CHAPTER 9

PREVENTIVE MEDICINE AND INFECTION CONTROL

INTRODUCTION

Prevention and control of disease are considered the most desirable means of maintaining good health. Information included in this overview should provide the Hospital Corpsman (HM) with a general knowledge of the principles and practices of the Navy’s Preventive Medicine afloat and ashore. This information is discussed in detail in the Manual of Naval Preventive Medicine, NAVMED P-5010.

PREVENTIVE MEDICINE

LEARNING OBJECTIVE:

Identify the different aspects of preventive medicine.

SANITATION

Sanitation is defined as the hygienic means of promoting health through prevention of human contact with the hazards of wastes. The goal of the Navy’s sanitation program is to provide personnel with a clean and healthy work and living environment.

Personal Hygiene

Because of the close living quarters in the Navy, particularly aboard ships, personal hygiene is of utmost importance. Uncleanliness or disagreeable odor affects the morale of shipmates. Disease and other health problems can spread rapidly affecting an entire compartment or division. Good personal hygiene promotes health and prevents disease. HMs are responsible for presenting health education training programs to the personnel in their unit, including the basics of personal hygiene, proper exercise, sleep, and nutritional requirements.

Sanitation of Living Spaces

The HM, as the Medical Department Representative (MDR), performs sanitation inspections and provides recommendations to the Commanding Officer (CO). The living spaces, their inspection, cleaning, and maintenance practices are discussed in detail in NAVMED P-5010.

Habitability

Factors that can affect habitability of working and berthing spaces are air ventilation, heating, and air conditioning. Measurements of thermal stress are used to monitor environmental conditions in which personnel work, live, and exercise. Monitoring environmental conditions is crucial to maintaining a safe environment for personnel.

VECTOR AND PEST CONTROL

A vector is any animal capable of transmitting pathogens or producing human or animal discomfort or injury. Some commonly encountered vectors are insects, arthropods (insects with hard, jointed exoskeleton and paired, jointed legs) and rodents. Pests are organisms (insects, rodents, snakes, etc.) that adversely affect military operations and the well-being of man and animal; attack real property, supplies, and equipment; or are otherwise undesirable.

FOOD-SERVICE SANITATION

Food-borne illnesses represent an ever-present threat to the health and morale of military personnel. To prevent food-borne illnesses, HMs need to ensure that all foods are procured from approved sources and processed, prepared, and served with careful adherence to recommended sanitary practices. When assigned as a MDR for a command or station, HMs may be given the responsibility of inspecting food, food-service facilities, and investigating food-borne illness outbreaks.
For guidance on safe time limits for keeping food, proper storage temperatures, and storage life of perishable and semi-perishable items, refer to tables in Naval Supply Publication 486, Food Service Management General Messes.

Training and Hygiene of Food-Service Personnel

Food-service personnel should be thoroughly indoctrinated in personal hygiene, food sanitation procedures, and in the methods and importance of preventing food-borne illness. Requirements for food service training are addressed in SECNAVINST 4061.1 series, Food Service Training Program.

Food-Service Report

Navy and Marine Corps food-service facilities are required to be inspected by a MDR, together with the food-service manager, officer, or designated representative. The findings of the inspection are reported on a NAVMED Form 6240/1, Food Service Sanitation Inspection. The inspector assigns an appropriate number of defect points based upon the guidelines for each area. Complete step-by-step procedures for filing the report are provided in NAVMED P-5010.

IMMUNIZATIONS AND COMMUNICABLE DISEASES

Navy and Marine Corps personnel are exposed to a wide variety of environmental conditions, including climatic extremes, stressful situations, and close living quarters. Many of these personnel travel to foreign lands where conditions may be unsanitary and have a high level of disease. Preventive medicine’s major role is to minimize disability by emphasizing immunization programs.

Immunizations

Vaccines used to protect Navy and Marine Corps personnel against certain diseases before exposure to infection are called prophylactic immunizations. Prophylactic immunizations are limited to very serious diseases for which effective and reliable immunizing agents have been developed. Immunizations procured for the Armed Forces are required to meet the minimum standards set by the Department of Health and Human Services (HHS).

Immunizations for Military Personnel

Navy and Marine Corps personnel are required to be in a deployable readiness status at all times. To make sure personnel are prepared for deployment, HMs should BUMEDINST 6230.15 series, Immunizations and Chemoprophylaxis, and review the immunization records on a routine basis including before deployments. Initial and booster dosages and routes of administration are dictated by the vaccine manufacturer, the U.S. Public Health Service Immunization Practices Advisory Committee (ACIP), or both.

Communicable Diseases

As the name implies theses are diseases that may be transmitted from a carrier to a susceptible host. They may be transmitted directly from an infected person or animal or indirectly through an intermediate host, vector, or inanimate object. The illness produced is the result of infectious agents invading and multiplying in the host, or from the release of their toxins (poisons).
An important step in the control of communicable disease is the expeditious preparation and submission of the Medical Event Report. Instructions and requirements for reporting to local, state, national, and international health authorities can be found in the preface of the NAVMED P-5038, Control of Communicable Diseases Manual. Follow instructions for the Medical Event Report (BUMEDINST 6220.12 series), when reporting communicable diseases affecting Navy and Marine Corps personnel.

WATER SUPPLY

A hygienically safe and continuously dependable water supply is a necessity of life. Drinking water should be free of disease-producing organisms, poisonous chemicals, and from objectionable color, odor, and taste.

Water Supply Ashore

Typically, Navy and Marine Corps activities ashore within the continental limits of the United States are situated where a municipal water supply is available. BUMEDINST 6240.1 series, Standards for Potable Water, sets drinking water standards for U.S. Naval establishments worldwide, both ashore and afloat. Both municipal and Navy generated water supplies must meet Navy standards.

Water Supply in the Field

Hospital Corpsmen are frequently called upon to approve field water sources and to recommend disinfection methods before water is considered safe to drink. Consider water acquired in the field as unsafe until it has been disinfected and tested. Approval of water sources should be based on a thorough surveillance of available water sources.

Water Quantity Requirements

The daily water requirements for personnel in the field vary with a number of factors including the season of the year, geographical location, and the tactical situation. Personnel who do not drink enough water can quickly become dehydrated both in extremely hot or extremely cold climates.

Water Treatment

Water treatment is the process of purifying water to make it potable (safe to drink). Various processes can be used to purify water. These processes include aeration, coagulation, flocculation, filtration, reverse osmosis, and disinfection, all of which are discussed in depth in NAVMED P-5010.

Water Supply Afloat

Potable water for shipboard use comes from one of several sources: the ship’s distillation plant, shore-to-ship delivery, or ship-to-ship transfer. The ship’s medical department is responsible for determining the quality of the water. The ship’s engineering section determines the quantity stored or produced and performs the actual chlorination or bromination.

Water Testing

Naval vessels follow water testing requirements and procedures outlined in the latest edition of Standard Methods for the Examination of Water and Wastewater, published by the American Public Health Association (APHA), American Water Works Association (AWWA), and the Water Pollution Control Federation (WPCF).
Manufacture and Handling of Ice

Most ships and shore activities use ice machines to make ice. To reduce bacterial growth, ice used around food or in food or drink must be made from potable water. All ice must be prepared in a sanitary manner and afforded the same protection as potable water. The medical departments aboard ships are required to include ice samples in any bacteriological analyses they perform on water.

WASTEWATER TREATMENT AND DISPOSAL

Wastewater is the spent water of a ship, base, industrial plant, or other activity. This spent water contains wastes, such as soil, detergent, and sewage. The proper disposal of these waste materials is one of the most important measures for controlling water-borne diseases, such as cholera and typhoid fever.

Wastewater Treatment and Disposal Systems Ashore

The use of approved municipal or regional wastewater collection and disposal systems is the preferred method for disposing of wastes from shore activities. Municipal or regional wastewater disposal systems are used by Navy shore activities whenever feasible.

