

# Infectious Disease Awareness

## Things to Remember

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1. Infectious diseases are illnesses, infections, or other health disorders which are caused by organisms that enter the body and multiply. These small organisms (microorganisms) include bacteria, viruses, fungi, and parasites. They may also be called pathogens or biological agents.
2. Occupations that are at risk from infectious disease exposure include:
  - building maintenance;
  - healthcare;
  - humanitarian aid;
  - first responders, emergency personnel, security;
  - laboratory;
  - environmental services (cleanup and waste disposal);
  - funeral and mortuary;
  - travel (airline, rail, ship); and
  - border, customs, and quarantine workers.
3. The primary routes of transmission for infectious diseases include:
  - **Direct contact:** A susceptible person physically contacts an infected person and transfers the organism.
  - **Indirect contact:** An individual touches a contaminated surface and then becomes infected by touching his or her mouth, eyes, or nose.
  - **Airborne:** Transmission occurs through droplets or aerosols. With aerosols, the organism gets into the air and is breathed in by another person and can cause infection. Airborne transmission does not require face-to-face contact with an infected individual. Droplets containing infectious agents are generated when an infected person coughs, sneezes, or speaks. Transmission occurs when droplets come into contact with a person's eyes, nose, or mouth.
  - **Vector-borne:** Carried by another species; "vector" usually refers to an insect, and transmission occurs via a bite from the vector.
  - **Non-contact vehicle transmission:** Infection spreads from a contaminated source to the individual. Often the contaminant is ingested (enters through the mouth). Pathogens may be found on food or in water.
  - **Bloodborne:** From contact with an infected person's blood or sometimes other body fluids.
4. Some examples of infectious diseases, their routes of transmission, and symptoms, include the following:
  - E. coli has been transmitted to the general population through contaminated food, often from inadequately washed fruit and vegetables. The symptoms of E. coli infections vary for each person but often include severe stomach cramps, diarrhea (often bloody), and vomiting.
  - Ebola virus disease most commonly spreads by direct contact with blood, secretions, organs, or other body fluids of infected individuals. EVD is usually marked by fever, muscle pain, headache, and sore throat. The illness progression includes nausea, vomiting, diarrhea, and impaired organ function.
  - Zika virus disease spreads to people primarily through the bite of an infected mosquito. It can also be sexually transmitted. Symptoms of Zika include mild fever, rash, joint/muscle pain, and headache.

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5. Recent or frequent outbreaks of an infectious disease include: bubonic plague, HIV/AIDS, influenza, E. coli, SARS, Ebola, and Zika (among others).
6. NIAID maintains and regularly revises a pathogen priority list, which includes three risk levels:
  - **Category A Priority Pathogens:** Organisms/biological agents that pose the highest risk to national security and public health.
  - **Category B Priority Pathogens:** The second-highest priority organisms/biological agents.
  - **Category C Priority Pathogens:** The third-highest priority, including emerging pathogens that could be engineered for mass dissemination in the future.
7. At work, if an employee is exposed to blood or bodily fluids, he or she should:
  - flush the area with running water;
  - wash the area with plenty of warm water and soap;
  - report the incident to the appropriate staff member (supervisor, human resources, health and safety specialist, staff medical personnel);
  - record the incident; and
  - seek medical advice.
8. *Biosafety* is the discipline addressing the safe handling and containment of infectious microorganisms and hazardous biological materials.
9. Key elements in assessing risks for occupational exposure to infectious diseases include:
  - Sources and pathways for potential exposure to infectious pathogens, as well as routes of transmission.
  - Characteristics of the pathogens, including pathogenicity, virulence, and infectious dose.
  - Effectiveness of existing controls, including the use of Standard and Expanded Precautions.
10. To help protect workers in infectious disease settings, biological safety experts developed Standard Precautions. For extremely high risk environments, a more stringent set of precautions, called Expanded Precautions, was developed. The implementation of these precautions will depend on the degree of risk and if the risk is well defined. In unknown situations, higher level precautions are required.
11. The main practices of Standard Precautions include:
  - hand hygiene;
  - respiratory hygiene/cough etiquett;
  - gloving;
  - mouth, nose, eye (face) protection;
  - gowns/protective clothing;
  - appropriate handling of laundry; and
  - environmental cleaning.

