

New York State Department of Health  
And  
New York State Education Department

Infection Control Training Syllabus  
Self Study

The content of this self-study handbook is established by the New York State Department of Health and the New York State Education Department and meets the licensure renewal requirement for mandatory Infection Control Training of Health Care Professionals in the State of New York.

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## TABLE OF CONTENTS

|   |    |
|---|----|
| ELEMENT I.....  | 6  |
| PROFESSIONAL RESPONSIBILITY FOR INFECTION CONTROL.....  | 6  |
| I.    STANDARDS OF CARE IN INFECTION PREVENTION AND CONTROL.....  | 6  |
| II.   STANDARDS OF PROFESSIONAL CONDUCT AS THEY APPLY TO INFECTION PREVENTION AND CONTROL.....  | 7  |
| ELEMENT II.....   | 8  |
| MODES AND MECHANISMS OF TRANSMISSION OF PATHOGENIC ORGANISMS IN THE HEALTHCARE SETTING AND STRATEGIES FOR PREVENTION AND CONTROL.....   | 8  |
| I.    TRANSMISSION OF INFECTIONS.....   | 8  |
| II.   PREVENTION STRATEGIES: BREAKING THE “CHAIN OF TRANSMISSION”.....  | 11 |
| ELEMENT III.....  | 15 |
| USE OF ENGINEERING AND WORK PRACTICE CONTROLS TO REDUCE THE OPPORTUNITY FOR PATIENT AND HEALTH-CARE WORKER EXPOSURE TO POTENTIALLY INFECTIOUS MATERIAL IN ALL HEALTHCARE SETTINGS.....                          | 15 |
| I.    HIGH RISK PRACTICES AND PROCEDURES:.....  | 16 |
| II.   SAFE INJECTION PRACTICES AND PROCEDURES DESIGNED TO PREVENT DISEASE TRANSMISSION FROM PATIENT TO PATIENT AND HEALTHCARE WORKER TO PATIENT.....  | 16 |
| III.  SAFE INJECTION PRACTICES AND PROCEDURES DESIGNED TO PREVENT DISEASE TRANSMISSION FROM PATIENT TO HEALTHCARE WORKER.....   | 18 |
| IV.   EVALUATION/SURVEILLANCE OF EXPOSURE INCIDENTS.....  | 18 |
| V.   ENGINEERING CONTROLS.....  | 19 |
| VI.   WORK PRACTICE CONTROLS.....   | 19 |
| ELEMENT IV.....   | 21 |
| SELECTION AND USE OF BARRIERS AND/OR PERSONAL PROTECTIVE EQUIPMENT FOR PREVENTING PATIENT AND HEALTHCARE WORKER CONTACT WITH POTENTIALLY INFECTIOUS MATERIAL.....   | 21 |
| I.    TYPES OF PPE/BARRIERS AND CRITERIA FOR SELECTION.....   | 21 |
| II.   CHOICE OF PPE AND BARRIERS BASED ON REASONABLY ANTICIPATED EXPOSURE OF THE HCW AND ON THE NEED FOR PATIENT PROTECTION:.....   | 23 |
| III.  PROPER AND EFFECTIVE USE OF PPE AND BARRIERS:.....  | 24 |
| IV.   DENTISTS AND DENTAL HYGIENISTS:.....  | 26 |
| ELEMENT V.....  | 27 |
| CREATION AND MAINTENANCE OF A SAFE ENVIRONMENT FOR PATIENT CARE IN ALL HEALTHCARE SETTINGS THROUGH APPLICATION OF INFECTION CONTROL PRINCIPLES AND PRACTICES FOR CLEANING, DISINFECTION, AND STERILIZATION..... | 27 |
| I.    UNIVERSAL PRINCIPLES.....   | 28 |
| II.   POTENTIAL FOR CONTAMINATION IS DEPENDENT UPON.....  | 28 |
| III.  STEPS OF REPROCESSING.....  | 28 |
| IV.   CHOICE/LEVEL OF REPROCESSING SEQUENCE.....  | 29 |
| V.    EFFECTIVENESS OF REPROCESSING INSTRUMENTS, MEDICAL DEVICES, AND EQUIPMENT.....  | 29 |
| VI.   RECOGNIZING POTENTIAL SOURCES OF CROSS-CONTAMINATION IN THE HEALTH CARE ENVIRONMENT.....  | 32 |
| VII.  FACTORS THAT HAVE CONTRIBUTED TO CONTAMINATION IN REPORTED CASES OF DISEASE TRANSMISSION.....   | 32 |

|  |    |
|--|----|
| VIII. EXPECTATIONS OF HEALTH PROFESSIONALS WITH RESPECT TO DIFFERING LEVELS OF DISINFECTION AND STERILIZATION METHODS AND AGENTS BASED ON THE AREA OF PROFESSIONAL PRACTICE SETTING AND SCOPE OF RESPONSIBILITIES..... | 33 |
| ELEMENT VI.....  | 35 |
| PREVENTION AND CONTROL OF INFECTIOUS AND COMMUNICABLE DISEASES IN HEALTH-CARE WORKERS .....  | 35 |
| I.    OVERVIEW OF OCCUPATIONAL HEALTH STRATEGIES FOR INFECTION CONTROL.....  | 35 |
| II.   PREVENTION AND CONTROL OF BLOODBORNE PATHOGEN TRANSMISSION .....   | 37 |
| III.  EVALUATION OF HCWS INFECTED WITH HIV, HBV, HCV OR OTHER BLOODBORNE PATHOGENS .....   | 40 |

## **Background**

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

The statute applies to the following professionals:

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

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

## **Goal of Infection Control Training as Mandated by Chapter 786**

The goal of the infection control training requirement is to:

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

## **Training Requirement: Minimum Core Elements**

In defining the scope of this training, the Departments consulted with health professionals in professional societies, academia, and healthcare organizations representative of the professions and the settings affected by this mandate. The resulting syllabus consists of six core elements. Each core element must be covered to meet the training requirement.

## **Comparison to Required Training as Part of the Occupational Safety and Health Administration (OSHA) Bloodborne Pathogen Standard**

The New York State law requires training to control transmission of disease from healthcare worker to patient, patient to healthcare worker, and patient-to-patient. OSHA requirements do not meet the New York State law for mandatory training since their focus is limited to preventing occupational exposure.

## **Exemptions or Equivalency Approvals**

**New York State Education Department** may exempt **dentists, dental hygienists, licensed practical nurses, optometrists, podiatrists and registered nurses** from completing the course work or training required upon receipt of the following:

- A written application for such exemption establishing there is no need to complete the course work or training because the nature of the applicant's practice does not require the use of infection control techniques or barrier precautions; or
- Documentation satisfactory to the department that the applicant/licensee has completed course work or training equivalent to that approved by the department.

Professionals in the categories listed above not currently practicing in New York State but holding active New York State licenses DO NOT need to complete the infection control course work at this time. Upon resuming practice in New York State, they have 90 days to complete the training.

To obtain an exemption form from the **New York State Education Department**, request a copy of Form 1C by contacting the Forms Management Unit by phone at 518-474-3817 ext. 320 or email [opforms@mail.nysed.gov](mailto:opforms@mail.nysed.gov), or by logging onto [www.op.nysed.gov](http://www.op.nysed.gov).

**New York State Department of Health** may exempt **physicians, physician assistants and specialist assistants** from taking the required course work based upon receipt of documentation of the following:

- A written application indicating the criteria upon which the applicant is requesting an **exemption**. The criteria for exemptions are:
  - Retired and no longer in active practice; or
  - Interruption of active practice; or
  - Not practicing in New York State; or
  - Do not provide direct patient care, or the nature of the practice does not require application of infection control principles and practices (e.g., counseling, education) **and** do not directly supervise or oversee individuals or programs where others are responsible for providing patient care or reprocessing patient care equipment; or
  - Other practice category. This requires full written explanation on the request for exemption form.
- A written application indicating the criteria upon which the applicant is requesting an **equivalency exemption through training**. The criteria for equivalency exemptions are:
  - Completion of a fellowship in infectious disease; or
  - Two years experience as a hospital epidemiologist; or
  - Current certification in infection control; or
  - Infection control practitioner qualified by training and/or experience.

