

IUPUI

Bloodborne Pathogens Handbook



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I. Introduction

On December 6, 1991, the Occupational Safety and Health Administration (OSHA) promulgated a final rule entitled "Occupational Exposure to Bloodborne Pathogens". Indiana Occupational Safety and Health Administration (IOSHA), the governing body for occupational health and safety in Indiana, adopted the federal standard without change. The purpose of this standard is to eliminate or minimize occupational exposure to the Hepatitis B virus (HBV), the human immunodeficiency virus (HIV), and other bloodborne pathogens.

It has been well documented that employees with occupational exposure to blood and other potentially infectious materials containing bloodborne pathogens face a significant health risk. This risk can be minimized or eliminated using a combination of engineering and work practice controls, personal protective clothing and equipment, training, medical surveillance, Hepatitis B vaccination, warning signs and labels, and other provisions described in this handbook.

This handbook covers the basic provisions of the Bloodborne Pathogen Regulation. Specific details and operating procedures are provided in each department's *Exposure Control Plan*.

II. Sources of Bloodborne-Type Infections

Certain human-source fluids and materials are likely carriers of infectious viruses if the host is infected. A list of the most likely infectious materials follows:

- ❖ Blood
- ❖ Semen
- ❖ Vaginal Secretions
- ❖ Cerebrospinal Fluid
- ❖ Amniotic Fluid
- ❖ Synovial Fluid
- ❖ Pleural Fluid
- ❖ Peritoneal Fluid
- ❖ Pericardial Fluid
- ❖ Unfixed Human Body Tissue (other than intact skin)

Other body fluids are believed to possess little risk for carrying and transmitting pathogenic viruses. The following are not included as sources of bloodborne pathogens (unless they contain blood):

- ❖ Feces
- ❖ Urine
- ❖ Sweat
- ❖ Sputum
- ❖ Vomitus
- ❖ Nasal Secretions
- ❖ Tears
- ❖ Saliva (except in dental treatment)

III. Diseases Caused by Bloodborne Pathogen Infection

There are a number of bloodborne pathogens that cause disease. Hepatitis B virus (HBV) is the most common significant infection experienced by workers who are exposed to potentially infectious materials. The human immunodeficiency virus (HIV) which causes AIDS, is not occupationally transmitted as frequently, but it is deadly.

Although HIV and HBV are the primary concerns when dealing with potentially infectious material, other disease that can be transmitted in the same manner include the following:

- ❖ Hepatitis C
- ❖ Syphilis
- ❖ Brucellosis
- ❖ Leptospirosis
- ❖ Arboviral Infections
- ❖ Relapsing Fever
- ❖ Viral Hemorrhagic Fever
- ❖ Malaria
- ❖ Babesiosis
- ❖ Creutzfeldt-Jakob Disease
- ❖ Human T-lymphotropic Virus Type I

IV. Modes of Transmission

There are three ways in which a person can be infected in the workplace:

- ❖ Cutting, puncturing or piercing through the skin with any contaminated sharp item (such as a used needle, broken glass or human bite).
- ❖ Contact of infectious materials with existing skin cuts, abrasions or rashes.
- ❖ Splashing or spraying of infectious materials into unprotected eyes, nose or mouth.

There are other ways of transmitting bloodborne pathogens that are unrelated to the workplace. These other ways include the following:

- ❖ Sexual contact with an infected individual.
- ❖ From an infected mother to her newborn infant.
- ❖ Sharing contaminated needles by illegal drug users.
- ❖ Blood transfusions (very rare today due to the testing of donated blood).

V. Personal Protective Equipment

Personal protective equipment (PPE) includes items worn by an employee to provide a barrier between the worker and contaminated materials. PPE must be supplied by the employer at no cost to the employee. Appropriate sizes and types of equipment must be provided in the location where they need to be used. Each departmental *Exposure Control Plan* details the protective equipment required for each task in Appendix H.

Examples of the type of PPE used and some of their characteristics are as follows:

Gloves

- ❖ Type appropriate for the task.
- ❖ Available in appropriate sizes.
- ❖ Hypo-allergenic available if needed.

Eye and Face Protection

- ❖ Required when danger of splashing or spraying of infectious materials is anticipated.
- ❖ Safety glasses are the minimum protection, face shields and surgical-type masks may be required.

Clothing

- ❖ Fluid-resistant clothing must be worn if there is potential for splashing and soak through.
- ❖ All clothing (lab coats, scrubs) that is potentially contaminated with bloodborne pathogens must be laundered through IUPUI and not taken home for cleaning.

CPR/Resuscitation Equipment

- ❖ required for employees where job includes CPR or emergency treatment.
- ❖ one-way masks are required for mouth-to-mouth resuscitation.

NOTE: Potentially-contaminated PPE must be removed before leaving the area where it is used.

VI. Warning Signs and Labels

Biohazard warning signs and labels are used to notify all persons of the potential presence of infectious materials. These signs and labels are required to be fluorescent orange or orange-red with words and symbols in a contrasting color for bloodborne pathogens.

