

UNIVERSITY of PENNSYLVANIA



EXPOSURE CONTROL PLAN

**Office of Environmental Health and Radiation Safety
(EHRS)**

3160 Chestnut Street, Suite 400 / 6287

215-898-4453

www.ehrs.upenn.edu

ehrs@ehrs.upenn.edu

TABLE OF CONTENTS

I.	Introduction	4
II.	Bloodborne Pathogens Exposure Control Plan	4
	A. Definitions	5
	B. Exposure Determination	6
	C. Implementation Schedule and Compliance Methods	6
	1. Implementation Schedule	6
	2. Compliance Methods	6
	a. Standard Precautions	6
	b. Engineering & Work Practice Controls	6
	1) Engineering controls	7
	i. Biological safety cabinets	7
	ii. Sharps containers	7
	iii. Mechanical pipetting devices	7
	iv. Sharps with engineered sharps injury protection and needleless systems	7
	v. Splash guards & plastic backed absorbent pads	7
	vi. Sealed rotor heads & centrifuge cups	7
	2) Work practice controls	7
	i. Handwashing	7
	ii. Sharps/ needles	8
	iii. Work area restrictions	8
	iv. Specimen handling & transport	8
	v. Contaminated equipment	9
	vi. Personal protective equipment	9
	vii. Cleaning	10
	viii. Decontamination	11
	ix. Infectious waste disposal	11
	x. Laundry	11
	xi. Labeling and signs	11
	c. Medical Surveillance	11
	1) Hepatitis B vaccine	12
	2) Post-exposure evaluation and follow-up	12
	3) Interaction with healthcare professional	13
	d. Evaluative Measures	13
	e. Information and Training	13
	1) Training	13
	2) Recordkeeping	14
	3) Dates	14
	f. HIV/HBV Research Laboratories	14
	Appendix A	
	Job classifications in which all employees may be expected to incur occupational exposure to blood or other potentially infectious material	15
	Appendix B	
	Job classifications in which some employees <u>may</u> have occupational exposure to blood or other potentially infectious materials	17
	Appendix C	
	To be completed by the <i>PRINCIPAL INVESTIGATOR/AREA SUPERVISOR</i>	19
	Appendix D	
	Tuberculosis Infection Control Plan	22
	Appendix E	
	Post-exposure Evaluation Form	26
	Appendix F	
	Evaluative Recommendations	27
	Appendix G	
	Program for the Evaluation of Devices with Engineered Sharps Injury Protection	28

UNIVERSITY of PENNSYLVANIA EXPOSURE CONTROL PLAN

I. Introduction

Certain job activities at the University of Pennsylvania may result in occupational exposure to human blood and other body fluids that have the potential for carrying infectious agents. The Exposure Control Plan describes mechanisms for compliance with the Occupational Safety and Health Administration (OSHA) standard, "[Occupational Exposure to Bloodborne Pathogens; Final Rule](#)", 29 CFR Part 1910.1030, rev. 2001, (<http://www.osha-slc.gov/needlesticks/needlesticks-regtxtrev.html>), to ensure worker safety and environmental protection.

Tuberculosis

In 1994, the Centers for Disease Control and Prevention (CDC) published the "[Guidelines for preventing the Transmission of *Mycobacterium tuberculosis* In Health-Care Settings, 1994](#)". The guidelines made specific recommendations for reducing the risk of transmitting *Mycobacterium tuberculosis* (<http://www.hc-sc.gc.ca/pphb-dgsp/msds-ftss/msds103e.html>) in healthcare settings as a result of the increase of tuberculosis outbreaks in the United States during the mid-1980s and early 1990s. They contain specific information on ventilation requirements, respiratory protection, medical surveillance and training for those personnel who are considered at risk for exposure to tuberculosis in the workplace.

In December 2005, the guidelines were reevaluated and changes were made. The "[Guidelines for preventing the Transmission of *Mycobacterium tuberculosis* In Health-Care Settings, 2005](#)" were made available highlighting specific changes from the previous guidelines. Recommendations are summarized in Appendix D of this plan. ***If employees are at-risk of exposure to tuberculosis, the PRINCIPAL INVESTIGATOR/AREA SUPERVISOR must review the recommendations in Appendix D and ensure that they are in effect in their area.***

Investigators intending to work with *Mycobacterium tuberculosis* in the laboratory must obtain written approval from EHRS **before** beginning work. Propagation and manipulation of *Mycobacterium tuberculosis* cultures must be performed at Biosafety Level 3. A complete description of Biosafety Level 3 may be found in the [University's Biological Safety Manual](#) (http://www.ehrs.upenn.edu/programs/bio/bio_manual.html)

For more information consult the [CDC's TB Facts for Health Care Workers](#) (<http://www.cdc.gov/nchstp/tb/faqs/tbfacts/default.html>) or call EHRS at 215-898-4453.

Bloodborne Pathogens

In accordance with the OSHA Bloodborne Pathogens standard, 29 CFR 1910.1030, rev. 2001, the University of Pennsylvania developed an exposure control plan to minimize occupational exposure to bloodborne pathogens such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV). ***The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR must complete bold italicized portions of this plan (see Appendix C) and make the completed plan accessible to all employees who work with human blood, blood products or other potentially infectious materials in their area.***

Copies of this plan are available at the EHRS web site (www.ehrs.upenn.edu) or from:

**EHRS
Suite 400
3160 Chestnut Street/6287
215- 898- 4453**

II. Bloodborne Pathogens Exposure Control Plan

The following plan establishes practices and procedures for employees who work with human blood and

other potentially infectious materials:

A. Definitions

Blood- human blood, human blood components and products made from human blood. Human blood components include plasma, platelets and serosanguinous fluids (e.g., wound exudates).

Bloodborne pathogens- any pathogenic microorganisms that may be present in human blood and can cause human disease. These pathogens include but are not limited to HIV and HBV. Other bloodborne pathogens include agents of hepatitis C, malaria, syphilis, babesiosis, brucellosis, leptospirosis, arboviral infections, relapsing fever, Creutzfeld-Jakob disease, Human T-lymphotrophic Virus type I and viral hemorrhagic fever.

Contaminated- the presence or reasonably anticipated presence of blood or other potentially infectious materials on any item or surface.

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 and the surface or item is rendered safe for handling, use or disposal.

Employee- any permanent or temporary employee, graduate or undergraduate student that receives a University paycheck and could potentially be exposed to bloodborne pathogens in the course of their work.

Engineering controls- controls (e.g. sharps disposal containers, self-sheathing needles) that isolate or remove the bloodborne pathogens hazard from the workplace.

Exposure incident- a specific eye, mouth, other mucous membrane, non-intact skin or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties. Non-intact skin includes skin with dermatitis, hangnails, abrasions, chafing, etc.

Hand washing facilities- a facility providing potable water, soap and single use towels or hot air drying machines.

Occupational exposure- reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

Other potentially infectious materials- (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

Needleless systems- a device that does not use needles for (1) the collection of bodily fluids or withdrawal of body fluids after initial venous or arterial access is established; (2) the administration of medication or fluids; or (3) any other procedure involving the potential for occupational exposure to bloodborne pathogens due to percutaneous injuries from contaminated sharps.

Parenteral- piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts and abrasions.

Personal protective equipment- specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes (e.g., uniforms, pants, shirts) not intended to function as protection against a hazard are not considered to be personal protective equipment.

Regulated waste- liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.

Sharpⁱ with engineered sharps injury protection- a non-needle sharp or a needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident.

Source individual- any individual, living or dead, whose blood or other potentially infectious materials may be a source of occupational exposure to the employee.

ⁱ **Sharps** are devices/items having corners, edges, or projections capable of cutting or piercing the skin. This includes hypodermic needles, syringes (with or without the attached needle), pasteur pipettes, scalpel blades, blood vials, needles with attached tubing, culture dishes, suture needles, slides, cover slips and other broken or unbroken glass or plasticware. Sharps must be managed in accordance with the [EHRS Laboratory Sharps Waste Management Procedure](http://www.ehrs.upenn.edu/resources/waste/bio/usedsharps.html) (<http://www.ehrs.upenn.edu/resources/waste/bio/usedsharps.html>).