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12. Examples of airborne, droplet, and contact precautions include:
  - **Airborne Precautions:** Include special precautions such as personal respiratory protection and special air handling and ventilation are needed to minimize the spread of the disease.
  - **Droplet Precautions:** Include use of surgical masks or face shields when in close proximity to the infected person.
  - **Contact Precautions:** Masks, gowns, and gloves are typically used to reduce contact transmission risks. Use of disinfectants and decontamination procedures minimize the risk of spreading the infection.
  
13. The Hierarchy of Controls identifies actions, processes, and precautions to include in an exposure control plan based upon their effectiveness, from the most effective controls (elimination or substitution of the hazard), to engineering controls, administrative controls, and finally to the least effective controls (use of personal protective equipment – PPE).
  
14. Below are definitions and examples of the following controls: substitution, engineering, administrative, and PPE.
  - **Elimination and Substitution:** For an existing process, major changes in equipment and procedures may be required to eliminate or substitute for a hazard. These options more often relate to chemical hazards (e.g. replacing lead-based paint with titanium white, using ultraviolet light in place of chemical cleaning products) and not to control infectious disease.
  - **Engineering Controls:** Engineering controls seek to isolate people from the hazard or remove it before it comes in contact with the worker. Isolation is an example of an engineering control. Isolation is the separation of an infected person from others. It is frequently used for infectious aerosols or airborne diseases such as tuberculosis. To prevent the spread of disease from the isolation area, engineering controls such as barriers to access and special ventilation may be used. Infectious waste usually requires special containment before disposal or transport. Infectious waste must be contained separately from other waste and handled and transported by specially trained and authorized workers. A common example of containment is the use of sharps (e.g. hypodermic needles) containers in healthcare facilities. Today many public areas (such as bathrooms in airports or restaurants for example) provide sharps containers for their patrons. However when they are not available sharps may be discarded in the trash. Workers must be aware of their surroundings when handling any waste/trash.
  - **Administrative Controls:** These are changes in the way work is done. Some examples include changing procedures or implementing new ones, employee training, and installing signs and warning labels. Administrative controls do not remove hazards. Instead they limit exposure or reduce exposure through behavior changes and hazard awareness. For example, signs warn individuals that they are entering an area that uses radiation or that contains biological hazards. Administrative controls are often used in combination with PPE. Perhaps the most effective administrative control is limiting or eliminating the amount of time that a worker spends in an environment that presents risk of infection.
  - **PPE:** Personal Protective Equipment (PPE) includes gloves, protective clothing, hardhats, safety glasses, safety footwear and respirators. PPE is frequently used where hazards are not particularly well controlled. PPE programs may be relatively inexpensive to establish, but over the long term, can be very costly to sustain. These methods for protecting workers have also proven to be less effective than other measures, requiring significant effort by the affected workers.

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15. *Containment* or *biocontainment* is the physical containment of highly pathogenic organisms.
16. Considerations for selecting PPE for workers at risk of infectious disease exposure include:
  - **Type of anticipated exposure:** For example, workers may be exposed through splashes or sprays, or blood, body fluids and other contaminated liquids (sewage, contaminated water, etc.) that might penetrate regular clothing or get into mucous membranes.
  - **Durability and appropriateness of the PPE for the task:** This will affect, for example, whether an apron, gown, or full protective suit is selected for PPE. It is also important to know if the protective clothing needs to be fluid resistant, fluid proof, or neither. For cleaning/disinfecting tasks, the type of cleaning products used will impact PPE selection.
  - **Fit:** PPE must fit the individual user. The employer must provide PPE in the appropriate size for the wearers. This is particularly important for respiratory protection. Poorly fitted respirators will allow contaminants to enter.
17. PPE for working safely around infectious diseases includes:
  - **Gloves:** Nonsterile gloves made of latex, nitrile, or vinyl.
  - **Protective Clothing:** Full-covering protective suits, such as Tyvek®, and full-body garments constructed of durable viral penetration-resistant material.
  - **Face Shields:** Face shields may be worn over certain respirators to protect the face from splashed or sprayed substances. Goggles can also provide barrier protection for the eyes.
  - **Respiratory Protection:** The most commonly used respirators in healthcare settings are particulate respirators, such as half-face or full-face air-purifying respirators. Powered air-purifying respirators (PAPR) may also be used. If even greater protection is needed (for example in extremely hazardous or unknown environments) the worker may need to use a respirator that provides clean air from a tank, the Self-Contained Breathing Apparatus or SCBA.
18. Workers must don (put on) and use PPE properly to achieve the intended protection and minimize the risk of infection. Workers should doff (remove) PPE in a way that avoids self-contamination. For example, avoid skin and mucous membrane contact with potentially infectious materials. Do not remove respirators in work areas where air contaminants (e.g., airborne-transmissible agents) may be present.
19. *Decontamination* is the process of removing contaminants (infectious agents) that have accumulated on people who have worked in a contaminated or likely contaminated environment. Decontamination occurs in stages or steps with a defined order that must be followed to ensure the maximum protection and minimum spread of disease.
20. *Disinfection* is a process that eliminates most or all infectious organisms from objects and surfaces. Usually liquid chemicals are used as disinfectants. These may include certain alcohol-based hand cleaners and bleach solutions. A sample disinfection protocol includes these steps:
  - Remove all visible debris, especially organic material.
  - Wash the area or item with water and detergent.
  - Thoroughly rinse the cleaned area to remove any detergent residue.
  - Allow the area to dry completely.
  - Apply the appropriate disinfectant.
  - Allow the proper contact time (usually at least 10 minutes).
  - Thoroughly rinse and allow the area or item to dry.

