New York State Infection Control
For New York State Professionals

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CE for Dental Professionals:

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Answer Sheet: New York State Infection Control

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Overall Course Objectives

At the completion of this educational activity, the learning will be able to:

- 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 and scientifically contrived practices to prevent infection and learn to control various factors that lead to infection.
- Minimize the opportunity for transmission of pathogens to patients and healthcare workers.
- Familiarize professionals with the law requiring this training and the professional misconduct charges that may be applicable for not complying with the law.

Additional Learning Objectives will be presented at the beginning of each element.

Introduction

This course meets the New York State requirement for training on infection control and barrier precautions, pursuant to Chapter 786 of the Laws of 1992, for the following professions:

- Dentists
- Dental Hygienists
- Licensed Practical Nurses
- Medical Residents
- Medical Students
- Optometrists
- Physicians
- Physician Assistants
- Physician Assistant Students
- Podiatrists
- Registered Professional Nurses
- Specialist Assistants

This training must be completed every four years unless otherwise exempt.

The course includes the following six mandated elements:

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.

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

III. Use of engineering and work practice controls to reduce the opportunity for patient and healthcare worker exposure to potentially infectious materials in all healthcare settings.

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

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, sterilization.

VI. Prevention and control of infectious and communicable diseases in healthcare workers.

Infection Control, The Beginning

Fundamental infection control techniques date back to the mid 1800’s with the pioneering work of Dr. Joseph Lister, a British surgeon. While working as professor of surgery at the University of Glasgow, Lister read a paper written by Louis Pasteur that indicated rotting and fermentation could occur under anaerobic conditions if microorganisms were present. Lister confirmed Pasteur’s conclusions with his own experiments and developed antiseptic techniques for wounds.

In August 1865 at Glasgow Infirmary, Lister applied lint dipped in carbolic acid onto the wound of an eleven year old boy suffering from a compound fracture after a cart wheel had run over his leg. After four days, Lister changed the dressing and discovered no infection had developed, and after six weeks, Lister was amazed to find the boy's bones had fused back together. He subsequently published his results in The Lancet in a series of five articles, running from March through July 1867, entitled: "On a New Method of Treating Compound Fracture, Abscess, etc.: with Observation on the Conditions of Suppuration". Later, on August 9, 1867, he read a paper before the British Medical Association in Dublin, on the “Antiseptic Principle of the Practice of Surgery”, which was reprinted in The British Medical Journal.

Lister successfully introduced carbolic acid (now known as phenol) to sterilize surgical
instruments and to clean wounds, which reduced postoperative infections and made surgery safer for patients.

Lister left Glasgow in 1869, and returned to Edinburgh as Professor of Surgery at the university. He continued to develop methods of antisepsis and asepsis. Lister’s fame spread, and audiences of more than 400 people came to hear him lecture. As the germ theory of disease became more widely accepted, it was realized infection could be better controlled by prevention. Some consider Lister the father of modern antisepsis. In 1879, Listerine mouthwash was named after him for his work in antisepsis. Also named in his honor is the bacteria genus Listeria, typified by the food borne pathogen Listeria monocytogenes. Aseptic techniques and hospital quality sterilization and disinfection are commonplace in dental offices today. (Wikipedia)

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 completion of 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.
- Recognize the professional's responsibility to monitor infection prevention and control practices of those medical and ancillary personnel for whom s/he is responsible and intervene as necessary to assure compliance and safety.

Rules, Regulations, and the Law:

Rules of the Board of Regents, Part 29.2(a)(13)

(a) Unprofessional conduct shall also include, in the professions of: acupuncture, athletic training, audiology, certified behavior analyst assistant, certified dental assisting, chiropractic, creative arts therapy, dental hygiene, dentistry, dietetics/nutrition, licensed behavior analyst, licensed perfusionist, licensed practical nursing, marriage and family therapy, massage therapy, medicine, mental health counseling, midwifery, occupational therapy, occupational
therapy assistant, ophthalmic dispensing, optometry, pharmacy, physical therapist assistant, physical therapy, physician assistant, podiatry, psychoanalysis, psychology, registered professional nursing, respiratory therapy, respiratory therapy technician, social work, specialist assistant, speech-language pathology (except for cases involving those professions licensed, certified or registered pursuant to the provisions of article 131 or 131-B of the Education Law in which a statement of charges of professional misconduct was not served on or before July 26, 1991, the effective date of chapter 606 of the Laws of 1991):

(13) 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 used following treatment of a 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 a 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; and

(14) failing to adhere to applicable practice guidelines, as determined by the commissioner, for the compounding of sterile drugs and products.

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

Part 92 - Infection Control Requirements

Effective Date: Wednesday, November 24, 1993

SubPart 92-1 - Physician's, Registered Physician Assistants and Specialist Assistants: Required Course Work or Training in Infection Control and Barrier Precautions Every Four Years

Effective Date: Wednesday, November 24, 1993
Section 92-1.1 - Course work or training
Course work or training in infection control and barrier precautions for physicians, registered physician assistants (PAs) and specialist assistants (SAs) as sufficient to satisfy the requirement of Public Health Law section 238, shall contain the core content which is specified in a syllabus prepared by the Department of Health (DOH) in consultation with the Department of Education, including course work or training in basic concepts of disease transmission, scientifically accepted principles and practices for infection control and engineering and work practice controls.
Effective Date: Wednesday, November 24, 1993

Section 92-1.2 – Application
Persons or organizations, other than DOH regulated health care facilities, including home health care agencies, wishing to provide such course work or training to physicians, PAs, and SAs must submit an application to DOH for review and approval, on forms prescribed by the Commissioner. The Department may request additional information from the applicant and conduct site visits. DOH regulated health care facilities, including home health care agencies, wishing to provide such course work or training to physicians, PAs and SAs must inform the department in a manner as prescribed by the Commissioner.
Effective Date: Wednesday, November 24, 1993

Section 92-1.3 - Provider competency
Persons or organizations seeking approval, other than DOH regulated health care facilities, including home health care agencies, shall document their expertise and competence to communicate the course materials and document that course work or training shall be supported by adequate facilities, equipment and other physical resources. Such facilities and agencies are deemed competent to provide training and education on infection control, unless they are subject to a denial or termination as provided for in section 92-1.5 of this Subpart.
Effective Date: Wednesday, November 24, 1993

Section 92-1.4 - Approval period
The department may approve for a six-year period the course work or training as submitted by an organization or person.
Effective Date: Wednesday, November 24, 1993

Section 92-1.5 - Denial or termination
A determination by the department that course work or training offered is inadequate or incomplete shall result in the denial or termination of departmental
Section 92-1.6 - Certificate of completion
Persons or organizations engaged in training and education pursuant to this Subpart shall supply each participant who has completed a course with a certificate of completion, as specified by the Commissioner, within 21 days and shall maintain a record for six years of participants who complete the work or training.

Effective Date: Wednesday, November 24, 1993

92-1.7 Certificate of retention.
In the event that an approved person or organization discontinues offering course work or training, a record of certifications shall be retained in a manner approved by the department for six years from the date of issuance.

Effective Date: Wednesday, November 24, 1993

Section 92-1.8 - Submission of documentation to the department
Physicians, PAs and SAs must submit documentation of course completion to DOH, except that such persons holding privileges or affiliated with or employed by DOH regulated health care facilities, including home health care agencies, need not submit documentation of course completion to the department. DOH regulated health care facilities, including home health care agencies, shall maintain documentation in credentialing or employment files of such infection control training and education of physicians, PAs and SAs.

Effective Date: Wednesday, November 24, 1993

Section 92-1.9 – Exemptions
The department may grant an exemption from such training and education to: physicians, PAs and SAs when the professional demonstrates to the Department's satisfaction that:

1) no need exists to complete the course work or training due to the nature of his/her practice, or
2) he/she has completed equivalent course work or training. No need to complete course work or training exists when health professionals are in settings where they do not provide direct patient care, do not have responsibility for supervising staff who provide direct patient care or reprocess used patient care equipment, or do not perform services to which these standards would be expected to apply, or when the professional does not practice in New York State. A physician, a P.A. or S.A. who has been granted an exemption shall notify the
Department in writing of any change in the nature of his or her practice within 30 days of the occurrence of such change. The physician, P.A. or S.A. shall then obtain necessary course work or training within 90 days of the change in practice.

Effective Date: Wednesday, November 24, 1993

Section 92-1.10 – Equivalencies
Equivalent training or course work shall be that training or course work which covers the concepts of disease transmission, scientifically accepted principles and practices for infection control, and engineering and work practice control as detailed in the syllabus. Equivalent course work or training must emphasize the bidirectional aspect of disease transmission.

Effective Date: Wednesday, November 24, 1993

SubPart 92-2 - Physicians, Registered Physician Assistants and Specialist Assistants Required Use of Infection Control Practices

Effective Date: Wednesday, November 24, 1993

Statutory Authority: Public Health Law, Section 230-a

Section 92-2.1 - Required use of infection control practices
Required use of infection control practices. For physicians, registered physician assistants and specialist assistants, the definition of unprofessional conduct shall include the failure to use scientifically accepted infection control practices to prevent transmission of disease pathogens from patient to patient, physician to patient, registered physician or specialist assistant to patient, employee to patient, and patient to employee, as appropriate to physicians, registered physician’s assistants and specialist’s assistants. Such practices shall include:

(a) adherence to scientifically accepted standards for: handwashing; aseptic technique; use of gloves and other barriers for preventing bi-directional contact with blood and body fluids; thorough cleaning followed by sterilization or disinfection of medical devices; disposal of non-reusable materials and equipment; and cleaning between patients of objects that are visibly contaminated or subject to touch contamination with blood or body fluids;

(b) use of scientifically accepted injury prevention techniques or engineering controls to reduce the opportunity for patient and employee exposures; and

(c) performance monitoring of all personnel, licensed or unlicensed, for whom the licensee is responsible regarding infection control techniques.

Effective Date: Wednesday, November 24, 1993
Relevant Professional and National Organizations

American Dental Association (ADA)

- Since 1993, the ADA and the Centers for Disease Control and Prevention (CDC) have updated and supplemented their infection control recommendations to reflect new scientific knowledge and growing understanding of the principles of infection control.
- The ADA urges all practicing dentists, dental auxiliaries and dental laboratories to employ appropriate infection control procedures as described in the 2003 CDC Guidelines, and 2016 CDC Summary and to keep up to date as scientific information leads to improvements in infection control, risk assessment, and disease management in oral health care.
- Along with the proper sterilization of instruments and materials, sterilizer monitoring is an essential part of any in-office infection control program (for information on instrument and equipment sterilization, consult "Sterilization and Disinfection of Dental Instruments" in the ADA Roadmap to CDC Guidelines for Infection Control in Dental Health-Care Settings).

The above referenced materials in blue can be accessed from here: http://www.ada.org/en/member-center/oral-health-topics/infection-control-resources.

Centers for Disease Control and Prevention (CDC) Recommendations


Infection control is concerned with preventing nosocomial or healthcare associated infection, a practical (rather than academic) sub discipline of epidemiology. Infection control and hospital epidemiology are akin to public health practice, practiced within the confines of healthcare delivery systems. Infection control addresses factors related to the spread of infections within the healthcare setting whether from patient-to-patient, patient-to-staff, staff-to-patient, or among staff members. Infection control includes prevention through hand hygiene/handwashing, cleaning/disinfection/sterilization, vaccination, surveillance and outbreak investigation, monitoring/investigation of demonstrated or suspected spread of infection, and management of outbreaks.
CDC Recommendations:

- Improve effectiveness and impact of public health interventions.
- Inform clinicians, public health practitioners, and the public.
- Are developed by advisory committees, ad hoc groups, and CDC staff.
- Are based on a range of rationale and form systematic reviews of expert opinions.

The CDC develops a broad range of guidelines which are intended to improve the effectiveness and impact of public health interventions and inform key audiences, most often clinicians, public health practitioners, and the public.

Guidelines can be developed by formal advisory committees, ad hoc work groups, and CDC staff. Development processes can vary, depending on the topic, available scientific data, urgency, resources, etc. and are based on a range of rationale, depending on the availability of scientific evidence.

The basic aim of infection control is to reduce the number of pathogenic microbes in the field of operation to a level where the body’s normal resistance can prevent infection.

CDC guidelines for infection control can be found here: https://www.cdc.gov/infectioncontrol/guidelines/index.html

CDC’s National Healthcare Safety Network is the nation's most widely used healthcare-associated infection tracking system. NHSN provides facilities, states, regions, and the nation with data needed to identify problem areas, measure progress of prevention efforts, and ultimately eliminate healthcare-associated infections (CDC 2017).

In addition, NHSN allows healthcare facilities to track blood safety errors and important healthcare process measures such as healthcare personnel influenza vaccine status and infection control adherence rates (CDC 2017).

There are many other organizations that focus on scientifically accepted practices of infection control including but not limited to:

- Association of Professionals in Infection Control and Epidemiology (APIC) www.apic.org
- Infectious Disease Society of America (IDSA) www.idsociey.org
- Joint Commission http://www.jointcommission.org/
- New York State Department of Health https://www.health.ny.gov
- Society for Healthcare Epidemiology of America (SHEA) www.shea-online.org
Implications of professional conduct standards

Professionalism expands on the basic principles of ethics to include the conduct, aims, and qualities that characterize a professional or a profession. It communicates behavior expectations as they relate to a given profession. The term is often viewed as being a quality in both conduct and character that coincides with an individual’s use of superior knowledge, skill, and judgment for the benefit of another, even above any consideration of self-interest. In essence, the term re-emphasizes the necessity of dental professionals and professional organizations to give priority to the well-being of the patients they serve.

The Code of Ethical Conduct set forth by the ADA states that dentists themselves are first and foremost responsible for assigning qualified assistants and licensed dental hygienists, only those duties which can be legally delegated. It is also the responsibility of the dentist to supervise all patient care provided by auxiliary personnel working under their direction. Although most dentists may think of themselves first and foremost as private practitioners, they are increasingly reliant on others to meet the oral health needs of their patients. Additionally, as more specialized fields of dentistry arise, it becomes necessary to outsource procedures to specialists, and it is imperative that practicing dentists have substantive knowledge and resources when it comes to referring patients.

According to The Journal of Family Medicine and Primary Care; “It is a general legal and ethical principle that one must get valid consent before starting treatment or physical investigation, or providing personal care, for a patient or conducting research involving human participants. In medical terms, informed consent implies to ‘providing sufficient information for a patient to make an informed and rational choice, the information includes the inherent risks and alternatives that a reasonable doctor would provide having regard to the particular circumstances of the patient.’ This principle reflects the right of patients to decide what happens to their own bodies and is an essential part of good practice.”

The fundamental ethical principles governing healthcare workers, include protecting a patient’s life and health at all times, to respect the patients autonomy to make informed choices about what happens to them, and to do this fairly and without prejudice. Thus the fundamental principles of ethics and law have many similarities, however, most individuals concur that law is perhaps better defined as the formal rules and regulations by which a society is governed, while ethics are informal or formal rules of behavior that guide individuals or groups of people. Essentially, legal rights are grounded on written law while ethical rights are grounded on principles and values.
Consequences of failing to follow accepted standards of infection prevention and control:

1) Increased risk of adverse healthcare outcomes for patients and healthcare workers.
2) Healthcare professionals may be subject to charges of professional misconduct.

The New York State Education Department, Office of the Professions maintains New York’s Professional Misconduct Enforcement System.

To report professional misconduct call 1-800-442-8106 or email conduct@nysed.gov.

Once a complaint is investigated possible outcomes include:

- Disciplinary action.
- Revocation of professional license.
- Professional liability.

To maintain professional compliance a professional must:

- Participate in the required infection prevention and control training.
- Adhere to accepted principles and practices of infection prevention and control.

