BLOODBORNE PATHOGEN TRAINING COURSE

OBJECTIVES: Upon completion of this lesson, the employee should be able to:

√ understand what bloodborne pathogens are and how they may be transmitted.

√ know what constitutes "blood or other potentially infectious materials".

√ know what the concept of "universal precautions" means and that its use is required.

√ understand where to obtain a copy of the OSHA Bloodborne Pathogen Standard

√ understand that all employees with occupational exposure to blood or other potentially infectious materials have the right to receive the hepatitis B vaccination series at no cost to the employee.

√ understand what to do in the event of an exposure incident.

This training course is divided into three lessons. Read the material and complete the quiz at the end, then go on to the next lesson. If you should have difficulties in one of the lessons, you may go back and re-read the material.

Now, lets get started.....

COURSE OUTLINE:

LESSON ONE:
- I. INTRODUCTION TO THE BLOODBORNE PATHOGEN STANDARD
- II. SCOPE AND APPLICATION

LESSON TWO:
- III BLOODBORNE PATHOGEN REQUIREMENTS
  - A. EXPOSURE DETERMINATION
  - B. UNIVERSAL PRECAUTIONS
  - C. ENGINEERING AND WORK PRACTICE CONTROLS
  - D. PERSONAL PROTECTIVE EQUIPMENT (PPE)
  - E. LABELS AND SIGNS
  - F. HOUSEKEEPING/SPILL PROCEDURES
  - G. HEPATITIS B VACCINATION
  - H. EXPOSURE INCIDENT PROCEDURES AND POST-EXPOSURE EVALUATION/ FOLLOW-UP
  - I. SOURCE BLOOD PROCEDURES
  - J. TRAINING

LESSON THREE:
- IV. HAND HYGIENE PROCEDURES
- V. BIOMEDICAL WASTE DISPOSAL
  - A. DEFINITION OF BIOMEDICAL WASTE
  - B. DISPOSAL PROCEDURES
    1. SHIPPING PROCEDURES
    2. AUTOCLAVE PROCEDURES
    3. AUTOCLAVE STERILIZATION VALIDATION

I. INTRODUCTION TO THE BLOODBORNE PATHOGEN STANDARD

Bloodborne pathogens are infectious microorganisms carried in human blood that can cause serious disease. The microorganisms and diseases include:

- Human Immunodeficiency Virus (HIV)
- Hepatitis B Virus (HBV)
- Hepatitis C virus (HCV)
- Hepatitis D Virus (HDV)
- *Plasmodium sp.* (the agent which causes malaria)
- *Treponema pallidum* (the agent which causes syphilis)
- Leptospirosis
- Arboviral infections
- Adult T-cell Leukemia/lyphoma (caused by HTLV-I)
- HTLV-I Associated Myelopathy
- Diseases Associated with HTLV-II
- Creutzfeldt-Jakob Disease
- Babesiosis
- Brucellosis
- Viral Hemorrhagic Fever

Transmission of these infectious diseases can occur through sexual contact and contact with blood and other potentially infectious body fluids, including occupational exposures such as needlesticks or body fluid splashes. Some interesting facts about bloodborne pathogens are as follow:

- As of December, 2006, at least 57 healthcare/laboratory workers have been documented to seroconvert to HIV after occupational exposure to HIV-infected blood, including 19 laboratory workers. (These numbers have not changed since 2002). 140 additional cases of HIV infection or AIDS are reported in healthcare workers without such documentation, but no other risk factors other than occupational exposure are reported.
- Up to 800,000 percutaneous injuries may occur annually among all U.S. health care workers (both hospital-based workers and those in other health care settings).
- After percutaneous injury with a contaminated sharp instrument, the average risk of infection is 0.3% for HIV, ranges from 6% to 30% for Hepatitis B, and from 5-10% for Hepatitis C. See the abstract of the CDC document at www.**cdc**.gov/**niosh**/pdfs/97-111.pdf.
- HIV may be more hardy than previously reported. Cell-free and cell-associated HIV cultures suspended in 10% serum remain infectious for several weeks at room temperature. When dried onto a glass coverslip, the virus may remain infectious for several days. Blood obtained 16.5 days postmortem has been reported to contain culture infective HIV. However, according to the CDC, no one has been infected with HIV due to contact with an environmental surface.
- In a dried state, HBV may remain viable on surfaces for up to 1 week.
- HBV is more highly contagious than HIV. One milliliter of blood from an HIV-infected person may contain a few hundred to approximately 10,000 infectious viral particles. One milliliter of blood from a HBV-infected person may contain more than 100 million infectious virus particles.
- Approximately 70% of individuals infected with hepatitis B virus are symptomatic, ranging from mild fever and nausea to severe abdominal pain, jaundice, and liver

failure (signs and symptoms are less common in children than adults.) That means that 30% of those infected have no symptoms. Death from chronic liver disease occurs in 15-25% of chronically infected persons.