Hazard warning signs shall be posted at the entrance to work areas where research is being conducted with HIV, HBV or other infectious agents that cause disease. At IUPUI, it is recommended that laboratories that work with potentially infectious blood or body fluids post the biohazard warning information at the lab entry.

Biohazard labels are required for the following situations:

- ❖ Biowaste containers.
- ❖ Refrigerators/freezers used to store blood or other infectious materials.
- ❖ Containers for storing, transporting, or shipping blood or other infectious materials.
- ❖ Contaminated equipment requiring handling for service, repair or shipping.

VII. Engineering Controls

Engineering controls are devices which are designed to reduce the potential for contact between workers and potentially infectious materials. They work by removing the hazard from the work environment or isolating the worker from exposure to the hazard. Each departmental *Exposure Control Plan* details the engineering controls required for each task in Appendix F.

Examples of engineering controls used for protection against bloodborne pathogen infection include the following:

- ❖ Biological safety cabinets (laminar flow hoods)
- ❖ Sharps containers
- ❖ Self-sheathing needles
- ❖ Mechanical pipets
- ❖ Plexiglass splash shields

VIII. Work Practice Controls

Work practice controls involve altering the way a task is performed to reduce or eliminate exposure to potentially infectious material. Each departmental *Exposure Control Plan* details the work practice controls required for each task in Appendix G. Examples of work practice controls include the following:

- ❖ Prohibiting recapping of needles by a two-handed technique.
- ❖ Hand washing after contact with potentially infectious materials.
- ❖ Prohibiting eating, drinking and like activities in areas where potentially infectious materials are used or stored.
- ❖ Using methods that minimize splashing or spraying of potentially infectious materials.
- ❖ Using absorbent coverings for countertops and equipment to contain spills or splashes and to facilitate easier cleanup.

IX. Housekeeping, Decontamination and Spill Cleanup

All work areas where potentially infectious materials are used must be maintained in a clean and sanitary condition. All equipment and environmental and work surfaces must be cleaned and decontaminated according to procedures in Appendix I of the *Exposure Control Plan* at the following times:

- ❖ After completion of a procedure or set of procedures.
- ❖ When a surface is overtly contaminated.
- ❖ At the end of a work shift if surfaces may have been contaminated since the last cleaning.

The following steps shall be taken in cleaning up small (specimen-size, less than 100 ml or 4 oz.) spills of potentially infectious materials:

- ❖ Wear gloves (preferably heavy-duty rubber) and safety glasses during spill cleanup.
- ❖ If broken glass or other sharps are in the spilled material, pick up sharp items with tongs or other mechanical means and not with hands.
- ❖ Sprinkle dry chlorine compound on the spill to completely cover the spilled material.

- ❖ If dry chlorine compound is unavailable, absorb spill by placing paper towels on the spill. Apply a disinfectant, such as a 1:10 dilution of household bleach, onto the paper towels left in place.
- ❖ Remove the residue and/or soaked paper towels with clean paper towels.
- ❖ Apply a final application of disinfectant to spill area and clean up with paper towels.
- ❖ Dispose of all residue and paper towels in a biohazard waste bag.

Spills larger than those described above will be the responsibility of Environmental Health and Safety.

X. Regulated and Other Infectious Waste

Regulated infectious waste is waste that is capable of transmitting disease to those handling it. Examples of regulated waste, according to Indiana State regulation, include the following:

- ❖ Liquid or semi-liquid blood or other potentially infectious materials.
- ❖ Contaminated items capable of releasing blood or other contaminated materials if compressed.
- ❖ Items which are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling.
- ❖ Contaminated sharps.
- ❖ Human tissues.
- ❖ Infectious biological cultures or agent stock and associated biologicals.
- ❖ Contaminated animal carcasses, body parts and bedding.

In addition to those materials required to be treated as infectious waste, it is recommended that the following materials also be included in the infectious waste stream:

- ❖ Disposable gloves that are potentially contaminated.
- ❖ Surface or equipment protective coverings that are potentially contaminated.
- ❖ Bandages that have contacted blood or other body fluids.

XI. Containment and Disposal of Infectious Waste

Infectious waste must be divided into two waste streams: Sharp and non-sharp items. Non-sharp items, including disposable gloves, gowns and barrier materials, are disposed in an infectious waste bag. Sharp items are disposed in puncture-resistant sharps containers, typically constructed of heavy-duty plastics. **Sharps include items that are sharp in their original form or can become sharp on breaking or bending.** Sharps include the following:

- ❖ Syringes
- ❖ Needles
- ❖ Scalpels
- ❖ Pasteur Pipets
- ❖ Rigid Plastic Pipets
- ❖ Glassware

Infectious waste must be treated to eliminate its infectious properties prior to disposal. The primary treatment for infectious waste is autoclaving, a heat treatment for inactivating infectious materials. If there is an autoclave within the department or building, it can be treated on-site and marked "treated". Once infectious waste has been properly autoclaved and marked as such, it can be disposed as ordinary trash.

If there is no autoclave available for use within the department or building, contact Environmental Health and Safety for information on treatment and disposal of infectious waste.