**Element II: Modes and Mechanisms of Transmission of Pathogenic Organisms in the Healthcare Setting and Strategies for Prevention and Control**

**Learning Objectives:**

At the completion of this element, the learner will be able to:

- Describe how pathogenic organisms are spread in healthcare settings.
- Identify the factors which influence the outcome of an exposure to pathogenic organisms in healthcare settings.
- List strategies for preventing transmission of pathogenic organisms.
- Describe how infection 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.

**Reservoir**: Place in which an infectious agent can survive but may or may not multiply or cause disease. Healthcare workers may be a reservoir for a number of nosocomial organisms spread in healthcare settings.

**Standard precautions**: A group of infection prevention and control measures that combine the major features of Universal Precautions and Body Substance Isolation and are based on the principle that all blood, body fluids, secretions, excretions except sweat, nonintact skin, and mucous membranes may contain transmissible infectious agents.

**Susceptible host**: A person or animal not possessing sufficient resistance to a particular infectious agent to prevent contracting infection or disease when exposed to the agent.

**Transmission**: Any mechanism by which a pathogen is spread by a source or reservoir to a person.

**Common vehicle**: Contaminated material, product, or substance that serves as a means of transmission of an infectious agent from a reservoir to one or more susceptible hosts through a suitable portal of entry.

**Chain of Infection**
Infection through any of these routes requires that all of the following conditions be present:

- An adequate number of pathogens, or disease-causing organisms, to cause disease (infectious agent).
- A reservoir or source that allows the pathogen to survive and multiply (reservoir such as blood).
- A portal of exit from the reservoir or source to new host
  - Sites (respiratory tract, gastrointestinal tract, genitourinary tract, skin/mucous membrane, transplacental, blood);
  - Mechanisms (drainage, excretions, secretions).
- Portal of entry:
  - Sites (respiratory tract, gastrointestinal tract, genitourinary tract, skin/mucous membrane, transplacental, parenteral);
  - Mechanisms (percutaneous injury, invasive devices/procedures (e.g., vascular access), surgical incision.
- Mode of transmission:
  - Contact with pathogen:
    - Direct contact with an infectious lesion, blood, saliva or body fluids.
    - Indirect transmission from contaminated instruments or surfaces.
    - Aerosolization of infected blood, saliva, or nasopharyngeal secretion droplets.
    - Contact of mucosa of the eyes, nose, or mouth with droplets or spatter.
  - Common vehicle (e.g., food, water);
  - Vectorborne.
- A susceptible host (one who is not immune).

The occurrence of these events is considered the chain of infection. Effective infection control strategies prevent disease transmission by interrupting one or more links in the chain.

According to the Centers of Disease Control, “Transmission of infectious agents among patients and dental health care personnel (DHCP) in dental settings is rare. However, from 2003 to 2015, transmissions in dental settings, including patient to-patient transmissions, have been documented. In most cases, investigators failed to link a specific lapse of infection prevention and control with a particular transmission. However, reported breakdowns in basic infection prevention procedures included unsafe injection practices, failure to heat sterilize dental handpieces between patients, and failure to monitor (e.g., conduct spore testing) autoclaves. These reports highlight the need for comprehensive training to improve understanding of underlying principles, recommended practices, their implementation, and the conditions that have to be met for disease transmission” (CDC 2016).
Other Potentially Infectious Materials (OPIM): OPIM means any of the following:

- Human body fluids such as saliva in dental procedures and 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.
- Any unfixed tissue or organ (other than intact skin) from a human (living or dead).
- Any of the following if known or reasonably likely to contain or be infected with HIV, HBV, or HCV.
- Cell, tissue, or organ cultures from humans or experimental animals.
- Blood, organs, or other tissues from experimental animals.
- Culture medium or other solutions.

Factors influencing the outcome of exposures:

A) Host factors:
   a. Natural barriers (e.g., intact skin, respiratory cilia, gastric acid and motility, flow of urine, tears, normal flora);
   b. Host immunity (e.g., inflammatory response, humoral immunity, cell-mediated immunity, immune memory).

B) Pathogen or infectious agent factors:
   a. Infectivity;
   b. Pathogenicity;
   c. Virulence;
   d. Size of inoculum;
   e. Route of exposure;
   f. Duration of exposure.

C) Environmental factors:
   a. Contamination of environment, fomites;
   b. Contamination of equipment.

Methods to prevent the spread of pathogenic organisms in healthcare settings

A) Standard precautions:
   1) Respiratory hygiene/cough etiquette;
   2) Safe injection practices (see Element III);
   3) Use of masks during spinal/epidural access procedures.

B) For patients infected with organisms other than bloodborne pathogens:
   1) Early identification;
   2) Prompt isolation;
   3) Appropriate treatment.

C) Control of routes of transmission:
   1) Hand hygiene:
      i. Appropriate selection and use of agents (e.g., soap and water, alcohol based hand sanitizers);
      ii. Factors influencing hand hygiene efficacy;
iii. Sources of potential contamination or cross-contamination of hand hygiene materials.

2) Use of appropriate barriers:
   i. Appropriate selection, donning, doffing, and disposal of personal protective equipment (PPE).

3) Appropriate isolation/cohorting of patients infected with communicable diseases:
   i. Standard precautions for all patients;
   ii. Transmission based precautions for other pathogens:
       1. Contact (direct, indirect);
       2. Droplet;
       3. Airborne.
   iii. Host support and protection:
       1. Vaccination;
       2. Pre-and post-exposure prophylaxis;
       3. Protecting skin and immune system integrity.
   iv. Environmental control measures:
       1. Cleaning, disinfection, and sterilization of patient care equipment (see Element V);
       2. Environmental cleaning (housekeeping);
       3. Appropriate ventilation;
       4. Waste management;
       5. Linen and laundry management;
       6. Food services.
   v. Engineering and work practice controls (see Element III).
   vi. Training and education of healthcare workers

Handwashing

All professionals must thoroughly wash their hands with soap and water at the start and end of each workday. Professionals must wash contaminated or visibly soiled hands with soap and water and put on new gloves before treating each patient. If hands are not visibly soiled or contaminated, an alcohol rub may be used as an alternative to soap and water. Hands must be thoroughly dried before donning gloves in order to prevent bacterial growth and washed again immediately after glove removal. A professional must refrain from direct patient care if conditions are present that may render the professional or patients more susceptible to opportunistic infection or exposure.

All professionals who have exudative lesions or weeping dermatitis of the hands must refrain from all direct patient care and from handling patient care equipment until the condition resolves.
Hand Hygiene Definitions

- **Handwashing** Washing hands with plain soap and water.
- **Antiseptic handwash** Washing hands with water and soap or other detergents containing an antiseptic agent.
- **Alcohol based handrub** Rubbing hands with an alcohol containing preparation.

According to the CDC in 2016, when using alcohol-based hand sanitizer:

- Put product on hands and rub hands together
- Cover all surfaces until hands feel dry
- This should take around **20 seconds**
- **Surgical antisepsis** Handwashing with an antiseptic soap or an alcohol based handrub before operations by surgical personnel.

The primary defense against infection and transmission of pathogens is healthy, unbroken skin. Keeping nails short is considered key, because the majority of flora on the hands are found under and around the fingernails. Hands are the most common mode of pathogen transmission. Hand hygiene reduces the spread of bacteria. Hand hygiene is considered the single, most critical measure reducing the risk of transmitting organisms to patients and health care personnel. Dental care workers should wash their hands thoroughly (for a minimum duration of 15 seconds) with an antimicrobial handwash at the beginning of the day and in between patients.

The CDC Guideline for Hand Hygiene in Healthcare Settings recommends:

- When cleaning your hands with soap and water, wet your hands first with water, apply the amount of
- product recommended by the manufacturer to your hands, and rub your hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers.
- Rinse your hands with water and use disposable towels to dry. Use towel to turn off the faucet.
• Avoid using hot water, to prevent drying of skin.

**Personal Hygiene**

The staff should wear clean, fresh uniforms every day. Wear a long sleeved fluid resistant lab coat (or a disposable gown) over your uniform when any spatter is possible (even during cleaning). Do not wear the lab coat or uniform out of the office. Wash uniforms in hot soapy water and bleach. Machine dry at 100°F. Clean uniforms on site or by a third party. Pull longer hair back away from the face. False fingernails can lift at the edge, creating an area for fungi and microorganisms to breed. Keep fingernails trimmed, so they do not stress or puncture gloves. Keep cuts and sores covered. Do not touch your face, nose, or mouth with contaminated gloves.

**Surfaces and Waste Disposal**

**Surface Covers**

Many surfaces in the dental operatory become contaminated, and they are difficult to clean or cannot be autoclaved. Cover chair buttons, control buttons on the air/water syringe, switches on the unit, light handles, hoses, handpieces, and air/water syringe holders with plastic wrap, aluminum foil, or other disposable material that is impervious to water. Replace with fresh covers after each patient. Covers are faster and easier to remove and throw away than cleaning and disinfecting these areas. Make sure not to contaminate underlying surfaces by touching them or removing covers.

**Surface Cleaning**

Countertops should be disinfected after each patient. Surface barriers can be used and changed between patients OR dental practitioners should clean and disinfect all clinical contact surfaces not protected by impervious barriers using an EPA registered, hospital grade low to intermediate level disinfectant after each patient. Low level hospital disinfectants must be effective against HBV and HIV; intermediate level hospital disinfectants are effective against TB.

When using disinfectants, follow manufacturer’s instructions. Routinely clean all housekeeping surfaces (floors, walls, sinks) with a detergent and water or an EPA registered, hospital grade disinfectant. Preclean surfaces with a detergent cleaner before disinfecting. Disinfectants that have detergent properties can be used for this step. Prepare cleaning and disinfecting solutions daily. Use water, not alcohol, to dilute concentrates or other chemicals.

Wear utility gloves, a mask, protective eyewear, and protective clothing during
surface cleaning and disinfection to reduce skin, mucous membrane, or eye contamination. Generously spray cleaner onto surfaces, and wipe or scrub with paper towels or brush. If possible, rinse over a sink. After precleaning surfaces, spray disinfectant and leave undisturbed for ten minutes or by the amount of time given by manufacturer’s directions. (Spray - Wipe - Spray) Clean mops and cloths and dry them thoroughly before reusing.

**Spilled Blood**

Absorb any spilled blood with paper towels, saturate the area with bleach, and place soiled cleaning supplies in appropriate containers. Always wear utility gloves when cleaning up spilled blood.

**Disposal of Contaminated Wastes**

Contaminated, solid waste must be disposed of according to applicable local, state, and federal environmental standards. Local ordinances vary from area to area in regard to waste management. Check with local authorities for specific regulations.

**Regulated Medical Waste Management**

- Properly label waste containers to prevent injuries and leakage.
- Medical wastes are treated in accordance with state and local EPA regulations.
- Processes for regulated waste include autoclaving and incineration.

**Limiting Contamination**

Perform dental procedures by conscientiously limiting the amount of droplet nuclei, spatter, and aerosols. Use high speed evacuation, proper patient positioning, and a rubber dam if appropriate. Use over gloves if it is necessary to make a chart entry during treatment. Anything used in the patient's mouth must be sterile. Put all instruments for a patient on a sterile tray with a cover, and place all instruments back onto this tray after use. Wipe down the area where the tray rests with disinfectant after each patient. Use of any irrigating solution should be delivered using a sterile delivery system.

**Facilities**

If non critical items or surfaces likely to be contaminated are manufactured in a manner preventing cleaning and disinfection, they must be protected with disposable impervious barriers. Disposable barriers must be changed when visibly soiled or damaged and between patients.

Clean and disinfect all clinical contact surfaces that are not protected by impervious
barriers using a state, federal or California Environmental Protection Agency (CalEPA) hospital grade low to intermediate level disinfectant after each patient. The low level disinfectants used must be labeled effective against HBV and HIV.

Use disinfectants in accordance with the manufacturer’s instructions. Clean all housekeeping surfaces (floors, walls, sinks) with a detergent and water or a state, federal or California Environmental Protection Agency (CalEPA) registered hospital grade disinfectant. Products used to clean items or surfaces prior to disinfection procedures must be clearly labeled, and DHCP must follow all material safety data sheet (MSDS) handling and storage instructions.

Dental unit water lines must be anti-retractive. At the beginning of each workday, dental unit lines and devices must be purged with air or flushed with water for at least two (2) minutes prior to attaching handpieces, scalers, air water syringe tips, or other devices. The dental until lines and devices must be flushed between each patient for a minimum of twenty (20) seconds.

Contaminated solid waste must be disposed of according to applicable local, state, and federal environmental standards.

**Lab Areas**

Splash shields and equipment guards must be used on dental laboratory lathes. Fresh pumice and a sterilized or new ragwheel must be used for each patient. Devices used to polish, trim, or adjust contaminated intraoral devices must be disinfected or sterilized, properly packaged, or wrapped and labeled with the date and the specific sterilizer used if more than one sterilizer is utilized in the facility. If packaging is compromised, the instruments must be recleaned, packaged in a new wrap, and sterilized again. Sterilized items must be stored in a manner so as to prevent contamination.

All intraoral items such as impressions, bite registrations, and prosthetic and orthodontic appliances must be cleaned and disinfected with an intermediate level disinfectant before manipulation in the laboratory and before placing in the patient’s mouth. The Dental Board of California and Dental Hygiene Committee of California shall review this regulation annually and establish a consensus.

**Iodophor Solutions**

Iodophors are probably the most commonly used surface disinfectants. They have low toxicity, no offensive odor, and are not irritating to the skin. However, they do not produce a residual effect on the treated surface. Iodophors are rated by the EPA as a tuberculocidal hospital disinfectant. Some solutions are poor detergents, so the
surface must be precleaned with another product. Residual effects are cumulative with each treatment. Longer lasting disinfection results if surfaces are allowed to dry completely. Follow manufacturer’s directions for mixing and contact time.

**Complex Phenolics**

Some complex or synthetic phenols are excellent for surface disinfection. They have a good detergent effect, so the same solution can be used for precleaning and disinfection.

**Alcohol-Quaternary Ammonium Compounds**

Alcohol combined with quaternary ammonium compounds enhances the antimicrobial spectrum. Alcohol quaternary compounds are appropriate disinfectants.

**Sodium Hypochlorite (Bleach)**

Bleach should be mixed with water in a dilution of 1:10 or 1:100 of a 5.25% solution. Use a 1:100 solution (approximately 1/4 cup of 5.25% household chlorine bleach to one gallon of water) when cleaning blood and debris. Make a fresh solution every day, and wear heavy utility gloves when cleaning with bleach. A bleach and water mixture is not recommended as a surface disinfectant after every patient because of its odor and corrosive nature. It is a good solution for applying to contaminated paper products before their disposal. Any instruments that may have been sprayed with bleach should be rinsed well before soaking in detergents or disinfectants.

**Unacceptable Solutions**

**Quaternary Ammonium Compounds**

The Council for Dental Therapeutics of The American Dental Association has declared all older quaternary ammonium compounds unacceptable for use in dentistry. They are not tuberculocidal, sporidical, or virucidal and will not kill all gram negative bacteria. They are inactivated by soap, hard water, and organic debris.

**Alcohol**

Alcohol (both types: ethyl and isopropyl) is ineffective against bacterial spores, not consistently effective in killing viruses, evaporates rapidly, has no residual effect, and is inactivated by organic matter. Alcohol is not EPA approved for instrument or surface disinfection.
Element III Use of Engineering and Work Practice Controls to Reduce the Opportunity for Patient and Healthcare Worker Exposure to Potentially Infectious Materials in all Healthcare Settings

Learning Objectives:

At the completion of this element, the learner will be able to:

- Define healthcare-associated disease transmission, engineering controls, safe injection practices, and work practice controls.
- Describe specific high-risk practices and procedures that increase the opportunity for 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., scalpels, lancets, lancet platforms/pens, puncture devices, needles, syringes, injections).
- 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., dental office, hospitals, long-term care facilities, ambulatory settings, home care).

