

**ST. JOSEPH'S HOSPITAL
HEALTH CENTER
SYRACUSE, NEW YORK**

**MANDATORY
INFECTION PREVENTION
AND CONTROL
TRAINING**

SELF LEARNING PACKET

Revised 9/2012

**LAWS OF NEW YORK
1992
CHAPTER 786**

OFFICE OF INFECTION PREVENTION AND CONTROL

The content of this packet was established on the basis of the Laws of the State of New York requiring Infection Control Training for designated licensed healthcare professionals.



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Welcome! This self – paced learning packet is designed to assist you in learning and reviewing information about infection control. Upon completion of this packet and the post-test, you will have met the requirements for the New York State mandated infection control update.

Work at your own pace. The information is divided into six (6) elements, or sections. There are review questions every few pages to help you to remember important information.

Make sure you take breaks periodically too.

Please don't write in the packet. We'll be using it again for other individuals who need this information. We have provided a worksheet for answering the review questions at the end of each element and an answer sheet for the post-test.

Non-Physician staff:

Once you have completed the post-test, return yourself learning packet and the answer key to Clinical Learning and Resource (CL&R). Be sure you write your name, employee number and Department/Unit on top of the post-test answer sheet. After CL&R adds this to your education file, you will receive your certificate via inter – departmental mail at your request.

Physicians:

Contact Medical Staff Office.

Feel free to contact the Infection Prevention and Control Office at 448-6252; or Administration at 448-5880 with any questions you may have about the packet or the process of obtaining your certificate. The Infection Preventionists are also available on beeper Monday through Friday 0700 – 1530 at the following numbers:

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Good luck to you and don't forget to call if you need help. Now turn the page to review the course content outline and background information.

MINIMUM CORE ELEMENTS OF REQUIRED COURSE WORK OR TRAINING IN INFECTION CONTROL

ELEMENT I

The responsibility to adhere to scientifically accepted principles and practices of infection control and to monitor the performance of those for whom the professional is responsible

ELEMENT II

Modes and mechanisms of transmission of pathogenic organisms in the healthcare setting and strategies for prevention and control

ELEMENT III

Use of engineering and work practice controls to reduce the opportunity for patient and healthcare worker contact with potentially infectious material for bloodborne pathogens

ELEMENT IV

Selection and use of barriers and/or personal protective equipment for preventing patient and healthcare worker contact with potentially infectious material

ELEMENT V

Creation and maintenance of a safe environment for patient care through application of infection control principles and practices for cleaning, disinfection, and sterilization

ELEMENT VI

Prevention and management of infectious and communicable diseases in healthcare workers

INFECTION CONTROL COURSE WORK

New York State Department of Health and State Education Department

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 every four years, unless otherwise exempted.

One of the most important of these was the Department of Health's establishment of a policy on healthcare workers infected with Human Immunodeficiency Virus (HIV) or Hepatitis B virus (HBV). Another important event was the adoption by the Board of Regents, effective March 1992, of an amendment to Regents Rules expanding the definition of unprofessional conduct to include failure to follow appropriate infection prevention techniques in healthcare practice. Similar regulations have been adopted by the Department of Health.

The question of how to protect patients from contracting HIV through receipt of healthcare has been the subject of debate in the scientific community, as well as in public and private sectors. The Department of Health has been intensely involved in this issue at both the State and National levels. As a result of these deliberations, consensus has been reached in New York State that the strategy that offers the greatest opportunity for protecting the public in settings where they receive healthcare, is one of assuring that infection control measures are routinely in place and routinely observed. Such practices must provide protection from cross contamination from patient to patient, as well as patient and healthcare worker exposure to pathogens through the direct provision of care. While bloodborne pathogens are the chief concern driving policy and legislation at this time, other pathogens transmitted by contact (e.g., Staphylococci, gram-negative organisms) may also pose a risk. Broad attention to the principles of infection control will diminish the opportunity for these exposures as well.

This training was initially required in 1994, and every four years thereafter.

In September 2008 the NYSDOH and NYSED revised the syllabus with the following changes:

- Element III has been updated to include injection safety language consistent with current CDC recommendations.
- Element V has been updated to include language addressing appropriate reprocessing of medical devices and equipment in all settings, including reprocessing in outpatient and ambulatory surgery settings.
- Language related to the prevention of transmission of hepatitis C virus (HCV) has been added.
- References to Airborne Precautions have been removed from Element III since they are not applicable to bloodborne pathogen transmission.
- Formatting edits have been made to clarify content

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 control principles, as appropriate for 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 unprofessional conduct charges that may be applicable for not complying with the law.

Last updates from NYSDOH or NYSED 2010.

ELEMENT I

ELEMENT I

HEALTHCARE PROFESSIONALS HAVE THE RESPONSIBILITY TO ADHERE TO SCIENTIFICALLY ACCEPTED PRINCIPLES AND PRACTICES OF INFECTION CONTROL IN ALL HEALTHCARE SETTINGS AND TO OVERSEE AND MONITOR THOSE MEDICAL AND ANCILLARY PERSONNEL FOR WHOM THE PROFESSIONAL IS RESPONSIBLE.

LEARNING OBJECTIVES

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

- Recognize the benefit to patients and healthcare workers of adhering to scientifically accepted principles and practices of Infection Prevention and Control;
- Recognize the professional's responsibility to adhere to scientifically accepted Infection Prevention and Control practices in all healthcare settings and the consequences of failing to comply; and
- Recognize the professional's responsibility to monitor Infection Prevention and Control practices of those medical and ancillary personnel for whom he or she is responsible and intervene as necessary to assure compliance and safety.

CONTENT OUTLINE

- I. Sources and definition of standards of professional conduct as they apply to Infection Prevention and Control.

- A. Rules of the Board of Regents, Part 29.2 (a)(13);

- B. Part 92 of Title 10 (Health) of the Official Compilation of Codes, Rules, and Regulations of New York;

- C. Statements of relevant professional and national organizations:

Occupational Safety and Health Administration (OSHA) Federal agency. Mandates zero exposures. Responsible for Bloodborne Pathogen Standard 1991.

New York State Department of Health (NYSDOH). Part 405 of the Health Code includes compliance with Infection Control Standards.

Center for Disease Control and Prevention (CDC). Federal agency that develops and publishes guidelines and/or recommendations that are encouraged to be implemented in all healthcare settings, i.e.: Isolation Guidelines, Hand washing/use of alcohol hand sanitizer, disinfectants, Standard Precautions etc.

Association for Professionals in Infection Control and Epidemiology, Inc (APIC). Develops and publishes appropriate Infection Control Guidelines for evidence-based practice.

II. Implications of professional conduct standards.

A. Professional responsibility to adhere to infection control standards

1. Prevention of bloodborne diseases: Transmission of bloodborne diseases (HIV, Hep B, Hep C) is preventable through strict adherence to scientifically accepted infection prevention techniques.

The application of Standard Precautions, previously Universal Precautions, greatly minimizes the risk of blood and body fluid exposures among healthcare workers and patients. This standard of care has been in place in healthcare settings since 1985.

A Standard of Care describes established criteria for the care of, or performance of individuals in similar circumstances.

Standard Precautions is the application of barriers such as gloves, gowns, masks and/or protective eye wear with side shields as well as proper disposal of sharps to prevent skin and mucous membrane exposure to bloodborne pathogens. Standard Precautions is applicable to all patients and all body fluids with the exception of sweat.

A major feature of Standard Precautions that receives less attention is sharps disposal. Injuries with hollow bore needles that have been in an artery or vein pose the highest risk to HCWs.

Practitioners using any sharp devices in the performance of care are responsible for their disposal.

Needles/sharps left on food trays, procedure trays, bedside, or work areas are frequently involved in injury to personnel doing the “clean up”.

Do not keep any other trash or linen receptacles under sharps container and do not obstruct the top of the sharps container.

Care needs to be taken to practice safely and responsibly when handling and disposing of needles/sharps, e.g., practice passive passing techniques in an operating room setting and placing sharps in an approved container at the completion of a procedure.

DON'T LEAVE YOUR SHARPS FOR SOMEONE ELSE TO CLEAN UP.

2. Prevention of Airborne Diseases: Appropriate identification of patients with airborne diseases, e.g., tuberculosis, measles, and chicken pox, is critical to ensure placement in negative pressure rooms or other appropriate environment and application of correct respiratory protective equipment.
 3. Practices such as hand washing/hand hygiene and aseptic technique are vital in preventing the spread of most bacterial infections (e.g., staph and strep) and some viruses (i.e., Herpes, cold, influenza, CMV) in healthcare settings.
 4. Ensuring that appropriate cleaning, disinfection and sterilization policies and procedures are in place for medical devices, equipment, and the environment and that they are followed.
 5. Occupational health practices (Employee Health) are in place to prevent and control communicable diseases in healthcare workers, e.g., TB skin testing, vaccination for Hep B, measles, Rubella.
- B. Professional responsibility for monitoring others to assure safety of all patients and personnel

C. Consequences of failing to follow accepted standards of infection control

1. Increased risk of adverse health outcomes for patients and healthcare workers
2. Subject to charges of professional misconduct
 - a. Mechanisms for reporting professional misconduct may include completing an incident report.
 - b. Complaint investigation can be initiated based on reports from patients, family members, or co-workers. Complaints can be reported to the Hospital Administration or directly to the New York State Department of Health, Office of Health Systems Management (OHSM) or to the New York State Education Department, Office of Professional Misconduct.
 - c. Possible outcomes
 1. Disciplinary action
 2. Revocation of professional license
 3. Legal action for liability

III. Methods of Compliance

- A. Participation in required infection control training
- B. Adherence to accepted principles and practices of infection control

Turn the page to review the section of the New York State Law pertaining to unprofessional conduct in the area of infection control as well as a picture review of Standard Precautions.

**NEW YORK STATE EDUCATION DEPARTMENT
RULES OF THE BOARD OF REGENTS
SECTION 29.2(a) (13)
UNPROFESSIONAL CONDUCT IN THE AREA OF
INFECTION CONTROL**

Effective October 5, 2011

29.2 General provisions for health professions.

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. Such techniques shall include but not be limited to:

- i. wearing of appropriate protective gloves at all times when touching blood, saliva, other body fluids or secretions, mucous membranes, nonintact skin, blood-soiled items or bodily fluid-soiled items, contaminated surfaces, and sterile body areas, and during instrument cleaning and decontamination procedures;
- ii. discarding gloves and following treatment of patient and changing to new gloves if torn or damaged during treatment of a patient; washing hands and donning new gloves prior to performing services for another patient; and washing hands and other skin surfaces immediately if contaminated with blood or other body fluids;
- iii. wearing of appropriate masks, gowns or aprons, and protective eyewear or chin-length plastic face shields whenever splashing or spattering of blood or other body fluids is likely to occur;
- iv. sterilizing equipment and devices that enter the patient's vascular system or other normally sterile areas of the body;
- v. sterilizing equipment and devices that touch intact mucous membranes but do not penetrate the patient's body or using high-level disinfection for equipment and devices which cannot be sterilized prior to use for a patient;
- vi. using appropriate agents, including but not limited to detergents for cleaning all equipment and devices prior to sterilization or disinfection;
- vii. cleaning, by the use of appropriate agents, including but not limited to detergents, equipment and devices which do not touch the patient or that only touch the intact skin of the patient;
- viii. maintaining equipment and devices used for sterilization according to the manufacturer's instructions;
- ix. adequately monitoring the performance of all personnel, licensed or unlicensed, for whom the licensee is responsible regarding infection control techniques;

x. placing disposable used syringes, needles, scalpel blades, and other sharp instruments in appropriate puncture-resistant containers for disposal; and placing reusable needles, scalpel blades, and other sharp instruments in appropriate puncture-resistant containers until appropriately cleaned and sterilized;

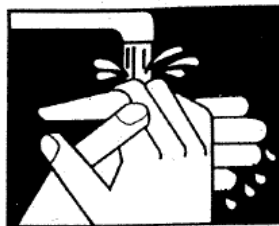
xi. maintaining appropriate ventilation devices to minimize the need for emergency mouth-to-mouth resuscitation;

xii. refraining from all direct patient care and handling of patient care equipment when the health care professional has exudative lesions or weeping dermatitis and the condition has not been medically evaluated and determined to be safe or capable of being safely protected against in providing direct patient care or in handling patient care equipment; and

xiii. placing all specimens of blood and body fluids in well-constructed containers with secure lids to prevent leaking; and cleaning any spill of blood or other body fluid with an appropriate detergent and appropriate chemical germicide.

STANDARD PRECAUTIONS FOR THE CARE OF ALL PATIENTS

Includes Blood,
Body Fluids,
Secretions, Excretions,
and
Contaminated Items



1. Wash hands **BEFORE** and **AFTER** patient care, regardless of whether gloves are worn. Wash hands immediately after gloves are removed and between patient contacts.



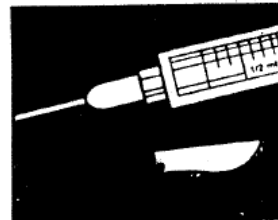
2. Wear gloves when touching blood, body fluids, secretions, excretions, and contaminated items. Put on clean gloves just before touching mucous membranes & nonintact skin.



3. Wear 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.



4. Wear gown 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. Remove soiled gown as promptly as possible & wash hands.



5. Take care to prevent injuries when using needles, scalpels and other sharp instruments or devices; when handling sharp instruments after procedures; when cleaning used instruments; and when disposing of used needles.

Use mouthpieces, resuscitation bags, or other ventilation devices as an alternative

Please complete the following questions to reinforce the information presented in Element I. Remember **not** to write in this booklet, use the **work sheet** supplied with the packet.

1. Routine use of infection control measures will provide protection for BOTH _____ and _____.
2. Retraining in these Infection Control measures is required every _____ years to maintain licensure.
3. Failure to follow appropriate infection prevention techniques in healthcare practice is considered _____.
4. The term used to describe measures taken to minimize risk of blood and body fluid exposure is _____.
5. Professional responsibility includes which of the following?
 - A. adherence to infection control standards.
 - B. monitoring others to assure safety of all patients and personnel.
 - C. understanding the consequences of failing to comply with the accepted standards.
 - D. all of the above.

Now turn the page to check your answers and identify any areas you need to review.

Answers/rationale

1. patients and staff – this is a professional responsibility to minimize exposure and reduce the risk of transmission of disease.
2. Four (4) – New York State required update.
3. Professional misconduct – per New York State Education Department Rules of the Board of Regents Section 29.2 (q) (13).
4. standard precautions - Standard precautions is the application of barriers such as gloves, gowns, masks, and/or protective eye wear with side shields as well as proper disposal of sharps to prevent skin and mucous membrane exposure to bloodborne pathogens.
5. d (all) – Professional conduct standards include professional responsibility to adhere to infection control standards, monitoring others to assure safety of all patients and personnel, and identifying consequences of failure to follow the accepted standards of infection control.

Great! Continue on with Element II....

ELEMENT II

Element II

Content Outline:

- I. Definitions
- II. Overview of Transmission of Infectious Agents
 - A. Chain of Infection
 1. Infection agent (bacteria, viruses, fungi, parasites)
 2. Reservoir/sources (animate, inanimate)
 3. Portal of Exit (vehicles and mechanisms by which pathogens leave)
 4. Transmission (contact, droplet, airborne, common vehicle, vector borne)
 5. Portal of Entry (sites and mechanisms by which pathogens are introduced)
 6. Susceptible host
 - B. Factors which influence the outcome of an exposure
- III. Breaking the Chain of Infection
 - A. Recognition and Control of Reservoir – consider all patients to be potentially infected
 - B. Control of Routes of Transmission
 - Handwashing/Alcohol hand sanitizing products
 - Use of personal protective equipment (PPE) (Barriers)
 - Environmental practices
 - Engineering controls (safer devices)
 - Sterilization or disinfection of patient care equipment
 - Work practice controls (modification in technique)
 - Isolation Sign
 - Isolation/cohorting individuals with the same communicable disease
 1. Contact Precautions:
 - Prevention of Methicillin Resistant Staphylococcus Aureus (MRSA) Transmission
 - Prevention of Vancomycin Resistant Enterococci (VRE) Transmission
 - Prevention of other microorganisms transmission
 2. Respiratory Precautions
 - Droplet Transmission
 - Airborne Transmission
 - C. Support and protection of the host
 - D. Training and education of healthcare workers
 - E. Precautions for patients with resistant microorganisms in the outpatient setting

