Patients with infections and infectious disease regularly come to the medical facility for treatment. As the medical assistant goes from patient to patient performing clinical procedures, such as taking vital signs and assisting the physician, the potential for transmitting disease is high if the medical assistant does not follow protective measures such as handwashing, sanitization, and proper handling of medical waste. Thorough handwashing and/or use of alcohol rubs by all medical personnel before each patient contact is one of the most effective ways to combat nosocomial infections. Nosocomial infections are those that occur as a result of treatment in a health care facility (e.g., hospital, outpatient treatment center).

Infection control and medical and surgical asepsis are crucial in medical facilities to prevent the spread of disease and infection. Understanding and following the guidelines for breaking the “chain of infection” protects not only the patients and other health care workers in the facility but also the medical assistant.

**LEARNING OBJECTIVES**

You will be able to do the following after completing this chapter:

**Key Terms**

1. Define, appropriately use, and spell all the Key Terms for this chapter.

**Infection Control**

2. Explain why it is important for medical assistants to understand the basic principles of infection control.
3. Explain the difference between nonpathogenic and pathogenic microorganisms.
4. List the six requirements that must be present for microorganisms to grow.
5. List five classes of disease-causing microorganisms and give at least one example of a disease caused by each.
6. Describe the five parts of the “chain of infection,” and give three examples of how this chain can be broken.
7. Define the roles of the CDC and OSHA regarding Standard Precautions.
9. Demonstrate the correct procedure for properly disposing of biohazardous materials.
10. List the five responsibilities of employers to protect employees against exposure to potentially biohazardous materials, according to the OSHA Bloodborne Pathogens Standard.
11. List the six types of information found on an MSDS and explain how an MSDS supports the “right-to-know” law.

**Medical Asepsis**

12. Differentiate between medical asepsis and surgical asepsis.
13. Explain the difference between normal flora and transient flora.
14. List four methods of maintaining hand hygiene.
15. Demonstrate the correct procedure for handwashing for medical asepsis.
16. Demonstrate the correct procedure for hand sanitization using an alcohol-based hand rub.
17. Demonstrate the correct procedure for applying and removing nonsterile gloves.

**Surgical Asepsis**

18. Differentiate among sanitation, disinfection, and sterilization.
19. Demonstrate the correct procedure for sanitizing instruments.
20. Demonstrate the correct procedure for performing chemical sterilization of items.
21. Explain the basic purpose and function of an autoclave.
Because medical assistants or other health care providers may interact with patients who have infections or infectious disease, individuals must understand the basics of infection control so the spread of disease may be prevented and not passed to other patients and staff. Knowledge about microorganisms and how infection is spread from one person to another is necessary before the medical assistant performs any tasks in the medical office. The body has many natural defenses to prevent microbes from entering the body such as skin, tears, stomach acid, and cough reflex. Stopping the transmission of infectious diseases within the medical office can be accomplished by following simple guidelines. In addition, many regulations and guidelines are in place to help health care professionals prevent the transmission of infectious agents (microbes) and break the chain of disease transmission. The CDC and OSHA work to stop the spread of disease by establishing and enforcing these guidelines and regulations.

**Microorganisms**

Microorganisms are found in the air we breathe, on our skin, on everything we touch, and even in our food.
Microorganisms are so small that they can only be seen with a microscope. Fortunately, not all microorganisms are harmful.

**Nonpathogens** are not harmful and are not disease-producing microorganisms. They help keep a balance in the environment (e.g., decomposing materials) and in the body (e.g., breaking down food in the digestive tract). Nonpathogens also help to limit the growth of pathogens. Nonpathogens represent normal flora or resident flora, occurring naturally on the skin and in the body, and they fight off infection when they remain in their normal location. If a nonpathogenic organism is transported to an area outside its normal environment, it can become a disease-producing organism.

**Pathogens** are disease-producing microorganisms. When a pathogen invades a person who has a weakened immune system, an infection can occur, possibly leading to death. Even people who are healthy may become infected and may die, depending on the type of pathogen (e.g., a healthy person could contract HIV from having sex with someone infected with HIV). In most cases, however, people with weakened immune systems are more likely to acquire infection.

**EXAMPLE OF A NONPATHOGEN BECOMING A PATHOGEN**

*Escherichia coli* is a species of bacteria that live in the lower digestive tract. If they travel to the urinary tract, an infection occurs, as when females incorrectly wipe from back to front after toileting (instead of front to back). This can deposit rectal contaminants into the urethra, which may result in a urinary tract infection (UTI).

As with people, microorganisms must have certain conditions in order to grow (Box 31-1).

### Disease-Causing Microorganisms

The medical assistant may be exposed to several classes of microorganisms on a daily basis (Table 31-1). By maintaining a healthy state, the body will often be able to resist an infection. Each class of microorganisms has its own unique characteristics. Pathogens can produce poisons (toxins) that react with the body tissues, whereas other types of microorganisms cause an allergic reaction or destroy cells.

**Bacteria**

Bacteria are single-celledmicroorganisms that multiply rapidly. Bacteria are classified according to shape and arrangement (Figure 31-1) and include the following:

- **Cocci** are round or spherical.
- **Diplococci** are cocci occurring in pairs (e.g., gonorrhea, meningitis).
- **Streptococci** are cocci occurring in chains (e.g., bacterial pneumonia, upper respiratory infection).
- **Staphylococci** are cocci arranged in clusters (e.g., acne, boils, or pus).
- **Bacilli** are rod-shaped and occur singly, in pairs, and chains (e.g., typhoid, diphtheria, anthrax, and tuberculosis).

Bacilli can form hard-walled capsules (spores) and are difficult to kill.

- **Spirochaetes** are spiral or corkscrew shaped (e.g., Lyme disease, syphilis).

To assist with identification, bacteria can also be grouped according to their staining properties. For example, gram-positive bacteria (*Staphylococcus aureus*) will stain purple and gram-negative bacteria (*Escherichia coli*) will stain red. Those bacteria not accepting a stain are spores, which means they have a protective covering that is resistant to disinfection and require sterilization to destroy them.

**Rickettsiae**

Rickettsiae are parasites that need a host to survive, so they cannot live outside the body. They are smaller than bacteria. They are carried by fleas, lice, ticks, and mites. When these insects bite, the rickettsiae can be transmitted into the human body (e.g., Rocky Mountain spotted fever).

**Fungi**

Fungi include yeasts and molds and are either a single-cell or multicellular microorganisms (e.g., ringworm). They can live...
Protozoa
Protozoa (parasites) are single-celled animals found in contaminated water and decaying material (e.g., amoeba causes dysentery, malaria).

Viruses
Viruses can only reproduce if they are within a living cell. When viruses invade, they take over the cell and alter the genetic materials (e.g., DNA, RNA). They are the smallest of all microorganisms and are only visible when viewed under an electron microscope. Figure 31-2 shows the human immunodeficiency virus (HIV), which causes acquired immunodeficiency syndrome (AIDS). Since viruses (e.g., cold, flu) live within cells, they cannot be destroyed by disinfection methods.

Chain of Infection
Pathogens (disease-causing agents) follow a cycle, or "chain," to transmit disease from one person to another. The most common way for disease to enter the body is through a break in the skin or a compromised body system. Diseases can also enter the body from the nasal mucosa. If the person’s immune system is functioning properly, the person may be able to fight off the disease process. Also, if any part of the chain is broken (e.g., microbes or germs are washed away from the hands), the disease cannot spread. If the body’s defenses are weak, however, the microbes will invade. When a disease is spread from one person to another, the following chain of events occurs (Figure 31-3):

1. An infected person, known as the carrier or reservoir host, carries the disease-causing microbes (causative agent—bacteria, viruses, protozoa, and so forth).
2. The microbes exit the body through urine, feces, saliva, blood, tears, mucous discharge, or other means. The method by which the germs leave the body is called the **route of exit**.

3. Another person is infected through **direct contact** (e.g., person-to-person contact or contact with body secretions) or **indirect contact** with contaminated substances (e.g., food, air, instruments). The mode by which the microbes enter the person’s body is called the **method of transmission**.

4. The microbes enter the other person’s body through the nose, mouth (airborne—inhalation), eyes, or broken skin. The method by which the germs enter the person’s body is called the **route of entry**.

5. The **susceptible host** (person, insect, or animal that can be infected by the microorganism) becomes a reservoir host if infected, and the chain of infection starts again. This is how disease can spread to many people.

Since pathogens grow and reproduce quickly, medical assistants must know how to keep disease-producing organisms from spreading. Hand sanitization is the most important method of preventing the spread of disease in the medical office. Good personal hygiene and the use of disposable gloves when handling potentially biohazardous materials are other methods that can break the chain of infection.

### Centers for Disease Control and Prevention

The **Centers for Disease Control and Prevention (CDC)** is part of the U.S. Public Health Service and Department of Health and Human Services. In 1987 the CDC issued guidelines for protecting health care workers from blood-borne infections and HIV. These guidelines became known as “Universal Precautions.” The CDC issued new guidelines in 1996 called “Standard Precautions” that apply to all clients and patients receiving treatment at health care facilities. The two most common carriers of microbes in a medical office setting are the staff and equipment used for patient treatments (e.g., stethoscope, examination table). Standard Precautions are designed to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection in a patient care setting (Figure 31-4 and Procedure 31-1).

Standard Precautions must be observed at **ALL TIMES** and for **ALL PATIENTS** regardless of age, gender, and diagnosis. Procedures for Standard Precautions cover the following areas:

- Body fluid classifications (e.g., blood, body fluids except sweat and tears, secretions, excretions, nonintact skin, and mucous membranes).
- Use of protective barriers to protect the health care worker from exposure to infectious materials, including protective eyewear, gowns, boots (shoe covers), masks, head covering, and gloves (Figure 31-5).
- Biohazard waste management, including use of proper containers for disposal of materials.

Infectious waste (any material that has the potential to carry disease) is mandated by law to be separated at the place of origin (e.g., medical office), labeled as to contents, and either decontaminated on site or removed by a commercially licensed biohazard waste management company. Procedure 31-2 gives detailed instructions for properly disposing of biohazardous waste.