**New York State Department of Health** exemption forms are available at [http://www.nyhealth.gov/professionals/diseases/reporting/communicable/infection/hcp\\_training.htm#how](http://www.nyhealth.gov/professionals/diseases/reporting/communicable/infection/hcp_training.htm#how)

## ELEMENT I

### PROFESSIONAL RESPONSIBILITY FOR INFECTION CONTROL

*All health-care professionals have the responsibility to adhere to scientifically accepted principles and practices of infection control in all healthcare settings and to oversee and monitor the performance of those medical and ancillary personnel for whom they are responsible.*

#### Learning Objectives:

- Recognize the benefits 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 these practices in all healthcare settings and the consequences of failing to comply;
- Recognize the professional's responsibility to monitor infection prevention and control practices of those medical and ancillary personnel for whom he/she is responsible and intervene as necessary to assure compliance and safety.

#### Definitions:

- **Standard Precautions (Universal Precautions):** precautions that are applicable to all patients, including use of barriers, such as gloves, gowns, masks, and/or protective eyewear, and proper disposal of sharps, to prevent skin and mucous membrane exposure to bloodborne pathogens and all other moist and potentially infectious body substances.
- **Standard of Care:** established criteria for the performance of individuals in similar circumstances.
- **OSHA:** Occupational Safety and Health Administration, a branch of the U. S. Department of Labor

#### I. Standards of Care in Infection Prevention and Control

##### A. Prevention of Bloodborne Diseases:

Evidence suggests that the transmission of human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) through medical and dental procedures is preventable through the strict adherence to good infection prevention and control practices. **Standard Precautions** decrease the opportunity for blood exposures among health-care workers and patients, and have become the standard of care in all health care settings since 1985.

##### B. Other Standards of Care include:

1. Practices to prevent spread of airborne diseases (e.g., tuberculosis, measles, chickenpox, smallpox)
2. Practices, such as hand hygiene, aseptic technique, and use of barrier methods, especially gloves, to prevent contact spread of most bacterial infections (e.g., staph and strep) and some viruses (herpes, cold viruses, CMV) in healthcare settings;
3. Appropriate cleaning, disinfection, and sterilization of medical devices and equipment; and

4. Occupational health practices for prevention and control of communicable diseases in healthcare workers (e.g. TB skin testing and immunizations against hepatitis B, measles, and rubella).

## II. Standards of Professional Conduct as They Apply to Infection Prevention and Control

### A. Mandated NY State and Federal Standards of Professional Conduct

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

### B. Implications of Professional Conduct Standards

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

## ELEMENT II

### MODES AND MECHANISMS OF TRANSMISSION OF PATHOGENIC ORGANISMS IN THE HEALTHCARE SETTING AND STRATEGIES FOR PREVENTION AND CONTROL

#### Learning Objectives:

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

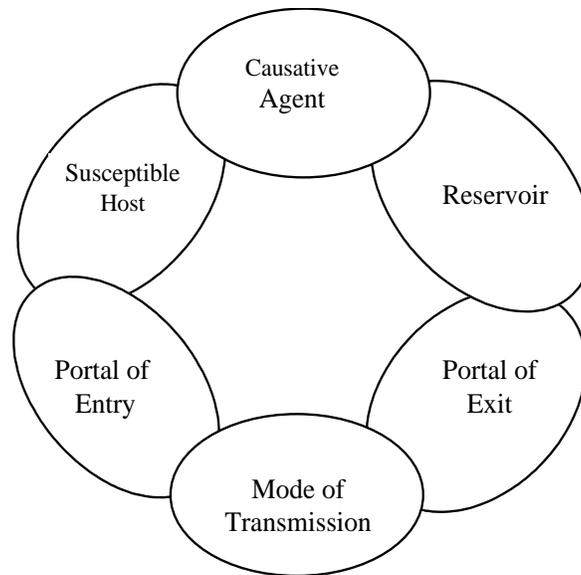
#### Definitions:

- **Pathogen or Infectious Agent:** a biological, physical, or chemical agent capable of causing disease. Biological agents may be bacteria, viruses, fungi, protozoa, helminthes, or prions.
- **Portal of Entry:** the means by which an infectious agent enters the susceptible host.
- **Portal of Exit:** the path by which an infectious agent leaves the reservoir.
- **Transmission:** any mechanism by which a pathogen is spread by a source or reservoir to a person.
- **Reservoir:** place in which an infectious agent can survive but may or may not multiply or cause disease. Healthcare workers may be a reservoir for a number of nosocomial organisms spread in healthcare settings.
- **Susceptible Host:** a person or animal lacking sufficient resistance to a particular infectious agent.
- **Common Vehicle:** contaminated material, product, or substance that serves as a means of transmission of an infectious agent from a reservoir to one or more susceptible hosts through a suitable portal of entry.
- **Healthcare-Associated Infection:** any infection which is acquired in a healthcare setting; manifestation of clinical illness may occur during or after discharge from the hospital or other health care facility, depending on the incubation period of the infection.
- **Incubation Period:** the time between exposure to an infectious agent and the onset of disease, ranging from hours to years.
- **Colonization:** presence of an infectious agent on skin, mucous membranes (nose, throat, vagina, intestinal tract) wounds, or in urine, stool or secretions, without causing illness. The colonizing agent may later cause disease, or may be transmitted to other persons.
- **Carrier:** person who carries an organism but may not have an active infection; can transmit to others
- **Standard Precautions:** a group of infection prevention and control measures that are based on the principle that all blood, body fluids, secretions, excretions except sweat, nonintact skin, and mucous membranes may contain transmissible infectious agents.

#### I. Transmission of Infections

##### A. “The Chain of Infection”:

The Chain of Infection is the pattern of spread of infection from one host to another susceptible host, or from the environment to a susceptible host. This chain requires a *pathogen*, a *reservoir*, a *portal of exit*, a *mode of transmission*, a *portal of entry*, and a *susceptible host*. With acquisition of the infectious agent, the new host may become ill, may remain asymptomatic (but may be a carrier), or develop an illness, which resolves but may be followed by a prolonged carrier state. Many infections are spread from person-to-person (e.g., influenza, measles, chickenpox, tuberculosis, colds, strep throat, staph, HIV, hepatitis A, B, and C, typhoid, gastroenteritis), whereas others are spread from environment-to-person without further spread between people (e.g., Legionnaire’s Disease, Anthrax and several fungal infections).



**B. Presence of a pathogen:**

Pathogens vary in their illness-causing potential, depending on virulence, survival outside the host, host and organ specificity (tendency to infect one type of human or animal host or a particular organ system), and ability to mutate. Mutations allow microorganisms to become more virulent; to develop resistance to antimicrobial drugs, and to avoid normal host defenses.

1. **Bacteria:** examples are staph aureus, streptococci, *E. coli*, *Pseudomonas*, anaerobes, *rickettsia*, *mycoplasma*, *chlamydia*, and mycobacteria such as TB.
2. **Viruses:** examples are influenza, common cold viruses, measles, mumps, chickenpox (varicella), smallpox (Variola), hepatitis A, B, and C, and HIV.
3. **Fungi:** include yeasts (e.g., *Candida*) and molds (e.g., *Aspergillus*).
4. **Parasites:** include protozoa (e.g., malaria, toxoplasmosis, pneumocystis), worms, and insects (e.g., lice and scabies).
5. **Prions:** include Kuru (shivering disease), CJD (mad cow disease), Germmann-Straussler-Scheinker (GSS), fatal familial insomnia (FFI), and atypical dementias (prion dementia without spongiform disease).

**C. Reservoirs include:**

1. Animate
  - a. People:

**Patients and healthcare personnel;  
Infected or colonized persons;**

### **Ill persons or asymptomatic carriers.**

*Persons who are asymptomatic may readily transmit infection if they are colonized, are incubating an infection, or are chronic carriers of the infectious agent.*

*Examples:* Many healthcare workers carry *Staph aureus* in their nose and may transmit it to patients; chickenpox and hepatitis A can be transmitted during their incubation periods, before illness occurs; hepatitis B can be transmitted (via blood, body fluids, sex, or birth) during an asymptomatic incubation period lasting up to 6 months, and 10% of those infected become chronic carriers who may transmit the infection indefinitely; HIV is transmissible (via blood, body fluids, sex, or birth) during the asymptomatic incubation period lasting up to 10 or more years, and throughout the period of illness. Hepatitis C can be transmitted (via blood, body fluids, sex, or birth) during an incubation period ranging from 2 weeks to 6 months. The period of communicability may remain indefinitely in persons chronically infected.