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- 21.** Government standards related to working around infectious diseases include:
- Bloodborne Pathogens Standard (29 CFR 1910.1030);
  - Personal Protective Equipment (PPE) Standard (29 CFR 1910.132);
  - Respiratory Protection Standard (29 CFR 1910.134);
  - Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard (29 CFR 1910.120);
  - General Duty Clause (Sec. 5(a)(1)) of the Occupational Safety & Health Act; and
  - Hazard Communication Standard (29 CFR 1910.1200).
- 22.** Some OSHA standards provide guidelines for medical screening for working around infectious diseases:
- The Bloodborne Pathogens Standard does not require a pre-placement medical exam but requires that the employer offer the Hepatitis B vaccine.
  - The HAZWOPER Standard requires a pre-placement medical exam as well as emergency/exposure examinations or tests when a worker performs job tasks on a hazardous materials response or cleanup.
  - The Respiratory Protection Standard requires workers to fill out a respirator medical evaluation questionnaire or complete a medical exam that answers the same questions as those in the questionnaire.
- 23.** Psychosocial hazards affect the workers' emotional or psychological well-being. They may relate to the way work is conducted and managed, the nature of the work (e.g. physical hazards, conflict, isolation, etc.) or social context (e.g. stereotypes, stigma, etc.).
- 24.** Symptoms of stress are many and varied, but some include:
- |                            |                               |                |
|----------------------------|-------------------------------|----------------|
| • nausea                   | • difficulty making decisions | • sadness      |
| • diarrhea                 | • flashbacks                  | • apathy       |
| • high blood pressure      | • anxiety                     | • isolation    |
| • headaches                | • guilt                       | • withdrawal   |
| • sleep problems           | • fear                        | • anger        |
| • difficulty concentrating | • grief                       | • irritability |
- 25.** Actions employers can take to address issues of concern for personnel working around infectious diseases include:
- Involve workers in risk assessment.
  - Communicate work hazards, tasks and precautions.
  - Provide more worker control over work tasks and environment.
  - Value safety and health in the workplace.
  - Consider the interaction between working and living conditions.
  - Listen to and address worker's fears.

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- 26.** Actions workers can take to manage stress from working in environments that pose a risk of infectious disease include:
- Develop a “buddy” system with a co-worker. Watch out for each other.
  - Take care of yourself physically by exercising regularly and eating small quantities of food frequently.
  - Take frequent rest breaks.
  - Drink plenty of fluids such as water and juices.
  - Try to eat a variety of foods and increase your intake of complex carbohydrates (breads, whole grain muffins, granola bars, etc.).
  - Whenever possible, take breaks away from the work area. Eat and drink in the cleanest area available.
  - Recognize and accept what you cannot change – the chain of command, organizational structure, waiting, equipment failures, etc.
  - Give yourself permission to feel bad – you are in a difficult situation.