Wastewater Treatment and Disposal Systems Afloat

The overboard discharge of untreated sewage from DoD ships within the navigable waters of the United States and the territorial seas (within three nautical miles of shore) is prohibited by federal law. To comply with the law, Naval vessels are being equipped with marine sanitation devices (MSD) that either treat sewage before discharge or collect and hold it until it can be properly disposed of through dockside sewer connections or pumped overboard in unrestricted waters.

INFECTION CONTROL

LEARNING OBJECTIVE:

Describe basic infection control procedures.

Infection control involves taking steps to prevent the spread of infectious agents. The HM's command will develop local standard infection control policies and written protocols following NAVMED P-5010; BUMEDINST 6220.9 Series, Nosocomial Infection Control Program; and BUMEDINST 6600.10 series, Dental Infection Control Program. COs and Officers in Charge (OIC) must appoint, in writing an Infection Control Officer (ICO) to assist in implementing an infection control program. Some of the information may be different from what the Corpsman's command policies and procedures are for infection control. COs and OIC may adapt the policies and procedures from these instructions to meet their local conditions and criteria.

All HMs must be aware of sources and methods of transmission of pathogenic microorganisms and infectious diseases. With the constant threat of thousands of diseases and viruses that exist, it is more important than ever to know how to protect healthcare professionals and the patients. In 2008, infections accounted for an estimated 1.7 million infections and 99,000 associated deaths in American hospitals alone, according to the Centers for Disease Control and Prevention (CDC). In this chapter, the HM will learn the vital basics to defend themselves and their patients from these dangers.
INFECTION CONTROL TERMS AND DEFINITIONS

The following terms and their definitions will help the HM understand the material that is in this chapter and in Chapter 10, “Disinfection and Sterilization.”

- **Asepsis:** The state of being free of pathogenic organisms.
- **Aseptic Technique:** A set of specific practices and procedures performed under carefully controlled conditions with the goal of minimizing contamination by pathogens.
- **Bioburden:** The number of microorganisms contaminating an object; known as bioload or microfloral load.
- **Bloodborne Pathogens:** Pathogenic microorganisms that are present in human blood and capable of causing disease in humans.
- **Bowie-Dick Type Test:** A diagnostic test of a prevacuum sterilizer’s ability to remove air from the chamber and detect air leaks. This is not a sterility assurance test.
- **Chemical Disinfection:** The destruction or inhibition of most viruses and bacteria while in their active growth phase; does not necessarily kill all spores nor can it be verified by a monitor.
- **Chemical Indicator:** Chemical dyes used to determine whether the conditions required for sterilization are met; known as internal or external indicators, dosage indicator, or process indicator.
- **Contaminated:** The presence or reasonably expected presence of blood or other potentially infectious material on an item or surface.
- **Contaminated Laundry:** Laundry that has been visibly soiled with blood or other potentially infectious materials.
- **Culture:** The reproduction and growth of microorganisms in living tissue cells or on a nutrient medium.

- **Dental Item Classification:** Dental items are classified as critical, semi-critical or non-critical based on the pathways through which cross-contamination may occur and the location and technique of instrument use.
- **Critical Items:** Instruments and materials that penetrate the skin, mucous membranes, or bone; these items must be sterile before use. Examples include surgical instruments, periodontal knives, and suture needles.
- **Semi-Critical Items:** Instruments, equipment, or materials that frequently contact mucous membranes but cannot be sterilized because of their design or inability to withstand heat. At minimum these items require high-level disinfection. Examples include some radiographic positioning devices and plastic impression trays.
- **Non-critical Items:** Instruments, equipment, or materials that do not normally penetrate or contact mucous membranes but which are exposed to splatters, sprays, or splashing of blood, or are touched by contaminated hands. These items require intermediate-level disinfection. Examples include the dental unit and medical exam table.
- **Disinfected:** To cleanse something so as to destroy or prevent the growth of disease-carrying microorganisms.
- **Infectious Agent:** An infectious agent is an organism that is capable of producing an infection or infectious disease.
- **Infectious Micro-Organisms:** Organisms capable of producing disease in a host.
- **Invasive Procedure:** A surgical entry into the tissues, cavities, organs, or repair of major traumatic injuries. This includes the manipulation, cutting, or removal of any oral or perioral tissue during which bleeding occurs, or the potential for bleeding exists.
- **Micro-Organisms:** Bacteria, fungi, viruses, and bacterial spores.
- **Nosocomial Infection:** An infection resulting from treatment in a hospital and is secondary to the patient's original condition; it is unrelated to the primary diagnosis.

- **Personal Protective Equipment (PPE):** Specialized barrier attire worn by an employee to protect against a hazard.

- **Occupational Exposure:** Reasonably anticipated skin, eye, mucous membrane, or parenteral exposure to blood or other potentially infectious materials that may result from performance of duties, despite the appropriate use of PPE.

- **Saturated Steam Sterilization:** A process that uses steam heat under pressure for sufficient length of time to kill all forms of micro-organisms.

- **Sanitary Sewer System:** A sewer system connected to a sewage treatment plant.

- **Spray-Wipe-Spray:** An acceptable method of cleaning and disinfecting. Presently there is no agent on the market with the Environmental Protection Agency (EPA) registration that cleans and disinfects in one step. The importance of cleaning as a separate step from disinfection and sterilization cannot be overemphasized.

- **Sterile field:** A specified area, such as within a tray or on a sterile towel, which is considered free of microorganisms.

- **Sterile, Sterility:** Free from all living micro-organisms.

- **Sterilization:** Process that destroys all types and forms of micro-organisms.

- **Sterilization Area:** The area of a health care facility designed for housing sterilization equipment and conducting sterilization procedures.

- **Sterilizer (Gravity Displacement Type):** A type of sterilizer in which incoming steam displaces via gravity, the residual air through a port or drain usually in or near the bottom of the sterilizer chamber.

- **Sterilizer (Prevacuum Type):** A type of sterilizer that relies on one or more pressure and vacuum evolutions at the beginning or the end of the cycle.

- **Unit Dose:** The quantity of materials or supplies required to treat a single patient.

- **Standard Precautions:** A protocol for infection control that treats all human blood and body fluids as if known to be infectious for human immunodeficiency virus (HIV), hepatitis B virus (HBV), and other blood borne pathogens.

- **Engineered Controls:** Method of managing environment and health by placing a barrier between the contamination and the rest of the site, thus limiting exposure pathways.

- **Work Practice Controls:** Controls that reduce the likelihood of exposure by altering the way one performs a task such as having patients brush their teeth or using antiseptic mouthwash before beginning a procedure; using the rubber dam whenever possible, disinfecting the isolated teeth, and using a disinfectant mouthwash before and after applying the dam; heavy duty, puncture-resistant utility gloves are used when handling instruments, and while cleaning and disinfecting instruments during the sterilization process; using an accepted and safe technique for recapping needles; and disposing of sharps before beginning cleanup procedures at the conclusion of treatment.
CLASSIFICATIONS OF MICRO-ORGANISMS

Microbiology is the study of microscopic life forms called micro-organisms. Disease producing organisms are said to be pathogenic. Other micro-organisms that are not considered pathogenic can produce infections under favorable conditions. Micro-organisms are classified as bacteria, bacterial spores, viruses, protozoa, and fungi. With regards to the process of infection control, HMs need to know the kinds of micro-organisms present and how to deal with them so that they know how to fight them.

Bacteria

Not all bacteria will take on the form of a spore’s shell-like coating to withstand unfavorable conditions. Bacteria in a spore state remain alive but passive. They are resistant to the effects of heat, drying, and most bactericidal chemicals. They remain capable of becoming virulent (strongly pathogenic) again under favorable conditions. Under unfavorable conditions they will either die or remain dormant in a spore state until another opportunity for growth presents itself.

Viruses

Viruses are micro-organisms that are much smaller than bacteria. Viruses vary in size, from being the size of a single protein molecule to the size of a more complicated bacterial cell. They can be so small that they can be seen only through an electron microscope.