#### **b. Insects or animals**

*Examples:* skunks, fox, and bats are reservoirs of rabies; mice and deer are reservoirs of Lyme Disease, which is transmitted to humans from these animals by ticks

#### **2. Inanimate Environment:**

Water, soil, food, counter tops, sinks, medical equipment

*Examples:* soil and water (including home and hospital hot water tanks) are reservoirs of *Legionella*, the cause of Legionnaire's Disease; stagnant water is a reservoir of *Pseudomonas* and other potential pathogens in hospitals; soil and dust are reservoirs of *Aspergillus*, a potential pathogen in immunocompromised hosts; soil is a reservoir of tetanus, anthrax and other anaerobic infections.

#### **D. Portals of Exit:**

Routes and mechanisms by which pathogens exit the body

1. Respiratory tract  
coughing, sneezing, respiratory and oral secretions;
2. Skin/mucous membranes  
draining skin lesions or wounds;
3. GI tract  
feces (diarrhea or formed stool);
4. Genitourinary tract  
urine;
5. Drainage of blood and other body fluids
6. Transplacental

#### **E. Modes of Transmission:**

1. **Contact** with the pathogen via an infected/colonized person or their contaminated environment.
  - a. **Direct Contact:** touching a person or direct contact with their blood or secretions

- b. **Indirect Contact:** handling of environment or objects (“fomites”) contaminated with infected blood or secretions; or carriage of infection from one patient to another on the healthcare workers’ hands
- c. **Large droplet:** close-range (within 3-6 feet) exposure to droplets generated by coughing or sneezing
- d. **Airborne:** infections acquired by inhalation of aerosols composed of small infectious particles. Infectious aerosols are generated from coughing/sneezing/laughing/talking persons, or from the environment (water, soil, dust). Infection may spread widely in a room, corridor, or through a ventilation system.

*Examples: tuberculosis, chickenpox, measles, aspergillus, histoplasmosis*

- 2. **Common vehicle:** contaminated food, water, medication, intravenous fluid or other product, which transmits infection to 2 or more persons.
- 3. **Vector-borne:** transmission via an insect or animal carrier.  
*Examples: mosquitoes are vectors of malaria and West Nile Virus; ticks are vectors of Lyme Disease.*

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

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

**G. Factors which influence the outcome of an exposure:**

- 1. **Host susceptibility:** Immunity from past infection or immunization (e.g. measles, rubella) decreases susceptibility. Impairment of host defenses, e.g., due to advanced age, prematurity, chronic disease, malignancy, malnutrition, injury, or chemotherapy increases susceptibility. Impairment of defense is mediated by alteration in:
  - a. Natural barriers to infection, e.g., intact skin, stomach acid, respiratory tract cilia, and cough mechanism; tears and normal flora.
  - b. Immune system, e.g., humoral immunity (antibodies), cell-mediated immunity (lymphocytes, macrophages), inflammatory response.
  - c. Presence of a foreign body/invasive device.
- 2. **Pathogen or Infectious Agent factors**
  - a. Infectivity
  - b. Pathogenicity or the ability of an agent to cause disease in a susceptible host.
  - c. Virulence of the pathogen: invasiveness, ability to cause disease;
  - d. Inoculum size: amount of the infectious agent in the exposure;
  - e. Route of exposure: some routes more likely to cause infection;
  - f. Duration of exposure
- 3. **Environmental factors**
  - a. Contamination of environment
  - b. Contamination of equipment

**II. Prevention Strategies: Breaking the “Chain of Transmission”**

- A.** Consider **all patients** to be **potentially infected** with a bloodborne pathogen

## **B. For organisms other than bloodborne pathogens**

1. Recognize, isolate, diagnose, and treat persons with transmissible disease. *Examples:* tuberculosis, pertussis (whooping cough), meningococcal meningitis.
2. Eliminate or control inanimate reservoirs of pathogenic organisms. *Example:* eliminate stagnant water sources in health care setting; treat hot water systems for *Legionella*.

## **C. Eliminate or control inanimate reservoirs of pathogenic organisms:**

### **1. Hand Hygiene** is the single most important means of preventing spread of infection:

- a. Washing with a non-antimicrobial or an antimicrobial soap, running water and friction for a minimum 15 seconds when hands are visibly dirty or grossly contaminated with proteinaceous material effectively removes organisms from the hands.
- b. If hands are not visibly soiled an alcohol-based waterless antiseptic agent for routine decontamination of hands should be used. Apply product to palm of one-hand and rub hands together, covering all surfaces of hands and fingers, continuing rubbing until hands are dry.
- c. To improve hand hygiene adherence among personnel, especially in instances where high workloads and high intensity of patient care are anticipated, make an alcohol-based waterless antiseptic agent available at convenient locations.
- d. An antimicrobial soap may be preferred before surgical or invasive procedures, before contact in ICU settings, and after contact with blood, secretions, excretions, drainage, or contaminated articles.
- e. Care must be taken to avoid re-contamination of hands from soap containers, sink handles, standing water in sink or on counter. Bar soap should not be used.

### **2. Use of barriers** (gloves, gowns, masks, goggles): see Element IV.

### **3. Sterilization and disinfection** of patient care equipment: see Element V.

### **4. Isolation or cohorting:**

- a. **Standard Precautions** apply to all patients receiving care regardless of diagnosis or presumed infection status. Standard Precautions
  - Apply to 1) blood; 2) all body fluids, secretions, and excretions except sweat, regardless of whether or not they contain visible blood; 3) non-intact skin; and 4) mucous membranes.
  - Are designed to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection in hospitals.
  - Require the use of barrier protection (gloves, gowns, goggles and masks) and safe work practices (safe disposal of sharps and regulated wastes).

### **Transmission Based Isolation Precautions:**

Designed for patients suspected or documented to be infected with highly transmissible or epidemiologically important pathogens for which additional precautions beyond Standard Precautions are needed. There are three types of Transmission-based precautions. They may be combined for diseases that have multiple routes of transmission. When used either singularly or in combination, they are to be used in addition to Standard Precautions.

1. **Contact precautions**-used when a patient is known or suspected to be infected or colonized with epidemiologically important microorganisms transmitted by direct contact with the patient or indirect contact with environmental surfaces or patient equipment.
2. **Droplet precautions** - used when patient is known or suspected to be infected with microorganisms transmitted by large particle droplets that can be generated by the patient when coughing, sneezing, talking or the performance of procedures. A surgical mask must be worn when within 3-6 feet of the patient.
3. **Airborne precautions** - used when patients are known/suspected to be infected with microorganisms transmitted by airborne droplet nuclei (smaller-particle residue 5 microns or smaller in size) of evaporated droplets that remain suspended in the air and that can be dispersed widely by air currents within a room or over long distance and long periods of time.

#### 5. Environmental practices:

- a. Housekeeping: maintaining a clean environment;
- b. Ventilation: special room ventilation is required for patients with TB (or suspected TB), SARS, Chickenpox and certain other airborne infections;
- c. Waste management: proper disposal of sharps and infectious waste;
- d. Cleaning, disinfection, and sterilization of patient care equipment;
- e. Food services;
- f. Linen and laundry management.

#### 6. Engineering controls

- a. Safer devices

#### 7. Work practice controls

- a. Modification in techniques

### D. Protection of the host:

#### 1. Vaccination:

- a. **Personnel:** Health care workers (HCWs) are required to provide proof of immunity against measles (rubeola) and rubella either by history of natural disease or by providing documentation of vaccination. Vaccination against hepatitis B is strongly recommended. Annual influenza vaccination is advised for all HCWs to prevent illness and transmission of influenza to patients.

Surgical masks are required to be worn when delivering patient care if the HCW is not vaccinated against flu.

- b. **Patients:** should receive vaccinations appropriate to their age and risk group (e.g. influenza and pneumococcal vaccine for patients with chronic disease).

2. Pre-and **post-exposure prophylaxis** = preventative treatment or vaccination given after exposure to an infectious agent, in order to prevent infection or illness.