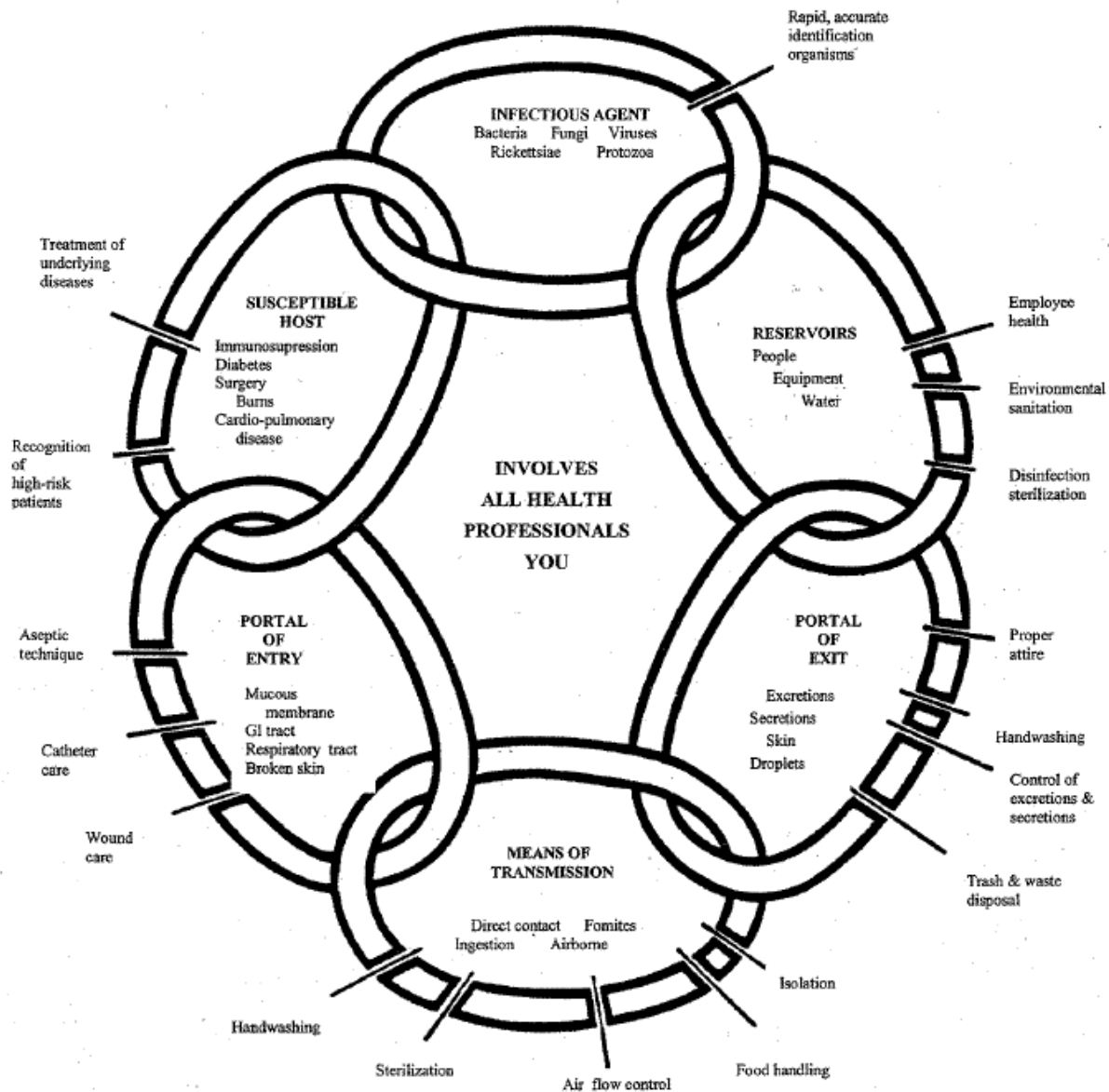
I. Definitions:

- **Blood:** human blood, human blood components, and products made from human blood.
- **Bloodborne pathogens:** pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV).
- **Contaminated:** the presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.
- **Contaminated Sharps:** any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires.
- **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.
- **Exposure Incident:** a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties.
- **Fomites:** An inanimate object or substance such as clothing or furniture capable of supporting the transmission of infectious agents.
- **Needleless Systems:** a device that does not use needles for:
 - (1) the collection of bodily fluids or withdrawal of body fluids after initial venous or arterial access is established;
 - (2) the administration of medication or fluids; or
 - (3) Any other procedure involving the potential for occupational exposure to blood borne pathogens due to percutaneous injuries from contaminated sharps.
- **Occupational Exposure:** reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.
- **Other Potentially Infectious Materials:** (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV-or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.
- **Parenteral:** piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.
- **Pathogen:** A biological agent capable of causing disease.
- **Personal Protective Equipment:** specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes (e.g., uniforms, pants, shirts or blouses) not intended to function as protection against a hazard are not considered to be personal protective equipment.

- **Regulated Waste:** liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.
- **Sharps with Engineered Sharps Injury Protections:** a nonneedle sharp or a needle device used for withdrawing a body fluids, accessing a vein or artery, or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident.
- **Source Individual:** any individual, living or dead, whose blood or other potentially infectious materials may be a source of occupational exposure to the employee. Examples include, but are not limited to, hospital and clinic patients; clients in institutions for the developmentally disabled; trauma victims; clients of drug and alcohol treatment facilities; residents of hospices and nursing homes; human remains; and individuals who donate or sell blood or blood components.
- **Standard Precautions:** precautions used for all patients regardless of diagnosis.
- **Sterilize:** the use of a physical or chemical procedure to destroy all microbial life including highly resistant bacterial endospores.
- **Susceptible Host:** a person or an animal with lack of effective resistance to a particular pathogenic agent.
- **Transmission:** any mechanism by which a pathogen is spread by a source of reservoir to a person.
- **Transmission Based Isolation Precautions:** safeguards designed for patients documented or suspected to be infected with highly transmissible or epidemiologically important pathogens for which additional precautions beyond standard precautions are needed to interrupt transmission. There are three types of transmission-based precautions; airborne precautions, droplet precautions, and contact precautions.

Now that we've reviewed some definitions, turn the page to review the chain of infection.

TRANSMISSION OF AN INFECTION



II. Overview of Transmission of Infectious Agents

A. **The chain of infection:** Infection results from the interaction between a pathogen or infectious agent and a susceptible host. Three factors - PATHOGEN (causative agent) with portals of entry and exit, a method of TRANSMISSION, and SUSCEPTIBLE HOST represent the elements needed to develop an infection.

1. Infectious agent:

1) Bacteria - single-cell microorganisms. Examples in the healthcare setting include: Tuberculosis (TB), MRSA, VRE, VISA, VRSA, Streptococcus

2) Viruses - smaller than bacteria; need a living host to grow. Examples in the healthcare setting include: HIV, HBV, HCV, influenza, and Varicella zoster.

Newly identified viruses include the Corona virus, which is associated with Severe Acute Respiratory Syndrome (SARS), H₁N₁, Novel Influenza, and H₅N₁, which is responsible for Avian Flu.

Remember to check travel history with patients presenting with atypical pneumonias and severe acute viral illness.

3) Fungi - molds and yeasts. Examples in the healthcare setting include: Candida, Aspergillus, and Cryptococcus

4) Parasites - less frequently are seen in healthcare settings. Examples in the healthcare setting include:

- Protozoa-unicellular, e.g., Toxoplasma gondii, and Pneumocystis carinii
- round worms, tape worms
- arthropods, e.g., lice, scabies, mites, ticks, maggots, bed bugs

2. Reservoir/Source:

a. Animate:

- People:
 - 1) Patients and Healthcare workers
 - 2) Infected or colonized person

An example of a reservoir; An ill person who is infected with chicken pox, Hepatitis B, or Hepatitis A, in whom the virus replicates and can be transmitted via respiratory secretions, blood, or oral-fecal route, respectively.

Some diseases are capable of being transmitted prior to the onset of symptoms. Chicken pox or measles are examples of diseases that are contagious before the onset of rash and fever.

- Insects or Animals:

Host	Reservoir for:
Deer	Lyme Disease
Bats/foxes	Rabies
Chickens	Avian Flu (H ₅ N ₁)
Mosquitoes	West Nile Virus/EEE

b. Inanimate Environment:

- 1) Water
- 2) Soil
- 3) Food
- 4) Medical Equipment

3. Portal of Exit

- Portal of Exit refers to the way in which a pathogen leaves a reservoir. Examples include:
 - 1) Respiratory Tract - pathogens are expelled by coughing or sneezing; the pathogen adheres to the droplets which leave the body by the forceful exhalation.
 - 2) Oral secretions - A health care worker who is not wearing gloves and has a torn cuticle may come in contact with pathogens contained in oral secretions such as Herpes virus in the saliva of an infected patient.
 - 3) Draining lesions - any pathogen can leave the body via drainage from an infected wound and lesion (e.g., Staph aureus in an infected abdominal wound that is touched by the hands of a HCW with a small scratch or broken eczematous area).
 - 4) Diarrhea - pathogens exit the body in feces (e.g., Salmonella; Hepatitis A and other viruses).
 - 5) Blood - pathogens exit the body in blood (ex: HIV, Hep B, Hep C)

4. Transmission

- The transmission of a pathogen from a reservoir to a susceptible host occurs by several routes:
 - 1) Direct contact: involves person-to-person spread (e.g., the fecal-oral spread of the Hepatitis A virus).
 - 2) Indirect Contact: involves contact with contaminated inanimate objects (e.g., Transfer of enteric pathogens on an endoscope without first being effectively cleaned and disinfected and/or sterilized).
 - 3) Respiratory Droplet: Involves passage of a pathogen through the air by droplets when the source and patient are within 3-5 feet, and the source is sneezing or coughing (e.g., strep throat, influenza, common colds).
 - 4) Respiratory Airborne: Involves a pathogen transmitted through the air (e.g. TB, measles).
 - 5) Common Vehicle: Contaminated fomites or any other substances that are responsible for disease production in susceptible hosts (e.g., contaminated water, food, medication, IV solution).
 - 6) Vector Borne: Transmission of a pathogen by animal, insect or tick (e.g., deer ticks transmit Lyme disease, specific mosquitoes transmit malaria, West Nile Virus, EEE, and chickens carry the H5N1 (Avian Flu Virus).)

5. Portal of Entry

There are various sites where microorganisms can be deposited onto/into the susceptible host:

a) Entry sites:

- 1) Non-intact skin - such as a cut or torn cuticle.
- 2) Respiratory tract - inhalation of a microorganism
- 3) Gastrointestinal tract - ingestion of a microorganism
- 4) Transplacental transmission of microorganism from mother to the fetus
- 5) Urinary tract - the microorganism enters via foley, cystoscopes inserted into the urethra,

b) Mechanisms of introduction:

- 1) Percutaneous injury
- 2) Vascular access
- 3) Surgical incision
- 4) Other invasive devices

6. Susceptible Host

1) Host characteristics that influence the susceptibility to develop infection are:

- age
- diagnostic/therapeutic procedure
- genetics
- immunization status
- life style
- gender
- medication
- nutritional status
- occupation
- pregnancy
- socioeconomic status
- trauma
- presence of a foreign body/
invasive device
- Age: patients at the extremes of age are most susceptible to develop infection. The newborn often has low or absent antibody levels, and geriatric patients often have a decreased immune response.
- Nutritional status: inadequate nutrition can lead to skin breakdown and poor response to medical treatments.
- Therapeutic and diagnostic procedures: surgery, anesthesia, hemodialysis, chemotherapy, and invasive procedures place the patient at an increased risk for infection.
- Lifestyle and socioeconomic level: statistics have shown that intravenous drug users are at an increased risk for a variety of infectious diseases.

2) Nonspecific host defenses are:

- normal flora
- natural antibodies
- natural barriers to the entry of microorganisms:
 - 1) The intact skin and mucous membranes (mechanical)
 - 2) The Respiratory tract (cilia, cough mechanisms)
 - 3) The Intestinal tract (gastric acid)
 - 4) The Genitourinary tract (mechanical flushing)
 - 5) The Eye (tearing-flushing mechanism)

3) Immune system defenses are:

- Inflammatory response - the tissue reaction in response to irritants and foreign particles.
- Humoral immunity - B lymphocytes are a type of white blood cell that produce antibodies (protein).
- Cell-mediated immunity - this immune response stimulates white blood cells to inactivate foreign particles (T helper and T killer cells).

Don't forget to take a break when you need to.... there's a lot more material to cover

4) **Factors which influence the outcome of an exposure:**

- Impairment of host defenses (nonspecific host defense, immune system)
- Infectivity capable of producing infection.
- Pathogenicity capable of causing disease.
- Virulence of the pathogenic organism - this means its power or ability to cause an adverse body reaction. The less virulent, the more organisms needed to cause infection (size of inoculum).
- The size of the organism - small airborne organisms (i.e., less than 5 microns) will go into the lower respiratory system while larger organisms will be trapped in the upper respiratory system.
- The route of exposure - some organisms can penetrate through breaks in the skin, while others may be ingested and absorbed through the GI tract.
- The duration of exposure - the longer the organism has access to the body, the greater the potential for causing the infection

III. Breaking of the Chain of Infection

Control measures in the Healthcare setting are actions that we can take to decrease an infection risk based on understanding the mode of transmission of microorganisms.

Prevention and control measures target the ENVIRONMENT, the PATHOGEN, AND the HOST and eliminate opportunities for cross-contamination:

A. Recognition and Control of the Reservoir:

- 1) In a human, recognizing the signs and symptoms of an infection such as: fever, cough, or purulent drainage is important so that actions can be taken to prevent transmission.
- 2) Laboratory, radiologic and other diagnostic testing or procedures assist in identifying the cause of the infection.
- 3) Judicious and appropriate antimicrobial therapy
- 4) Eliminating or controlling the inanimate environment that supports the growth of pathogenic organisms.
- 5) Early identification and implementing transmission based isolation precautions.

B. Control of Routes of Transmission

- **Hand Hygiene** is the single most important means of eliminating transient pathogens from hands and preventing the spread of infection among patients, HCWs and visitors.
 - a. Washing hands is a vigorous rubbing together of all surfaces of lathered hands with soap followed by rinsing under a stream of water.
 - b. After hands are washed, avoid recontamination of hands by touching the sink or faucets.
 - c. Reusable soap dispensers must never be topped off with additional soap when the level is low, but rather must be emptied, cleaned, and dried prior to refilling, or replaced. This prevents potential contamination with microbial growth.

- d. Employee hand hygiene is to be completed with a liquid soap or alcohol hand sanitizer.
 - e. When an alcohol sanitizer is used, make sure all surfaces of the hands are covered and allowed to air dry.
 - f. Bar soaps are available at SJHHC for individual patient use only.
 - g. Employee hand hygiene indications:
Personnel should wash their hands with soap and running water or use a alcohol hand sanitizer:
 - Prior to contact with any patients and after removing gloves
 - Before taking care of newborns
 - Before and after touching wounds, whether surgical, traumatic, or associated with an invasive device
 - After situations during which microbial contamination of hands is likely to occur, especially those involving contact with mucous membranes, blood or body fluids, secretions or excretions
 - After touching inanimate sources that are likely to be contaminated with microorganisms, i.e. after they are used for collecting specimens
 - Before starting and after completing duty
 - After using the toilet*
 - After sneezing, coughing on hands or using a tissue*
 - After handling trash
 - Before and after eating
 - After removing sterile or exam gloves (non-sterile)
 - When there is visible soiling*
 - Respiratory hygiene/Cough etiquette
 - Use of masks during spinal/epidural procedure
 - On contact isolation
- * When the hands are visibly soiled, after using the bathroom or sneezing into the hands, they MUST be washed with soap and water when caring for a patient on contact isolation, and per policy.

- **Personal Protective Equipment**

Use of PPE helps to place a mechanical barrier between the infectious agent (pathogen) and the portals of entry in HCWs or patients by use of masks, gloves, gowns, and /or protective eyewear (Refer to Element IV)-important to appropriately don, doff, and dispose of PPE.

- Respiratory hygiene/cough etiquette.
- Use of masks during spinal/epidural procedure.

- **Environmental practices:**

- a. **Housekeeping practices** are essential for healthcare facilities. To eliminate potential reservoirs of pathogens, appropriate cleaning and sanitation of the environment is needed. Clean-up of blood and body fluid spills is the responsibility of everyone and must be accomplished with the use of appropriate germicides/disinfectant and PPE.
- b. **Negative pressure ventilation system** and adequate air exchange patterns have been shown to be effective in decreasing the opportunity for transmission of airborne diseases such as TB and Measles.

- c. Waste management.** All regulated medical waste (bio-hazardous waste) containers should be:
1. Constructed to prevent leakage during handling, storage, and transport;
 2. Labeled or color-coded;
 3. Closed prior to removal to prevent spillage or protrusion of contents; and
 4. Placed in a second leak-proof container if outside contamination of the primary container has occurred.
- d. Sharps management.** The most important means of preventing infection from blood borne pathogens is immediate containment of contaminated sharps (needles, scalpels, glass) in a rigid puncture-resistant container which is red in color or prominently displays a biohazard label. Containers should be sealed and replaced when $\frac{3}{4}$ full. Engineered safety devices, i.e. needles, scalpels, etc, should be used whenever possible and to the extent that they are available.
- e. Linen and laundry management.** Contaminated laundry should be handled as little as possible, with a minimum of agitation. It should be bagged at the location of use and placed in containers. All employees who have contact with contaminated laundry must wear appropriate protective equipment.
- **Engineering controls:** usage of devices with safety features when it is indicated. On November 1, 2000 the “New York State Sharps Safety Act” was signed by the Governor. It added a new article to the health law requiring use of safe sharps and needles by healthcare facilities. The bill provides exceptions to using safety devices for lack of market availability, risk to patient safety, effectiveness of a medical procedure, and lack of evidence showing that a safety device is more effective than a conventional device. The addition of new devices will alter the manner in which a task is performed. Therefore, work practice control is the modification in technique by employees after appropriate training.
 - **Sterilization or disinfection of patient care equipment.**
Any reusable instruments, medical devices, and equipment used for a patient care must be cleaned, disinfected, or sterilized before use on another patient (Refer to Element V).
 - **Isolation/Cohorting individuals with the same Communicable disease.**
The use of isolation precautions is facility-specific. Cohorting or placing patients with the same infection together in the same room is a scientifically acceptable practice, but must be evaluated in relation to the risk and benefit to the patients.