Viruses cannot live long or reproduce outside of a living body (host). They must be able to enter and live in specific cells. For descriptive purposes, they are customarily divided into three subgroups, based on host specificity:

- Bacterial viruses
- Animal viruses (including those that attack humans)
- Plant viruses

Some of the most common diseases caused by viruses are colds, smallpox, measles, rubella, herpes simplex, AIDS, and hepatitis. Viruses are usually not affected by therapeutic treatment with antibiotics.

Most viruses are susceptible to immersion in boiling water for at least 20 minutes; an exception to this rule is hepatitis. Due to these exceptions to heat resistance, autoclaving is the preferred method for sterilization which is discussed in Chapter 10.

Protozoa

Protozoa are single-celled animals that do not have a rigid cell wall. Some protozoa cause parasitic diseases but not all are pathogens. Most species are harmless, living on dead organic matter or bacteria. Protozoa that are pathogenic survive freely in nature and must be spread by a carrier. Most protozoa pass through a life-cycle that has definite stages of development such as malaria.

Fungi

Fungi are plants that lack chlorophyll. They are free-living organisms that are smaller than protozoa. Mold and yeast forms of fungi, have firm cell walls, and resemble plants more than animals.

Molds usually form cells in long chains or threads that grow into tangled masses. Some threads of the mass bare clusters of seed-like spores that when dry are easily blown into the air like dust. Each microscopic seed is capable of growing new mold upon settling in a suitable place. Mold spores are easily destroyed by heat. The most common infections in humans because of fungus are athlete’s foot and ringworm. The mold penicillin is very common in nature and contributes to the spoilage of food; the penicillin drug is derived from this mold.
STANDARD PRECAUTIONS

All personnel must assume that all body fluids, contaminated instruments, and contaminated materials are infectious. Standard Precautions must be used to protect HMs and the patients. Identifying potentially infectious patients by medical history, physical examination, or readily available laboratory tests is not always possible. A period of up to several weeks often exists between the time a person becomes infected with a virus and the time when a laboratory test can detect the antigens or antibodies that form. In an HIV-infected individual, this period could be 6 months or more. Even if a patient tests negative, he or she may still be infectious.

Standard Precautions are intended to reduce the transmission of microorganisms from recognized and unrecognized sources of infection. Standard Precautions should be applied to all patients receiving care regardless of their diagnosis or presumed infection status. Universal Precautions is a subset of Standard Precautions focusing on the infection control methods to prevent the spread of disease from blood and body fluids from direct contact by utilizing gloves, gown, goggles, and mask. Standard Precautions include other contaminated sources (i.e. stethoscope, linen, etc.) and prevention measures. Standard precautions include the following:

Hand Hygiene

Hand washing is one of the most important procedures in preventing the transfer of microorganisms from one person to another. The purpose of hand washing is to remove these micro-organisms from the folds and grooves of the skin by lifting and rinsing them from the skin surface. Good hand washing techniques and use of gloves are essential before anticipated exposure to patients’ blood or bodily fluids. Hand washing must (at minimum) be completed:

- At the beginning of each day
- Before and after each patient contact
- Before handling food and medications
- After coughing, sneezing, or nose blowing
- After using the toilet
- In contact with blood, bodily fluids, secretions, excretions and contaminated items, whether or not gloves are worn
- Between patients, before and after going to lunch, after taking a break, after using the bathroom, or any time they become contaminated
- At the end of the day

The skin harbors two types of flora, resident or normal flora and transient flora.

Resident organisms’ characteristics:

- Can survive and will multiply on the skin
- Can be cultured repeatedly from the skin
- Are usually of low virulence and are not easily removed

Transient bacteria characteristics:

- Do not survive and will not multiply on the skin
- Are not firmly attached to the skin
- Are effectively removed by rubbing of the hands together and rinsing them under running water

Special attention is needed while washing hands to ensure common mistakes are not made, such as:

- Fingertips, thumbs, and the areas between the fingers are washed poorly or may be skipped entirely
- The dominant hand is generally washed less thoroughly than the non-dominant hand
- Microbe counts under the fingernails have been found to remain high even after surgical scrubs
Hand Washing Agents

There are many commercial hand washing products available for use in clinical settings. The HM needs to be aware of the two main hand washing agents used in the Navy, water-based cleaning agents and waterless hand washing agents.

Water-Based Cleaning Agents

Water-based cleaning agents include chlorhexidine, alcohol, and iodophors among the active antimicrobial ingredients approved for hand washing.

CHLORHEXIDINE GLUCONATE.—This antiseptic is usually marketed as 4 percent chlorhexidine gluconate with 4 percent isopropyl alcohol in a sudsy base. Chlorhexidine gluconate is an effective antiseptic for reducing transient and resident microbial hand flora, and has a sustained antimicrobial effect. It does not appear to affect the skin adversely. It is approved as a surgical scrub.

IODOPHORS.—These are water soluble complexes of iodine with organic compounds that are effective against all gram-positive and gram-negative bacteria and viruses. Iodophors usually do not have a long-acting germicidal action and, if used frequently, may cause severe drying of the skin.

Waterless Hand Washing Agents

Waterless hand washing agents contain 70 percent isopropyl alcohol and virtually disinfect the skin in 20 seconds. They are effective against bacilli, fungi, and viruses. Unfortunately, they are volatile, flammable, evaporate quickly, and dry the skin. Alcohol-based, waterless hand washing agents may be used in areas where hand washing sinks are not readily available and should only be used when hands are not visibly soiled.

Hand Washing Equipment and Soap Dispensers

All patient care areas should have sinks with electronic or mechanical elbow, foot, or knee action faucet control for asepsis and ease of function.

The use of hands-free actuated soap dispenser controls is preferable. Maintenance for refillable hand washing agent dispensers is to empty, disassemble, and clean them weekly. Do not use bar soaps in bathrooms or clinical and common areas.

Hand Washing Techniques

Personnel involved in patient care must follow a rigid hand washing protocol including the following practices:

- Removing all jewelry and other ornaments from the hands and wrists
- Wetting the hands under warm, running water and applying the necessary amount of antimicrobial soap is required to work up a lather
- Vigorously rub the hands together, fingers entwined. This creates friction and loosens dirt and microorganisms
- Clean under the fingernails using a nail brush or pick
- Continue scrubbing the wrists and lower forearms
- Visibly soiled hands may require more time
PERSONAL PROTECTIVE EQUIPMENT (PPE)

LEARNING OBJECTIVES:

Identify types of personal protective equipment (PPE).

Describe the purpose for each type of personal protective equipment (PPE).

GLOVES

HMs should wear gloves for all patient contact activity. Complete all treatment on each patient, wash, and re-glove before beginning treatment procedures on another patient. Gloves torn or punctured during patient treatment should be replaced immediately.

Washing increases the protective nature of the gloves up to 60 percent, repeated use of a single pair of gloves is not permitted. Do not use petroleum-based hand lotions before donning gloves as they will break down the gloves. If a staff member has an allergy to latex, it should be documented in the member’s medical record so that latex free gloves can be acquired.

Many types of gloves are available for use in dental and medical procedures. The most common are as follows:

- **Sterile Surgical Gloves:** They are the highest quality, most expensive, and best fitting. They are used for surgical or invasive (bloody) procedures where maximum protection against infection must be provided for the patient and the provider.

- **Under Gloves:** These are sterile surgical gloves that are worn underneath the primary surgical gloves; this process is called double gloving. They are a green or blue color allowing more protection from needle sticks and making small punctures in the top gloves more visible. Double gloving is now standard practice in most surgical areas.

- **Procedural Gloves:** They are manufactured like sterile surgical gloves but they are non-sterile and are not individually wrapped in pairs. Procedural gloves offer the highest quality and best fit at a greatly reduced cost when sterile surgical gloves are not required.

- **Latex Examination Gloves:** These are the least expensive type of non-sterile gloves that are commonly used in routine procedures. They are available in a variety of sizes and can with cornstarch to ease putting them on and off. Some individuals may develop hypersensitive reactions either to the latex material or the cornstarch; latex powderless gloves or latex free gloves should be worn if this occurs.