Engineering Controls: Controls (e.g., sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems) that isolate or remove the bloodborne pathogens hazard from the workplace.

Injection safety (or safe injection practices): A set of measures taken to perform injections in an optimally safe manner for patients, healthcare personnel, and others. A safe injection does not harm the recipient, does not expose the provider to any avoidable risks and does not result in waste that is dangerous for the community. Injection safety includes practices intended to prevent transmission of bloodborne pathogens between one patient and another, or between a healthcare worker and a patient, and also to prevent harms such as needlestick injuries.

Single-use medication vial: A bottle of liquid medication that is given to a patient through a needle and syringe. Single-use vials contain only one dose of medication and should only be used once for one patient, using a new sterile needle and new sterile
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).

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

A) Percutaneous exposures
   1) Exposures occurring through handling/disassembly/disposal/reprocessing of contaminated needles and other sharp objects:
      i. Manipulating contaminated needles and other sharp objects by hand (e.g., removing scalpel blades from holders, removing needles from syringes);
      ii. Delaying or improperly disposing (e.g., leaving contaminated needles or sharp objects on counters/workspaces or disposing in non-puncture-resistant receptacles);
      iii. Recapping contaminated needles and other sharp objects using a two-handed technique.
   2) Performing procedures where there is poor visualization, such as:
      i. Blind suturing;
      ii. Non-dominant hand opposing or next to a sharp;
      iii. 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:
      i. Contact with contaminated hands;
      ii. Contact with open skin lesions/dermatitis;
      iii. Splashes or sprays of blood or body fluids (e.g., during irrigation or suctioning).

C) Parenteral exposures:
   1) Injection with infectious material may occur during:
      i. Administration of parenteral medication;
      ii. Sharing of blood monitoring devices (e.g., glucometers, hemoglobinometers, lancets, lancet platforms/pens);
      iii. Infusion of contaminated blood products or fluids.

Preprocedural Mouth Rinsing

It is an excellent idea to use a pre-procedural mouth rinse to reduce microbial levels.
in the patient’s mouth. There is no mouthwash currently available that is a perfect preprocedural mouthrinse. Chlorhexidine gluconate seems to be the best wide spectrum mouthrinse currently available.

The American Heart Association recommends chlorhexidine rinses as an adjunct to antibiotic prophylaxis, especially if patients are high risk or have poor oral hygiene. Much research regarding CHG indicates it reduces the patient's chances of developing infections during procedures. CHG helps to control opportunistic infections in compromised patients who have bone marrow transplants, cancer, or HIV infection.

**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:
   a. Transmission of bloodborne viruses, including hepatitis B and C viruses to patients;
   b. 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);
   c. Referral of providers to licensing boards for disciplinary action; and
   d. Malpractice suits filed by patients.

B) Pathogens including HCV, HBV, and human immunodeficiency virus (HIV) can be present in sufficient quantities to produce infection in the absence of visible blood.
   a. Bacteria and other microbes can be present without clouding or other visible evidence of contamination.
   b. The absence of visible blood or signs of contamination in a used syringe, IV tubing, multi- or single-dose medication vial, or blood glucose monitoring device does NOT mean the item is free from potentially infectious agents.
   c. All used injection supplies and materials are potentially contaminated and should be discarded.

C) Proper infection control technique requires that healthcare providers must:
   a. Maintain aseptic technique throughout all aspects of injection preparation and administration:
      i. Medications should be drawn up in a designated "clean" medication area that is not adjacent to areas where potentially contaminated items are placed.
      ii. Use a new sterile syringe and needle to draw up medications while preventing contact between the injection materials and the non-sterile environment.
      iii. Ensure proper hand hygiene (i.e. hand sanitizing or hand washing if hands are visibly soiled) before handling medications.
      iv. If a medication vial has already been opened, the rubber septum should be disinfected with alcohol prior to piercing it.
      v. 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.

vi. Medication vials should be discarded upon expiration or any time there are concerns regarding the sterility of the medication.

b. Never administer medications from the same syringe to more than one patient, even if the needle is changed.

c. Never use the same syringe or needle to administer IV medications to more than one patient, even if the medication is administered into the IV tubing, regardless of the distance from the IV insertion site.

i. All of the infusion components from the infusate to the patient’s catheter are a single interconnected unit.

ii. All of the components are directly or indirectly exposed to the patient's blood and cannot be used for another patient.

iii. 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 medication vial.

iv. 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.

d. 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.

e. Dedicate vials of medication to a single patient, whenever possible.

i. Medications packaged as single-use must never be used for more than one patient:

1. Never combine leftover contents for later use;

ii. Medications packaged as multi-use should be assigned to a single patient whenever possible;

1. Never use bags or bottles of intravenous solution as a common source of supply for more than one patient.

f. Never use peripheral capillary blood monitoring devices packaged as single-patient use on more than one patient:

i. Restrict use of peripheral capillary blood sampling devices to individual patients.

ii. Never reuse lancets. Use single-use lancets that permanently retract upon puncture whenever possible.

The Centers for Disease Control and Prevention offers the following recommendations with the use of needles, cannulas that replace needles, and, where applicable intravenous delivery systems (CDC, 2007):

- Use aseptic technique to avoid contamination of sterile injection equipment.
- Do not administer medications from a syringe to multiple patients, even if the needle or cannula on the syringe is changed. Needles, cannulae and syringes are sterile, single-use items; they should not be reused for another patient nor to access a medication or solution that might be used for a subsequent patient.
Safe Injection Practices and Procedures Designed to Prevent Disease Transmission from Patient to Healthcare Worker

The Occupational Safety and Health Administration (OSHA) regulate workplace safety in the United States either through federal regulation or state-sponsored OSHA programs. In dentistry, one of the areas covered by the Bloodborne Pathogens Rule 1, is the use of personal protective equipment (PPE). There are no specific requirements regarding the types of materials for PPE. The regulations require that the employer assess the potential for exposure based on the nature of procedures typically done in a particular practice and select the appropriate protective attire.

The intention of PPE in dentistry is to prevent workers' skin, eyes, nose, mouth, and other mucous membranes from coming into contact with a patient's blood or other potentially infectious materials (OPIM), including saliva. Other requirements include providing PPE in appropriate sizes, replacing when necessary, and maintaining and laundering items as needed. All responsibility for providing and maintaining PPE and ensuring its use lies with the employer. The dentist / employer may not allow an employee to decline the use of PPE when there is a potential for exposure. For instance, the employer may not allow an assistant or hygienist to skip wearing a mask during procedures where there will be spray or spatter because they find it uncomfortable.

The following information is for professional display from OSHA® website, as of February 2017: https://www.osha.gov/OshDoc/data_BloodborneFacts/bbfact01.pdf
OSHA's Bloodborne Pathogens Standard

Bloodborne pathogens are infectious microorganisms present in blood that 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), the virus that causes AIDS. Workers exposed to bloodborne pathogens are at risk for serious or life-threatening illnesses.

Protections Provided by OSHA's Bloodborne Pathogens Standard

All of the requirements of OSHA’s Bloodborne Pathogens standard can be found in Title 29 of the Code of Federal Regulations at 29 CFR 1910.1030. The standard's requirements state that employers must ensure that workers who are occupationally exposed to blood or other potentially infectious materials (OPIM), as defined in the standard, are protected. This standard protects workers who can reasonably be anticipated to come into contact with blood or OPIM as a result of doing their job duties.

In general, the standard requires employers to:

- **Establish an exposure control plan.** This is a written plan to eliminate or minimize occupational exposures. The employer must prepare an exposure determination that contains a list of job classifications in which all workers have occupational exposure and a list of job classifications in which some workers have occupational exposure, along with a list of the tasks and procedures performed by those workers that result in their exposure.

- **Employers must update the plan annually** to reflect changes in tasks, procedures, and positions that affect occupational exposure, and also technological changes that eliminate or reduce occupational exposure. In addition, employers must annually document in the plan that they have considered and begun using appropriate, commercially-available effective safer medical devices designed to eliminate or minimize occupational exposure. Employers must also document that they have solicited input from frontline workers in identifying, evaluating, and selecting effective engineering and work practice controls.

- **Implement the use of universal precautions** (treating all human blood and OPIM as if known to be infectious for bloodborne pathogens).

- **Identify and use engineering controls.** These are devices that isolate or remove the bloodborne pathogens hazard from the workplace. They include sharps disposal containers, self-sheathing needles, and safer medical devices, such as sharps with engineered sharps-injury protection and needleless systems.

- **Identify and ensure the use of work practice controls.** These are practices that reduce the possibility of exposure by changing the way a task is performed, such as appropriate practices for handling and disposing of contaminated sharps, handling specimens, handling laundry, and cleaning contaminated surfaces and items.

- **Provide personal protective equipment (PPE), such as gloves, gowns, eye protection, and masks.** Employers must clean, repair, and replace this equipment as needed. Provision, maintenance, repair and replacement are at no cost to the worker.

- **Make available hepatitis B vaccinations to all workers with occupational exposure.** This vaccination must be offered after the worker has received the required bloodborne pathogens training and within 10 days of initial assignment to a job with occupational exposure.

- **Make available post-exposure evaluation and follow-up to any occupationally exposed worker who experiences an exposure incident.** An exposure incident is a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or OPIM. This evaluation and follow-up must be at no cost to the worker and includes documenting the route(s) of exposure and the circumstances
under which the exposure incident occurred; identifying and testing the source individual for HBV and HIV infectivity, if the source individual consents or the law does not require consent; collecting and testing the exposed worker’s blood, if the worker consents; offering post-exposure prophylaxis; offering counseling; and evaluating reported illnesses. The healthcare professional will provide a limited written opinion to the employer and all diagnoses must remain confidential.

- **Use labels and signs to communicate hazards.** Warning labels must be affixed to containers of regulated waste; containers of contaminated reusable sharps; refrigerators and freezers containing blood or OPIM; other containers used to store, transport, or ship blood or OPIM; contaminated equipment that is being shipped or serviced; and bags or containers of contaminated laundry, except as provided in the standard. Facilities may use red bags or red containers instead of labels. In HIV and HBV research laboratories and production facilities, signs must be posted at all access doors when OPIM or infected animals are present in the work area or containment module.

- **Provide information and training to workers.** Employers must ensure that their workers receive regular training that covers all elements of the standard including, but not limited to: information on bloodborne pathogens and diseases, methods used to control occupational exposure, hepatitis B vaccine, and medical evaluation and post-exposure follow-up procedures. Employers must offer this training on initial assignment, at least annually thereafter, and when new or modified tasks or procedures affect a worker’s occupational exposure. Also, HIV and HBV laboratory and production facility workers must receive specialized initial training, in addition to the training provided to all workers with occupational exposure. Workers must have the opportunity to ask the trainer questions. Also, training must be presented at an educational level and in a language that workers understand.

- **Maintain worker medical and training records.** The employer also must maintain a sharps injury log, unless it is exempt under Part 1904 – Recording and Reporting Occupational Injuries and Illnesses, in Title 29 of the Code of Federal Regulations.

**Additional Information**

For more information, go to OSHA’s Bloodborne Pathogens and Needlestick Prevention Safety and Health Topics web page at: [https://www.osha.gov/SLTC/bloodbornepathogens/index.html](https://www.osha.gov/SLTC/bloodbornepathogens/index.html).

To file a complaint by phone, report an emergency, or get OSHA advice, assistance, or products, contact your nearest OSHA office under the “U.S. Department of Labor” listing in your phone book, or call us toll-free at (800) 321-OSHA (6742).

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; the teletypewriter (TTY) number is (877) 889-5627.

For assistance, contact us. We can help. It’s confidential.

OSHA® Occupational Safety and Health Administration
www.osha.gov 1-800-321-6742

D5G 1/2011
What are bloodborne pathogens?

Bloodborne pathogens are infectious microorganisms in human blood that can cause disease in humans. These pathogens include, but are not limited to, hepatitis B (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV). Needlesticks and other sharps-related injuries may expose workers to bloodborne pathogens. Workers in many occupations, including first aid team members, housekeeping personnel in some industries, nurses and other healthcare personnel may be at risk of exposure to bloodborne pathogens.

What can be done to control exposure to bloodborne pathogens?

In order to reduce or eliminate the hazards of occupational exposure to bloodborne pathogens, an employer must implement an exposure control plan for the worksite with details on employee protection measures. The plan must also describe how an employer will use a combination of engineering and work practice controls, ensure the use of personal protective clothing and equipment, provide training, medical surveillance, hepatitis B vaccinations, and signs and labels, among other provisions. Engineering controls are the primary means of eliminating or minimizing employee exposure and include the use of safer medical devices, such as needleless devices, shielded needle devices, and plastic capillary tubes.

What is the Bloodborne Pathogens standard?

OSHA’s Bloodborne Pathogens standard (29 CFR 1910.1030) as amended pursuant to the Needlestick Safety and Prevention Act of 2000, prescribes safeguards to protect workers against the health hazards caused by bloodborne pathogens. Its requirements address items such as exposure control plans, universal precautions, engineering and work practice controls, personal protective equipment, housekeeping, laboratories, hepatitis B vaccination, post-exposure follow-up, hazard communication and training, and recordkeeping. The standard places requirements on employers whose workers can be reasonably anticipated to contact blood or other potentially infectious materials (OPIM), such as unfixed human tissues and certain body fluids.

What is the Needlestick Safety and Prevention Act?

The Needlestick Safety and Prevention Act (the Act) (Pub. L. 106-430) was signed into law on November 6, 2000. Because occupational exposure to bloodborne pathogens from accidental sharps injuries in healthcare and other occupational settings continues to be a serious problem, Congress required modification of OSHA’s Bloodborne Pathogens standard (29 CFR 1910.1030) to set forth in greater detail (and make more specific) OSHA’s requirement for employers to identify, evaluate and implement safer medical devices such as needleless systems and sharps with engineered sharps.
protections. The Act also mandated additional requirements for maintaining a sharps injury log and for the involvement of non-managerial healthcare workers in identifying, evaluating and choosing effective engineering and work practice controls. These are workers who are responsible for direct patient care and be potentially exposed to injuries from contaminated sharps.

*How does the Needlestick Safety and Prevention Act apply to OSHA’s Bloodborne Pathogens standard?*

The Act directed OSHA to revise its Bloodborne Pathogens standard (29 CFR 1910.1030). OSHA published the revised standard in the Federal Register on January 18, 2001; it took effect on April 18, 2001. The requirement to implement the use of engineering controls, which includes safer medical devices, has been in effect since 1992.

*How does the standard affect states that operate their own federally-approved occupational safety and health programs?*

States and territories that operate their own OSHA-approved state programs are required to adopt a Bloodborne Pathogens standard that is at least as effective as the Federal OSHA standard.

*Does the standard apply to public sector (state and local government) employees?*

The 25 states and two territories that operate OSHA-approved state plans are required to enforce an "at least as effective" standard in the public sector. In the remaining states where Federal OSHA has jurisdiction, hospitals in the public sector are required to comply with the Bloodborne Pathogens standard with enforcement by the Centers for Medicare and Medicaid Services (42 U.S.C. 1395cc(a)(1)(V) and (b)(4)).

*Do the Bloodborne Pathogens standard and the Needlestick Safety and Prevention Act apply to me?*

OSHA’s Bloodborne Pathogens standard, including its 2001 revisions, applies to all employers who have an employee(s) with occupational exposure (i.e., reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials (OPIM) that may result from the performance of the employee’s duties). These employers must implement the requirements set forth in the standard. Some of the new and clarified provisions in the standard apply only to healthcare settings, but other provisions, particularly the requirements to update the Exposure Control Plan and to keep a sharps injury log, apply to non-healthcare as well as healthcare settings.
What does the standard say about the use of safer medical devices?

The standard states, "engineering and work practice controls shall be used to eliminate or minimize employee exposure." The 2001 revision defines engineering controls as "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." Employers who have employees exposed to contaminated sharps must consider and implement appropriate commercially available and effective safer medical devices designed to eliminate or minimize occupational exposure. Also, employees with occupational exposure must be trained in the use and limitations of methods that will prevent or reduce exposure, including appropriate engineering controls, work practices and personal protective equipment. Therefore, training must include instruction on any new techniques and practices associated with new engineering controls.

If I’ve never had an employee experience a needlestick, do I still need to use safer devices?

Yes. OSHA standards are intended to be implemented as a means to prevent occupational injuries and illnesses. To most effectively avoid percutaneous injuries from contaminated sharps, employers must implement engineering controls, including safer medical devices, so that employees have them available to use.

How many non-managerial employees do I need to include in the process of choosing safer medical devices?

Small medical offices may want to seek input from all occupationally exposed employees when making their decisions. Larger facilities are not required to request input from all exposed employees; however, the employees selected should represent the range of exposure situations encountered in the workplace (e.g., pediatrics, emergency department, etc.). Regardless of the number chosen, in order to be included in the process the workers must be responsible for direct patient care and be potentially exposed to injuries from contaminated sharps. The solicitation of employees who have been involved in the input and evaluation process must be documented in the Exposure Control Plan.

Does OSHA have a list of available safer medical devices?

No. OSHA does not approve or endorse any product. It is the employer's responsibility to identify and implement appropriate, commercially available and effective safer medical devices for the specific medical procedures being conducted.
What if a safer option is not available for the medical device that I use?

A key element in choosing a safer medical device, other than its appropriateness to the procedure and its effectiveness, is its availability on the market. If there is no safer option to the medical device that you are using for a particular procedure, you are not required to adopt a device different from the one currently being used. During your annual review of devices, you must consider new or prospective safer options and document this fact in your written Exposure Control Plan. With advances in medical technology, more devices are becoming available for different procedures. If no engineering control is available, work practice controls shall be used and, if occupational exposure still remains, personal protective equipment must also be used.

Do I have to keep a sharps injury log? Does it have to be confidential?

If, as an employer, you are required to maintain a log of occupational injuries and illnesses under 29 CFR Part 1904, you must also establish and maintain a sharps injury log for recording percutaneous injuries from contaminated sharps. The sharps injury log must contain, at a minimum, the type and brand of device involved in the injury (if known), the department or work area where the exposure incident occurred, and an explanation of how the incident occurred. The log must be recorded and maintained in a manner that protects the confidentiality of the injured worker (e.g., removal of personal identifiers).

Does the revised Bloodborne Pathogens standard apply to medical or dental offices that have fewer than 10 employees?

OSHA’s Bloodborne Pathogens standard applies to all employers with employees who have occupational exposure to blood or other potentially infectious materials (OPIM), regardless of how many workers are employed. However, the offices and clinics of medical doctors and dentists are exempt from the requirement to keep a log of occupational injuries and illnesses and thus exempt from maintaining a sharps injury log. (See Appendix A to Subpart B of 29 CFR Part 1904.) All other applicable provisions of the Bloodborne Pathogens standard still apply.

What information do I need to include in my written Exposure Control Plan (ECP)? How often do I need to update it?

The required elements of an ECP are:

- The exposure determination which identifies job classifications with occupational exposure and tasks and procedures where there is occupational exposure and that are performed by employees in job classifications in which some employees have occupational exposure;
• The procedures for evaluating the circumstances surrounding exposure incidents;
• A schedule of how other provisions of the standard are implemented, including methods of compliance, HIV and HBV research laboratories and production facilities requirements, hepatitis B vaccination and post-exposure evaluation and follow-up, communication of hazards to employees, and recordkeeping;
• Methods of compliance include:
  o Universal Precautions;
  o Engineering and work practice controls, e.g., safer medical devices, sharps disposal containers, hand hygiene;
  o Personal protective equipment;
  o Housekeeping, including decontamination procedures and removal of regulated waste.
• Documentation of:
  1. the annual consideration and implementation of appropriate commercially available and effective safer medical devices designed to eliminate or minimize occupational exposure, and
  2. the solicitation of non-managerial healthcare workers (who are responsible for direct patient care and are potentially exposed to injuries from contaminated sharps) in the identification, evaluation, and selection of effective engineering and work practice controls.

The ECP must be reviewed and updated at least annually, and whenever necessary to reflect new or modified tasks and procedures which affect occupational exposure and to reflect new or revised employee positions with occupational exposure.

Are employers responsible for providing sharps containers for employees who are diabetic and need insulin shots in a non-healthcare related facility?

The employer would not be required to provide a sharps container to an employee using insulin syringes for personal therapeutic reasons. To eliminate potential exposures to other workers, however, the employer could require that the employee provide his or her own workplace sharps container.

What does OSHA currently accept as "appropriate" disinfectants to prevent the spread of HIV and HBV?

OSHA’s position is that EPA-registered tuberculocidal disinfectants, diluted bleach solutions and EPA-registered disinfectants that are labeled as effective against both HIV and HBV as well as Sterilants/High-Level Disinfectants cleared by the FDA, meet the requirement in the standard and are "appropriate" disinfectants to clean contaminated
surfaces, provided that such surfaces have not become contaminated with agent(s) or volumes of or concentrations of agent(s) for which higher level disinfection is recommended.

It is important to emphasize the EPA-approved label section titled "SPECIAL INSTRUCTIONS FOR CLEANING AND DECONTAMINATION AGAINST HIV-1 AND HBV OF SURFACES\OBJECTS SOILED WITH BLOOD\BODY FLUIDS." These instructions require:

- That personal protective equipment be provided for the worker performing the task;
- That all the blood must be cleaned up thoroughly before applying the disinfectant;
- That the disposal of the infectious waste be in accordance with federal, state, or local regulations; and
- That the surface be left wet with the disinfectant for 30 seconds for HIV-1 and for 10 minutes for HBV.

*Is a Hepatitis B (HBV) post-vaccination titer required?*

29 CFR 1910.1030(f)(1)(ii)(D) takes into consideration the changing nature of medical treatment relating to hepatitis B. OSHA requires use of the U.S. Public Health Service (USPHS) guidelines current at the time of the evaluation or procedure. The most current guidelines regarding hepatitis B is the Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Post-Exposure Prophylaxis in MMWR, Vol. 50, No.11, June 29, 2001. The hepatitis B vaccination must be given in the standard dose and through the standard route of administration, as recommended in the guidelines. Employees who have ongoing contact with patients or blood and are at ongoing risk for percutaneous injuries must be tested for antibody to hepatitis B surface antigen, one to two months after the completion of the three-dose vaccination series. Employees who do not respond to the primary vaccination series must be revaccinated with a second three-dose vaccine series and retested. Non-responders to the second series must be medically evaluated.

Are workers who administer the vaccines in emergency situations (e.g., in a pandemic response) covered by the Bloodborne Pathogens standard

The Bloodborne Pathogens standard covers all workers in the private sector as well as civilian employees of federal entities. State and local government employees are covered if they are in one of the 25 states and two territories that operate their own OSHA-approved state plans. In the remaining jurisdictions, where Federal OSHA has authority, hospitals operated by state, territorial or local governments are required to
provide the protection of the Bloodborne Pathogens standard to their employees with enforcement by the Centers for Medicare and Medicaid Services (42 U.S.C. 1395cc(a)(1)(V) and (b)(4)).

Additionally, the CDC recommends that all vaccination clinics comply with the Bloodborne Pathogens standard's provisions.

Where can I get information about what is expected of me?

There are several resources available for employers and employees with regard to occupational exposures to blood and OPIM. First is the OSHA Bloodborne Pathogens standard (29 CFR 1910.1030). Also available are CPL 2-2.69 (November 2001) Enforcement Procedures for the Occupational Exposure to Bloodborne Pathogens, and many other related documents. This information can be found on OSHA’s Bloodborne Pathogens and Needlestick Prevention Web Page. You may access additional information, such as information from OSHA’s Consultation and State Plan State Offices, via OSHA’s website or by phone at 1-800-321-OSHA (6742). CDC and the National Institute for Occupational Safety and Health (NIOSH), a CDC agency, also have documents related to the prevention of occupational exposure to blood and OPIM available.

Evaluation/Surveillance of exposure incidents

- Identification of who is at risk for exposure,
- Identification of what devices cause exposure,
  - ALL sharp devices can cause injury and disease transmission if not used and disposed properly.
    - Devices with higher disease transmission risk (hollow bore),
    - Devices with higher injury rates (“butterfly”-type IV catheters, devices with recoil action)
  - Blood glucose monitoring devices (lancet platforms/pens).
- Identification of areas/settings where exposures occur, and
- Circumstances by which exposures occur.
- Post exposure management- See Element VI.

Engineering controls

- Use safer devices whenever possible to prevent sharps injuries
  - Evaluate and select safer devices
  - Passive vs. active safety features
  - Mechanisms that provide continuous protection immediately
  - Integrated safety equipment vs. accessory devices
    - Properly educate and train all staff on safer devices,
    - Consider eliminating traditional or non-safety alternatives whenever possible
• Explore engineering controls available for specific areas/settings
• Use puncture-resistant containers for the disposal and transport of needles and other sharp objects
  o Refer to published guidelines for the selection, evaluation and use (e.g., placement) of sharps disposal containers
  o National Institute for Occupational Safety and Health (NIOSH) guidelines – available at http://www.cdc.gov/niosh/topics/bbp/#prevent

Instruct patients to (NYSDOH, 2009):

• Never put the used sharps container in the trash.
• Never flush used sharps down the toilet or drop them into a sewer drain.
• Never clip, bend, or put the cap back on used sharps.
• Never put loose used sharps or your used sharps container in with the recyclables.
• Never use soda cans, milk cartons, glass bottles or containers that can be broken or punctured.
• Avoid coffee cans because the plastic lid easily comes off and may leak. When the used sharps container is almost full, instruct patients to bring it to a safe disposal site:
• Some drugstores, health clinics, and community service agencies have large metal boxes (called kiosks) for sharps disposal.

Also: New York State provides many locations where used sharps can be brought such as any hospital or nursing home. The New York State Department of Health provides a list of disposal sites by county here: http://www.health.ny.gov/diseases/aids/harm_reduction/needles_syringes/sharps/directory_sharpscollection.htm.

• Use splatter shields on medical equipment associated with risk prone procedures (e.g., locking centrifuge lids).

Work practice controls

• General practices
  o Hand hygiene including the appropriate circumstances in which alcohol–based hand sanitizers and soap and water handwashing should be used (see Element II).
  o Proper procedures for cleaning of blood and body fluid spills:
    • Initial removal of bulk material followed by disinfection with an appropriate disinfectant.
Proper handling/disposal of blood and body fluids, including contaminated patient care items.

Proper selection, donning, doffing, and disposal of personal protective equipment (PPE) as trained [see Element IV].

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.

Preventing percutaneous exposures:
- Avoid unnecessary use of needles and other sharp objects.
- Use care in the handling and disposing of needles and other sharp objects,
  - Avoid recapping unless absolutely medically necessary.
  - When recapping, use only a one-hand technique or safety device.
  - Pass sharp instruments by use of designated "safe zones".
  - Disassemble sharp equipment by use of forceps or other devices.

Modify procedures to avoid injury:
- Use forceps, suture holders, or other instruments for suturing,
- Avoid holding tissue with fingers when suturing or cutting,
- Avoid leaving exposed sharps of any kind on patient procedure/treatment work surfaces.
- Appropriately use safety devices whenever available:
  - Always activate safety features.
  - Never circumvent safety features

**Standard Precautions** is a set of combined precautions that include major components of universal precautions (designed to reduce the risk of transmission of blood borne pathogens) and body substance isolation (designed to reduce the risk of transmission of pathogens from moist body substances). They are a group of infection prevention practices that apply to all patients, regardless of suspected or confirmed infection status, in any setting in which healthcare is delivered. These include hand hygiene, use of gloves, gowns, masks, eye protection, or face shields, depending on anticipated exposure, as well as, safe handling of sharps. Standard precautions must be used for care of all patients regardless of their diagnoses or personal infectious status.

**Standard Precautions**

- Apply to all patients.
- Integrate and expand universal precautions to include organisms spread by blood and body fluids, secretions, and excretions except sweat, whether or not they contain blood.
Elements of Standard Precautions

- Handwashing.
- Use of gloves, masks, eye protection, and gowns.
- Cleaning, disinfection, sterilization.
- Safe procedures for handling sharps.
- Infection control.

Universal Precautions Infection control procedures and barrier techniques are determined by exposure to blood and blood contaminated products, and are used on all patients, regardless of their disease state. The procedures are designed to prevent transmission of HIV, HBV, and other blood borne pathogens in health care settings.

Needles

Strict guidelines need to be followed for handling and disposing of sharps. Use a new, sterile disposable needle and fresh carpule of anesthetic for every patient requiring anesthesia. Handle needles and sharps like scalpels and scalers carefully, because they easily puncture gloves and injure skin. Recap needles using the scoop technique or a protective device. One safe recapping method uses forceps to steady the cap. Whatever technique is used, do not direct the needle point toward any part of the body. Needles must not be bent or broken for the purpose of disposal.

Contaminated needles, disposable needles, syringes, scalpel blades, and other sharp items and instruments must be placed into sharps containers for disposal as close as possible to the point of use according to all applicable local, state, and federal regulations. They must be disposed of as soon as possible after use. They should be placed in color coded, puncture resistant, leakproof containers until they can be properly processed. Continue to watch for new needle safety technology.

Disposal of Waste

Medical waste of concern requires special storage, handling, neutralization and disposal, according to state regulations. Such waste includes:
Solid waste soaked or saturated with blood or saliva
• Surgically removed hard or soft tissue (not including extracted teeth)
• Contaminated sharp items (e.g., needles, scalpel blades, wires)

All containers with blood or saliva (e.g., suctioned fluids) may be safely poured into a utility sink, drain or toilet, which drains into a sanitary sewer system or septic tank. DHCP should wear appropriate PPE during this task.

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:

At the completion of this element, the learner will be able to:

• Describe the circumstances that require the use of barriers and personal protective equipment to prevent patient or healthcare worker contact with potentially infectious material.
• Identify specific barriers or personal protective equipment for patient and healthcare worker protection from exposure to potentially infectious material.

Definitions

Personal protective equipment (PPE): Specialized clothing or equipment worn by an employee for protection against a hazard.

Barriers: Equipment such as gloves, gowns, aprons, 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.

Types of PPE/barriers and criteria for selection

Gloves:
• Types (sterile, non-sterile, utility);
• Material (e.g., natural rubber latex, vinyl, nitrile).

Medical exam gloves must be worn when there is contact with mucous membranes, blood, OPIM, and during all preclinical, clinical, post clinical, and laboratory procedures.
When processing contaminated sharp instruments, needles, and devices, professional must wear heavy duty utility gloves to prevent puncture wounds. Gloves must be discarded when torn or punctured, upon completion of treatment, and before leaving laboratories or areas of patient care activities. All professional must perform hand hygiene before donning gloves and after removing and discarding gloves. Gloves must not be washed before or after use.

Gloves are not a substitute for handwashing! Washing hands thoroughly with antimicrobial soaps disinfect hands, but will not make them sterile. Medical exam gloves must be worn when there is potential contact with mucous membranes, blood or OPIM. Properly fitting gloves should be snug but not restrictive and should cover the cuffs of a long sleeved gown. Gloves must be discarded upon completion of treatment and before leaving laboratories or areas of patient care activity. Wear a new pair of gloves for each patient.

Healthcare workers should wash their hands after removing and discarding gloves. Do not wash, disinfect or sterilize gloves for reuse. Do not touch your face, nose, or mouth with contaminated gloves. For most dental procedures, single use non sterile rubber gloves are acceptable. It is recommended that sterile surgical gloves be worn for surgical extractions and more invasive procedures. Sterile gloves will theoretically limit contamination of the surgical site.

Disinfectant chemicals can cause defects in latex gloves, so it is better to use heavy utility gloves when using or mixing chemicals. Do not use petroleum or oil based lotions before donning gloves, because these damage gloves and reduce their effectiveness. Store gloves according to manufacturer’s directions. If gloves are torn, cut, or punctured, change them as soon as possible. Wash hands thoroughly and replace gloves before continuing with a procedure. Sharp nail edges or broken nails are likely to increase glove failure. Long artificial or natural nails can make donning gloves difficult and can cause gloves to tear more readily. Gram negative organisms are more prevalent on artificial nails.

Any cuts should be covered with Band Aids. Use antibacterial ointment on cuts if indicated. Slip one layer of gauze between the Band Aid and glove to keep the Band Aid from becoming moist. Inexpensive plastic gloves can be worn over sterile gloves when writing data in charts or retrieving an item out of a drawer. These gloves may not be used alone as hand barriers or for intraoral patient care.

Gloves are available as ambidextrous or right and left specific. Ambidextrous gloves are less expensive, but right/left specific gloves are more comfortable on hands and wrists. In oral surgery, effectiveness of wearing two pairs of gloves to prevent disease transmission has not been demonstrated, but the majority of studies have demonstrated
a lower frequency of inner glove perforation and visible blood on surgeon’s hands. Double gloving does not appear to substantially reduce manual dexterity or tactile sensitivity. Some health care workers have reported allergies to latex or the powder used in gloves. It is more common in 2016 that dental offices use Nitrile gloves to, not only protect clinicians from any latex sensitivities or allergies, but also, to avoid latex reactions with patients!

**Latex Allergy**

<table>
<thead>
<tr>
<th>![Image of hands with gloves]</th>
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<td>• Type I hypersensitivity to natural rubber latex proteins.</td>
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<tr>
<td>• Reactions may include nose, eye, and skin reactions.</td>
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<tr>
<td>• More serious reactions may include respiratory distress, rarely shock or death.</td>
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**Cover garb:**

- Types (gowns, aprons, laboratory coats);
- Characteristics (fluid impervious, fluid resistant, permeable);

**Gowns**

Health care workers must wear reusable or disposable protective attire when clothing or skin is likely to be in contact with blood or OPIM. Gowns should be fluid resistant, high necked, and provide coverage to the knees. Gowns must be changed in between patients and when they are visibly soiled or moist. They must be removed and placed in laundry or disposal bags when leaving laboratories and after patient care.

Wash uniforms in hot soapy water and bleach. Reusable gowns must be laundered in accordance with Cal-DOSH Blood borne Pathogens Standards, Title 8, California Code Regulations Section 5193 or other applicable state and federal regulations. Machine dry reusable gowns at 100°F. Cost analyses will reveal the most economical protective apparel choice for your office.

**Masks and Face Shields**

- Types (surgical, procedure, particulate respirators)

Wear surgical masks in combination with either chin length plastic face shields or protective eyewear to protect the face, mouth, and nasal cavity when blood, OPIM, or other body fluid splatter is expected. Masks should be well constructed. Pleated, soft masks have better filtration than cup masks. A tight seal at the bridge of the nose on the
mask will minimize eyewear fogging. Use a mask with at least a filtration rate of 95% of particles three to five microns.

Masks must be changed after each patient and during patient treatment (if applicable). Microbes pass more easily through moisture, so change your mask if it becomes wet or visibly soiled. Some professionals change masks after one hour. Be careful not to touch your mask with soiled gloves if it is to be reused. After each patient, face shields and protective eyewear must be cleaned, and if visibly soiled, disinfected.

Eye protection (goggles, safety glasses)

Protective Eyewear

Debris can be irritating to the eye, and microorganisms can enter the body through the eye's mucous membrane. Wear protective eyewear to shield your eyes from blood, OPIM, or other body fluid spatter. Wrap around goggles or face shields are recommended. Face shields used during air abrasion deflects aluminum oxide particles.

Protective eyewear also keeps healthcare workers from touching their eyes during procedures and when mixing chemicals. After each patient, face shields and protective eyewear must be cleaned, and if visibly soiled, disinfected. The patient can also wear protective eyewear. Some offices provide sunglasses to patients to reduce overhead light glare and protect the patient's eyes from spatter.

Loupes

Follow the manufacturer’s guidelines when it comes to cleaning loupes but, a good approach is to first carefully use compressed air to remove any matter from the lenses and mounting, to prevent scratching. Some recommend rinsing under warm water while others make special disinfecting clothes. To prevent contamination to yourself or patient, not to mention to preserve the integrity of the loupes, make sure to know how to best clean them in between patients.

Choosing PPE based on reasonably anticipated interaction:

- Potential contact with blood or other potentially infectious material via:
  - Splashes;
  - Respiratory droplets;
  - Airborne pathogens.
• Volume of fluid expected (minimal, large volumes).

**Personal Protective Equipment**

All professionals must wear surgical facemasks in combination with either chin length plastic face shields or protective eyewear whenever there is potential for aerosol spray, splashing, or spattering or the following: droplet nuclei, blood, chemical or germicidal agents, or OPIM. Chemical resistant utility gloves and appropriate, task specific PPE must be worn when handling hazardous chemicals. After each patient treatment, masks must be changed and disposed.

Protective attire must be worn for disinfection, sterilization, and housekeeping procedures involving the use of germicides or handling contaminated items. All professionals must wear reusable or disposable protective attire wherever there is a potential for aerosol spray, splashing, or spattering of blood, OPIM, or chemicals and germicidal agents. Protective attire must be changed daily or between patients if they should become moist or visibly soiled. All PPE used during patient care shall be removed when leaving laboratories or areas of patient care activities. Reusable gowns must be laundered in accordance with state or federal regulations.

Gloves, eyewear, masks, face shields, and protective apparel are classified as medical devices and are regulated by the FDA. The employer is responsible for purchase of personal protective equipment.

**Choosing barriers/PPE based on intended need**

- Patient safety:
  - Sterile barriers for invasive procedures;
  - Masks for the prevention of droplet contamination.
- Employee safety:
  - Barriers for prevention of contamination.
  - Masks for prevention of exposure to communicable disease.

**Guidance on proper utilization of PPE/barriers**

- Proper fit (including fit-testing for particulate respirators);
- Integrity of barrier;
- Disposable versus reusable;
- Potential for cross-contamination if not changed/properly reprocessed between patients;
- Implications of over/under utilization;
Putting on PPE (N Eng JMed, 2015)

PPE should be put on near the patient's room, in a clean room or a marked area in the hallway. Clean PPE should also be stored in this area.

Before entering the area where PPE is put on, change into scrubs and ensure that a trained observer is available. Change into washable shoes, secure long hair or bangs, and ensure that all personal items (e.g., jewelry, pagers, and cell phones) have been removed.

Enter the PPE-donning area and visually check the integrity of the equipment. The trained observer will use a checklist to review the correct sequence of events and read aloud a description of the procedure for putting on PPE.

Before handling any PPE, clean your hands with an alcohol-based hand rub. When your hands are dry, put on the first pair of gloves. Next, sit down and put on boot coverings over your washable shoes.

Insert your arms through the sleeves of the gown, ensuring that the cuff of each inner glove remains under the sleeve. Place your head through the opening at the neck, if the gown has such an opening. Overlap the left and right sides of the gown at the back, and secure the ties. The observer may assist you in securing the ties.

Cup the outside of the respirator in your dominant hand, holding the pliable nasal strip at your fingertips and letting the two straps hang freely around your hand. Bring the respirator to your face. Secure the lower strap around the back of your neck, and then secure the upper strap behind your head.

Mold the pliable nasal strip around the bridge of your nose. Perform a seal-check. Begin by covering the respirator with your hands and inhaling deeply and quickly several times. The respirator should collapse slightly against your face. Next, place your hands around the edges of the respirator and exhale to determine whether there are any air leaks. If the respirator fails to collapse or if air leaks from the sides, remold the nasal strip and adjust the positioning of the respirator on your face. If you are still unable to obtain a complete seal, consider using a PAPR. Instructions in the use of a PAPR are beyond the scope of this review.
Place the hood over your head, ensuring that it overlaps the gown, covers your head and neck fully, and extends to the shoulders. If you are using an apron, place your head through the opening at the neck. Have the observer secure the ties in the back.

Put on the second pair of gloves. Extend this set of gloves over the sleeves of the gown.

Place the face shield over the hood, letting the cushion rest on your forehead and securing the strap on the back of your head. If your hair is tied in a bun, make sure the strap is positioned in a manner that ensures that the strap will not slide up or down. Adjust the elastic strap if necessary to ensure a snug fit. If you are wearing eyeglasses, adjust all PPE that covers your head to make sure you are comfortable, thereby minimizing the need to readjust your PPE during patient care.

The observer must now verify that the ensemble is intact and ensure that you can move comfortably without compromising the integrity of the PPE. Disinfect your outer gloves with an alcohol-based hand rub. You are now ready to enter the patient's room.

Removing PPE (N Eng JMed, 2015)

The proper removal and disposal of contaminated PPE is the most difficult challenge in preventing inadvertent exposure to pathogens; careful attention is required, and persons who wear prescription eyeglasses should make sure their glasses are not contaminated when they remove PPE. Removal of PPE should take place in an anteroom or doffing area that is separate from the patient's room. These areas are considered to be contaminated and are separate from the clean area used for putting on PPE. The PPE-removal area should not be used for any other purpose.

The following equipment should be available in the anteroom: clean gloves, an alcohol-based hand rub, one chair clearly identified as “dirty” for the removal of shoe coverings, a second chair designated as “clean” to be used for the disinfection of washable shoes, disinfectant wipes registered by the Environmental Protection Agency (EPA) for use in health care, and a leakproof container designated for the disposal of biohazardous waste for disposable equipment. If any reusable equipment is used, a second biohazardous waste container should be available to hold such equipment.

Before leaving the patient's room, use an EPA-registered disinfectant wipe to disinfect any visible contamination on your PPE. Disinfect your outer gloves with an alcohol-based hand rub and allow your gloves to dry.
A trained observer must be available in the anteroom to supervise the PPE-removal process. The observer should use a checklist that remains in the anteroom and watch carefully for any breach in protocol. It is important for the observer to wear a fluid-resistant or impermeable gown, a full-face shield, two pairs of gloves, and impermeable boot coverings. You may enter the PPE-removal area when the observer so indicates.

Once in the anteroom, conduct another inspection of your PPE and disinfect any visible contamination with a disinfectant wipe. An EPA-registered disinfectant spray can be used on heavy contamination if permitted by your institution. Disinfect your outer gloves with an alcohol-based hand rub.

If wearing an apron, break the strap behind your back, and then break the strap that secures the apron around your neck. Pull the apron away from your body, and then roll it inside-out, as shown in the video. Discard the apron in the biohazardous waste container.

Inspect your PPE again for visible contamination or tears. If visual contamination remains, wipe the area again with a disinfectant wipe. Disinfect your gloves.

Sit down on the chair designated as “dirty” to remove your boot covers. Grasp the heel of one cover and slowly pull it off your leg and foot. Avoid touching your scrubs and shoes. Dispose of the boot covering in the biohazardous waste container. Repeat with the other boot covering. Afterward, stand up, step away from the dirty chair, and disinfect your outer gloves.

Remove the outer gloves by grasping the glove on one hand with the other hand. Grasping the exterior of the glove at the wrist, pull the glove off of your hand, with the contaminated exterior folded inside. Hold the removed glove in the double-gloved hand. Slide a single-gloved finger under the wristband of the remaining outer glove. Gently pull off the glove so that it is now inside-out, forming a bag for the other glove, and discard. Disinfect the inner pair of gloves.

Remove the face shield. It is particularly important to avoid contamination of the eyes and mucous membranes when removing facial PPE. Tilt your head forward and lift the shield by the strap. Lift it above and away from your head without touching the shield itself, and discard it in the biohazardous waste container. Disinfect your gloves.

Leaning forward, grasp the hood near the top and carefully pull it off and away from your head. Discard it in the biohazardous waste container, and disinfect your gloves.

Remove your gown by first undoing the fastening at the waist. (The trained observer may assist you in undoing the fastenings at the neck and the back of
the gown. This assistance should be agreed upon by you and the observer before patient care. If the observer does assist you in the removal of your equipment, the observer must disinfect his or her outer gloves with an alcohol-based hand rub immediately after contact with your PPE.) Grasp the shoulder area and peel the gown away from your body, turning the gown inside-out and wrapping it into a bundle. Only the interior of the gown should remain visible. Discard the gown, and then disinfect your gloves.

Remove the inner pair of gloves as described for the outer pair, taking precaution to avoid contaminating your bare hands. Use an alcohol-based hand rub for disinfection after taking off the gloves. Put on a new pair of gloves once your hands have dried.

Remove the N95 respirator. To minimize the possibility of contamination, avoid contact with the respirator itself, touching only the straps. Tilt your head forward, grab the strap that is around your neck, and lift it over your head, allowing it to hang freely. Then bring the top strap over your head and use it to remove the respirator from your face. Discard the respirator, then disinfect your gloves.

Sit down on the designated clean chair and use disinfectant wipes to clean all external surfaces of your shoes. Disinfect your gloves.

Remove the last set of gloves as described previously. Disinfect your hands with an alcohol-based hand rub.

The trained observer should conduct a final inspection at this point to identify any contamination of your surgical scrubs. If there is contamination, an occupational safety and health coordinator should be informed immediately before you exit the PPE-removal area. The observer may now be contaminated and should always perform the same PPE-removal procedures as the health care worker before leaving the anteroom.

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, Sterilization

Learning Objectives

At the completion of 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.

Definitions

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

**Cleaning:** The process of removing all foreign material (i.e., dirt, body fluids, lubricants) from objects by using water and detergents or soaps and washing or scrubbing the object.

**Critical device:** An item that enters sterile tissue or the vascular system. These must be sterile prior to contact with tissue.

**Decontamination:** The use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles.

**Disinfection:** The use of a chemical procedure that eliminates virtually all recognized pathogenic microorganisms but not necessarily all microbial forms (e.g., bacterial endospores) on inanimate objects.

**High level disinfection:** Disinfection that kills all organisms, except high levels of bacterial spores, and is effected with a chemical germicide cleared for marketing as a sterilant by the U.S. Food and Drug Administration (FDA).

**Intermediate level disinfection:** Disinfection that kills mycobacteria, most viruses, and bacteria with a chemical germicide registered as a "tuberculocide" by the U.S. Environmental Protection Agency (EPA).

**Low level disinfection:** Disinfection that kills some viruses and bacteria with a V-2 chemical germicide registered as a hospital disinfectant by the EPA.

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

Per the CDC *Guidelines for Disinfection and Sterilization in Healthcare Facilities, 2008* (HICPAC, et al., 2008):

1. Formaldehyde-alcohol has been deleted as a recommended chemical sterilant or high-level disinfectant because it is irritating and toxic and not commonly used.
2. Several new chemical sterilants have been added, including hydrogen peroxide, peracetic acid and peracetic acid and hydrogen peroxide in combination.
3. Three percent phenolics and iodophors have been deleted as high-level disinfectants because of their unproven efficacy against bacterial spores, M. tuberculosis, and/or some fungi.
4. Isopropyl alcohol and ethyl alcohol have been excluded as high-level disinfectants 15 because of their inability to inactivate bacterial spores and because of the inability of isopropyl alcohol to inactivate hydrophilic viruses (i.e., poliovirus, coxsackie virus).
5. Reiteration/clarification of the need to high-level disinfect items such as vaginal endoscopes and ENT scopes between each patient use even if a protective sheath is used.
6. A 1:16 dilution of 2.0% glutaraldehyde-7.05% phenol-1.20% sodium phenate (which contained 0.125% glutaraldehyde, 0.440% phenol, and 0.075% sodium phenate when diluted) has been deleted as a high-level disinfectant because this product was removed from the marketplace in December 1991 because of a lack of bactericidal activity in the presence of organic matter; a lack of fungicidal, tuberculocidal and sporidical activity; and reduced virucidal activity.
7. The exposure time required to achieve high-level disinfection has been changed from 10-30 minutes to 12 minutes or more depending on the FDA-cleared label claim and the scientific literature. A glutaraldehyde and an orthophthalaldehyde have an FDA-cleared label claim of 5 minutes when used at 35 degrees C and 25 degrees C, respectively, in an automated endoscope reprocessor with FDA-cleared capability to maintain the solution at the appropriate temperature.
8. Many new subjects have been added to the 2008 Guideline. These include inactivation of emerging pathogens, bioterrorist agents, and bloodborne pathogens; toxicologic, environmental, and occupational concerns associated with disinfection and sterilization practices; disinfection of patient-care equipment used in ambulatory and home care; inactivation of antibiotic-resistant bacteria; new sterilization processes, such as hydrogen peroxide gas plasma and liquid peracetic acid; and disinfection of complex medical instruments (e.g., endoscopes).
Universal principles

- 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.
  - 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.
- Industry guidelines as well as equipment and chemical manufacturer recommendations should be used to develop and update reprocessing policies and procedures.
- Written instructions should be available for each instrument, medical device, and equipment reprocessed.

Potential for contamination is dependent upon:

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

Steps of Reprocessing

- Pre-cleaning
  - Removes soil, debris, lubricants from internal and external surfaces.
  - To be done as soon as possible after use.
- Cleaning
  - Manual (e.g., scrubbing with brushes)
  - Mechanical (e.g., automated washers)
  - Appropriate use and reprocessing of cleaning equipment (e.g., do not reuse disposable cleaning equipment)
  - Frequency of solution changes
- Disinfection - requires sufficient contact time with chemical solution.
- Sterilization - requires sufficient exposure time to heat, chemicals, or gases.
Choice/Level of reprocessing sequence

- Based on intended use (see Definitions):
  - Critical instruments and medical devices require sterilization.
  - Semi critical instruments and medical devices minimally require high level disinfection.
  - Noncritical instruments and medical devices minimally require cleaning and low level disinfection.
- Based on manufacturer's recommendations.
  - Compatibility among equipment components, materials, and chemicals used.
  - Equipment heat and pressure tolerance.
  - Time and temperature requirements for reprocessing.

Effectiveness of reprocessing instruments, medical devices and equipment

- Cleaning prior to disinfection.
- Disinfection.
  - Selection and use of disinfectants.
    - Surface products.
    - Immersion products.
  - Presence of organic matter.
  - Presence of biofilms.
  - Monitoring:
    - Activity and stability of disinfectant.
    - Contact time with internal and external components.
    - Record keeping/tracking of instrument usage and reprocessing.
  - Post-disinfection handling and storage
- Sterilization
  - Selection and use of methods.
  - 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.
  - Post-sterilization handling, packaging and storage (event-related criteria).

Recognizing potential sources of cross-contamination in the healthcare environment

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

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

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

• Specific factors:
  o Failure to reprocess or dispose of items between patients.
  o Inadequate cleaning.
  o Inadequate disinfection or sterilization.
  o Contamination of disinfectant or rinse solutions.
  o Improper packaging, storage and handling.
  o Inadequate/inaccurate record keeping of reprocessing requirements.

Methods of Sterilization

<table>
<thead>
<tr>
<th>Method</th>
<th>Standard Sterilizing Conditions*</th>
<th>Advantages</th>
<th>Precautions</th>
<th>Spore Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam autoclave</td>
<td>20-30 min at 250 F 3-10 min at 273 F</td>
<td>Time efficient; Good penetration; Sterilize water-based liquid</td>
<td>Do not use closed containers; May damage plastic and rubber items; non-stainless steel metal items corrode; Use of hard water may leave deposits</td>
<td>*Bacillus stearothermophilus strips, vials, or ampules.</td>
</tr>
<tr>
<td>Unsaturated chemical vapor</td>
<td>20 min at 270 F (20-40 psi)</td>
<td>Time efficient; No corrosion; Items dry quickly after cycle</td>
<td>Do not use closed containers; May damage plastic and rubber items; Must use special solution; Predry instruments or dip in special solution; Provide adequate ventilation; <strong>cannot sterilize liquids.</strong></td>
<td><em>Bacillus stearothermophilus strips</em></td>
</tr>
<tr>
<td>Dry heat oven</td>
<td>60-120 min at 320 F</td>
<td>No corrosion; Can use closed containers; Large capacity per cost; items are dry after cycle</td>
<td>Longer sterilization time; cannot sterilize liquids; May damage plastic and rubber items; Do not open door before end of cycle</td>
<td><em>Bacillus subtilis strips</em></td>
</tr>
<tr>
<td>Dry heat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid Heat</td>
<td>Transfer 12 min at 375 F (for)</td>
<td>No corrosion; Short</td>
<td>Predry instruments;</td>
<td><em>Bacillus subtilis strips</em></td>
</tr>
</tbody>
</table>
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

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

Presoaking

Soak contaminated instruments in a mild detergent to prevent blood, saliva, and debris from drying on the instruments. Presoaking for longer than a few hours may cause corrosion of some instruments. Employees should not reach into trays or containers holding sharp instruments that cannot be seen (sinks filled with soapy water in which sharp instruments have been
Work practice controls should include use of a strainer type basket to hold instruments and forceps to remove the items. If possible, use an ultrasonic cleaner basket set in a pan of presoak, so instruments can be directly immersed in ultrasonic cleaner without additional handling. Always wear heavy utility gloves, protective eyewear, a mask, and protective clothing when handling contaminated instruments.

**Precleaning**

Preclean debris and blood from instruments and surfaces after the presoak and before a sterilization cycle, because this bioburden will prevent chemicals or heat from contacting the instruments. Clean instruments by hand or by submerging in an ultrasonic cleaner. If hand scrubbing is the only option, wear heavy utility gloves, a mask, protective eyewear, and protective clothing. Be especially careful of spatter during hand scrubbing, and keep sterile instruments away from the scrubbing area. If safe, try to scrub instruments while submersed in a sink of water and use careful, light motions. Always rinse and dry instruments.

Ultrasonic cleaners are very effective and greatly reduce the risk of puncture injury to health care workers. Arrange the cleaning area so the ultrasonic cleaner is on one side, a sink is in the middle, and the sterilizer is on the other side. Use solutions designed specifically to aid in cavitation. These solutions are generally not disinfectants, so the instruments will emerge free from bioburden but will still be contaminated.

Match the cleaning activity with the type of instruments being cleaned (a light purpose cleaner for lightly soiled instruments, heavy duty for more heavily soiled instruments). Place the instruments in the basket before submersion to avoid spatter and keep them off the bottom of the ultrasonic cleaner. Use bur blocks, and be careful of overloading sharp instruments that may be dulled by contact with other items. Check manufacturer’s directions regarding burs, because some cannot be cleaned ultrasonically.

Make sure the lid is securely in place before turning the unit on. Instruments should be free of debris before removing them from the ultrasonic cleaner. Increase ultrasonic cleaning time for
instruments contained in plastic or resin type cassettes. Visually inspect the tips of instruments to make sure the bioburden is removed. Use heavy utility gloves for handling instruments from the ultrasonic since they are still contaminated.

Instruments must be rinsed and dried before sterilization. Wet instruments may corrode in chemical vapor sterilizers and cause paper wraps to burst making the packaged instruments open to air and contamination after the sterilization process. Always follow the manufacturer's directions for use, care, and cleaning of ultrasonic devices. Change solutions in the ultrasonic cleaner daily.

Use heavy utility gloves, mask, protective eyewear, and protective clothing when changing the solution. The inside of the chamber should be disinfected, rinsed, and dried. Fill the container with fresh solution. Occasionally test the ultrasonic by suspending a piece of aluminum foil in the chamber and cavitate for 10 minutes. There should be a “peppered” effect on the foil from the ultrasonic action. Keep the foil pieces for comparison.

• 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):
  o Understand core concepts and principles.
    ▪ Standard and Universal Precautions.
    ▪ Cleaning, disinfection, and sterilization described in Sections III and IV.
    ▪ Appropriate application of safe practices for handling instruments, medical devices, and equipment in the area of professional practice.
    ▪ Designation and physical separation of patient care areas from cleaning and reprocessing areas is strongly recommended by NYSDOH.

Steps in Instrument Processing

Instrument Processing Area

Use a designated processing area to control quality and ensure safety. Divide processing areas into work areas such as:

  • Receiving, cleaning, and decontamination.
  • Preparation and packaging.
- Sterilization.
- Storage.

**Storage of Sterile and Clean Items and Supplies**

- Use date or event related shelf life practices.
- Examine wrapped items carefully prior to use.
- When packaging of sterile items is damaged, reclean, rewrap, and re-sterilize.
- Store clean items in dry, closed, or covered containers.

  - Determine appropriate reprocessing practices taking into consideration:
    - **Selection of appropriate methods:**
      - Antimicrobial efficacy.
      - Time constraints and requirements for various methods.
      - Compatibility among equipment/materials:
        - Corrosiveness.
        - Penetrability.
        - Leaching.
        - Disintegration.
        - Heat tolerance.
        - Moisture sensitivity.
    - **Toxicity:**
      - Occupational health risks.
      - Environmental hazards.
      - Abatement methods.
      - Monitoring exposures.
      - Potential for patient toxicity/allergy.
    - **Residual effect:**
      - Antibacterial residual.
      - Patient toxicity/allergy.
    - **Ease of use:**
      - Need for specialized equipment.
      - Special training requirements.
    - **Stability:**
      - Concentration.
      - Potency.
      - Efficacy of use.
      - Effect of organic material.
    - **Odor.**
    - **Cost.**
    - **Monitoring:**
      - Frequency.
      - FDA regulations for reprocessing single use devices can be found here:
Element VI: Prevention and Control of Infectious and Communicable Diseases in Healthcare Workers

Learning Objectives

Upon completion of this element the learning will be able to:

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

Definitions

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

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

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

Pre-placement and periodic health assessments

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

  The Advisory Committee on Immunization Practices (ACIP) (CDC, 2011), recommend the below for healthcare personnel:

  - **Hepatitis B**
    - HCP and trainees in certain populations at high risk for chronic hepatitis B (e.g., those born in countries with high and intermediate endemicity) should be tested for *Hepatitis B surface antigen*
(HBsAg) and hepatitis B core antibody/ hepatitis B surface antibody (anti-HBc/anti-HBs) to determine infection status.

- **Influenza**
  - Emphasis that all HCP, not just those with direct patient care duties, should receive an annual influenza vaccination.
  - Comprehensive programs to increase vaccine coverage among HCP are needed; influenza vaccination rates among HCP within facilities should be measured and reported regularly.

- **Measles, mumps, and rubella (MMR)**
  - History of disease is no longer considered adequate presumptive evidence of measles or mumps immunity for HCP; laboratory confirmation of disease was added as acceptable presumptive evidence of immunity. History of disease has never been considered adequate evidence of immunity for rubella.
  - The footnotes have been changed regarding the recommendations for personnel born before 1957 in routine and outbreak contexts. Specifically, guidance is provided for 2 doses of MMR for measles and mumps protection and 1 dose of MMR for rubella protection.

- **Pertussis**
  - HCP, regardless of age, should receive a single dose of *tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine* (Tdap) as soon as feasible if they have not previously received Tdap.
  - The minimal interval was removed, and Tdap can now be administered regardless of interval since the last tetanus or diphtheria-containing vaccine.
  - Hospitals and ambulatory-care facilities should provide Tdap for HCP and use approaches that maximize vaccination rates.

- **Varicella**
  - Criteria for evidence of immunity to varicella were established. For HCP they include written documentation with 2 doses of vaccine, laboratory evidence of immunity or laboratory confirmation of disease, diagnosis of history of varicella disease by health-care provider, or diagnosis of history of herpes zoster by health-care provider.

- **Meningococcal**
  - HCP with anatomic or functional asplenia or persistent complement component deficiencies should now receive a 2-dose series of meningococcal conjugate vaccine. HCP with HIV infection who are vaccinated should also receive a 2 dose series.
  - Those HCP who remain in groups at high risk are recommended to be revaccinated every 5 years.

  - Tuberculosis screening:
    - Symptoms evaluation.
Tuberculosis is a lung infection caused by Mycobacterium tuberculosis. The bacterium is carried in airborne infective droplet nuclei by sneezing, coughing, speaking or singing. The nuclei can stay suspended in the air for hours. Prolonged exposure to the disease is usually required for infection.

Transmission of *Mycobacterium tuberculosis*

- Spread by droplet nuclei.
- Immune system usually prevents spread.
- Bacteria can remain alive in the lungs for many years (latent TB infection).

The dental team’s relatively brief interaction reduces the risk of tuberculosis transmission during treatment. Nevertheless, dental health care personnel can be exposed to persons with infectious TB, and should have a baseline two step test tuberculin skin test at the beginning of employment. Some strains of the disease are resistant to standard drug treatment regimens. Most adults with a properly functioning immune system are able to resist a tuberculosis infection. More than 90% of current TB cases occur in people who have been previously infected with the disease (reactivation rather than new onset). The CDC recommends the following protocol for treating dental patients with tuberculosis:

- Ask patients about TB symptoms and history of TB.
- Refer patients with symptoms of active TB to a physician for evaluation.
- Postpone elective dental treatment until diagnostic tests rule out active tuberculosis.
- Implement isolation protocol in a medical center if emergency dental care is required. Dental care providers must use HEPA filter masks during treatment.
• Limit treatment to relieve immediate pain.
• Refer any dental health care worker with TB symptoms to a physician for evaluation. The worker may return to practice after diagnostic tests rule out active tuberculosis or once therapy has eliminated infectivity.

- Screening for other communicable diseases:
  - Health assessments (history and physicals).
  - Symptoms requiring immediate evaluation by a licensed medical professional and possible restriction from patient care activities and return to work clearance:
    - Fever;
    - Cough;
    - Rash;
    - Vesicular lesions;
    - Draining wounds;
    - Vomiting;
    - Diarrhea.

Management strategies for potentially communicable conditions

- Appropriate evaluation and treatment;
- Limiting contact with susceptibles;
- Furlough until noninfectious.

Specific occupational health strategies for prevention and control of bloodborne pathogen transmission

- Healthcare worker exposure risk education:
  - Potential agents (HBV, HCV, HIV);
  - Prevention strategies:
    - HBV vaccination (including safety, efficacy, components, and recommendations for use);
    - Hand hygiene;
    - Appropriate PPE and barrier precautions;
    - Sharps safety;
    - Standard and Universal Precautions.

AIDS

Acquired immune deficiency syndrome (AIDS) was identified and reported in the Morbidity and Mortality Weekly Report (MMWR) for the first time on June 5, 1981. It is caused by a retrovirus, called human immunodeficiency virus (HIV). This virus suppresses critical human T-cells in the immune system. Patients are susceptible to diseases that are harmless to a person with a normal immune system.
The patient may be completely asymptomatic for quite some time (even up to 7 years). Both a symptomatic AIDS patient and an asymptomatic HIV positive patient are equally infectious. Dr. Robert Siliciano from Johns Hopkins University conducted research using the blood of 50 Baltimore AIDS patients to measure the virus' resistance to treatment. “What HIV has done is tap into the most fundamental aspect of the immune system, and that is its immunological memory.” (Dr. Siliciano)

Siliciano said the virus lies silent inside resting memory T-cells, whose job is to store a record of the germs they encounter to keep the body ready for return battles. Inside these sleeping cells, HIV lies dormant but dangerous. AIDS cells die off very slowly. Based on data from his Baltimore patients, Siliciano estimated it takes 73 years for AIDS cells to die, and he can imagine no way to speed the process. Scientists now say this latent reservoir is the single biggest obstacle to curing AIDS.

Signs and symptoms of HIV infection include persistent generalized lymphadenopathy, fever lasting more than a month, involuntary weight loss of more than 10% of baseline body weight, diarrhea lasting more than a month, or any combination of these. This disease is called AIDS when the patient acquires what is known as an AIDS defining illness (Pneumocystis pneumonia, Kaposi's sarcoma and recurrent bacterial pneumonia are examples), or when their T-cell count drops below 200 or 14% of their total lymphocyte count.

Many patients who test positive for HIV infection may have been carrying the disease undiagnosed for a long time. It is currently not a legal requirement for anyone to disclose his or her HIV status in a health history. Many times patients do not disclose this information for fear of being denied treatment or discriminated against.
Health Care Workers with Documented and Possible Occupationally Acquired HIV/AIDS

<table>
<thead>
<tr>
<th></th>
<th>Documented</th>
<th>Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental Worker</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Nurse</td>
<td>24</td>
<td>35</td>
</tr>
<tr>
<td>Lab tech, clinical</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>Lab tech, non clinical</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physician, non surgical</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>69</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>142</td>
</tr>
</tbody>
</table>

*3 dentists, 1 oral surgeon, 2 dental assistants

Transmission of HIV from Infected Dentists to Patients

- Only one documented case of HIV transmission from an infected dentist to a patient.
- No transmissions documented in the investigation of 63 HIV infected DHCP (including 33 dentists or dental students).
- Immediate (within 24 hrs) treatment with antiretroviral drugs is recommended for these situations in order to further reduce the likelihood of contraction. The course for these drugs is usually 4 weeks.

Hepatitis

Viral hepatitis is categorized in three types:

- Infectious: A
- Serum: B and D
- Non A or B: C, E

Hepatitis A and E are spread through food or water contaminated by infected human feces. Hepatitis B, C, and D are spread through percutaneous or permucosal
contact with infected body fluids or blood. Hepatitis E is rare in the US and not encountered in the dental setting very often.

Hepatitis B virus (HBV) is transmitted either through percutaneous modes (IV drug use or prick wounds), by sexual contact, from mother to fetus or infant, and nonpercutaneous modes (transfer of infectious body secretions like saliva, blood, and crevicular fluid to mucous membranes or open wounds in the skin). Approximately 80% of all HBV infections are undiagnosed. HBV has been demonstrated to survive in dried blood at room temperature on environmental surfaces for up to one week. Hepatitis B virus damages liver cells and can be found in high numbers in the blood of an infected individual.

The symptoms of hepatitis B infection include: anorexia, malaise, nausea, vomiting, abdominal pain, fatigue, and jaundice in varying combinations. Other symptoms may be skin rashes, arthralgias, and arthritis. If left untreated, the patient may become a carrier or develop cirrhosis, acute hepatitis, or primary liver cancer.

The greatest concentration of HBV in an infected patient's mouth is in the gingival sulcus. Inflammation may be present due to gingivitis. Probing or scaling will result in easy, profuse bleeding. The dental hygienist is at high risk for infection because of the bleeding associated with routine prophylaxis.

Other risky procedures include packing cord for crown impressions, oral surgery, needle sticks, injuries from contaminated sharps, blood and saliva contamination of cuts and cracks on the skin, and spraying of blood and saliva onto mucous membranes.

**Transmission of HBV from Infected DHCP to Patients**

- Eight dentists tested for HBeAg were positive.
- Lack of documented transmissions since 1987 may reflect increased use of gloves and vaccines.

The American Dental Association and The Centers for Disease Control recommend dental professionals vaccinate against hepatitis B. Employers should provide easy access to a qualified health care professional who can administer the vaccine and provide appropriate follow up testing. The plasma derived hepatitis B vaccine, "Heptavax-B" was introduced in the United States in 1982. Ninety-six percent of healthy adults seroconvert and have the correct antibody levels to prevent infection by the end of the series.
Two vaccines are currently available: Recombivax HB (Merck Sharp and Dohme), and Engerix B (SmithKline). They are made using recombinant DNA technology, and results in 99% of healthy adults seroconverting. Anyone who is hypersensitive to yeast should consult their personal physician before being immunized with these products.

The standard protocol for administration of the HBV vaccine is three doses in the deltoid muscle. The first dose should be given at baseline, the second, one month later, and the third, six months later. Test for anti HBs at one to two months after third dose. If an unvaccinated person is exposed to HBV, a single dose of hepatitis B immunoglobulin is given within 24 hours of exposure, and the first vaccine dose within seven days. If someone is exposed while in the middle of their series, one dose of immunoglobulin is given immediately and then the series continues as scheduled.

Anyone who has been vaccinated and then exposed to HBV should have his blood tested. If he has a low antibody response, he should be given a booster dose of the vaccine and a dose of hepatitis B immunoglobulin. People who are exposed to HBV but have been unresponsive to the vaccine should have a dose of hepatitis B immunoglobulin immediately, then another one month later. Everyone should have a blood test after completing the vaccine series to confirm its effectiveness. Currently, the CDC does not recommend boosters for vaccine responders.

**Post-exposure evaluation and management**

- **Bloodborne pathogens:**
  - Prompt evaluation by licensed medical professional;
  - Risk assessment in occupational exposures;
  - Recommendations for approaching source patient and healthcare worker evaluations;
  - Recommendations for post-exposure prophylaxis emphasizing the most current NYSDOH and CDC guidelines;
  - Post-exposure management of patients or other healthcare workers when exposure source is a healthcare worker:
    - Professional obligation to inform patients exposed to a healthcare worker’s blood or other potentially infectious material.
- **Airborne or droplet pathogen:**
  - Tuberculosis:
    - Recommendations for post-exposure prophylaxis emphasizing the most current New York State guidelines for post-exposure prophylaxis.
  - Varicella, Measles, Mumps, Rubella, Pertussis:
• Consult the most current Federal, State, or local requirements for post-exposure evaluation and management.
  o Notification of healthcare workers/public.

**Evaluation of healthcare workers infected with HIV, HBV and/or HCV or other bloodborne pathogens.**

- Review New York State Department of Health Policy on HIV testing of healthcare workers.
- Criteria for evaluating infected health care worker’s for risk of transmission:
  - Nature and scope of professional practice;
  - Techniques used in performance of procedures that may pose a transmission risk to patients;
  - Assessed compliance with infection control standards;
  - Presence of weeping dermatitis, draining or open skin wounds;
  - Overall health:
    - Physical health;
    - Cognitive status.
- Expert panels for evaluation of healthcare workers infected with bloodborne pathogens.

**Element VII: Sepsis Awareness and Education**

**Learning Objectives**

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

- Describe the scope of the sepsis problem and the NYS Sepsis Improvement Initiative;
- Recognize the signs and symptoms of sepsis to identify and treat at-risk patients, both adult and pediatric, as early as possible;
- Understand the need for rapid evaluation and management in adults and children if sepsis is suspected;
- Identify common sources of sepsis;
- Educate patients and families on methods for preventing infections and illnesses that can lead to sepsis and on identifying the signs and symptoms of severe infections and when to seek care.

**Definitions**

**Sepsis** Sepsis is defined as a clinical syndrome in which patients have an infection that is accompanied by an extreme systemic response.

**Severe Sepsis** Sepsis of sufficient severity that the function of major organ systems in
the body (such as heart, kidney, brain and others) are impaired. Patients with severe sepsis that have continued organ system impairment and/or low blood pressure that does not respond to treatment with adequate fluid replacement are considered to be in “septic shock.” Many patients come to experience lifelong impairments because of the broad impact that sepsis may have on organ and tissue function.

**Severe sepsis (adult)** proven or suspected infection, two or more manifestations of systemic response to infection, and organ dysfunction.

**Severe sepsis (pediatric)** proven or suspected infection, abnormal temperature or white blood cell count and one other manifestation of systemic response to infection, and organ dysfunction.

**Septic shock (adult)** severe sepsis and persistent hypotension (low blood pressure) after fluid administration or severe sepsis and evidence of low perfusion (initial lactate level greater than or equal to 4).

**Septic shock (pediatric)** sepsis and cardiovascular organ dysfunction despite 20cc/kg of Crystalloid fluid administration.

**Protocol initiation** patients in each hospital who received care consistent with the initiation of their formal protocol, excluding those cases with identified (and justified) clinical or advanced directive exceptions.

**Time zero** the start time for reported bundle measures. For aggregated data, time zero is the time that the hospital’s protocol was initiated, or, if protocol was not initiated, the earliest time documented in the clinical data, such as triage time or arrival time. For hospital specific measures, time zero is defined as Emergency Department triage time.

**3-hour bundle (adult)** composite measure that includes receipt of measurement of blood lactate level, blood culture collection prior to antibiotics, and broad spectrum antibiotic administration within three hours of “time zero” for patients with severe sepsis and septic shock presenting in the Emergency Department. Patients with clinical exclusions for any of the interventions and patients who have been transferred from or to another acute care hospital are excluded from this measure.

**6-hour bundle (adult)** composite measure that includes receipt of the 3-hour bundle interventions plus three additional interventions for patients with septic shock: supporting blood pressure and organ function with both fluids and other medications if needed (vasopressors), as well as re-measuring blood lactate levels when the initial lactate level is elevated. This measure, using the same ‘time zero’ as the three-hour bundle, measures the percentage of patients with septic shock (a subset of all patients) that received all of the three-hour bundle interventions as well as the three additional interventions described in this section. Patients with clinical contraindications to any of
the interventions and patients who have been transferred from or to another acute care hospital are excluded from this measure.

1-hour bundle (pediatric) composite measure for pediatric patients with sepsis that includes receipt of parenteral fluids, blood cultures, and antibiotics within one hour of their presentation in the emergency room. Patients with clinical exclusions and patients who have been transferred from or to another acute care hospital are excluded from this measure.

Sepsis-Scope of the Problem

Sepsis is a life-threatening medical emergency that requires early recognition and intervention. Each year at least 1.7 million adults in America develop sepsis (CDC 2018). Nearly 270,000 Americans die as a result of sepsis each year; one in three patients who die in a hospital have sepsis (CDC, 2018).

Prevalence and Mortality in New York State

Severe sepsis and septic shock impact approximately 50,000 patients in NY each year. Prior to New York State’s implementation of the Sepsis Initiative, discussed later in this course, on average almost 30% of these patients died. The following figures from the 2016 New York State Report on Sepsis Care Improvement Initiative: Hospital Quality Improvement give a clear picture of observed results since implementation of the Sepsis Initiative (NY DOH, 2016).

Figure 1 shows the percentage of adult patients (age ≥ 18) with severe sepsis or septic shock for whom the hospital’s evidence informed sepsis protocol was initiated at the treating hospital. Reasons that protocols may not be implemented include late diagnoses, lack of clarity about interventions at a transferring hospital, or lack of documentation in the medical record. Patients with clinical contraindications to interventions in the protocol or advanced directives, who are enrolled in a clinical study, who refuse interventions or who die within six hours are excluded from this measure. Figure 1 shows that the percentage of adult patients with severe sepsis or septic shock who had a sepsis protocol initiated increased progressively over time from 73.7% in Q2 2014 to 84.3% by Q4 2016.
Figure 2 shows the percentage of pediatric patients (age < 18) with severe sepsis or septic shock for whom a protocol was initiated at the treating hospital. There is a small number of pediatric patients with severe sepsis or septic shock relative to the number of adult patients. This small volume of pediatric cases in each quarter could contribute to the fluctuation seen over time in the percentage of pediatric patients with severe sepsis and septic shock for whom a sepsis protocol was initiated. In Q2 2014, 80.6% of pediatric patients had a sepsis protocol initiated, and in Q4 2016, 85.7% had a sepsis protocol initiated.
Figure 3 shows the percentage of adult patients (age ≥ 18) with severe sepsis or septic shock for whom all the recommended early interventions in the 3 hour early management bundle were administered within the recommended timeframe. These interventions include measurement of lactate level, blood culture collection prior to antibiotics, and antibiotic administration. Patients who died within three hours of time zero and those with clinical contraindications to any of the recommended interventions are excluded from this measure bundle. At the onset of the initiative, 41.5% of eligible patients with severe sepsis or septic shock received all three interventions within the recommended timeframe, while by Q4 2016 the percentage had increased to 59.5%.

![Figure 3. Adult Early Intervention (3-Hour Early Management Bundle): Quarter Two, 2014 through Quarter Four, 2016*](image)

(*) excludes patients with clinical contraindications for protocol interventions or who died within three hours

Figure 4 shows the percentage of adult patients (age ≥ 18) with severe sepsis or septic shock for whom all the recommended interventions in the 6 hour early management bundle were administered. These interventions include the three hour bundle interventions and a repeat lactate level, crystalloid fluid administration and administration of vaspressors for blood pressure support for patients who require these interventions. Patients who died within six hours of time zero and patients with clinical contraindications to any of the interventions are not included in the measure calculation. In Q2 2014, 22.6% of patients received all required interventions within the recommended timeframe. This percentage progressively increased to 39.7% by Q4 2016.
Figure 5 shows the percentage of pediatric patients (age <18) with severe sepsis or septic shock who received all interventions in the early management bundle within one hour. For pediatric patients, these timely interventions include blood cultures, antibiotics and the administration of 20 cc/kg of crystalloid fluid. Pediatric patients who died within one hour of time zero or who have clinical contraindications to any of the interventions are excluded from the measure bundle. Fluctuations are again seen across quarters, likely due to small case volumes. At the onset of the initiative, 4.9% of pediatric patients with severe sepsis or septic shock received all recommended interventions within one hour, and in Q4 2016 21.7% of patients received all recommended interventions.
To evaluate the impact of the New York State Sepsis Care Improvement Initiative on the outcomes of patients with severe sepsis and septic shock, the percentage of sepsis patients within hospital mortality is calculated. Trends in overall mortality from severe sepsis or septic shock are presented in Figures 6 and 7. All patients with severe sepsis or septic shock are included in the mortality calculation. Figure 6 shows the percentage of adult patients (age >18) with severe sepsis or septic shock who died during their hospital stay. The overall mortality continued to decrease in 2016, from 30.2% in Q2 2014 to 26.0% in Q4 2016.

Figure 6. Adult In-Hospital Mortality: Quarter Two, 2014 through Quarter Four, 2016

![Percentage of adult patients with severe sepsis or septic shock who died during their hospital stay from Q2 2014 to Q4 2016.](NY DOH, 2016)

Figure 7 shows the percentage of pediatric patients with severe sepsis or septic shock (age < 18) who died during their hospital stay. The percentages of mortality for pediatric patients fluctuated across quarters, with mortality of 10.5% reported in Q4 2016. Mortality ranged from a low of 6.5% reported in Q3 2015 to the highest percentage of 15.3% reported in Q1 2015. Again, the fluctuation in percentages is likely influenced by the low volume of pediatric cases in each quarter.
New York State Sepsis Improvement Initiative and Rory Staunton’s Law

In 2014 hospitals in New York that provide care to patients with sepsis were required to develop and implement evidence-informed sepsis protocols which describe their approach to both early recognition and treatment of sepsis patients. In addition, hospitals were required to report date to the NYS Health Department that is used to calculate each hospital’s performance on key measures of early treatment and protocol use. Hospitals were also required to submit sufficient clinical information for each patient with sepsis to allow the Department of Health to develop a methodology to evaluate “risk adjusted” mortality rates for each hospital. Risk adjustment takes into account the different mix of characteristics and comorbid conditions, including sepsis severity, of patients cared for within each hospital and permits comparison of hospital performance (NY DOH, 2016).