Standard precautions to be used at all times in conjunction with the three isolation categories which require additional precautions where indicated:

1. **Contact:**
 - a. **Direct-contact** transmission by body surface to body surface contact, and the physical transfer of microorganism between infected or colonized person and susceptible host. Transmission most often occurs via the hands of HCWs (e.g. conjunctivitis, MRSA, rabies, scabies, MRSA, VRE)

- b. **Indirect-contact** transmission involves contact of a susceptible host with contaminated objects.
2. **Droplet**, theoretically, is a form of contact transmission. Droplets are generated from the source person primarily during the performance of certain procedures. Droplets are propelled a short distance through the air. Transmission involves contact of the mucous membranes of the nose, mouth, or conjunctivae with a large droplet particle (greater than 5 micron) e.g. influenza, meningitis, meningococemia, mumps, parvo virus B19 (fifth disease).
3. **Airborne**, occurs by dissemination of airborne droplet nuclei (small particle residue less than 5 microns) that remain suspended in the air for long periods of time, or dust particles carrying the infectious agent. Transmission occurs by inhaling these particles, e.g. Measles, pulmonary Tuberculosis, Varicella (chicken pox), and disseminated Herpes zoster (Shingles).
- **Resistant organisms, emerging issues:**
- 1) **MRSA** or Methicillin resistant Staphylococcus aureus: Neonates, most children, and adults are intermittently colonized by Staphylococcus aureus, harboring the organism either in their nasopharynx or on their skin. MRSA is a strain of Staphylococcus aureus that is resistant to Methicillin (Oxacillin or Nafcillin) and, therefore, treatment with Oxacillin is ineffective. MRSA is a pathogen whose incidence has increased steadily in the United States since 1980. Transmission of this organism within the hospital appears to be contact, patient-to-patient, via the hands of personnel. Transient presence of MRSA on the hands of HCWs can occur after patient care procedures such as wound debridement, dressing changes, tracheal care and catheter care. Common sites of recovery of the organism are surgical wounds, respiratory secretions, sputum, IV catheters, indwelling urinary catheters, burn sites, decubitus ulcers and blood.
- A. Prevention of MRSA transmission:
- a. In the hospital:**
1. A private room is required or the patient may be cohorted with another MRSA patient.
 2. Instruments such as disposable stethoscope are kept in the patient's room until discharge.
 3. Disposable equipment such as BP cuff and thermometer to be used and disposed of upon patient discharge.
 4. Patients will be screened for MRSA and placed on isolation according to Infection Control policy if they have been exposed.
 5. MRSA screening that is ordered by the Office of Infection Prevention and Control may include nares, perianal area, open wound, urine if a foley catheter is present, or lines and tube sites. Routine screening orders are generally nares and perianal. See MRSA Roommate Screening Protocol Form 11968.

b. At home:

1. Casual contact, like hugging, holding hands, kissing, etc. does not pose any risk as long as you have good personal hygiene such as thorough and frequent hand washing.
2. Family members should practice good hand washing whenever they care for the patient.
3. If nursing agencies are providing care, personnel should wear gloves and gown since they are also providing care to others.

2) VRE or Vancomycin Resistant Enterococcus. Enterococcus is a bacteria that Normally lives in everyone's intestine; this is called colonization.

The resistant enterococci cannot be treated with many common antibiotics, as well as Vancomycin. VRE can become harmful when you develop signs and symptoms of infection. Since 1997, VRE has become much more common throughout the world.

Specific steps are taken in the hospital and at home to prevent the spread of VRE:

A. In the hospital:

1. A private room is required or the patient may be cohorted with VRE patient.
2. PPE should be worn whenever entering the patient's room (gown & gloves).
3. The gown should be removed with gloved hands, then gloves removed. Hands should then be washed for at least 15-20 seconds with antimicrobial soap.
4. Instruments such as stethoscopes are kept in patient's room until discharge.
5. Disposable items such as BP cuff & thermometer are to be used and disposed of upon patient discharge.
6. The room and instruments are cleaned prior to use by another patient.

B. At home:

1. Casual contact like hugging, holding hands, kissing, etc. does not pose any risk as long as you have good personal hygiene with thorough and frequent hand washing. Always wet your hands then use soap, (Dial, Lever 2000, etc.) rub it into a good lather, count for 15-20 seconds then rinse your hands with running water.
2. Bathrooms should be kept clean. All standard commercially prepared bathroom cleaners (Lysol, Clorox, Tilex, etc.) will kill the VRE bacteria when used according to manufactures instructions.
3. Family members who are care givers should wear gloves if handling urine or stool.

Remember there are bacteria all around us. Our immune system works constantly to prevent us from becoming infected. Good hygiene and careful hand washing prior to leaving the bathroom and before preparing food or meals is only good sense.







- 3) ESBL or Extended Spectrum Beta – Lactamase
These are gram negative bacteria such as E.coli, Klebsiella pneumonia, Klebsiella oxytoca, Serratia and others. The resistance to antibiotics has been genetically mediated. Patients with ESBL will be identified by the laboratory and then be placed on contact isolation.
- 4) CJD or Creutzfeldt-Jakob Disease is a transmissible and progressive neurologic disorder that is also known as spongiform encephalopathy. Transmission is by a proteinaceous infectious agent or “prion”. Standard precautions are used for general patient care but strict adherence to special precautions is needed to prevent exposure to infectious neural tissue.
- 5) VISA/VRSA or Vancomycin Intermediate/Resistant Staphylococcus aureus
 - a) Private room required-may **NOT** be cohorted.
 - b) PPE (gloves & gown) are to be worn by all people (staff & visitors) entering patient room.
 - c) Instruments such as stethoscopes are kept in room until patient discharge.
 - d) Disposable items such as BP cuffs & thermometers are to be used and disposed of when patient discharged.
 - e) The room and instruments are cleaned prior to use by another patient.

Bioterrorist Agents:

The agents such as bacteria, viruses and toxins that are used to cause intentional disease or death against a targeted population are classified as Bioterrorist Agents. See the following table for information on the agents anticipated to be most likely used. Any unusual disease pattern or unexplained increase in the incidences of a common syndrome that is above seasonally expected levels should be reported to the local Health Department.

Transfer or Discharge of Infected Individuals:

When patients are DISCHARGED they must understand the importance of complying with the medical regimen prescribed. This includes medications and ways to prevent the spread of infection. When any patient, with a known or suspected infectious or communicable disease is TRANSFERRED to another healthcare facility, it is essential to communicate any needed isolation and infection control precautions.

BIOTERRORIST AGENTS							
WATCH FOR THESE SYMPTOMS							
Disease	Signs & Symptoms	Incubation Time (Range)	Person-to-Person Transmission	Isolation	Diagnosis	Postexposure Prophylaxis for Adults	Treatment for Adults
Anthrax <i>Bacillus anthracis</i> A. Inhalation 	Flu-like symptoms (fever, fatigue, muscle aches, dyspnea, nonproductive cough, headache), chest pain; possible 1-2 day improvement then rapid respiratory failure and shock. Meningitis may develop.	1 to 6 days (up to 6 wks)	None	Standard Precautions	Chest x-ray evidence of widening mediastinum; obtain sputum and blood culture. Sensitivity and specificity of nasal swabs unknown - do not rely on for diagnosis.	Postexposure Prophylaxis for Adults Prophylaxis for 60 days: Ciprofloxacin* 500 mg PO q 12h Or Doxycycline 100 mg PO q 12h Alternative (if strain susceptible and above contraindicated): Amoxicillin 500 mg PO q 8h *In vitro studies suggest that Levofloxacin 500 mg PO q 24h Or Gatifloxacin 400 mg PO q 24h Or Moxifloxacin 400 mg PO q 24h could be substituted	Inhalation anthrax Combined IWPO therapy for 60d Ciprofloxacin 500 mg q 12h Or Doxycycline 100 mg q 12h, AND 1 or 2 additional drugs (vancomycin, rifampin, imipenem cindamycin, chloramphenicol, clindamycin, and if susceptible penicillin or ampicillin)
B. Cutaneous 	Intense itching followed by painless papular lesions, then vesicular lesions, developing into eschar surrounded by edema.	1 to 12 days	Direct contact with skin lesions may result in cutaneous infection.	Contact Precautions	Peripheral blood smear may demonstrate gram positive bacilli on unspun smear with sepsis.	Recommendations same for pregnant women and immunocompromised persons	Cutaneous anthrax Ciprofloxacin 500 mg PO q 12h Or Doxycycline 100 mg PO 12h
C. Gastrointestinal (GI) 	Abdominal pain, nausea and vomiting, severe diarrhea, GI bleeding, and fever.	1 to 7 days	None	Standard Precautions	Culture blood and stool.	Recommendations same for pregnant women and immunocompromised persons	Recommendations same for pregnant women and immunocompromised persons
Botulism <i>botulinum toxin</i> 	Afebrile, excess mucus in throat, dysphagia, dry mouth and throat, dizziness, then difficulty moving eyes, mild pupillary dilation and nystagmus, intermittent ptosis, indistinct speech, unsteady gait, extreme symmetric descending weakness, flaccid paralysis; generally normal mental status.	Inhalation: 12-80 hours Foodborne: 12-72 hours (2-8 days)	None	Standard Precautions	Laboratory tests available from CDC or Public Health Dept; obtain serum, stool, gastric aspirate and suspect foods prior to administering antitoxin. Differential diagnosis includes polio, Guillain Barre, myasthenia, tick paralysis, CVA, meningococcal meningitis.	Pentavalent toxoid (types A, B, C, D, E) 0.5 ml SQ may be available as investigational product from USAMRIID.	Botulism antitoxins from public health authorities. Supportive care and ventilatory support. Avoid clindamycin and aminoglycosides.
Pneumonic Plague <i>Yersinia pestis</i> 	High fever, cough, hemoptysis, chest pain, nausea and vomiting, headache. Advanced disease: purpuric skin lesions, copious watery or purulent sputum production; respiratory failure in 1 to 6 days.	2-3 days (2-6 days)	Yes, droplet aerosols	Droplet Precautions until 48 hrs of effective antibiotic therapy	A presumptive diagnosis may be made by Gram, Weyson or Wright stain of lymph node aspirates, sputum, or cerebrospinal fluid with gram negative bacilli with bipolar (safety pin) staining.	Doxycycline 100 mg PO q 12h Or Ciprofloxacin 500 mg PO q 12h	Streptomycin 1 gm IM q 12h Or Gentamicin 2 mg/kg, then 1.0 to 1.7 mg/kg IV q 8h Alternatives: Doxycycline 200 mg PO load, then 100 PO mg q 12h Or Ciprofloxacin 400 mg IV q 12h
Smallpox <i>variola virus</i> 	Prodromal period: malaise, fever, rigors, vomiting, headache, and backache. After 2-4 days, skin lesions appear and progress uniformly from macules to papules to vesicles and pustules, mostly on face, neck, palms, soles, and subsequently progress to trunk.	12-14 days (7-17 days)	Yes, airborne droplet nuclei or direct contact with skin lesions or secretions until all scabs separate and fall off (3 to 4 weeks)	Airborne (includes N95 mask) and Contact Precautions	Swab culture of vesicular fluid or scab, send to BL-4 laboratory. All lesions similar in appearance and develop synchronously as opposed to chickenpox. Electron microscopy can differentiate variola virus from varicella.	Early vaccine critical (in less than 4 days). Call CDC for vaccine. Vaccinia immune globulin in special cases - call USAMRIID 301-619-2833.	Supportive care. Previous vaccination against smallpox does not confer lifelong immunity. Potential role for Cidofovir.

C. Support and protection of the Host

- Vaccination: Vaccine preventable diseases are the focus of Employee Health Office programs to ensure the immunity of HCWs (Element VI).
 - a. Influenza vaccine is recommended for those who care for patients. It has been shown that HCWs may carry those viruses into the work environment and transmit infection to their compromised patients.
 - b. Hepatitis B vaccine is recommended for all children and HCWs to prevent Hepatitis B disease. Hep. B is a serious illness, and 20% of those infected will die of liver failure.
- Hepatitis Post-Exposure Prophylaxis: After percutaneous or mucosal exposure to the blood of a patient who is Hepatitis B surface antigen positive, Hepatitis B immune globulin (HBIG) and Hepatitis B vaccine are recommended unless the employee has already been vaccinated or is antibody positive.

Hepatitis B immune globulin (HBIG) for Post- exposure prophylaxis should be given as soon as possible to those unvaccinated or without protective level of antibody. The effectiveness of post exposure prophylaxis is uncertain if it is **DELAYED more than 7 days after exposure** (OSHA Bloodborne pathogen Standard 29CFR 1910.1030).

HIV Post-exposure prophylaxis: After percutaneous or permucosal exposure to the blood of a HIV positive patient, post exposure prophylaxis should be given per Employee Health Office (EHO) policy.

You have now completed the basic content for Element II. The next page pertains to physicians with office practices only. Following the physicians' information are a few review questions for Element II.

Precautions for patients with resistant microorganism in outpatient setting:

It is important that you address your office policy for patients with resistant infection because their numbers will continue to increase. You have the responsibility of notifying consulting physicians, hospitals or other diagnostic centers when referring and scheduling these patients for admission or testing. To deny these patients appropriate management is discriminatory.

In your office:

- Patient records should be flagged with accurate information.

Fundamental elements needed to prevent transmission of infectious agents in ambulatory care settings.

1. Adhere to Standard Precautions and the use of PPE as indicated.
2. Hand Hygiene
3. Infections safety
4. Environmental cleaning
5. Respiratory hygiene/cough etiquette

Please answer the following few questions **on the worksheet** included with this packet. Remember not to write in this learning packet. Thanks!!!

1. The three (3) factors which are necessary for an infection to occur are the presence of a _____, a means of _____, and a _____.
2. The single most important means of eliminating the transient carriage pathogens from your hands is _____.
3. Which of the following are bloodborne pathogens?
 - A. Protozoa and arthropods
 - B. Tuberculosis and E. coli
 - C. HIV and hepatitis B (HBV)
 - D. Candida and C. difficile
4. Deer, bats, and fox are examples of:
 - A. Portals of exit
 - B. Reservoirs
 - C. Susceptible hosts
 - D. Causative agents
5. All of the following are examples of viruses **except**:
 - A. HBV
 - B. HIV
 - C. Candida
 - D. Varicella
6. The primary objective of infection control measures is to:
 - A. Prevent the transmission of infection
 - B. Reduce the incidence of respiratory infections.
 - C. Ensure that sterilization techniques are properly carried out.
 - D. Put patients on isolation.
7. Which of the following statements are true concerning VRE in the hospital environment?
 - A. Hand washing is required for 30 seconds with an antimicrobial soap or use of alcohol rub
 - B. Gown and gloves should be worn whenever entering the patient's room.
 - C. Enterococcus is a normal bowel flora.
 - D. Cleaning procedures must be followed.
 - E. All of the above.
8. New safe sharp devices require the employee to alter their work practices, true or false?
9. Which of the following statements are true concerning Anthrax:
 - A. Person to person transmission of Inhalation Anthrax does not occur.
 - B. Direct contact with skin lesion may result in cutaneous infection.
 - C. Incubation periods vary between inhalation, cutaneous and gastrointestinal Anthrax.
 - D. All of the above.

Now turn the page to check your answers and look at the rationales

Answers/Rationales

1. Pathogen, transmission, susceptible host. These three elements as well as portals of entry/exit make up the chain of infection.
2. Handhygiene. Good handhygiene techniques allow us to break the chain of infection by controlling a significant method of transmission.
3. C, HIV and HBV. The other pathogens listed are transmitted through other means such as contact with contaminated sputum, stool, skin lesions, etc.
4. B, reservoirs. Deer are reservoirs of Lyme disease, bats, and fox of rabies.
5. C, candida. Candida is a yeast/fungus.
6. A, prevent the transmission of infection. While all the answers are correct, b, c, and d are means of achieving the overall goal of prevention.
7. E, all of the above. These steps are necessary to prevent the transmission of VRE to debilitated, hospitalized patients.
8. True. Any new safe device requires education prior to using.
9. D, all the above statements are accurate regarding Anthrax (Bioterrorist Agents Table).

Congratulations!!!! You have now completed Element II. This was a long section, so make sure you take a break when you need one. Read on for information on Element III, information related to reducing exposure to body fluids in the work place.

ELEMENT III

ELEMENT III

USE OF ENGINEERING AND WORK PRACTICE CONTROLS TO REDUCE THE OPPORTUNITY FOR PATIENT AND HEALTHCARE WORKERS 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 reinjection practices, and work practice controls;
- Describe specific high-risk practices and procedures that increase the opportunity for healthcare worker and patient exposure to potentially infectious material;
- Describe specific measures to prevent transmission of bloodborne pathogens from patient up patient, healthcare worker to patient, and patient to healthcare worker via contaminated injection equipment;
- Identify work practice controls designed to eliminate the transmission of blood borne 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.

I. 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:** The equipment, devices, or instruments that remove or isolate a hazard from the work place (e.g., sharps disposal containers, needles with a safety feature, local exhaust ventilation).
- **Infection 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.
- **Work Practice Controls:** The policies and/or procedures that reduce or eliminate the likelihood of exposure by altering the manner in which a task is performed.

CONTENT OUTLINE

1. 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/disassembling/disposal/reprocessing of contaminated needles and other 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 on counters/workspaces or disposing in non-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 suction).

C. Parenteral Exposure:

1. Injection with infectious material
 - Sharing of blood monitor devices.
2. Infusion of contaminated blood products or fluids.
3. Administration of parenteral medications

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 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 infection supplies and materials are potentially contaminated and should be discarded.

C. Providers should:

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 in to 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:
 - 1) Never combine leftover contents for later use;
 - 2) Medications packaged as multi-use should be assigned to a single patient whenever possible;
 - 3) 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.

- A. 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)
 - c. 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,
 - 1. Avoid recapping unless absolutely medically necessary.
 - 2. When recapping, use only a one-hand technique or safety device.
 - 3. Pass sharp instruments by use of designated “safe zones”.
 - 4. Disassemble sharp equipment by use of forceps or other devices.

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. Appropriate use of safety devices whenever available:
 - a. Always activate safety features.
 - b. Never circumvent safety features.