- **Nitrile Gloves:** These can be sterile or unsterile examination gloves made of synthetic latex. They contain no latex proteins, reducing the possibilities of any hypersensitivities and adverse reactions from patients. They offer excellent resistance to punctures and tears. Nitrile gloves are three times more puncture resistant than rubber and can be used to offer superior resistance to many types of chemicals.

Clinical Apparel

Wear reusable or disposable clinical apparel, such as smocks, scrubs, laboratory coats, or other PPE when treating patients or working in areas where contaminated or potentially contaminated materials may be present. When surgical procedures are performed involving reasonable exposure to blood or other potentially infectious materials (OPIM), additional personnel protective equipment or apparel, such as long-sleeved gowns, is required. Forearms must be covered if one reasonably assumes that they will be splattered with saliva or blood.
All personnel must take the following precautions regarding the use of clinical apparel:

- Wear clinic apparel only in the treatment facility
- Change clinic apparel daily or when visibly soiled
- Turn in soiled linen at the end of the work period and place them in a soiled linen receptacle
- Do not leave dirty clinic attire in personal clothing lockers or spaces overnight
- Do not take clinic attire home to avoid the spread of pathogens to home and family

Face Mask and Shield

Wear a face mask or a full-length face shield with a face mask during any patient treatment where aerosols, particulates and splashes will be a possibility. All personnel must wear a mask in the surgical suite, dental treatment rooms (DTR), medical treatment rooms (MTR), and central sterilization room (CSR), especially on the dirty side of the CSR. Personnel must change face masks in the following situations:

- After each patient or when the mask is visibly soiled
- When involved in other activities such as prosthetic laboratory and equipment repair procedures where airborne particles or dusts are produced
- After sorting laundry
- During decontamination procedures. When cleaning spills of infections wastes

There are several types of masks available for different purposes:

- **Surgical Mask** is made from paper or other non-woven material and is worn by health professionals during surgery and at other times to catch the bacteria shed in liquid droplets and aerosols from the wearer's mouth and nose
- **Cone Mask** is a stiff, thin, woven mask used for simple procedures for protection from splashing and aerosols
- **N95 Respirator** is a lightweight, nose-and-mouth respirator that can provide some level of protection for the wearer from viruses and small particles. The masks come in different sizes due to the necessity for a proper fit for optimal protection. It can be used during surgery or during airborne precautions

Protective Eyewear

Wear protective eyewear when assisting or providing treatment in all surgical procedures or other procedures that may cause a splash, splatter, or airborne particles. Eyewear or goggles must have solid side shields to provide maximum protection. Patients must be provided approved protective eyewear for all dental exams and treatments. Disinfect patient eyewear after treatment.

Protective Headwear

Wear disposable protective headwear during surgical procedures. Headwear must fit the head to minimize exposure of the head and hair to potential splashing or spraying of blood or airborne particles. Cloth scrub caps may also be worn, but must be washed daily and in a style in accordance with the treatment facility regulations.
TRANSMISSION-BASED PRECAUTIONS

LEARNING OBJECTIVES:

Identify the three types of transmission-based precautions.

Describe the purpose of the three types of transmission-based precautions.

Transmission-based precautions are the second tier of infection prevention. It has been designed for patients with confirmed or suspected pathogens that can be spread by airborne, droplet, or direct contact with the patient. A specific and constantly updated list can be found on the Healthcare Infection Control Practices Advisory Committee (HICPAC) / CDC Isolation Guideline, on the CDC web site. The precautions listed below are in addition to the standard HM precautions.

AIRBORNE PRECAUTIONS

Airborne transmission occurs by the evaporation of droplets that can remain in the air for long periods or spread by dust particles that contain the infectious agent (measles, tuberculosis, chicken pox, etc.). Airborne precautions include the following:

- Place patient in a private, negative pressure room (6 to 12 exchanges per hour) with air being pumped outside or through a HEPA filter
- All medical personnel must wear Occupational Safety and Health Administration (OSHA)-specified respiratory protection (such as a N95 mask)
- Place a surgical mask over the patient’s nose and mouth while transporting

NOTE:
Patient transport should be limited to essential purposes only.

DROPLET PRECAUTIONS

Droplet precautions are used for patients infected with microorganisms spread by coughing, sneezing, or talking such as influenza virus, adenovirus and rhinovirus. The following actions should be taken:

- If possible the patient should be placed in a private room or one with another patient infected with the same organism. If that is still not possible a 3 foot partition should be maintained between the infected patient and any other patients
- All healthcare providers should wear a mask within three feet of the patient
- Place a surgical mask over the patient’s nose and mouth while transporting

NOTE:
Patient transport should be limited to essential purposes only.
CONTACT PRECAUTIONS

Contact precautions should be used for patients infected or colonized with organisms that can be transmitted by direct contact with a provider or indirect contact (spread by contact with patient care equipment or surfaces in the patient’s room). Examples include methicillin-resistant Staphylococcus aureus (MRSA) and vancomycin-resistant E. coli (VRE).

- Place the patient in a private room or one with another patient infected with the same organism and no other infections.
- Gloves must be worn upon entering, changed after handling any injective material, and removed before leaving the patient’s room. Hands must be washed immediately after glove removal.
- Masks are not necessarily mandatory in this situation, ensure to avoid touching the face with contaminated items such as gloves.
- Disposable gowns are worn on entering the patient’s room to prevent contact of any clothing with the patient or infected materials. The gown is removed before leaving the patient’s room exercising care to avoid surfaces in the room.
- Transport patients only if necessary and the transporting team maintains contact precautions.
- Patient-care equipment is dedicated to a single patient to prevent cross infections. If this is not possible, the equipment must be thoroughly cleaned and disinfected before being used by another patient.

IMMUNIZATION AND TESTING

All personnel providing direct patient care, including civilian employees, volunteers, laboratory, and repair personnel who are potentially exposed to blood and saliva, must receive an HBV vaccine. All active duty healthcare personnel will be tested for HIV every two years and tuberculosis testing and/or screening on an annual basis.

MEDICAL HISTORY REVIEW

A thorough review of each patient’s current medical history is mandatory before initiating any examination or treatment procedure.

EATING, GROOMING, DRINKING, AND SMOKING

Eating, grooming, drinking, and smoking are permitted only in designated areas separate from MTFs and DTFs. Follow all BUMED and command instructions pertaining to this matter.

INFECTION CONTROL IN TREATMENT ROOMS

In accordance with BUMEDINST 6220.9 Series, Nosocomial Infection Control Program; BUMEDINST 6600.10 Series, Dental Infection Control Program; and the NAVMED P-5010 the terms and procedures described in the following sections will be used.

MEDICAL ASEPSIS

Medical asepsis describes those practices used to prevent the transfer of pathogenic organisms from person to person, place to place, or person to place. Medical aseptic practices are routinely used in direct patient care areas and other service areas in the healthcare environment to interrupt the chain of events necessary for the continuation of an infectious process. The components of this chain of events consist of the elements defined below.

Reservoir of Infectious Agents

The carrier on which the infectious agent primarily depends for survival. The agent lives, multiplies, and reproduces so that it can be transferred to a susceptible host. Reservoirs can be man, animal, plants, or soil. Man himself is the most frequent reservoir of infectious agents pathogenic to man.
Portal of Exit

The avenue by which the infectious agent leaves its reservoir. When the reservoir is man, these avenues include various body systems, such as respiratory, intestinal, genitourinary tracts, and open lesions.

Mode of Transmission

The mechanism by which the infectious agent is transmitted from its reservoir to a susceptible being (host). Air, water, food, dust, dirt, insects, inanimate objects, and other persons are examples of modes of transmission.

Portal of Entry

The avenue by which the infectious agent enters the susceptible host. In man, these portals correspond to the exit route avenues, including the respiratory and gastrointestinal tracts, through a break in the skin, or by direct infection of the mucous membrane.