Standard precautionsⁱⁱ (formerly universal precautions)- an approach to infection control in which all human blood and human body fluids, secretions and excretions except sweat are treated as if they are infected with HIV, HBV and other bloodborne pathogens.

Work practice controls- controls that reduce the likelihood of exposure by altering the manner in which a task is performed (e.g., prohibiting recapping of needles by a two-handed technique).

B. Exposure Determination

OSHA requires employers to determine which employees may incur occupational exposure to blood or other potentially infectious materials. The exposure determination is made without regard to the use of personal protective equipment (i.e. employees are considered to be exposed even if they wear personal protective equipment). This exposure determination is required to list all job classifications in which all employees may be expected to incur such occupational exposure, regardless of frequency. At PENN the following job classifications are in this category:

(SEE Appendix A)

In addition, OSHA requires a listing of job classifications in which some employees may have occupational exposure. Not all employees in this category would be expected to incur exposure to blood or other potentially infectious materials. Therefore, to clearly understand which employees in this category are considered to have occupational exposure, specific tasks or procedures that may cause occupational exposure in each job classification must be listed. The job classifications for this category are as follows:

(SEE Appendix B)

The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR must complete Appendix C, #1 and #2, as follows:

#1. The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR shall identify additional job classifications in their area in which employees are exposed if they are not listed in Appendix A or B. This assessment will be made without accounting for the use of personal protective equipment.

#2. For those jobs classifications in which some employees may have occupational exposure to blood or bloodborne pathogens (Appendix B), the PRINCIPAL INVESTIGATOR/AREA SUPERVISOR will list those associated tasks or procedures that would cause employees to have potential occupational exposure.

C. Implementation Schedule and Compliance Methods

1. The following is PENN's implementation schedule:

Exposure Control Plan	May 5, 1992
Communication of Hazard (training, signs and labels)	June 4, 1992
Record keeping (medical and training)	June 4, 1992
Methods of Compliance	July 6, 1992
Hepatitis B Immunization, post exposure evaluation and follow-up	July 6, 1992
HIV/HBV Research Labs (Facility Criteria, Animal Facility Criteria, and Special Criteria)	July 6, 1992
Additional training	June 4, 1992
Needlestick and Other Sharps Injuries, Final Rule	July 18, 2001

2. Compliance Methods

a. Standard Precautions, formerly called **Universal Precautions,** (<http://www.cdc.gov/ncidod/hip/Blood/UNIVERSA.HTM>) will be observed in order to prevent contact with blood or other potentially infectious materials. Employees shall practice standard precautions and be trained in decontamination techniques *prior* to handling any blood or other potentially infectious materials. All blood or other potentially infectious materials will be considered infectious regardless of the perceived status of the source individual.

ⁱⁱ In 1996 the Centers for Disease Control and Prevention replaced "universal precautions" with "standard precautions". See "Guideline for Isolation Precautions in Hospitals", JS Garner et al, Inf. Cont & Hosp. Epid., Vol. 17, No.1, p 53-80, Jan., 1996.

b. **Engineering and work practice controls** will be utilized to eliminate or minimize exposure to employees at this facility. Additional information on engineering and work practice controls may be found in the [University's Biological Safety Manual](http://www.ehrs.upenn.edu/programs/bio/bio_manual.html), available at the EHRS web site (http://www.ehrs.upenn.edu/programs/bio/bio_manual.html) or from EHRS. Personal protective equipment will be utilized to further reduce occupational exposure.

1) The following **engineering controls** will be utilized:

i. **Biological safety cabinets**

(<http://www.ehrs.upenn.edu/programs/bio/cleanbench.html>) provide containment of infectious aerosols; isolate the operator from the agent; protect other personnel in the room. Cabinets must be certified annually or whenever moved. Contact EHRS (ehrs@ehrs.upenn.edu) for assistance with cabinet selection and proper placement in the laboratory.

ii. **Sharps containers** must be used for disposal of all needles, syringes and other sharps. Disposable sharps shall be separated from reusable sharps at the time of their disposal. All sharps shall be placed in an appropriate sharps container immediately or as soon as possible after use. Place sharps containers as near to procedure area as possible.

Sharps containers must be non-breakable, puncture resistant, leak proof, sealable and labeled with the universal biohazard symbol. Filled sharps containers will be removed for decontamination and cleaning by designated personnel in each department. Sharps containers must be replaced periodically when they are 2/3-3/4 full. For more details, consult the [EHRS Laboratory Sharps Waste Management Procedure](http://www.ehrs.upenn.edu/resources/waste/bio/usedsharps.html) (<http://www.ehrs.upenn.edu/resources/waste/bio/usedsharps.html>).

Reusable syringes and needles and other sharps must be placed in a *separate* container filled with disinfectant prior to decontamination and cleaning. To eliminate sorting later, do not place reusable sharps in pans containing pipettes or other glassware.

iii. **Mechanical pipetting devices** must be used. Mouth pipetting is prohibited.

iv. **Sharps with engineered sharps injury protection and needleless systems** are recommended. University personnel evaluate devices for effectiveness in reducing the risk of exposure incidents. Contact EHRS at (215) 898-4453, refer to the [Safety Engineered Sharps Evaluation Program](http://www.ehrs.upenn.edu/programs/bio/sharps.html) at the EHRS website (<http://www.ehrs.upenn.edu/programs/bio/sharps.html>), and/or see Appendix G of this Exposure Control Plan for more information.

v. **Splash guards and plastic backed absorbent pads** must be used to contain the spread of blood and potentially infectious material in the laboratory.

vi. **Sealed rotor heads and centrifuge cups** are used to avoid accidental spills and are an integral part of routine centrifuge operation.

The above controls will be examined and maintained on a regular schedule. **The schedule for reviewing the effectiveness of engineering controls is the responsibility of the PRINCIPAL INVESTIGATOR/AREA SUPERVISOR.** Contaminated equipment (biosafety cabinets, mechanical pipetting devices, splash guards, etc.) must be decontaminated at the end of the workday or after a spill.

2) **Work practice controls** are modifications of work procedures to reduce the likelihood of occupational exposure to blood or other potentially infectious materials. At PENN the following **work practice controls** will be utilized:

i. **Hand washing:** Hand washing facilities must be readily accessible to all

employees who incur exposure to blood or other potentially infectious materials. Hand washing facilities are located in laboratories and clinical areas.

If hand washing facilities are not readily available, the *PRINCIPAL INVESTIGATOR/AREA SUPERVISOR* is required to provide either an antiseptic cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. If these alternatives are used then the hands are to be washed with soap and running water as soon as feasible. The "CDC Guidelines for Hand Hygiene" can be found at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5116a1.htm>

After removal of personal protective gloves, employees shall wash hands & any other potentially contaminated skin areas immediately or as soon as feasible with soap & water.

If employees incur exposure to their skin or mucous membranes, those areas shall be washed or flushed with water as appropriate as soon as feasible following contact.

- ii. **Sharps/Needles:** Contaminated needles and other contaminated sharps will not be bent, recapped, removed, sheared or purposely broken. If a medical procedure requires that the contaminated needle be recapped or removed and no alternative is feasible, the recapping or removal of the needle must be done by the use of a mechanical device or a one-handed scoop method. Contact EHRS (ehrs@ehrs.upenn.edu) for alternative methods. Mixed waste sharps contaminated with carcinogens or mutagens must be separated from other sharps. These sharps must be discarded in an approved sharps container, labeled "**Carcinogen Contaminated Sharps / Do Not Autoclave**" and removed with other autoclaved infectious waste.

Sharps contaminated with radionuclides must be separated from other sharps.