III. Evaluation/Surveillance of exposure incidents

- A. Identification of those at risk for exposure - OSHA job description exposure class I. Job description that involves routine or potential exposure to blood, other body fluids. Those persons at risk can include:

- 1. The person performing the procedure;
- 2. The assistants;
- 3. Observers of the procedure; and
- 4. The patient (although not under OSHA jurisdiction)

This identification should take place prior to beginning the procedure. Enforcing compliance with proper use of engineering controls, administrative/work practice controls and use of personal protective equipment (PPE) is the **responsibility of every member of the healthcare team.**

- B. Identification of those devices causing exposure--* All sharps devices can cause injury and disease transmission if not used and disposed properly.
 - 1. Devices with higher disease transmission risk, like hollow bore needles
 - 2. Devices with higher injury rates, like butterflies with attached tubing that has recoil action.
 - 3. Blood glucose monitoring devices
- C. Identification of areas/settings where exposures occur
- D. Post exposure management (See element VI)

IV. Engineering controls which eliminate or isolate the hazard

- A. Use safer devices whenever possible to prevent sharps injuries
 - 1. Strategies
 - a. Proper evaluation and selection of safer devices
 - b. Safe devices for needle stick prevention. Safe devices have two types of Safety features:
 - 1) Passive safety feature:
Passive safety features are products in which the safety feature is “automatic”, in other words they do not require an action on the part of HCW(user) to activate the protective safety features.
 - 2) Active safety feature:
Active safety features are products in which the safety feature is not “automatic”, and that require the HCW (user) to activate the safety mechanism.
 - 2. Proper education and training on safer devices
 - 3. Mechanisms that provide continuous protection immediately
 - 4. Consider eliminating the traditional or non-safety alternative whenever possible.
 - B. Puncture-resistant containers for the disposal, transport of needles and other sharps:
Disposable sharps must be discarded immediately or as soon as possible into a container that is closeable, puncture-resistant, and leak-proof on the sides and bottom. The container must be labeled with a biohazard sign or red in color. The container must be installed at eye level with drop tray no higher than 57” high, optimally between 52” and 56” and must remain upright throughout use, be replaced routinely, and not be allowed to be overfilled. It is recommended to change needle containers when they have become ¾ full. It has to be closed before disposal or removal. The National Institute for Occupational Health and Safety and Health (NIOSH) published guidelines for the selecting and use of sharps disposal containers.
 - C. Splatter shields on medical equipment associated with risk prone procedures (locking centrifuge lids)

V. Work practice controls to eliminate or reduce the likelihood of exposure to potentially infectious material

A. General Practices

- 1) Reinforcing Hospital and Infection Prevention and Control policies and procedures.
- 2) Proper containment of blood and body fluid specimens in leak resistant containers
- 3) Not eating, drinking, and applying cosmetics or lip balm in work areas where blood/body fluids are handled
- 4) Use of PPE during cleaning of equipment.
 - Proper protection of work surfaces in direct proximity to patient procedure treatment area with appropriate barriers to prevent instruments from becoming contaminated with blood and body fluids.
- 5) PPE should be used and disposed of properly by all HCWs who perform, assist, or observe procedures that may result in splashing or spraying of blood or body fluids. Procedures such as:
 - endotracheal suctioning;
 - bronchoscopies;
 - surgical procedures
 - dental procedures
 - invasive procedures
 - drawing arterial blood gases;
 - administering Cardio Pulmonary Resuscitation; and
 - intubations or airway insertions
 - etc....
- 6) Gloves must be worn when there is reasonable likelihood of hand contact with blood and body fluids.
- 7) Gowns, pants, gloves, etc. should be worn over any areas of non-intact skin when any blood or body fluid is handled.
- 8) Careful HAND HYGIENE
- 9) Prompt cleaning with appropriate disinfectant
- 10) Proper disposal/handling of blood and body fluids including contaminated patient care items
- 11) Prompt clean-up of blood/body fluid spills
- 12) Cleaning/rinsing reusable instruments of visible soiling with blood and body fluids prior to soaking in enzyme solution

B. For percutaneous exposure

- 1) Avoiding the unnecessary use of needles and sharps
- 2) Using care in the handling and disposal of needles and other sharps devices:
 - a. Not recapping needles or using an appropriate one-handed technique in situations when recapping is necessary
 - b. Establishing safe zones for the passing of sharp instruments during surgical procedures

- c. Using forceps to disassemble sharp equipment
 - d. Placing reusable sharps in a closed, puncture-resistant container for transport to the reprocessing area
 - e. Being familiar with proper safety device activation prior to using sharps
 - f. Discard sharps into a puncture-resistant sharps container immediately after use.
- C. Modifying procedures to avoid injury
- a. Using forceps, suture holders, or other instruments during suturing procedures
 - b. Holding tissue with an instrument instead of the fingers
 - c. Removing sharps from an operative/procedure field as soon as possible
 - d. Monitoring for compliance with safe work standards and policies/procedures
 - e. Being familiar with proper safety device activation prior to using sharps
- D. Appropriate use of safety devices whenever available
- 1. Always activating the safety feature
 - 2. Not circumventing the safety feature

VI. Prevention and control of airborne pathogens

A. Tuberculosis:

Pulmonary tuberculosis should be suspected in persons with a productive, prolonged cough (over 3 weeks duration), fever, chills, night sweats, easy fatigability, loss of appetite, weight loss, and hemoptysis. The history of exposure to tuberculosis and of previous tuberculosis infection or clinically active disease should be elicited whenever the diagnosis of tuberculosis is entertained. Persons with suspected tuberculosis should be referred for an appropriate examination which should normally include a history, a physical examination, tuberculin skin test, a chest radiograph, and appropriate bacteriologic and/or histologic examinations. A positive bacteriologic culture for *M.tuberculosis* is essential to confirm the diagnosis of tuberculosis. The chest radiograph may be helpful in making the diagnosis but is never diagnostic for tuberculosis. Initial reports of positive smears or cultures should be reported within 24 hours by telephone to the health department so that a contact investigation can be initiated as quickly as possible.

- 1) **Inpatients**- the Infection Control Office reports positive and suspicious clinical presentations to Health Department.
- 2) **Outpatients**- must be reported by the healthcare provider.

B. Control Measures for suspect cases:

- 1) Early identification, appropriate isolation for patients, and treatment of TB disease
- 2) Education of patients to cover their mouth when coughing, and wearing a mask when it is medically necessary to leave the isolation room
- 3) Triage and separate patients with possible TB disease in ER, waiting rooms, out-patient areas, or provide those patients with a surgical mask to wear

C. Engineering controls to prevent transmission

- 1) Isolation rooms
 - a. negative pressure
 - b. appropriate air exchanges - 6 - 12 air changes occur inside the room per hour using minimally 2 exchanges of fresh air
 - c. direct exhaust to the outside air
 - d. keep doors to negative pressure room closed to prevent air contamination of areas outside the room.
- 2) HEPA filtration
- 3) Ultraviolet irradiation if available

D. Personal Protective Equipment (PPE) [Element IV]

- 1) Respiratory protection [Particulate Filter Respirator (PFR) N-95 mask] should be worn by all persons with potential exposure to TB even when administrative and engineering controls are in place. PFR N-95 masks require annual fit testing and a check each time the mask is worn.
- 2) Particulate respirators are protective devices which have been tested for their ability to trap small particles.
- 3) **Occupational Safety and Health Administration (OSHA)** is requiring the use of a HEPA filtered respirator or a mask with PFR N-95 filtration abilities.
- 4) **National Institute for Occupational Safety (NIOSH)** certifies a respirator for TB. An example of a respirator is the Powered Air Purifying Respirator (PAPR)
- 5) **MSHA (Mine Safety and Health Administration)** certifies respirator for specific substances
- 6) For use of respiratory protection mask, the healthcare worker should go through a program with **fit testing and fit checking**

E Special considerations

- 1) Operating suites (positive pressure) – the OR must have a specific policy for the management of a suspected or known TB patient. The policy should include the following:
 - a. Designated room based on the air exhaust pattern
 - b. Written procedures for preventing the contamination of the core environment
 - c. Written cleaning procedure
- 2) Identify procedures associated with transmission of extrapulmonary TB, such as irrigations, cautery, etc.
- 3) Transportation of potentially infectious patients should only be done if ordered procedure or treatment is life saving or limb sparing. Patient must be transported wearing a surgical mask.

Now just turn the page for a few questions to help you review the information from Element III

Remember not to write in this booklet, use the worksheet provided to answer the following questions. Good luck!!

Review questions for Element III

1. Enforcing compliance with proper use of engineering controls, work practice controls and PPE's is the responsibility of only the licensed healthcare worker (HCW).
True or false?

2. Engineering controls are equipment, devices that remove or isolate a hazardous material from the work place.
True or false?

3. Avoiding the unnecessary use of needles and sharps is an example of a _____ control.

4. An example of a mucous membrane exposure is
 - A. A needle stick
 - B. A splashing of amniotic fluid into the eyes
 - C. An injury which occurs while removing sharps from a surgical field
 - D. None of the above

5. Which of the following statements are true concerning caring for a patient with pulmonary tuberculosis (TB) in the hospital?
 - A. The patient should be in a negative pressure room.
 - B. PFR N-95 masks should be worn by healthcare workers (HCW) when caring for a patient with TB and r/o TB.
 - C. Patients with pulmonary TB or r/o TB should be out of negative pressure rooms only when ordered procedure or treatment is life or limb sparing.
 - D. Patients being transported for life saving or limb sparing procedures or treatments should wear a surgical mask.
 - E. All of the above

Answers and rationales are located on next page.

Answers/Rationales:

1. False. It is the responsibility of every member of the healthcare team to enforce compliance.
2. True. Examples of these controls include puncture resistant sharps disposal containers, protected needles, needleless IV systems, and other devices with a protective barrier. These measures are used first to decrease the possibility of exposures.
3. Work practice. Work practice controls are safety measures, which are used to decrease risk of exposures as opposed to safety equipment. This particular practice helps reduce percutaneous exposure.
4. B. This is an exposure of mucous membrane to a body fluid. Responses A and C are examples of percutaneous exposures.
5. E. Patients should be in negative pressure rooms to limit airborne droplet transmission. Use of properly fitted PFR N-95 masks which have been tested for their ability to trap small particles. Patients should be out of their rooms as little as possible. When out of their rooms, they need to wear surgical masks. PFR N-95 masks are only worn by staff members who have been properly fitted for them. Surgical masks are also worn by family members and visitors.

Congratulations you are through this long section of information!!!!!!!!!!.

End of
Element III

ELEMENT IV

ELEMENT IV

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

LEARNING OBJECTIVES:

Upon completion of training in this element, the learner will be able to:

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

DEFINITIONS:

- Barriers: Equipment such as gloves, gowns, apron, masks, or protective eyewear, which when worn, can reduce the risk of exposure of the health care worker's skin or mucous membranes to potentially infective materials.
- Personal protective equipment (PPE): Specialized clothing or equipment worn by an employee for protection against a hazard.
- Medical Asepsis: Medical practices that reduce the number of organisms and/or prevent or reduce their transmission from one person to another.
- Surgical Asepsis: "Sterile technique" refers to practices designed to keep objects and areas maximally free from microorganisms.

Turn the page to begin Element IV content.

CONTENT OUTLINE:**I. Types of PPE/barriers and criteria for selection.****A. Gloves:**

1. Types (sterile, non-sterile, utility);
2. Sterile vs non sterile
3. Material (e.g., natural rubber latex, vinyl, nitrile).

B. Cover garb:

1. Indications
2. Types (gowns, aprons, laboratory coats);
3. Permeability

C. Masks:

1. Types (surgical, procedure particulate respirators)

D. PAPR**E. Face shields.****F. Fluid shields****G. Eye protection (goggles, safety glasses).****H. Shoe covers, leg covers, boots, and head covers****II. Wound Dressings****III. General Information****A. Choosing barriers/PPE passed on intended need****B. Guidance on proper utilization of PPE/barriers**

- a. Proper fit
- b. Integrity of barrier
- c. Disposable vs. reusable
- d. Potential for cross-contamination
- e. Implications of over/under utilizations
- f. PPE does not replace hand hygiene

I. TYPES OF PPE AND BARRIERS:

A. Gloves: (latex, vinyl, nitril, utility)

1. Indications: Gloves must be worn for all anticipated hand contact with blood or any other body fluid, excretion or secretion with the exception of sweat.

Gloves can NOT be washed, disinfected, or sterilized for reuse (with the exception of utility gloves). These gloves must be changed between patients. Hand hygiene must be performed before and after the gloves are worn.

2. Sterile vs. Non-sterile Gloves:

- a. Sterile gloves are to be used in surgery or other procedures where normal host defenses are interrupted and there is potential for infection, as well as to prevent transmission of microorganisms between HCW and patient (e.g., surgical procedure, insertion of central venous catheters, insertion of urinary catheters, etc.).
- b. Non-sterile gloves are used to prevent transmission of microorganisms between HCW and patient in situations where sterility is not required (e.g., vaginal exams, emptying containers with body fluids, phlebotomy, inserting a peripheral IV catheter, etc.)
- c. Utility gloves are used for heavy-duty housekeeping chores, when handling and transporting trash, and in decontamination areas. These may be reused after decontamination as long as they are not cracked, peeling, torn, or punctured. These gloves should be washed before taking them off.

3. Glove materials:

- a. Latex has been the “gold standard” in the past for protection of HCW ↔ patient disease transmission.

Latex gloves are allowed a 4% pin prick factor which means they are not 100% occlusive. When these gloves are torn or contaminated they must be replaced as soon as is practical.

There are many issues of concern related to the use of latex powdered gloves:

1. Latex allergies
 2. Latex sensitivities
 3. Other sensitivities related to the powders, proteins or processing procedures of these gloves.
- b. Vinyl gloves were never thought to be as protective as latex.

- Recent literature supports vinyl gloves are an adequate barrier in the prevention of disease transmission.
- Quality vinyl gloves that fit properly, are used properly, and are changed when contaminated or torn, will provide an adequate barrier to prevent the transmission of microorganisms.
- Many healthcare settings have been using vinyl gloves as the rates of sensitivities and allergies have increased.

c. Hypo-allergenic products such as Nitril are the current exam gloves on the units.

B. Cover garb (clothing)

1. Indications: protective attire to prevent contamination of the skin and mucous membrane, as well as work clothes and undergarments (regular work clothes, uniforms, or surgical scrubs are not considered protective attire).

2. Types:

- a. Gowns with sleeves are indicated in surgery and obstetrics and/or when spraying or splashing of blood or body fluid is anticipated. Disposable gowns are required to enter rooms of those on Contact Isolation.
- b. Aprons without sleeves may be worn if lesser exposure is likely.
- c. Laboratory coats are worn in the laboratory setting per guidelines issued for laboratories and should be considered part of a dress code. Laboratory coats are not protective clothing or considered PPE outside the laboratory.

3. Permeability

- a. Permeable - easily penetrated by fluids.
- b. Resistant - designed to repel fluids under normal circumstances, however large volumes of fluid or fluids under high pressure will eventually strike through.
- c. Impervious - fluids will not strike through.

You must be familiar with the practices in your particular setting and the protective wear provided. Policies and procedures will assist you in selecting the appropriate cover clothing.

C. Masks

Types:

- a. Surgical masks are used to protect the patient from the nasal or oral drainage of healthcare personnel and simultaneously protect the mucous membrane of the HCW (nose and mouth) from exposure to splashes of blood or body fluid.

* Remember, if mucous membrane protection for the nose and mouth of the HCW is indicated, then eye protection would also be necessary.

- b. Particulate filter respirator masks (PFR) are designed to protect the wearer from:
 - 1. Inhalation of foreign debris like dusts, mists, fumes, etc., and
 - 2. Inhalation of infectious airborne or aerosolized particles like Mycobacterium tuberculosis.

In the hospital setting, surgical masks are sufficient protection for bacterial meningitis, pertussis, and N-95 masks are used by the HCW for protection from pulmonary tuberculosis, smallpox, anthrax, measles, chicken pox, etc and avian flu.

There are several types of particulate filter respirators each having different filtration qualities depending on their intended use.

- Dust-mist
- Dust-mist-fume
- PFR N-95
- HEPA filters

The HEPA filter mask has the highest level of filtering ability.

Currently, the acceptable mask for prevention of exposure to TB is either a HEPA filter mask or a PFR mask with N-95 filtration abilities. Depending on the manufacturer, these can be different colors or shapes. It is the responsibility of the employer that the wearer is properly fit tested for size and is taught to perform a fit check each time the mask is worn. The fit check ensures that there is an adequate seal that prevents contaminated air from being drawn in around the edges of the mask.

- c. PAPR (Powered Air Purifying Respirator). This device is a hood with an attached power source that will provide protection against airborne droplet nuclei when an employee cannot be fit tested for a PFR/N-95 mask. This hood can be utilized for emergency situations and for men with facial hair that cannot be fit tested. When this hood is used in the OR, a surgical mask must also be worn under the hood.
- d. Face shields are designed to protect the mucous membrane of the eyes, nose, and mouth from splash contamination with blood or body fluids. This would be an acceptable alternative to a combination of mask and goggles. This does NOT provide airborne protection for TB disease. Masks with face shields attached should be routinely stocked in all patient rooms.
- e. Fluid shields are designed to protect the mucous membrane from exposure to blood and body fluids. This type of shield can be used in the OR and Decontamination Room.

- f. Eye protection or goggles are required whenever splashes of blood or body fluid may be generated. Eye protection **MUST** include solid side shields. Ordinary eyeglasses are not acceptable unless a solid side shield is added.
- g. Shoe covers, leg covers, boots, and head covers are long established attire in operating rooms, attempting to reduce contamination of the operative field and provide barriers for exposure to blood and body fluids.

II. WOUND DRESSINGS:

Other barriers, like wound dressings, help reduce the risk of exposure to blood and body fluids.

III. General Information:

- A. Choose barrier/PPE based on the type of protection needed and considering the procedure being performed. For example:
 - Full sterile barrier precautions are used for the person inserting and any persons assisting with central line insertion. This protects the patient from contamination of insertion site. Full sterile barrier precautions with the addition of a mask with face shield protects the HCW mucous membranes from contact with the patient's blood or body fluids.
- B. Guidance on proper application of PPE/barriers for protection. The OSHA Bloodborne Pathogen Standard of 1991 requires employers to provide PPE and ensure compliance with its use.
 - a. Proper fit- All PPE must fit correctly and be worn properly.
 - b. Integrity of barrier
 - c. Disposable vs. reusable barriers/PPE – Disposable items should not be reused.
 - d. Potential for cross-contamination if not changed between patients
 - e. Implications of over/under-utilization of barriers/PPE – under utilization of PPE puts patient and HCW's at unnecessary risk. Over utilization of PPE wastes resources, intimidates patients and families, and may interfere with the delivery of effective patient care.
 - f. Wearing of PPE DOES NOT REPLACE HAND HYGIENE.