Susceptible Host

Man or another living organism that affords an infectious agent nourishment or protection to survive and multiply.

NOTE:
Removal or control of any one component in the above chain of events will control the infectious process.

Concurrent Disinfection

Consists of the daily measures taken to control the spread of pathogenic organisms while the patient is considered infectious.

Terminal Disinfection

Consists of those measures taken to destroy pathogenic organisms remaining after the patient is discharged from isolation. There are a variety of chemical and physical means used to disinfect supplies, equipment, and environmental areas. Each facility will determine its own protocols based on the recommendation of an Infection Control Committee.

INFECTION CONTROL IN THE TREATMENT ROOM

As a HM, infection control in the treatment room is an all hands responsibility throughout the day. There are many precautions and procedures involved with infection control practices. The implementation of aseptic technique is required when preparing for patient treatment, during treatment, and after the patient is dismissed. There can be no deviation from the command written procedures and guidelines on infection control. The HM must be able to accomplish the following infection control procedures:

- Prepare the treatment room for patient care
- Assist the Medical/Dental Officer during treatment
- Disinfect the treatment room between patients
- Secure the treatment room at the end of the day
- Perform housekeeping duties
- Sort laundry
- Dispose of infectious waste
Preparing the Treatment Room

OSHA and the Navy require that all treatment facilities ensure a clean and sanitary workplace. Work surfaces, equipment, and other reusable items must be decontaminated with an EPA-registered disinfectant upon completion of procedures when contamination occurs through splashes, spills, or other contact with blood and OPIM. Observe and perform the following procedures:

- Wipe all flat surfaces (tables, chairs, hanging lights etc.)
- Ensure all trash is empty from the day before
- Place clean protective barriers on equipment that is difficult to clean (microscopes, dental chairs, exam beds etc.)
- Open instrument trays, packs, or cassettes and leave wrapping material underneath as a barrier for the work surface
- For DTRs, at the beginning of the day flush each of the unit water lines and hoses for at least 1 minute, even if their use is not anticipated and flush for at least 30 seconds between patients
- Potable water supplies may contain up to 100 bacterial colony forming units per millimeter (cfu/ml), and water in dental units, at times, can contain in excess of 1,000,000 cfu/ml
  - This microbial contamination comes from the retraction of contaminated water and saliva through the dental hand piece and the growth of bacteria in the unit water lines
  - Although most incoming water is chlorinated, chlorine loses its potency as the water lies stagnant in the unit tubing
  - Under the right circumstances, these bacteria will multiply and may become pathogenic

Infection Control for the DTR

Aerosols (spray originating from a patient’s mouth during dental procedures) in the work environment present a potential health hazard for both the staff and patient. The long term effect is cumulative and may be harmful. Aerosol levels can also be lowered and minimize the potential risk by employing the following procedures:

- Clean cavity preparations with water, air, or an air and water combination
- Use high-volume evacuator (HVE)
- Use rubber dams
- Cover ultrasonic tanks when in use

The Dental Officer may direct the HM to have patients brush their teeth or rinse with a mouthwash before treatment. This reduces the microbial concentration of oral flora (saliva). Three 10-second rinses will temporarily reduce a patient’s microbial count by up to 97 percent. Many Dentists are now using a 0.12 percent chlorhexidine gluconate preoperative rinse that also significantly decreases the amount of microbial count of an aerosol.
The following procedures should be used with all dental patients for infection control:

- HMs must wash their hands before donning and after removal of gloves
- Wear sterile gloves for all invasive surgical procedures
- Use non-sterile gloves for examination and other non-surgical dental procedures
- Use a rubber dam whenever possible
- Swab isolated teeth with an antimicrobial mouthwash to reduce aerosolization of oral bacteria
- Use disposable suction, saliva ejector, and irrigation tips
- Autoclave all instruments that can withstand heat sterilization
- Sterilize rotary cutting instruments such as burs and diamonds before using
- Use the unit dose concept when dispensing supplies for each treatment setup
  - This is mandatory
- Use sterilizable cassettes, tray sets, or packs for instruments
- Place the proper amount of supplies in each setup before sterilizing
- Store opened packages of supplies in closed drawers or cabinets in the DTR (in a covered container if practical)
- Use clean forceps to dispense only enough supplies for immediate use. HMs must never use their hands to dispense items from bulk storage containers
- Use of bottled irrigation solution for surgical and non-surgical procedures is considered sterile only for that patient if aseptic techniques are maintained
- Record expiration dates on all opened containers

Before leaving the DTR, all personnel will remove and discard gloves and masks worn during patient treatment, except when transporting contaminated items to the CSR or to the prosthetic laboratory.

To prevent contamination of a patient’s chart, remove gloves and wash hands (unless cover gloves are worn) before writing in dental records, viewing radiographs, or taking photographs.

Preparing for the Next Patient

HMs must clean and disinfect the previously covered surfaces between patients when the integrity of the physical barriers has been compromised or the surface is visibly soiled or if there is any question about the possibility of contamination. For example, if moisture is absorbed through the cover to the underlying surface, then the purpose of the barrier is defeated, and the surface must be disinfected.

HMs will:

- Ensure their room is clean
- Wipe down any patient contact areas
- Put away all equipment used for the previous patient
- Remove their gloves and wash their hands and other exposed skin surfaces with an antimicrobial soap
- Replace clean disposable barriers and set up clean hand pieces and instruments for the next patient
Securing the Treatment Room

HMs must thoroughly clean their space and all their equipment. Every command will have different procedures to fit their needs, but the following are the basic requirements.

- Remove all debris and particulate matter before disinfection
- Remove and discard all the disposable coverings or barriers contacted during patient treatment while still gloved. It is important to remove the surface covers carefully to prevent contamination of the covered areas. This is accomplished by turning the soiled outer side toward the inside
- Using the spray-wipe-spray technique, clean and disinfect all unprotected “high touch” areas. To be effective, the disinfectant must remain in contact with the surfaces for the time specified by the manufacturer

**NOTE:**

**Do not** use 2 percent glutaraldehyde as a surface disinfectant because of its caustic vapors and high cost.

- Clean uncarpeted floor and other horizontal surfaces regularly and when spills occur
- Use mops with a detergent and an EPA-registered disinfectant or a detergent with sodium hypochlorite (1:100 dilution)
  - Mops must be cleaned once every 24 hours or more often as needed
- Clean walls and blinds only if they are visibly soiled
- Inspect, clean, and disinfect on a regular basis, all bins, pails, cans, and similar receptacles intended for reuse and having the potential for contamination with blood or OPIM; clean and disinfect these containers immediately or as soon as possible upon visible contamination
- Noninfectious waste refuse containers are not considered infection control hazards. Line them with plastic bags, leave them uncovered, and do not allow them to overflow
- Remove hinged doors on cabinet refuse containers and hinged lids on freestanding containers since they present an increased potential for cross-contamination
- Do not pick up broken glassware directly with hands. Instead, use mechanical means such as a brush and dust pan, vacuum cleaner, tongs, cotton swabs, or forceps

Securing the DTR

For the DTR there are a few extra responsibilities that must be taken care of at the end of the day.

- Flush the High-Volume Evacuator (HVE) system with at least one quart of water
- Clean the system with an HVE system cleaner at least once each week. Use the system cleaner more often if indicated by problems
- HMs must never lay contaminated instruments directly on countertops or work surfaces
- Rewrap cassettes, packs, or trays in the original wrap and place individually packaged instruments in a leak proof covered container to transport to the CSR
- Flush each unit waterline and hose for 30 seconds
- If the unit has a self-contained water delivery system, follow manufacturer’s instructions for flushing and air purging the lines
Contaminated Dental Hand Pieces

Many dental clinics with CSRs will have the HM remove the contaminated hand pieces they have used and turn them into the CSRs along with their instruments. The CSR technician will handle, disinfect, lubricate, and sterilize the dental hand pieces. This saves the Dental assistant valuable time and avoids any excess aerosols that occur during the disinfection and lubrication procedure.