- Only 20% of individuals infected with hepatitis C virus are symptomatic, but approximately 75-85% become chronically infected and chronic liver disease occurs in greater than 70% of persons with HCV infection.
- While an effective vaccine and post-exposure prophylaxis is available to prevent hepatitis B, no vaccine is available to prevent hepatitis C and no post-hepatitis C exposure immunoprophylaxis has been successfully developed. Antiviral drugs, such as interferon used alone or in combination with ribavirin, have been approved for the treatment of persons with chronic hepatitis C, with a success rate of about 10 - 40%.
- In the United States, the cumulative number of persons with AIDS is approximately 943,525, 1.25 million persons are chronically infected with HBV, and 4.1 million are infected with HCV (3.2 million chronically infected).

In response to occupational exposures to bloodborne pathogens and the hazards associated with such exposures, the Occupational Safety and Health Administration (OSHA) established the the Standard for Bloodborne Pathogens (29 CFR 1910.1030) which has been adopted by the Oklahoma Department of Labor as applicable to state employees. A copy of this standard may be obtained from the Environmental Health and Safety Office or the OSHA website. The OUHSC/OU-Tulsa *Infectious Diseases Policy* incorporates the requirements of this regulation into University policy.

II. SCOPE AND APPLICATION

The bloodborne pathogen regulation applies to employees who have reasonably anticipated eye, skin, mucous membrane or parenteral contact with human blood or other potentially infectious materials that may result from the performance of an employee's duties. Other potentially infectious material means the following:

Human Body Fluids

- semen
- vaginal secretions
- cerebrospinal fluid
- synovial fluid
- pleural fluid
- pericardial fluid
- peritoneal fluid
- amniotic fluid
- saliva in dental procedures
- any body fluid that is visibly contaminated with blood
- all body fluids in situations where it is difficult or impossible to differentiate between body fluids

Other

- any unfixed tissue or organ (other than intact skin) from a human, living or dead
- HIV-containing cell or tissue cultureshuman organ culturesHIV or hepatitis B virus (HBV) containing culture medium or other solutions

- blood, organs, or other tissues from experimental animals only if they are known to be infected with HIV, HBV or other bloodborne pathogens infectious to man
- established human cell lines, human tissue cultures, and human cell strains*

*NOTE: For laboratory personnel, yes, this includes HeLa cells and other human cell lines. Per OSHA, these materials may only be excluded from the requirements of the OSHA Bloodborne Pathogen regulation if they have been fully tested to be free of bloodborne pathogens (including HIV, HBV, Epstein-Barr virus, Herpesvirus and papilloma members of the Papovavirus group, etc.) and documented as such. This documentation must be retained by the laboratory. Cell lines that are procured from commercial vendors or other sources may or may not provide such documentation. Read their documentation carefully, as it may state the product is free of other contamination (such as bacterial), but not necessarily bloodborne pathogens. Once the testing has been performed and documented, the material must be protected from further contamination.

NOTE: The bloodborne pathogen standard does **NOT** apply to other human body fluids such as urine, feces, or vomitus, unless there is visible contamination of these materials with blood.

In general, healthcare workers (including those in the field of dentistry) have reasonable anticipation of exposure to blood and other potentially infectious body fluids. Examples of other types of employees who have reasonable anticipation of exposure to human blood (or other potentially infectious materials) include housekeeping staff, OUHSC Police (when assisting accident/injury victims), and laboratory personnel working with human blood or human cell lines.

Most workplace exposures to bloodborne pathogens occurs from contact with contaminated (human) blood. For instance, contaminated blood can enter your body through an open cut, scratch, skin abrasion, dermatitis, acne, through a puncture from a needle or broken glass, or from a splash to the eyes, nose or throat. The key to preventing such infection is to follow the precautions identified in the following sections.

Bloodborne Pathogens Quiz 1

No vaccine is available to prevent hepatitis C and no post-exposure immunoprophylaxis has been successfully developed.

- a. True
- b. False

The OSHA bloodborne pathogen standard applies to:

- a. nurses only.
- b. employees with reasonable anticipation of occupational exposure to blood or other potentially infectious material.
- c. only employees who work with AIDS patients.
- d. all employees

HIV and HBV are the only bloodborne pathogens regulated by OSHA.

- a. True
- b. False

HIV and HBV may be present in body fluids other than blood.

- a. True
- b. False

BLOODBORNE PATHOGEN TRAINING COURSE

Lesson Two: **III. Bloodborne Pathogen Requirements**

III. *BLOODBORNE PATHOGEN REQUIREMENTS*

A. EXPOSURE DETERMINATION

Each department must determine which, if any, employees have reasonable anticipation of exposure to human blood or other potentially infectious materials as a result of their job duties. If it is determined that employee(s) have such exposure, the procedures in the Exposure Control Plan in the OUHSC/OU-Tulsa *Infectious Diseases* Policy should be followed.

B. UNIVERSAL PRECAUTIONS

Because individuals may be infected with bloodborne diseases and not know it or show signs or symptoms of any illness, the **OSHA Bloodborne Pathogen regulation** requires the use of "**universal precautions**" as defined by the CDC to prevent contact with all human blood or other potentially infectious material.