### Occupational Safety and Health Administration

The **Occupational Safety and Health Administration (OSHA)** mandates and enforces the use of Standard Precautions, requiring all employers to provide a safe working environment for their employees. Universal Precautions treat all patients as if they are infected with a transmissible bloodborne disease, whereas Standard Precautions are Universal Precautions plus transmission-based precautions. Examples of transmission-based diseases are tuberculosis, transmitted through the airborne route; severe acute respiratory syndrome (SARS), transmitted through the droplet route; and HIV, transmitted through the direct contact route. Training employees on the management of hazardous waste products and management of infectious waste is a requirement. All health care employees need to know that their working conditions are safe.

Medical assistants must become familiar with the biohazard symbols and guidelines of OSHA to protect themselves against exposure to bloodborne pathogens (note the symbols in Figure 31-4). Procedures using Standard Precautions are designed to minimize the risk of an infection being...
**STANDARD PRECAUTIONS**

**FOR INFECTION CONTROL**

**Sanitize Hands**
Sanitize after touching blood, body fluids, secretions, excretions, and contaminated items. Sanitize immediately after gloves are removed and between patient contacts. Avoid transfer of microorganisms to other patients or environments.

**Wear Gloves**
Wear when touching blood, body fluids, secretions, excretions, and contaminated items. Put on clean gloves just before touching mucous membranes and nonintact skin. Change gloves between tasks and procedures on the same patient after contact with materials that may contain high concentrations of microorganisms. Remove gloves promptly after use, before touching noncontaminated items and environmental surfaces, and before going to another patient, and sanitize hands immediately to avoid transfer of microorganisms to other patients or environments.

**Wear Mask and Eye Protection or Face Shield**
Protect mucous membranes of the eyes, nose, and mouth during procedures and patient-care activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.

**Wear Gown**
Protect skin and prevent soiling of clothing during procedures that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions. Remove a soiled gown as promptly as possible and sanitize hands to avoid transfer of microorganisms to other patients or environments.

**Patient-Care Equipment**
Handle used patient-care equipment soiled with blood, body fluids, secretions, or excretions in a manner that prevents skin and mucous membrane exposure, contamination of clothing, and transfer of microorganisms to other patients and environments. Ensure that reusable equipment is not used for the care of another patient until it has been appropriately cleaned and reprocessed and single-use items are properly discarded.

**Environmental Control**
Follow hospital procedures for routine care, cleaning, and disinfection of environmental surfaces, beds, bedrails, bedside equipment, and other frequently touched surfaces.

**Linen**
Handle, transport, and process used linen soiled with blood, body fluids, secretions, or excretions in a manner that prevents exposures and contamination of clothing and avoids transfer of microorganisms to other patients and environments.

**Occupational Health and Bloodborne Pathogens**
Prevent injuries when using needles, scalpels, and other sharp instruments or devices; when handling sharp instruments after procedures; when cleaning used instruments; and when disposing of used needles.

Never recap used needles using both hands or any other technique that involves directing the point of a needle toward any part of the body; rather, use either a one-handed "scoop" technique or a mechanical device designed for holding the needle sheath.

Do not remove used needles from disposable syringes by hand, and do not bend, break, or otherwise manipulate used needles by hand. Place used disposable syringes and needles, scalpels, blades, and other sharp items in puncture-resistant sharps containers located as close as practical to the area in which the items were used, and place reusable syringes and needles in a puncture-resistant container for transport to the reprocessing area.

Use resuscitation devices as an alternative to mouth-to-mouth resuscitation.

**Patient Placement**
Use a private room for a patient who contaminates the environment or who does not (or cannot be expected to) assist in maintaining appropriate hygiene or environmental control. Consult Infection Control if a private room is not available.

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**FIGURE 31-4** Standard Precautions for infection control. (Courtesy Brevis Corporation, Salt Lake City, UT.)
**TASK:** Identify and demonstrate the application of Standard Precautions in a real or simulated scenario, as assigned by the instructor. Develop an exposure and postexposure control plan or review the medical assisting department's plan and comment on its contents. Sign-off and date.

**EQUIPMENT AND SUPPLIES**
- Personal protective equipment (PPE): eyewear, gown, boots (shoe covers), mask, gloves
- Current Standard Precautions
- Biohazardous waste container
- Puncture-resistant sharps container

**SKILLS/RATIONALE**

1. **Procedural Step.** Assemble all necessary equipment.
   **Rationale.** It is important to have all supplies and equipment ready and available before starting any procedure to ensure efficiency.

2. **Procedural Step.** Select the appropriate PPE for the procedure assigned.
   **Rationale.** Understanding which barrier precautions must be used for every medical procedure is critical to ensure the highest level of protection is used to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection.

3. **Procedural Step.** Identify body substance isolation (BSI) procedures.
   **Rationale.** Depending on the type of microorganism suspected or the method of transmission, BSI procedures may be implemented.

4. **Procedural Step.** Apply transmission-based precautions as they apply to the assigned procedure.
   **Rationale.** Knowing whether the possible transmission of organisms is airborne, droplet, or direct or indirect contact helps to identify the BSI procedures required to prevent contamination.

5. **Procedural Step.** Describe Standard Precautions as they apply to all body fluids, secretions and excretions, blood, nonintact skin, and mucous membranes.

6. **Procedural Step.** Describe to the instructor the importance of continuing education as it relates to practices using Standard Precautions, including the following:
   a. Barrier protection
   b. Handwashing/hand sanitization
   c. PPE
   d. Needles, handling sharps
   e. Cleanup and disposal of contaminated items
   f. Identification and labeling of biohazardous material

7. **Procedural Step.** Develop an exposure and postexposure control plan or review department’s and identify exposure control mechanisms in a simulated exposure event. Include the following areas:
   - Barrier protection
   - Environmental protection
   - Housekeeping controls
   - Safety training programs
   - Follow-up
   - Documentation
   - Material safety data sheet (MSDS)
   **Rationale.** Having a predetermined exposure control plan ensures that all medical personnel are routinely trained in preventing or handling incidents of contamination or have a resource to reference as needed.

8. **Procedural Step.** Demonstrate the proper use of the following exposure control devices:
   - Sharps containers
   - Eyewash stations
   - Fire extinguishers
   - Biohazardous waste containers
   **Rationale.** Practicing the proper use of each of these exposure control devices helps to ensure their correct use when working in a medical facility.

   Cite the time requirement for the training or retraining record.

**Continued**
PROCEDURE 31-1  Practice Standard Precautions—cont’d

**Rationale.** OSHA regulations require proper documentation of all instances of Standard Precautions training for every employee each year as part of the facility’s exposure control plan.

**10. Procedural Step.** Demonstrate knowledge of the basic guidelines approved by OSHA and recommended by the CDC for a postexposure action plan, as follows:

a. Wash needle sticks, punctures, or lacerations with soap and water.
b. Flush splashes to the nose, mouth, or skin with water.
c. Irrigate eyes with clean water, saline, or sterile irrigants.
d. Report the incident to the appropriate personnel.
e. Follow all office exposure control policies regarding follow-up treatment, which may include vaccinations or chemoprophylaxis.

**FIGURE 31-5** Personal Protective Equipment. A, Gloves, waterproof laboratory coat, and face shield. B, Addition of head covering and shoe covers to the PPE.

Medical asepsis is the process of making an area clean and free of infection-causing microorganisms. Procedures that involve body parts that are not normally “sterile” require medical asepsis (also called the “clean” technique) and not sterile asepsis. By following the guidelines established by the CDC, medical assistants can reduce the spread of infection. This protects both themselves and their patients. Medical aseptic techniques are designed to promote cleanliness and prevent contamination.

As mentioned, normal flora or resident flora refers to microorganisms on the epidermis and deeper layers of the skin that are usually nonpathogenic. **Transient flora** refers to microorganisms that grow on the surface of the skin and are picked up easily by the hands. These transient microorganisms can be pathogenic. The use of aseptic techniques in the medical office reduces the transfer of pathogens (Box 31-3). Hand hygiene and the use of gloves are important parts of medical asepsis.

**Handwashing**

One of the most effective ways to reduce pathogenic transmission is through frequent handwashing. Frequency, soap, friction, and warm running water are all necessary components of handwashing for effective infection control. Regular soap is sufficient, but the use of an antimicrobial soap is preferred for medical asepsis if contact with body fluids has occurred (Figure 31-8 and Procedure 31-3). 

Text continued on p. 648
PROCEDURE 31-2

Properly Dispose of Biohazardous Materials

TASK: Identify waste classified as biohazardous and select appropriate containers for disposal. Assemble all equipment and demonstrate disposal of actual or simulated waste, following exposure control guidelines.

EQUIPMENT AND SUPPLIES
- Personal protective equipment (PPE)
- Current Standard Precautions
- Biohazardous waste container
- Sharps container

SKILLS/RATIONALE

1. Procedural Step. Assemble all necessary equipment.
   Rationale. It is important to have all supplies and equipment readily available before starting any procedure to ensure efficiency.

2. Procedural Step. Select the appropriate PPE for cleaning a blood spill.
   Rationale. Understanding which barrier precautions should be used in every medical procedure is critical to ensure the highest level of protection.

3. Procedural Step. Identify waste classified as “biohazardous.”
   a. Any item contaminated with blood or body fluids must be discarded in an appropriately labeled “biohazardous waste” container.
   b. All items used for a medical procedure but not saturated with blood or body fluids may be disposed of in regular waste containers (e.g., cotton ball with a small drop of blood).
   c. All sharp implements, such as needles, scalpel blades, and glass slides, must be discarded in a puncture-resistant sharps container.
   d. Biohazardous waste and puncture-resistant sharps containers are typically red and must be labeled with a biohazard symbol.
   Rationale. Selecting the appropriate container for disposal, for sharps, for general waste, and for laboratory specimens is critical to maintain infection control.