Some commands require the HM to perform hand piece maintenance; it includes removing the hand pieces after each patient, lubricating it, and operating it for 30 seconds. This will purge the tubing removing any potentially infectious material from retraction of coolant water during previous treatment. Many manufacturers require lubrication of hand pieces before and after sterilization. To prevent cross-contamination, follow these procedures:

- Use two separate containers of lubricant—one marked for lubrication before sterilization and another marked for after sterilization
- Lubricate hand pieces with one end in a headrest cover to capture the aerosol contaminants or use one of the many commercial products for cleaning and lubricating hand pieces

For disinfecting non-autoclavable hand pieces while wearing gloves, use the following procedures:

- Submerge two gauze sponges per hand piece in a high level, EPA registered disinfectant. Squeeze out any excess
- Use one sponge to wipe the hand piece and discard
- Wrap the second sponge around the hand piece and return it to the holder for the period of time specified by the manufacturer
- Before reuse, wipe the hand piece thoroughly with potable water to remove residual disinfectant

- If the hand piece is autoclavable, remove the hand piece from the couplings, clean, and lubricate following the manufacturer’s instructions

Bringing Contaminated Items to the CSR

After completion of the above procedures, the HM can now take all metal and heat stable items to the CSR for sterilization. Ensure all instruments and equipment are handled properly and no sharp objects are protruding through packs or cassettes while transporting items to the CSR.

Housekeeping

Although micro-organisms are normal contaminants of walls and floors, these surfaces are rarely associated with transmitting infection to staff and patients; all facilities must remain clean. The infection control instruction will determine and implement a written schedule for cleaning and a method of disinfection based upon location within the facility. The OSHA and NAVOSH requirements for housekeeping include sections on equipment, laundry, and infectious waste disposal.

EXPOSURE INCIDENT

All personnel must pay close attention when using sharps and fluids. Accidents happen and personnel who sustain a penetrating injury (needle stick or cut) or a splash (into the eye or onto mucous membranes) with contaminated fluids must not be ignored.

Immediately complete the following:

1. Stop activity immediately and step back from the point of contamination.
2. Squeeze the skin around the needle stick or cut to expel blood and contaminants.
3. Cleanse the puncture site or flush the eye with cool water for 15 minutes.
4. Report the incident and seek medical attention promptly.
5. Follow the facility’s protocol for follow-up.
If a needle stick is involved, most facilities will draw a baseline blood sample from the patient and the injured caregiver. Periodic blood samples are drawn over 12 months to determine health status and the need for treatment.

Refer to NEHC-TM89-2, Nosocomial Infection Control Manual for Ambulatory Care Facilities, and report the incident as a mishap to the command safety officer and command risk manager using OPNAVINST 5102.1 series.

**MANAGEMENT OF INFECTIOUS WASTE**

**LEARNING OBJECTIVES:**

*Identify medical waste sorting, packaging, handling, and disposal procedures.*

*Identify ordinary and contaminated laundry and how they are each handled.*

Concern exists about potentially adverse effects of infectious waste on public health and the environment. Scientific evidence shows that infectious waste is no greater threat to the public health or environment than residential solid waste. Treatment facilities must establish an effective plan for dealing with infectious waste. This plan should include the segregation, packing and handling, storage, transportation, treatment, and disposal of such debris. The management plan must establish recordkeeping systems, personnel training programs, and incorporate the minimally acceptable management standards for Navy MTF and DTF (as contained inBUMEDINST 6280.1 series, Management of Infectious Waste).

**INFECTIOUS WASTE**

Infectious waste is liquid or solid waste containing pathogens in sufficient numbers and of sufficient virulence to cause infectious disease in susceptible hosts exposed to the waste. If there is doubt as to the infectiousness of the material in question, contact the ICO or supervisor.

Several examples are:

* Sharps (needles, scalpels blades)
* Microbiology waste (cultures, stocks containing microbes)
* Pathological waste (human tissue, body parts)
* Liquid waste (blood, cerebrospinal fluid)
* Medical waste from isolation rooms

**Segregation**

Separate infectious waste from noninfectious waste at its point of origin. (i.e. MTFs, DTFs, and immunization stations) Infectious waste shall be placed in containers labeled with the universal biohazard symbol and the word "BIOHAZARD" or be red in color. Containers shall be lined with plastic bags of sufficient thickness, durability, puncture resistance, and burst strength to prevent rupture or leaks.

Plastic bags must be red with the BIOHAZARD symbol and be of sufficient quality and thickness so that only one bag is needed for most situations, though most commands suggest to double bag. Bags must never be overloaded and they shall be labeled and secured before being removed or replaced.
How to close a biohazard bag:

1. Twist the top of the bag.
2. Wrap tape around the twisted neck of the bag starting from the lower part of the neck ascending to the opening.
3. At the top of the bag, bend the neck in half and tape the neck to itself; this is known as “goose necking.”

Each MTF and UTF will have their own protocol. HMIs need to ensure they are familiar with local Hazardous Material laws and instructions.

Place sharps into rigid, puncture resistant red sharps container (Fig. 9-1) with the BIOHAZARD symbol. Never clip, cut, or bend needles or overfill containers. Sharps containers shall be closed before removal or replacement to prevent spillage or protrusion of contents during handling, storage, or transport.

Liquid Regulated Waste

Pour liquid regulated wastes into the sanitary sewer system through clinical sinks (not hand washing sinks), unless local or state regulations prohibit this practice.

Disposable Sharps

Treat used disposable sharps, such as needles, scalpel blades, capsules, disposable syringes, used burs, and broken instruments as regulated waste. Handle these items with extreme care to prevent any unintentional injury and the possible spread of blood borne diseases.

In the dental and surgical setting, because a patient may require a second injection of local anesthetic, and most syringes are not disposable, recapping is sometimes necessary. Use the following guidelines when recapping:

- Never recap a needle using a two-handed technique
- Use one of the commercially available sheath holders, or use the “scoop” technique
- If using the scoop technique, the cap is scooped up from the tray with the needle tip using only one hand
- Never allow uncovered needles to remain on the instrument tray

Figure 9-1.—BIOHAZARD Sharps Container

Photograph provided by HM2 Timothy Hanna of the Biomedical Photograpy Department of Navy Medicine Support Command, Bethesda, MD
Linen Handling

Improper handling of linen results in the transfer of pathogenic organisms through direct contact with the healthcare provider's clothing and subsequent contact with the patient, patient-care items, or other materials in the care environment. Bed linens, towels, smocks, trousers, and other protective attire are considered ordinary laundry unless they are visibly soiled by blood or OPIM. Ordinary laundry should be sorted wearing gloves and processed following the command's laundry policy. Place all dirty linen in appropriate laundry bags.

Contaminated laundry is any laundry soiled with blood or OPIM and will be packed in a red biohazard container or bag, or in a leak-proof plastic bag with a biohazard label. Linen from patients having infectious or communicable diseases must be handled in a special manner. When sorting laundry, the HM must wear gloves and other appropriate personnel protective attire. Bag contaminated laundry at the location of use.

All linen, whether clean or used, must never be held against one's clothing or placed on the floor. The floors of a healthcare facility are considered to be grossly contaminated; any article coming in contact with the floor will also be contaminated. Do not sort or reuse soiled laundry in patient care areas. If there is an on-site laundry service, follow instructions contained in BUMEDINST 6600.10 series.
Transportation

When the infectious waste is ready to be moved, there are regulations that must be followed while in transport.
- Place it in ridged, leak-proof containers marked by the biohazard symbol
- Refer to the Federal, State and Local laws for regulations on licensing and vehicle labeling.

The treatment and disposal methods shown in Table 9-1 are the minimally acceptable standards. The ICO should ensure that all areas within a command handle regulated waste in a uniform manner and as always consult all Federal, State and local laws and regulations.