Under universal precautions, human blood and other potentially infectious material should be treated as if it is infectious for HBV, HIV, and other bloodborne pathogens. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids should be considered potentially infectious materials.

Universal precautions do not apply to feces, nasal secretions, sputum, sweat, tears, urine, and vomitus unless they contain visible blood. Universal precautions do not apply to saliva except when visibly contaminated with blood or in the dental setting where blood contamination of saliva is predictable.

Universal precautions involve the use of protective barriers such as gloves, gowns, aprons, masks, or protective eyewear, which can reduce the risk of exposure of the health care worker's skin or mucous membranes to potentially infectious materials. In addition, under universal precautions, it is recommended that precautions be taken to prevent injuries caused by needles, scalpels, and other sharp instruments or devices.

The OUHSC/OU-Tulsa Infectious Diseases Policy also requires the use of "**standard precautions**" for all hospital settings. Standard precautions add body substance isolation principles to the requirements of universal precautions and apply them to all patients receiving care in hospitals, regardless of their diagnosis or presumed infection status. Standard precautions apply to human blood; all body fluids, secretions, and excretions except sweat, regardless of whether or not they contain visible blood; nonintact skin; and mucous membranes.

C. ENGINEERING AND WORK PRACTICE CONTROLS

Engineering and work practice controls should be utilized first to minimize employee exposure, including the following.

- Handwashing facilities should be readily accessible to employees. Where handwashing facilities are not readily accessible, employees should be provided with an appropriate hand cleanser in conjunction with clean cloth or paper towels or antiseptic towelettes and employees should wash their hands with soap and running water as soon as feasible after using the antiseptic hand cleansers or towelettes.
- Employees should wash their hands or other skin with soap and water or flush mucous membranes with water immediately or as soon as feasible following contact of body areas with blood or other potentially infectious materials, and after removal of gloves or other personal protective equipment.
- Contaminated needles or other contaminated sharps should not be bent, recapped, or removed. If needles must be recapped, a mechanical means or a one-handed technique should be used.
- Immediately or as soon as possible after use, contaminated sharps should be placed in appropriate containers, even if the sharps are reusable and will be reprocessed. These containers should be:

- puncture resistant,
- labeled with the biohazard symbol or color-coded,
- leak-proof on the sides and bottom, and
- replaced when approximately 2/3 full.

- Other guidelines for selection of sharps containers should consider issues such as lids that lock tight for safe disposal, a container that is specifically constructed for the method of sterilization that will be used (if sharps containers are not specifically constructed to be autoclaved, the resulting mass of melted plastic is extremely hazardous due to the needles that often protrude), and a clear top that would allow inspection. Placement of these containers is also critical such that they are located near the point of use, but away from unwanted access, such as patients (including children).

- Eating, drinking, smoking, and applying cosmetics should not occur in areas where occupational exposure is present. Food or drink should not be stored in areas where blood or other potentially infectious materials are present or stored.
- Employees should use procedures which minimize spraying, splashing, spattering, and generation of droplets of infectious material.
- No mouth pipetting should occur.
- Specimens of blood or other potentially infectious materials should be placed in a container which prevents leakage during collection, storage, transport, or shipping. This container should be red or labeled with the biohazard symbol and closed prior to being stored, transported, or shipped. If contamination outside this primary container occurs or is likely to occur, it should be placed in a second red or similarly labeled container which prevents leakage during handling processing, storage, transport, or shipping.
- Equipment which has been in contact with blood or other potentially infected material should be examined prior to servicing or shipping and should be decontaminated as necessary. Where complete decontamination cannot occur prior to servicing, a readily observable biohazard label should be attached to the equipment stating which portions of the equipment remain contaminated, and the employee requesting the service or repair should inform the service representative and/or the manufacturer so that appropriate precautions can be taken.

Needlestick Prevention

Needlesticks, other percutaneous injuries, and splashes to mucous membranes are a major concern for all healthcare workers. Some current statistics include:

- Up to 800,000 percutaneous injuries may occur annually among all U.S. health care workers (both hospital-based workers and those in other health care settings). After percutaneous injury with a contaminated sharp instrument, the average risk of infection is 0.3% for HIV and ranges from 6% to 30% for hepatitis B.
- From 1993 – 1999, on average, 400 healthcare workers were infected with hepatitis B each year.

Appropriate commercially available and effective safer medical devices designed to eliminate or minimize occupational exposure should be used whenever feasible.

Employees are encouraged to identify work practices which may have the potential for percutaneous injuries, and to report to Clinic Managers whenever the use of a safer medical device will minimize such injuries. Assistance in identifying such devices is available from the OUHSC Employee Health Office at 405/271-3100.

D. PERSONAL PROTECTIVE EQUIPMENT (PPE)

Where occupational exposure remains after the institution of the above engineering controls, personal protective equipment (PPE) should also be used. Appropriate PPE should be provided by the department (at no cost to the employee) in the correct sizes and readily accessible for the job at hand. The type and characteristics of the PPE will depend upon the task and degree of exposure anticipated.

Supervisors should instruct employees on the proper use of PPE for the task at hand and ensure that employees use the PPE properly.