YOU ARE RESPONSIBLE FOR PROTECTING YOURSELF, YOUR PATIENTS, AND THOSE PERSONS WHO ASSIST YOU IN PROCEDURES THAT MAY LEAD TO SPLASHES OF BODY FLUIDS.

You have completed the content for ELEMENT IV. Turn the page to review a few questions.

Now it's time to review some of the information you just read about in Element IV....
Answer the following questions on the worksheet provided. Then turn the page to review your answers. Rationales for the answers are also provided. You may also look back in the text for any answers that you don't recall.

***PLEASE DON'T WRITE IN THE BOOKLET ITSELF.**

Please answer True or False for questions 1 - 4:

1. Sterile gloves are worn when performing a vaginal exam.
2. It is necessary to perform hand hygiene after gloves are removed.
3. Quality vinyl gloves that fit properly and are used properly provide adequate barrier to prevent the transmission of infection
4. Health care workers (HCW's) must wear a PFR N-95 mask are when caring for a patient with pulmonary TB or r/o TB and Smallpox or r/o Smallpox.
5. What minimum Personal Protective Equipment is necessary to prevent potential blood and body fluid exposure when providing patient care? _____
6. Fluid resistant means that:
 - A. It is impermeable.
 - B. Fluids will not pass through the fabric.
 - C. Fluids easily penetrate the fabric.
 - D. It will repel fluids under normal circumstances.
7. Which of the following people should wear a PFR N-95 mask (duck bill or cone shape) when in contact with a patient with TB?
 - A. HCW who has been fit tested
 - B. All HCW's
 - C. The patient when transported for medically necessary testing
 - D. Visitors
 - E. B, C, and D
 - F. A, C, and D

Answers/Rationales:

1. False. Non-sterile gloves are worn to prevent the transmission of microorganisms and when, sterility is not required.
2. True. Microorganisms will multiply in the warm, dark, moist environment inside gloves.
3. True. As the incidence of latex allergies increases, gloves made from other non-latex materials will eventually replace them.
4. True. PFR N-95 masks have filtering power sufficient to protect the HCW from Transmission of pulmonary TB and small pox.
5. Gloves. Minimally, gloves must be worn in any situation that has the potential for exposure to blood or body fluids. Additional protective equipment may be necessary for prevention of transmission by other routes.
6. “D”. The definition of fluid resistant gown states that fluids are repelled under normal conditions however, large volumes of fluid or fluids under high pressure will eventually strike through.
7. “A”. Only those healthcare workers who have been fit tested should wear PFR N-95 masks. Visitors and patients being transported should wear surgical masks. HCW's who have not been fit tested should not be taking care of this patient !!!

Pretty painless, right? You have now completed Element IV. Only 2 more sections and the post test.

ELEMENT V

ELEMENT V

CREATION AND MAINTENANCE OF A SAFE ENVIRONMENT FOR PATIENT CARE THROUGH THE APPLICATION OF INFECTION CONTROL PRINCIPLES AND PRACTICES FOR CLEANING, DISINFECTION, AND STERILIZATION

Learning Objectives:

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

- Define cleaning, disinfection, and sterilization;
- Differentiate between non-critical, semi-critical, and critical medical devices;
- Describe the three levels of disinfection;
- 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;
- 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.

Content Outline

- I. Definitions
- II. General Information
- III. Universal Principles
- IV. Disease Transmission by Contaminated Equipment
- V. Principles of Cleaning
- VI. Disinfection
- VII. Sterilization
- VIII. Cross Contamination in the Healthcare Environment
- IX. Reuse of Disposable Equipment or Devices
- X. Soiled Linen
- XI. Regulated Medical Waste

I. DEFINITIONS

Contamination: The presence of microorganisms on an item or surface.

External Contamination:

- External contamination occurs when devices such as BP cuffs, oximeters, or electronic thermometers are used between patients.

Internal Contamination:

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

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. 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: 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 US FDA.

Intermediate-level Disinfection: Disinfection that kills mycobacteria, most viruses, and bacteria using a chemical germicide registered as a “tuberculocide” by the US 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. It required 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.

Sterilization: The use of a physical or chemical procedure to destroy all microbial life, including highly resistant bacterial endospores.

II. GENERAL INFORMATION

- A. Recognizing differing levels of disinfection/sterilization methods and agents based on the area of professional practice setting and scope of responsibilities.
 1. Knowledge expectations of health professionals who practice in settings where the responsibility of handling, cleaning, and processing equipment or devices is performed elsewhere (Central Sterile Processing, Endoscopy unit, or Nursing unit).
 - a. Standard precautions
 - b. Basic concepts and principles of cleaning, disinfection, and sterilization described above.

- c. Appropriate application of safe practices for handling devices and equipment in the area of professional practice.
 2. Knowledge expectations of individuals who have primary or supervisory responsibilities for equipment or device reprocessing (Central Sterile staff or clinics and physician practices where medical equipment is reprocessed on site).
 - a. Standard precautions.
 - b. Core concepts and principles of cleaning, disinfection, and sterilization described above.
 - c. Appropriate application of safe practices for handling devices and equipment in the area of professional practice.
 - d. Designation and physical separation of patient care areas from cleaning and reposing areas is strongly recommended by NYSDOH.
 3. Considerations for the selection of appropriate methods.
 - a. Disinfectant efficacy
 - b. Time constraints and requirements for various methods
 - c. Compatibility with equipment/materials
 - corrosiveness
 - penetrability
 - heat tolerance
 - moisture sensitivity
 - Leaching
 - Disintegration
 - d. Toxicity
 - occupation health risks
 - environmental hazards
 - abatement methods
 - monitoring exposures if necessary
 - potential for patient toxicity
 - e. Residual effect
 - antibacterial residual
 - patient toxicity
 - f. Ease of use
 - need for special equipment
 - training requirements

g. Stability

- concentration
- potency
- efficacy of use
- effect of organic material

h. Odor

i. Cost

j. Ability to monitor process

- methods for monitoring
- current recommendations for monitoring frequency

k. FDA regulations for reuse of single use devices

- B. Cleaning, disinfection, and sterilization play a major role in the prevention of infections related to the introduction of microorganisms from contaminated equipment, supplies, or the environment.
- C. When breaches in infection control practice occur, the risk is to the patient. The risk for the patient is greatest when invasive procedures are performed.
- D. There may be additional risks for employees to become colonized and/or infected during processing of equipment if strict adherence to infection control practice (wearing PPE) is not followed.
- E. All healthcare settings need to have established policies for disposal and/or reprocessing of supplies. These policies should include but are not limited to:
1. Procedure for reprocessing reusable equipment or supplies appropriate for each type of material and its intended use in patient care. (See FDA guidelines for reprocessing)
 2. Work flow patterns *from* soiled/contaminated *to* clean/sterile areas.
 3. Procedure for receiving and storing clean/sterile supplies and to provide for rotation to avoid outdating of supplies.
 4. Procedure for recall of products from commercial suppliers and from in-house preparation.
- F. Every healthcare setting should develop monitoring systems, to include:
1. Monitoring of the sterilization process with results recorded in a permanent log or record.
 2. Recall of items if monitors indicate sterilization is not complete.

3. Designated shelf life of each sterilized item, or event related sterilization policies (event related sterilization instituted here in November 1995).
4. Checking and recalling outdated supplies to reprocess or discard as appropriate.

G. Classification of items: Instruments and items for patient care are divided into 3 categories based on the degree of risk of infection involved in the use of the items. The 3 categories are critical items, semi-critical items, and non-critical items.

1. **Critical Instruments and Devices:** Those which are directly introduced into the human body either into or in contact with the bloodstream or normally sterile areas of the body. Critical medical devices require sterilization.

NOTE: The risk of patients acquiring an infection, if the item is improperly decontaminated and processed, is substantial.

Scrupulous physical or mechanical cleaning is required prior to sterilization.

EXAMPLES: Surgical and dental instruments and devices
 Drainage catheters (nephrostomy, biliary, etc.)
 Needles, syringes
 Arthroscopes, laparoscopes
 Endoscopic biopsy forceps, cannulas and guide wires
 Implantable devices
 Transducer heads
 Culdoscopes
 Intravascular catheters, etc.
 Probes used in sterile body cavities

2. **Semi-Critical Instruments and Devices:** Those items or objects which come in contact with mucous membranes (eyes, nose, mouth, genito-urinary) or non-intact skin. Minimally require high-level disinfection using chemical disinfectants; sterilize, if feasible.

Meticulous physical or mechanical cleaning is required prior to any disinfection/sterilization process.

EXAMPLES: Endoscopes
 Endotracheal tubes
 Anesthesia breathing circuits
 Respiratory Therapy equipment
 Dental x-ray jackets
 Vaginal speculums
 ENT exam instruments
 Laryngoscope blades
 Esophageal manometry probes
 Anorectal manometry catheters
 Diaphragm fitting rings

Note: The CDC recommends that scopes be sterilized, if feasible, and if sterilization is not feasible, high level disinfection should be utilized. There is currently no data to prove that sterilization of scopes reduces the risk of infection as compared to proper cleaning and high level disinfection. However, since there is also no data to prove that proper cleaning and high level disinfection eliminates the potential for cross-contamination, sterilization following cleaning is the preferred method.

3. **Non-Critical Instruments and Devices:** Instruments, devices, or equipment that come in contact with intact skin, but not mucus membranes. Use of such items carries relatively little risk of transmitting infection directly to patients.

Intermediate to low-level disinfection is acceptable for this category of equipment.

EXAMPLES: Blood pressure cuffs
 Crutches
 Cardiac diagnostic electrodes
 Bed boards
 Stretchers
 Electronic thermometers
 Glucometers
 Bed pans
 Bed rails
 Linens
 Bedside tables
 Patient furniture
 Floors

III. 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 suspect 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 procedures.
- C. Written instructions should be available for each instrument, medical device, and equipment reprocessed.
- D. Potential for contamination is dependent upon:
 1. Type of instrument, medical device, equipment, and/or environmental surface
 - a. Potential for external contamination (e.g., presence of hinges, crevices)
 - b. Potential for internal contamination (e.g., presence of lumens)
 - c. Physical composition, design, or configuration of the instrument, medical device equipment, or environmental surface

2. Frequency of hand contact with instrument, medical device, equipment, or environmental surface.
 3. Potential for contamination with body substances or environmental sources of microorganisms.
 4. Level of contamination.
 - a. Types of microorganisms
 - b. Number of microorganisms
 - c. Potential for cross-contamination
- E. Steps of Reprocessing
1. Pre-cleaning
 - a. Removes soil, debris, and lubricants from internal and external surfaces
 - b. To be done as soon as possible after use
 2. Cleaning
 - a. Manual (e.g., scrubbing with brushes)
 - b. Mechanical (e.g., automated washers)
 - c. Appropriate use and reprocessing of cleaning equipment (e.g., do not reuse disposable cleaning equipment)
 - d. Frequency of solution changes
 3. Disinfection-requires sufficient contact time with chemical solution
 4. Sterilization-requires sufficient exposure time to heat, chemicals, or gases
- F. Choice/Level of reprocessing sequence
1. Based on intended use (see definitions):
 - a. Critical instruments and medical devices require sterilization
 - b. Semi critical instruments and medical devices minimally require high level disinfection
 - c. Noncritical instruments and medical devices minimally require cleaning and low level disinfection
 2. Based on manufacturer's recommendations
 - a. Compatibility among equipment components, materials, and chemicals used
 - b. Equipment heat and pressure tolerance
 - c. Time and temperature requirements for reprocessing
- G. Effectiveness of reprocessing instruments, medical devices, and equipment
1. Cleaning prior to disinfection
 2. Disinfection
 - a. Selection and use of disinfectants
 - i. Surface products
 - ii Immersion products
 - b. Presence of organic matter
 - c. Presence of biofilms

- d. Monitoring
 - Activity and stability of disinfectant
 - Contact time with internal and external components
 - Record keeping/tracking of instrument usage and reprocessing
 - e. Post-disinfection handling and storage
3. Sterilization
- a. Selection and use of methods
 - b. Monitoring
 - Biologic monitors
 - Process monitors (tape, indicator strips, etc.)
 - Physical monitors (pressure, temperature gauges)
 - Record keeping and recall/tracking system for each sterilization processing batch/item
 - c. Post-sterilization handling, packaging and storage (event-related criteria)

IV. DISEASE TRANSMISSION BY CONTAMINATED EQUIPMENT

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

Examples are:

1. Endoscopes-colitis
2. Bronchoscopes-pneumonia
3. Tonometers-eye infection
4. GU equipment-contaminated urinary drainage system or cystoscopes leading to urinary tract infection and possible blood stream infection
5. Vascular access devices-contamination of these devices at the time of insertion or subsequent contamination could result in blood stream infection

B. Contributing factors in reported cases:

1. Inadequate cleaning. Examples: inadequately cleaned commodes contributing to transmission of Clostridium difficile colitis; inadequate clean-up of blood spills contributing to transmission of Hepatitis B
2. Inadequate disinfection/sterilization process. Example: inadequately sterilized instruments increasing post-operative wound infection rates
3. Contamination of disinfectant or rinse solution. Example: Pseudomonas-contaminated disinfectant causing contamination of bronchoscopes; C. difficile-contaminated endoscopes
4. Reuse of disposable equipment. Example: reuse of disposable platforms on glucometers linked with transmission of Hepatitis B
5. Failure to reprocess or dispose of equipment between patients. Example: transmission of S. aureus, Hepatitis B, and numerous other pathogens.
6. Improper storage, handling, and packaging
7. Degree of frequency of hand contact. The more a device is handled with unwashed hands the higher the degree of contamination.
8. Inadequate/inaccurate record keeping of reprocessing requirements
9. Breaks in Infection Control practices during handling or reprocessing of equipment

- C. Level of contamination
 1. Type(s) of microorganism(s)
 2. Number of microorganism(s)
- D. Potential for cross-contamination

V. PRINCIPLES OF CLEANING

- A. Thoroughness of internal and external physical cleaning is vital to the process. Prior to disinfection, the item must be thoroughly cleaned and rinsed since organic debris and residual detergent may inactivate the disinfectant. More complex equipment creates opportunities for breaks in this process. *Example:* multiple internal channels in endoscopic equipment must be thoroughly washed and rinsed prior to disinfection.
- B. Soil prevents contact between microbes and lethal agents (disinfectants, sterilants) and may directly inactivate these agents.
- C. Manual or mechanical cleaning eliminates a large number of microorganisms present on objects, with or without visible contamination.
- D. Sound cleaning practices, in addition to their aesthetic benefits, reduce the microbial load on environmental surfaces (hospital approved disinfectant).
- E. Manufacturer's recommendations for operation of cleaning equipment and use of cleaning supplies must be followed carefully.
- F. Pre-soaking instruments vs. immediate transport to a central reprocessing area. Pre-soaking in detergent-disinfectant solution is preferred when delays in reprocessing are unavoidable.
- G. Choice of reprocessing method should be based on:
 - a. Intended use of the equipment or device (critical, semi-critical, and non-critical)
 - b. Manufacturer's recommendations for reprocessing

VI. DISINFECTION-use of an EPA approved chemical germicide to destroy or irreversibly inactivate infectious organisms, but not necessarily their spores. Disinfectants can be concentrated liquids, ready to use liquids, powders, or sprays.

- A. The effectiveness of the disinfection process depends on:
 1. Cleaning and removing visible soil prior to disinfection
 2. Selecting and appropriately using disinfectants
 3. Monitoring activity of disinfectants (frequency of solution change, solution testing)
 4. Handling and storing the equipment after disinfection
 5. Disinfectant concentration and contact time
 6. Complexity and physical properties of product or device
 7. Type and density of microbial contamination
 8. Temperature and relative humidity

B. Types of disinfectants

1. **Alcohol** (ethyl or isopropyl): intermediate level disinfection
2. **Aldehyde solutions**: high level disinfection
3. **Hypochlorites** (e.g., chlorine bleach) at 1:10 to 1:100 dilutions: intermediate level disinfectant
4. **Iodophors** (e.g., Betadine): intermediate level disinfection
5. **Phenolics**: intermediate level disinfection
6. **Quaternary ammonium compounds**: low level disinfection

C. General principles regarding use of chemical disinfectants include:

1. Read the label for activity and adhere to usage instructions and chemical contact time.
2. Chemicals should have an EPA approval on the label.
3. *All items must be thoroughly cleaned before disinfecting.*
4. *All items must be thoroughly rinsed and dried after disinfecting.* Care must be taken not to recontaminate the items.
5. Only surfaces in direct contact with the solution will be disinfected (instruments must be opened, disassembled, and completely submerged for the required period of time).
6. Items should be dry before submerging to avoid diluting the solution to inactive levels.
7. Disinfectants are formulated for inanimate objects and are damaging to the skin. Gloves should always be worn to protect the hands. Goggles are advisable to protect eyes from splashes. Generally, the more effective against microbes, the more toxic to humans.
8. Disinfectants should be used in well-ventilated rooms.
9. For environmental cleaning to be effective adhere to chemical contact time.
- 1.0 Instruments that are disinfected must then be stored in a clean area or in a case (e.g., flexible laryngoscopes).

