 or greater to provide at least 95% efficiency. The healthcare provider should receive training on proper fitting and how to wear correctly.
- The N-95 or greater efficiency mask should be worn upon entrance into patients room and while in patients room.
- Explain to patients and visitors how to use special masks.
- Keep patients in their rooms as much as possible and transport if only necessary. Patient **MUST** wear high efficiency mask (if medically feasible). Transporter does not require respiratory protection.
- Encourage patients to cough or sneeze directly into tissues and to dispose of them.
- **HANDS MUST BE WASHED** after touching the patient or potentially contaminated articles and after taking your gloves, mask, and/or gown off.

**Ebola**

Ebola, previously known as Ebola hemorrhagic fever, is a rare and deadly disease found in several African countries. Ebola can cause disease in humans and nonhuman primates (monkeys, gorillas, and chimpanzees), and although the natural reservoir host of Ebola remains unknown, researchers believe that the virus is animal-borne and that bats are the most likely reservoir.
**Symptoms of Ebola include:**

Symptoms of Ebola may appear anywhere from 2 to 21 days after exposure to Ebola, but the average 8 to 10 days, and include:

- Fever
- Muscle pain
- Weakness
- Vomiting
- Internal/External bleeding (from skin, eyes, gums)
- Fatigue
- Severe headache
- Diarrhea
- Abdominal pain

**How is Ebola transmitted?**

Ebola can infect mammals, including humans, bats, monkeys, and apes. Humans can be infected through contact with blood, secretions, organs, and other bodily fluids of an infected animal. Human to human transmission occurs through direct contact with blood or body fluids of an infected person. Healthcare providers caring for Ebola patients and the family and friends in close contact with Ebola patients are at the highest risk of contracting Ebola. Their risk of exposure is elevated because they may come in contact with the blood or body fluids of patients who have Ebola.

The risk of exposure can also occur after coming in contact with infected wildlife. The virus also can be spread through contact with objects that have been contaminated with the virus, such as:

- Clothes
- Bedding
- Needles
- Syringes/sharps
- Medical equipment

**Suspected Ebola Patient**

The screening process is a critical component to identifying a patient with Ebola. This process should include taking a recent travel history.

Once a patient has been determined as having met the criteria for Ebola, the healthcare provider should also implement standard, contact, & droplet precautions using appropriate personal protective equipment (PPE) and the patient should be placed in isolation in a single patient room with a private bathroom. The door(s) should be kept closed and a log should be maintained of all persons entering the patient's room. In addition, public health officials should be notified if Ebola is suspected.

Further information for the evaluation and management for the Emergency Department and complete algorithm can be found here and the algorithm for evaluation and management for Ambulatory Care can be found here. The CDC general patient evaluation for suspected Ebola can be accessed here.
Diagnosis of Ebola

It is difficult to diagnose a person in the first few days of contracting the disease. The early symptoms, such as fever, can be often seen in other more commonly occurring diseases known to the healthcare worker. Confirmation that symptoms are caused by Ebola virus infection are made by obtaining blood samples for lab tests.

Treatment of Ebola

Currently, there is no FDA-approved vaccine or medicine (e.g., antiviral drug) available for Ebola. The following basic interventions, when used early, can significantly improve the chances of survival:

- Providing intravenous fluids (IV) and electrolytes
- Maintaining oxygen status and blood pressure
- Treating other infections if they occur

People who recover from Ebola infection develop antibodies that last for at least 10 years.

Special Precautions for the treatment of Ebola patients:

Personal Protective Equipment

It is important to remember that ALL body parts should be completely covered when putting on Personal Protective Equipment. The CDC recommends that healthcare workers in close contact with patients who have suspected or known infection of Ebola wear the following personal protective equipment (PPE):

- Impermeable garment:
  - Single-use (disposable) fluid resistant or impermeable gown that extends to at least mid-calf
  - OR
  - Coverall without integrated hood
- Respiratory protection:
  - PAPR (powered air purifying respirator) – a hooded respirator with single-use a full-face shield, helmet, or headpiece. Any reusable helmet or headpiece must be covered with a single-use (disposable) hood that extends to the shoulders and fully covers the neck and is compatible with the selected PAPR.
  - OR
  - Single-use (disposable) N95 respirator in combination with single-use (disposable) surgical hood extending to the shoulders and single-use (disposable) full-face shield.
- Single-use (disposable) boot covers that are waterproof and go to at least mid-calf or leg covers
- Single-use (disposable) examination gloves with extended cuffs, using double-glove technique (sterile for some procedures)
- Single-use (disposable) apron that is waterproof and covers the torso to the level of the mid-calf should be used if Ebola patients have vomiting or diarrhea eye protection
Training on Correct Use of PPE