1. PPE Selection

While each department should assess the potential hazards associated with departmental tasks (including the administration of first aid) and the resulting PPE requirements, the following guidelines are offered:

- Gloves should be worn when it can be reasonably anticipated that the employee may have hand contact with blood or other potentially infectious materials, mucous membranes, and non-intact skin such as during phlebotomies and when handling or touching contaminated items.
- Masks in combination with eye protection devices such as goggles or face shields should be worn whenever splashes, spray, spatter, or droplets of blood or other potentially infectious material may be generated and eye, nose, or mouth contamination can be reasonably anticipated.
- Gowns, aprons, lab coats, surgical caps or hoods, and/or shoe covers should be worn when gross contamination can be reasonably anticipated.

2. PPE Use and Disposal

- PPE should be removed as soon as possible if penetrated by blood or other potentially infectious material.
- Disposable gloves should be removed and replaced when contaminated or torn and should not be reused. Utility gloves may be decontaminated for re-use if the integrity of the glove is not compromised.
- To prevent widespread contamination, employees must remove gloves before touching objects such as door knobs, light switches, telephones, etc., and before leaving the work site.
- Removed PPE should be placed in a designated area or container for storage, washing, decontamination, or disposal. Contaminated disposable PPE should be placed in a biohazard bag until it can be sterilized/autoclaved or shipped for disposal. See Lesson 3 for disposal procedures.
- Contaminated launderable PPE should **not** be taken home for cleaning. Purchasing has established a contract with an outside vendor (contact the Purchasing Office for the current vendor). Departments that choose to use a different vendor should ensure that the vendor is informed of the contaminated status of the laundry and that compliance with the OSHA Bloodborne Pathogen standard is required when handling the laundry.

E. LABELS AND SIGNS

Biohazard labels should be affixed to all containers, refrigerators, freezers, etc. that hold blood or other potentially infectious material including biomedical waste. Red bags or containers may be substituted for labels. Labels should be affixed in a manner that prevents loss or unintentional removal. Individual containers of blood or other potentially infectious materials that are placed in a labeled container during storage, transport, shipment, or disposal are exempted from the labeling requirement. In other words, if the exterior of the refrigerator containing blood vials is appropriately labeled, each individual container inside the refrigerator need not be labeled. However, once a vial is removed from the labeled refrigerator, if not used and re-stored immediately, it will need to be labeled.

F. HOUSEKEEPING/SPILL PROCEDURES

Departments are responsible for cleaning their own spills, work surfaces, and equipment on a regular basis. Do not leave a spill for housekeeping personnel to clean up - it will still be there the next day. Contaminated work surfaces should be decontaminated after completion of procedures, immediately or as soon as feasible

after any spill of blood or other potentially infectious material, and at the end of the work shift if the surface has become contaminated since the last cleaning.

All bins, pails, cans, and similar receptacles intended for reuse which have a reasonable likelihood for becoming contaminated with blood or other potentially infectious material should be inspected and decontaminated on a regularly scheduled basis and cleaned and decontaminated immediately or as soon as feasible upon visible contamination.

Broken glassware which may be contaminated should not be picked up directly with the hands but by mechanical means such as a brush and dustpan, tongs or forceps.

Spill procedures for blood or other potentially infectious materials on hard surfaces are provided here.

- Alert people in the immediate area of the spill.
- Universal precautions should be used. Put on protective equipment, including disposable gloves of sufficient strength not to tear during cleaning activities. If enough material has been spilled to expect splashing during cleaning, additional protective equipment may be required, such as a face shield or safety goggles and a mask, or disposable outer clothing, such as laboratory coat with long sleeves, back-fastening gown or jumpsuit, and/or disposable shoe covers.
- Cover the spill with paper towels or other absorbent materials.
- Carefully pour an appropriate disinfectant, applied according to manufacturer's handling instructions, around the edges of the spill and then into the spill. Avoid splashing. Appropriate disinfectants include:
    - products registered by the United States Environmental Protection Agency (USEPA) as a "hospital disinfectant" (chemical germicides that have a label claim for tuberculocidal activity),
    - products registered by the USEPA as being effective against human immunodeficiency virus (HIV), or
    - a solution of 5.25 percent sodium hypochlorite (household bleach) diluted between 1:10 and 1:100 with water (a 1:100 dilution of common household bleach yields 500 parts per million free available chlorine - approximately 1/4 cup of bleach per gallon of tap water).
- Know that disinfectants require an appropriate contact period to work. For a 1:10 bleach solution, this can be as long as 30 minutes, depending on the type of material. Therefore, even thought the bleach or disinfectant has been added at this point of the cleanup, you must still consider the material to be potentially infectious.
- After the spill has been absorbed, place contaminated towels in a plastic waste disposal bag. Clean up the spill area with fresh towels soaked in disinfectant. Leave a residue of disinfectant. Allow a 20-minute contact period (or the manufacturer's contact time) before considering the area clean and disinfected.
- All contaminated towels and gloves should be double-bagged for disposal and labeled with the biohazard symbol. Disposal must follow procedures outlined in Lesson 3.