4. Procedural Step. Identify the universal biohazard symbol and describe the proper use of the biohazardous spill cleanup kits.
   Prepackaged kits are available to manage a variety of biohazardous waste spills. Be sure to check for expiration dates and rotate stock. Also, read the manufacturer’s instructions for each kit and routinely provide all personnel with in-service training.
   Rationale. These kits should be purchased and kept on hand in case of biohazard emergencies.

   a. All chemical containers or potentially hazardous materials containers must be properly labeled. When a label becomes unreadable, the contents of the container must be properly discarded and a new product purchased.
   b. Any spill of blood or body fluids and all counter or patient surfaces must be cleaned with a 1:10 bleach solution. Gloves must be worn during the cleaning and discarded in the appropriate biohazardous waste container on completion.
   c. Containers must never be filled more than two-thirds full. Never retrieve any item from a biohazardous waste container once it has been discarded.
   d. Biohazardous waste containers and puncture-resistant sharps containers must be removed from the medical facility by a commercially licensed biohazard waste management company.

Continued
6. **Procedural Step.** Review material safety data sheets (MSDSs).
   a. MSDSs must be obtained and maintained for every chemical used in the medical facility. Many manufacturers supply MSDSs with every purchase of the product. For any chemical that does not come with an MSDS, an Internet search will typically locate one.
   b. Keep all MSDSs in one binder. Label the binder as such, and keep it in one location so that everyone in the office knows where to find it.

7. **Procedural Step.** Document the decontamination of equipment.
   A laboratory safety manual should be kept where all personnel can locate it. All decontamination of equipment must be recorded, including the type of decontamination, date, time, and person(s) who provided the decontamination. A written plan for preventing this type of decontamination in the future is worthwhile.

8. **Procedural Step.** Describe the importance of ongoing safety training.
PERSONAL PROTECTIVE EQUIPMENT

• Goggles
• Gloves
• Head cover and shoe covers

If an employee has an allergy to powder or latex, the employer must provide hypoallergenic or powderless gloves. The employee cannot be charged for PPEs.

EXPOSURE INCIDENT MANAGEMENT

An exposure incident is contact with blood or biohazard infectious material that occurs when doing one’s job. When an exposure incident is reported, the employer must arrange for an immediate and confidential medical evaluation. The information and actions required are as follows:

• Documenting how the exposure occurred.
• Identifying and testing the “source” individual, if possible.
• Testing the employee’s blood, if consent is granted.
• Providing counseling.
• Evaluating, treating, and following up on any reported illness.

Medical records must be kept for each employee with occupational exposure for the duration of employment plus 30 years.

COMMUNICATION OF POTENTIAL HAZARDS TO EMPLOYEES

A medical assistant will be exposed to hazardous chemicals on the job. OSHA classifies materials in the work environment according to the degree of hazard to health that they impose. In most cases, chemicals handled by medical assistants are not any more dangerous than those used in the home. However, exposure is likely to be greater, concentrations higher, and exposure time longer in certain procedures.

The “right-to-know” law, OSHA’s hazard communication standard, states that each employee has a right to know what chemicals he or she is working with in the workplace. The right-to-know law is intended to make the workplace safer by making certain that all information regarding chemical hazards is known to the employee. OSHA publishes specific guidelines for method of storage, labeling, handling, cleaning spills, and disposing of the materials. This information is supplied in the material safety data sheet (MSDS), a fact sheet divided into nine sections, about a chemical that includes the following information (Figure 31-6):

• Identification of the chemical
• Listing of the physical and health hazards
• Precautions for handling
• Identification of the chemical as a carcinogen
• First-aid procedures
• Name, address, and telephone number of manufacturer

Many MSDS information sheets can be obtained in repositories on the Internet. An MSDS should be updated at least every 3 years. Employers must ensure that all products have an up-to-date MSDS when they enter the workplace.

Potential hazards are also communicated with labels and color. Any containers with biohazard waste must be orange (or reddish orange) and must display the biohazard symbol (Figure 31-7). These labels and colors alert employees to the risk of possible exposure.
Aseptic Techniques for the Medical Office

1. Sanitize hands before and after patient contact
2. Wear gloves when handling contaminated articles
3. Treat all substances as if they contained pathogens
4. Clean all equipment soon after patient use
5. Discard disposable equipment and supplies soon after patient use
6. Use protective covering (PPE) when there is a possibility of contaminating the uniform
7. Place all dressing material in a waterproof, red biohazard bag

**PPE:** Personal protective equipment.

**FIGURE 31-6** Material safety data sheet (MSDS). **A,** Front.
**SECTION V  Clinical Medical Assisting**

**MATERIAL SAFETY DATA SHEET**

**SECTION 6  HEALTH HAZARD DATA**

<table>
<thead>
<tr>
<th>ROUTE OF ENTRY</th>
<th>SKIN: Yes</th>
<th>EYES: Yes</th>
<th>INHALATION: Yes</th>
<th>INGESTION: Yes</th>
</tr>
</thead>
</table>

**SIGNS AND SYMPTOMS OF OVEREXPOSURE:**

<table>
<thead>
<tr>
<th>SKIN: Moderate irritation. May aggravate existing dermatitis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EYES: Serious eye irritant. May cause irreversible damage.</td>
</tr>
<tr>
<td>INHALATION: Vapors may be irritating and cause stinging sensations in the eyes, nose, and throat.</td>
</tr>
<tr>
<td>INGESTION: May cause irritation or chemical burns of the mouth, throat, esophagus, and stomach. May cause vomiting, diarrhea, dizziness, faintness, and general systemic illness.</td>
</tr>
</tbody>
</table>

**CARCINOGENICITY DATA:**

| NTP: No | AIRC: No | OSHA: No |

**SECTION 7  EMERGENCY FIRST AID PROCEDURES**

<table>
<thead>
<tr>
<th>SKIN: Wash skin with soap and water for 15 minutes. If irritation persists, seek medical attention.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EYES: Immediately flush with water for 15 minutes. Seek medical attention.</td>
</tr>
<tr>
<td>INHALATION: Remove to fresh air. If irritation persists, seek medical attention.</td>
</tr>
<tr>
<td>INGESTION: Do not induce vomiting. Give large amounts of water. Seek medical attention.</td>
</tr>
</tbody>
</table>

**SECTION 8  PRECAUTIONS FOR SAFE HANDLING AND USE**

<table>
<thead>
<tr>
<th>SPILL PROCEDURES: Ventilate area and wear protective gloves and eye gear. Wipe with sponge, mop, or towel. Flush with large quantities of water. Collect liquid and discard it.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WASTE DISPOSAL METHOD: Container must be triple rinsed and disposed of in accordance with federal, state, and/or local regulations. Used solution should be flushed thoroughly with water into sewage disposal system in accordance with federal, state, and/or local regulations.</td>
</tr>
<tr>
<td>PRECAUTIONS IN HANDLING AND STORAGE: Store in a cool, dry place (59-86°F) away from direct sunlight or sources of intense heat. Keep container tightly closed when not in use.</td>
</tr>
</tbody>
</table>

**SECTION 9  CONTROL MEASURES**

<table>
<thead>
<tr>
<th>VENTILATION: Adequate ventilation to maintain recommended exposed limit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESPIRATORY PROTECTION: None normally required for routine use.</td>
</tr>
<tr>
<td>SKIN PROTECTION: Wear protective gloves (butyl rubber, nitrile rubber, polyethylene, or double-gloved latex).</td>
</tr>
<tr>
<td>EYE PROTECTION: Wear safety goggles or safety glasses.</td>
</tr>
<tr>
<td>WORK/HYGIENE PRACTICES: Prompt rinsing of hands after contact. Handle in accordance with good personal hygiene and safety practices. These practices include avoiding unnecessary exposure.</td>
</tr>
</tbody>
</table>

In 2002 the CDC published updated guidelines for “hand hygiene” in a health care setting. **Hand hygiene** is a general term that includes the following:

- **Antiseptic hand rub:** Applying an antiseptic (alcohol-containing) hand rub product to all surfaces of the hands. The effective amount varies with each product.
- **Handwashing:** Washing with plain soap and water.
- **Antiseptic handwash:** Washing hands with water and a soap containing an antiseptic agent (e.g., hexachlorophene).
- **Surgical handwash:** Washing with an antiseptic preparation for an extended time, following a certain protocol.
## PROCEDURE 31-3

### Perform Proper Handwashing for Medical Asepsis

**TASK:** Prevent the spread of pathogens by aseptically washing hands, following Standard Precautions.

**EQUIPMENT AND SUPPLIES**
- Liquid antibacterial soap
- Nailbrush or orange stick
- Paper towels
- Warm running water
- Regular waste container

### SKILLS/RATIONALE

1. **Procedural Step.** Remove rings and watch (or push watch up on the forearm so the wrist is clear of any jewelry).
   **Rationale.** The wearing of jewelry increases the number of microorganisms on the hands. Moving the watch up on the forearm provides complete access to fingers, hands, and wrists.

2. **Procedural Step.** Stand close to the sink, without allowing clothing to touch the sink.
   **Rationale.** The sink is considered contaminated. Reaching over the sink increases the risk of becoming contaminated by microorganisms.

3. **Procedural Step.** Turn on the faucets, using a clean paper towel.
   **Rationale.** The faucets are considered contaminated because they can contain bacteria.

4. **Procedural Step.** Adjust the water temperature to warm.
   **Rationale.** Water that is too hot or too cold can cause chapping and cracking, therefore providing an entry point for pathogens. Warm water removes less of the protective oils on the hands, thus reducing the chance of chapping and cracking.

5. **Procedural Step.** Discard the paper towel in the regular waste container.
   **Rationale.** The paper towel is considered contaminated after touching the faucets and cannot be reused.

6. **Procedural Step.** Wet hands and wrists under warm running water, and apply liquid antibacterial soap (using a paper towel to activate soap dispenser).
   **Rationale.** By keeping the hands and forearms lower than the elbows at all times, being careful not to touch the inside of the sink, which is also considered to be contaminated.