Note: Although human blood is listed as a regulated infectious waste, it is allowed to be disposed in sink or sewer drains as long it is done carefully without splashing and is thoroughly washed down the drain with water. The sewage system and treatment plant provide appropriate treatment for this material.

XII. Exposure Incidents

An exposure incident occurs when a person has a type of contact with potentially infectious materials that can cause the transmission of disease. Exposure incidents require written reporting and medical follow-up. The three recognized modes of transmission of bloodborne pathogens that require medical treatment are:

- ❖ **Parenteral Exposure** - piercing, puncturing or cutting the skin with potentially-contaminated sharp items.
- ❖ **Exposure to Non-Intact Skin** - contact of potentially infectious material with cuts, rashes, abrasions or other breaks in the skin.
- ❖ **Mucous Membrane Exposure** - contact of eyes, nose or mouth with potentially infectious materials by splashing, spraying or touching.

The following steps should be followed when an exposure incident has occurred:

- ❖ Make the site bleed if there is a parenteral exposure.
- ❖ Wash the exposed area immediately and thoroughly.
- ❖ Removed soaked clothing, wash skin and put on clean, dry clothing.
- ❖ Report the incident to work supervisor.
- ❖ Complete an Incident Report - Include the name of the source individual, if known.
- ❖ Call 274-OUCH(6824) or page 12-OUCH to get information regarding the potential need for immediate medical treatment. Therapy is now available which can reduce the risk of HIV seroconversion if given within 2 hours after an exposure.
- ❖ Go to Occupational Health Services/Student Health Services (OHS/SHS) during normal work hours for a medical evaluation.

XIII. Hepatitis B Vaccination

While there is no vaccination for HIV or many other bloodborne pathogens, there is one available for Hepatitis B, the most frequent bloodborne viral infection transmitted in the workplace. The following provides important information relative to this vaccine program:

- ❖ No charge to the employee - employee's department pays the fee.
- ❖ Series of three injections over a 6-month period.
- ❖ Safe vaccine with no risk of contacting hepatitis or any other disease from the vaccine.
- ❖ Effective in over 95% of people who complete series.
- ❖ Booster shots for those who have completed the series in the past are not recommended by the CDC at this time.
- ❖ Voluntary - not required for employment but highly recommended.
- ❖ OHS/SHS Acceptance/Refusal Form - must be completed by all employees with potential exposure.

XIV. Other Biohazards

In addition to bloodborne pathogens, there are other pathogenic infectious agents that require safety considerations. Areas where potential exposure exists include laboratories, animal care facilities and patient care. The U.S. Department of Health and Human Services, through the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) divisions, has categorized many biohazardous agents according to their potential to cause harm to humans.

The CDC/NIH publication *Biosafety in Microbiological and Biomedical Laboratories* provides safety precautions for handling biohazards in laboratories and animal research facilities. It categorizes biohazardous agents into biosafety levels 1-4, with 4 as the most hazardous. Examples of common microbiological agents in each biosafety level are as follows:

Biosafety Level 1

Bacillus subtilis
Naegleria gruberi
Infectious canine hepatitis virus

Biosafety Level 2

Bloodborne pathogens
Toxoplasma spp.
Salmonella - all species
Chlamydia psittaci
Haemophilus ducreyi
Cytomegaloviruses
Adenoviruses (human)

Biosafety Level 3

Mycobacterium tuberculosis
Mycobacterium bovis
Histoplasma capsulatum (mold form)
Rickettsia (except *Vole rickettsia*)
Coxiella burnetii

Biosafety Level 4

Ebola fever virus
Lassa virus
Herpesvirus simiae (Monkey B virus)
Marburg virus

TELEPHONE NUMBERS

Environmental Health and Safety

Director - Rich Strong	274-1388
Environmental Manager (Hazardous and Infectious Wastes) - Kevin Mouser	274-4351
Industrial Hygiene/Lab Safety Manager John Beltz	274-2829
All Other Areas	274-2005

Other Safety/Health Areas

Radiation Safety Office	274-4797
Hospital Safety Office	274-0400
Infection Control	630-7475
Occupational Health Service/ Student Health Services	274-5887

Emergencies

Police	274-7911
Fire	274-2311
Emergency Medical Service	634-1313
Utilities	274-7609
Bloodborne Pathogen Information Line	274-OUCH
Bloodborne Pathogen Exposure - 24-hour pager	12-OUCH

LITERATURE REFERENCES

IUPUI/IUMC Bloodborne Pathogens - Exposure Control Plan, 1991 (Updated periodically).

Laboratory Safety - Principles and Practices, 2nd Ed., Fleming, D.O., Richardson, J.H., Tulis, J.J. and Vesley, D., ASM Press, Washington, D.C.

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DNA Science, A First Course in Recombinant DNA Technology, Micklos, D.A. and Freyer, G.A., Cold Spring Harbor Laboratory Press, 1990.

Guidelines for Research Involving Recombinant DNA Molecules (NIH Guidelines), U. S. Department of Health and Human Services, 1996 (updated periodically).

Guidelines for the Assessment of Bioaerosols in the Indoor Environment, American Conference of Governmental Industrial Hygienists, Cincinnati, OH., 1989.