Spill procedures on carpet are as follows:

- Do not use chlorine bleach solution on carpet.
- Use only a registered disinfectant as described above. Read and follow manufacturer's instructions.
- Isolate the area, if possible.
- Wear gloves and other appropriate PPE.
- For small spills on carpets (smaller than a quarter):
    - Soak the spill with enough disinfectant to cover the spot.
    - Let dry at least overnight to ensure that the spot is disinfected.

    - Shampoo carpet, if needed, or use 3% hydrogen peroxide to remove discoloration.
- For larger spills on carpet:
    - Pour disinfectant on the spot and let stand at least 30 minutes to allow some disinfection to take place. Blot up excess liquid with disposable towels.
    - Soak the area with additional disinfectant. Allow to dry overnight. Shampoo carpet, if needed, or use 3% hydrogen peroxide to remove discoloration.
- All contaminated towels and gloves should be double-bagged and labeled with the biohazard symbol. Disposal of contaminated material must follow procedures outlined in Lesson 3.

G. HEPATITIS B VACCINATION

All employees who have occupational exposure to blood or other potentially infectious materials (as defined earlier in this training program) should be provided with the opportunity to receive the hepatitis B vaccine to at no cost to the employee. The employee may decline the vaccination and request it at a later date. Employees should contact Employee Health in Oklahoma City (405) 271-3100 or (918) 646-0146 (pager) in Tulsa for information on the Hepatitis B vaccine.

Although some people may lose antibody over time, immunologic memory still persists. Therefore, the CDC does not recommend booster doses unless an exposure occurs, at which time a titer will be performed to determine need.

H. EXPOSURE INCIDENT PROCEDURE AND POST-EXPOSURE EVALUATION/FOLLOW-UP

If you experience an exposure incident (such as a stick with a contaminated needle or a splash of potentially infectious material in the eye, mouth, mucous membrane, or non-intact skin):

- Immediately clean the wound with soap and water; flush mucous membranes with water or normal saline solution.
- Notify your supervisor or other designated individual and proceed for medical treatment at the recommended locations.

  It is important to proceed to medical attention as soon as possible. Current studies indicate that for some exposures, medical treatment provided within the first 1-2 hours of exposure has been effective in the prevention of the spread of bloodborne diseases.

  A confidential examination should be made available to the employee (at no cost) to address such infectious diseases as hepatitis B and HIV, including applicable post-exposure prophylaxis and counseling. Follow-up confidential examinations should also be made available to the employee (at no cost). The results of any of these examinations or blood testing should not be made available to anyone other than the employee. However, the healthcare professional providing treatment must forward a written opinion (as outlined in the OSHA regulation) to the employee and to the employee's supervisor, which may appear in the form of a "Post Exposure Medical Disposition Form" or similar documentation which does **not** contain test results, only that the employee was seen and that they may or may not return to work.

All occupational injuries, illnesses and exposures, including minor injuries requiring first aid **must** be reported and documented by the employee's supervisor. The employee and supervisor should complete the forms and follow the procedures

If the exposure is a result of a needlestick, **make note of the brand and type of device (if applicable) which caused the injury and report it on the injury report forms, as OSHA now requires that such information be tracked.**

I. TRAINING

All employees with occupational exposure should receive initial training (at the time of assignment to tasks where occupational exposure may take place), additional training when changes that affect employees' occupational exposure or work practices occur, and at least annually thereafter.

This concludes Lesson Two of the Bloodborne Pathogen Training Training Course. You are now ready to take the quiz for this lesson.

Bloodborne Pathogens Quiz 2

You do not need to wear gloves when handling blood or other potentially infectious materials if you have passed this course and are sure to be very careful.

- a. True
- b. False

Personal protective equipment should be removed as soon as possible if penetrated by blood or other potentially infectious material.

- a. True
- b. False

If you receive an occupational exposure to blood or other potentially infectious material, you should wait to see if you become infected before you notify your supervisor.

- a. True
- b. False

If I get stuck by a needle or splashed with blood, I should:

- a. wait to see if I get sick.
- b. immediately flush the affected area then notify my supervisor.

- c. take two aspirin or Tylenol.
- d. put on rubber gloves.

BLOODBORNE PATHOGEN TRAINING COURSE

Lesson Three:

IV. HAND HYGIENE PROCEDURES

V. BIOMEDICAL WASTE DISPOSAL

A. DEFINITION OF BIOMEDICAL WASTE

B. DISPOSAL PROCEDURES

1. Shipping Procedures
2. Autoclave Procedures
3. Autoclave Sterilization Validation

IV. *HAND HYGIENE PROCEDURES*

Hand hygiene is the simplest, most effective measure for preventing nosocomial infections. CDC recommendations for hand hygiene practices for personnel with patient care responsibilities include the following.