7. **Procedural Step.** Work the soap into lather by rubbing the palms together using a circular motion. Interlace fingers and rub the soap and water between the fingers a minimum of 10 times.
   **Rationale.** Rubbing the hands together in this manner causes friction, which dislodges microorganisms and other debris from the hands.

8. **Procedural Step.** Clean the fingernails with a nailbrush or an orange stick.

---

*Continued*
Alcohol-Based Hand Rubs

The CDC recommends the use of alcohol-based hand rubs by all health care providers during patient care. These rubs significantly reduce the number of microorganisms on the skin, are fast acting (e.g., 15 to 20 seconds), and cause less skin irritation than regular handwashing techniques.

When hands are not visibly soiled, the CDC recommends the use of an alcohol-based hand rub for hand asepsis. Acceptable hand rubs are preparations containing 60% to 95% alcohol. The following are examples of clinical situations when an alcohol-based hand rub can be used:
1. Before and after patient contact.
2. Before applying gloves and after removing gloves.
3. After removal of gloves when minimal contact with body fluids or excretions, mucous membranes, wounds, and dressings has occurred.
4. When moving from a contaminated portion of the body (e.g., mouth) to a clean body site.
5. After contact with medical equipment used during patient care.

The hand rub lotion or gel is applied to the palm of the hand, using enough to wet both hands. Hands are rubbed together, covering the entire surface and including nails and the wrist area, until dry (Procedure 31-4).

The exact amount needed to reduce the bacteria on the hands varies from product to product. Therefore the manufacturer’s instructions should be followed.

**Gloves**

*Nonsterile disposable gloves* are used when performing clean procedures (e.g., drawing blood) and when being exposed to contaminated substances (e.g., handling specimens). When applying the nonsterile gloves, you can touch both the inside and the outside of the glove. When removing the gloves after a procedure, you must be careful not to contaminate the hands and clothing (Procedure 31-5).

Gloves reduce hand contamination by an average of 75%. They also prevent cross-contamination and protect patients and health care providers from infection. Gloves must be applied before and changed after each patient encounter.

The medical assistant must remember that the use of gloves does not eliminate the need for hand hygiene, and the use of hand hygiene does not eliminate the need for gloves. Box 31-4 provides key components for hand hygiene compliance.

**PROCEDURE 31-4**

**Perform Alcohol-Based Hand Sanitization**

**TASK:** Prevent the spread of pathogens by applying an alcohol-based hand rub.

**EQUIPMENT AND SUPPLIES**

- Alcohol-based hand rub containing 60% to 95% ethanol or isopropanol (gel, foam, or lotion)

**SKILLS/RATIONALE**

1. **Procedural Step.** Visibly inspect hands for obvious contaminants or debris.
   *Rationale.* When hands are visibly dirty, contaminated with proteinaceous material, or visibly soiled with blood or other body fluids, they must be washed with either a nonantibacterial soap and water or an antibacterial soap and water.

2. **Procedural Step.** Remove rings and watch or push watch up on the forearm so the wrist is clear of any jewelry.
   *Rationale.* The wearing of jewelry increases the number of microorganisms on the hands. Moving the watch up on the forearm provides complete access to fingers, hands, and wrists.

3. **Procedural Step.** When decontaminating hands with an alcohol-based hand rub, dispense an ample amount of the product into the palm of one hand.
   *Rationale.* This ensures sufficient coverage of the skin and nails.

4. **Procedural Step.** Rub the hands together covering all surfaces of hands and fingers, up to ½ inch above the wrist.

5. **Procedural Step.** Rub hands together until hands are dry, approximately 15 to 30 seconds.
   *NOTE:* Alcohol-based hand rubs will not replace the need for sinks or other hand hygiene supplies (e.g., soap, paper towels). Because health care workers may experience a “buildup” of emollients on the hands after repeated use of alcohol-based products, the CDC recommends washing hands with soap and water after 5 to 10 applications of gel.
PROCEDURE 31-5

Apply and Remove Clean, Disposable (Nonsterile) Gloves

**TASK:** Apply and remove disposable gloves properly.

**EQUIPMENT AND SUPPLIES**
- Alcohol-based hand rub
- Disposable gloves
- Biohazardous waste container

**SKILLS/RATIONALE**

**APPLYING GLOVES**

1. **Procedural Step.** Select the correct size and style of gloves. Gloves should be selected by size so that they fit snugly but are not too tight. Select the style that best fits personal needs, such as latex or vinyl, with or without powder.

2. **Procedural Step.** Sanitize hands as described in Procedure 31-3 or 31-4. *Rationale.* “Gloving” is not a substitute for sanitizing the hands.

3. **Procedural Step.** Apply gloves and adjust them to make sure they fit comfortably. *Rationale.* A fit that is too tight can cause the glove to tear; a fit that is too tight or too loose can make it difficult to perform tasks effectively.

4. **Procedural Step.** Inspect the gloves carefully for tears, holes, or punctures. If you find a defect in a glove, you must remove, discard, and replace it. Because the defective glove has not yet come in contact with potentially biohazardous material, it can be disposed of in an ordinary waste receptacle.

**REMOVING GLOVES**

You must remove gloves carefully to prevent contamination of your hands by the possible pathogens on the outside of the gloves.

1. **Procedural Step.** Grasp the outside of one glove with the first three fingers of the other hand approximately 1 to 2 inches below the cuff. *Rationale.* This helps to avoid touching a soiled glove to a clean hand. Touching the skin with the dirty glove could contaminate it.

Continued
2. **Procedural Step.** Stretch the soiled glove by pulling it away from the hand, and slowly pull the glove downward off the hand. As you pull the glove off, your arm should be extended away from your body, and your hands should be pointed downward. Remove the glove by turning it inside out. 

**Rationale.** Pulling the outside of the glove with your fingers curled under the cuff will cause it to turn inside out as it is removed. This will confine the contaminants that were on the outside surface to the inside of the removed glove. If the glove has not been torn or damaged during this step, it can touch your skin once it is inside out.

5. **Procedural Step.** Stretch the glove away from the hand, and pull the cuff downward over the hand and over the balled-up glove, turning it inside out with the balled glove inside. 

**Rationale.** By turning the glove inside out, all contaminated material is enclosed within the glove, reducing the chance of accidental contamination.

6. **Procedural Step.** Carefully dispose of the gloves in a marked biohazardous waste container. A red plastic biohazard bag is adequate for glove disposal, because gloves do not have any sharp edges that could puncture the bag. 

**Rationale.** Grossly contaminated gloves are considered hazardous even after the contamination has been contained to the inside.

7. **Procedural Step.** Sanitize the hands. Always sanitize the hands after a procedure. 

**Rationale.** Remember that gloving is not a substitute for thorough hand sanitization.
CHAPTER 31

SURGICAL ASEPSIS

Surgical asepsis is not the same as medical asepsis. Surgical asepsis is removing all microorganisms, both pathogenic and nonpathogenic, from an object. Surgical asepsis applies to all techniques used to maintain a sterile environment. To be considered sterile, an item must be free from all microorganisms, including spores.

Three main techniques are used to prevent the spread of infection in the medical office: sanitization, disinfection, and sterilization.

Sanitization

Sanitization reduces the number of microorganisms on an item and is the lowest level of infection control. Items that only touch the surface of the skin can be sanitized. Think of sanitization as a "good old-fashioned scrubbing." A brush, low-sudsing detergent, and hot water for rinsing are used. Sanitizing does not destroy all microorganisms or spores. Before an item can be disinfected or sterilized, however, it must be sanitized. Failure to remove organic material prevents the steam or chemical from penetrating the surface of the item.

Sanitization is the first step to clean and sterile instruments. The medical assistant should begin to sanitize instruments immediately after an instrument has been used or as soon as possible after use. When items containing contaminated materials (e.g., blood, mucus) are sanitized, the material is first rinsed with cool water. Cool water will not coagulate the protein in the contaminated material. A low-sudsing detergent with a neutral pH (Figure 31-9) should be used with a scrub brush to clean the instruments and to loosen any debris (Procedure 31-6). When possible, ultrasonic cleaning should be used for cleaning instruments, since it reduces the risk of injury by eliminating hand scrubbing, which can lead to accidental skin punctures. After scrubbing or ultrasonic cleaning, the instruments must be fully rinsed with clean or distilled water to remove any residue. Dry each instrument with a clean towel or paper towels.

Disinfection

Disinfection is the process of applying an antimicrobial agent to nonliving objects to destroy pathogens and is considered an intermediate level of infection control. Disinfection occurs when scrubbing or soaking an item with a chemical cleaning agent (e.g., 10% bleach solution, alcohol). Disinfection destroys or inhibits the activity of microorganisms, but it has no effect on spores.

Sterilization

Sterilization destroys all microorganisms, including spores. Sterilization occurs by using heat, steam under pressure, gas, ultraviolet (UV) light, or chemicals (Box 31-5). Any device...

### BOX 31-5

**Methods of Sterilization**

<table>
<thead>
<tr>
<th>METHOD</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HEAT</strong></td>
<td>Steam under Pressure</td>
</tr>
<tr>
<td></td>
<td>• 250°F at 15 lbs of pressure for 20 to 30 minutes, depending on the type of item</td>
</tr>
<tr>
<td><strong>Dry Heat</strong></td>
<td>• 320°F for 1 to 2 hours, depending on the type of item</td>
</tr>
<tr>
<td><strong>GAS</strong></td>
<td>Ethylene Oxide</td>
</tr>
<tr>
<td></td>
<td>• Used for heat-sensitive items</td>
</tr>
<tr>
<td></td>
<td>• Exposure time of 1 to 3 hours</td>
</tr>
<tr>
<td></td>
<td>• Items must be placed in an aerator to remove toxic residue from the packaging and item</td>
</tr>
<tr>
<td><strong>SOLUTION (CHEMICAL AGENTS)</strong></td>
<td>• Item(s) submerged in a chemical agent for 4 to 24 hours, depending on the item and agent used</td>
</tr>
<tr>
<td><strong>RADIATION (ULTRAVIOLET)</strong></td>
<td>• Used by manufacturers to sterilize items sensitive to steam and chemicals (e.g., plastics)</td>
</tr>
</tbody>
</table>

**FIGURE 31-9** Commercially available surgical instrument care products.
**TASK:** Properly sanitize contaminated instruments by cleansing with detergent and water to reduce the number of microorganisms, or by using an ultrasound cleaner.