All sharps must be discarded in an approved sharps container in accordance with guidelines described in the [EHRS Laboratory Sharps Waste Management Procedure](http://www.ehrs.upenn.edu/resources/waste/bio/usedsharps.html) (<http://www.ehrs.upenn.edu/resources/waste/bio/usedsharps.html>).

- iii. **Work Area Restrictions:** In work areas where there is a reasonable likelihood of exposure to blood or other potentially infectious materials, employees shall not eat, drink, apply cosmetics or lip balm, smoke, or handle contact lenses. Food and beverages are not to be kept in refrigerators, freezers, shelves, cabinets, or on counter tops or bench tops where blood or other potentially infectious materials are present.

Mouth pipetting / suctioning of potentially infectious materials is prohibited.

All procedures will be conducted in a manner that will minimize splashing, spraying, splattering, and generation of droplets of blood or other potentially infectious materials. ***The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR is responsible for identifying methods that will be employed in their areas. (Complete Appendix C, # 3.)***

- iv. **Specimen Handling and Transport:** Blood or other potentially infectious materials will be placed in a container that prevents leakage during the collection, handling, processing, storage, and transport of the specimen.

The container used for this purpose will be labeled or color coded in accordance with the requirements of the OSHA bloodborne pathogens standard and will be closed prior to handling. In order to qualify for an exemption to this requirement, standard precautions shall be practiced in the handling of all specimens. This exemption shall apply only while specimens remain at PENN.

Any specimens that could puncture a primary container will be placed within a puncture-resistant secondary container. ***The PRINCIPAL INVESTIGATOR/ AREA SUPERVISOR shall specify how this will be carried out, i.e. which***

specimens, if any, could puncture a primary container, which containers may be used as secondary containers and where the secondary containers are located in their area. (Complete Appendix C, # 4.)

If outside contamination of the primary container occurs, the primary container shall be placed within a secondary container which prevents leakage during the handling, processing, storage, transport, or shipping of the infectious agent (which are considered Dangerous Goods).

All shippers of infectious material must attend biennial training to fulfill regulatory requirements. For details, call EHRS at (215) 898-4453 or consult the [EHRS website](http://www.ehrs.upenn.edu/programs/bio/transporting.html) (<http://www.ehrs.upenn.edu/programs/bio/transporting.html>).

- v. **Contaminated Equipment:** Equipment which has become contaminated with blood or other potentially infectious materials shall be examined prior to servicing or shipping and shall be decontaminated as necessary unless the decontamination of the equipment is not feasible.

The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR shall list any equipment that cannot be decontaminated prior to servicing or shipping. (Complete Appendix C, # 5.)

The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR must contact the shipper or service provider to obtain their labeling requirements prior to shipping or servicing of contaminated equipment.

- vi. **Personal Protective Equipment:** [OSHA standard 29 CFR 1910.132](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9777&p_text_version=FALSE) (http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9777&p_text_version=FALSE) requires workplace assessment for potential hazards and mandates that employers provide appropriate personal protective equipment (PPE) for employees. Investigators or area supervisors are responsible to perform the assessments and to select and train employees in the use of routine items such as lab coats, protective gloves, safety glasses, face shields, etc. Investigators or area supervisors must consult with EHRS for assistance with the selection and training of employees for the use of non-routine PPE such as respirators.

Personal protective equipment shall be provided without cost to all employees who are at risk of occupational exposure to bloodborne pathogens. Personal protective equipment will be chosen based on the anticipated exposure to blood or other potentially infectious materials. The protective equipment will be considered appropriate only if it does not permit blood or other potentially infectious materials to pass through or reach the employees' clothing, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time that the protective equipment will be used.

Personal protective equipment includes but is not limited to: gloves, surgical gowns, laboratory coats and jackets, face shields, masks, protective eyewear with solid side shields and shoe covers.

The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR will ensure that personal protective equipment is provided and worn by employees as needed and that training in the proper wearing and use of such equipment is provided.

The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR will list how personal protective equipment will be provided, i.e., its location and/or who has responsibility for its distribution. (Complete Appendix C, # 6a.)

All personal protective equipment will be cleaned, laundered, and disposed of by the employer at no cost to employees. **Soiled personal protective equipment must not be taken home to launder.** The employer will make all repairs and replacements at no cost to employees.

All garments that are penetrated by blood shall be removed immediately or as soon as feasible. All personal protective equipment will be removed prior to leaving the work area.

The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR shall list where employees are expected to place the personal protective equipment upon leaving the work area. (Complete Appendix C, # 6b.)

- a) **Gloves:** Gloves shall be worn where it is reasonably anticipated that employees may have hand contact with blood, other potentially infectious materials, non-intact skin and mucous membranes, and when handling or touching contaminated items or surfaces. Routine gloving is required for all phlebotomies. EHRS recommends the use of nitrile, powder-free latex or latex-free products to help prevent latex allergy. More information on [latex allergy](http://www.ehrs.upenn.edu/programs/occupat/latex_allergy.html) can be found at the EHRS website (http://www.ehrs.upenn.edu/programs/occupat/latex_allergy.html).

The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR will list the procedures in their areas that require the use of gloves. (Complete Appendix C, # 7a.)

Disposable gloves are not to be washed or decontaminated for re-use and are to be replaced as soon as practical when they become contaminated or as soon as feasible if they are torn, punctured, or when their ability to function as a barrier is compromised.

Utility gloves may be decontaminated for re-use provided that the integrity of the glove is not compromised. Utility gloves will be discarded if they are cracked, peeling, torn, punctured, or exhibit other signs of deterioration or when their ability to function as a barrier is compromised.

- b) **Masks:** Masks in combination with eye protection devices, such as goggles or glasses with solid side shields, or chin length face shields, are required to be worn whenever splashes, spray, splatter, or droplets of blood or other potentially infectious materials may be generated and eye, nose, or mouth contamination can reasonably be anticipated.

If work requires the use of a respirator, employees must participate in the [University's respiratory protection program](http://www.ehrs.upenn.edu/programs/occupat/upennresp.html) (<http://www.ehrs.upenn.edu/programs/occupat/upennresp.html>). Personnel must have prior medical clearance to wear a respirator and must consult with EHRS on the selection and use of respiratory protective equipment.

The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR will list situations in their areas that require such protection. (Complete Appendix C, # 7b.)

- c) **Protective clothing:** Appropriate protective clothing shall be used, such as lab coats, gowns, aprons, clinic jackets, or similar outer garments. Disposable water-repellent overgowns shall be worn when contamination with blood or other potentially infectious materials is anticipated.

The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR will list situations that require the use of such protective clothing. (Complete Appendix C, # 7c.)

- vii. **Cleaning:** The facility will be cleaned according to PENN Facilities Services schedule. **The PRINCIPAL INVESTIGATOR/ AREA SUPERVISOR shall ensure that the laboratory is maintained in a clean and sanitary fashion.**

- viii. **Decontamination:** Establishing decontamination procedures is the

responsibility of the *PRINCIPAL INVESTIGATOR/AREA SUPERVISOR*. A 1:10 (for a high organic load e.g. blood spill) or 1:100 dilution (for surface decontamination) of household bleach made fresh daily is recommended for use in most circumstances. For further assistance in selecting an appropriate disinfectant, contact EHRS (ehrs@ehrs.upenn.edu).

All contaminated work surfaces will be decontaminated:

- after completion of procedures.
- immediately or as soon as feasible after any spill of blood or other potentially infectious materials.
- at the end of the workday if the surface may have become contaminated since the last cleaning.

Contaminated plastic backed absorbent pads shall be removed immediately or as soon as feasible after any spill of blood or other potentially infectious materials as well as at the end of the workday.

All bins, pails, cans, and similar receptacles shall be inspected and decontaminated according to a schedule to be determined by the facility manager of each school.

Any broken glassware which may be contaminated must not be picked up directly with bare or gloved hands. It must be removed by mechanical means such as tongs and/or dustpans and broom and placed in an appropriate infectious waste sharps container.