VII. STERILIZATION

A. The effectiveness of the sterilization process depends on:

1. Selecting and using appropriate sterilization methods
2. Monitoring the sterilization process and keeping logs of biological testing
3. Handling and storing processed sterile instruments and pre-packaged sterile items in a safe environment
4. Complexity and physical properties of product or device
5. Cleaning or removing visible soil, prior to sterilization
6. Type and density of microbial contamination
7. Sterilant concentration and contact time
8. Temperature and relative humidity

B. Methods of sterilization are based on their mode of action for microbial inactivation.

1. Energy mode of action
 - a. Moist heat (steam autoclave)
 - b. Dry heat (hot-air oven, beads) found most commonly in the practice of dentistry. (Not used in this facility)
 - c. Flash lamps

- d. Enhanced ultraviolet radiation
- e. Glow discharge plasma
- f. Gas plasma
- g. High voltage impulse electromagnetic field
- h. Pulse infrared radiation at two different wavelengths

2. Chemical Mode of Action

- a. Ethylene oxide (gas) (Eliminated at SJHHC March 1997)
- b. Steris-liquid chemicals
- c. Cyanogen gas-low temperature sterilization agent suitable for point of care application including sterilization of endoscopes
- d. Ozone process-designed for hospital sterilization of surgical and diagnostic instruments containing polymers, which are heat sensitive

3. Combined Chemical and Energy Mode of Action

- a. Gas plasma hydrogen peroxide
- b. Oxidizing agent in vapor phase combined with gas plasma at atmospheric pressure
- c. Ultrasonic aerosolization of a hydrogen peroxide solution
- d. Hydrogen peroxide vapor
- e. Acoustic energy applied to a solution containing isopropyl alcohol

C. Advantages and disadvantages of sterilization methods:

1. **Steam sterilization:**

- a. Advantages:
 - highly effective
 - rapid heating and rapid penetration of textiles
 - nontoxic
 - inexpensive
 - can be used to sterilize liquids
- b. Disadvantages:
 - Will damage items that are heat and moisture sensitive
 - will not sterilize powders and oils

2. **Dry heat sterilization:** used to sterilize items that can withstand high temperatures (e.g., 340° for 60 minutes)

- a. Advantages:
 - can be used for powders, anhydrous oils, glass
 - reaches surfaces of instruments that cannot be disassembled
 - instruments do not corrode or rust
 - inexpensive
- b. Disadvantages:
 - slow and uneven penetration
 - long exposure time
 - high temperatures damages rubber goods and some fabrics
 - limited packaging materials
 - variable temperature and exposure time, determined by the article being sterilized

3. **Ethylene oxide (ETO) sterilization:** low temperature gas sterilization technology

a. Advantages

- highly effective
- can process items unable to tolerate the thermal methods

b. Disadvantages

- difficult to monitor
- requires ETO permeable packaging materials
- lengthy cycle time
- costly
- toxic to humans, aeration improves dissipation of residual ETO (metal items do not require aeration; however, the packaging materials may require aeration)
- toxic to environment

4. **Steris paracetic acid liquid:** used to sterilize heat-sensitive medical and surgical items that can be immersed

a. Advantages

- Rapid processing time
- Low temperature
- Reduced employee exposure to hazardous chemicals, noxious fumes, chemical residues and toxic gases
- No environmental controls or monitors required

b. Disadvantages

- Equipment with lumens limited to lumens up to 400 mm in length and 3 mm or greater in diameter
- Items are not packaged

5. **Sterrad:** hydrogen peroxide vapor sterilization

a. Advantages

- Compact
- Rapid processing time
- Cost effective
- Biological indicator is self contained

b. Disadvantages

- Trays cannot have paper or absorbable materials, e.g., gauze, cotton, towels
- Instruments with lumens are limited to lengths of 400 mm or 15 inches and lumen diameters of 3 mm or greater

D. **Sterilization monitoring systems** are meant to assure that the parameters for sterilizing equipment meets standards. Types of monitoring systems include:

1. Mechanical - time, temperature, and pressure
2. Chemical - internal and external indicators
3. Biological - a commercial preparation of spores

E. Handling and Storage

1. These procedures are important to prevent contamination of packages already sterilized or purchased and packaged as sterile.
2. Storage areas should be designed and located to avoid:
 - a. Contamination from patient secretions or body fluids
 - b. Hand contamination by employees obtaining extra supplies
 - c. Contamination from supplies being returned to stock
3. Prevent disruption of package integrity:
 - a. Keep items at least 8 inches off the floor
 - b. Prevent moisture damage from plumbing fixtures, or extremes of heat and cold
 - c. Protect from insects or other pests
 - d. Area must be clean, dry, dust free, lint free
 - e. Recommend temperature 65°-72°F
 - f. Relative humidity recommended 35-50%
4. Prior to use, check package integrity to assure that:
 - a. package is free of tears, dampness, excessive dust, gross soil
 - b. there is a chemical indicator on the outside of the package
 - c. an expiration date has not been passed
 - d. the seal has been maintained if heat sealed

VIII. CROSS-CONTAMINATION IN THE HEALTHCARE ENVIRONMENT

It is important to identify surfaces, equipment, and practices which have potential for cross-contamination.

- All items having contact with mucous membranes must be cleaned and disinfected between patient use. *Example:* reusable thermometers.
- Items having contact with intact skin, such as blood pressure cuffs and stethoscopes, need to be cleaned periodically and/or when visibly soiled.
- Clean and dirty work areas should be separated to reduce cross-contamination of supplies.
- 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).
- Gloves must be removed and hand hygiene performed after touching contaminated surfaces and/or equipment (e.g., urinary collection devices, bedpans, dressings).

IX. REUSE OF DISPOSABLE EQUIPMENT OR DEVICES

- CDC, Joint Commission, and AORN states that single-use (labeled disposable) items should not be reprocessed.
- The FDA states that the HEALTHCARE facility bears full responsibility and accepts liability for reprocessing and reusing disposable products. The facility must be able to document that:
 - a. the product can be cleaned and sterilized adequately

- b. the device's "physical characteristics or quality" will not be adversely affected by the reprocessing
 - c. the product remains safe and effective for its intended use
- Ethical issues regarding quality of items, charging mechanisms and whether the patient is made aware of "used equipment" become dilemmas. (see FDA Guidelines: Enforcement Priorities for Single-use Devices Reprocessed by Third parties and Hospitals August 2000)

X. SOILED LINEN

- Policies and procedures must be in place for linen handling to protect employees from possible exposure to contaminated linen, and potential for sharps injury.
- If using a contract laundry, their services, policies, and procedures should be comparable to your own or meet acceptable practice standards.

XI. REGULATED MEDICAL WASTE:

- All facilities must comply with regulations related to the generation, handling, and disposal of all waste.
 - a. Definition: Regulated medical waste includes liquid, semi-liquid, or other body fluids. Examples are, saturated items that would release blood or other body fluids in a liquid or semi-liquid state if compressed, or items that are caked with dried blood or body fluids that could be released during handling.
 - b. Red bags will be readily available and used for immediate disposal of regulated medical waste only
- There could be a substantial cost savings for a facility since the difference in the cost of shipping and/or incineration of red bags versus clear bags is significant.

Turn the page to review a few questions from ELEMENT V.

Please use the worksheet provided....

Please complete the following questions to reinforce the information presented in Element V. Remember **not** to write in this booklet, use the **worksheet** supplied with the packet.

1. _____ is the process that results in the elimination of many or all pathogenic microorganisms from inanimate objects with the exception of bacterial spores.
2. The removal of all foreign materials from objects is accomplished by _____.
3. Post operative wound infections may occur as a result of _____.
4. Prior to disinfection, it is essential that all items should be thoroughly cleaned. The effectiveness of disinfection is increased by
 - A. Removing excess soil and microbes
 - B. Reducing the microbial load on environmental surfaces
 - C. Pre-soaking the instrument before transfer to Central Sterile (e.g. commodes)
 - D. All of the above
5. Prior to using equipment or supplies sterilely packaged, you would check the integrity of a sterile package for which of the following?
 - A. Tears, dampness, excessive dust, and/or gross soil
 - B. A chemical indicator on the outside of the package
 - C. A current expiration date if applicable
 - D. All of the above
 - E. A and C only

Answers/ Rationales:

1. Disinfection. Disinfection eliminates many pathogens, but does not eliminate bacterial endospores. Sterilization eliminates all forms of microbial life.
2. Cleaning. Cleaning removes foreign material such as soil and organic debris from objects.
3. Inadequate disinfection/sterilization. When equipment or supplies are inadequately cleaned and disinfected, it increases the risk of infection to the patient.
4. “D”. By removing as many microbes as possible, we improve the effectiveness of the disinfection process.
5. “D”. Always check package integrity of a sterile package prior to use. If a chemical indicator is used, check for it. If the package is heat sealed, check to make certain that the seal is intact. If an expiration date is visible, check to make certain you are within the time period.

One more to go.....

ELEMENT VI

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 (HCWs) and patients;
- Recognize non-specific disease findings, which should prompt evaluation of healthcare workers;
- Identify occupational health strategies for preventing HIV, bloodborne pathogens and other communicable diseases in healthcare worker;
- Identify resources for evaluation of healthcare workers infected with HIV, HBV, and/or HCV.

Content Outline

I. Definitions

II. Prevention of Disease Transmission by Healthcare Workers

- A. Periodic Health Assessment/Screening
- B. Recommended/Required Immunizations
- C. Evaluation of Acute and Incubating Illnesses
- D. Post Exposure Evaluation for Non-Bloodborne Communicable Disease
- E. Work Restrictions

III. Specific Strategies for Prevention of Bloodborne pathogen transmission

- A. Risk of Bloodborne Pathogens to HCWs
- B. HBV Prevention through Vaccination
- C. Elements of Post-Exposure Management

IV. The HIV/HBV infected healthcare worker

- A. Factors affecting the ability to provide care
- B. Voluntary review process

I. DEFINITIONS:

- Infectious Disease: A clinically manifest disease of humans or animal resulting from an infection.
- Communicable Disease: An illness due to a specific infectious agent or its toxic products which arises through transmission of that agent from an infected person, animal, or inanimate reservoir 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 disease in healthcare workers.
- Occupational Exposure: Reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employees' duties

II. Prevention of Disease Transmission by Healthcare Workers

A. Periodic Health Assessment/Screening

Pre-employment and annual health assessments including history and physical are performed to review the overall health status of healthcare workers: OSHA Classification, immunization record and TB testing. Any necessary vaccinations can be administered at this time.

B. Recommended/Required Immunizations and Screening

The hospital shall require the following of all personnel as a condition of employment or affiliation:

Tuberculosis (TB) Screening : Required by: NY State Department of Health and OSHA.

- a. All new employees, volunteers and student nurses that indicate a negative history of Tuberculin (T.B.) Screening are required to undergo a two (2) step testing procedure by placement of a PPD/Mantoux.
 1. **First Test** placed a time of pre-placement exam.
 2. **Second Test** place one to three (1-3) weeks later; if first test interpreted as zero-induration.
 3. Those individuals that can provide documentation of an insignificant induration from a PPD/Mantoux done within the past twelve (12) months will not have to second T.B. test.
- b. If the individual relates a **positive history** to T.B. testing, he/she will be evaluated for signs and symptoms of disease.
 1. A baseline chest x-ray will be ordered for those individuals that are unable to provide a copy of a negative CXR report done within the past three years.
 - If he/she does not submit the written report by the first morning of orientation, an x-ray will be done prior to attendance in the class.
 2. A chest x-ray will be ordered for any individual who is found to have signs or symptoms that may be suspicious of disease.
 3. If the individual has undergone prophylactic treatment, a medical statement will be requested for their medical record.
- c. After pre-employment screening an annual tuberculin skin test (PPD) is performed. More frequent screening may be required of employees working in areas or departments that have been identified as high risk (three (3) PPD conversions within one (1) year). When the conversion rate declines, testing will return to annual employee screening.

Hepatitis B (HBV) – Required by: U.S. Department of Labor (OSHA)

HBV Vaccine is offered to healthcare workers classified as OSHA Category 1 free of charge.

Certification of immunity against Rubeola – Documentation of immunity is required of all HCW's born in 1957 or later. It is highly recommended for individuals immunized prior to 1968 to be revaccinated, since they are considered susceptible.

Required by: NY State Department of Health

Certification of immunity against Rubella (German measles) – Documentation of immunity by serologic evidence of antibodies or a certificate of immunization against rubella is required for all HCWs.

Required by: NY State Department of Health

Certification of immunity to Varicella (chickenpox) – Employees without a positive history of Varicella disease or lack of serological evidence of Varicella zoster antibodies will be counseled on the availability of the Varicella vaccine.

The vaccine protects 70-90% of recipients against infection and 95% of recipients against the development of severe disease for at least ten (10) years after receiving the vaccine. When a vaccinated person develops Varicella, their course is generally less severe. They generally have less skin lesions, are afebrile, and have a shorter duration of illness than unvaccinated individuals.

Influenza Vaccine is offered annually free of charge to all employees in the fall. This vaccine is strongly recommended for all HCW's to prevent the spread of disease to other employees and patients. This vaccine contains only noninfectious, inactivated viruses. **It can not cause the flu.** The most likely side effects are fever or tenderness at the injection site. This is minor, compared to the symptoms that you would experience if you actually acquired the flu. There is also the risk of transmitting the flu to a patient that can be reduced if the HCW receives his/her annual flu shot. Nosocomial transmission of influenza does occur every year and has been associated with high mortality rates for patients.

Diphtheria and Tetanus Toxoid (DT) is available from the health office. Booster doses should be obtained at 10 yr. intervals. The Employee Health Office will be offering DTaP (Diphtheria, Tetanus, and Pertussis) vaccine for departments at highest risk for Pertussis.

C. Evaluation of Acute/Incubating illnesses in Healthcare Workers

The hospital requires that all employees report immediately to their Supervisor any signs or symptoms of personal illness. Any employee found to have, or suspected of having an infectious condition of potential danger to patients, shall be removed from duty, placed under the care of his/her physician and may not return to duty until it is approved by the physician and the EHO medical director.

SYMPTOMS:

You are required to call the Employee Health Office if you should be experiencing, or have been diagnosed with any of the following symptoms:

- Body Lice (including head lice)
- Chicken pox
- Cough, persistent and productive or spasmodic
- Fever
- Diarrhea
- Conjunctivitis (Pink Eye)
- Meningitis
- Open and/or draining skin sores, wounds, boils, vesicular lesions
- Rash
- Ring worm
- Scabies
- Shingles
- Strep Throat
- Jaundice (yellow skin, eyes)
- Vomiting

D. POST-EXPOSURE EVALUATION for non-bloodborne communicable diseases

If a healthcare worker has been exposed to any of the following diseases they should be evaluated by the Health Office for appropriate recommendations:

Pertussis (Whooping Cough)**EVALUATION:**

- a. Exposure is confirmed by the Infection Prevention and Control staff and/or Hospital Epidemiologist.
- b. Prophylactic therapy (if indicated)
 - Azithromycin 500mg on day 1, followed by 250mg po daily days 2-5.
 - If allergy to Azithromycin B then Bactrim DS 1 po bid x 14 days will be prescribed.

Tuberculosis**EVALUATION:**

- a. In a Healthcare Worker with negative PPD tests:
 1. A baseline PPD must be placed as soon as possible after exposure if more than one month has passed since their prior PPD
 2. At twelve (12) weeks post exposure all involved HCWs will be retested.
- b. In a Healthcare Worker with a prior positive PPD:
 1. They must report any signs/symptoms (unexplained fever, night sweats, weight loss, cough, or sputum production) that lasts longer than two (2) weeks to the Health Office

2. At twelve (12) weeks post exposure the HCW will be interviewed for signs/symptoms of disease if suspected or evident, a chest x-ray will be ordered and the Employee Health Office Physician notified
3. Every conversion needs to be evaluated by the Onondaga County Chest Clinic or private physician for indications for INH prophylaxis

*The CDC 2005 guidelines for detection of TB in healthcare workers with exposures recommend a one –step blood test instead of skin testing. This may replace the skin test in the future.

4. PROPHYLACTIC THERAPY (IF INDICATED): INH 300mg po QD x 9 months

Meningococcal Disease (Neisseria meningitidis)

EVALUATION:

1. The Hospital Epidemiologist or designee must confirm exposure prior to the administration of prophylactic antibiotics. It is transmitted by aerosol droplets or contact with respiratory tract secretions. Employees who performed mouth-to-mouth resuscitation, endotracheal intubation or endotracheal tube management should receive prophylactic therapy.
2. PROPHYLACTIC THERAPY (IF INDICATED):
Rifampin 600mg po bid x 2 days **or**
Ciprofloxacin 500mg x 1 dose **or** (MMWR 49 NoRR-7 6-30-00)
Ceftriaxone 250mg IM x 1

* Caution contact lens wearers if Rifampin prescribed (discoloration of contact lenses).

Varicella (chickenpox or herpes zoster, (shingles))

EVALUATION:

Any one of the following exposures is considered significant:

1. Negative history of Varicella or are known to be seronegative, who have contact with another employee with the diagnosis of chicken pox up to 48 hours prior to the onset of a rash
2. Negative history of Varicella or are known to be seronegative, who have cared for a patient with the diagnosis of Varicella, or a patient with disseminated Zoster who was not properly isolated
3. Negative history of Varicella, or are known to be seronegative, who have a household member with the diagnosis of Chicken Pox

There are other communicable diseases that HCW's may be treated for exposure (**see chart 1**)

E. Work Restrictions

SEE CHART 1 FOR RECOMMENDATIONS ON WORK RESTRICTIONS

F. Reportable Diseases

The NY state Department of Health requires that an extensive list of Communicable diseases (for example: Meningitis, Tularemia, Giardiasis, Salmonella, Campylobacter) be reported to county and state health departments to institute screening and treatment of contacts, and for epidemiological studies.

The hospital requires employees with any of these reportable diseases to report such illness to the Employee Health Office. All information is kept confidential.

III. SPECIFIC STRATEGIES FOR PREVENTION OF BLOODBORNE PATHOGEN TRANSMISSION

A. Risk of Bloodborne Pathogen transmission to Healthcare Workers

Healthcare workers are at risk for occupational exposure to the human immunodeficiency virus (HIV), hepatitis B (HBV), and hepatitis C (HCV). These exposures can occur through:

1. Needlesticks
2. Cuts from other sharp instruments contaminated with an infected patient's blood
3. Contact of the mucous membrane or skin with a patient's blood or other body fluids.