**EQUIPMENT AND SUPPLIES**
- Disposable gloves
- Rubber (utility) gloves
- Fluid-resistant laboratory coat
- Laboratory safety glasses
- Stiff nylon brush
- Container to hold instruments
- Instrument cleaning solution, stain remover, and lubricant
- Ultrasonic cleaner
- Material safety data sheet (MSDS) for cleaning solution
- Towel

**SKILLS/RATIONALE**

1. **Procedural Step.** Review the MSDS for the chemical agent being used.
   **Rationale.** Before beginning to work with any chemicals, first read the MSDS information to avoid injury or illness from improper handling of the chemical. It also provides first-aid information and recommendations if you should come in contact with chemicals.

2. **Procedural Step.** Put on gloves, laboratory coat, and safety glasses.
   **Rationale.** Personal protective equipment (PPE) must be used whenever there is a chance of contamination from body fluids, as when cleaning contaminated instruments.

3. **Procedural Step.** Apply utility gloves over the disposable gloves.
   **Rationale.** Utility gloves provide protection against accidental punctures or cuts from sharp instruments and should be worn when sharps are sanitized. Utility gloves also provide added protection to hands and wrists from harsh chemicals.

4. **Procedural Step.** Mix cleaning solution for the instruments, following directions on the label. Alternately, prepare the ultrasound cleaning device, following the manufacturer’s directions.
   **Rationale.** Directions for mixing solutions may vary depending on the manufacturer. It is important to follow the specific directions on the bottle to ensure that the correct strength is used.

5. **Procedural Step.** Remove contaminated instruments from the area, and place them in a covered container.
   **NOTE:** If the instruments cannot be cleaned immediately after use, they should be soaked in a low-sudsing detergent.

6. **Procedural Step.** Prepare instruments for sanitation by first separating out the sharp and delicate instruments.
   **Rationale.** Separating sharp instruments from other instruments helps prevent the dulling of sharp edges and lessens the chance of accidental injury. Delicate instruments should also be separated to prevent them from being damaged. Delicate instruments are typically sanitized using the ultrasound cleansing method (see end of procedure).

7. **Procedural Step.** Rinse all instruments under cool running water to remove organic material.
   Instruments should be rinsed under cool to tepid water (approximately 100° to 110° F).
   **Rationale.** Hemostats and scissors and any hinged or ratcheted instruments must be open when rinsing and washing to allow for the removal of debris. Blood is more easily removed with cool water; hot water coagulates organic material, making it difficult to remove.

8. **Procedural Step.** Using a scrub brush and cleaning solution, loosen any debris on the instruments.
   a. Be sure to scrub all surfaces, including hinges and ratchets, and to scrub into the serrations.
   b. Remove any stains or rusting as needed with the appropriate chemicals or brush.
   c. Some sudsing of the cleaning solution should occur during this process; this helps to loosen debris and body fluids.
   d. Delicate instruments should be scrubbed carefully to prevent damage and personal injury.
Sanitize Instruments—cont’d

**Rationale.** Stains and rust prevent instruments from being free of microorganisms. If these cannot be removed, the instrument must be taken out of circulation and not used.

9. **Procedural Step.** Rinse the instruments. Using hot water, rinse the instruments to remove all soap and residue; this will allow for adequate sterilization. Allow the instruments to drain as much water as possible, and then place them on several layers of paper towels or a lint-free cloth towel. **Rationale.** Hot water must be used because it dries faster than cold water and helps prevent water spots on the instruments. Leaving soap or residue on the instruments will not allow the steam of autoclaving to penetrate properly to the surface of the instruments.

10. **Procedural Step.** Dry each instrument with a paper towel. Place the towel-dried instrument on a dry lint-free towel for additional air drying. **Rationale.** Instruments must be completely dry before wrapping for the autoclave. Dry instruments do not rust, do not form water spots, and do not dilute chemicals used for disinfection after sanitization.

11. **Procedural Step.** Dispose of the cleaning solution. Once all instruments have been sanitized, the cleaning solution should be disposed and not reused.

12. **Procedural Step.** Once the instruments are completely dry, inspect them for defects and check for proper working condition.

If a flaw is apparent, the instrument should be promptly and properly repaired, or discarded if repairs are not possible. A defective instrument should not be used until repairs have been completed. Care when handling instruments prevents problems with improper function on its next use.

13. **Procedural Step.** Lubricate hinged instruments. Once instruments have been dried and inspected, lubricate the hinges and ratchets. **Rationale.** Lubricating hinges and ratchets on instruments prolong their use and help them to function better.

14. **Procedural Step.** Discard any contaminated material, such as towels, in the appropriate biohazardous waste container.

15. **Procedural Step.** Remove and dispose of PPE as appropriate. **NOTE:** Instruments are now ready to be wrapped for autoclaving.

**ULTRASONIC METHOD**

1. **Procedural Step.** Prepare ultrasonic cleaning solution according to the manufacturer’s instructions and pour into the machine.

2. **Procedural Step.** Separate the different types of metals (e.g., stainless steel, aluminum).

3. **Procedural Step.** Open hinged instruments and place them in the ultrasonic cleaner, completely covering them with solution.

4. **Procedural Step.** Turn on the ultrasonic machine and set the timer for the recommended period.

5. **Procedural Step.** Remove the instruments at the end of the cleaning cycle.

6. **Procedural Step.** Change the ultrasonic cleaner according to the manufacturer’s instructions, keeping it covered between uses.

7. **Procedural Step.** Rinse instruments with warm water to remove soap residue. **Rationale.** Residue left on the instruments could cause staining of instruments.

8. **Procedural Step.** Dry instruments before sterilization to prevent water spots or rust from forming.
that enters a sterile body cavity (e.g., catheter, probe, or hemostat) and instruments that cut the skin (e.g., scalpel with blade, scissors) must be sterilized.

Gas autoclaves and chemical baths are used to sterilize equipment that would be damaged by heat and moisture. Procedure 31-7 explains the process of properly sterilizing an item using a chemical agent.

**Steam Sterilization**
An autoclave is used to produce steam under pressure. Steam sterilization is the primary method used to sterilize instruments in the medical office. Autoclaves can be automatic or manual (Figure 31-10).

Steam under pressure destroys microorganisms by causing them to explode. The primary conditions that must be met for steam sterilization to occur include the following:
- Pressure of 15 lbs
- Temperature of 250° to 270° F
- Time period per manufacturer’s recommendations, depending on size of surgical pack or instruments

**FOR YOUR INFORMATION**

**HOW DOES AN AUTOCLAVE WORK?**
The outer chamber of the autoclave jacket creates a buildup of steam that is forced into the inner chamber. Items to be sterilized are placed in the inner chamber. When 15 lbs of pressure has been reached, the temperature will be maintained at 250° to 270° F. The autoclave has a pump that operates to remove all air from the chamber; only after all the air is removed can the correct pressure and temperature be reached. The items are then exposed to these conditions for a prescribed time.

The drying cycle is as important as the sterilizing cycle. When time has expired, the pressure is vented and the door opened ½ to ¾ inch to aid the drying process. Wetness can cause a break in sterility because moisture allows bacteria to grow. When dried, the items are carefully removed for storage.

**AUTOCLAVE MAINTENANCE**
Daily cleaning of the autoclave requires the inner chamber and door gaskets to be wiped with a damp, lint-free cloth. Monthly, a mild detergent should be used to clean the autoclave, and it should be rinsed to remove any residue.

**Wrapping Items for Sterilization**
The items to be sterilized may be wrapped to maintain sterility. This is accomplished by using disposable paper wrappers, disposable paper pouches, or two 140-thread–count muslin wrappers. The wrapping material chosen must be permeable to steam (i.e., it must allow steam to pass through). The wrapping material must also be strong enough to hold together during the processing and handling stages.

The following ways are used to determine whether the items were exposed to conditions necessary for sterility:
- Disposable paper pouches usually have a thermal or chemical indicator embedded in the paper that changes colors when the package has been exposed to steam pressure and the correct temperature.
- A sterilization strip, or indicator strip, with an embedded chemical indicator is placed in the center of a dense pack. When the strip changes color, it signifies that the center of the pack was exposed to conditions necessary for sterility: pressure, temperature, and time (Figure 31-11, A).
- If a wrapper is used, autoclave tape is used to seal the package (Figure 31-11, C). Stripes on the tape have a chemical indicator that will change color when exposed to the correct steam pressure and temperature.
- The use of a biological indicator is the only true indicator that an item is sterile (Figure 31-12). A biological indicator is processed in the autoclave and then either sent to an outside laboratory to obtain results or processed in the office by using an incubation process. Successful test results identify that all bacterial spores have been killed.

Instruments used immediately can be placed in a perforated tray and sterilized unwrapped. A towel should be placed under the instruments to absorb moisture. Jars must be placed on their sides, and liquids are done separately.

Procedure 31-8 demonstrates how to wrap items correctly for the autoclave. Do not wrap items too tightly since inadequate sterilization may occur from improper wrapping.

Procedure 31-9 explains how to load an autoclave properly for the sterilization process. Providing adequate space between packs allows for proper steam circulation and drying. Overloading the sterilizer may cause sterilization failure.

Items that are packaged for sterilization can be used immediately or stored for later use. Items flash sterilized (sterilized but not wrapped) must be used immediately. How the item is wrapped and stored is also important. The medical assistant must be careful not to contaminate the article when opening the wrapping.

