



INFECTION CONTROL
SELF-STUDY MODULE

Education & Professional Development

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Background

In August 1992, Chapter 786 of the Laws of 1992 established a requirement that certain healthcare professionals licensed in New York State receive training on infection control and barrier precautions by July 1994 and every four years thereafter unless otherwise exempted.

The statute applies to the following professionals:

- Dental hygienists
- Dentists
- Licensed practical nurses
- Optometrists
- Physicians
- Physician assistants
- Podiatrists
- Registered professional nurses
- Specialist assistants
- *Medical students
- *Medical residents
- *Physician assistant students

(* These categories were added pursuant to legislation enacted in November 2008.)

Goal of Infection Control Training as Mandated by Chapter 786

The goal of the infection control training requirement is to:

- Assure that licensed, registered, or certified health professionals understand how bloodborne pathogens may be transmitted in the work environment: patient to healthcare worker, healthcare worker to patient, and patient to patient;
- Apply current scientifically accepted infection prevention and control principles as appropriate for the specific work environment;
- Minimize opportunity for transmission of pathogens to patients and healthcare workers; and
- Familiarize professionals with the law requiring this training and the professional misconduct charges that may be applicable for not complying with the law.

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ELEMENT I

PROFESSIONAL RESPONSIBILITY FOR INFECTION PREVENTION

All health-care professionals share responsibility to adhere to scientifically accepted principles and practices of infection prevention, and to monitor the performance of those for whom they are responsible.

Learning Objectives:

- Recognize benefits to patients and health-care workers of adhering to scientifically accepted principles and practices of infection prevention;
- Recognize the professional's responsibility to adhere to these practices, and the consequences of failing to comply;
- Recognize the professional's responsibility to monitor infection prevention practices of those medical and ancillary personnel for whom he or she is responsible and intervene as necessary to assure compliance and safety.

Definitions:

- Standard Precautions: precautions that are applicable to all patients, including use of barriers, such as gloves, gowns, masks, and/or protective eye wear, and proper disposal of sharps, to prevent skin and mucous membrane exposure to blood borne pathogens from blood, all body fluids, secretions and excretions regardless of whether or not they contain visible blood.
- Standard of Care: established criteria for the performance of individuals in similar circumstances.
- OSHA: Occupational Safety and Health Administration, a branch of the U.S. Department of Labor

I. Standards of care in infection prevention

- A. Standard Precautions are used to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources in hospitals; this is the first level of precautions for all patients.
- B. Transmission based precautions, the second level of precautions used for caring for patients with or suspected to have certain communicable diseases.
 1. Airborne
 2. Contact
 3. Droplet
- C. Hand washing and aseptic technique, practices to prevent contact spread of most bacterial infections (e.g. staph and strep) and some viruses (herpes, cold viruses, CMV) in healthcare settings.
- D. Appropriate cleaning, disinfection, and sterilization processes of medical devices and equipment to prevent transmission of infection.
- E. Occupational health practices used for the prevention and control of communicable diseases in health-care workers.

II. Standards of professional conduct as they apply to infection prevention

A. Mandated NY State and Federal standards of professional conduct

1. New York State: 1992 legislation formally established scientifically accepted infection prevention practices as standards of professional conduct. The New York state Department of Health and New York State Education Department require that all licensed health care professionals in New York must complete mandatory course work in infection prevention before July 1, 1994 and every 4 years thereafter. Documentation of this training is required for hospital-credentialing of physicians, and for state licensing or registration of non-physicians.
2. OSHA (US Department of Labor): in 1991 the OSHA Blood borne Pathogens Standard took effect, requiring enforcement of Universal/ Standard Precautions and training of all personnel (with potential blood or body fluid exposure) in infection prevention techniques. The Standard also mandates the availability of appropriate protective equipment and barriers, and requires procedures for follow up after an exposure.

B. Implications of professional conduct standards

1. All health care professionals bear responsibility to adhere to infection prevention standards. By law in New York State, unprofessional conduct includes “failing to use scientifically accepted infection prevention techniques appropriate to each profession for the cleaning and sterilization or disinfection of instruments, devices, materials, and work surfaces, utilization of protective garb, use of covers for contamination-prone equipment and the handling of sharp instruments” ... and “failure to use scientifically accepted infection prevention practices to prevent transmission of disease pathogens from patient to patient, professional to patient, employee to patient, and patient to employee...”
2. All health-care professionals have a responsibility to monitor the practices of others to assure the safety of all patients and personnel.
3. Consequences of failure to follow accepted standards of infection prevention include:
 - a. Subjecting self, co-workers, and/or patients to increased risk of communicable disease.
 - b. Subjecting oneself to charges of unprofessional conduct.
 - i. Mechanisms for reporting unprofessional conduct: patients, family members, or co-workers can file charges against a health professional through their institution (e.g., hospital or employer) or directly to the New York State Department of Health, Office of Health Systems Management (OHSM);
 - ii. Investigation of the complaint is carried out by the hospital, employer, or OHSM;

iii. Possible outcomes, depending on the severity of misconduct, include:

- Disciplinary action
- Revocation of professional license, or
- Professional liability: since infection prevention practices are considered standard of care, failure to adhere to these standards may be grounds for professional liability.

III. Methods of Compliance.

- A. Participation in required infection prevention and control training;
 - 1. Completion of state mandated training
 - 2. Completion of employer required annual training
 - 3. Participating in monitoring and auditing of infection control practices

- B. Adherence to accepted principles and practices of infection prevention and control.
 - 1. Utilizing PPE .
 - 2. Employing isolation methods.
 - 3. Sterilizing equipment and devices according to manufacturer's guidelines.
 - 4. Cleaning with appropriate agents.
 - 5. Monitoring personnel regarding infection control techniques.
 - 6. Place disposable needles, syringes in puncture resistant boxes.
 - 7. Handwashing before and after patient care, or whenever soiled.
 - 8. Maintaining standard precautions.

ELEMENT II

TRANSMISSION AND CONTROL OF INFECTION IN HEALTH CARE SETTINGS

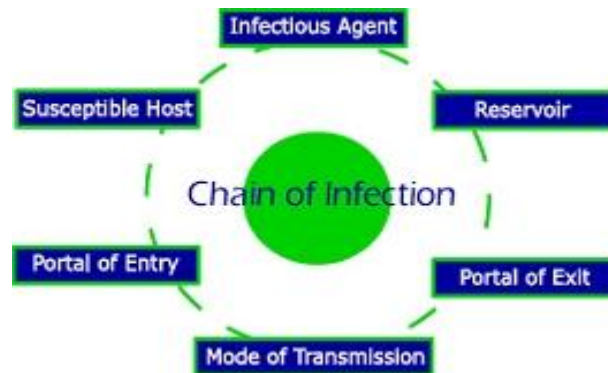
Learning Objectives:

- Describe how pathogenic organisms may be spread in health care settings;
- Identify the factors which influence the outcome of an exposure in healthcare settings;
- List strategies for prevention of transmission of pathogenic organisms;
- Describe how infection prevention concepts are applied in professional practice.

Definitions:

- **Pathogen or Infectious Agent:** a biological agent or a microorganism capable of causing disease. Biological agents may be bacteria, viruses, fungi, protozoa, helminthes, or prions.
- **Portal of entry:** The means by which an infectious agent enters the susceptible host.
- **Portal of exit:** The path by which an infectious agent leaves the reservoir.
- **Reservoir:** Place in which an infectious agent can survive but may or may not multiply or cause disease. Healthcare workers may be a reservoir for a number of nosocomial organisms spread in healthcare settings.
- **Standard precautions:** A group of infection prevention and control measures that combine the major features of Universal Precautions and Body Substance Isolation and are based on the principle that all blood, body fluids, secretions, excretions except sweat, nonintact skin, and mucous membranes may contain transmissible infectious agents.
- **Susceptible host:** A person or animal not possessing sufficient resistance to a particular infectious agent to prevent contracting infection or disease when exposed to the agent.
- **Transmission:** any mechanism by which a pathogen is spread by a source or reservoir to a person.
- **Common vehicle:** Contaminated material, product, or substance that serves as a means of transmission of an infectious agent from a reservoir to one or more susceptible hosts through a suitable portal of entry.
- **Healthcare Associated Infection (HAI):** any infection which is acquired in a health care setting; manifestation of clinical illness may occur during or after discharge from the hospital or other health care facility, depending on the incubation period of the infection.
- **Incubation Period:** the time between exposure to an infectious agent and the onset of disease.
- **Colonization:** presence of an infectious agent on skin, mucous membranes (nose, throat, vagina, intestinal tract), or wounds, or in urine, stool or secretions, without signs or symptoms of infection. The colonizing agent may later cause disease, or may be transmitted to other persons.