The development and implementation of the New York State Sepsis Care Improvement Initiative are the result of ongoing Department collaboration with federal, state, private initiatives and hospital partners to improve sepsis awareness advance sepsis care, and to make maximal use of the data collected from hospitals to better understand which clinical practices are influencing survival and other important outcomes for patients. Some of these collaborations to improve sepsis care include:

**Sepsis Advisory Group** The NYDOH convenes a group of clinicians from across New York State that assisted with the development and implementation of the initiative since 2013. This diverse expert group includes both adult and pediatric specialists who treat patients with sepsis. The advisory group has
provided key input into the structure of on-going quarterly performance reports presented to each hospital on their protocol use, protocol adherence, and mortality results compared to statewide averages as well as trended over time. These interim feedback performance reports have provided information for hospitals to target implementation of the improvements we have seen over time.

In addition to providing input in the refinement of our data collection and measurement process, the Sepsis Advisory Group will advise the department on new developments and interventions for patients with sepsis, including treatments and processes of care delivery, that show promise for improving outcomes for patients with sepsis throughout New York State. With the completion of the second quality reporting cycle for hospitals, the advisory group will focus increasingly on data evaluation for identifying and disseminating promising clinical interventions and system improvements from those hospitals with exceptional results.

A smaller group has been convened of pediatric specialists to address pediatric sepsis care, refining data collection and ensuring alignment with updated guidelines.

**IPRO, Implementation Business Partner** IPRO (formerly Island Peer Review Organization) assisted the NYDOH throughout the initiative, including the review of hospital sepsis protocols, development of the data dictionary, feedback reports, validation and analyses. Key activities included the streamlining of electronic data collection, ensuring data integrity, customizing reports, providing webinars, and helpdesk support to hospitals.

**Partnership For Patients (P4P)** The Center for Medicare and Medicaid Services (CMS) has awarded the hospital associations in New York State with grants to support a variety of quality and safety improvements focused on inpatient care. The Healthcare Association of New York State (HANYS) and the Greater New York Hospital Association (GNYHA) work in collaboration with participating hospitals and the NYSDOH to assist hospitals to continue improvements in this priority area.

The P4P sepsis initiative aims to help hospitals improve sepsis care processes by supporting front line staff adherence to hospital protocols. With agreement from the hospitals, the NYSDOH Shares sepsis data for P4P-participant hospitals to inform customized quality improvement work on key clinical interventions for each hospital. The result is focused improvement activities on key clinical interventions and sharing of best practices. Activities include webinars, sepsis regional forums, and project manager on side hospital support.

**Participating Hospitals** In 2017, the Department surveyed participating hospitals and convened meetings of staff involved in sepsis reporting to identify challenges and best practices, quality improvement initiatives and hospitals’ data needs.
Insight obtained from the survey and meetings informed improvements to data definitions and specifications and planning for data sharing with hospitals to facilitate future quality improvement initiatives.

**Private Foundations** Several private foundations have provided support and assistance in raising public awareness regarding sepsis which has amplified the work of the initiative in New York State. In addition, the Rory Staunton Foundation created by the Staunton family and named for Rory Staunton, a 12-year old New York State resident who died from sepsis in 2012, was instrumental in advocating for the existing regulations ('Rory’s Regulations’) in New York and now, in other states as well. Other organizations, such as the Sepsis Alliance, have also played an important national role in bringing attention and focus to sepsis care.

**Support for Research** The Department is supporting research around sepsis. An article titled 'Time To Treatment and Mortality during Mandated Emergency Care for Sepsis' was published in the New England Journal of Medicine with the support of the NYSDOH in May 2017 which details the importance of timely intervention in sepsis care. This article and other articles in submission will add to the evidence to improve sepsis care in New York State.

**International Support for Sepsis** In 2017, the World Health Organization (WHO) recognized sepsis as a global health priority and adopted a resolution on improving the prevention, diagnosis, and management of sepsis. The resolution calls for health workers to increase awareness of sepsis by using the term "sepsis" in communications with patients, relatives, and other parties because greater awareness is a crucial step in reducing the global burden of sepsis. The resolution also calls for clear treatment guidelines and performance targets tailored to local environments. The resolution with its implicit recognition of sepsis as a major threat to patient safety and global health has the potential to save millions of lives around the world.

**Purpose:** Early recognition of sepsis is the responsibility of all healthcare providers. Most sepsis cases are community required; seven in ten patients with sepsis had recently used healthcare services or had chronic conditions requiring frequent medical care.

**Hospital Regulations:** Rory’s Regulations: 10NYCRR 405.2 and 405.4 were implemented in 2013, and they require hospitals in New York State to adopt evidence-based protocols to ensure early diagnosis and treatment of sepsis.

**Causes of Sepsis**

Any infection can trigger sepsis. Populations of increased risk of developing sepsis are: the very young, the elderly, people with chronic conditions and those who are immune
suppressed.

Sites and sources of infections commonly associated with sepsis include the lungs, urinary tract, skin and gut.

**Early Recognition of Sepsis**

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

**Principles of Sepsis Treatment**

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

**Patient Education and Prevention**

- Preventing infection: hand hygiene, wound care, and vaccinations.
- Risk factors (high risk patients):
  - Sepsis is possible in anyone with an infection that develops a complication
  - People most at risk of sepsis are the very young and the old, and anyone with these risk factors: A weakened immune system. **Chronic** illness, including diabetes, kidney or liver disease, AIDS, and cancer (CDC, 2018).
- Warning signs and symptoms of sepsis:
  - **Fever** and **chills**.
  - Very low body temperature.
  - Peeing less than normal.
  - **Rapid** pulse.
  - **Rapid breathing**.
  - **Nausea** and **vomiting**.
  - **Diarrhea** (CDC, 2018).
- Seeking immediate care for worsening infection and signs and symptoms of sepsis.
• Giving relevant history and information to clinicians.

Summary Checklist

In outline form, here are some of the main points of infection control for the dental office.

Before the patient is seated for treatment:

• All health care workers in direct contact with patients should be immunized against the hepatitis B virus.
• Each patient should fill out a thorough medical health history form and this should be updated at each appointment.
• Prostheses and appliances to be delivered to the patients should be disinfected before fitting.
• Disposable coverings should be placed prior to seating each patient in operatory, and all surfaces should be disinfected.
• Take a few seconds to look over the setup to see if anything is missing.

During patient treatment:

• Treat all patients as potentially infectious.
• Use protective wear and barrier techniques such as gloves, mask, protective eyewear, and gowns, lab coats, or uniforms when in contact with body fluids or mucous membranes.
• X-ray films that are contaminated should be opened for processing in the darkroom with gloves, being careful not to touch the film. Then, remove the gloves to place film in the developer.
• Conduct procedures with the minimum amount of droplets, spatters, and aerosols. Use a rubber dam when appropriate. Use a high volume aspirator.
• Use gloves correctly to protect hands. Wash hands before and after gloving.
• Change gloves in between each patient. Change gloves that are torn, cut, or punctured.
• Avoid injury to hands by being careful with sharp items, placing disposable needles in an appropriate receptacle, and recapping needles using a recommended technique.
• Try not to leave the treatment room if at all possible during a procedure.
• Use an overglove if answering the phone, writing or going into a drawer.
• Don't touch your face or hair.
• At end of treatment: discard mask and gloves, wash hands, and remove gown.
• Change gown between patients, and clean face shields and protective eyewear.
• Make notes in chart and dismiss patient.
After the patient leaves:

- Wear heavy rubber gloves while disinfecting surfaces after each patient and handling instruments.
- Clear off all instruments that can be soaked, and put them in a container.
- Clean all debris from instruments.
- Sterilize instruments that penetrate soft tissue or bone. Also sterilize, when possible, all instruments that come in contact with oral mucous membranes, body fluids, or any contaminated secretions of patients. High level of disinfectant must be used if item is heat sensitive or oddly sized.
- Run air/water syringe, ultrasonic scaler, and/or handpiece for 30 seconds to flush lines.
- Clean suction lines with disinfectant by aspirating an acceptable, non foaming solution.
- Dispose of all disposable items after one use.
- Clean and sterilize handpieces if possible but must be sterilized for intraoral use of handpieces; follow manufacturer’s directions.
- Use caution when handling sharps, especially disposable needles and scalpels.
- Place them in a puncture resistant container before disposal.
- Decontaminate all environmental surfaces. Use absorbent paper toweling and a detergent type disinfectant to preclean surface and remove debris. Dispose of towels appropriately. Spray area liberally with disinfectant and leave wet for the time indicated by the directions. Dispose of and replace any protective coverings on switches, light handles, x-ray unit head.
- Decontaminate all outgoing materials such as impressions, bite registrations, and appliances being sent to a laboratory.
- Use only small individual amounts of pumice in a disposable container for each patient, and discard any unused portion.
- Appropriately dispose of wastes. Any blood, suctioned fluids, or other liquid waste should be, if your state allows it, poured in a drain connected to a sanitary sewer system. Solid wastes contaminated with blood or saliva, including tissue, extracted teeth, and bloody (dripping) gauze should be sealed in a sturdy impervious bag and disposed of according to local, state and federal government regulations.
- Wash hands after removing gloves.
Timetable Checklist

Daily

• Clean and disinfect floors, work surfaces, door knobs, sink handles, drawer pulls, and anything else that may have been touched but not disinfected after each patient. Clean sterilizing area, disinfect brushes, and wipe down heat sterilizers.

Weekly

• Clean and disinfect lower areas of walls, front office areas, phones, and other areas not disinfected daily. Check stock and supplies to make certain you have an adequate amount of barrier products, chemicals, solutions, and supplies for the next week. Check the expiration date on all chemicals like glutaraldehyde. Test heat sterilizer with biological test strips.

Monthly

• Clean out drawers and storage spaces, disinfect with a product that has a long lasting effect.

Annually

• Review cross infection control system. Check that your hepatitis B vaccine is up to date (usually needs a booster every 5 years). Communicate with the laboratory regarding infection control of incoming/outgoing cases.

The Absolute Bottom Line

• Be vaccinated against hepatitis B.
• Treat all patients as if they were infectious.
• Have patients use an antiseptic mouthrinse before invasive procedures.
• Use an antiseptic handwash.
• Wear a disposable mask or face shield.
• Wear disposable latex gloves any time you touch mucous membranes.
• Wear protective eyewear.
• Wear a disposable gown or lab coat when spatter is expected.
• Wear clinical attire at all times.
• Use a rubber dam when appropriate.
• Put needles and other sharps in a puncture resistant container.
• Use sterilizable handpieces.
• Use an ultrasonic cleaner instead of hand scrubbing instruments.
• Correctly package instruments for sterilization.
• Use a heat sterilizer.
• As a general rule of thumb, it an instrument goes into a patient’s mouth, it needs to be either discarded or sterilized before being used on another patient.
• Monitor the sterilizer with appropriate spore tests weekly.
• Use glutaraldehyde for items that cannot be heat sterilized for the appropriate time recommended.
• Use an appropriate surface precleaner.
• Use an appropriate surface disinfectant for the time recommended by the manufacturer.
• Use surface covers.
• Have an adequate waste disposal system according to local regulations.
• Review scientific literature for technology at least annually to find safer devices to use in your practice.
• Keep your dental unit water cleaner than 200 CFU/mL for regular procedures and use sterile water for surgical procedures.

Conclusion

Infection control began with Dr. Joseph Lister and his pioneering efforts in sterilization techniques. As the chain of infection began to be understood, effective infection control strategies to prevent disease transmission were developed, and state and federal guidelines were written and mandated to control infection in all public health settings. Infection control, disinfection, and sterilization techniques, designed to protect patients and healthcare professionals, were developed to stop the spread of pathogens between patients and healthcare professionals, healthcare professionals and patients, and from patient to patient. From these procedures and techniques, daily, weekly, monthly, and annual cleaning and disinfection schedules were developed and should be implemented in all healthcare practices to achieve infection control goals. In addition, personal protection equipment should be made available to all healthcare professionals and sharps containers should be readily available. By adhering to state and federal infection control guidelines and regulations, the spread of disease producing pathogens will be minimal, and the health and safety of patients and healthcare professionals protected.

References

American Dental Association Code of Ethics, 2016

American Dental Association, Oral Health Topics, Infection Control,


New York State Department of Health *Part 92 of Title 10 (Health) of the Official Compilation of Codes, Rules and Regulations of New York*

Course Test: New York State Infection Control For New York State Professionals

1) Pursuant to Chapter 786 of the Laws of 1992, the New York State mandated infection control course must be repeated every ______ years:
   a. Two
   b. Three
   c. Four
   d. Five

2) If a healthcare professional fails to adhere to scientifically accepted principles and practices of infection control s/he may be subject to all of the following except:
   a. Professional Liability
   b. Disciplinary Action
   c. Deportation
   d. Revocation of Professional License

3) To maintain professional compliance a professional must participate in the required infection prevention and control training and adhere to accepted principles and practices of infection prevention and control.
   a. True
   b. False
4) Effective infection control strategies prevent disease transmission by interrupting one or more links in the chain of infection.
   a. True
   b. False

5) Personal protective equipment includes:
   a. Gowns
   b. Gloves
   c. Masks
   d. All the above

6) Wearing gloves is the single most effective way to control infection.
   a. True
   b. False

7) Mucous membrane/non-intact skin exposures include:
   a. Contact with contaminated hands.
   b. Contact with open skin lesions/dermatitis.
   c. Splashes of sprays of blood or body fluids.
   d. All of the above.

8) Unsafe injection practices have resulted in notification of patients of possible exposure to bloodborne pathogens and recommendations that they be tested for hepatitis C virus, hepatitis B virus, and HIV.
   a. True.
   b. False.

9) If a medication vial has already been opened, the rubber septum should be disinfected with alcohol prior to piercing it.
   a. True.
   b. False.

10) When handling and disposing of needles and sharps:
   a. Avoid recapping unless absolutely medically necessary.
   b. When recapping use both hands.
   c. Pass sharp instruments with the pointed end facing downward.
   d. Disassemble sharp equipment carefully with both hands.
11) Personal Protective Equipment (PPE) is specialized clothing or equipment worn by an employee for protection against a hazard.
   a. True.
   b. False.

12) Types of PPE include all of the following except:
   a. Gloves.
   b. Aprons.
   c. Eye Glasses.
   d. Masks.

13) Appropriate user education for use of PPE includes selection, doffing, washing, and disposal.
   a. True.
   b. False.

14) Potential for contamination of medical devices and equipment is dependent upon:
   a. Potential for external contamination.
   b. Potential for internal contamination.
   c. Physical composition, design, or configuration of the device or equipment.
   d. All of the above.

15) At any point a break in the infection control practices can compromise the integrity of instruments, medical devices or equipment.
   a. True.
   b. False.

16) Symptoms requiring immediate evaluation by a licensed medical professional and possible restriction from patient care include:
   a. Fever.
   b. Rash.
   c. Vomiting.
   d. All of the Above.
17) Severe sepsis and septic shock impact approximately 50,000 patients in NY each year.
   a. True.
   b. False.

18) The most commonly used surface disinfectants are:
   a. Complex Phenolics.
   b. Iodophor Solutions.
   c. Sodium Hypochlorite (Bleach).
   d. Alcohol-Quaternary Ammonium Compounds.

19) The basic aim of infection control is to reduce the number of pathogenic microbes in the field of operation to a level where the body's normal resistance can prevent infection.
   a. True.
   b. False.

20) Management strategies for potentially communicable conditions includes:
   b. Limiting contact with susceptible.
   c. Furlough until noninfectious.
   d. All of the above.