**FOR YOUR INFORMATION**

**HOW DOES A BIOLOGICAL INDICATOR WORK?**
The biological indicator is a container with live spores that is placed in a load of items for sterilizing. It is placed in an area that steam may not penetrate if the autoclave is not working properly or if the items are improperly loaded. The front area by the door, the bottom shelves, and the back of the autoclave by the vent are all areas that may not receive the correct amount of steam. Once the biological indicator has been processed, it is usually sent to an independent laboratory with a control sample for testing. Lack of growth is a sign that the autoclave was functioning properly. The CDC recommends that an autoclave be tested using a biological indicator at least weekly.
**PROCEDURE 31-7**

**Perform Chemical Sterilization**

**TASK:** Properly sterilize items using a chemical agent.

**EQUIPMENT AND SUPPLIES**
- Chemical agent, disinfectant
- Material safety data sheet (MSDS) for disinfectant solution
- Fluid-resistant laboratory coat
- Laboratory safety glasses
- Disposable gloves
- Utility gloves
- Stainless steel or glass container with cover
- Towels
- Articles to be disinfected
- Sterile transfer forceps

**SKILLS/RATIONALE**

STANDARD PRECAUTIONS ARE TO BE FOLLOWED.

1. **Procedural Step.** Review the MSDS for the chemical agent being used.
   **Rationale.** Before beginning to work with any chemicals, first read the MSDS information to avoid injury or illness from improper handling of the chemical. It also provides first-aid information and recommendations if you should come in contact with chemicals.

2. **Procedural Step.** Apply personal protective equipment (PPE).
   **Rationale.** PPE must be used whenever there is a chance of contamination from body fluids, as when cleaning contaminated instruments.

3. **Procedural Step.** Apply utility gloves over the disposable gloves.
   **Rationale.** Utility gloves provide protection against accidental punctures or cuts from sharp instruments and should be worn when sharps are sanitized. Utility gloves also provide added protection to hands and wrists from harsh chemicals.

4. **Procedural Step.** Mix disinfectant solution following directions on the label.
   **Rationale.** Directions for mixing solutions may vary depending on the manufacturer. It is important to follow the specific directions on the bottle to ensure that the correct strength is used.

5. **Procedural Step.** Check the expiration date.
   **Rationale.** Loss of potency may result if solution is beyond expiration date.

6. **Procedural Step.** Pour sufficient quantity of disinfectant solution into a stainless steel or glass container with an airtight cover to allow for complete immersion of items to be disinfected.

Continued
Perform Chemical Sterilization—cont’d

7. **Procedural Step.** Gather items to be disinfected. Prepare instruments by first separating out the sharp and delicate instruments. **Rationale.** Separating sharp instruments from other instruments helps prevent the dulling of sharp edges and lessens the chance of accidental injury. Delicate instruments should also be separated to prevent them from being damaged.

8. **Procedural Step.** Sanitize the items by following the steps in Procedure 31-6. **Rationale.** Placing items into the solution while still wet will dilute the solution and decrease its effectiveness.

9. **Procedural Step.** Dry the items. **Rationale.** Placing items into the solution while still wet will dilute the solution and decrease its effectiveness.

10. **Procedural Step.** Place the items in the disinfectant chemical solution, making certain that the instruments are completely covered in the chemical agent. **Rationale.** Completely covering all items allows the chemical agent to reach all parts of the instrument.

11. **Procedural Step.** Place the airtight lid on the container. **Rationale.** Keeping the container covered prevents the escape of toxic fumes into the environment and prevents evaporation of the solution.

12. **Procedural Step.** Disinfect the items for the required time. The length of time may vary with the type and strength of disinfectant being used. Exposure time may be from 20 minutes to 3 hours or longer. For example, items must be soaked for 1 to 4 hours in Cidex solution. **Rationale.** The required time allows for the complete destruction of all microorganisms.

   **NOTE:** Never add additional instruments to those already soaking since the length of disinfecting time will be affected.

13. **Procedural Step.** Before using them, remove the items from the chemical agent and rinse completely. This may be accomplished by lifting a stainless steel tray that fits inside the container out of the container and rinsing the items under running water or in a sterile, distilled-water bath. **Rationale.** This removes residue from the items, which could cause irritation to the tissues of the patient.

14. **Procedural Step.** Using sterile transfer forceps, remove the items from the tray for use.

15. **Procedural Step.** Dry items before use with a sterile towel.

16. **Procedural Step.** Remove gloves and sanitize the hands. **NOTE:** Change the solution in the container every 7 to 14 days or as recommended by the manufacturer.
CONCLUSION OR INTERPRETATION

By correctly packaging and loading and maintaining temperature of 250°F for the correct amount of time, items can be successfully sterilized in either autoclave type.

AUTOCLAVE COMPARE AND CONTRAST

<table>
<thead>
<tr>
<th>Automatic</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HOW ALIKE?</strong></td>
<td></td>
</tr>
<tr>
<td>Reservoir is filled with distilled water</td>
<td></td>
</tr>
<tr>
<td>Sterilizer is turned on</td>
<td></td>
</tr>
<tr>
<td>Steam penetrates packaged items that are loaded properly</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Automatic</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HOW DIFFERENT?</strong></td>
<td></td>
</tr>
<tr>
<td>Chamber fills by using manual controls</td>
<td></td>
</tr>
<tr>
<td>Chamber fills by using manual controls</td>
<td></td>
</tr>
<tr>
<td>Timer</td>
<td></td>
</tr>
<tr>
<td>Must be set when pressure and temperature are met</td>
<td></td>
</tr>
<tr>
<td>Timing begins automatically when temperature and pressure reach 250°F and 15 lbs of pressure</td>
<td></td>
</tr>
<tr>
<td>Automatically vents when cycle is complete</td>
<td></td>
</tr>
<tr>
<td>Automatically vents when cycle is complete</td>
<td></td>
</tr>
<tr>
<td>Vent</td>
<td></td>
</tr>
<tr>
<td>The vent control must be depressed manually</td>
<td></td>
</tr>
<tr>
<td>Automatically vents when cycle is complete</td>
<td></td>
</tr>
<tr>
<td>Automatically vents when cycle is complete</td>
<td></td>
</tr>
<tr>
<td>Drying</td>
<td></td>
</tr>
<tr>
<td>The door must be cracked open manually and time set</td>
<td></td>
</tr>
<tr>
<td>Drying</td>
<td></td>
</tr>
<tr>
<td>Drying</td>
<td></td>
</tr>
</tbody>
</table>

PATTERNS OF SIGNIFICANT SIMILARITIES AND DIFFERENCES

Both styles of autoclaves perform the same function. The computerized autoclave is preset. The manual autoclave must be put into each cycle.

CONCLUSION OR INTERPRETATION

By correctly packaging and loading and maintaining temperature of 250°F for the correct amount of time, items can be successfully sterilized in either autoclave type.

**FIGURE 31-10**

FIGURE 31-11 A, Sterilization strips, or chemical indicator strips, contain a heat-sensitive dye and change color when the sterilizer has maintained the proper parameters (e.g., correct temperature, pressure for the cycle, and for a certain period of time). B, Chemical indicator embedded in paper pouch. C, Autoclave tape. Top, Before the sterilization process. Bottom, Diagonal lines appear during autoclaving and indicate that the wrapper article has been sterilized.

FIGURE 31-12 Biological indicator. A biological test pack includes two spore tests that are sterilized and one spore control that is not sterilized.

TABLE 31-2

Recommended Shelf Life of Sterilized Items Stored by Various Methods

<table>
<thead>
<tr>
<th>Storage Method</th>
<th>Expiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linen wrapped, four-layer thickness</td>
<td>30 days</td>
</tr>
<tr>
<td>Paper</td>
<td>30 days</td>
</tr>
<tr>
<td>Nonwoven fabric</td>
<td>30 days</td>
</tr>
<tr>
<td>Linen wrapped, with tape-sealed dustcover</td>
<td>3 months</td>
</tr>
<tr>
<td>Plastic/paper combination, heat sealed</td>
<td>3 months</td>
</tr>
<tr>
<td>Plastic film, tape sealed</td>
<td>3 months</td>
</tr>
<tr>
<td>Linen wrapped, with heat-sealed dustcover</td>
<td>6 months</td>
</tr>
<tr>
<td>Plastic film, heat sealed</td>
<td>6 months to 1 year</td>
</tr>
</tbody>
</table>

CONCLUSION

The first chapter in the Clinical Medical Assisting section of this text covers infection control and asepsis because this knowledge is necessary before learning about the clinical procedures and duties of the medical assistant that may involve exposure to potentially hazardous materials and pathogens. Protecting patients and staff from the spread of disease is critical in a medical office. Medical assistants need to understand fully the guidelines of infection control and the medical and surgical aseptic techniques that can help them break the chain of infection.

By following the policies and procedures of the medical facility and adhering to the Standard Precautions issued by the CDC and mandated by OSHA, medical assistants help ensure that the medical office is a safe and healthy environment for all patients, workers, and visitors.
Wrap Instruments for the Autoclave

**TASK:** Wrap sanitized instruments for autoclaving.

**EQUIPMENT AND SUPPLIES**
- Autoclave wrapping material
- Autoclave tape
- Sterilization indicator strip
- Sterilization pouch
- Waterproof pen

**INSTRUMENT PACK**
- Ten 4 × 4-inch gauze squares
- 1 forceps
- 1 Kelly hemostat
- 1 S/S (sharp/sharp) operating scissors
- Or items designated by instructor

**INDIVIDUAL PACK**
- 1 small rake retractor
- Or items designated by instructor

**SKILLS/RATIONALE**

1. **Procedural Step.** Sanitize the hands.

2. **Procedural Step.** Assemble equipment and supplies. **NOTE:** For this procedure you will be wrapping a pair of forceps, a pair of operating S/S scissors, a pair of Kelly hemostats, and ten 4 × 4 gauze squares in autoclave wrap (instrument pack), as well as a small rake retractor (individual pack) in a sterilization pouch, or items designated by your instructor.

3. **Procedural Step.** Place the appropriate-size wrappers for the instruments pack item on a clean, flat surface in a diamond-shaped position.

4. **Procedural Step.** Place the items for the instrument pack in the center of the wrapping material. If an instrument is being wrapped and it has a moveable joint, it should be opened. Place a 4 × 4 gauze square folded over the cutting edges of the scissors.