<table>
<thead>
<tr>
<th>Types of Infectious Waste</th>
<th>Methods of Treatment</th>
<th>Methods of Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microbiological</td>
<td>Steam sterilization</td>
<td>Sanitary Landfill</td>
</tr>
<tr>
<td></td>
<td>Chemical Disinfection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incineration</td>
<td></td>
</tr>
<tr>
<td>Pathological</td>
<td>Incineration (C)</td>
<td>Sanitary Landfill</td>
</tr>
<tr>
<td></td>
<td>Burial</td>
<td></td>
</tr>
<tr>
<td>Bulk blood and other</td>
<td>Gelatinization</td>
<td>Sanitary sewer</td>
</tr>
<tr>
<td>potentially infectious</td>
<td></td>
<td></td>
</tr>
<tr>
<td>liquids</td>
<td>Steam sterilization</td>
<td>Sanitary landfill</td>
</tr>
<tr>
<td>Sharps in sharps containers</td>
<td>Incineration</td>
<td>Sanitary landfill</td>
</tr>
</tbody>
</table>

Several steps should be used in the treatment and disposal of infectious waste. These steps include the identification of waste; segregation, sorting, packaging.
1. For effective sterilization, the temperature must be maintained at 121 degrees C (250 degrees F) for at least 90 minutes, at 15 pounds per square inch of gauge pressure. Bacillus stearothermophilus spore strips must be used weekly to test the sterilization process.
2. Chemical disinfection is most appropriate for liquids.
3. Ash remaining after incineration may go directly to the sanitary landfill, unless state or local regulations require testing the ash for characteristics of hazardous waste.
4. Disposal of placentas by grinding with subsequent discharge to a sanitary sewer is acceptable unless prohibited by county or local laws/regulations.
5. Burial or cremation is acceptable.
6. Must be further treated by steam sterilization or incineration.
7. Discharge to a sanitary sewer is acceptable unless prohibited by county or local laws/regulations.
8. Must be treated by steam sterilization or incineration before landfill disposal.

Table 9-1.—Treatment and Disposal Methods for Infectious Waste

9-22
Recordkeeping

The ICO should implement a practical system to monitor disposal of infectious waste. This system includes date, type of waste, amount (weight, volume, or number of containers), and disposition. Further guidance for infectious waste can be found in BUMEDINST 6600.10 series and BUMEDINST 6280.1 series.

INFECTIONIOUS WASTE SPILLS

In case of a spill or break in containment immediately do the following:

- Affected area should be cleaned immediately
- Wear all appropriate PPE to prevent exposure
- Place all leaking or broken containers in a new double-lined container marked with the biohazard symbol
- Remove any blood or fluid spills with an absorbent material and disinfect the area with a solution of household bleach diluted 1:10 with clear water or an EPA approved disinfectant

CLEANING THE OPERATING/MEDICAL TREATMENT ROOM

LEARNING OBJECTIVE:

Identify how to properly field day a surgical suite.

Cleanliness in the operating room is an absolute must. Cleaning routines must be clearly understood and carefully followed. The causes of postoperative wound infections have, on occasion, been traced to the operating room. Since no two patients are alike and all patients have their own resident bacteria, every surgical case must be considered to be contaminated.

At the beginning of each day, all the fixtures, equipment, and furniture in each operating room will be damp-dusted with an antiseptic germicide solution. During the operation, keep the room clean and orderly at all times. Should sponges be dropped on the floor, or if blood or other body fluids spill, clean the area immediately using a disinfectant germicide solution and a clean cloth.

Between operations, clean all used items. The area of the floor occupied by the surgical team must be cleaned using the wet vacuum method. If a wet vacuum is not available, mops may be used but a clean mop head must be used following each operation. Gowns and gloves must be removed before leaving the room. All linens and surgical drapes must be bagged and removed from the room after each case. All trash and disposable items must be bagged and disposed of appropriately after each case. All instruments must be washed by gloved hands or placed in perforated trays and put through washer/sterilizer.
At the completion of the day's operations, each operating room should be *terminally cleaned* using an antiseptic germicide solution and the following tasks accomplished:

- Clean all wall or ceiling-mounted equipment
- Clean all spotlights and lights on tracks
- Thoroughly scrub all furniture used in the room, including the wheels
- Clean metal buckets and other waste receptacles and put them through the washer/sterilizer, if possible
- Clean scrub sinks
- Machine scrub the entire floor in each room. If a machine is not available, use a large floor brush
- Suction up the disinfectant germicide solution that is used on the floor, using a wet vacuum. If mops are used, make sure a clean mop head is issued for each room

**NOTE:**
The use of mops in the operating room is the LEAST DESIRABLE method of cleaning.

**SURGICAL ASEPTIC TECHNIQUE**

**LEARNING OBJECTIVE:**

*Identify the principles and guidelines for surgical aseptic technique.*

*Surgical aseptic technique* is the term that describes the sterilization, storage, and handling of articles to keep them free of pathogenic organisms. There are important procedures that need to be understood before entering the surgical environment: the preparation and sterilization of surgical equipment and supplies; and the preparation of the operating room for performing a surgical procedure. Specific methods of preparation will vary from place to place, but the basic principles of surgical aseptic technique will remain the same.

Before an operation, it is necessary to sterilize and keep sterile all instruments, materials, and supplies that come in contact with the surgical site. Every item handled by the surgeon and the surgeon's assistants must be sterile. The patient's skin and the hands of the members of the surgical team must be thoroughly scrubbed, prepared, and kept as aseptic as possible.

During the operation, the surgeon, surgeon's assistants, and the scrub HM must wear sterile gowns and gloves and must not touch anything that is not sterile. Maintaining sterile technique is a cooperative responsibility of the entire surgical team. Each member must develop a surgical conscience, a willingness to supervise and be supervised by others regarding the adherence to standards. Without this cooperative and vigilant effort, a break in sterile technique may go unnoticed or not be corrected, and an otherwise successful surgical procedure may result in complete failure.

**BASIC GUIDELINES**

To assist in maintaining the aseptic technique, all members of the surgical team must adhere to the following principles:

- Practice good personal hygiene; daily bathing and clothing change
- Personnel having colds, sore throats, open sores, and/or other infections will not be permitted in the operating room
- Operating room attire (which includes scrub suits, gowns, head coverings, and face masks) must not be worn outside the operating room suite. If such occurs, change all attire before re-entering the clean area.
  (The operating room and adjacent supporting areas are classified as clean areas)
- Surgical team members having direct contact with the surgical site must perform the surgical hand scrub before the operation
- All materials and instruments used in contact with the site must be sterile
- Gowns worn by surgeons and scrub HMs are considered sterile from shoulder to waist (in the front only), including the gown sleeves
- If sterile surgical gloves are torn, punctured, or have touched an unsterile surface or item, they are considered contaminated
- Unsterile articles must not come in contact with sterile articles
- Ensure the patient’s skin is as clean as possible before a surgical procedure
- Take every precaution to prevent contamination of sterile areas or supplies by airborne organisms

**HANDLING STERILE ARTICLES**

When HMs are changing a dressing, removing sutures, or preparing the patient for a surgical procedure, it is necessary to establish a sterile field from which to work. The field should be established on a stable, clean, flat, dry surface. Wrappers from sterile articles may be used as a sterile field as long as the inside of the wrapper remains sterile. If the size of the wrapper does not provide a sufficient working space for the sterile field, use a sterile towel. Once established, only those persons who have donned sterile gloves should touch the sterile field. The following basic rules must be adhered to:

- An article is either sterile or unsterile
- If there is doubt about the sterility of an item, consider it unsterile
- Any time the sterility of a field has been compromised, replace the contaminated field and setup
- Do not open sterile articles until they are ready for use
- Do not leave sterile articles unattended once they are opened and placed on a sterile field
- Do not return sterile articles to a container once they have been removed from the container

- Never reach over a sterile field
- When pouring sterile solutions into sterile containers or basins, do not touch the sterile container with the solution bottle. Once opened and first poured, use bottles of liquid entirely. If any liquid is left in the bottle, discard it
- Never use an outdated article. Unwrap it, inspect it, and, if reusable, rewrap it in a **new** wrapper for sterilization
- General rule: anything draped in blue or green (colors of drapes and gowns may vary for each MTF) is considered sterile and should not be touched by anyone but the “scrubbed in” surgical staff