STRICT ADHERENCE TO STANDARD PRECAUTIONS HELPS TO DECREASE THE RISK OF EXPOSURE TO THESE PATHOGENS

- Hand Hygiene
- HBV vaccine
- Appropriate PPE
- Sharps safety
- Standard precautions

<u>Summary of the Risk of Developing a Bloodborne Pathogen after a Needlestick Injury</u>	<u>Risk of Transmission after a needlestick injury</u>
Hepatitis B virus	6– 30%
Hepatitis C virus	2.7 – 6.0%
HIV	0.30%

1) Human immunodeficiency virus (HIV)

The risk of developing HIV after a needlestick injury is much lower (approximately 100 times) than acquiring the hepatitis B virus. Development of HIV progresses to AIDS after an asymptomatic incubation period of several years and is ultimately fatal. There is preliminary data, that antiretroviral drug therapy is beneficial in preventing transmission once a healthcare worker has been exposed. To prevent exposures always remember not to recap needles, always activate safety feature on syringes, dispose of used needles in the appropriate sharps disposal containers, and use appropriate barriers (e.g. gloves, eye and face protection, gowns) when contact with blood and body fluids is expected.

Depending on what type of exposure, the **risk** for developing HIV is as follows:

1. An accidental needlestick or cut is about **1 in 300**.
2. Exposure of the eye, nose, or mouth to HIV infected blood is about **9 in 10,000**
3. Exposure of **NONINTACT** skin to HIV-infected blood is less than the risk of mucous membrane exposure.

The risk of developing HIV is increased if: it is a deep injury, there is visible blood on the device, procedure involves a needle placed directly in a vein or an artery, or the source patient has a high viral load.

2) Hepatitis C (formerly Hepatitis non A non B)

There is no vaccine available to prevent Hepatitis C from occurring. Hepatitis C can have long term consequences such as chronic liver disease including cirrhosis and hepatocellular carcinoma. Hepatitis C causes a chronic carrier state in 60-70% of all exposed patients. This chronic carrier state increases the risk of transmission of Hepatitis C to others along with a high incidence of hepatocellular carcinoma and cirrhosis. There has been some success treating Hepatitis C with alpha Interferon, however every individual must seek treatment advice from their physician.

The risk from a single exposure results in an average rate of seroconversion of about 2% (range 0-6%)

3) Hepatitis B

- a. The risk of developing Hepatitis B is greater than both Hepatitis C and HIV. Vaccination is highly recommended for OSHA Category 1 employees. The development of Hepatitis B may result in chronic hepatitis, cirrhosis and hepatocellular carcinoma. Acute hepatitis B can be fatal from acute hepatic necrosis. The chronic carrier state occurs in about 5 – 10% of cases.
- b. The risk after a single needle exposure ranges from **6-30%** in healthcare workers who are not vaccinated or who did not respond to the vaccine.
- c. Hepatitis B prevention through vaccination

Vaccination helps to prevent transmission of infection, clinical disease, and chronic HBV infection. Vaccination is highly recommended for OSHA Category 1 employees. The vaccine is used both for pre-exposure prophylaxis and in post-exposure prophylaxis in combination with hepatitis B immune globulin (HBIG). HBIG provides immediate immunity in susceptible individuals by giving them antibodies against hepatitis B.

The following are some important facts regarding the hepatitis B vaccine:

1. The vaccine is not made from blood products, so there is **no** risk of developing AIDS or hepatitis B from the vaccine.

2. Three (3) doses are given at 0, 1, and 6 months intramuscularly
3. The vaccine is contraindicated in patients with an anaphylactic reaction to baker's yeast and thimerosal allergy.
4. There has not been a clinical case of Hepatitis B disease in a person who has responded to the vaccine series.
5. Side effects from the vaccine include soreness at the injection site, headache, fatigue, and fever. These side effects decrease with each vaccine dose.
6. OSHA Class I employees receive the vaccination series at no charge and OSHA Class II for a fee. If an OSHA Class I employee refuses, they must sign a statement of declination and counseling will be provided regarding the risk of not receiving the immunization.

B. Elements of Post-Exposure Management

1. Exposure to blood, semen, vaginal secretions, cerebrospinal, peritoneal, pericardial, pleural, amniotic, synovial, or any other body fluid visibly contaminated with blood are considered exposures which may require medical management
 2. Percutaneous Exposure (skin was punctured such as a needlestick or abrasion)
 3. Exposure of a mucous membrane such as the eyes, nose or mouth, nonintact skin
 4. The following steps should be taken after an exposure to blood or bodily fluids:
 - a. Clean the injury site/mucous membrane
 - Needlesticks and cuts should be washed with soap and water
 - Splashes to the nose, mouth, or skin should be flushed with a large volume of water.
 - Eyes should be irrigated with a large volume of clean water or saline.
 - b. Report the exposure.
 - The exposure should be reported verbally to the immediate supervisor or the Administrative Coordinator
 - An Employee/Affiliate occurrence report form must be completed.
 - Report to the Employee Health Office (Monday - Friday from 0700-1530) or Emergency Department (after 3:30 on weekdays, weekends, or holidays) within 1 hour of exposure for assessment, treatment and counseling.
- * THIS IS EXTREMELY IMPORTANT, SINCE ANTIVIRAL THERAPY MUST BE STARTED WITHIN 1-2 HOURS TO BE EFFECTIVE IN PREVENTING HIV TRANSMISSION
- c. Source Evaluation
 - The source person is informed of the exposure of an employee to his/her blood.
 - Appropriate testing is performed on the source person after counseling and consent is obtained.

d. Exposure care by EHO/ED

- Review of Hepatitis B Vaccination status
- Baseline serologic testing for HBV, HCV (if unvaccinated or known non-responder) and HIV (after counseling and written consent)
- Counseling about the risk of infection resulting from the exposure, recommended post exposure treatment and follow-up and precautions to prevent possible HIV transmission to others. Precautions to follow include abstaining from sexual intercourse or using a latex condom, postpone planning a pregnancy, refrain from blood, organ or sperm donation, and breastfeeding.
- Baseline labs will be drawn if post-exposure prophylaxis is initiated.

5. Post-Exposure Prophylaxis

- Hepatitis B (HBV) Exposure: HBV vaccination and HBV immune globulin (HBIG) are recommended for unvaccinated HCWs.
- HIV Exposure:

A three drug regimen consisting of:

1. Zidovudine (AZT)/Lamivudine (Combivir) 1 po, twice daily
2. Tenofovir 300mg po daily

These drugs are initiated within 1-2 hours of exposure and continued for 4 weeks or until the source patient can be tested.

SEE APPENDIX 3-D FOR INFORMATION ON DOSE, SIDE EFFECTS, AND DRUG INTERACTIONS.

6. Post-Exposure Follow-up

- Repeat HIV testing will be obtained on the employee at 6 weeks, 3 months, and 6 months after exposure.
- Report symptoms of an acute illness during 12 weeks after exposure, especially if characterized by fever, rash, muscle aches, malaise, or lymph node enlargement, which may signify recent HIV infection.
- If the HCW continues on antiretroviral therapy, laboratory tests will be evaluated at two (2) weeks, four (4) and (6) weeks.
- The antiretrovirals will be discontinued if
 - the source patient is found to be HIV negative
 - the healthcare worker is found to be pregnant
 - the physician feels that the toxicity of the antiretroviral(s) outweighs the potential benefit
 - the employee is found to be HIV positive at baseline testing. (Referral for HIV follow-up)
- Professional obligation to inform patients exposed to a HCW blood or other potentially infectious materials

7. Confidentiality

ALL DATA ON THE EXPOSURE AND FOLLOW-UP OF THE EMPLOYEE WILL BE CONSIDERED STRICTLY CONFIDENTIAL. NO PERSON WHO OBTAINS CONFIDENTIAL HIV RELATED INFORMATION MAY DISCLOSE THIS INFORMATION UNLESS IT FITS THE CRITERIA AS OUTLINED BY PUBLIC HEALTH LAW (ARTICLE 27-F)

IV. THE HIV/HBV INFECTED HEALTHCARE WORKER

a. Factors affecting the ability to provide care

The hospital emphasizes with their medical and administrative staff the need for strict observance of Standard Precautions.

1. HIV or HBV infection alone does not justify limiting a healthcare worker's professional duties. Limitation, if any, should be determined on a case-by-case basis after consideration of the factors that influence transmission risk, including inability or unwillingness to comply with infection control standards or functional impairment which interferes with job performance.
2. HCWs with acute hepatitis B/HIV should use barrier precautions (including double gloving) for procedures that involve potential trauma to tissues or contact with mucous membranes or nonintact skin
3. Presence of weeping dermatitis, draining or open skin
4. Overall health

b. Advisory Panel

1. An advisory panel will be convened in cases where a healthcare worker voluntarily seeks the panel's review of the risk of HIV/HBV transmission to others through his/her work place practice. The Advisory Panel shall evaluate and advise.

You have completed the content for ELEMENT VI. Review chart and appendix 3-D. Turn to page 90 to answer a few questions for ELEMENT VI, after reviewing the tables.

ELEMENT VI – CHART 1

**SUMMARY OF IMPORTANT RECOMMENDATIONS AND WORK RESTRICTIONS
PERSONNEL WITH OTHER INFECTIOUS DISEASES**

DISEASE/PROBLEM	RELIEF FROM DIRECT PATIENT CONTACT	PARTIAL WORK RESTRICTION	DURATION
Conjunctivitis, infectious	Yes		Until discharge ceases
Cytomegalovirus, viremia	No		
Diarrhea, acute state/self limiting	Yes		Until symptoms resolve
Diagnosed Salmomella Shigella Campylobacter Giardia Hepatitis A Cholera Yersinia	Yes		Employee may return to work if two (2) stool cultures are negative after appropriate treatment. Giardia: 24 hours after treatment has started, if no longer having diarrhea.
Group A Step Disease	Yes		Until 24 hours after adequate treatment
Hepatitis Viral Hepatitis A	Yes		Until 7 days after onset of jaundice or cleared by physician
Hepatitis B Acute	Yes		Until 7 days after onset of jaundice or cleared by physician
Carrier – Hepatitis B	Possible		Based on case by case evaluation/physician evaluation
Hepatitis C Acute	Yes		Until 7 days after onset of jaundice or cleared by physician
Herpex Simplex Genital Hands (Herpetic Whitlow) Orofacial	No Yes Possible	It is not known whether gloves prevent transmission	Until lesions heal If early state or draining. Evaluate each case.

Measles – Active	Yes		Until 7 days after the rash appears.
Post Exposure	Yes	7 th – 14 th day after exposure or 7 days after rash appears	From the 5 th through 21 st day after exposure and/or 7 days after appearance of rash.
HIV	Possible		Based on case by case evaluation/physician evaluation.
Mumps – Active	Yes		Until 9 days after onset of parotitis
Post Exposure	Yes		12 th through 26 th day after exposure or until 9 days after onset of parotitis.

DISEASE/PROBLEM	RELIEF FROM DIRECT PATIENT CONTACT	PARTIAL WORK RESTRICTION	DURATION
Parvovirus B 19 (Fifth Disease)	Yes		7 days after onset
Pertussis – Active (Whooping Cough)	Yes		From the beginning of the catarrhal state through the 3 rd week after onset of paroxysms or until 7 days after start of effective therapy.
Post Exposure (asymptomatic personnel)	No		
Post Exposure (symptomatic personnel)	Yes		Until Pertussis differentiated.
Rubella – Active	Yes		Until 5 days after the rash appears; from the 7 th through the 21 st day after exposure and/or 5 days after rash appears
Post Exposure	Yes		
Scabies	Yes		Until treated
Staphylococcus Aureus (skin lesions)	Yes		Until lesions have resolved.
Zoster (Shingles) – Active	Possible		Until lesions dry and crust/or based on case by case evaluation/ability to cover drainage areas.
Zoster (Shingles)	Yes		From the 10 th to the 21 st day after exposure and if Varicella occurs until all lesions are dry and crusted.
Post Exposure Employees	Yes		
Non-Immune to Varicella			
Varicella (Chicken Pox) – Active	Yes		Until all lesions dry and crust from the 10 th through 21 st day after exposure or if Varicella occurs until all lesions dry and crust.
Post Exposure Non-Immune to Varicella	Yes		
Tuberculosis	Possible		Based on case by case evaluation/physician evaluation.
Employees with			Employees with

Immunosuppression			Immunosuppression as a result of disease or therapy should evaluate, with their personal physicians, their own risks of working in a hospital environment. Such employees if returning to work should provide a letter from their physician to the EHO indicating their abilities to work and outlining any patient care areas where they should not work.
Notification of Reportable Diseases			The hospital requires employees with any of the Dept. of Health reportable disease to report such illness to the EHO or Infection Control Nurse. Information about employee illness is kept confidential. However, reporting communicable illness is mandatory for both patients and staff and for education, where appropriate, of the infected employee.

Original: January 1998

Revised: December 2001

RECOMMENDED PEP MEDICATION: ZIDOVUDINE (ZDV)							
Trade Name	Retrovir						
Classification	Nucleoside Reverse Transcriptase Inhibitor						
Form	100-mg capsules, 300-mg tablets, 10-mg/mL IV solution, 10-mg/mL oral solution Each Combivir tablet contains ZDV 300 mg and 3TC 150 mg						
Dosing Recommendations	200 mg tid or 300 mg bid or with 3TC as Combivir,* 1 bid						
Renal Impairment Dosing	<table border="1"> <thead> <tr> <th>CrCl (mL/min)</th> <th>Dose</th> </tr> </thead> <tbody> <tr> <td><15</td> <td>100 mg q6-8h (or 300 mg qd)</td> </tr> <tr> <td>Hemodialysis</td> <td>100 mg q6-8h (or 300 mg qd)</td> </tr> </tbody> </table>	CrCl (mL/min)	Dose	<15	100 mg q6-8h (or 300 mg qd)	Hemodialysis	100 mg q6-8h (or 300 mg qd)
CrCl (mL/min)	Dose						
<15	100 mg q6-8h (or 300 mg qd)						
Hemodialysis	100 mg q6-8h (or 300 mg qd)						
Food Effect	Absorption similar with or without food. Fatty food may decrease bioavailability (clinical significance unknown).						
Oral Bioavailability	60%						
Serum Half-life	1.1 hour						
Intracellular Half-life	3 hours						
Route of Metabolism	Metabolized to AZT glucuronide (GAZT); renal excretion of GAZT						
Adverse Events	GI intolerance, headache, insomnia, asthenia, lipodystrophy Bone marrow suppression: anemia, neutropenia, and, less commonly, thrombocytopenia Lactic acidosis with hepatic steatosis is a rare but potentially life-threatening toxicity						
FDA Pregnancy Category	C (no maternal toxicity or fetal defects noted with long-term follow-up)						
Long-Term Animal Carcinogenicity Studies	Positive (rodent, non-invasive vaginal epithelial tumors)						
Animal Teratogen Studies	Negative (mice and rabbits)						
Black Box Warnings	Zidovudine may be associated with hematologic toxicities, including granulocytopenia and severe anemia, particularly in advanced HIV-infected patients. Prolonged zidovudine use has been associated with symptomatic myopathy. Lactic acidosis and severe hepatomegaly with steatosis, including fatal cases, have been reported with the use of antiretroviral nucleoside analogues alone or in combination.						
Drugs to Avoid	As part of the ARV regimen: Stavudine Zalcitabine Doxorubicin (additive bone marrow suppression)						
Cautious Use or Dose Adjustment							
Antivirals	Ganciclovir: Additive bone marrow suppression Ribavirin: Additive anemia – May require use of EPO						

* Combivir should not be used in patients with renal insufficiency. Separate components and dose based on glomerular filtration rate (GFR).

RECOMMENDED PEP MEDICATION: LAMIVUDINE (3TC)													
Trade Name	Epivir												
Classification	Nucleoside Reverse Transcriptase Inhibitor												
Form	150-, 300-mg tablets; 10-mg/mL oral solution Each Combivir tablet contains ZDV 300 mg and 3TC 150 mg												
Dosing Recommendations	150 mg bid or 300 mg qd <50 kg: 2 mg/kg bid <i>or</i> with ZDV as Combivir,* 1 bid												
Renal Impairment Dosing	<table border="1"> <thead> <tr> <th>CrCl (mL/min)</th> <th>Dose</th> </tr> </thead> <tbody> <tr> <td>30-49</td> <td>150 mg qd</td> </tr> <tr> <td>15-29</td> <td>150 mg first dose, then 100 mg qd</td> </tr> <tr> <td>5-14</td> <td>150 mg first dose, then 50 mg qd</td> </tr> <tr> <td><5</td> <td>50 mg first dose, then 25 mg qd</td> </tr> <tr> <td>Hemodialysis</td> <td>No data</td> </tr> </tbody> </table>	CrCl (mL/min)	Dose	30-49	150 mg qd	15-29	150 mg first dose, then 100 mg qd	5-14	150 mg first dose, then 50 mg qd	<5	50 mg first dose, then 25 mg qd	Hemodialysis	No data
CrCl (mL/min)	Dose												
30-49	150 mg qd												
15-29	150 mg first dose, then 100 mg qd												
5-14	150 mg first dose, then 50 mg qd												
<5	50 mg first dose, then 25 mg qd												
Hemodialysis	No data												
Food Effect	No food effect												
Oral Bioavailability	86%												
Serum Half-life	5-7 hours												
Intracellular Half-life	18 hours												
Elimination	Renal excretion												
Adverse Events	Minimal toxicity for adults Lactic acidosis with hepatic steatosis is a rare but potentially life-threatening toxicity												
FDA Pregnancy Category	C												
Long-Term Animal Carcinogenicity Studies	Negative (no tumors, lifetime rodent study)												
Animal Teratogen Studies	Negative												
Black Box Warnings	Lactic acidosis and severe hepatomegaly with steatosis, including fatal cases, have been reported with the use of antiretroviral nucleoside analogues alone or in combination. Epivir tablets and oral solution (used to treat HIV infection) contain a higher dose of lamivudine than Epivir-HBV tablets and oral solution (used to treat chronic hepatitis B). Patients with HIV infection should receive only doses and formulations appropriate for treatment of HIV infection.												
Drugs to Avoid	As part of the ARV regimen: Abacavir + tenofovir Emtricitabine Tenofovir + didanosine Zalcitabine												

* Combivir should not be used in patients with renal insufficiency. Separate components and dose based on glomerular filtration rate (GFR).