Healthcare workers should receive rigorous and repeated training to ensure they are knowledgeable and proficient in donning and doffing PPE prior to engaging in management of an Ebola patient. They should demonstrate competency while being observed by a trained observer. In addition to donning and doffing training, the healthcare worker should practice performing required duties while wearing PPE. A step-by-step training video regarding the CDC's recommended procedures for donning and doffing personal protective equipment (PPE) for all healthcare workers coming in contact with known or suspected Ebola patients can be found here:

CDC's Guidance for Donning and Doffing Personal Protective Equipment (PPE) During Management of Patients with Ebola Virus Disease in U.S. Hospitals

Use of Trained Observer

The sequence and actions for donning and doffing are critical to avoiding exposure, a trained observer will read aloud to the healthcare worker each step in the procedure checklist and visually confirm and document that the step has been completed correctly. The trained observer should be knowledgeable about all aspects related to PPE and should know the exposure management plan in the event of an unintentional break in procedure. The trained observer should NOT provide physical assistance during doffing procedures. However since the trained observer will be present in the PPE removal area during the doffing process, the trained observer should wear the following recommended PPE:

- Single-use (disposable) fluid-resistant gown that extends to at least mid-calf or coverall without integrated hood
- Single-use (disposable) full face shield
- Single-use (disposable) surgical mask
- Single-use (disposable) gloves with extended cuffs, two pairs should be worn
- Single-use (disposable) ankle-high shoe covers

Designated areas for donning and doffing of PPE

A clear layout and separation between clean and potentially contaminated areas is critical to prevent contamination and exposure. A one-way flow of care should be established and marked with visible signage (signs on the floor) moving from clear areas where PPE is donned to the patient room and to the PPE removal area. Signs should be posted to highlight key aspects of PPE donning and doffing:

- Designating clean areas vs. potentially contaminated areas
- Reminding healthcare workers of wait for trained observer before removing PPE
- Reinforcing need for slow and deliberate removal of PPE to prevent self-contamination
- Reminding healthcare workers to perform disinfection of gloved hands in between steps of the doffing procedure
**Patient Care Equipment**

- Have dedicated medical equipment for patient care (preferably disposable)
- Non-dedicated, non-disposable equipment used for patient care should be immediately cleaned and disinfected according to manufacturer’s instructions and hospital policies

**Additional Infection Control Practices**

- Safe injection practices (as outlined in Standard Precautions)
- Limit the use of needles and other sharps as much as possible
- All needle and sharps should be handled with extreme care
- Dispose of all needles and sharps in puncture-proof, sealed containers
- Keep hands away from the face
- Limit touching surfaces and body fluids
- Disinfect immediately any visibly contaminated PPE surfaces, equipment, or patient care area surfaces using an *EPA-registered disinfectant wipe
- Perform regular cleaning and disinfection of patient care surfaces, even if absent of visible contamination (this should be performed by only the nurses or physicians as a part of patient care activities in order to limit the number of additional healthcare workers in the room)
- Healthcare workers should perform frequent disinfection of gloved hands using an alcohol-based hand rub (ABHR), particularly after handling body fluids.

**Aerosol Generating Procedures (AGP’s)**

It has not been established that Ebola can be contracted through airborne transmission, however there may be some patients with severe pulmonary involvement or during certain invasive procedures that can potentially produce aerosols. Aerosol Generating Procedures (AGP’s) include but may not be limited to: airway suctioning, aerosolized or nebulized medication administration, bronchoscopy, endotracheal intubation and extubation, and positive pressure ventilation via face mask. In these instances, facilities may choose to adhere to the following CDC recommendations:

- Visitors should not be present
- Limit number of individuals entering room
- Only pertinent healthcare personnel needed for procedure are present
- Conduct the procedure in a private room or ideally, when possible, in an Airborne Infection Isolation Room (AIIR)
- All doors should be kept closed and entry and exit should be limited or eliminated if possible during the procedure
- Use PPE recommendations as outlined above for these procedures
Environmental Cleaning & Control

The CDC recommends the following environmental cleaning practices for any patient care areas of known or suspected Ebola virus patients, this especially includes environmental staff services but are also for anyone who would be performing cleaning tasks.