- **Carrier:** a person who is colonized or infected by an infectious agent for an extended time, often without symptoms, and who may transmit infection to others.
- **Fomites:** an inanimate object or substance such as clothing, furniture, soap, or mouthwash, that is capable of transmitting infectious agents from one individual to another.



I. Transmission of infections

A. “The Chain of Infection”: the pattern of spread of infection from one host to another susceptible host, or from the environment to a susceptible host. This chain requires a *pathogen*, a source or *reservoir*, a *portal of exit*, a *mode of transmission*, a *portal of entry*, and a *susceptible host*.

B. Presence of a pathogen:

1. Bacteria: examples are Staph, Strep, E. Coli, Pseudomonas, Anaerobes, Rickettsia, Mycoplasma, Chlamydia, and Mycobacteria such as TB.
2. Viruses: examples are influenza, common cold viruses, measles, mumps, chickenpox (varicella), hepatitis A, B, and C, and HIV.
3. Fungi: include yeasts (e.g., Candida) and molds (e.g., Aspergillus).
4. Parasites: include protozoa (e.g., malaria, toxoplasmosis, pneumocystis), worms, and insects (e.g., lice and scabies).
5. Prions: (e.g., Creutzfeldt-Jakob disease, kuru, human bovine spongiform encephalitis also known as mad cow disease) Proteinaceous infectious particles; different from viruses because of apparent lack of nucleic acid; made of glycoproteins, prions collect in the brain tissue as deposits in patients with prion disease.

C. Reservoirs include:

1. Animate

- a) People: Persons may be asymptomatic but capable of transmitting infection.
Examples: 40% of health-care workers carry *Staph aureus* in their noses and may transmit it to patients; chicken pox and hepatitis A can be transmitted during their incubation periods, before illness occurs; hepatitis B can be transmitted (via blood, body fluids, sex, or during birth) during an asymptomatic incubation period lasting

up to 6 months, and 10% of those infected become chronic carriers who may transmit the infection indefinitely; HIV can be transmitted (via blood, body fluids, sex, or birth) during the asymptomatic incubation period lasting up to 10 or more years.

b) Insects or animals

Examples: Skunks, fox, and bats are reservoirs of rabies which is transmitted directly by bites; wild mice and some other small mammals are reservoirs of Lyme Disease, which is transmitted to humans from these animals by ticks.

2. Inanimate Environment: Water, soil, food, counter tops, sinks, medical equipment.

Examples: Soil and water (including home and hospital hot water tanks) are reservoirs of *Legionella*, stagnant water is a reservoir of *Pseudomonas*; soil and dust are reservoirs of *Aspergillus*; soil is a reservoir of *Tetanus*.

D. Portals of exit: Routes and mechanisms by which pathogens exit the body:

1. Pathogens are expelled by coughing or sneezing, respiratory and oral secretions;
2. Draining skin lesions or wounds;
3. Feces (diarrhea or formed stool);
4. Urine;
5. Drainage of blood and other body fluids.

E. Modes by which pathogens are transmitted:

1. Contact

- a. Direct contact: Involves a direct body surface to body surface contact and physical transfer of microorganisms between a susceptible host and an infected or colonized person.
- b. Indirect contact: Involves contact of a susceptible host with a contaminated intermediate object, usually inanimate.

Example: MRSA, Scabies, Respiratory Syncytial Virus (RSV)

2. Respiratory droplet: Transmission occurs with exposure to droplets containing microorganisms generating from an infected person propelled a short distance (3 feet) and deposited on the hosts conjunctivae, nasal mucosa and mouth.

Example: Influenza, Rubella, and Pertussis, Strep throat, Common colds

3. Respiratory airborne: Infections acquired by inhalation of aerosols composed of small infectious particles which are suspended in the air. Infection may spread widely in a room, corridor, or through a ventilation system.

Example: Tuberculosis, Chickenpox, Measles

4. Respiratory airborne plus contact:

Example: SARS (Severe Acute Respiratory Syndrome), Smallpox, Avian Influenza

5. Common vehicle: Contaminated food, water, medication, intravenous fluid or other product which transmits infection to 2 or more persons.
6. Vector-borne: Transmission via an insect or animal carrier.

Example: Mosquitoes are vectors of Malaria; ticks are vectors of Lyme Disease.

F. Portals of Entry: routes and mechanisms by which pathogens are introduced:

1. Entry sites: Non-intact skin, mucous membranes; gastrointestinal, respiratory, and genitourinary tracts; across placenta to fetus.
2. Mechanisms: Via ingestion, inhalation, endotracheal tube, bladder catheter, percutaneous injury (e.g., needlestick), vascular access, surgical incision, etc.

G. Factors which influence the outcome of an exposure:

1. Host susceptibility: Immunity from past infection or immunization (e.g., measles, rubella) decreases susceptibility. Impairment of host defenses, (e.g., due to advanced age, prematurity, chronic disease, malignancy, malnutrition, pregnancy, occupation, life style, presence of a foreign body/invasive device, immunization status, genetics, trauma, chemotherapy, and other medications) increases susceptibility.

Impairment of defense is mediated by alteration in:

- a) Natural barriers to infection, e.g., intact skin, stomach acid, respiratory tract cilia, and cough mechanism;
 - b) Immune system, e.g., humoral immunity (antibodies), cell-mediated immunity (lymphocytes, macrophages), inflammatory response.
2. Virulence of the pathogen: Invasiveness, ability to cause disease;
 3. Inoculum's size: Amount of the infectious agent in the exposure;
 4. Route of exposure: Some routes are more likely to cause infection;
 5. Duration of exposure.

II. Prevention: Breaking the "Chain of Transmission"

A. Recognition and control of reservoirs:

1. Recognize, diagnose, and treat persons with transmissible disease.
Examples: tuberculosis, whooping cough, meningococcal meningitis.
2. Eliminate or control inanimate reservoirs of pathogenic organisms.
Example: eliminate stagnant water sources in health care setting; treat hot water systems for Legionella.
3. Laboratory, radiologic, and other diagnostic testing or procedures assist in identifying the cause of the infection.

B. Interrupt routes of transmission:

1. Hand Hygiene - a general term that applies to handwashing, antiseptic hand wash, antiseptic hand rub or surgical hand antisepsis. Hand washing is the single most important means of preventing spread of infection:

- a) Handwashing with a non-antimicrobial soap or antimicrobial soap: wet hands with running water, apply hand washing agent to hands and rub hands together vigorously for at least 10 - 15 seconds, covering all surfaces of the hands and fingers. Rinse hands with warm water and dry thoroughly with a disposal towel. Use a clean dry paper towel to turn off faucet.
- b) Waterless antiseptic hand rubs: An antiseptic agent that does not require the use of water. After applying such an agent, rub the hands together until dry. This is the preferred method for handwashing when hands are not visibly soiled, e.g., visible dirt, or visible body substances such as blood, feces or urine.
- c) Decontaminate hands:
 1. After contact with a patient's intact skin (as in taking a pulse or blood pressure, or lifting a patient).
 2. After contact with body fluids or excretions, mucous membranes, non-intact skin, or wound drainage.
 3. If moving hands from a contaminated body site to a clean body site during patient care.
 4. After contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient.
 5. Before caring for patients with severe neutropenia or other forms of immune suppression.
 6. Before donning sterile gloves.
 7. Before inserting indwelling urinary catheters or other invasive devices.
 8. After removing gloves.
 9. Before and after eating.
 10. After handling trash.
 11. After sneezing, coughing on hands or using tissue.
- d) Hand lotions or creams should be used to minimize the occurrence of irritant contact dermatitis associated with hand antisepsis or handwashing. Solicit information from manufacturers regarding any effects that hand lotions, creams, or alcohol based hand antiseptics may have on the persistent effects of antimicrobial soaps used.
- e) Other aspects of hand hygiene:
 - Do not wear artificial fingernails or extenders when providing patient care.
 - Keep natural fingernails less than 1/4 inch long.
 - Wear gloves when it is reasonably anticipated that contact with blood or other potentially infectious materials, mucous membranes and non-intact skin will occur.
 - Remove gloves after caring for a patient. Do not wear the same pair of gloves for the care of more than one patient and do not wash gloves between patients.
2. Use of barriers or Personal Protective Equipment (PPE) (gloves, gowns, masks, goggles): see Element IV.
3. Sterilization and disinfection of patient care equipment: see Element V.
4. Isolation or cohorting:
 - a) Private room with negative pressure ventilation system isolation is necessary for diseases transmitted by airborne route, and private room for disease spread by contact when patient hygiene is poor.

- b) Cohorting (sharing a room) may be appropriate when 2 patients are infected or colonized with the same organism.
 - c) Transfer of patients within a hospital may be appropriate, e.g., placing a patient with chickenpox away from immuno-compromised susceptible patients.
 - d) A private room may be required for preventing transmission of GI tract organisms.
5. Environmental practices:
- a) Housekeeping: Maintaining a clean environment;
 - b) Ventilation: Special room ventilation (e.g., negative pressure) is required for patients with known or suspected TB and certain other airborne infections;
 - c) Waste management: Proper disposal of sharps and infectious waste;
 - d) Linen and laundry management.
 - e) Careful selection of safety devices or sharp management: No one medical device is considered appropriate or effective for all circumstances, selection of devices is based on; effectiveness and reliability of safety mechanisms, acceptability to the health care worker and provision that the use of the device does not adversely affect patient care.
6. Protection of the host:
- a) Vaccination:
 - Personnel: immunity against measles (rubeola) and rubella is required of health-care workers (HCWs) either by vaccination, history of natural disease or antibody titer. Vaccination against Hepatitis B is highly recommended. Annual influenza vaccination is advised for all HCWs to prevent illness and transmission of influenza to patients.
 - Varicella vaccination is recommended for those without natural immunity to chicken pox.
 - Patients: should receive vaccinations appropriate to their age and risk group.
 - b) Post-exposure prophylaxis: preventative treatment or vaccination given after exposure to an infectious agent, in order to prevent infection or illness.

Examples:

- antibiotics (Rifampin or Ciprofloxacin) given after exposure to meningococcal disease;
 - 1st dose of Hepatitis B vaccine and Hepatitis B immune globulin after exposure of an unvaccinated person to Hepatitis B-infected blood;
 - Varicella-zoster immune globulin (VZIG) given to a susceptible, immunocompromised host after exposure to chickenpox if individual is not vaccinated.
 - Anti-retroviral medications given after high risk exposures to HIV infected blood.
- c) maintain skin integrity;
 - d) Avoid unnecessary use, or excessive duration of placement, of intravenous lines, bladder catheters, and other invasive devices.

C. System of Precautions:

1. Standard Precautions: use Standard Precautions for the care of all patients.

a) Hand washing

b) Gloves: wear gloves (clean, non-sterile gloves are adequate) when touching blood, body fluids, secretions, excretions, and contaminated items. Put on clean gloves just before touching mucous membranes and non-intact skin. Change gloves between tasks and procedures on the same patient after contact with material that may contain a high concentration of microorganisms. Remove gloves promptly after use, before touching non-contaminated items and environmental surfaces, and before going to another patient, and wash hands immediately to avoid transfer of microorganisms to other patients or environments.

c) Mask, Eye Protection, Face Shield, Gowns

i. Wear a mask and eye protection or a face shield to 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 and excretions.

ii. Wear a gown (a clean, non-sterile gown is adequate) to protect skin and prevent soiling of clothing during procedures and patient-care activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions. Select a gown that is appropriate for the activity and amount of fluid likely to be encountered. Remove a soiled gown as promptly as possible and wash hands to avoid transfer of microorganisms to other patients or environments.

d) Patient-Care Equipment:

Handle used patient-care equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, 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 cleaned and reprocessed appropriately. Follow your institution's policy on re-use of single use devices, the FDA has published guidelines concerning the re-use of single use devices.

e) Environmental Control:

Ensure that the hospital has adequate procedures for the routine care, cleaning, and disinfection of environmental surfaces, beds, bedrails, bedside equipment, and other frequently touched surfaces and ensure that these procedures are being followed.

f) Linen:

Handle, transport, and process used linen soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous

membrane exposures and contamination of clothing and that avoids transfer of microorganisms to other patients and environments.

g) Patient placement:

Place a patient who has a communicable disease and who is unable to maintain appropriate hygiene or environmental control, in a private room. If a private room is not available, consult with infection prevention professionals regarding patient placement or other alternatives.

D. Transmission-Based Precautions:

1. Airborne Precautions: In addition to Standard Precautions, use Airborne Precautions, or the equivalent, for patients known or suspected to be infected with microorganisms transmitted by airborne droplet nuclei, small-particle residue (5 microns or smaller in size) of droplets containing microorganisms that remain suspended in the air and that can be dispersed widely by air currents within a room or over a long distance, such as tuberculosis, measles, or chickenpox.
2. Droplet Precautions: Use Droplet Precautions, or the equivalent, for a patient known or suspected to be infected with microorganisms transmitted by droplets (larger than 5 microns in size) that can be generated by the patient during coughing, sneezing, talking, or the performance of a procedure.
3. Contact Precautions: Use Contact Precautions for specified patients known or suspected to be infected or colonized with epidemiologically important microorganisms that can be transmitted by direct contact with the patient (hand or skin-to-skin contact that occurs when performing patient-care activities that require touching the patient's dry skin) or indirect contact (touching) with patient's environment surfaces or patient-care items used.

ELEMENT III

USE OF ENGINEERING AND WORK PRACTICE CONTROLS TO REDUCE THE OPPORTUNITY FOR PATIENT AND HEALTHCARE WORKER EXPOSURE TO POTENTIALLY INFECTIOUS MATERIAL IN ALL HEALTHCARE SETTINGS

LEARNING OBJECTIVES

Upon completion of course work or training on this element, the learner will be able to:

- Define healthcare-associated disease transmission, engineering controls, safe injection practices and work practice controls
- Describe specific high-risk practices and procedures that increase the opportunity for health care worker and patient exposure to potentially infectious material.
- Describe specific measures to prevent transmission of bloodborne pathogens from patient to patient, healthcare worker to patient, and patient to healthcare worker via contaminated injection equipment.
- Identify work practice controls designed to eliminate the transmission of bloodborne pathogens during use of sharp instruments (e.g., scalpel blades and their holders (if not disposable), lancets, lancet platforms/pens, puncture devices, injections); and
- Identify where engineering or work practice controls can be utilized to prevent patient exposure to bloodborne pathogens.

DEFINITIONS

- **Healthcare-associated infections (HAIs):** Infections associated with healthcare delivery in any setting (e.g., hospitals, long-term care facilities, ambulatory settings, home care).
- **Engineering Controls:** Controls (e.g., sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems) that isolate or remove the bloodborne pathogens hazard from the workplace.
- **Injection safety** (or safe injection practices): A set of measures taken to perform injections in an optimally safe manner for patients, healthcare personnel, and others. A safe injection does not harm the recipient, does not expose the provider to any avoidable risks and does not result in waste that is dangerous for the community. Injection safety includes practices intended to prevent transmission of bloodborne pathogens between one patient and another, or between a healthcare worker and a patient, and also to prevent harms such as needlestick injuries.
- **Single-use medication vial:** A bottle of liquid medication that is given to a patient through a needle and syringe. Single-use vials contain only one dose of medication and should only be used once for one patient, using a new sterile needle and new sterile syringe.

- **Multi-dose medication vial:** bottle of liquid medication that contains more than one dose of medication and is often used by diabetic patients or for vaccinations.
- **Work Practice Controls:** Controls that reduce the likelihood of exposure to bloodborne pathogens by altering the manner in which a task is performed (e.g., prohibiting recapping of needles by a two-handed technique).

I. High risk practices and procedures (by exposure type) capable of causing healthcare acquired infection with bloodborne pathogens:

A. Percutaneous exposures

1. Exposures occurring through handling/disassembly/disposal/reprocessing of contaminated needles sharp objects:
 - a) Manipulating contaminated needles and other sharp objects by hand (e.g., removing scalpel blades from holders, removing needles from syringes)
 - b) Delaying or improperly disposing (e.g., leaving contaminated needles or sharp objects counters/workspaces or disposing in on-puncture-resistant receptacles),
 - c) Recapping contaminated needles and other sharp objects using a two handed technique.
2. Performing procedures where there is poor visualization, such as:
 - a) Blind suturing,
 - b) Non-dominant hand opposing or next to a sharp,
 - c) Performing procedures where bone spicules or metal fragments are produced.

B. Mucous membrane/non-intact skin exposures

1. Direct blood or body fluids contact with the eyes, nose, mouth, or other mucous membranes via:
 - a) Contact with contaminated hands,
 - b) Contact with open skin lesions/dermatitis,
 - c) Splashes or sprays of blood or body fluids (e.g., during irrigation or suctioning)

C. Parenteral exposures

1. Injection with infectious material may occur during:
 - a) Administration of parenteral medication,
 - b) Sharing of blood monitoring devices (e.g. glucometers, hemoglobinometers, lancets, lancet platforms / pens)
 - c) Infusion of contaminated blood products or fluids.

II. Safe injection practices and procedures designed to prevent disease transmission from patient to patient and healthcare worker to patient.

A. Unsafe injection practices have resulted in one or more of the following:

1. Transmission of bloodborne viruses, including hepatitis B and C viruses to patients;
2. Notification of thousands of patients of possible exposure to bloodborne pathogens and recommendation that they be tested for hepatitis C virus, hepatitis B virus, and human immunodeficiency virus (HIV);

3. Referral of providers to licensing boards for disciplinary action; and
 4. Malpractice suits filed by patients.
- B. Pathogens including HCV, HBV, and human immunodeficiency virus (HIV) can be present in sufficient quantities to produce infection in the absence of visible blood.
1. Bacteria and other microbes can be present without clouding or other visible evidence of contamination.
 2. The absence of visible blood or signs of contamination in a used syringe, IV tubing, multi-dose medication vial, or blood glucose monitoring device does NOT mean the item is free from potentially infectious agents.
 3. All used injection supplies and materials are potentially contaminated and should be discarded.
- C. Proper infection control techniques healthcare providers must:
1. Maintain aseptic technique throughout all aspects of injection preparation and administration:
 - a) Medications should be drawn up in a designated "clean" medication area that is not adjacent to areas where potentially contaminated items are placed.
 - b) Use a new sterile syringe and needle to draw up medications while preventing contact between the injection materials and the non-sterile environment.
 - c) Ensure proper hand hygiene before handling medications.
 - d) If a medication vial has already been opened, the rubber septum should be disinfected with alcohol prior to piercing it.
 - e) Never leave a needle or other device (e.g. "spikes") inserted into a medication vial septum or IV bag/bottle for multiple uses. This provides a direct route for microorganisms to enter the vial and contaminate the fluid.
 - f) Medication vials should be discarded upon expiration or any time there are concerns regarding the sterility of the medication.
 2. Never administer medications from the same syringe to more than one patient, even if the needle is changed.
 3. Never use the same syringe or needle to administer IV medications to more than one patient, even if the medication is administered into the IV tubing, regardless of the distance from the IV insertion site.
 - a) All of the infusion components from the infusate to the patient's catheter are a single interconnected unit.
 - b) All of the components are directly or indirectly exposed to the patient's blood and

cannot be used for another patient.

- c) Syringes and needles that intersect through any port in the IV system also become contaminated and cannot be used for another patient or used to re-enter a non patient specific multi-dose vial.
 - d) Separation from the patient's IV by distance, gravity and/or positive infusion pressure does not ensure that small amounts of blood are not present in these items.
4. Never enter a vial with a syringe or needle that has been used for a patient if the same medication vial might be used for another patient.
 5. Dedicate vials of medication to a single patient.
 - a) Medications packaged as single-use must never be used for more than one patient:
 - Never combine leftover contents for later use;
 - Medications packaged as multi-use should be assigned to a single patient whenever possible;
 - Never use bags or bottles of intravenous solution as a common source of supply for more than one patient.
 6. Never use peripheral capillary blood monitoring devices packaged as single-patient use on more than one patient:
 - a) Restrict use of peripheral capillary blood sampling devices to individual patients
 - b) Never reuse lancets. Consider selecting single-use lancets that permanently retract upon puncture.

III. Safe injection practices and procedures designed to prevent disease transmission from patient to healthcare worker.

- Refer to OSHA guidelines, available at http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051

IV. Evaluation/Surveillance of exposure incidents

- A. Identification of who is at risk for exposure,
- B. Identification of what devices cause exposure,
 1. ALL sharp devices can cause injury and disease transmission if not used and disposed properly.
 - a) Devices with higher disease transmission risk (hollow bore),and
 - b) Devices with higher injury rates ("butterfly"-type IV catheters, devices with recoil action) Blood glucose monitoring devices (lancet platforms/pens).
 - c) Identification of areas/settings where exposures occur, and
 - d) Circumstances by which exposures occur.

e) Post exposure management- See Element VI.

V. Engineering controls

- A. Use safer devices whenever possible to prevent sharps injuries
 - 1. Evaluate and select safer devices
 - 2. Passive vs. active safety features
 - 3. Mechanisms that provide continuous protection immediately
 - 4. Integrated safety equipment vs. accessory devices
 - a) Properly educate and train all staff on safer devices
 - b) Consider eliminating traditional or non-safety alternatives whenever possible.
 - c) Explore engineering controls available for specific areas / settings.
- B. Use puncture-resistant containers for the disposal and transport of needles and other sharp objects
 - 1. Refer to published guidelines for the selection, evaluation and use (e.g., placement) of sharps disposal containers
 - a) National Institute for Occupational Safety and Health (NIOSH) guidelines available at: <http://www.cdc.gov/niosh/topics/bbp/#prevent>
 - b) NYSDOH recommendations "Household Sharps-Dispose of Them Safely", available at: <http://www.health.state.ny.us/publications/0909.pdf>
- C. Use splatter shields on medical equipment associated with risk prone procedures (e.g. locking centrifuge lids)

VI. Work practice controls

- A. General practices
 - 1. Hand hygiene including the appropriate circumstances in which alcohol-based hand sanitizers and soap and water handwashing should be used (see Element II)
 - 2. Proper procedures for cleaning of blood and body fluid spills:
 - a) Initial removal of bulk material followed by disinfection with an appropriate disinfectant.
 - 3. Proper handling/disposal of blood and body fluids, including contaminated patient care items.
 - 4. Proper selection, donning, doffing, and disposal of personal protective equipment (PPE) as trained (see Element IV)
 - 5. Proper protection of work surfaces in direct proximity to patient procedure treatment area with appropriate barriers to prevent instruments from becoming contaminated with bloodborne pathogens.
 - 6. Preventing percutaneous exposures:
 - a) Avoid unnecessary use of needles and other sharp objects.
 - b) Use care in the handling and disposing of needles and other sharp objects,
 - i. Avoid recapping unless absolutely medically necessary.
 - ii. When recapping, use only a one-hand technique or safety device
 - iii. Pass sharp instruments by use of designated "safe zones".
 - iv. Disassemble sharp equipment by use of forceps or other devices
 - v. Discard used sharps into a puncture resistant sharps container immediately after use.

B. Modify procedures to avoid injury:

1. Use forceps, suture holders, or other instruments for suturing,
2. Avoid holding tissue with fingers when suturing or cutting,
3. Avoid leaving exposed sharps of any kind on patient procedure/treatment work surfaces.
4. Appropriately use safety devices whenever available:
 - a) Always activate safety features.
 - b) Never circumvent safety features.

ELEMENT IV

SELECTION AND USE OF BARRIERS AND/OR PERSONAL PROTECTIVE EQUIPMENT FOR PREVENTING PATIENT AND HEALTHCARE WORKER CONTACT WITH POTENTIALLY INFECTIOUS MATERIAL

Learning Objectives:

- Describe the circumstances which require the use of barriers and personal protective equipment (PPE) to prevent patient and health-care worker (HCW) contact with potentially infectious material;
- Identify specific barriers and/or PPE for patient and HCW protection from exposure to potentially infectious material.

Definitions:

- **Personal Protective Equipment (PPE):** specialized clothing or equipment (e.g., gloves, gowns, masks, goggles) worn by a health-care worker (HCW) for protection against a hazard, (toxic or infectious).
- **Barrier:** Equipment such as gloves, gowns, aprons, masks, or protective eyewear, which when worn, can reduce the risk of exposure of the healthcare worker's skin or mucous membranes to potentially infective materials.

I. Types of PPE and barriers and criteria for selection

A. Gloves:

1. When to be worn: gloves must be worn for all anticipated hand contact with blood, potentially infectious body fluids, mucous membranes (oropharynx, GI, respiratory, and genitourinary tracts), non-intact skin, or wounds, and when handling items contaminated with blood or body fluids. Gloves must be worn during all invasive procedures and all vascular access procedures, including all phlebotomies and insertion of IV's or other vascular catheters. Gloves are not to be washed, disinfected, or sterilized for reuse (except utility gloves). Gloves must be changed between patients, and hands must be washed after gloves are removed.
2. Sterile and non-sterile gloves:
 - a) Sterile gloves are required to prevent transmission of infection from HCW to patient in surgery and in other procedures associated with a high risk of infection due to interruption of normal host defenses. (Examples: insertion of central venous catheters and urinary catheterization).
 - b) Non-sterile gloves are used to reduce transmission of infection in situations where sterility is not required (examples: oral or vaginal examination, cleaning a spill, emptying suction containers, urine drainage bags, or bedpans) or where sterile technique does not necessitate sterile gloves (Examples: phlebotomy, peripheral IV catheter insertion).



3. Glove Material:

- i. Latex, nitrile or vinyl gloves are used for most medical, dental, and laboratory procedures discussed above. Since gloves can be torn, they should be inspected prior to use. Disposable, single use gloves must be replaced as soon as practical if contaminated, punctured, or damaged during use. Double-gloving or puncture-resistant liners can be used to decrease the risk of percutaneous injury and exposure to blood/body fluids.
- ii. Latex gloves - usually tan in color, more pliable with a tighter fit, but contains proteins that can cause HCW and patient allergies, also often powdered which can contribute to dermatitis.
- iii. Vinyl gloves - usually white in color, less irritating, not associated with allergy reactions, but are less pliable and do not fit as tightly.
- iv. Nitrile gloves - rubber based nitrile gloves are resistant to punctures, chemicals, blood products, nicks, and abrasions. They are not latex and allergy free.
- v. Utility gloves are used for heavy duty housekeeping chores. They may be decontaminated and reused unless they are cracked, peeling, torn, or punctured.
- vi. Hypo-allergenic gloves, glove liners, or powder less gloves are available.

B. Cover garb: protective attire to prevent contamination of skin, mucous membranes, work clothes, and undergarments. (Regular work clothes, uniforms, surgical scrubs are not considered protective attire.)

1. Types of cover garb:

- a) Gowns (with sleeves) are worn:
 - in surgery and obstetrics,
 - when splashing, spraying, spattering of blood/body fluids is anticipated,
 - when blood/body fluid contamination of arms is anticipated
- b) Aprons (no sleeves) may be worn for lesser degrees of exposure.
- c) Laboratory coats are worn in laboratory setting.

2. Permeability characteristics/definitions:

- a) Impervious: fluids will not pass through
- b) Fluid resistant: resists penetration of fluids under most circumstances
- c) Permeable: easily penetrated by fluids

3. Choice of gown or apron depends on the level of blood or body fluid exposure anticipated. Fluid resistant gowns are suitable for most situations; extra fluid resistant sleeves can be worn over a gown, and/or an impervious apron can be worn under a gown, to improve protection against soak-through during prolonged or high-blood-loss surgical procedures. Impervious gowns may

be preferable for procedures with the highest risk of blood exposure. Impervious gowns may be less comfortable since the material does not breathe well.

C. Masks

1. Types of masks

- a) Surgical mask: purpose is to protect the patient by preventing discharge of contaminated nasal and oral secretions from the wearer during a procedure, and thereby reduce risk of wound infection.
- b) Surgical or procedure mask with face shield: purpose is to protect the wearer's eyes, nose and mouth from exposure to splattered or splashed blood or body fluids.
- c) Particulate respirator: purpose is to filter out, and protect wearer from inhalation of airborne infectious particles of very small size. An OSHA class, N-95 respirator is an acceptable respirator for protection from small droplet inhalation such as with tuberculosis. Positive Air Purifying Respirators (PAPRs) may also be worn by those unable to be fitted with an N-95 type respirator.

2. Characteristics of masks:

- a) Filtration characteristics of the material: surgical masks may effectively block discharge of large droplets into the air, but the material is not an effective filter to prevent inhalation of very small, aerosolized particles characteristic of TB and airborne viral diseases. Particulate respirators provide an increased level of filtration. A wet mask is generally less effective and should not be used.
- b) Face seal: a tight seal around the edges of a particulate respirator is essential to its effectiveness. If loose fitting, contaminated air is drawn in around the edges of the mask with each inhalation, instead of the air being drawn through the filter. If face seal is not achieved or not possible, a PAPR can be used as an alternative.

- D. Face shields protect eyes, nose, and mouth from exposure to blood or body fluids via splash, splatter, or spray. Protection against airborne pathogens requires the addition of a respirator mask.
- E. Eye protection (goggles, safety glasses, or face shield) should be worn during all major surgical procedures and whenever splashes/sprays of blood or body fluid may be generated. Ordinary glasses are not acceptable unless a solid side shield is added to the eye wear.
- F. Shoe covers, leg covers, boots, and head covers are appropriate attire whenever heavy exposure to blood/body fluids is anticipated, usually in surgery. Most situations such as these involve surgical procedures in which caps or hoods are already required for sterility. Shoe/leg and head covers should be removed and discarded before leaving the operating room suite.
- G. Other barriers, e.g., application of wound dressings to reduce risk of exposure to blood/body fluids.

II. Choosing PPE based on reasonably anticipate interaction:

A. Potential contact with blood or other potential infectious material via:

1. Contact with any bleeding or drainage: use gloves plus impervious gown or apron.
2. Blood/body fluid splashes, sprays, splatters: use gloves, (fluid resistant) gown, mask, and eye

protection or face shield. These are appropriate for general surgery, obstetrics, and dentistry.

3. Large droplet vs. airborne (aerosol) pathogen: gown, a face shield, or surgical mask plus eye protection, will protect against inoculation of large droplets or splatter into mouth, nose, and eyes. Optimal protection against airborne disease (e.g., TB, influenza, measles, chickenpox) requires a particulate respirator (such as N-95 or PAPR).

B. Volume of fluid expected.

1. Minimal fluid expected may only require gloves.
2. Large Volumes of fluid expected, generating splashes, sprays, or splatter use (fluid resistant) gown, mask and eye or face protection with solid side shields to protect mouth, eyes, nose, and face and shoe covers. It is important to evaluate risk before performing a task, don appropriate PPE to protect yourself and the patient.

III. Choosing barriers / PPE based on intended need:

A. **Patient Safety:**

1. Select sterile barriers and PPE for invasive procedures. Example: sterile gowns, gloves, dressings in surgery. Maximum sterile barriers for central line insertion practices including mask, sterile gown, large sterile drape, sterile gloves, and cap.
2. Select surgical masks for prevention of droplet contamination from healthcare workers to patients' wounds or during any spinal injections. The mask provides a fluid barrier to protect the patient and healthcare worker from mucous membrane exposure.

B. **Employee Safety:**

1. Barriers for prevention of contamination. To protect yourself, it is essential to have a barrier between you and the potentially infectious material.
2. Masks for prevention of exposure to communicable disease. Use appropriate mask to prevent an exposure. Surgical mask for (e.g. influenza, meningitis), particulate respirator such as N-95 or PAPR is required for (e.g. TB, measles, chickenpox, or during aerosol generating procedures for a patient with influenza)

IV. Guidance on proper utilization of PPE / barriers:

A. Proper fit

1. Gloves: too small may tear; too large are clumsy.
2. Mask: must fit snugly around mouth and nose, with metal band molded across bridge of nose, and straps or ties in place.
3. Gowns: impervious or fluid resistant according to its use should cover skin and clothes.

B. Integrity of barrier: check for holes, tears, or damage before use

1. Inspect gloves for tears or holes before use. Replace gloves as soon as practical if damaged during use.
2. Masks should be replaced if damaged or wet.

C. Disposable vs. reusable barriers and PPE

1. Disposable items should not be reused.
2. Reusable items must be properly cleaned and reprocessed before reuse.
3. Surgical masks are replaced after each use, and between patients. Particulate respirators are often used for longer periods of time, but should be replaced if damaged, soiled, or wet.
4. All PPE, whether disposable or reusable, must be removed after the user completes the procedure they were intended for, before leaving the work area, and hands must be washed after removing gloves.

D. Potential for cross-contamination if PPE is not changed between patients

1. Gloves, gowns, aprons, and surgical masks must be changed between patient contacts. Never wear the same gloves or other PPE from patient-to- patient.

Hands must be washed before putting gloves on and after gloves are removed. Gloves do not completely prevent penetration of bacteria and viruses, and the moist environment inside a glove can promote growth of bacteria on the skin.

E. Under- and over-utilization of barriers and PPE

1. Under-utilization places HCWs and patients at unnecessary risk.
2. Over-utilization of barriers wastes resources, may intimidate patients, and may interfere with patient care.

F. Supply availability and accessibility

1. General PPE: Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary by reason of hazards of process, infectious material, environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation, or physical contact. (29 CFR 1910.132 (a))

G. Appropriate user education: Selection, donning, doffing, and disposal.

1. Key points About PPE

- i. Don before contact with the patient, generally before entering the room
- ii. Use carefully- don't spread contamination
- iii. Remove and discard carefully in receptacles provided, either at the doorway or immediately outside patient room; remove respirator outside room
- iv. Immediately perform hand hygiene

2. Sequence for Donning PPE (combination of PPE will affect sequence- be practical)

- i. Gown first
- ii. Mask or respirator
- iii. Goggles or face shield

iv. Gloves

a) How to Don a Gown

- i. Select appropriate type and size
- ii. Opening is in the back
- iii. Secure at neck and waist
- iv. If gown is too small, use two gowns (gown #1 ties in front #2 ties in back)

b) How to Don a Mask

- i. Place over nose, mouth and chin
- ii. Fit flexible nose piece over nose bridge
- iii. Secure on head with ties or elastic
- iv. Adjust to fit

c) How to Don a Particulate Respirator

- i. Select a fit tested respirator
- ii. Place over nose, mouth and chin
- iii. Fit flexible nose piece over nose bridge
- iv. Secure on head with elastic
- v. Adjust to fit
- vi. Perform a fit check
 - a. Inhale- respirator should collapse
 - b. Exhale- check for leakage around face

d) How to Don Eye and Face Protection

- i. Position goggles over eyes and secure to the head using the ear pieces or headband
- ii. Position face shield over face and secure on brow with headband
- iii. Adjust to fit comfortably

e) How to Don Gloves

- i. Don gloves last
- ii. Select correct type and size
- iii. Insert hands into gloves
- iv. Extend gloves over isolation gown cuffs

In addition to wearing PPE, you should also use safe work practices

Keep gloved hands away from face

Avoid touching or adjusting other PPE

Remove gloves if they become torn; perform hand hygiene before donning new gloves

Limit surfaces and items touched

3. Sequence for Doffing PPE

- i. Gloves
- ii. Face shield or goggles

- iii. Gown
- iv. Mask or respirator

a) How to remove Gloves

- i. Grasp outside edge near wrist
- ii. Peel away from hand, turning glove inside-out
- iii. Hold in opposite gloved hand
- iv. Slide ungloved finger under the wrist of the remaining glove
- v. Peel off from inside, creating a bag for both gloves
- vi. Discard in waste container

b) How to remove Goggles or Face Shield

- i. Grasp ear or head pieces with ungloved hands
- ii. Lift away from face
- iii. Place in designated receptacle for reprocessing or disposal

c) Removing Gown

- i. Unfasten ties
- ii. Peel gown away from neck and shoulder
- iii. Turn contaminated outside toward the inside
- iv. Fold or roll into a bundle
- v. Discard in waste container as appropriate

d) Removing a Mask

- i. Untie the bottom, then top, tie
- ii. Remove from face
- iii. Discard into designated waste container

e) Removing a Particulate Respirator (outside of patients room)

- i. Lift the bottom elastic over your head first
- ii. Then lift off the top elastic (done slowly to prevent respirator from “snapping” off the face)
- iii. Discard into waste container (outside of patients room)

f) Hand Hygiene

Perform hand hygiene immediately after removing PPE

- i. If hands become visibly contaminated during PPE removal, wash hands before continuing to remove PPE

Wash hands with soap and water or use an alcohol-based hand rub

ELEMENT V

PRINCIPLES AND PRACTICES FOR CLEANING, DISINFECTION, AND STERILIZATION

Learning Objectives:

Define cleaning, disinfection, and sterilization;

- Differentiate between non critical, semi critical, and critical medical devices;
- Describe the three levels of disinfection (i.e., low, intermediate, and high);
- Recognize the importance of the correct application of reprocessing methods for assuring the safety and integrity of patient care equipment in preventing transmission of bloodborne pathogens;
- Recognize the professional's responsibility for maintaining a safe patient care environment in all healthcare settings; and
- Recognize strategies for, and importance of, effective and appropriate pre-cleaning, chemical disinfection, and sterilization of instruments and medical devices aimed at preventing transmission of bloodborne pathogens.

Definitions:

- **Contamination:** The presence of microorganisms on an item or surface.
- **Cleaning:** The process of removing all foreign material (i.e., dirt, body fluids, lubricants) from objects by using water and detergents or soaps and washing or scrubbing the object
- **Critical device:** An item that enters sterile tissue or the vascular system (e.g. intravenous catheters, needles for injections). These must be sterile prior to contact with tissue.
- **Decontamination:** The use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles.
- **Disinfection:** The use of a chemical procedure that eliminates virtually all recognized pathogenic microorganisms but not necessarily all microbial forms (e.g., bacterial endospores) on inanimate objects.
- **High level disinfection:** Disinfection that kills all organisms, except high levels of bacterial spores, and is effected with a chemical germicide cleared for marketing as a sterilant by the U.S. Food and Drug Administration (FDA).
- **Intermediate level disinfection:** Disinfection that kills mycobacteria, most viruses, and bacteria with a chemical germicide registered as a "tuberculocide" by the U.S. Environmental Protection Agency (EPA).
- **Low level disinfection:** Disinfection that kills some viruses and bacteria with a chemical germicide registered as a hospital disinfectant by the EPA.

- **Non critical device:** An item that contacts intact skin but not mucous membranes (e.g., blood pressure cuffs, oximeters). It requires low level disinfection.
- **Semi critical device:** An item that comes in contact with mucous membranes or non intact skin and minimally requires high level disinfection (e.g., oral thermometers, vaginal specula).
- **Sterilization:** The use of a physical or chemical procedure to destroy all microbial life, including highly resistant bacterial endospores.

I. Universal principles.

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

1. Special procedures are required for handling brain, spinal, or nerve tissue from patients with known or suspected prion disease (e.g., Creutzfeldt-Jakob disease [CJD]). Consultation with infection control experts prior to performing procedures on such patients is warranted.

B. Industry guidelines as well as equipment and chemical manufacturer recommendations should be used to develop and update reprocessing policies and 25 procedures.

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

II. Potential for contamination is dependent Potential for Contamination

A. Evidence of disease transmission by contaminated equipment is well documented. The composition /material of the device or equipment may be a factor in the level of contamination (i.e., upholstery).

B. External contamination occurs when devices such as BP cuffs, oximeters, electronic thermometers are used from patient to patient.

C. Internal contamination occurs when the inner lumen of a device has exposure to blood and body fluids.

Examples:

Vascular access devices (IV cannulas, arterial pressure monitors, cardiac and vascular prostheses, A-V shunts for hemodialysis): contamination of devices at time of insertion, or subsequent contamination, may result in blood stream infection, site of entry infection, or remote infection.

Genito-urinary tract devices: contaminated urinary drainage systems or cystoscopes can cause nosocomial urinary tract infection and subsequent blood stream infection.

Respiratory tract devices: contaminated fluid nebulizers, ventilators, in-line temperature probes or bronchoscopes may cause nosocomial pneumonia and tuberculosis.

D. Degree of frequency of hand contact: The more a device is handled with unwashed hands the higher the degree of contamination.

E. Potential for contamination with body substance of environmental source microorganisms is a recognized potential source of cross-contamination in the health care environment.

F. Identification of surfaces or equipment which require between patient cleaning is essential.

1. All items having contact with mucous membranes must be cleaned and disinfected between patient use. Example: reusable thermometers.
2. Items having contact with intact skin, such as blood pressure cuffs and stethoscopes, need periodic cleaning and decontamination.
3. Any environmental surface, equipment, or device contaminated with blood or body fluids should be cleaned and disinfected immediately.
4. Dedicated patient equipment such as infusion pumps is to be cleaned and disinfected between patients.

G. Identification of practices which contribute to touch contamination and the potential for cross-contamination:

1. Clean and dirty work areas should be separated to reduce cross contamination of supplies.
2. Environmental cleaning must be performed on a regular basis to reduce microbial load on surfaces (e.g., commodes contaminated with feces may be a vehicle for spread of *C. difficile* between patients).
3. Gloves must be removed and hands washed after touching contaminated surfaces or equipment (e.g., urinary collection devices, bedpans, dressings).

H. Level of contamination

The level of contamination is dependent on:

1. Types of microorganisms, bacteria, viruses, spores
2. The number of microorganisms
3. Potential for cross contamination

III. Steps of Reprocessing.

A. Pre-cleaning:

1. Removes soil, debris, lubricants from internal and external surfaces;
2. To be done as soon as possible after use.
3. Intended to remove bioburden
 - a. the number of bacteria living on a surface that has not been sterilized.
 - b. can remain on surfaces after sterilization if not properly removed prior to sterilization

B. Cleaning:

1. Manual (e.g., scrubbing with brushes);
2. Mechanical (e.g., automated washers);
3. Appropriate use and reprocessing of cleaning equipment (e. g., do not reuse

disposable cleaning equipment); - Manufacturer's guidelines should dictate practice.

4. Frequency of solution changes – follow manufacturer's guidelines

C. Disinfection- requires sufficient contact time with chemical solution.

D. Sterilization- requires sufficient exposure time to heat, chemicals, or gases.

IV. Choice/Level of reprocessing sequence.

A. Based on intended use (see Definitions):

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

B. Based on manufacturer's recommendations. Confirm:

1. Compatibility among equipment components, materials, and chemicals used;
2. Equipment heat and pressure tolerance;
3. Time and temperature requirements for reprocessing

V. Effectiveness of reprocessing instruments, medical devices and equipment.

A. Cleaning prior to disinfection;

B. Disinfection:

1. Selection and use of disinfectants:
 - a. Surface products;
 - b. Immersion products.
2. Presence of organic matter;
3. Presence of biofilms;
4. Monitoring:
 - a. Activity and stability of disinfectant;
 - b. Contact time with internal and external components;
 - c. Record keeping/tracking of instrument usage and reprocessing.
5. Post-disinfection handling and storage.

C. Sterilization:

1. Selection and use of methods:
2. Monitoring:
 - a. Biologic monitors;
 - b. Process monitors (tape, indicator strips, etc.);
 - c. Physical monitors (pressure, temperature gauges);
 - d. Record keeping and recall/ tracking system for each sterilization processing batch/item;
3. Post-sterilization handling, packaging and storage (event-related criteria).

VI. Recognizing potential sources of cross-contamination in the healthcare environment.

- A. Surfaces or equipment which require cleaning between patient procedures/treatments;
- B. Practices that contribute to hand contamination and the potential for cross-contamination;
- C. Consequences of reuse of single-use/disposable instruments, medical devices or equipment.

VII. Factors that have contributed to contamination in reported cases of disease transmission.

A. At any point in reprocessing or handling, breaks in infection control practices can compromise the integrity of instruments, medical devices or equipment.

B. Specific factors:

- 1. Failure to reprocess or dispose of items between patients;
- 2. Inadequate cleaning;
- 3. Inadequate disinfection or sterilization;
- 4. Contamination of disinfectant or rinse solutions;
- 5. Improper packaging, storage and handling;
- 6. Inadequate/inaccurate record keeping of reprocessing requirements.

VIII. Expectations of health professionals with respect to differing levels of disinfection and sterilization methods and agents based on the area of professional practice setting and scope of responsibilities.

A. Professionals who practice in settings where handling, cleaning, and reprocessing equipment, instruments or medical devices is performed elsewhere (e.g., in a dedicated Sterile Processing Department):

- 1. Understand core concepts and principles:
 - a. Standard and Universal Precautions (e.g., wearing of personal protective equipment);
 - b. Cleaning, disinfection, and sterilization described in Sections III and IV above;
 - c. Appropriate application of safe practices for handling instruments, medical devices and equipment in the area of professional practice;
 - d. Designation and physical separation of patient care areas from cleaning and reprocessing areas is strongly recommended by NYSDOH.
- 2. Verify with those responsible for reprocessing what steps are necessary prior to submission:
 - a. Pre-cleaning;
 - b. Soaking.

B. Professionals who have primary or supervisory responsibilities for equipment , instruments

or medical device reprocessing (e.g., Sterile Processing Department staff or clinics and physician practices where medical equipment is reprocessed on-site):

1. Understand core concepts and principles:
 - a. Standard and Universal Precaution,
 - b. Cleaning, disinfection, and sterilization described in Sections III and IV above:
 - c. Appropriate application of safe practices for handling instruments, medical devices, and equipment in the area of professional practice;
 - d. Designation and physical separation of patient care areas from cleaning and reprocessing areas is strongly recommended by NYSDOH.

2. Determine appropriate reprocessing practices taking into consideration:
 - a. Selection of appropriate methods:
 - i. Antimicrobial efficacy;
 - ii. Time constraints and requirements for various methods.
 - iii. Compatibility among equipment/materials:
 - 1.) Corrosiveness;
 - 2.) Penetrability;
 - 3.) Leaching;
 - 4.) Disintegration;
 - 5.) Heat tolerance;
 - 6.) Moisture sensitivity.
 - iv. Toxicity:
 - 1.) Occupational health risks;
 - 2.) Environmental hazards;
 - 3.) Abatement methods;
 - 4.) Monitoring exposures;
 - 5.) Potential for patient toxicity/allergy.
 - v. Residual effect:
 - 1.) Antibacterial residual;
 - 2.) Patient toxicity/allergy.
 - vi. Ease of use:
 - 1.) Need for specialized equipment;
 - 2.) Special training requirements.
 - vii. Stability:
 - 1.) Concentration;
 - 2.) Potency;
 - 3.) Efficacy of use;
 - 4.) Effect of organic material.
 - viii. Odor.
 - ix. Cost.
 - x. Monitoring:
 - 1.) Frequency
 - 2.) FDA regulations for reprocessing single use devices
(refer to the FDA web site at: <http://www.fda.gov/cdrh/reprocessing/>)

ELEMENT VI

PREVENTION AND CONTROL OF INFECTIOUS AND COMMUNICABLE DISEASES IN HEALTHCARE WORKERS

LEARNING OBJECTIVES

At the conclusion of course work or training on this element, the learner will be able to:

- Recognize the role of occupational health strategies in protecting healthcare workers and patients;
- Recognize non-specific disease findings that should prompt evaluation of healthcare workers;
- Identify occupational health strategies for preventing transmission of bloodborne pathogens and other communicable diseases in healthcare workers; and
- Identify resources for evaluation of healthcare workers infected with HIV, HBV, and/or HCV.

DEFINITIONS

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

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

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

I. Pre-placement and periodic health assessments.

A. Immunization/screening programs (e.g., measles, mumps, rubella, varicella, hepatitis B, annual influenza, any other recommended or mandated requirements);

B. Tuberculosis screening:

1. Symptoms evaluation.
2. Tuberculin skin testing as required by regulation.

C. Screening for other communicable diseases:

1. Health assessments (history and physicals).
2. Exposure monitoring

D. Symptoms requiring immediate evaluation by a licensed medical professional and possible restriction from patient care activities and return to work clearance:

1. Fever;
2. Cough;
3. Rash;
4. Vesicular lesions;
5. Draining wounds;
6. Vomiting;
7. Diarrhea.

II. Management strategies for potentially communicable conditions.

- A. Appropriate evaluation and treatment;
 - B. Limiting contact with susceptibles;
 - C. Furlough until noninfectious.
- III. Specific occupational health strategies for prevention and control of bloodborne pathogen transmission.
- A. Healthcare worker exposure risk education:
 1. Potential agents (HBV, HCV, HIV);
 2. Prevention strategies:
 - a. HBV vaccination (including safety, efficacy, components, and recommendations for use);
 - b. Hand hygiene;
 - c. Appropriate PPE and barrier precautions;
 - d. Sharps safety;
 - e. Standard and Universal Precautions.
- IV. Post-exposure evaluation and management.
- A. Bloodborne pathogens:
 1. Prompt evaluation by licensed medical professional;
 2. Risk assessment in occupational exposures;
 3. Recommendations for approaching source patient and healthcare worker evaluations;
 4. Recommendations for post-exposure prophylaxis emphasizing the most current NYSDOH and CDC guidelines;
 5. Post-exposure management of patients or other healthcare workers when exposure source is a healthcare worker:
 - a. Professional obligation to inform patients exposed to a healthcare worker's blood or other potentially infectious material.
 - B. Airborne or droplet pathogen:
 1. Tuberculosis:
 - a. Recommendations for post-exposure prophylaxis emphasizing the most current New York State guidelines for post-exposure prophylaxis.
 2. Varicella, Measles, Mumps, Rubella, Pertussis:
 - a. Consult the most current Federal, State, or local requirements for post-exposure evaluation and management.
 - C. Notification of healthcare workers/public.
- V. Evaluation of healthcare workers infected with HIV, HBV and/or HCV or other bloodborne pathogens.
- A. Review New York State Department of Health Policy on HIV testing of healthcare workers.
 - B. Criteria for evaluating infected health care workers for risk of transmission:
 1. Nature and scope of professional practice;
 2. Techniques used in performance of procedures that may pose a transmission risk to patients;
 3. Assessed compliance with infection control standards;
 4. Presence of weeping dermatitis, draining or open skin wounds;
 5. Overall health:

- a. Physical health;
 - b. Cognitive status.
- C. Expert panels for evaluation of healthcare workers infected with bloodborne pathogens.

ELEMENT VII SEPSIS AWARENESS AND EDUCATION

LEARNING OBJECTIVES

At the conclusion of course work or training on this element, the learner will be able to:

- Describe the scope of the sepsis problem and the NYS Sepsis Improvement Initiative
- Describe persons at increased risk of developing sepsis
- Identify common sources of infection that may lead to sepsis
- Describe early signs and symptoms that may be associated with sepsis in adults and children and infants
- Understand the need for immediate medical evaluation and management if sepsis is suspected
- Educate patients and families on methods for preventing infections and illnesses that can lead to sepsis and on identifying the signs and symptoms of severe infections and when to seek medical care

DEFINITIONS

Sepsis: is a life-threatening condition caused by a host's extreme response to infection. The Surviving Sepsis Campaign 2016 International Guidelines define sepsis as life-threatening organ dysfunction caused by a dysregulated host response to infection. Earlier definitions defined sepsis as an inflammatory response to infection, while sepsis associated with organ dysfunction was identified as severe sepsis. Septic shock is a subset of sepsis that manifests with circulatory and cellular/metabolic dysfunction; it is associated with a higher mortality risk.