RECOMMENDED PEP MEDICATION: TENOFIVIR (TDF)									
Trade Name	Viread								
Classification	Nucleotide Reverse Transcriptase Inhibitor								
Form	300-mg tablets								
Dosing Recommendations	300 mg qd								
Renal Impairment Dosing	<table border="1"> <thead> <tr> <th>CrCl (mL/min)</th> <th>Dose</th> </tr> </thead> <tbody> <tr> <td>30-49</td> <td>300 mg qd</td> </tr> <tr> <td>10-29</td> <td>300 mg bid</td> </tr> <tr> <td>ESRD</td> <td>300 mg q wk</td> </tr> </tbody> </table>	CrCl (mL/min)	Dose	30-49	300 mg qd	10-29	300 mg bid	ESRD	300 mg q wk
CrCl (mL/min)	Dose								
30-49	300 mg qd								
10-29	300 mg bid								
ESRD	300 mg q wk								
Food Effect	<p>Fatty meal ↑ TDF AUC 40% (clinical significance unknown). May take TDF with or without meals.</p> <p>Co-administration of TDF + ddI buffered tablets should be on an empty stomach; TDF + ddI EC may be taken on an empty stomach or with a light meal</p>								
Oral Bioavailability	25% in fasting state; 39% with high fat meal								
Serum Half-life	17 hours								
Intracellular Half-life	10 to 50 hours								
Elimination	Renal excretion								
Adverse Events	<p>Asthenia, headache, diarrhea, nausea, vomiting, flatulence</p> <p>Although there have been no cases of lactic acidosis reported with TDF use, lactic acidosis with hepatic steatosis is a rare but potentially life-threatening toxicity with the use of NRTIs</p> <p>Rare reports of renal insufficiency</p>								
FDA Pregnancy Category	B (one study showed normal growth; however, there was a decrease in fetal bone porosity and insulin-like growth factor was observed)								
Long-Term Animal Carcinogenicity Studies	Negative (rats); in female mice, liver adenomas were increased at exposures 16 times that in humans								
Animal Teratogen Studies	Negative (osteomalacia when given to juvenile animals at high doses)								
Black Box Warnings	<p>Lactic acidosis and severe hepatomegaly with steatosis, including fatal cases, have been reported with the use of nucleoside analogs alone or in combination with other antiretrovirals.</p> <p>Viread has <i>in vitro</i> activity against HBV but is not indicated for the treatment of chronic hepatitis B virus (HBV) infection and the safety and efficacy of Viread have not been established in patients co-infected with HBV and HIV. Severe acute exacerbations of hepatitis B have been reported in patients who are co-infected with HBV and HIV and have discontinued Viread. Hepatic function should be monitored closely with both clinical and laboratory follow-up for at least several months in patients who discontinue Viread and are co-infected with HIV and HBV. If appropriate, initiation of anti-hepatitis B therapy may be warranted.</p>								
Drugs to Avoid	<p>As part of the ARV regimen: Atazanavir without ritonavir</p> <p>Lamivudine + abacavir</p> <p>Lamivudine + didanosine</p>								
Cautious Use or Dose Adjustment									
Antiretrovirals	<p>Atazanavir + ritonavir: ATV AUC ↓ 25%, C_{min} ↓ 23% – Use ATV 300 mg + RTV 100 mg qd</p> <p>Didanosine: ddI AUC ↑ 44%, C_{max} ↑ 28% – Monitor for ddI-associated toxicities; for patients ≥60 kg, ↓ ddI EC dose to 250 mg qd; for patients <60 kg, ↓ ddI EC to 200 mg qd</p> <p>Lopinavir/ritonavir: LPV/r + TDF – Monitor for TDF-associated adverse events</p>								
Antivirals	Cidofovir, ganciclovir, valganciclovir: May increase serum concentration of these drugs and/or TDF – Monitor for dose-related toxicities								

Now it's time to review some of the information you just read about in Element VI... Answer the following questions on the worksheet provided. Then turn the page to review your answers. Rationales for the answers are also provided. You may also look back in the text for any answers that you don't recall.

1. Symptoms that include diarrhea, fever, chills, cough, and/or rash are:
 - A. Insignificant
 - B. Too vague to be important
 - C. Possibly consistent with a communicable disease
 - D. Symptoms that do not require any follow up.

2. HCW's are at risk for occupational exposure to HIV, HBV, and HCV. These exposures can occur through all of the following except:
 - A. Needlesticks
 - B. Sneezing
 - C. Cuts from contaminated sharp instruments
 - D. Contact of mucous membrane or non-intact skin with a patient's blood

3. Vaccination for which of the following diseases is highly recommended for HCW's that are at risk of contact with blood, blood products, or bodily secretions?
 - A. HIV
 - B. Hepatitis C
 - C. Hepatitis B
 - D. Flu

4. What steps are necessary for any HCW following an exposure to blood or bodily fluids?
 - A. Clean the wound
 - B. Report the exposure verbally to supervisor and complete an Employee Affiliate Occurrence report
 - C. Report to the Employee Health Office (or Emergency Department on off shifts) **within 1 hour of exposure** for assessment, treatment, and counseling.
 - D. All of the above

5. Staff diagnosed with conjunctivitis must:
 - A. Be relieved from direct patient contact until discharge ceases
 - B. Wear eye protection until discharge ceases
 - C. Wear gloves for all patient contact until discharge ceases
 - D. None of the above

Answers/Rationale:

1. “C”. These symptoms need to be evaluated as they may be indicative of a communicable disease. If an employee displays these symptoms, they should report them to the Employee Health Office.
2. “B”. Sneezing does not cause a bloodborne exposure.
3. “C”. Hepatitis B is the only bloodborne disease listed for which a vaccine is available. Flu is not bloodborne, but vaccination is highly recommended for HCW’s.
4. “D”. All steps are essential. You must report within one hour of exposure as antiviral therapy must be started within 1-2 hours to be effective in preventing HIV transmission.
5. “A”. Conjunctivitis is highly contagious and staff diagnosed with it should not have contact with patients until discharge ceases.

Congratulations!!!! You have now completed all the content in the SLP on Infection Control. Complete the post-test and the worst is over!!! Turn the page for final instructions. The post-test is from page 92 to 98.

Good luck!

a. **Non-physician staff:**

Once you have completed the post-test, please fill in your name, employee number when prompted. If you wish to have a certificate of completion, please contact CL&R.

b. **Physicians:**

Dear Practitioner:

New York State Law requires that physicians and dentists, as well as other health care professionals, undergo mandatory infection control training every four years. The law further requires that documentation of such training must be provided to the hospitals in which the practitioner has clinical privileges.

In order to ensure continuation of your medical staff appointment please click on the link at the bottom of this packet, complete your answers and submit, your answers will be submitted to the Medical Staff Office and they will send you a copy of your certificate. If you have any questions please contact the Medical Staff Office at 315.448.5881

We hope the information presented has helped you review and update your knowledge of infection control practice. Thanks for learning with us!

References:

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2. APIC Infection Control and Applied Epidemiology Principles and Practice (2000)
3. Mandatory Infection Control Training
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HERF
5. Core Curriculum on Tuberculosis
Fourth Edition, 2000
6. MMWR vol. 49/no RR-7
June 30, 2000
7. St. Joseph's Infection Control Policy (2012)
8. Infection Control Training for Healthcare Professionals (January 2002)
Self-study Syllabus was developed by the Infection Control programs at several area hospitals:
 - The Genesee Hospital
 - Highland Hospital
 - Park Ridge Hospital
 - Rochester General Hospital
 - St. Mary's Hospital
 - Strong Memorial Hospital
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11. Rutala, William (ed.) Disinfection, Sterilization and Antiseptics: Principles, Practices, Challenges, and New Research.
12. Sebazco S. RN, BS, CIC (2005) Cleaning, Disinfection and Sterilization. Infection Control And Epidemiology/APIC Training Course

Latex allergy additional readings

1. Adams R. Recent advances in contact dermatitis. *Annals of Allergy* 1991; 67:522-67
2. Gonzalez E. Latex hypersensitivity: A new and unexpected problem. *Hospital Practice* 1992; 24(2): 137-151.
3. Heese A, Hintzenstern Jv, Peters K-P, Koch H, Hornstein O. Allergic and irritant reactions to rubber gloves in medical health services. *Journal of the American Academy of Dermatology* 1991; 25 (5:) 831-839
4. Kwitteken P, Pawlowski N, Becker J, Sweinberg S. Latex hypersensitivity reactions despite prophylaxis. *Allergy Preceedings* 1992; (in press).
5. Slater J. Rubber anaphylaxis. *New England Journal of Medicine* 1989; 320: 1126-30
6. Sussman G, Tarlo S, Dolovich J. The spectrum of IgE-mediated responses to latex. *Journal of the American Medical Association* 1991; 265: 2844
7. Swanson, MC Bubak, ME, Hunt, LW, Reed, ED. Occupational respiratory allergic diseases from latex. *Journal of Allergy and Clinical Immunology* 1992; 89:1:2#329 (abstract).
8. Turjanmaa K, Reunala T. Condoms as a source of latex allergen and cause of contract urticaria. *Contact Dermatitis* 1989; 17:270.

Post Test

Remember to use the attached answer sheet

1. The main focus of the United States Department of Labor's Occupational Safety and Health Administration (OSHA) is to protect the health of
 - A. Workers
 - B. Patients
 - C. Communities
 - D. Schools
2. The New York State Department of Health has issued guidelines to help prevent transmission of HIV, Hepatitis B and C to patients during medical and dental procedures. These guidelines state that healthcare personnel who violate the principles of infection control in their practice may be
 - A. Indicted for a felony
 - B. Charged with unprofessional conduct
 - C. Sentenced to community service
 - D. Held in contempt of court
3. In which of these cases should a patient be notified of a healthcare worker's HIV status?
 - A. When the patient is exposed to the healthcare worker's blood
 - B. When the patient has an open wound
 - C. When the patient is pregnant
 - D. When the patient's immune system is compromised
4. At which of these times is it essential to wear utility gloves?
 - A. When serving food to an HIV-infected patient
 - B. When doing heavy duty housekeeping and while cleaning instruments (Decontamination)
 - C. When doing vision screening on sexually active persons
 - D. When touching IV fluid bags
5. A licensed healthcare worker should monitor the infection control techniques of which of these personnel?
 - A. Only her/himself
 - B. Only unlicensed personnel for whom the licensee is responsible
 - C. Only licensed personnel for whom the licensee is responsible
 - D. All personnel for whom the licensee is responsible

6. While awaiting cleaning and sterilization, soiled reusable sharps must be placed in a:
 - A. Sodium hypochlorite solution
 - B. Sterile saline solution
 - C. Needle container
 - D. Puncture-resistant container

7. In which of these instances should the healthcare worker refrain from direct patient care?
 - A. The worker has a vaginal infection of fungal origin
 - B. The worker has an uncovered weeping dermatitis on the forearm
 - C. The worker has a dry patch of psoriasis on the forehead
 - D. The worker has a butterfly rash associated with lupus erythematosus on the face

8. Complaints of unprofessional conduct related to infection control can be reported by
 - A. Patients only
 - B. Healthcare workers only
 - C. State and local enforcement agencies only
 - D. Anyone

9. The transmission of a pathogen from a reservoir to a susceptible host occurs by
 - A. Direct and indirect contact
 - B. Respiratory droplet
 - C. Respiratory airborne
 - D. All of the above

10. To prevent the spread of infection, the single most important action a healthcare worker should take is to
 - A. Hand hygiene using an alcohol sanitizer or soap and water
 - B. Sterilize instruments
 - C. Use disposable needles
 - D. Report breaks in aseptic techniques

11. A liquid soap container is almost empty. It is acceptable to add more soap to refill the Dispenser.
 - A. True
 - B. False

12. Control measures are actions used to
 - A. Make the patient independent
 - B. Prevent transmission of infection through the use of personal protective equipment
 - C. Decrease the risk of transmission of infection
 - D. B and C

13. Hepatitis B vaccine is recommended for all OSHA category I healthcare workers.
 - A. True
 - B. False

14. For a patient who has draining disseminated (outside of 2 non-contiguous dermatomes) Herpes zoster, which of these isolation precautions should be used?
 - A. Neutropenic isolation
 - B. Airborne-Contact
 - C. Contact isolation
 - D. Enteric isolation

15. Which of these practices is considered an example of a desirable work practice control?
 - A. Forbidding the staff to eat in patient areas
 - B. Encouraging the wearing of sterile gowns when bathing infants
 - C. Altering a high risk procedure to minimize exposure
 - D. A and C

16. At which of these times is it appropriate to use personal protective equipment?
 - A. Prior to entering the cafeteria
 - B. Instead of utilizing engineering controls
 - C. When patient is not on isolation
 - D. When there is a risk of exposure after engineering and work practice controls have been instituted

17. Which of these activities places a healthcare worker at risk for exposure to and contact with bloodborne pathogens?
 - A. Removing scalpel blades with your bare hands
 - B. Using sharps that are unbendable
 - C. Cleansing a suture line
 - D. Wearing a pair of clean gloves under a pair of sterile gloves

18. The best location to place a container for the disposal of needles is
 - A. As close as possible to where the supply of needles is kept
 - B. In the area where other dirty equipment is kept
 - C. As close as possible to where the needles are used
 - D. In an area where a healthcare professional can supervise its use

19. While caring for an individual, a healthcare worker's hand touches a bloody area. Which of these actions should the worker take first?
- A. Find out if that patient is HIV positive
 - B. Wash his/her hands thoroughly
 - C. Report to supervisor
 - D. Document the incident
20. It is important to keep the door of an AFB (TB) isolation room closed to
- A. Maintain proper air changes/hour within the room
 - B. Help to prevent air contamination in areas outside the room
 - C. Minimize the environmental stimulation that the patient receives from outside the room
 - D. A and B
21. When healthcare workers wear the PFR/N-95 mask, the concerns are
- A. The caregiver fit checks each time the mask is worn
 - B. The caregiver has been fit tested
 - C. Every mask has an individual carrying case
 - D. A and B
22. Which of these statements about protective barriers is true?
- A. The employee is responsible for repairing them if they become damaged
 - B. The employee must remove them prior to leaving the work area
 - C. The employee is responsible for the cost of replacing a uniform
 - D. The employer should not provide any barriers.
23. At which of these times is it essential to wear gloves?
- A. When taking the blood pressure of a woman who has just delivered an HIV-positive infant
 - B. When removing the food tray from the room of a woman who is receiving whole blood
 - C. When doing a dressing change
 - D. When writing in a patient's chart
24. At which of these times is it essential for healthcare professional to wash their hands with soap and water.
- A. Before donning gloves and after removing gloves
 - B. After using the toilet
 - C. Before and after eating
 - D. All of the above
25. Which of these statements regarding disposable gloves is accurate?
- A. They are puncture-proof
 - B. They cannot be decontaminated and reused
 - C. They do not cause contact dermatitis
 - D. They are self-sterilizing

26. If a healthcare worker is going to come in contact with a patient with pulmonary tuberculosis, it is essential that the worker wear
- A. Washable clothing
 - B. Sterile gloves
 - C. Goggles
 - D. A particulate filter respirator (PFR) or powered air purifying respirator (PAPR)
27. To prevent droplet contamination of a sterile field, the healthcare worker should wear
- A. Gloves
 - B. A gown
 - C. A surgical mask
 - D. Goggles
28. The process that completely eliminates or destroys all forms of microbial life is called
- A. Sterilization
 - B. Disinfection
 - C. Decontamination
 - D. Pasteurization
29. What procedure is most appropriate to use to reprocess critical instruments, those used in a sterile body cavity?
- A. Mechanical cleaning alone
 - B. Wiping with alcohol
 - C. Soaking in enzyme solution
 - D. Sterilization
30. Prior to sterilizing or disinfecting a medical device, it is most important to
- A. Expose the device to infrared lights
 - B. Document the last use of the device
 - C. Place the device in a handwashing sink
 - D. Mechanically clean the device
31. When a reusable medical device or instrument is classified as a semi-critical device, it is essential that
- A. The item be cleaned with the hospital approved disinfectant
 - B. A high level of disinfection be used with the item
 - C. The item be sterilized
 - D. B & C
32. When opening a sterilized package, assess that:
- A. The chemical indicator strip to be activated
 - B. A package free of tears, dampness or soiling
 - C. The expected date of use precedes the expiration date
 - D. All of the above

33. For which of these reasons is it essential to use proper methods of environmental cleaning?
- A. To decrease the incidence of spore formation
 - B. To assure that patient care areas are shiny
 - C. To reduce the microbial load on surfaces
 - D. To prolong the effects of equipment sterilization
34. The Occupational Safety and Health Administration (OSHA) requires that all healthcare workers have a pre-employment
- A. Tuberculosis screening
 - B. Blood typing
 - C. Mumps titer
 - D. Urinalysis
35. Risk factors involved in healthcare workers' contracting Bloodborne diseases include
- A. An injury with contaminated needles/sharp instruments
 - B. Sexual contact with infected individuals
 - C. Mucous membrane exposure to contaminated blood
 - D. All of the above
36. The risk of developing HIV is increased if
- A. It is a deep injury
 - B. There is visible blood on the device
 - C. The source patient has high viral load
 - D. All of the above
37. The influenza vaccine is
- A. Offered annually
 - B. Free of charge to all employees
 - C. Cannot cause the flu
 - D. All of the above
38. The following symptoms require immediate evaluation by a licensed medical professional and possible restriction from patient care activities and return to work clearance:
- A. Fever and rash
 - B. Cough and vesicular lesions
 - C. Draining wounds and vomiting
 - D. Diarrhea
 - E. All of the above

Well, you made it through!

Non physician staff: Fill in name and employee number when prompted. If you wish to have a certificate of completion, please contact CL&R.

Physician staff: Follow directions on page 95.

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