Lab personnel must be prepared to respond to spills of potentially infectious materials in their areas. [Biohazardous spill response procedures](http://www.ehrs.upenn.edu/emergency/bio.html) are available at the EHRS website (<http://www.ehrs.upenn.edu/emergency/bio.html>).

The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR will describe the procedure to be used for decontamination and spill cleanup. (Complete Appendix C, #8.)

ix. Infectious Waste: Infectious waste shall be placed in appropriate infectious waste containers located in laboratories or clinical areas. All infectious waste from laboratories must be autoclaved prior to disposal. Contact the facility manager or EHRS for waste disposal information specific to your area. For more [information on infectious waste](http://www.ehrs.upenn.edu/resources/waste/bio/default.html), consult the EHRS web site (<http://www.ehrs.upenn.edu/resources/waste/bio/default.html>).

x. Laundry Procedures: Apparel contaminated with blood or other potentially infectious materials will be handled as little as possible. Such apparel will be decontaminated, preferably by autoclaving, before it is sent to a laundry for cleaning. Such apparel will not be sorted or rinsed in the area of use.

All employees who handle contaminated apparel will utilize personal protective equipment to prevent contact w/ blood or other potentially infectious materials.

xi. Labeling and Signs:

a) Labels: Biohazard warning labels shall be attached to containers of regulated waste, refrigerators and freezers containing blood or other potentially infectious materials, lab equipment in which biohazards are stored or used (e.g. incubators, centrifuges, etc.), and other containers used to transport or ship blood or other potentially infectious materials.

Labels shall:

- 1) include the universal biohazard symbol.
- 2) be fluorescent orange or orange-red or predominantly so with lettering or symbols in a contrasting color.
- 3) red bags or containers may be substituted for labels.



- b) **Signs:** Biohazard warning signs shall be posted at the entrance to HIV/HBV research laboratories and other work areas in which biohazards are used. Contact EHRS to [request a room sign](http://www.ehrs.upenn.edu/programs/labsafety/chp/appendixi.html) (<http://www.ehrs.upenn.edu/programs/labsafety/chp/appendixi.html>).

c. **Medical Surveillance**

In accordance with the [Health Insurance Portability and Accountability Act](http://www.hhs.gov/ocr/hipaa/) or HIPAA (<http://www.hhs.gov/ocr/hipaa/>), effective April 14, 2003, all patient-related medical information will be kept confidential.

- 1) **Hepatitis B Vaccine:** The PRINCIPAL INVESTIGATOR/AREA SUPERVISOR will ensure that all employees who have been identified as having exposure to blood or other potentially infectious materials are offered the Hepatitis B vaccine, at no cost to the employee. The vaccine will be offered within 10 working days of their initial assignment to work involving the potential for occupational exposure to blood or other potentially infectious materials.

The vaccine will be administered to the employee by or under a licensed physician or under supervision of another licensed health care professional. It will be made available to the employee during normal work hours at a reasonable time. Occupational Medicine administers the vaccine at:

**Occupational Medicine (Immunization)
Silverstein Pavilion, ground floor
Hospital of the University of Pennsylvania (HUP)
University of Pennsylvania Medical Center (UPMC)
34th and Spruce Streets
215-662-2354
Monday, Wednesday, Friday 7:30 a.m. - 7:30 p.m.
Tuesday & Thursday 7:30 a.m. – 3:45 p.m.**

Employees who decline the Hepatitis B vaccine will be asked to sign a Declination waiver that uses the following wording:

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

A copy of the [Hepatitis B Declination waiver](http://www.ehrs.upenn.edu/programs/bio/declination.html) can be found on the EHRS web site (<http://www.ehrs.upenn.edu/programs/bio/declination.html>) The vaccine will be provided at no cost to employees who initially decline the vaccine but later wish to receive it. (changed order of sentences)

- 2) **Post-Exposure Evaluation and Follow-Up:** When an employee incurs an exposure, it should be reported to the PRINCIPAL INVESTIGATOR/ AREA SUPERVISOR and EHRS at 215-898-4453.

All employees who incur an exposure will be offered post-exposure evaluation and follow-up in accordance with the OSHA Bloodborne Pathogens Standard. When an employee incurs an exposure, he/she should report to:

**Occupational Medicine
Silverstein Pavilion, first floor**

HUP/UPMC
34th and Spruce Street
Monday through Friday 8:00 a.m. – 3:30 p.m.

All other times report to:

Emergency Department
Silverstein Pavilion, ground floor
HUP/UPMC

The evaluation and follow-up will include the following under the direction of the director of Occupational Medicine:

- Documentation of the route of exposure and the circumstances related to the incident.
- If possible, the identification of the source individual and, if possible, the status of the source individual. The blood of the source individual will be tested (**after consent is obtained by the *PRINCIPAL INVESTIGATOR/ AREA SUPERVISOR***) for HIV/HBV infectivity.
- Results of testing of the source individual will be made available to the exposed employee along with information about the applicable laws and regulations concerning disclosure of the identity and infectivity of the source individual.
- The employee will be offered the option of having blood collected for testing of his/her HIV/HBV serological status. The blood sampling will be preserved for at least 90 days to allow the employee to decide if the blood should be tested for HIV serological status. However, if the employee decides prior to that time that testing will be conducted then the blood sample will be discarded after the results are obtained.
- The employee will be offered post exposure prophylaxis in accordance with the current recommendations of the U.S. Public Health Service (USPHS). For a copy of these recommendations, call EHRs at 215-898-4453.
- The employee will be given appropriate counseling concerning precautions to take during the period after the exposure incident. The employee will also be given information on potential signs and symptoms of illness and told to report these to Occupational Medicine, should they occur.
- Medical records will be obtained and kept in accordance with all applicable regulations.

3) Interaction with Health Care Professional: The health care provider shall provide EHRs with a written opinion within 15 days after the exposed employee has been evaluated. Written opinions will be obtained in the following instances:

- i) when the employee is sent to obtain the Hepatitis B vaccine.
- ii) whenever the employee is sent to a health care professional following an exposure incident.

Health care professionals shall be instructed to limit their opinions to:

- i) whether the Hepatitis B vaccine is indicated and if the employee has received the vaccine,
- ii) that the employee has been informed of the results of the evaluation, and
- iii) that the employee has been told about any medical conditions resulting from exposure to blood or other potentially infectious materials.

The written opinion to the employer must not reference any personal medical information.

d. Evaluative Measures

EHRs shall solicit input from employees who are exposed due to a needlestick or percutaneous injury. In accordance with HIPAA, all patient-related medical information will be kept confidential. As part of the University program to develop safer alternative work practices associated with exposure, injury evaluation results and recommendations will be made available in the [Exposure Control Plan, Appendix F](http://www.ehrs.upenn.edu/programs/bio/ecp/appendixf.html) (<http://www.ehrs.upenn.edu/programs/bio/ecp/appendixf.html>).

e. Information and Training

- 1) **Training:** Training for all employees potentially at-risk will be conducted *prior* to initial assignment to tasks where occupational exposure to human source materials or other potential infectious materials may occur. Training will be conducted by EHRS. Interactive and web-based training modules, videotapes, slides and written materials are used. Additional [information about training](http://www.ehrs.upenn.edu/training/index.html) is available at the EHRS web site (<http://www.ehrs.upenn.edu/training/index.html>).

Training for employees will include the following:

- Details of the OSHA standard, "Occupational Exposure to Bloodborne Pathogens".
- Epidemiology, symptomatology and mode of transmission of bloodborne diseases.
- This Exposure Control Plan, i.e., points of the plan, lines of responsibility, how the plan will be implemented, etc.
- Procedures that might cause exposure to blood or other potentially infectious materials.
- Methods used to control exposure to blood or other potentially infectious materials.
- Personal protective equipment available and who should be contacted concerning its provision, replacement and laundering.
- Post-exposure evaluation and follow-up.
- Signs and labels.
- Hepatitis B vaccine program.

Employees will receive annual refresher training, which will be conducted within one year of the employee's previous training.