I. Sepsis - Scope of the Problem

- A. Sepsis is a life-threatening medical emergency that requires early recognition and intervention.
- B. Most sepsis cases are community-acquired.
- C. Seven in 10 patients with sepsis had recently used healthcare services or had chronic conditions requiring frequent medical care.
- D. Sepsis prevalence and mortality in the United States and New York State:
 1. Severe sepsis and septic shock impact approximately 50,000 patients in NY each year, and on average almost 30% of patients died from this syndrome prior to the implementation of the New York State Sepsis Care Improvement Initiative. In addition, many more may experience lifelong impairments because of the broad impact that sepsis may have on organ and tissue function.
 2. There are over 1.7 million adults annually with sepsis in the US contributing to 270,000 deaths.
 3. A CDC evaluation found 7 in10 patients with sepsis had recently used a healthcare facility.



II. New York State Sepsis Care Improvement Initiative and “Rory’s Regulations” (as it applies to healthcare professionals) – A law developed in 2013 named for a 12 year old boy who died after becoming septic from a cut sustained in gym class.

A. Purpose

1. To increase early recognition of suspected sepsis by all healthcare professionals by requiring such individuals to complete course work or training on sepsis;
2. Stress the importance of timely initiation of evidence-based protocols to improve sepsis outcomes.

B. Requirements

1. New York State regulations at 10 NYCRR §§ 405.2 and 405.4 require hospitals to, among other things:
 - a. Adopt evidence-based protocols to ensure early diagnosis and treatment of sepsis; and
 - b. Ensure hospital staff are trained to implement such sepsis protocols.
 - c. Collect sepsis data to improve care, report annually to the state, and be subject to audits.

III. Causes of Sepsis

A. Development of sepsis following infection

1. Bacterial infections commonly trigger sepsis, although other microbial infections (e.g. fungal or viral) can also trigger sepsis
2. Populations at increased risk of developing sepsis include:
 - a. The very young (under 1 year), and individuals 65 years of age and older;
 - b. People with chronic conditions such as diabetes, lung disease, kidney disease, or cancer; and
 - c. People with impaired immune systems.
3. Sepsis most commonly results from infection in the lungs, urinary tract, skin, and/or gastrointestinal tract

IV. Early Recognition of Sepsis

A. Manifestations of sepsis vary based on the type of infection and host factors.

1. Some people may have subtle sepsis presentations.

- a. Signs and symptoms that may be associated with sepsis in persons with confirmed or suspected infection can include:
 - i. Altered mental state, shortness of breath, fever, clammy or sweaty skin, extreme pain or discomfort, high heart rate
 - ii. Signs and symptoms in children and the elderly
 - iii. Severe forms of sepsis including septic shock
- b. If a person presents with suspected or confirmed infection, healthcare professionals should assess for signs of, and risk factors for sepsis.

V. Principles of Sepsis Treatment

- A. Prompt diagnosis and treatment are critical for optimal outcomes; there is increased morbidity and mortality with delayed recognition and response.
 - 1. Recommended diagnostic modalities include blood cultures and other tests to identify source and site of infection and organ dysfunction.
 - 2. Recommended treatment of sepsis includes administration of appropriate intravenous (IV) antimicrobial therapy, with source identification and de-escalation of antibiotics as soon as feasible.

VI. Patient Education and Prevention

A. Preventing infection:

- 1. hand hygiene,
- 2. wound care, and
- 3. vaccination

B. Risk factors (high-risk patients):

- 1. CDC evaluation found more than 90% of adults and 70% of children who developed sepsis had a health condition that may have put them at risk.
 - a. Sepsis occurs most often in people 65 years or older or younger than 1 year,
 - b. with weakened immune systems, or
 - c. with chronic medical conditions (e.g., diabetes).
- 2. Four types of infections are often associated with sepsis:
 - a. lung,
 - b. urinary tract,
 - c. skin, and
 - d. gut.
- 3. While less common, even healthy infants, children, and adults can develop sepsis from an infection, especially when not treated properly.
- 4. Common germs that can cause sepsis are:
 - a. Staphylococcus aureus,
 - b. Escherichia coli (E. coli), and
 - c. some types of Streptococcus.

C. Warning signs and symptoms of sepsis

- 1. Shivering, fever, or very cold
- 2. Extreme pain or discomfort
- 3. Clammy or sweaty skin
- 4. Confusion or disorientation
- 5. Short of breath
- 6. High heart rate

D. Seeking immediate care for worsening infection and signs and symptoms of sepsis

1. Educate patients
 - a. Learn sepsis signs and symptoms.
 - b. Know if you are at higher risk.
 - c. If sepsis is suspected, get immediate medical attention. Ask, "Could it be sepsis?"
 - d. Stress the need to prevent infections,
 - e. manage chronic conditions, and seek care if signs of severe infection or sepsis are present.
 2. Reassess and closely monitor
 - a. Check patient progress frequently.
 - b. Reassess antibiotic therapy 24-48 hours or sooner to change therapy as needed.
 - c. Be sure the antibiotic type, dose, and duration are correct.
 3. Act Fast
- E. Giving relevant history and information to clinicians
1. Stress importance of a complete history in order to treat patient correctly.
 2. Minor cut, injuries and pain can be important.

Appendix A: Selected Infection Control Laws and Regulations

Public Health Law

§ 230-a. Infection control standards

Visit: <http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO>: and search term “230-a”

§ 230-d. Office-based surgery

Visit: <http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO>: and search term “230-d”

§ 239. Course work or training in infection control practices

Visit: <http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO>: and search term “239”

§ 239-a. Infection control guidelines

Visit: <http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO>: and search term “239-a”

§ 2760. Advisory panel established

Visit: <http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO>: and search term “2760”

§ 2761. Function, powers and duties

Visit: <http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO>: and search term “2761”

Education Law

§ 6505-b. Course work or training in infection control practices

Visit: <http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO>: and search term “6505-b”

§ 6509. Definitions of professional misconduct

Visit: <http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO>: and search term “6509”

§ 6530. Definitions of professional misconduct

Visit: <http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO>: and search term “6509”

Health Regulations (10 NYCRR)

Part 92 Infection Control Requirements

Visit: https://www.health.ny.gov/regulations/nycrr/title_10/ and search Title 10 term “92”37

Education Regulations (8 NYCRR)

Part 58 Approval of Course Work or Training in Infection Control Practices and Barrier Precautions

Visit:

<https://govt.westlaw.com/nycrr/Browse/Home/NewYork/NewYorkCodesRulesandRegulations?guid=lf1953a30ab3811dd9e3f9b6a3be71c54&>

2018 Revision from New York State Department of Health and State Education Department

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Revisions: 2006, 2008, 2009, 2013, 2018

Name: _____ NYS License # _____

Phone (Daytime) _____ **CROUSE EMPLOYEES LIST UNIT/DEPARTMENT (i.e. icu, nicu)** _____

Home Address: _____ Change of Address

Send Certificate to: _____

1. Failure to follow accepted standards of infection prevention and control is considered:
 - a. professionally acceptable.
 - b. professional misconduct.
 - c. criminal intent.
 - d. distracted care.

2. The single most critical measure for reducing the risk of transmitting organisms to patient's and healthworkers is:
 - a. Handwashing.
 - b. Glove use.
 - c. Isolation precautions.
 - d. Standard precautions.

3. Failure to wash your hands or follow acceptable principles of infection control are considered:
 - a. professionally acceptable.
 - b. professional misconduct.
 - c. criminal intent.
 - d. distracted care.

4. Single –use medication vials are to be used:
 - a. Once per one patient.
 - b. For multiple patients.
 - c. Twice per one patient.
 - d. None of the above.

5. Used sharps must be discarded in a puncture-resistant container:
 - a. True
 - b. False

6. Pulmonary tuberculosis (TB) is spread by which mode of transmission?
 - a. Indirect.
 - b. Droplet.
 - c. Airborne.
 - d. Direct contact.

7. Pre-Cleaning is _____ to _____ :
- required, remove soil and debris.
 - required, provide immediate reuse
 - not required, be completed
 - not required, process in an autoclave
8. Potential sources of cross-contamination include:
- cleaning surfaces between procedures
 - reusing single use equipment
 - cleaning equipment
 - washing hands between patients
9. Which of the following is the preferred method of hand hygiene when hands are not visibly soiled?
- Medical grade soap and water.
 - Waterless hand sanitizing agent.
 - Use sterile gloves to protect hands.
 - Wait until the hands are visibly soiled
10. Healthcare workers should be evaluated and could be restricted from returning to work if they have:
- a fever
 - draining wounds
 - a rash
 - any of the above
11. Signs and symptoms that may be associated with sepsis include:
- altered mental state
 - fever
 - tachycardia
 - all of the above
12. Sepsis is a life threatening medical emergency. It has been found that:
- 7 out of 10 septic patients had recently used healthcare services.
 - 2 out of 20 septic patients had recently used healthcare services.
 - it occurs randomly in patients regardless of healthcare service use.
 - instances are rare throughout New York State.

Signature _____ Date _____