5. **Procedural Step.** Place a sterilization strip in the center of the pack (the most difficult place for steam to reach). **NOTE:** You should always check the expiration date of the sterilization strip so you are assured that the strip will work as expected.

6. **Procedural Step.** Position the items in the pack just below the center of the wrap, with the longest part pointing toward the two side corners.

**Rationale.** If instruments are closed, the steam may not seep into the hinges for complete sterilization. Instruments with sharp edges should have the edges covered with gauze squares to prevent the puncture of the package or injury to someone handling the pack. Placing a 4 × 4 gauze square over the cutting edge of the scissors also protects the instrument from becoming dull or damaged.

**Continued**
### Procedure 31-8

**Wrap Instruments for the Autoclave—cont’d**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
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| **7.** **Procedural Step.** Wrap the instruments.  
Starting with one piece of autoclave wrapping material, wrap the instrument pack as follows:  
a. Starting with the bottom flap, bring the wrapping material up snug against the instruments, then double-back 1 to 2 inches, leaving a flap. This “flap” will be used later to open the pack without touching and contaminating the instruments.  
![Image of wrapped instruments](image.png)  
b. Fold each corner in toward the center, one corner at a time, then double-back 1 to 2 inches, leaving a flap as you did with the bottom.  
![Image of folded corner](image.png)  
c. Fold the remaining top edge of the pack in the same manner as the sides, doubling back 1 to 2 inches.  
d. Flip the now-squared pack forward so that only the remaining flap is visible. Fold the “flap” back. This completes the inside wrap.  
![Image of squared pack](image.png) |
| **8.** **Procedural Step.** Repeat the wrapping process.  
Repeat the process with a second piece of autoclave wrapping material in the same manner as the first layer, or wrap. This time, when you get to the last flap, fold it so it is on the outside of the pack; this flap will be used to tape the pack closed.  
**Rationale.** All instrument packs must be “double wrapped” to ensure sterility. The package should be wrapped firmly enough to allow for handling but loosely enough to allow for the penetration of steam.  
![Image of second layer](image.png)  
**9.** **Procedural Step.** Secure the package with autoclave tape.  
Tear off a piece of tape from the roll that is long enough to secure the package. Fold a flap of tape on itself at one end to allow for easier removal of the tape once the package has been autoclaved.  
**Rationale.** Autoclave tape is like masking tape with stripes that change color when the package has been exposed to steam. This makes it possible to distinguish easily between packs that have been autoclaved and those that have not. Autoclave tape is not an indication of whether the pack is sterile, only that it has been through the sterilization process.  
![Image of autoclave tape](image.png)  
**10.** **Procedural Step.** Label the autoclave tape.  
With the waterproof pen, label the package with the following information:  
a. Instrument(s) enclosed or type of package (e.g., minor surgery).  
b. Date of autoclaving.  
**Rationale.** The date is important because wrapped sterile packs only maintain their sterility for 1 month. Any pack older than 1 month must be rewrapped and resterilized.  
c. Initials of the person who prepared the package.  
![Image of labeled tape](image.png)  
**11.** **Procedural Step.** Set the package aside until it is time to autoclave.  
**INDIVIDUAL INSTRUMENT**  
**12.** **Procedural Step.** Label the pouch.  
With a waterproof pen, label the pouch with the name of the instrument, the date of sterilization, and the initials of the person wrapping the pack.  
**Rationale.** The package must be labeled before placing the instrument inside the pouch so that the pouch is not torn when labeling with the pen.  
![Image of labeled pouch](image.png)  
**Continued**
31-8 Wrap Instruments for the Autoclave—cont’d

13. Procedural Step. Place the instrument carefully into the sterilization pack with the handles on the sealed edge or peel-apart side.
   a. Place the instrument in the pouch with the handle end first.
      **Rationale.** The handle end must be inserted into the pouch first because it is the opposite end of the pouch that will be opened after it is sterilized. This will allow the instrument to be appropriately grasped by its handle.
   b. Seal the pouch.
      **Rationale.** Depending on the style of the pouch, use the appropriate method of closure. Placing the handles on the edge that opens will allow the instrument to be handed in its functional position (the correct position for the physician to remove from the pack while maintaining sterility).
      • Adhesive closure. Peel the paper strip away to expose the adhesive. Fold the flap over, and press firmly to seal the paper to the plastic.
      • Autoclave tape. Fold the flap of the open end over to the plastic. With a piece of autoclave tape, seal the edge and around each corner.
      • Thermal sealer. Place the edges of the pouch under the heat bar, and apply pressure for 15 seconds.

Rationale. Some pouches are packaged so that the peel-off paper end is inserted into the pack before sealing and serves as the sterilization indicator. If this is not available on the sterilization pack you use, you must insert a sterilization strip before sealing the pouch.

**NOTE:** If the instrument package is opened and added to the sterile tray in a sterile manner, handle end–first insertion is not necessary. If the instrument package is being opened, however, and the instrument is presented to the physician to grasp from the package, the handle must be presented first. It is best to be in the habit of always inserting the handle end first into the sterilization pouch.

14. Procedural Step. Set the package aside until it is time to autoclave.
**PROCEDURE 31-9**

**Sterilize Articles in the Autoclave**

**TASK:** Properly sterilize supplies and medical equipment using an autoclave.

**EQUIPMENT AND SUPPLIES**
- Distilled water
- Heat-resistant gloves
- Wrapped packs (prepared in Procedure 31-8)
- Stainless steel canister containing 2 × 2-inch gauze squares, or items designated by instructor
- Autoclave with instruction manual
- Autoclave log
- Pen

**SKILLS/RATIONALE**

1. **Procedural Step.** Assemble previously wrapped autoclave packs, other items to sterilize, supplies, and equipment.
   **Rationale.** It is important to have all supplies and equipment ready and available before starting any procedure to ensure efficiency.

2. **Procedural Step.** Fill the autoclave with distilled water.
   Check the water level in the reservoir tank of the autoclave and fill it with distilled water as recommended by the manufacturer. Typically a "fill" line is marked on the inside of the reservoir.
   **Rationale.** Water used to fill the reservoir in the autoclave must be free of minerals, so distilled water is used. Minerals in tap water can corrode the stainless steel chamber of the autoclave and block the air exhaust valve. Water is used to build the steam necessary for sterilization.

3. **Procedural Step.** Load the autoclave chamber with previously prepared items, leaving space for adequate circulation.
   a. Ensure that the items do not touch the chamber walls.
   b. Place wrapped packs on their side and stainless steel or glass items on their side with lids off so that the items inside (e.g., gauze) will be sterilized.

4. **Procedural Step.** Turn the autoclave control knob to "fill."
   There is a "fill" line marked on the inside "floor" of the autoclave; allow the water to enter the inside chamber to this line. Do not overfill the chamber.
   **Rationale.** This allows water from the reservoir chamber to fill the inside chamber of the autoclave.

5. **Procedural Step.** Close the door tightly.
   Be sure to follow the manufacturer’s instructions.
   **Rationale.** The door must be closed tightly so that the autoclave can properly heat the water to form steam and can operate with the amount of steam and temperature necessary for sterilization to occur. It is also important to lock the door properly because much pressure builds up during the autoclave cycle.

6. **Additional Step.** If you are sterilizing dressing supplies and "hard" goods such as instruments together, place the dressing supplies on the top shelf and the hard goods on the bottom shelf.

7. **Procedural Step.** Place large packs 2 to 4 inches apart and small packs 1 to 2 inches apart.
   **Rationale.** The chamber must be loaded properly so that there is enough room for the steam to circulate. To sterilize the items effectively, steam needs to penetrate the middle portion of each item at its thickest point. Placing packs on their side maximizes steam circulation and effective drying.

**Continued**
6. **Procedural Step.** Turn the control knob to the “on” or “autoclave” setting to start the autoclave cycle.
   **Rationale.** The “on” control starts pressurization and increases the temperature of the autoclave.

7. **Procedural Step.** Check that the pressure gauge has reached 15 to 17 pounds of pressure and that the temperature has reached 250°F.
   **Rationale.** Adequate pressure must be achieved to reach the correct temperature of at least 250°F to 270°F.

8. **Procedural Step.** Set the timer for the required time (typically 20 minutes).
   **Rationale.** For sterilization to occur, the autoclave must reach the required amount of pressure at the required temperature for the required length of time.

9. **Procedural Step.** After the time has expired, turn the control knob to “vent.”
    **Note:** Remember to follow the manufacturer’s recommendations for the autoclave you are using.
   **Rationale.** Venting the autoclave releases steam, which brings down the pressure. The pressure in the autoclave must drop to zero to be fully vented.

10. **Procedural Step.** When the pressure gauge returns to zero, open the door ½ to 1 inch.
    **Note:** Never open the door until the pressure gauge is on zero.
   **Rationale.** Opening the door allows a more rapid escape of steam and drying of autoclave contents.
    **Note:** Opening the autoclave door before the pressure gauge has reached zero may result in steam burns or other injuries.

11. **Procedural Step.** Allow items to dry completely before removing them from the autoclave.
    **Rationale.** Drying time is typically 15 to 60 minutes, depending on the articles being autoclaved.

12. **Procedural Step.** Once the articles are completely dry, use heat-resistant gloves to remove items from the chamber.
    **Rationale.** The inner chamber of the autoclave should not be touched with bare hands. Heat is retained in the autoclave walls longer than in the articles being autoclaved, and injury could result.

13. **Procedural Step.** Turn the autoclave control knob to the “off” position (unless the autoclave will be used again).

14. **Procedural Step.** Inspect each pack carefully.
    a. Make sure that the autoclave tape on the outside of a wrapped pack and the arrows on the back of the pouches changed color as expected.
    b. Ensure that no damage occurred to the sterilized packs during processing.
    **Note:** Autoclave tape changing colors only indicates the pack has been through the autoclaving process; it does not indicate that it is sterilized. Sterilization cannot be determined until the pack is opened at the time it is used, when the sterilization strip in the center of the pack can be checked.

15. **Procedural Step.** Turn the autoclave control knob to the “on” or “autoclave” setting to start the autoclave cycle.
   **Rationale.** The “on” control starts pressurization and increases the temperature of the autoclave.

16. **Procedural Step.** Check that the pressure gauge has reached 15 to 17 pounds of pressure and that the temperature has reached 250°F.
    **Rationale.** Adequate pressure must be achieved to reach the correct temperature of at least 250°F to 270°F.

**Continued**
Infection Control and Asepsis

CHAPTER 31

PROCEDURE 31-9 Sterilize Articles in the Autoclave—cont’d

15. Procedural Step. Store the autoclaved articles.
   **Rationale.** Make sure to store autoclaved articles in a clean, dust-proof area with the most recently sterilized items in the back so that those closest to the expiration date are used first.

16. Procedural Step. Record the date, the time the cycle was run, a description of the load, the duration of the cycle, chamber temperature, and your initials in the autoclave log.
   Comment on any change from the usual autoclave process.
   **Rationale.** Logging the articles autoclaved will provide quality assurance for all supplies in each autoclaved load in case any questions about adequate sterilization should arise.
   **NOTE:** The autoclave should be cleaned regularly according to the manufacturer’s instructions to prevent buildup of minerals and other debris in the chamber and on the outside surface. Proper maintenance of the autoclave is necessary for proper sterilization of the materials.

Chapter Summary

Reinforce your understanding of the material in this chapter by reviewing the curriculum objectives and key content points below.

1. Define, appropriately use, and spell all the Key Terms for this chapter.
   - Review the Key Terms if necessary.

2. Explain why it is important for medical assistants to understand the basic principles of infection control.
   - Understanding the principles of infection control helps medical assistants prevent the spread of disease in the medical office.

3. Explain the difference between nonpathogenic and pathogenic microorganisms.
   - Pathogenic microorganisms are disease producing; nonpathogenic microorganisms are not.
   - Nonpathogenic microorganisms help maintain homeostasis in the body, but can become disease producing if transported to an area outside their normal environment.

4. List the six requirements that must be present for microorganisms to grow.
   - Microorganisms need varying degrees and types of nutrients, darkness, temperature, pH, gases, and moisture to live and grow.

5. List five classes of disease-causing microorganisms and give at least one example of a disease caused by each.
   - Bacteria: gonorrhea, bacterial pneumonia, upper respiratory infection, syphilis, and diphtheria
   - Rickettsiae: Rocky Mountain spotted fever
   - Fungi: athlete’s foot, vaginal yeast infection
   - Protozoa: dysentery
   - Viruses: HIV

6. Describe the five parts of the “chain of infection,” and give three examples of how this chain can be broken.
   - The reservoir host, or carrier, is infected with the disease-causing microbes (or germs).
   - The germ leaves the body of an infected person by a route of exit (e.g., blood).
   - The infection is transmitted by direct or indirect contact (method of transmission such as touching, use of instruments).
   - Infection is transmitted to another person through a route of entry (e.g., broken skin).
   - The susceptible host becomes a reservoir host if infected, and the chain begins again.
   To break the chain, (a) practice frequent hand sanitization; (b) make good use of personal equipment, including gloves when handling biohazardous material; and (c) maintain Standard Precautions when working in the health care setting.

7. Define the roles of the CDC and OSHA regarding Standard Precautions.
   - CDC issues the Standard Precautions.
   - OSHA mandates and currently enforces these precautions.

   - Review Procedure 31-1.

9. Demonstrate the correct procedure for properly disposing of biohazardous materials.
   - Review Procedure 31-2.
10. List the five responsibilities of employers to protect employees against exposure to potentially biohazardous materials, according to the OSHA Bloodborne Pathogens Standard.
   - Develop an exposure control plan.
   - Implement engineering controls and safe work practices.
   - Provide and train employees in the use of personal protective equipment (PPE).
   - Keep accurate records and follow mandated procedures for exposure incidents.
   - Communicate potential hazards to employees.

11. List the six types of information found on a material safety data sheet (MSDS), and explain how an MSDS supports the "right-to-know" law.
   - An MSDS contains information identifying a chemical, listing hazards and precautions for handling, identifying the chemical as carcinogenic (if applicable), providing first-aid procedures, and listing the contact information for the manufacturer.
   - There must be an MSDS on file for all chemicals in the medical office.
   - OSHA requires the manufacturers of these chemicals to make MSDSs available, usually as a package insert.

12. Differentiate between medical asepsis and surgical asepsis.
   - In medical asepsis, also called the "clean" technique, an object is clean and free from pathogens. Nonpathogenic microorganisms may still be present.
   - In surgical asepsis, also called "sterile" technique, all microorganisms have been removed.

13. Explain the difference between normal flora and transient flora.
   - Normal flora occurs naturally on the skin and helps the body fight infection.
   - Transient flora is picked up easily and can be pathogenic.

14. List four methods of maintaining hand hygiene.
   - Handwashing with soap and water or antiseptic hand cleanser, antiseptic hand rub, and surgical handwashing are all methods of maintaining hand hygiene.

15. Demonstrate the correct procedure for handwashing for medical asepsis.
   - Review Procedure 31-3.

16. Demonstrate the correct procedure for hand sanitization using an alcohol-based hand rub.
   - Review Procedure 31-4.

17. Demonstrate the correct procedure for applying and removing nonsterile gloves.
   - Review Procedure 31-5.

18. Differentiate among sanitization, disinfection, and sterilization.
   - Sanitization does not destroy all microorganisms or spores.
   - Disinfection destroys or inhibits the activity of pathogens but has no effect on spores.
   - Sterilization kills all microorganisms, including spores.

19. Demonstrate the correct procedure for sanitizing instruments.
   - Review Procedure 31-6.

20. Demonstrate the correct procedure for performing chemical sterilization of items.
   - Review Procedure 31-7.

21. Explain the basic purpose and function of an autoclave.
   - An autoclave is used to produce steam under pressure and is the primary method for sterilizing instruments in the medical office.

22. Demonstrate the correct procedure for wrapping items for the autoclave.
   - Review Procedure 31-8.

23. Demonstrate the correct procedure for performing steam sterilization of items in an autoclave.

24. Describe how the autoclave is maintained on a daily and monthly basis.
   - The inner chamber and door gaskets should be wiped with a damp, lint-free cloth daily.
   - A mild detergent should be used to clean the autoclave monthly, with careful rinsing to remove any residue.

25. Explain the purpose of a chemical indicator, sterilization strip, and biological indicator.
   - Chemical indicators alert the medical assistant after processing that conditions inside the autoclave (e.g., pressure, temperature) were right for sterilization.
   - Sterilization strips are embedded within the center of a dense pack to show that conditions for sterilization have occurred within the pack.
   - Biological indicators are used to determine the overall effectiveness of the autoclave.

26. List three factors that influence the shelf-life of sterilized instruments.
   - Instruments can be prepared, sterilized, and stored for 30 days up through several months (to 1 year), depending on the (a) type of packaging material, (b) environment in the storage area, and (c) how the package is sealed, among other factors.

27. Analyze a realistic medical office situation and apply your understanding of infection control and asepsis to determine the best course of action.
   - Medical assistants must be prepared to prevent cross-contamination and the spread of infection by practicing all safety precautions and procedures. Using PPE, remembering Standard Precautions on every patient at all times, and maintaining OSHA guidelines are essential practices that a medical assistant must perform daily.

28. Describe the impact on patient care when medical assistants understand how to prevent the spread of disease and exposure to potentially biohazardous materials in the medical office.
   - The role of the medical assistant is to control and prevent the spread of infection when performing patient care.
   - Common aseptic practices include proper handwashing, use of gloves to prevent transfer of pathogens, and proper preparation of items for sterilization.
If you have accomplished the objectives in this chapter, you will be able to make better choices as a medical assistant. Take another look at this situation and decide what you would do.

Janine is a new medical assistant in the office of Dr. McGee, a specialist in infectious diseases. Janine did her practical experience in a pediatric practice, often caring for children with viral and bacterial infections. As she begins her new employment, Janine asks to see the MSDSs and the current Exposure Control Plan. She also wants to know where the PPEs for her use are stored.

During patient care, medical workers often come in direct contact with many microorganisms, as Janine will in an office that specializes in infectious diseases. Janine’s supervisor wants to be sure Janine is prepared to protect patients, other staff, and herself from infection. The supervisor reviews with Janine the importance of proper handwashing in infection control. Another important task for Janine will be performing both medical asepsis and surgical asepsis on a regular basis, so the supervisor assesses Janine’s ability to perform these skills. The supervisor asks Janine what is done at the end of the day before leaving the office to break the cycle of infection. Janine responds that all medical workers should remove any garments that have been in direct contact with pathogens and nonpathogens and each person should carefully sanitize his or her hands.

Would you be prepared to take the necessary precautions to stop the spread of infection in the medical office?

1. What are “MSDSs”? What are “PPEs”? Why are both important to the health care worker?
2. What is “OSHA,” and what are the requirements that a medical office must have to meet the OSHA standards?
3. What is included in the “Exposure Control Plan”?
4. What is the “chain of infection,” and why is hand sanitization important in breaking this chain?
5. What is the difference between handwashing and hand sanitization in maintaining hand hygiene? Give two indications for the appropriate use of each.
6. What is the difference between medical asepsis and surgical asepsis?
7. What is the difference between sanitization and disinfection?
8. Is there a degree of sterilization in surgical asepsis? Defend your answer.
9. What is a non-pathogen? A pathogen?
10. How should Janine handle infectious waste from patients with a bacterial infection who are seen by Dr. McGee?

WEB SEARCH

1. Research procedures that require the use of aseptic technique. This exercise will enhance your knowledge concerning ways to break the chain of infection. The presence of microorganisms is not enough to promote infection. The chain of infection follows a designated pathway.

- Keywords: Use the following keywords in your search: aseptic technique, asepsis, bacteria, microorganisms, handwashing.
Dear Author:

During the preparation of your manuscript for publication, the questions listed below have arisen. Please attend to these matters and return this form with your proof.

Many thanks for your assistance.

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