ADDITIONAL TRAINING REQUIRED FOR EMPLOYEES WHO WORK IN HIV/HBV RESEARCH LABORATORIES WILL BE PROVIDED BY *PRINCIPAL INVESTIGATORS/AREA SUPERVISORS* IN CONSULTATION WITH EHRS.

The outline for training material is located at the:

EHRS
3160 Chestnut Street, Suite 400
Philadelphia, PA 19104-6287
215-898-4453

A copy of the OSHA standard "[Occupational Exposure to Bloodborne Pathogens](http://www.osha-slc.gov/needlesticks/needlesticks-regtxtrev.html)" may be obtained from the OSHA web site (<http://www.osha-slc.gov/needlesticks/needlesticks-regtxtrev.html>) or by calling EHRS at 215-898-4453.

2) Record keeping

All training records required by the OSHA standard will be maintained by the:

EHRS
3160 Chestnut Street, Suite 600
Philadelphia, PA 19104-8287

Medical records will be maintained by:

Occupational Medicine,
Silverstein Pavilion, first floor
HUP/UPMC, 34th and Spruce Streets
Philadelphia, PA 19104-4283

3) Dates

All provisions required by the Occupational Exposure to Bloodborne Pathogens Standard, rev. 2001, will be implemented by July 18, 2001.

f. HIV/HBV Research Laboratories

The ***PRINCIPAL INVESTIGATOR/AREA SUPERVISOR*** shall consult with EHRS for a description of applicable criteria and additional training required for employees who

work in HIV/HBV research laboratories.

Appendix A

Job classifications in which all employees may be expected to incur occupational exposure to blood or other potentially infectious materials:

ASST COACH A
ASST COACH FOOTBALL
ASST COACH M & W SWIMMING
ASST COACH M BASKETBALL
ASST COACH M TRACK & FIELD
ASST COACH MEN'S CREW
ASST COACH MEN'S LACROSSE
ASST COACH MEN'S SWIMMING
ASST COACH STRNGTH/FITNS
ASST COACH W BASKETBALL
ASST COACH W GOLF
ASST COACH W TRACK & FIELD
ASST COACH W VOLLEYBALL
ASST COACH WOMEN LACROSSE
ASST COACH WOMEN'S CREW
ASST COACH WRESTLING
ASST COACH/ATHLETIC_ADMIN
ASSC DIR EV HTH & RAD SAF
ASSOC DIR STUD HEALTH
ASSOC DIRECTOR IHGT
ATHLETIC TRAINER
CAPTAIN UNIV POLICE
CHIEF OF POLICE
CLINICAL SPECIALIST
COORDNTR CLINICAL RESRCH
CPUP CLINICAL POSITION
CPUP CLINICAL POSITION E
DENTAL ASSISTANT A
DENTAL ASSISTANT B
DENTAL ASSISTANT C
DEPUTY CHIEF UNIV POLICE
DETECTIVE
DETECTIVE SERGEANT
DIR CLINICAL PRACTICE
DIR DENTAL CARE CENTER
DIR ENVIR HLTH & RAD SAF
DIR STUDENT HEALTH SERV
DIRECTOR CLINICAL TRIALS
ENVRMTL HLTH & SFTY SPEC
EMBALMER
HEAD COACH BASEBALL
HEAD COACH FIELD HOCKEY
HEAD COACH FOOTBALL
HEAD COACH M & W FENCING
HEAD COACH M & W SWIMMING
HEAD COACH M BASKETBALL
HEAD COACH M TRACK & FIELD
HEAD COACH MEN'S CREW
HEAD COACH MEN'S FENCING
HEAD COACH MEN'S LACROSSE
HEAD COACH MEN'S SOCCER
HEAD COACH MEN'S SQUASH
HEAD COACH MEN'S SWIMMING
HEAD COACH MEN'S TENNIS
HEAD COACH SOFTBALL
HEAD COACH W GYMNASTICS
HEAD COACH W LACROSSE
HEAD COACH W TRACK & FIELD
HEAD COACH W VOLLEYBALL
HEAD COACH W BASKETBALL
HEAD COACH WOMEN'S CREW
HEAD COACH WOMEN'S SOCCER
HEAD COACH WOMEN'S SQUASH
HEAD COACH WOMEN'S TENNIS
HEAD COACH WRESTLING
HEALTH PHYSICS TECH
HEALTH PHYSICS TECH SR
HEALTH PHYSICS TECH TRAIN
INDUSTRIAL HYGIENIST
INDUSTRIAL HYGIENIST SR
INSPECTOR SAFETY
INST BIOSAFETY OFF
INTERNAL MEDICAL
MAINTENANCE MECH
MECH MAINTENANCE SR
MED HEALTH PHYSICIST JR
MED PHYS/DIR DOSMTRY SERV
MEDICAL HEALTH PHYS SR
MEDICAL HEALTH PHYSICIST
MEDICAL PHYSICIST
MEDICAL PHYSICIST SR
MGR CAMPUS MAINTENANCE
MGR FIRE & OCCUPTNL SAFTY
MGR SPORTS MED/HD TR
NURSE A
NURSE ASSISTANT
NURSE B
NURSE PRACTITIONER
NURSE SUPERVISOR
NURSE, LICENSED PRACTICAL
OCCUPATIONAL THERAPIST
PARAMEDIC
PHARMACIST
PHARMACY ASSISTANT A
PHARMACY ASSISTANT B
PHYSICIANS ASSISTANT
SAFETY OFF BIOLOG SR
SAFETY OFFICER BIO
SAFETY SPECIALIST
SERGEANT UNIV POLICE
STAFF DENTIST
STAFF PHYSICIAN
SUPERVISOR DENTAL
SUPV CLINICAL LAB (CERT)
SUPV DETECTIVES
TEACHER CHILDREN'S CTR
TECH AUTOPSY
TECH CLINICAL A
TECH CLINICAL B
TECH DENTAL
TECH HEALTH & SAFETY
TECH HISTOLOGY
TECH HISTOLOGY SR
TECH MRI
TECH OPHTHALM C
TECH OPHTHALMIC A

TECH OPHTHALM B
TECH PSG SLEEP CENTER
TECH REGISTERED PSG
TECH SLEEP CENTER
TECH CYTOGENETICS
TECHNOLOGIST MEDICAL
TECHNOLOGIST NUCLEAR
TECHNOLOGIST PET

TECHNOLOGIST PET SR
TECHNOLOGIST RADIOLOG
TEMP LAB ASSIST
TEMP LAB TECH
TEMP MED AIDE
TEMP RESEARCH ASST
UNIV POLICE CORPORAL
UNIVERSITY POLICE

Appendix B

Job classifications in which some employees may have occupational exposure, regardless of frequency, especially those in the following Schools/Departments: Dental Medicine, Medicine, Biology, Bioengineering:

ADMIN ASST A, B	MANAGER FACILITIES
AIRCONDNG REFRIG MECH	MANAGER ULAR
APPRENTICE	MED OFFICE ASST
ASSC DIR ATHLETICS SR	MGR ATHLETIC EQUIPMENT
ASSISTANT MANAGER A, B, C	MGR RES PROJECT A, B, C
ASSOC DIR FACILITIES	MGR SPORTS MED/HD TR
ASSOC DIR LAB ANIM HUSB	NURSE VET A
ASSOC DIR RESIDENCE	OFFC ADMNST ASST A, B
ASSOC DIR UTILITIES & ENG	OFFENSIVE COORD FOOTBALL
ASSOC DIRECTOR A, B, C, D, E	OUTREACH WORKER
ASSOC VP/CAMPUS SVCS	PART TIME PROFESSIONAL
ASSOC VICE PROV/UNIV LIFE	PLUMBER
ASST COACH A, B, C	PHYSICAL THERAPIST
ASST COACH/ATHLETIC ADMIN	PLUMBER
ASST FACILITIES MANAGER	RECEPTIONIST A, B
ASST SUPV CUSTODIAL (NBC)	RECEPTIONIST CLINICAL
ASST SUPV LARGE ANIMAL	RECREATION ASSISTANT
ASST VICE PROV RESEARCH	RECREATION THER/ACT DIR
ATHLETIC CREW RIGGER	REGULAR PART TIME EMP
ATTENDANT LARGE ANIMAL A, B, C	RESEARCH ADMINISTRATOR SR
AVP FACILITIES OPERATIONS	RESEARCH COORDINATOR
BLDG ADMINISTRATOR	RESEARCH COORDINATOR SR
BLDG ADMINISTRATOR SENIOR	RESEARCH INVESTIGATOR SR
BLDG OPER MANAGER	RESEARCH SPECIALIST A, B, C, D
CAREGIVER	SECRETARY TECH MED
CARETAKER	SERVICE MECHANIC
CARPENTER	SERVICES ASSISTANT A, B, C, D
COORDINATOR A, B	SPORTS MEDICINE TECH A
COORDINATOR LABS	SPORTS MEDICINE TECH B
COORDNTR INSTRUCTION LABS	SPORTS MEDICINE TECH C
COORDNTR REC/ATHLETICS	SPORTS MEDICINE D
CUSTODIAN	STAFF ASSISTANT A, B, C
DEFENSIVE COORD FOOTBALL	STAFF RESEARCHER A, B
DIR ANIMAL CARE OPS	STAFF VET
DIR ANIMAL MODELS CORE	STERILIZATION ATTEND SR
DIR ANIMAL SERVICE IHGT	STERILIZATION ATTENDANT
DIR CHILDRENS CTR	SUPERVISOR EXEMPT A, B
DIR DIV LAB ANIMAL MED	SUPERVISOR NON EXEMPT
DIR FACILITIES SERVICES	SUPERVISOR SERVICES
DIR FIRE & EMERGENCY SVCS	SUPERVISOR TECH
DIR INST NEUROLOG SCI	SUPV ATTNDNT LG ANIMAL
DIR INSTITUTIONAL RESRCH	SUPV CAMPUS MAINTENANCE
DIR INTERCOLG ATHLETICS	SUPV LAB ANIMAL
DIR RECREATION	SUPV NURSING VET
DIR SPECIAL SERVICES	SUPV VET ANESTH
ELECTRICIAN	TECH ASST LAB ANIMAL
ELECTRICAL OPERATOR	TECH INSTRUMENTATION
ENGR PRESSURE CHAMBER	TECH LAB ANIMAL
EXEC DIR PENN CANCER CNTR	TECH MECHANICAL
FACILITIES MANAGER A	TECH PRESSURE CHAMBER
FACILITIES PLANNER	TECH PSYCHOLOGY
FARM SUPERVISOR	TECH RESEARCH LAB A, B, C
FARM WORKER	TECH TRAINING SPEC
FILTERPERSON	TECH TRAINING SPEC SR
HELPER	TECH ULTRASOUND
INSTRUMNT STERIL ATTN A, B	TECH ULTRASOUND SR
LAB ANIMAL ASSISTANT	TECH VET A, B, C, D
LAB SERVICES ASST A, B, C, D	TECH VET ANESTH

TECH VET ANESTH SR
TECH VET ANESTH TRN
TECH VET IMAGING A, B, C
TECH VET OR
TECH VET OR SR
TECH VET SR
TECH VET TRAINEE
TECH X-RAY
TECH X-RAY SR
TECHNLGIST LAB ANIMAL
VET NURSE ASST A, B
VET NURSE B
VET TECH A
VET TECH ANESTHESIA A
VET TECH ANESTHESIA B
VET TECH ANESTHESIA C
VET TECH ANESTHESIA D
VET TECH EMERG SVCS A
VET TECH EMERG SVCS B
VET TECH EMERG SVCS C
VET TECH EMERG SVCS D
VET TECH ICU A

VET TECH ICU B
VET TECH ICU C
VET TECH ICU D
VET TECH IMAGING A
VET TECH IMAGING B
VET TECH IMAGING C
VET TECH IMAGING D
VET TECH OR A
VET TECH OR B
VET TECH OR C
VET TECH OR D
VET TECH TRAINEE
VET TECH WARD A
VET TECH WARD B
VET TECH WARD C
VET TECH WARD D
VET TECH WARD/ICU A
VET TECH WARD/ICU B
VET TECH WARD/ICU C
VET TECH WARD/ICU D
VETERINARY HEAD NURSE

Appendix C

To be completed by the **PRINCIPAL INVESTIGATOR/AREA SUPERVISOR:**

1. List additional job classifications not listed in Appendices A or B in which employees may have occupational exposure to blood or bloodborne pathogens. This assessment will be made without regard for the use of personal protective equipment. (See p. 4 of the Exposure Control Plan.)

2. For those job classifications in which some employees may have occupational exposure to blood or bloodborne pathogens, list those associated tasks or procedures that would cause employees to have potential occupational exposure. (See p. 4 of the Exposure Control Plan.)

3. Identify methods that will be employed to minimize splashing, spraying, splattering and generation of blood or other potentially infectious materials. (See p. 6 of the Exposure Control Plan.)

4. Specify which specimens, if any, could puncture a primary container, which containers to use as secondary containers and where secondary containers are located. (See pp. 6-7 of the Exposure Control Plan.)

7. c. List situations that require the use of protective clothing (lab coats, gowns, aprons, clinic jackets, etc.). (See p. 8 of the Exposure Control Plan.)

8. Describe the procedure to be used for decontamination and spill cleanup. (See pp. 8-9 of the Exposure Control Plan.)

Appendix D

Tuberculosis (TB) Infection Control Plan

This document makes recommendations for reducing the risk of transmitting *Mycobacterium tuberculosis* (*M. tuberculosis*) to healthcare workers (HCWs), patients, volunteers, visitors, and others in University healthcare settings. Designated personnel (PRINCIPAL INVESTIGATORS / AREA SUPERVISORS) are responsible to conduct a risk assessment for their area to determine the risk for nosocomial or occupational transmission of *M. tuberculosis* and implement an appropriate TB infection control plan.

HCWs refers to all paid and unpaid persons working in healthcare settings who have the potential for exposure to *M. tuberculosis*. This may include but is not limited to: physicians, dentists, nurses, aides, dental workers, technicians, workers in laboratories and morgues, emergency medical personnel, students, part-time personnel, temporary staff not employed by the University, and persons not directly involved in patient care but who are potentially at risk for occupational exposure to *M. tuberculosis* (e.g. volunteer workers and dietary, housekeeping, maintenance, clerical and janitorial staff).

TB Screening Protocol

I. Introduction to TB

TB is a disease caused by a bacterium, *M tuberculosis*. TB is spread primarily by airborne droplets coughed up from the lungs of persons with active disease. Once inhaled, the organisms establish infection in the lungs and then disseminate throughout the body before the immune response brings the primary infection under control. Most infected persons have no symptoms of disease. Following infection a small percentage of individuals will develop symptoms. About ten percent of persons who become infected will develop an active case of TB during their lifetimes.

The risk of developing active disease is enhanced by a number of factors, including HIV infection, pharmacologic immunosuppression (e.g. cyclosporin, steroids), underlying medical conditions such as diabetes mellitus and sudden weight loss.

For decades the prevalence of TB in the United States was declining. In the mid 1980's, however, the number of TB cases increased, fueled by the development of the epidemic of HIV infection in this country. Those areas seeing the largest caseloads of HIV infection are the same areas experiencing the largest increases in TB cases. In 1992 pulmonary TB was made an AIDS-defining illness. In 1993 the number of cases of TB in this country decreased from the previous year. This decline may be due to reporting of TB cases as AIDS-defining illnesses, rather than reporting through TB control channels or to greater success in having patients complete a course of treatment.