Wash hands with either a non-antimicrobial soap and water or an antimicrobial soap and water:

- when hands are visibly dirty;
- when hands are contaminated with proteinaceous material;
- when hands are visibly soiled with blood or other body fluids;
- if exposure to *Bacillus anthracis* or *Clostridium difficile* is suspected or proven; and
- before eating and after using a restroom

If hands are not visibly soiled, use an alcohol-based hand rub or wash hands with an antimicrobial soap and water for routinely decontaminating hands in the following clinical situations:

- before having direct contact with patients;
- before donning sterile gloves when inserting a central intravascular catheter;
- before inserting indwelling urinary catheters, peripheral vascular catheters, or other invasive devices that do not require a surgical procedure;
- after contact with a patient's intact skin (e.g., when taking a pulse or blood pressure, and lifting a patient);
- after contact with body fluids or excretions, mucous membranes, nonintact skin, and wound dressings only if hands are not visibly soiled;
- if moving from a contaminated-body site to a clean-body site during patient care;
- after contact with inanimate objects (including medical equipment) in the immediate vicinity of the patient; and
- after removing gloves.

Personnel with patient care responsibilities should wear gloves for all hand contaminating activities.

Personnel with patient care responsibilities are prohibited by University and Hospital policies from wearing artificial nails (anything applied to natural nails other than nail polish is considered artificial, including bonding, tips, wrappings, tapes, and inlays). Nail polish, if chipped or worn, should be removed. Natural nails should be maintained less than one quarter of an inch long if personnel care for patients at high risk of acquiring infections (e.g. patients in intensive care units or in transplant units).

V. *BIOMEDICAL WASTE DISPOSAL*

A. DEFINITION OF BIOMEDICAL WASTE

Biomedical waste is defined by the Oklahoma Department of Environmental Quality (ODEQ) as "waste materials which are capable of producing an infectious disease which are not otherwise regulated as hazardous waste." Examples of biomedical waste includes:

- cultures and stocks of infectious agents and associated biologicals;
- biological tissues;
- human blood and blood products;
- pathological wastes;
- contaminated sharps including hypodermic needles, syringes (with or without the attached needle), Pasteur pipettes, scalpel blades, suture needles, broken glassware, or sharp glassware such as used microscope slides and cover slips (sharps need not be contaminated with **human** blood or tissue to be considered contaminated - any contamination with animal blood, tissue, etc. is also considered by ODEQ to be biomedical waste);
- animal carcasses, body parts, and contaminated bedding;
- wastes from surgery, autopsy and other medical procedures;
- soiled dressings and other patient-care materials;
- dialysis unit wastes;
- isolation wastes, unless determined to be non-infectious by the infection control committee at the health care facility;
- pharmaceutical wastes;
- laboratory reagents contaminated with infectious body fluids;
- all materials which have come in contact with cytotoxic/antineoplastic agents; and
- any other material and contaminated equipment which, in the determination of the facility infection control staff, presents a significant danger of infection because it is contaminated with, or may reasonably be expected to be contaminated with, etiologic agents.

B. DISPOSAL PROCEDURES

While being collected, all biomedical wastes should be stored in a leak proof container that is color coded or labeled with the biological hazard symbol. Sharps containers should also be puncture-proof.

Untreated biomedical waste **may not be** disposed of in the municipal waste stream (regular trash). All biomedical waste must be shipped for disposal by incineration or treated by steam sterilization or chemical disinfection then repackaged in an unmarked outer bag or box that is **not** red nor labeled with the biohazard symbol for disposal in the regular trash.

1. Shipping Procedures

FHA has a contract for biomedical waste disposal services for all facilities with Stericycle, Inc.

If the biomedical waste is to be shipped for disposal through Stericycle (or any other qualified biomedical waste disposal company, if the current contract changes), the Department of Transportation (DOT) requires additional training for those persons packing, shipping, or signing the documentation for such shipments. This training must also include information on hazardous materials security.

DOT defines ***Regulated Medical Waste*** as "a waste or reusable material derived from the medical treatment of an animal or human, which includes diagnosis and immunization, or from biomedical research, which includes the production or testing of biological products."

DOT defines ***Sharps*** as "any object contaminated with a pathogen or that may become contaminated with a pathogen through handling or during transportation and also capable of cutting or penetrating skin or packaging material. Sharps include; needles, **syringes**, scalpels, broken glass, culture slides, culture dishes, broken capillary tubes, broken ridged plastic, wood shaft cotton swabs and exposed ends of dental wires." Sharps (including syringes, even if the needle has been removed) must be placed in sharps containers prior to shipment for disposal.

PACKING AND SHIPPING PROCEDURES

DOT requires that the regulated medical waste (RMW) be packaged properly for shipment, and it is the generator of the waste who is responsible for these packing procedures. Violations of these regulations are subject to fines of many thousands of dollars per package.

It is the responsibility of the generator to make sure that biomedical/regulated medical waste bags are closed properly by one of the following three methods which will seal the bag closed such that no fluid or other material may escape when the bag is turned upside down.

1. Twist the open end and tie the end into one knot. (Do not tie alternate corners into knots. This will not appropriately close the bag.)

2. Twist the open end and fold it over into a gooseneck. Tape the folded end shut with duct tape.

3. Use a twist tie that is of sufficient length and strength which will effectively close the bag.

The closed bag or sharps container must then be placed in an outer (secondary) container for shipment. This container must be:

- made of rigid material (plastic or cardboard),
- impervious to outside moisture,
- able to prevent tearing or bursting under normal use, and
- puncture-resistant for sharps.

Containers (boxes/tubs) provided by the current vendor will meet these requirements. Do not try to use containers/boxes not supplied by the current vendor.

If liquids are present in the waste, the container lids must be tightly lidded or stoppered and the secondary container must contain sufficient absorbent material that is enough to handle 150% of the fluid amount inside the container.

The outer packaging is required to have the following markings:

- Regulated Medical Waste
- UN 3291
- The word "BIOHAZARD" and black biohazard symbol

The maximum material weight limit of any single red bag is 22 pounds. A 28 gallon container (tub) must not weigh more than 60 pounds.

Prior to shipping remember:

- Containers must be properly closed and lidded prior to transport.
- Check that there is no visible leaking or external contamination, and that the container is not ruptured or damaged in any way.
- No objects may be protruding from the container.
- All inner bags must be tied shut with twist tie or knot to make sure they do not leak out if inverted. Absorbent materials may be needed if liquids are present.
- Be sure that the container is not overfilled.

DOT requires that all hazardous materials be accompanied by shipping documents, also known as manifests. The main purpose of these is to provide clear communication in the event of an emergency when the hazardous material is in transit. It is very important that they are complete, correct and have emergency response contact information.

Shipping documents must have the following:

- Proper shipping name: "Regulated Medical Waste, n.o.s." (not otherwise specified)
- Hazard Class: "6.2"
- Identification #: "UN3291"
- Packaging Group (cultures and stocks): PG II
- Quantity of material shipped - weight or volume
- Emergency response number (manned 24/7)
- Shipper's certification (generator signature)

Only persons knowledgeable about the package and trained in the DOT shipping requirements for RMW should sign the manifests (it is a violation of DOT regulations to have an untrained person sign the manifest). **Copies of the manifest must be retained and be easily retrievable for a DOT inspector for two years.**

HAZARDOUS MATERIALS SECURITY

Many materials that are classified as hazardous materials are essential products to research and industry, but potential deadly weapons in the hands of a terrorist. In the wake of increased concerns over terrorists threats and attacks, shippers and carriers who offer, transport or store hazardous materials have an increased responsibility to safeguard personnel, facilities and the hazardous materials themselves. Lost, stolen, or unprotected hazardous materials may be used for malicious acts that can cause harm, destruction, or other illegal activities. There is additional concern that during a biological event, such as an outbreak of pandemic flu, SARS, smallpox, etc., a potential terrorist strategy could be the theft of potentially infectious waste resulting from the care of such patients. Many potential terrorists do not fit a preconceived picture of a criminal. Many have been known to live and work within the community for years before carrying out an actual attack. Disgruntled employees or patients may also be persons who may carry out acts of violence.

For this reason, security of hazardous materials, including RMW, constitutes an essential component in protecting employees, students, the public, and the environment.

Packages containing hazardous materials should be properly identified and accounted for at all times. Hazardous materials must never be left unsecured. Materials are considered secure if they are in the possession of a trained "hazmat" employee or secured within a controlled, locked area. Control measures include:

- Don't prop open doors to areas where hazardous materials are stored or used.
- Account for and secure keys and access codes. Don't leave them unattended or give to unauthorized persons.
- Report lost keys.
- Secure all areas when not attended.
- Be aware of unfamiliar persons or visitors.
- Report tampering with doors, locks, etc.
- Avoid discussions with strangers about the storage location and shipment dates of hazardous materials.
- Report any missing hazardous materials to Management immediately

Recognition of dubious actions ranks as a primary guard in keeping hazardous materials secure. Examples of suspicious activities include:

- Observing a person monitoring or casing buildings or operations. The person may be taking pictures or notes, using binoculars, drawing maps, or collecting information by other means.
- People in buildings or areas who do not appear to be conducting legitimate business (loitering, etc.)
- Unauthorized personnel in restricted, sensitive or private areas.
- Repeatedly seeing an unknown vehicle in a sensitive area without an explanation.
- Noticing repetitive suspicious activities by the same person or vehicle.
- Break-ins or noticing signs of attempted break-ins to sensitive areas.

2. Autoclave Procedures

An autoclave will only work if you use it properly and safely. There are potential physical and biological hazards associated with improper use, as well as the potential for contamination of the research being performed and damage of the equipment. Follow these procedures to minimize these hazards.