Examples:

Antibiotics given documented exposure to meningococcal disease;

Antiviral drugs (combination of 2-3 agents) given after documented exposure to HIV-infected blood/body fluid;

Hepatitis B vaccine and hepatitis B immune globulin given after exposure of an unvaccinated person to hepatitis B-infected blood;

Varicella-zoster immune globulin (VZIG) given to a susceptible, immunocompromised host after exposure to chickenpox.

Antivirals given after influenza exposure to prevent disease or mitigate disease severity

3. **Protect skin** from breakdown

4. **Avoid unnecessary use** or excessive duration of placement of intravenous lines, bladder catheters, and other invasive devices.

#### **E. Training and education of health care workers**

1. Training should be directly linked to the implementation of professional and regulatory standards as well as facility policies and procedures.

*Examples include:* OSHA Bloodborne Pathogen Training when beginning employment and then annual training for all “at risk” healthcare workers. Ongoing infection prevention and control education to comply with policies and procedures.

## ELEMENT III

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

#### Learning Objectives:

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

#### Definitions:

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

## I. High risk practices and procedures:

Circumstances and practices which are capable of causing healthcare acquired infection with bloodborne pathogens

### A. Percutaneous exposures = exposures that occur through the skin

1. Exposure occurring through handling, disassembly, disposal of, or reprocessing of contaminated needles and other sharps. *Examples:*  
manipulating contaminated needles and other sharp objects by hand, (e.g. removing scalpel blades from holders, needles from syringes)  
delaying or improperly disposing, (e.g. leaving contaminated needles or sharp objects on counters/work spaces or disposing in non-puncture resistant receptacles)  
recapping contaminated needles and other sharp objects using a two-handed technique
2. Performing procedures where there is poor visualization. *Examples:*  
blind suturing (suturing by feel)  
non-dominant hand opposing or next to a sharp  
performing procedures where bone spicules or metal fragments are produced

### B. Mucous membrane or non-intact skin exposures (exposures through eyes, mouth, nose, cuts, rashes, dermatitis) occur via:

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

### C. Parenteral exposures (exposure via the blood stream) may occur by injection with infectious material during:

1. Administration of parenteral medication;
2. Sharing of blood monitoring devices (e.g. glucose meters, hemoglobinometers, lancets, lancet platforms/pens);
3. Infusion of contaminated blood products or fluids.

## II. Safe Injection Practices and Procedures Designed to Prevent Disease Transmission from Patient to Patient and Healthcare Worker to Patient

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

1. Transmission of bloodborne viruses, including Hepatitis B and C viruses to patients;
2. Notification of thousands of patients of possible exposure to bloodborne pathogens and recommendation that they be tested for Hepatitis C virus, Hepatitis B virus, and human immunodeficiency virus (HIV);
3. Referral of providers to licensing boards for disciplinary action and;
4. Malpractice suits filed by patients.

B. Pathogens including HCV, HBV, and HIV can be present in sufficient quantities to produce infection even in the **absence of visible blood**

1. Bacteria and other microbes can be present without causing cloudiness of the fluid or other visible evidence of contamination
2. The absence of visible blood or signs of contamination in a used syringe, IV tubing, multi-dose medication vial, or blood glucose monitoring device does NOT mean the item is free from potentially infectious agents
3. All used injection supplies and materials are potentially contaminated and should be discarded immediately after use.

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. Clean hands before handling medications
  - d. If a medication vial has already been opened, the rubber septum must be disinfected with alcohol prior to piercing it
  - e. Never leave a needle or other device (e.g. “spikes”) inserted into a medication vial septum or IV bag/bottle for multiple uses. This provides a direct route for microorganisms to enter the vial and contaminate the fluid
  - f. Medication vials should be discarded upon expiration or any time there are concerns regarding the sterility of the medication
2. **Never administer medications from the same syringe** to more than one patient, even if the needle is changed
3. **Never use the same syringe or needle** to administer IV medications to more than one patient, even if the medication is administered into 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
    - i. Never combine leftover contents for later use
  - b. Medications packaged as multi-use should be assigned to a single patient whenever possible
    - i. Never use bags or bottles of IV 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. Use single-use lancets that permanently retract upon puncture whenever possible.

**Note: Safe Injection Practices and Procedures Designed to Prevent Disease Transmission from Patient to Healthcare Worker**

Refer to OSHA guidelines, available at

[http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=10051](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051)

### III. Evaluation/Surveillance of Exposure Incidents

#### A. Identification of who is at risk for exposure

- MD, RN, LPN, dentists, dental hygienists;
- Assistants: Nursing assistants, technicians, orderlies
- Ancillary personnel: respiratory therapists, physical therapists, housekeepers, laundry staff;
- Patients

#### B. Identification of what devices can 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)
  - b. Devices with higher injury rates (“butterfly” type IV catheters, devices with recoil action)
  - c. Blood glucose monitoring devices (lancet platform/pens)

#### C. Identification of areas/settings where exposures occur

1. Patient room
2. Operating room
3. Treatment rooms

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4. Physicians' offices

D. Circumstances by which exposures occur

1. Recapping
2. Transferring a body fluid between containers
3. Failing to properly dispose of used needles in puncture-resistant sharps containers
4. Failure to activate the engineered safety device

E. Post exposure management. See Element VI.

#### **IV. Engineering Controls**

**A. Use safer devices whenever possible to prevent sharps injuries:**

1. Evaluate and select safer devices
2. Employ Passive vs. active safety features
3. Implement use of mechanisms that provide continuous protection immediately
4. Use integrated safety equipment vs. accessory devices
5. Properly educate and train all staff on safer devices
6. Consider eliminating traditional or non-safety alternatives whenever possible
7. Explore engineering controls available for specific areas/settings

**B. Use Puncture-resistant containers** for the disposal and transport of needles and other sharps

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)

#### **V. 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 handling and disposing of needles and other sharp objects
    - i. Avoid recapping unless absolutely medically necessary
    - ii. When recapping, use only a one-handed technique or safety device
    - iii. Pass sharp instruments by use of designated “safe zones”
    - iv. Disassemble sharp equipment by use of forceps or other devices
    - v. Discard used sharps into a puncture-resistant sharps container immediately after use

**B. Modify procedures** to avoid injury

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

## ELEMENT IV

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

#### Learning Objectives:

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

#### Definitions:

- **Personal Protective Equipment (PPE):** specialized clothing or equipment (e.g., gloves, gowns, masks, goggles) worn by a health-care worker (HCW) for protection against a hazard.
- **Barriers:** an object that separates a person from a hazard (e.g., dressing or drape); equipment such as gloves, gowns, aprons, masks, or protective eyewear, which, when worn, can reduce the risk of exposure of the HCW's skin or mucous membranes to potentially infective materials.

#### I. Types of PPE/Barriers and Criteria for Selection

##### A. Gloves:

1. **When to be worn:** gloves must be worn for all anticipated hand contact with 1) blood, 2) all body fluids, excretions, and secretions *except sweat* (e.g., urine, stool, saliva, cerebrospinal fluid, wound drainage, etc), 3) mucous membranes (oropharynx, GI, respiratory, and genitourinary tracts), and 4) non-intact skin (wounds, rash or burns) and 5) when handling items contaminated with blood, body fluids, excretions, or secretions. Gloves must be worn during all invasive procedures and all vascular access procedures, including all phlebotomies and insertion of IV's or other vascular catheters.

Gloves are not to be washed, disinfected, or sterilized for reuse (except utility gloves). Gloves must be changed between patients, and hands must be sanitized after gloves are removed.

##### 2. Sterile and non-sterile gloves:

- a. **Sterile gloves** are required to prevent transmission of infection from HCW to patient **in surgery and in other procedures** associated with a high risk of infection due to interruption of normal host defenses. *Examples:* insertion of central venous catheters, urinary catheterization, surgical dressing changes, and tracheal suctioning.
- b. **Non-sterile gloves** are used to reduce transmission of infection when sterility is not required (e.g. oral or vaginal examination, cleaning a spill, emptying suction containers, urine drainage bags, or bedpans) or where sterile technique does not necessitate sterile gloves (*e.g.* phlebotomy, peripheral IV insertion).