**OPENING AND SETTING UP A STERILE FIELD**

The size of sterile fields can vary in size, from a small portion of a counter to a whole table or bed. The following is an example of opening a sterile gown and sterile gloves. Though this sounds simple, it is a complicated process. In every case there should be a **circulator**, usually a nurse or a HM that is not scrubbed in that is free to grab gear for procedures and assist the surgical team. The circulator will perform the following:

1. Inspect the equipment package for rips, punctures or any abnormality. If any are noted, the package should be considered unsterile and discarded.
2. Inspect the chemical indicator to ensure the pack has completed the sterilization process.
3. Remove and discard the protective plastic covering from the gown and the cloth covering.
4. Place the wrapped gown on a clean, dry, and flat surface with the folds facing up.
5. To open the wrap, the first corner of the wrap should be pulled away from the person opening the pack, paying special attention so it does not fold back on itself contaminating the gown.
6. Open the two side flaps.
7. Last, open the flap closest to the person opening the pack.

Do not touch the gown while attempting to grasp the corners of the flaps; as seen in Figure 9-2.

4. With the gloves exposed, drop them on the gown, paying attention so that the HM's clothes do not touch the sterile field.

NOTE:
The one inch border around the edge of the sterile field is considered contaminated. Do not drop the gloves onto the border or they will be considered unsterile. This would contaminate the gown and require the process to be started again.

SURGICAL HAND SCRUB

LEARNING OBJECTIVE:

Identify steps to properly complete a surgical scrub.

The purpose of the surgical hand scrub is to reduce resident and transient skin flora (bacteria) to a minimum. Resident bacteria are often the result of organisms present in the hospital environment. Because these bacteria are firmly attached to the skin, they are difficult to remove. Their growth is inhibited by the antiseptic action of the scrub detergent used. Transient bacteria are usually acquired by direct contact and are loosely attached to the skin. These are easily removed by the friction created by the scrubbing procedure. Proper hand scrubbing and the wearing of sterile gloves and a sterile gown provide the patient with the best possible barrier against pathogenic bacteria in the environment and against bacteria from the surgical team.
The following steps comprise the accepted method for the surgical hand scrub.

1. Trim the fingernails and cuticles. Nails should be no longer than the finger tips to avoid puncturing gloves. Do not use false fingernails since contamination may occur from fungal growth between the false and natural nails. Do not wear nail polish since micro-organisms can hide in small cracks in the finish.

2. Before beginning the hand scrub, don a surgical cap or hood that covers all hair, both head and facial, and a disposable mask covering the nose and mouth.

3. Using approximately 6 ml of antiseptic detergent and running water lather the hands and arms to 2 inches above the elbow. Leave detergent on the arms and do not rinse.

4. Under running water, clean the fingernails and cuticles, using a nail cleaner.

5. Starting with the fingertips, rinse each hand and arm by passing them through the running water. Always keep the hands above the level of the elbows.

6. From a sterile container, take a sterile brush and dispense approximately 6 ml of antiseptic detergent onto the brush and begin scrubbing the hands and arms.

7. Begin with the fingertips. Bring the thumb and fingertips together and scrub across the fingertips using 30 strokes using the brush.

8. Scrub all four surface planes of the thumb and all surfaces of each finger including the webbed space between the fingers; use 20 strokes for each surface area.

9. Scrub the palm and back of the hand in a circular motion, using 20 strokes each.

10. Visually divide the forearm into two parts, lower and upper. Scrub all surfaces of each division 20 strokes each, beginning at the wristband progressing to the elbow.

11. Scrub the elbow in a circular motion using 20 strokes.

12. Scrub in a circular motion all surfaces to approximately 2 inches above the elbow.

13. Do not rinse this arm when finished scrubbing. Rinse only the brush.

14. Pass the rinsed brush to the scrubbed hand and begin scrubbing the other hand and arm, using the same procedure outlined above.

15. Drop the brush into the sink when finished.

16. Rinse both hands and arms, keeping the hands above the level of the elbows, and allow water to drain off the elbows.

17. When rinsing, do not touch anything with scrubbed hands and arms.

18. The total scrub procedure must include all anatomical surfaces from the fingertips to approximately 2 inches above the elbow.

19. Dry the hands with a sterile towel. Do not allow the towel to touch anything other than scrubbed hands and arms.

20. Between operations, follow the same hand scrub procedure.
GOWNING AND GLOVING

LEARNING OBJECTIVE:

Identify how to properly gown and glove the HM and the surgeon.

The following will provide step by step instructions for gowning and gloving.

Before beginning the hand scrub process the sterile gown and glove packages must be opened. Upon completion of the surgical hand scrub, back through the door holding the hands up to avoid touching anything with the hands and arms. Gowning technique is shown in the steps of Figure 9-4. Pick up the sterile towel that has been wrapped with the gown (touching only the towel) and proceed as follows:

1. Dry one hand and arm, starting with the hand and ending at the elbow, with one end of the towel. Dry the other hand and arm with the opposite end of the towel. Drop the towel.

2. Pick up the gown in such a manner that hands touch only the inside surface at the neck and shoulder seams.

3. Allow the gown to unfold downward in front.

4. Locate the arm holes.

5. Place both hands in the sleeves.

6. Hold the arms cut and slightly up while slipping arms into the sleeves.

7. Another person (circulator) who is not scrubbed will pull the gown onto the scrub HM as the hands are extended through the gown cuffs.

Continue the process by opening the inner glove packet on the same sterile surface on which the gown was opened. The entire gloving process is shown in the steps of Figure 9-5.

1. Pick up one glove by the cuff using the thumb and index finger.

2. Touching only the cuff, pull the glove onto one hand and anchor the cuff over the thumb.

3. Slip the gloved fingers under the cuff of the other glove. Pull the glove over the fingers and hand, using a stretching side-to-side motion.

4. Anchor the cuff on the thumb. With the fingers still under the cuff, pull the cuff up and away from the hand and over the knitted cuff of the gown.

5. Repeat the preceding step to glove the other hand.

6. The gloving process is complete.
1. DRY HANDS.
2. PICK UP GOWN.
3. LET GOWN UNFOLD.
4. OPEN TO LOCATE SLEEVE / ARMOLES.
5. SLIP ARMS INTO SLEEVES.
6. HOLD ARMS OUT AND SLIGHTLY UP.
7. CIRCULATOR PULLS GOWN ON.

Figure 9.4.—Proper Gowning Technique
1. Pick up one glove with thumb and forefinger.

2. Pull glove on hand.

3. Slip partially gloved hand under cuff of second glove.

4. Pull second glove over other hand and pull glove up to gowned wrist.

5. Slip fingers of completely gloved hand under cuff of first hand, pull glove to gowned wrist.


Figure 9-5.—Proper Gloving Technique
To gown and glove the surgeon, follow these steps:

1. Pick up a gown from the sterile linen pack. Step back from the sterile field and let the gown unfold in front. Hold the gown at the shoulder seams with the gown sleeves facing inward.

2. Offer the gown to the surgeon. Once the surgeon's arms are in the sleeves, let go of the gown. Be careful not to touch anything but the sterile gown. The circulator will tie the gown.

3. Pick up the right glove. With the thumb of the glove facing the surgeon, place the fingers and thumbs of both hands in the cuff of the glove and stretch it outward, making a circle of the cuff.

4. Offer the glove to the surgeon. Be careful that the surgeon's bare hand does not touch the HM's gloved hands.

5. Repeat the preceding step for the left glove.

SUMMARY

This chapter has introduced the HM to many basics in preventive medicine and infection control procedures and philosophies such as standard precautions, infection control in the treatment rooms, biohazardous waste management, and surgical aseptic technique. Having a good grasp of these areas of patient care will give the HM a good base from which they can grow.