1. If the autoclave has an Autoclave Use Log, complete it before every use of the autoclave.
2. If the autoclave is dirty, contact the previous user to clean the machine. DO NOT USE the autoclave until it is cleaned. Clean the drain strainer before loading the autoclave.
3. Place all items in a tub before autoclaving. Never place glassware or bags directly on the bottom or floor of the autoclave. Place items inside a heat resistant plastic tub that will sit on a shelf or rack. Ensure tubs are not cracked.
4. Do not overfill the tubs. Nothing should hang over the edges or be tall enough to touch the top or sides of the autoclave. Overloading may lead to the center of the load not getting sterilized properly.
5. Place tubs in the center of the autoclave. It is important to allow the steam to circulate freely throughout the chamber.
6. Never autoclave a sealed container of liquids. Before loading containers of liquids into the autoclave, the caps must be loosened to ensure proper sterilization and to avoid having the bottles shatter during pressurization or when the container is opened.
7. Add a quarter- to a half-inch of water to a tub of empty bottles that are to be autoclaved. This will allow the bottles will heat more evenly.
8. For solid waste, do not pack the bags too full; bags packed to capacity with biohazardous waste will not be properly decontaminated.Add one cup of water to each bag of solid waste and keep the bags open. Polypropylene biohazard bags are impervious to steam.
9. Do not load non-autoclavable plastic materials into the autoclave. They will melt and cause damage to the autoclave.
10. Make sure the door of the autoclave is properly closed before starting the cycle.
11. Know the contents of the bags being placed in the autoclave in order to know which cycle to use, then use the proper cycle. Do not use a gravity cycle for liquid nor a liquid cycle for solids. Use of the wrong cycle can cause improper sterilization or spillage.
12. Be sure you know what you are doing if you want to adjust the temperature or run time. Increasing the temperature can melt trays or containers. Decreasing the temperature or run time can impair the sterilization procedure. Most re-set programs can accomplish what you need without adjusting the time or temperature.
13. Do not override an autoclave's built-in safety control features under any circumstance.
14. Do not abort a run just because you are in a hurry and want the cycle to finish faster. Aborting of cycles can cause the sterilizer to jam if it happens often, requiring a service call to get the autoclave running again.
15. Wait a full five to ten minutes before removing items after the completion of a run. If the autoclave load contains dry glassware wait five minutes and ten minutes if the load contains liquids.

16. Wear heat-resistant gloves when first opening the door after a run. When removing items from the autoclave, wear a rubber apron in addition to rubber sleeve protectors, heat resistant mitts and a face shield.
17. Let glassware cool for 15 minutes before touching it with ungloved hands.
18. Let liquid loads stand in an out-of-the-way place for a full hour before touching with ungloved hands. With liquid loads, be alert for a bottle still bubbling.
19. Close the autoclave door after each use.

3. Autoclave Sterilization Validation

Sterilization failure can result from a number of factors including improper loading, insufficient time and/or temperature, or equipment failure. Therefore, it is important to ensure that complete sterilization of biomedical waste has occurred prior to disposal. The use of a biological indicator is the most reliable method for this determination.

It is recommended that spore strips inoculated with *Bacillus stearothermophilus* and *Bacillus subtilis* or other suitable and reliable biological indicator be used at least once per week to monitor the adequacy of sterilizer performance. Some commercial spore strips have a color change indicator. This color change does not indicate that sterility was achieved, only that minimal process parameters were attained. Do not rely on this color change to ensure sterilization.

Place the spore strips in the middle or most inaccessible portion of the autoclave load, preferably inside a filled biohazardous waste bag. One way to be able to safely remove the strip from the load after autoclaving is to place a fresh spore strip inside a glass screw cap tube. Tie a string around the neck of the tube. Bury the tube in the center of the load as you build it. Thread the string out of the top of the bag. After the cycle is completed, you can pull on the string to retrieve the spore strip for incubation.

Process and incubate the spore strips according to manufacturer or vendor procedures. If the processed spore strips indicate microbiological growth, first try increasing the run time or ensuring the waste is properly loaded. If growth still occurs with run times of 45 minutes or more, the autoclave may need maintenance or repair. Notify your appropriate support service as soon as possible and do not use the autoclave until it has been repaired. Notify others who may use the equipment as well.

This concludes the Bloodborne Pathogen Training Training Course. You are now ready to take the quiz for this lesson.

Bloodborne Pathogens Quiz 3

Alcohol-based hand rubs are acceptable for use:

- a. between every patient regardless of the type of care provided.
- b. when hands are not visibly dirty, contaminated with proteinaceous material, or visibly soiled with blood.

- [ ] c. before eating and after using a restroom.
- [ ] d. after removing intact gloves.
- [ ] e. b. and d. only.

Biomedical waste is collected by putting it in:

- [ ] a. yellow plastic bags and trash cans.
- [ ] b. clear plastic bags and the dumpster.
- [ ] c. red or biohazard labeled plastic bags, boxes or sharps containers.
- [ ] d. white trash cans and the dumpster.

When shipping biomedical/regulated medical waste with a vendor, any container or bag is acceptable.

- [ ] a. True
- [ ] b. False

Only persons trained in the DOT shipping requirements for regulated medical waste may sign shipment manifests.

- [ ] a. True
- [ ] b. False

Please sign and turn into manager upon completion:

I have read and have had amble opportunity to have a supervisor or manager answer any questions that I may have had regarding Universal Precautions and Bloodborne Pathogens. I understand the presented material and will use this knowledge in my daily duties at Foot Healthcare Associates.

Print Name

Signature Date