### 3. Glove Material:

- a. **Vinyl, nitrile, or latex gloves** are used for most medical, dental, and laboratory procedures discussed above. Since gloves can be torn, they should be inspected prior to use. Disposable single use gloves must be replaced as soon as practical if contaminated, punctured or damaged during use. **Double-gloving** or **puncture-resistant liners** can be used to decrease the risk of percutaneous injury and exposure to blood/body fluids. If it is anticipated that there will be exposure to a large volume of blood or body fluids, then latex or nitrile gloves rather than vinyl gloves should be worn.
- b. **Rubber utility gloves** are used for heavy-duty housekeeping chores. They may be decontaminated and reused unless they are cracked, peeling, torn, or punctured.
- c. Hypoallergenic (latex free) gloves, glove liners, and powderless gloves are available.

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

#### 1. Types of cover garb:

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

#### 2. Permeability characteristics:

- a. **impervious** = fluids will not pass through
- b. **fluid resistant** = fluids will not readily pass through
- c. **permeable** = easily penetrated by fluids

3. **Choice of gown or apron** depends on the level of blood or body fluid exposure anticipated. **Fluid resistant** gowns are suitable for most situations; extra fluid resistant sleeves can be worn over a gown, and/or an impervious apron can be worn under a gown, to improve protection against soak-through during prolonged or high-blood-loss surgical procedures. **Impervious gowns** are preferable for procedures with the highest risk of blood exposure. Impervious gowns may be less comfortable since the material does not breathe well.

### C. Masks

#### 1. Types of masks:

- a. **Surgical mask:** purpose is to protect the patient by preventing discharge of contaminated nasal and oral secretions from the wearer during a procedure, and thereby reduce risk of wound infection.
- b. **Masks to protect the wearer:**
  - Protect wearer's nose/mouth from exposure to splattered or splashed blood or body fluids. Standard surgical masks are appropriate for this purpose.
  - Masks for protection against organisms spread via the airborne route such as TB, Chickenpox and novel agents such as SARS, Avian flu include N95 respirators, also called Particulate Respirators, and HEPA filter respirators in disposable and reusable

types. N95 respirators must filter out particles as small as 1 micron in size with at least 95% efficiency, and allow no more than 10% leakage of air around the mask. HEPA filters provide the highest level of filtering ability (0.3 micron size with 99.7% efficiency). Powered air-purifying respirators (PAPR or CAPRs) are an alternative for protection against TB. N95 respirators, HEPA respirators, CAPRs, and PAPRs are accepted by OSHA for protection of the wearer against airborne organisms.

## 2. Characteristics of masks:

- a. **Filtration** characteristics of the material: surgical masks may effectively block discharge of large droplets into the air, but the material is not an effective filter to prevent inhalation of very small, aerosolized particles characteristic of TB and airborne viral diseases. N95 and HEPA respirators provide increased levels of filtration. A wet mask is no longer effective.
- b. **Face seal:** a tight seal around the edges of a particulate respirator is essential to its effectiveness. If loose fitting, contaminated air is drawn in around the edges of the mask with each inhalation, instead of the air being drawn through the filter. Acceptable protection requires that face-seal leakage be no more than 10%. See **Respirator Fitting and Training** below (section III. A. 3.).

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

## II. Choice of PPE and barriers based on reasonably anticipated exposure of the HCW and on the need for patient protection:

### A. Selection of PPE/barriers based on anticipated exposure of HCW:

1. Contact with minimal bleeding or drainage: use gloves plus gown or apron.
2. The possibility of blood/body fluid splashes, sprays, splatters exists: use gloves, fluid resistant gown, mask, and eye protection or face shield. Appropriate in surgery, obstetrics, and dentistry.
3. Contact with large volume bleeding or drainage (likely to soak through): use the above, (select Latex or nitrile gloves) with fluid resistant gown, and add shoe covers, leg covers, and/or boots; consider impervious gown.
4. Large droplet vs. airborne (aerosol) pathogen: a face shield, or surgical mask plus eye protection, will protect against inoculation of large droplets or splatter into mouth, nose,

and eyes. Optimal protection against airborne disease (e.g., TB) requires a particulate respirator, PAPR, CAPR.

B. Selection of PPE/barriers based on need for **patient** protection:

1. Select sterile barriers and PPE for invasive procedures. *Example:* sterile gowns, gloves, dressings in surgery.
2. Select surgical masks for prevention of droplet contamination of patients' wounds. Most particulate respirators will also prevent droplet contamination from HCW to patient. **Exception:** exhalation valves (to allow easier breathing) on some particulate respirators will permit respiratory droplets to escape from the wearer; masks with exhalation valves should not be worn in surgery.
3. HCWs with skin lesions or nail infections must wear dressings and/or gloves to protect patients from exposure to HCW's blood/body fluids.

### III. Proper and effective use of PPE and barriers:

A. **Proper fit:**

1. **Gloves:** too small may tear; too large may be clumsy.
2. **Gowns:** should cover skin and clothes.
3. **Mask:** must fit snugly around mouth and nose, with metal band molded across bridge of nose, and straps or ties in place. When wearing an N95 particulate respirator mask, a fit check should be done after applying the mask and before going in the room.
  - a) **Respirator Fit-testing and Training:** HCWs who care for patients with known or suspected infectious TB are evaluated for ability to wear a particulate respirator (N95 mask or HEPA mask), fit-tested with the designated mask, and educated regarding TB transmission and precautions. Successful fit testing requires that face-seal leakage be no more than 10%. HCWs who have not been fit-tested and trained (or who cannot achieve adequate face seal due to facial contours or the presence of facial hair) for the appropriate respirator do not enter rooms being used for TB isolation. Powered air-purifying particulate respirators (**PAPRs or CAPRs**) are an alternative for respiratory protection of persons who have not or cannot be fit-tested successfully with an N95 mask but proper training about use must occur.

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

1. Inspect gloves for tears or holes before use. Replace gloves as soon as practical if damaged during use. Gloves need to be changed between patients and during care of the same patient if going from a dirty to clean task (e.g. perineal care to checking an IV site).
2. Masks should be replaced if damaged or wet.

C. **Disposable vs. reusable** barriers and PPE:

1. Disposable items should not be reused.
2. Reusable items must be properly cleaned and reprocessed before reuse.

3. Surgical masks are replaced after each use, and discarded promptly between patients. Particulate respirators (N95 and HEPA respirators) are often used for longer periods of time, but must be replaced if damaged, soiled, or wet.
4. All PPE, whether disposable or reusable, must be removed before leaving the patient room or work area, and hands must be sanitized.

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

1. Gloves, gowns, aprons, and surgical masks must be changed between patient contacts. Never wear the same gloves, gowns, etc. from patient-to-patient.
2. Hands must be sanitized after gloves are removed. Gloves do not completely prevent penetration of bacteria and viruses, and the moist environment inside a glove can promote growth of bacteria on the skin.
3. Reusable goggles should not be shared, and should be cleaned when soiled.

**E. Under- and over-use of barriers and PPE:**

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

**F. The proper sequence for putting on and removing PPE is as follows:**

**Putting on PPE**

1. Gown
  - Fully cover torso from neck to knees, arms to end of wrists, and fully wrap around the back
  - Fasten in back of neck and waist
2. Mask or Respirator
  - Secure ties or elastic bands at middle of head and neck
  - Fit flexible band to nose bridge
  - Fit snug to face and below chin
  - Fit-check respirator
3. Goggles or Face Shield
  - Place over face and eyes and adjust to fit
4. Gloves
  - Extend to cover wrist of isolation gown



PPE Use in Healthcare Settings

## Removing PPE

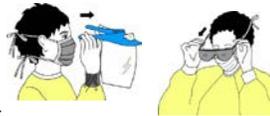
### 1. Gloves

- Outside of gloves is contaminated!
- Grasp outside of glove with opposite gloved hand, peel off
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist
- Peel glove off over first glove
- Discard gloves in waste container



### 2. Goggles or Face Shield

- Outside of goggles or face shield is contaminated !
- To remove, handle by head band or ear pieces
- Place in designated receptacle for reprocessing or in waste container



### 3. Gown

- Gown front and sleeves are contaminated !
- Unfasten ties
- Pull away from neck and shoulders, touching inside of gown only
- Turn gown inside out
- Fold or roll into a bundle and discard



### 4. Masks or Respirator

- Front of mask/respirator is contaminated – DO NOT TOUCH !
- Grasp bottom, then top ties or elastics and remove
- Discard in waste container



## IV. Dentists and dental hygienists:

- See: Centers for Disease Control (CDC). Recommended infection control practices for dentistry, 2003. revised 2012 *MMWR* 1993; 42(No. RR-8): 1-12 (May 28, 1993).

## ELEMENT V

### CREATION AND MAINTENANCE OF A SAFE ENVIRONMENT FOR PATIENT CARE IN ALL HEALTHCARE SETTINGS THROUGH APPLICATION OF INFECTION CONTROL PRINCIPLES AND PRACTICES FOR CLEANING, DISINFECTION, AND STERILIZATION

#### Learning Objectives:

- Define cleaning, disinfection, and sterilization
- Differentiate between non-critical, semi-critical, and critical medical devices
- Describe the three levels of disinfection (i.e. low, medium, and high)
- Recognize the importance of the correct application of reprocessing methods for ensuring 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

#### Definitions:

- **Contamination:** The presence of microorganisms on an item or surface
- **Cleaning:** The process of removing all foreign material (e.g. 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. It must be sterilized prior to contact with tissue.
- **Non-critical device:** An item that contacts intact skin but not mucous membranes. It requires low level disinfection.
- **Semi-critical device:** An item that comes in contact with mucous membranes or non-intact skin and minimally requires high level disinfection.
- **Decontamination:** The use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles
- **Disinfection:** The use of a chemical procedure that eliminates virtually all recognized pathogenic microorganisms but not necessarily all microbial forms (e.g. bacterial endospores) on inanimate objects
  - High-level disinfection: Disinfection that kills all organisms, except high levels of bacterial spores, and is accomplished with a chemical germicide cleared for marketing as a sterilant by the US Food and Drug Administration (FDA)
  - Intermediate level disinfection: Disinfection that kills mycobacteria, most viruses, and bacteria with a chemical germicide registered as a "tuberculocide" by the 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
- **Sterilization:** The use of a physical or chemical procedure to destroy all microbial life, including highly resistant bacterial endospores.

## **I. Universal Principles**

- A. Instruments, medical devices, and equipment should be managed and reprocessed according to recommended/appropriate methods regardless of a patient's diagnosis except for cases of suspected prion disease
  - 1. Special procedures are required for handling brain, spinal, and nerve tissue from patients with known or suspected prion disease (e.g. Creutzfeldt Jacob disease (CJD)). Consultation with infection prevention 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

## **II. Potential for contamination is dependent upon**

- A. Type of instrument, medical device, equipment, or environmental surface
  - 1. Potential for external contamination (e.g. presence of hinges, crevices)
  - 2. Potential for internal contamination (e.g. presence of lumens)
  - 3. Physical composition, design, or configuration of the instrument, medical device, equipment, or environmental surface
- B. Frequency of hand contact with instrument, medical device, equipment, or environmental surface
- C. Potential for contamination with body substances or environmental sources of microorganisms
- D. Level of contamination
  - 1. Types of microorganisms
  - 2. Number of microorganisms
  - 3. Potential for cross-contamination

## **III. Steps of Reprocessing**

### **A. Pre-cleaning:**

- 1. Removes soil, debris, lubricants from internal and external surfaces
- 2. To be done as soon as possible after use

### **B. Cleaning**

- 1. Manual (e.g. scrubbing with brushes)

2. Mechanical (e.g. automated washers)
3. Appropriate use and reprocessing of cleaning equipment (e.g. do not reuse disposable cleaning equipment)
4. Frequency of solution changes

C. **Disinfection** – requires sufficient contact time with chemical solutions

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

#### IV. Choice/Level of Reprocessing Sequence

A. Based on **intended use** (see Definitions)

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

B. Based on **manufacturer's recommendations**

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

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

A. **Cleaning** prior to disinfection

- Soil protects microbes from contact with lethal agents (disinfectants, sterilants), and may directly inactivate these agents.
- Physical cleaning eliminates large numbers of organisms associated with gross soil.
- Sound cleaning practices, in addition to their aesthetic benefits, reduce the microbial load on environmental surfaces.
- Manufacturer's recommendations for operation of cleaning equipment and use of cleaning supplies must be followed carefully.
- Pre-soaking in detergent-disinfectant solution is preferred when delays in reprocessing are unavoidable.
- Thoroughness of internal and external physical cleaning is vital to the process. Adequate disinfection cannot be achieved without first completing thorough cleaning and rinsing of the item, 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. **Disinfection**

1. Selection and use of disinfectants
  - a. Surface products

- b. Immersion products
- 2. Presence of organic matter
- 3. Presence of biofilms
- 4. Monitoring
  - a. activity and stability of disinfectant
  - b. contact time with internal and external components
  - c. record keeping/tracking of instrument usage and reprocessing
- 5. Post-disinfection handling and storage

## C. Sterilization

### 1. Selection and use of methods

#### a. Heat

##### 1. Steam

**Steam** continues to be the method of choice for sterilization of all moisture-stable items. The CDC Guideline for Disinfection and Sterilization states that steam sterilization should be used unless the object to be sterilized will be damaged by high pressure or moisture or is otherwise inappropriate for steam sterilization. **Immediate Use (Flash) sterilization** is the process of sterilizing items that are needed for immediate use. This process also requires the use of saturated steam. This process destroys most vegetative bacteria and viruses if the bioburden is low and no matter is evident. This type of sterilization should not be used as a routine sterilization process because of its minimal time and temperature requirements; the lack of biological indicators appropriate for rapid sterilization; the absence of protective packaging, and the possibility of contamination during transport. *Implantable items should only receive immediate use sterilization in an emergency situation.*

##### 2. Dry Heat

This process has been used for the sterilization of glass, instruments and other items that cannot be sterilized by steam sterilization. However, it is considered a less efficient process than moist heat. Furthermore, the parameters for dry heat are difficult to determine and the process is quite lengthy.

#### b. Gas

1. This option is rarely used in healthcare any longer. **ETO** is a colorless gas that is highly reactive with other chemicals. The ETO cycle involves preconditioning and humidification, gas introduction, exposure, evacuation and air washes. The process, excluding aeration time, is approximately 2 to 3 hours. ETO penetrates materials and, therefore, mechanical aeration is needed to remove the toxic ETO residue.
2. **Formaldehyde** can be used as a disinfectant (liquid form) or a sterilant (gas form). It is primarily used for decontamination of biological safety cabinets, high-efficiency particulate filter units.

### 3. Peroxide gas plasma

- a. Low-temperature sterilization method
- b. Utilizes hydrogen peroxide in vapor phase and low-temperature gas plasma

### 4. Peracetic acid gas plasma process (Plazlyte) cleared for use on selected instruments without small lumens.

- a. Can form a toxic salt when sterilization materials interact with copper, brass or zinc.

### 5. Vapor-phase hydrogen peroxide uses a deep vacuum to pull 30% liquid hydrogen peroxide from a disposable cartridge through a heated vaporizer.

#### c. Chemical Sterilants

- Glutaraldehyde
- Hydrogen peroxide
- Peracetic acid
- Peracetic acid with hydrogen peroxide

#### d. Other Methods

- Chlorine dioxide
- Filtration
- Ozone

## 2. Monitoring

- a. Biologic monitors
- b. Process monitors (tape, indicator strips, etc)
- c. Physical monitors (pressure, temperature gauges)
- d. Record keeping and recall/tracking system for each sterilization processing batch/item

## 3. Post-sterilization handling, packaging, and storage (event-related criteria)

1. Provide sterile storage in procedure areas (closed cabinets, wrappers) to avoid:
  - i. contamination from patient secretions or body fluids,
  - ii. hand contamination by employees obtaining extra supplies, and
  - iii. contamination from supplies being returned to stock after use.
  - iv. store packages to prevent disruption of package integrity:
  - v. covered storage to prevent moisture damage,
  - vi. store off the floor, and
  - vii. protect from insects and other pests.
2. Rotate stock so that items are used on a timely basis.
3. Appropriate storage conditions for sterile packs include:
  - i. limited access to storage area and/or closed cabinets,
  - ii. clean supplies should be stored separately from sterile supplies,

- iii. area must be clean, dry, dust free, lint free, temperature 18°-22° C (65° - 72° F), relative humidity 35-50%.

4. Check package integrity:

- i. Is the package free of tears, dampness, excessive dust, and gross soil?
- ii. Is there a chemical indicator on the outside of the package?
- iii. Has the expiration date been reached or passed? (if the manufacturer has an expiration date on the item)
- iv. If heat-sealed, has the seal been maintained?

## VI. Recognizing potential sources of cross-contamination in the health care environment

A. Surfaces or equipment which require cleaning between patient procedures/treatments:

- 1. All items having contact with mucous membranes must be cleaned and disinfected between patient uses. *Example:* reusable thermometers.
- 2. Items having contact with intact skin, such as blood pressure cuffs and stethoscopes, should also be disinfected after each use.
- 3. Any environmental surface, equipment, or device contaminated with blood or body fluids should be cleaned and disinfected immediately.

B. Practices that contribute to hand contamination and the potential for cross-contamination:

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

C. Consequences of reuse of single-use/disposable instruments, medical devices, or equipment

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

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

B. Specific factors

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

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

- A. Professionals who practice in settings where handling, cleaning, and reprocessing equipment, instruments, or medical devices is performed elsewhere (e.g. in a dedicated Sterile Processing Department):
  - 1. Understand core concepts and principles
    - a. Standard Precautions (e.g. wearing personal protective equipment)
    - b. Cleaning, disinfection, and sterilization described in Sections III and IV above
    - c. Appropriate application of safe practices for handling instruments, medical devices, and equipment in the area of professional practice
    - d. Designation and physical separation of patient care areas from cleaning and reprocessing areas is strongly recommended by NYSDOH
  - 2. Verify with those responsible for reprocessing what steps are necessary prior to transporting instruments
    - a. Pre-cleaning
    - b. Soaking
  
- B. Professionals who have primary or supervisory responsibilities for equipment, instruments, or medical device reprocessing (e.g. Sterile Processing Department staff or clinics and physician practices where medical equipment is reprocessed on site)
  - 1. Understand core concepts and principles
    - a. Standard Precautions
    - b. Cleaning, disinfection, and sterilization described in Sections III and IV above
    - c. Appropriate application of safe practices for handling instruments, medical devices, and equipment in the area of professional practice
    - d. Designation and physical separation of patient care areas from cleaning and reprocessing areas is strongly recommended by NYSDOH
  
  - 2. Determine appropriate reprocessing practices taking into consideration:
    - a. Selection of appropriate methods
      - i. Antimicrobial efficacy
      - ii. Time constraints and requirements for various methods
      - iii. Compatibility among equipment/materials
        - 1. Corrosiveness
        - 2. Penetrability
        - 3. Leaching
        - 4. Disintegration
        - 5. Heat tolerance
        - 6. Moisture sensitivity
    - iv. Toxicity
      - 1. Occupational health risks
      - 2. Environmental hazards
      - 3. Abatement methods
      - 4. Monitoring exposures

- 5. Potential for patient toxicity/allergy
- v. Residual effect
  - 1. Antibacterial residual
  - 2. Patient toxicity/allergy
- vi. Ease of use
  - 1. Need for specialized equipment
  - 2. Special training requirements
- vii. Stability
  - 1. Concentration
  - 2. Potency
  - 3. Efficacy of use
  - 4. Effect of organic material
- viii. Odor
- ix. Cost
- x. Monitoring
  - 1. Frequency
  - 2. FDA regulations for reprocessing single use devices (refer to FDA web site at <http://www.fda.gov/cdrh/reprocessing>)

## ELEMENT VI

### PREVENTION AND CONTROL OF INFECTIOUS AND COMMUNICABLE DISEASES IN HEALTH-CARE WORKERS

#### Learning Objectives:

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

#### Definitions:

- **Infectious Disease:** a clinically manifest disease of humans or animals resulting from an infection.
- **Communicable Disease:** an illness due to a specific infectious agent, which is acquired through transmission of that agent from an infected person, animal, or inanimate reservoir to a susceptible host.
- **Occupational Health Strategies:** as applied to infection prevention and control, a set of activities intended to assess, prevent, and control infections and communicable diseases in HCWs.

#### I. Overview of occupational health strategies for infection prevention and control

##### A. Goals of occupational health strategies:

1. Prevent disease transmission from HCWs to patients and staff.
2. Protect susceptible HCWs from infectious or communicable diseases.

##### B. Pre-placement and periodic health assessments:

1. **Immunization/screening programs** are targeted at several diseases:
  - a. **Tuberculosis (TB):** *at least* annual tuberculin skin testing is **required**; more often for high-risk positions. Symptoms evaluation at least annually for prior positive TST's.
  - b. **Hepatitis B (HBV):** HBV vaccination is strongly recommended; must be offered at no charge to HCWs whose work involves risk of exposure to blood/body fluids.
  - c. **Rubeola (measles):** documentation of immunity (2 doses of vaccine or a history of illness) is **required** of all HCWs born in 1957 or later.
  - d. **Rubella (German measles)** documentation of immunity (1 dose of vaccine or a positive serologic test) is **required** of all HCWs.
  - e. **Mumps:** screening for history of illness (and/or a blood test to confirm immunity or susceptibility) is often performed; vaccination is recommended for susceptible HCWs.
  - f. **Varicella (chickenpox):** screening for history of illness (and/or a blood test to confirm immunity or susceptibility) is recommended by CDC; vaccination is recommended for susceptible HCWs.

- g. **Influenza:** annual influenza vaccination is strongly recommended for all HCWs; vaccination is required to be offered to all employees in long term care facilities, home care, adult day care programs, etc. Those who are not vaccinated will be required to wear a surgical mask with patient contact.
- h. **Pneumococcal vaccine:** vaccination is required to be offered to all employees in long term care facilities, home care, adult day care programs etc.; it is highly recommended for anyone at risk as identified in ACIP guidelines

Some of the above screenings and immunizations are **required** by NY State or Federal mandates; others are highly **recommended**. Immunity to rubeola and rubella are required by the NY State Department of Health. Offering hepatitis B vaccine at no charge is required by the U.S. Department of Labor (OSHA). Annual TB screening (TST) is required by both the NY State Department of Health and OSHA.

- 2. **Reportable diseases:** the NY State Department of Health requires that cases of certain communicable diseases be reported to county and state health departments so that screening and/or treatment can be provided to contacts, and for epidemiological analysis. Diseases on the list include TB, rubeola, rubella, mumps, pertussis, syphilis, gonorrhea, and many others. Physicians, infection preventionists, laboratories, hospitals, nursing homes, school nurses, and day care directors are responsible for reporting these diseases. These can be assessed for during pre-employment physicals and annual health surveys.

C. **Evaluation of acute or incubating illnesses in HCWs:**

- 1. **HCWs exhibiting any of these symptoms** should be promptly evaluated for fitness to work (i.e., risk of transmitting to patients, staff, visitors):
  - fever, chills**
  - cough, sputum production**
  - sore throat**
  - exanthema (rash), vesicles**
  - skin lesions, weeping dermatitis**
  - draining wounds, sores**
  - diarrhea or vomiting**
  - eye infection or drainage**
- 2. **Post-exposure evaluation:** susceptible HCWs who have been exposed to the following diseases must also be evaluated:
  - tuberculosis**
  - varicella (chickenpox or herpes zoster, shingles)**
  - rubeola**
  - rubella**
  - pertussis (whooping cough)**
  - mumps**
  - meningococcal meningitis (close contact)**
  - scabies**
  - parvovirus B19 (Fifth's disease)**

D. **Management of ill or exposed HCWs** with acute or incubating communicable disease. The goal is to prevent potential transmission to susceptible patients and staff.

1. **Limit contact** with susceptible patients and staff. *Example:* temporary job re-assignment.
2. **Furlough from work** until HCW is no longer infectious or risk of contracting infection (post-exposure) has passed.

**Example: a susceptible (non-immune) HCW who has been exposed to chickenpox is usually furloughed from work beginning the 10<sup>th</sup> day through the 21<sup>st</sup> day after exposure (the incubation period for chickenpox).**

3. **Treatment** as needed. *Examples:*  
**HCW with active pulmonary tuberculosis is treated with multiple anti-tuberculosis drugs, and may return to work after symptoms have resolved and three sputum smears are negative.**  
**HCW with a newly positive tuberculin skin test but no evidence of active TB is treated with isoniazid (INH) for 6-9 months to prevent active TB from developing.**  
**HCW with draining skin lesions due to staph or strep (impetigo) may be treated with antibiotics until lesions heal.**

## II. Prevention and control of bloodborne pathogen transmission

A. **Risk** of bloodborne pathogens to HCWs:

1. **Occupational exposure** is defined as work-related contact with blood and other potentially infectious material via percutaneous exposure (needlestick, injection, cut), mucous membrane exposure (eye, nose, mouth), or non-intact skin exposure (wound, abrasion, dermatitis).  
**Potentially infectious material** includes blood, semen, vaginal secretions, spinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, fluids contaminated with blood, and any unknown fluid.
2. **Risks of specific pathogens**
  - a. **HIV:** the risk of acquiring HIV infection, following a needlestick contaminated with HIV-infected blood, is approximately 0.3%. Occupational infections have occurred via mucous membrane or non-intact skin exposures, but the risk from these exposures is much lower (0.1%). Infection with HIV may progress to AIDS after an asymptomatic incubation period of several years. HIV infection can be transmitted to others via sexual contact, blood contact, and perinatally (to the newborn).
  - b. **Hepatitis B virus (HBV):** percutaneous exposure to HBV results in a 6-30% risk of HBV infection. After an asymptomatic incubation period of 2-6 months, 50% of infected persons develop clinical hepatitis with jaundice, and the other 50% remain asymptomatic. 6-10% of HBV infected persons become chronic carriers who never clear the infection and can transmit HBV to others indefinitely (via sex, blood contact, or perinatally). 25% of chronic carriers develop chronic hepatitis with associated risk of cirrhosis, liver cancer, and death.

- c. **Hepatitis C virus (HCV):** exposure to HCV via needlestick results in a 1.8% risk for HCV infection. After an incubation period of 2 weeks to 6 months (usually 6-9 weeks), only 30-40% of persons with acute HCV will develop symptoms (anorexia, fatigue, nausea and vomiting, abdominal pain and jaundice). 75-85% of infected individuals will develop chronic disease. These chronically infected persons are at risk for developing chronic liver disease such as liver cancer and cirrhosis. Persons with chronic HCV may be evaluated for treatment with interferon and ribavirin to reduce the viral load and protect the liver from further damage. There is no vaccine for HCV.

#### B. **Hepatitis B prevention** through vaccination:

1. HBV vaccine is highly effective and safe.
2. Vaccination consists of 3 injections in the arm over a 6-month period.
3. Immunity develops in 80-95% of persons vaccinated.
4. Side effects may include soreness, slight swelling, and redness at the injection site; malaise and mild fever are uncommon reactions.
5. HBV vaccine is a recombinant product made from yeast (contains no live virus and no human serum or other human substances).
6. Vaccination is contraindicated in persons allergic to yeast or thimerosal (a preservative).

**HBV vaccination is strongly recommended** and must be offered by employers at no charge to employees whose work entails risk of exposure to blood and body fluids. Consent is required, and persons refusing vaccination must sign a declination statement.

#### C. **Prevention through HCW education**

Exposure to bloodborne pathogens can be reduced by providing education to HCW on exposure risk and risk-reduction strategies. This should include:

1. Potential agents (HIV, HBV, HCV)
2. Prevention strategies
  - a. Hand hygiene
  - b. Use of appropriate PPE and barrier precautions
  - c. Sharps safety
  - d. Use of standard precautions

#### D. **Post-exposure evaluation and management** of blood or body fluid exposures:

1. Every step in this process must be executed with maximum confidentiality for the patient and HCW involved.
2. **First, clean the affected area.** Cleanse skin with soap and water. For a needlestick, cut, or exposure through broken skin, wash affected area with soap and water. For oral exposure, rinse mouth well with water. For eyes, rinse well with sterile saline (after removing contact lenses).
3. **HCWs must promptly report blood/body fluid exposures** to infection prevention, occupational health, or a supervisor in accordance with the Exposure Control Plan at their hospital, clinic, or office practice. **It is recommended that medical assessment by a**

**licensed medical professional be completed immediately or shortly after the exposure (ideally within 1-2 hrs).**

4. **Evaluation of the exposure** includes documentation of:
  - a. date, time, and location of exposure;
  - b. route of exposure and type of potentially infectious material;
  - c. detail of exposure incident, task being performed, etc.;
  - d. identification of the source person, if known.
5. The **source person** is informed of the exposure and the importance of HIV, HBV, and HCV testing for blood-borne pathogens. **HIV, HBV, and HCV testing of the source** is performed after appropriate consent is obtained; informed, written consent and education are required for HIV testing. Persons already known to be HIV+, HBV+ and/or HCV+ need not be retested for that pathogen.
6. Medical evaluation, treatment and follow-up of the exposed HCW includes:
  - a. review of HBV vaccination status;
  - b. baseline serologic testing for HBV, HCV and HIV (after education and consent);
  - c. counseling about the risk of infection resulting from the exposure, recommended post-exposure treatment and follow-up, and precautions to prevent possible transmission to others.
  - d. post-exposure prophylaxis. *Examples:*
    - HBV exposure: HBV vaccination and Hepatitis B immune globulin (HBIG) are recommended for unvaccinated or non-immune HCWs, as soon as possible (preferably within 24 hours but up to 7 days after exposure)**
    - HIV exposure: post-exposure prophylaxis (PEP) with antiviral drugs (combinations of 2 or 3 agents) should be considered following significant HIV exposures. Post-exposure prophylaxis is based on the level of risk and exposure (i.e. amount and type) vs. the risk/benefit from PEP. If indicated, PEP should be initiated as soon as possible. The most current NYSDOH guidelines should be followed.**
    - HCV exposure: there is no known post-exposure treatment or vaccination at this time.**
  - e. post-exposure follow-up:
    - report 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;**
    - following a documented or suspected HIV exposure, repeat HIV testing of the HCW is recommended at baseline and periodically for 6 months post-exposure (e.g. 1 month, 3 months, and 6 months).**
    - following blood exposure, test the employee for baseline HCV, ALT and repeat testing at 4-6 months. (Anti-HCV is recommended for routine testing of asymptomatic persons, and should include use of both EIA to test for anti-HCV and supplemental or confirmatory testing with an additional, more specific assay).**
    - Use of supplemental antibody testing (i.e., RIBATM) for all positive anti-HCV results by EIA is preferred, particularly in settings where clinical services are not provided directly.**
7. Post-exposure management when the source is a HCW:

- a. when a patient or HCW sustains a blood/body fluid exposure and the source is a HCW, the hospital/clinic/practice has an ethical obligation to notify the exposed patient or HCW.
- b. the exposed patient or HCW, and the source HCW, are approached for counseling, consent, testing, treatment, and follow-up in the same manner as described above for a source patient and exposed HCW.

### III. Evaluation of HCWs infected with HIV, HBV, HCV or other bloodborne pathogens

#### A. NY State Department of Health policy on HIV testing of HCWs

1. Mandatory HIV screening of HCWs is discouraged;
2. **Voluntary HIV and HBV/HCV screening** of HCWs at risk for infection is encouraged so they may benefit from medical intervention; all HCWs who have been potentially exposed to HIV or HBV through personal risk behavior, blood products or occupational accidents should be strongly advised to seek testing.
3. **HCWs are not required to inform patients or employers** if they are HIV or HBV/HCV positive. Employers should be informed if infection results in impairment affecting job performance. A patient should be informed if that patient has sustained a significant exposure to the HCW's blood.

#### B. Evaluation of infected HCWs for risk of transmission

1. HIV or HBV/HCV infection alone does not justify limiting a HCW's professional duties.
2. **Limitations**, if any, should be determined on a case-by-case basis considering the factors that influence transmission risk, including:
  - a. Nature and scope of professional practice:  
**techniques used in invasive procedures which may pose a risk to patients; compliance with infection control standards.**
  - b. Presence of weeping dermatitis or skin lesions.
  - c. Overall health status: physical and cognitive function.
3. **Expert panel**: each hospital or institution must establish an expert panel to confidentially evaluate cases of HIV/HBV/HCV-infected HCWs with respect to work-related issues. An expert panel of the NY State Department of Health can also perform this evaluation. A panel can recommend practice limitations, modifications or restrictions where the evidence suggests there is a significant risk to patients.
4. Any **modification of work practice** must seek to impose the least restrictive alternative in accordance with federal disability laws.