II. The prevalence of TB in this region

Between 1989 and 1992 Philadelphia saw a forty percent increase in the number of cases of pulmonary TB; however, TB has declined by nearly half in subsequent years. One hundred forty-seven cases were reported in 2002. Philadelphia accounts for approximately 40% of Pennsylvania's total case in 2002.

The statewide rate of TB is approximately 3.1 cases per 100,000 population. This is lower than the national rate of 8.0 cases per 100,000 population. Philadelphia County, in contrast, has a case rate of 9.7 per 100,000, although there are segments of the community with much higher rates.

In the mid-1980s and early 1990s there was an increase in the prevalence of multi-drug resistant (MDR) TB in the United States. Like the trend in cases overall, the trend in MDR cases has been reversed as well. MDR-TB was never very prevalent in Philadelphia or in Pennsylvania despite a substantial occurrence of this phenomenon in nearby jurisdictions such as New Jersey and New York City. In recent years less than one percent of newly diagnosed cases of TB in Philadelphia have been MDR. However, nearly eight percent of the cases in Philadelphia are resistant to Isoniazid, an important drug in the arsenal against TB. This level of Isoniazid resistance

indicates that the potential for multi-drug resistance still exists. The inability to use first line drugs makes treatment for TB more complicated and of longer duration. In areas where the level of Isoniazid resistance exceeds 4%, four-drug initial therapy is necessary.

III. Risk assessment

It is important to realize that TB is spread most exclusively from patients who have pulmonary infection and who cough infectious organisms into the air, which may be inhaled by others. Rarely, a person with a soft tissue TB infection may spread organisms through aerosols from drainage at their infected site. Workers in front line positions involved in patient contact may encounter TB among individuals who have not yet been diagnosed. Personnel with outpatient contact should be aware of this problem. Laboratory personnel who handle the organism, *M. tuberculosis*, may also be at risk. An ongoing employee tuberculin screening program is available to monitor healthcare workers who may be at risk of becoming occupationally infected with tuberculosis.

IV. TB control measures

TB control involves a hierarchy of interventions. Those interventions are:

- 1) administrative controls
- 2) source control
- 3) environmental controls
- 4) personal protective equipment.

Administrative Controls

Administrative controls include the education of staff and development of policies and practices for the rapid identification and isolation of individuals suspect of having tuberculosis.

Management Of Patients To Prevent TB Exposures

1. Rapid identification, isolation of the patient and initiation of treatment is the best way to control tuberculosis and prevent its spread.
2. Professional staff should be aware of the presence of a cough in patients. Any patient complaining of a cough should be questioned regarding symptoms and risk factors for tuberculosis. Any individual suspected of having tuberculosis on the basis of symptoms described or on the basis of chest x-ray findings should be immediately given a mask to wear. The patient should be referred to their personal healthcare provider, HUP's Emergency Room or walk-in clinic for more careful evaluation as soon as possible. If an isolation room is available the suspect patient should be placed in a closed room and all health care workers entering the room should wear appropriate respiratory protection.
3. If a patient has a productive cough of more than two weeks duration a mask should be placed on the patient. Patients at particular risk of TB include those on immunosuppressive medications (e.g. cyclosporin, steroids), HIV infected persons, persons born in countries with high endemic rates of TB, alcoholics and those with kidney failure, pulmonary disease and other conditions.
4. If a cough is not identified by questioning or evaluation proceed with the appropriate workup for the patient.

Source Control

Source control is a very important aspect of TB control. The "source" is the coughing patient with active pulmonary or laryngeal TB. The ultimate means of source control is to have a patient with active TB successfully complete a course of therapy. It is now recommended that all patients with TB receive directly observed therapy, which involves the observed administration of all of a patient's medication. Factors such as homelessness, substance abuse, psychiatric disorders, as well as other problems may impair the patient's ability to complete therapy. It should be noted that tuberculosis medications are provided free by county health departments in the

Commonwealth of Pennsylvania. Therefore, inability to pay for medication should not be a factor in non-compliance with taking anti-TB medications. Attempts should be made to identify other factors that may interfere with a patient's ability to take proper medication.

While waiting for anti-TB therapy to take effect, the source control can be effected by having a patient wear a mask or simply cover his/her mouth while coughing. The mask may be a paper surgical mask. Patients known or suspected to have TB should be restricted in their movements in University treatment facilities.

Environmental Controls

Environmental controls are utilized to decontaminate the air in high-risk areas such as patient treatment rooms and treatment waiting rooms areas.

Treatment rooms must have negative air pressure to adjacent areas and a minimum of six air changes per hour in existing facilities. New facilities must have at least twelve air changes per hour in treatment areas. Negative pressure inside the treatment room permits air to be drawn into the room and prevents its escape to adjacent areas. This protects persons outside the room from exposure to infectious aerosols that may be generated inside the room by a patient with active TB. The room air is changed a minimum of six times each hour and exhausted from the building without internal recirculation. Exhaust air must be subjected to HEPA filtration if it is to be recirculated. Doors and windows to the room must be kept closed in order to maintain the negative pressure gradient.

If the number of air changes noted above is not attainable, alternative methods, such as local HEPA filtration should be considered. Contact the EHRS at 215-898-4453 for assistance in evaluating the ventilation requirements of your facility.

Respiratory Protection

The last line of defense against the spread of TB is the use of personal protective equipment. Respiratory devices are employed to prevent the inhalation of infectious droplets. They should be used in situations where the patient has not yet received sufficient treatment to be rendered non-infectious and when environmental controls may not provide adequate protection.

Appropriate respiratory protection must be provided at no cost to staff that are at-risk. Before wearing a respirator, personnel must:

- 1) Go to Occupational Medicine at HUP for medical evaluation.
- 2) Contact EHRS (215-898-4453) for training in respirator selection, fit testing and use.

V. What to do in the event of an exposure

If you believe you have been exposed to TB in the course of your duties at the University, you should discuss this with your supervisor for possible referral to the Occupational Medicine for TB screening. EHRS investigates occupational exposures to TB to determine if there have been any unprotected exposures. In instances of unprotected exposure, the exposed individuals are identified by EHRS and instructed to report to Occupational Medicine & Health Service for testing. Individuals who become infected with TB (develop a positive skin test reaction) following an exposure are not able to transmit TB unless they develop an active case of TB. Students who are exposed in the course of their studies should be evaluated in Student Health (215-662-2850).

VI. Screening of employees for TB

Every employee who is at-risk of occupational exposure to TB must be screened on an annual basis. Persons working in high exposure areas or occupations should be screened twice yearly.

The program of tuberculin screening is administered by Occupational Medicine at the University of Pennsylvania Medical Center (215-662-2354).

Should an employee be found to have a positive skin test for TB, further evaluation will be necessary, including, if needed, a chest radiograph. If the tuberculin skin test is positive,

preventive medicine may be indicated to reduce the risk of developing active disease. A decision whether to take the medicine should be made in conjunction with advice provided by Occupational Medicine and the employee's personal physician. Standard guidelines from the American Thoracic Society are employed in the decision to recommend prophylaxis following TB infectionⁱⁱⁱ.

VII. Individual Responsibilities

- a. Responsibilities of the primary University health care provider:
 - 1) Prompt referral of patients suspected or proven to have active pulmonary TB.
 - 2) Notification of EHRS of any potential exposure of employees to TB.
- b. Responsibilities of EHRS:
 - 1) Training University personnel who may be at-risk of occupational exposure to TB.
 - 2) Training and fit-testing of personnel who may require respiratory protection.
 - 3) Ensuring appropriate referral of employees suspected of having occupational exposure to a patient with active pulmonary TB or when an unsuspected TB exposure episode has occurred.
 - 4) Development of "contact" lists when an exposure episode has occurred, so that Occupational Medicine may perform appropriate screening.
- c. Responsibilities of the Occupational Medicine:
 - 1) Periodic (at least annually) screening of at-risk University employees for TB.
 - 2) Screening of University personnel following an unsuspected TB exposure episode.
 - 3) Maintenance of centralized medical records allowing employee tracking.
 - 4) Notification of EHRS if any University employee is found to have active TB.
- d. Responsibilities of Student Health Services:
 - 1) Pre-admission screening of University students for TB.
 - 2) Screening of University students following an unsuspected TB exposure episode.
 - 3) Maintenance of centralized medical records allowing student tracking.
 - 4) Notification of EHRS if any University student is found to have active TB.