- PPE worn during cleaning procedures should follow the above recommended PPE, as well as the same donning and doffing procedures.
- Use a U.S. Environmental Protection Agency (EPA)-registered hospital disinfectant with a label claim for a non-enveloped virus (norovirus, rotavirus, adenovirus, poliovirus).
- Avoid contamination of reusable porous surfaces that cannot be made single use.
- Use disposable cleaning cloths, mop cloths, and wipes and dispose of these in leak-proof bags.
- Use a rigid waste receptacle designed to support the bag to help minimize contamination of the bag’s exterior.
- Daily cleaning and disinfection of hard, non-porous surfaces (high-touch surfaces such as bed rails and over bed tables, housekeeping surfaces such as floors and counters) should be done.
- Remove all upholstered furniture and decorative curtains from patient rooms before use.
- Mattresses and pillows should have plastic covers or other protective covering to prevent fluids from leaking through.
- Patient rooms should not be carpeted.
- Basic principles for blood or body substance spill management should be followed as outlined by OSHA’s Bloodborne Pathogen Standards. CDC guidelines recommend removal of bulk spill matter, clean the site, and then disinfect the site. For large spills, an EPA-registered hospital disinfectant with label claims for non-enveloped viruses should be used and instructions for cleaning and decontaminating should be followed.
- Ebola-associated waste that has been appropriately incinerated, autoclaved, or otherwise inactivated is not infectious, does not pose a health risk, and is not considered to be regulated medical waste or a hazardous material under federal law.
- Waste items transported offsite for disposal that is contaminated or suspected of being contaminated with Ebola virus (which is considered a Category A infections substance) must be packaged and transported in accordance with the Department of Transportation’s (DOT) Hazardous Materials Regulations (HMR, 49 C.F.R., Parts 171-180). This includes:
  - medical equipment
  - sharps
  - linens
  - used health care products (such as soiled absorbent pads or dressings, kidney-shaped emesis pans, portable toilets, or byproducts of cleaning)
  - used Personal Protection Equipment (gowns, masks, gloves, goggles, face shields, respirators, booties, etc.)
What happens after being exposed to Ebola?

Meticulous PPE application and removal of PPE should be adhered to, however, if you experience an inadvertent exposure to patient blood, other body fluids, secretions or excretions:

- Stop working and immediately wash the affected skin surfaces with soap and water. Mucous membranes (e.g., conjunctiva) should be irrigated with copious amounts of water or eyewash solution
- Immediately contact occupational health/supervisor for assessment and access to postexposure management services

Healthcare Providers who develop sudden onset of fever, intense weakness or muscle pains, vomiting, diarrhea, or any signs of hemorrhage after an unprotected exposure (i.e. not wearing recommended PPE at the time of patient contact or through direct contact to blood or body fluids) to a patient with EVD should:

- Not report to work or should immediately stop working
- Notify their supervisor
- Seek prompt medical evaluation and testing
- Notify local and state health departments
- Comply with work exclusion until they are deemed no longer infectious to others

Post Mortem Care for the patient with Ebola

Unfortunately, there will be Ebola-related deaths and healthcare providers who will provide post-mortem care to these patients need to understand how to provide care in the event of death. It is critical for healthcare providers to know and understand your organization’s policies and procedures related to providing post-mortem care in the Ebola patient.

For guidance, please see more on the CDC website [here](https://www.cdc.gov).

Handling and Disposal of Infectious Wastes

Remember these simple points dealing with infectious materials / waste (e.g. blood and bodily fluids, human tissue, sharps, needles, scalpels, IV tubing):

1. All infectious waste is placed in closable leak proof containers or color coded, labeled or tagged with the biohazard symbol
2. Waste **MUST** be separated into appropriate containers
3. Biohazard bags are used for contaminated materials that are saturated with blood or other potentially infectious material
4. Sharps **MUST NOT** be recapped routinely
5. Sharps **MUST** be placed in approved puncture – resistant biohazard sharps container to the ¾ full mark
6. Fluids **MUST** be emptied into sanitary sewer system
7. Fluid – filled container that cannot be emptied prior to disposal **MUST** be placed in biohazard receptacle
8. Always protect yourself by wearing personal protective equipment when handling infectious waste

**Specimen Handling**

Laboratory specimen from all patients should be handled with equal care. All non-blood specimen containers **MUST** be securely closed before transport.

Blood specimens and other glass containers **MUST** be transported in a manner that reduces the risk of breakage and subsequent breakage.

Visible exterior soiling of specimen containers or lab tags **MUST** be handled before transport to the lab. If the lab tag becomes visibly soiled, issue a replacement tag for the specimen.

Transporting personnel should wash their hands after delivery of items to the lab. A glove may be worn on the hand used to carry the specimen(s) leaving the un-gloved hand free for opening doors, pushing elevator buttons, etc. A tray or box will facilitate the transport of multiple specimens.

**Crash Cart**

It is the responsibility of every employee in any patient care area to know where the crash cart is located. Nurses, Monitor Techs, Unit Secretaries, Nurse Techs, Nursing Assistants and all other staff in the patient care areas **MUST** be able to located and bring the crash cart to the bedside when requested.

**It is the responsibility of each Registered Nurse to be familiar with the medications and equipment stored in the crash cart.**
References:


