

North Carolina Central University Bloodborne Pathogen Training

Fulfills initial and annual training requirement for
Bloodborne Pathogen Standard 29 CFR 1910.1030

Acronyms

- BBP – bloodborne pathogen
- LAI – lab associated infection
- OPIM- other potentially infectious materials
- OSHA – Occupational Safety and Health Administration
- PPE- personal protective equipment

OBJECTIVES

- Understand BBP Standard
- Define key terms associated with the Standard
- Understand hierarchy of controls
- Be able to choose appropriate PPE
- Recognize biohazard signage
- Be familiar with most common BBP
- Be familiar with information contained in Exposure Control Plan
- Understand exposure management and response

1987 PRE-CURSORS TO BBP STANDARD

- Universal precautions
 - Treat all human blood and OPIM as if infectious
 - Recommended use of barriers (gloves and face shields)
 - Safe handling of sharp medical devices
- Body substance isolation rules
 - All *moist* body substances handled as infectious
 - Expanded recommended PPE
 - Required puncture-proof rather than –resistant sharps containers

BBP STANDARD - 1991

- **Mandated** Universal Precautions
 - Treat all human blood and OPIM as if they were known to be infectious BBP
- Defined occupational exposure
 - Reasonably anticipated skin, eye, mucous membrane or parenteral contact with blood or OPIM that may result from performing job duties
- Requires employers to mitigate BBP risk
 - Exposure Control Plan
 - Hepatitis B vaccination
- 1996 Revision to BBP Standard
 - Universal Precautions changed to **Standard Precautions**
 - Combined Universal Precautions & Body Substance Isolation Rules



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EXPOSURE CONTROL PLAN

- Required by BBP Standard
 - Identifies tasks with exposure potential
 - Lists job descriptions with exposure potential
 - Defines methods of exposure control
 - Standard precautions
 - Engineering, administrative and PPE controls
 - Hepatitis B vaccination
 - Process for post-exposure evaluation and follow-up
 - Documentation and recordkeeping



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EXPOSURE CONTROL PLAN

- myeol.nccu.edu/sites/default/files/2020-06/NCCU-Exposure-Control-Plan.pdf
- Also under Forms at Documents at [EHS](#) site
- Required to review the NCCU Exposure Control Plan as part of this training

BLOODBORNE PATHOGEN RISKS

- Blood
 - Human blood or blood components
 - Products derived from or containing human blood
- Human-derived cell lines
- Unfixed tissues or organs
- Other potentially infectious materials (OPIM)
 - semen
 - vaginal secretions
 - cerebrospinal fluid
 - synovial fluid
 - pleural fluid
 - peritoneal fluid
 - amniotic fluid
 - saliva
 - Any body fluid visibly contaminated with blood



BBP TRANSMISSION

- Needle stick
- Entry through broken skin
- Mucous membranes
 - Mouth, nose, eyes
- BBP contamination of hands or items followed by transfer of biohazard to portal of entry

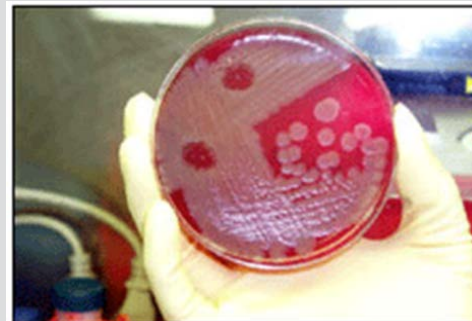


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NCCU BBP EXPOSURE RISKS

- Manipulating patient specimens
- Handling biological wastes
- Contaminated equipment or surfaces
- Medical/First aid activities
- Handling human derived cell lines
- Cleaning surfaces or handling waste contaminated by blood or OPIM



INFECTION RISK FACTORS

- Factors that impact risk of BBP infection
 - Individual health status
 - Concentration of pathogen
 - Infectious dose of pathogen
 - Virulence of pathogen



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BLOOD BORNE PATHOGENS

- According to the CDC there are 200+ BBP
- Most common BBP
 - Hepatitis B and C viruses (HBV, HCV)
 - Human immunodeficiency virus (HIV)
- Other BBP
 - Non-A hepatitis
 - *Treponema pallidum* (syphilis)
 - *Plasmodium* spp. (malaria)
 - *Brucella* spp.
 - Arboviruses (mosquito transmitted) – chikungunya, Zika
 - Hemorrhagic fever viruses - Ebola

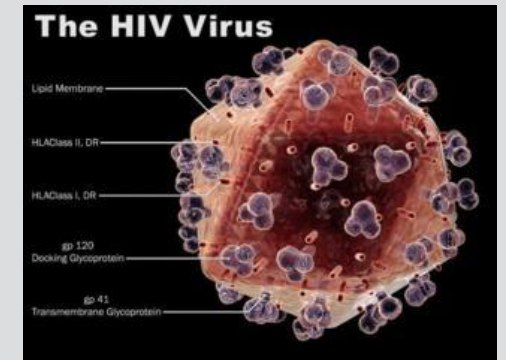


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HUMAN IMMUNODEFICIENCY VIRUS (HIV)

- Attacks and destroys immune cells
- Incubation is variable - can be years
- Signs/symptoms
 - Fatigue, fever, sore throat, lymphadenopathy, splenomegaly, rash, diarrhea, secondary infections, weight loss, dementia, psychosis
- 58 confirmed occupational HIV cases in US as of 2013
 - Only one confirmed case since 1999
- No vaccine
- Post exposure prophylaxis (PEP)
 - Begin as soon as possible after exposure (72 hours) and continue for 4 weeks
 - Regimen should contain 3 or more antiretroviral drugs



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HEPATITIS B VIRUS (HBV)

- Infects liver; can become chronic
- Most infectious of the BBP
- Incubation 4-25 weeks
- Signs/symptoms can appear 1-9 months post-exposure
 - Flu-like symptoms, dark urine, jaundice, abdominal pain, loss of appetite, nausea/vomiting
- Can survive for 1 week in dried blood on contaminated surfaces



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HEPATITIS B VACCINE

- Persons at NCCU with any risk of exposure to are offered the Hep B vaccination at hire
- Can request Hep B vaccine any time during employment
- Vaccine given in 3 doses



HEPATITIS C VIRUS (HCV)

- Acute or chronic infection of the liver
 - 75-85% of people develop chronic infection
- Most common chronic BBP in the US
- Incubation 2-25 weeks
- Symptom onset can take up to 20 years
- Signs/symptoms
 - Loss of appetite, nausea/vomiting, jaundice
- No vaccine available
- Infection with HCV **does not** guarantee protection
- Antiviral treatment is available

PREVENTING BBP EXPOSURES

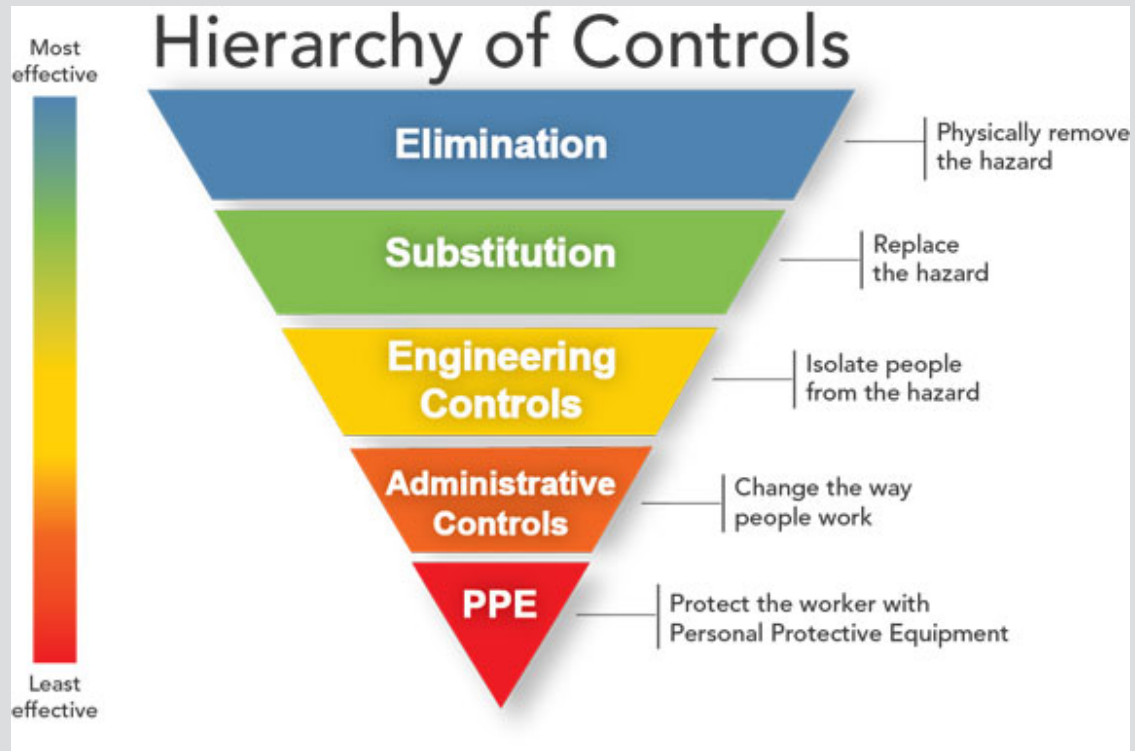


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HIERARCHY OF CONTROLS

- Determine effective & feasible risk mitigations
- In most laboratories, the most feasible and efficient mitigations are engineering controls



ENGINEERING CONTROLS

- Physically isolate personnel from hazard
- Examples
 - Directional airflow
 - Biosafety cabinets
 - Centrifuges with safety cups/rotors



ADMINISTRATIVE CONTROLS

- Policies and Standard-Operating-Procedures
- Exposure Control Plan
- Training



HANDWASHING

- Most effective administrative control
- Performed after removal of gloves
- Wash hands including all surfaces of hands and up to wrists
 - Wet hands with warm running water
 - Lather with soap and scrub between fingers, backs of hands and under nails for at least 20 seconds
 - Rinse and dry
 - Use a paper towel to turn off tap



SHARPS

- Used needles are not bent, broken, recapped, or re-sheathed by hand
- Needles are not removed from disposable syringes
- Needles and sharps are disposed of in dedicated sharps containers located near point of use



BIOHAZARD SIGNAGE AND LABELS

- Signage that bears the biohazard symbol is posted doors to areas where biohazards are present
- Biohazard labels are placed on
 - Biohazard waste containers
 - Storage vessels for biohazards
 - Containers used to store, transport or ship specimens
 - Potentially contaminated equipment



BIOHAZARD WASTE MANAGEMENT

- Biohazard waste should be collected in containers which are constructed to contain all contents and prevent leakage of fluids during handling, storage, or transport



SPILL RESPONSE

- Spills may occur when biohazardous materials with BBP risk are dropped/knocked over
- Biological spill procedures are trained to personnel with hazardous substance spill risk
- Biological spill materials/kits are present in all areas with biological spill risk



GENERAL HOUSEKEEPING

- Establish disinfection schedule for surfaces and equipment
- Wear appropriate PPE when cleaning
- Use proper disinfectant
 - <https://www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants>
- Observe appropriate contact time
 - Depends on disinfectant
- Clear surfaces of gross material using soap and water prior to applying disinfectant



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VISITORS

- Who is a visitor?
 - Anyone other than faculty, students, staff at NCCU who have been properly trained in hazards and mitigations
- Consider restricting visitors when hazards are present
- Protect at-risk visitors
 - PPE
 - Information about potential hazards

Occupationally acquired AIDS/HIV reported to CDC through 1992*

Occupation occupational	No. (%) of transmissions
Laboratory technician	25 (24.8)
Nurse.....	26 (25.7)
Physician.....	13 (12.8)
Medical tech/paramedic.....	7 (6.9)
Dentist/dental technician.....	6 (5.9)
Health aide/attendant	6 (5.9)
Janitorial /maintenance.....	6 (5.9)

*Surveillance for Occupationally Acquired HIV Infection: United States, 1981 to 1992: Division of HIV/AIDS, National Center for Infectious Diseases, Centers for Disease Control and Prevention, *Laboratory Medicine*, Volume 24, Issue 2, 1 February 1993, Pages 107–108.



PERSONAL PROTECTIVE EQUIPMENT

- BBP standard requires risk assessment to determine which hazards necessitate PPE
- PPE is the least effective control mechanism and should be implemented last
- Must receive training in proper use of PPE
- Additional information located on the [OSHA website](#)

GLOVES

- Gloves are worn for all procedures that involve contact with known or potentially biohazardous material
- Usefulness increases exponentially with proper training
- Do not handle cell phones or personal items while wearing gloves
- Change gloves when torn or soiled
- Gloves may not be washed or reused



Methicillin-resistant *Staph aureus* infection resulting from improper use of gloves and poor hand hygiene*

*Duman Y, Yakupogullari Y, Otlu B and Tekerekoglu MS. 2016. Am J Inf Control 44(8).



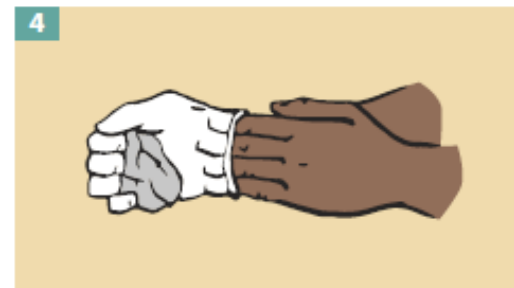
Grasp the outside of one glove at the wrist.
Do not touch your bare skin.



Peel the glove away from your body,
pulling it inside out.



Hold the glove you just removed in
your gloved hand.



Peel off the second glove by putting your fingers
inside the glove at the top of your wrist.



Turn the second glove inside out while pulling
it away from your body, leaving the first glove
inside the second.



Dispose of the gloves safely. Do not reuse the gloves.



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IMPROPER GLOVE DOFFING – NC Case

- Laboratorian had small cut on finger (X)
- Contact between the outside of the glove and the cut during doffing resulted in lab-associated BBP infection



LAB COATS/GOWNS

- NOT worn in public areas
- Must be buttoned with sleeves extended
- Do not store contaminated lab coats near street clothes or clean lab coats
- Do not take lab coats home

Exposure Management

Persons with occupational risk must be trained how to identify an exposure or potential exposure and what to do after an exposure/potential exposure



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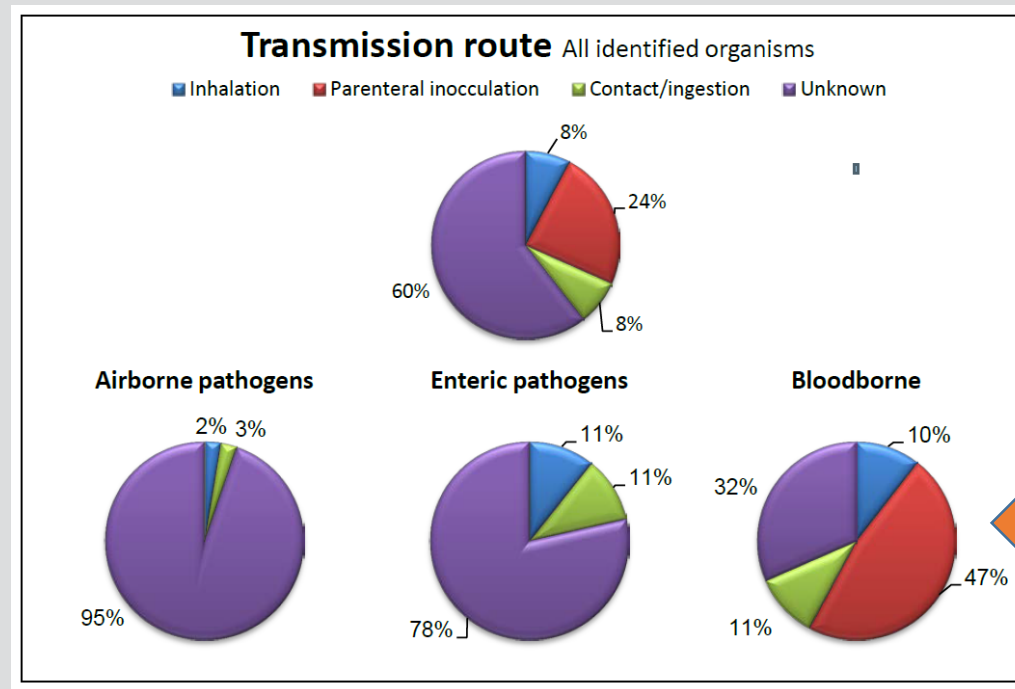
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Exposures & Potential Exposures

- BBP Exposure definition
 - Percutaneous injury (e.g., needlestick or cut with a sharp object) or contact of mucous membrane or nonintact skin with blood or OPIM
- Exposure
 - Known, unplanned, contact with infectious agent
 - Needle stick or cut with sharp object
 - Spill/splash into mucous membrane
 - Entry through broken or intact skin
- Potential exposure
 - Failure of control mechanism (engineering or PPE)

KNOWN VS. POTENTIAL EXPOSURES

- Between 2007-2012, 32% of BBP lab-associated infections were NOT associated with a defined exposure



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PERCUTANEOUS EXPOSURE IMMEDIATE RESPONSE



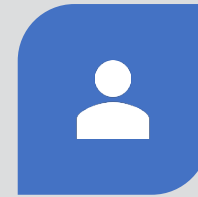
REMOVE
GLOVES AND
FORCE
WOUND TO
BLEED



WASH WOUND
WITH SOAP
AND WATER
FOR 5
MINUTES



UTILIZE FIRST
AID KIT IF
NECESSARY



NOTIFY
SUPERVISOR



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Eye Exposure

- Flush with water for 15 minutes using an emergency eye wash station
- Notify Supervisor



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POST-EXPOSURE EVALUATION

- All exposures (known or potential) should be reported immediately to Supervisor to obtain medical evaluation and follow-up
- Signs and symptoms consistent with a pathogen you have worked with or around should also be reported
 - Remember – 32% of BBP LAIs did not have a known cause
- [Current CDC recommendations for HBV, HIV, and HCV](#)

Almost Done.....

- Review [Exposure Control Plan](#) (information included in quiz)
- If you have not already completed one or are unsure if you have
 - Complete Hepatitis B Acknowledgement Form included in Exposure Control Plan and submit to your Supervisor
- Take [quiz](#) and score $\geq 80\%$
 - You will receive a training confirmation to supply to your Supervisor once the quiz is successfully completed
- Please contact ehs@nccu.edu if you have any questions or issues