VIII. Important Telephone Numbers

Should you have questions about TB control, please call the telephone numbers listed below for additional information.

Office of Environmental Health and Radiation Safety	215-898-4453
Occupational Medicine	215-662-2354
Student Health Service	215-662-2850

Appendix E

University of Pennsylvania

ⁱⁱⁱ American Thoracic Society. Treatment of Tuberculosis and Tuberculosis Infection in Adults and Children. *Am J Respir Crit Care Med* Vol 149. pp 1349-1374, 1994.
EHRS Update August 2007

Environmental Health and Radiation Safety

Post Exposure Evaluation Form
Needlestick and/or Other Sharp Object Injuries

Instructions: Complete this form to assist the University develop safer alternative work practices associated with needlesticks or other sharps injuries. Keep a copy of this form for your records. Return the completed form to EHRS, Suite 400, 3160 Chestnut Street/ 6287 or by FAX: 215-898-0140.

Employee Information:

Name: _____	PENN ID #: _____
Position/Title: _____	School/Department: _____
Mailing Address: _____	Mail Code: _____
Telephone: _____	FAX: _____
E-mail: _____	Emergency Telephone: _____
Principal Investigator: _____	Telephone: _____

Injury Information:

Date and time of injury: _____ Body Part Injured (specific): _____
Location where injury occurred (specific laboratory room, clinical area, etc.): _____
What type of Personal Protective Equipment (PPE) were you wearing at the time of the exposure incident?
 lab coat gloves safety glasses other, specify: _____

Procedure being performed at time of injury: _____
Describe how the incident occurred: _____

Device Information:

Identify Sharp Involved (if known): _____
Type: _____ Brand: _____ Model: _____
Did the sharps have engineered sharps injury protection? Yes No Don't know
Was the protective mechanism activated? Yes No Don't know
When did the exposure incident occur?
 Before activation During activation After Activation

Do you have an opinion that any other engineering control, administrative or work practice could have prevented the injury? Yes No Don't know
Describe: _____

Appendix F

Evaluative Recommendations

EHRHS collects information from employees who have had an exposure to potentially infectious materials. EHRHS has evaluated the information and presents the following recommendations:

Handling Trash Bags – EHRHS investigated several incidents of housekeeper injuries during trash bag removal from University spaces due to improperly discarded sharps. University policy mandates the disposal of sharp items in a rigid sharps container to prevent any accidental injury. Complete [guidelines for the management of all sharps](http://www.ehrs.upenn.edu/resources/waste/bio/usedsharps.html) are available at the EHRHS website (<http://www.ehrs.upenn.edu/resources/waste/bio/usedsharps.html>).

When handling trash bags, it is recommended that housekeepers take precautions to prevent injury should sharps have been discarded improperly. Housekeepers should not compress trash bags nor remove trash bags if they notice improperly discarded sharps in the trash. The trash should be left in the area and the area housekeeping supervisor informed of the mismanaged materials. The housekeeping supervisor should contact EHRHS and a biosafety officer will discuss the matter with the laboratory supervisor.

Removing Scalpel Blades - Improper handling of scalpel blades creates a safety hazard to the user. Use mechanical means (forceps, pliers, etc.) to remove a scalpel blade from the instrument handle whenever possible. Should mechanical means be unavailable, disinfect the instrument before attempting to remove the blade. Disposable scalpels with engineered sharps injury protection are strongly recommended.

Handling of Butterfly Needles - Several injuries occurred while handling butterfly needles in both the clinical and research settings. Problems arise when disposing of these items in sharps containers, due to additional tubing and adaptor parts associated with this device. Use special care when placing butterfly needles in sharps containers. If a sharps container is used primarily for butterfly needles, choose a sharps container with a wide opening to help resolve the problem. Disposable butterfly needles with engineered sharps injury protection are highly recommended.

Needlestick Injuries While Handling Animals - Several percutaneous injuries occurred as result of unexpected erratic movements by animal subjects. When handling needles and research animals, be sure the animal is properly restrained and/or tranquilized. Whenever possible, use syringes with engineered sharps injury protection.

Familiarity With New Products - Everyday new products enter the marketplace. Depending on factors such as price, convenience, safety-engineering and the natural progress of technology, they are adopted by individuals who may be unaware of the techniques needed to handle these devices properly. Splashes to mucous membranes and percutaneous injuries have occurred because of this unfamiliarity with a newly introduced device. EHRHS highly recommends that individuals become familiar with newly introduced products before using them in situations involving human source material, biohazardous materials, and other hazardous substances. Practicing with a non-hazardous substitution helps hone one's technique and raises awareness of the limitations of the item.

Appendix G

University of Pennsylvania's Program for the Evaluation of Devices with Engineered Sharps Injury Protection

Occupational Safety and Health Administration OSHA announced changes to the [Bloodborne Pathogens Standard 29 CFR Part 1910.1030](http://www.osha-slc.gov/needlesticks/needlesticks-regtxtrev.html), (http://www.osha-slc.gov/needlesticks/needlesticks-regtxtrev.html) effective April 18, 2001. [The Needlestick Safety and Prevention Act](http://www.med.virginia.edu/epinet/hr5178rv.html) (http://www.med.virginia.edu/epinet/hr5178rv.html), effective April 18, 2001 (http://www.med.virginia.edu/epinet/hr5178rv.html), mandated these changes, which require employers to 1) select safer needle devices as they become available and 2) involve employees in identifying and choosing the devices to help reduce needlestick injuries among healthcare workers and others who handle medical sharps.

Since the revision, EHRS has been recruiting participants to evaluate devices with engineered sharps injury protection, which are defined as a non-needle sharp or a needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident. Volunteers have substituted devices with engineered sharps injury protection for regular sharps in an effort to evaluate the effectiveness of these devices. The outcome of these evaluations will be made available to University employees in the University's Exposure Control Plan.

Many University of Pennsylvania personnel covered by the Bloodborne Pathogens Standard work in a research setting. EHRS has chosen the following safety engineered sharps devices to evaluate at this time because they are most commonly used and have documented associations with injuries in the research setting.

To review the results of non-managerial employee evaluations of safety-engineered sharps devices, you must verify your affiliation with the University of Pennsylvania* with a University email address. Email EHRS at biohazregdoc@ehrs.upenn.edu for copies of the results below.

Results of the evaluation of **safety-engineered scalpels**:

- Futura™ LARK® Safety Scalpel
- BD Bard-Parker Protected Disposable Scalpel™
- Personna Safety Scalpel®
- EHRS recommendations

Results of the evaluation of **safety-engineered butterfly needles**:

- BD Vacutainer® Safety-Lok™ Blood Collection Set
- Kendall Monoject Angel Wing™ Blood Collection Set
- VACU-8 Blood Collection System
- EHRS recommendations

Evaluation of **safety-engineered syringes**:

EHRS is currently searching for volunteers. Interested? Email biohazregdoc@ehrs.upenn.edu or go to the EHRS website (<http://www.ehrs.upenn.edu/programs/bio/sharps.html>).

* **DISCLAIMER**

The Office of Environmental Health and Radiation Safety (EHRS), on behalf of the University of Pennsylvania and its Health System, conducted these product evaluations as part of its compliance with the Needlestick Safety and Prevention Act and the related Bloodborne Pathogens Standards issued by OSHA. EHRS did not receive any consideration or compensation from any product manufacturer or distributor whose product(s) were evaluated. The recommendations and opinions expressed on these pages are the result of the information gathered from employees, and do not reflect any individual employee's recommendation or opinion, or a recommendation or opinion for any purpose other than compliance with the Needlestick Safety and Prevention Act and the related OSHA regulations.