Bloodborne Pathogens for Healthcare Students

Complying with OSHA Standard 29 CFR 1910.1030

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Training Objectives

- Understand the OSHA Bloodborne Pathogens Regulation (29 CFR 1910.1030)
- To recognize potential hazards associated with bloodborne pathogens
- To understand appropriate steps to minimize risks associate with bloodborne pathogens.
- To know procedures in the event of an exposure

Who Needs BBP Training?

- All personnel INCLUDING students who may reasonably anticipate any exposure to blood or other potentially infectious material
- This applies to all clinical or research activities where you may be exposed to human infectious material
- This even includes research working with even non-primate infectious material

Training Elements

Part I:	The Bloodborne Pathogens Standard
Part II:	Epidemiology and Disease Transmission
Part III:	Exposure Control Plan (ECP)
Part IV:	Components of BBP Plan
Part V:	Exposure Management
Part VI:	Conclusions

SECTION 1:

BLOODBORNE PATHOGEN STANDARD

OSHA Bloodborne Pathogen Standard

- Scope and Application
  - Applies to every employer, employee as well as any students, trainees or volunteers
  - It is the employer's or school's responsibility to ensure that the they are in compliance with the OSHA standards

OSHA Bloodborne Pathogen Standard

Potentially Infectious Material Includes:

- Any blood, blood products, bloody fluids or fresh tissue from patients or research animals infected with a BBP
- Human cell lines
- Non-human primate cell lines
- Media and supernatants from human or non-human primate cell cultures

OSHA Bloodborne Pathogen Standard

- Pathogens that are routinely considered under the standard during an exposure evaluation are:
  - Human Immunodeficiency Virus (HIV)
  - Hepatitis B Virus (HBV)
  - Hepatitis C Virus (HCV)
  - Other potentially BBP include Malaria, Syphilis, Ebola, Leptospirosis and Epstein Barr Virus (EBV)

OSHA Bloodborne Pathogen Standard

- For students and trainees overall responsibility under the BBP Standard is the reasonability of the Office of the VP for Health Affairs and the HSC Deans
- All trainees must understand the exposure control plan
- All trainees must complete initial and annual refresher BBP training

PART II:

EPIDEMIOLOGY

Risk of Transmission

Dependent upon multiple factors

- Mode of entry (needle stick vs. splash to eyes)
- Viral load in source material (viral particles/milliliter)
- Infectivity of the particular virus

  (ease of becoming infected)
- Immune status of the one exposed to the BBP

Risk of Transmission

Needle Sticks Most Common Exposure

- 800,000-1,000,000 accidental needle sticks reported annually

- 80% of exposures from:
  - Recapping needles
  - Cleaning up after procedures
  - Disposing of needles
  - Giving medications
  - Handling trash

Risk of Transmission

Who is at the Greatest Risk?

- 1st: Nursing Staff
- 2nd: Laboratory Personnel
- 3rd: Physicians

Exposures Among Resident Physicians

Characteristics	No	(%)
Mean Age (± SE)	26±3.2 years	
Gender		
Male	59	(63.4)
Female	34	(36.5)
Departments		
Medicine and allied	18	(19.3)
Surgery and allied	37	(39.7)
Obstetrics and Gynecology	17	(18.2)
Lab sciences: Pathology, Microbiology, biochemistry	21	(22.5)
Non-clinical	12	(12.9)
Year of residency		
1st Year	37	(39.7)
2nd Year	29	(31.1)
3rd Year	27	(29.2)
Undergone any training on		
HIV/AIDS and Universal precaution	15	(16.1)

Occupational exposure with level of training of Resident Doctors

Level of training	Number of exposure				
	None	Once	Twice	>Twice	Total
First Year	23 (62.1)	6 (16.2)	3 (8.1)	5 (13.5)	**37**
Second Year	12 (41.3)	7 (24.1)	3 (10.3)	7 (24.1)	**29**
Three Year	04 (14.81)	7 (25.9)	8 (29.6)	8 (29.6)	**27**
Total	**39 (41.9)**	**20 (21.5)**	**14 (15)**	**20 (21.5)**	**93**

Characteristics	**No of participants**	**(%)**
Exposure while patient care		
Never	39	(41.9)
Only once	20	(23.6)
Twice	14	(12.9)
More than twice	20	(21.5)
Status of the Source		
HIV Positive	14	(87.4)
HIV Negative	06	(11.1)
HIV Status Un-know	35	(64.8)
Source Unknown	09	(16.6)
Reported the injury/exposure to authorities		
Not aware of it	09	(16.6)
Not reported, but aware about it	20	(37)
Yes	25	(46.2)
Total episodes of injury	96	

On average, exposure risk decreases for most residents as they progress through their training BUT……

Those who tend to report exposure tend to report more as they progress through their training.

Gaidhane et al. Occupational Exposure To HIV And Practices Of Universal Safety Precautions Among Residents Doctors . *Internet J Health.* 2009 8(2):

Relative Risk by Agent

- HBV……. 30.0% - Highest Risk
- HCV…….. 3.0%
- HIV……... 0.3% - Lowest Risk

Hepatitis B

- Greatest risk of transmission of the BBP
- Risk of transmission is up to 30%
- Presence of “e” antigen increases risk of transmission
- Immunization is protective so long as antibody develops

Hepatitis B

High Risk Populations

- Have unprotected sex with multiple sex partners or with someone who's infected with HBV
- IV drug abusers
- Hemodialysis patients
- Asian Pacific Island birth place or descent
- Healthcare workers
- Travel to high risk areas such as Asian

Hepatitis B

Recognized Risk for Health Care Workers

- Incidence 10 times great than in general population
- Most of those infected could not recall a specific injury such as a needle stick
- Presence of “e” antigen is present transmission rate is approximately 30%
- Virus can persist on hard surfaces for weeks

Hepatitis C

Risk of Transmission from Occupational Exposures

- Transmission rate is approximately 3% for each exposure (About 10 X'S that of HIV)
- 85% or more of acute infections become chronic
- 70% of those infected develop chronic liver disease
- no vaccine
- immunoglobulin not protective

Hepatitis C

High Risk Populations

- Have unprotected sex with multiple sex partners or with someone who's infected with HCV
- IV drug abusers (70-90% infected can be infected)
- Hemodialysis patients
- Healthcare workers
- Individuals born between 1945 and 1965
- Any who receive a blood transfusion prior to 1992
- Anyone who received a clotting factors prior to 1987

Hepatitis C

Out of 100 Individuals Infected with Hepatitis C

MF 80 chronic infection

MF 15 will develop cirrhosis

MF 5 develop liver cancer

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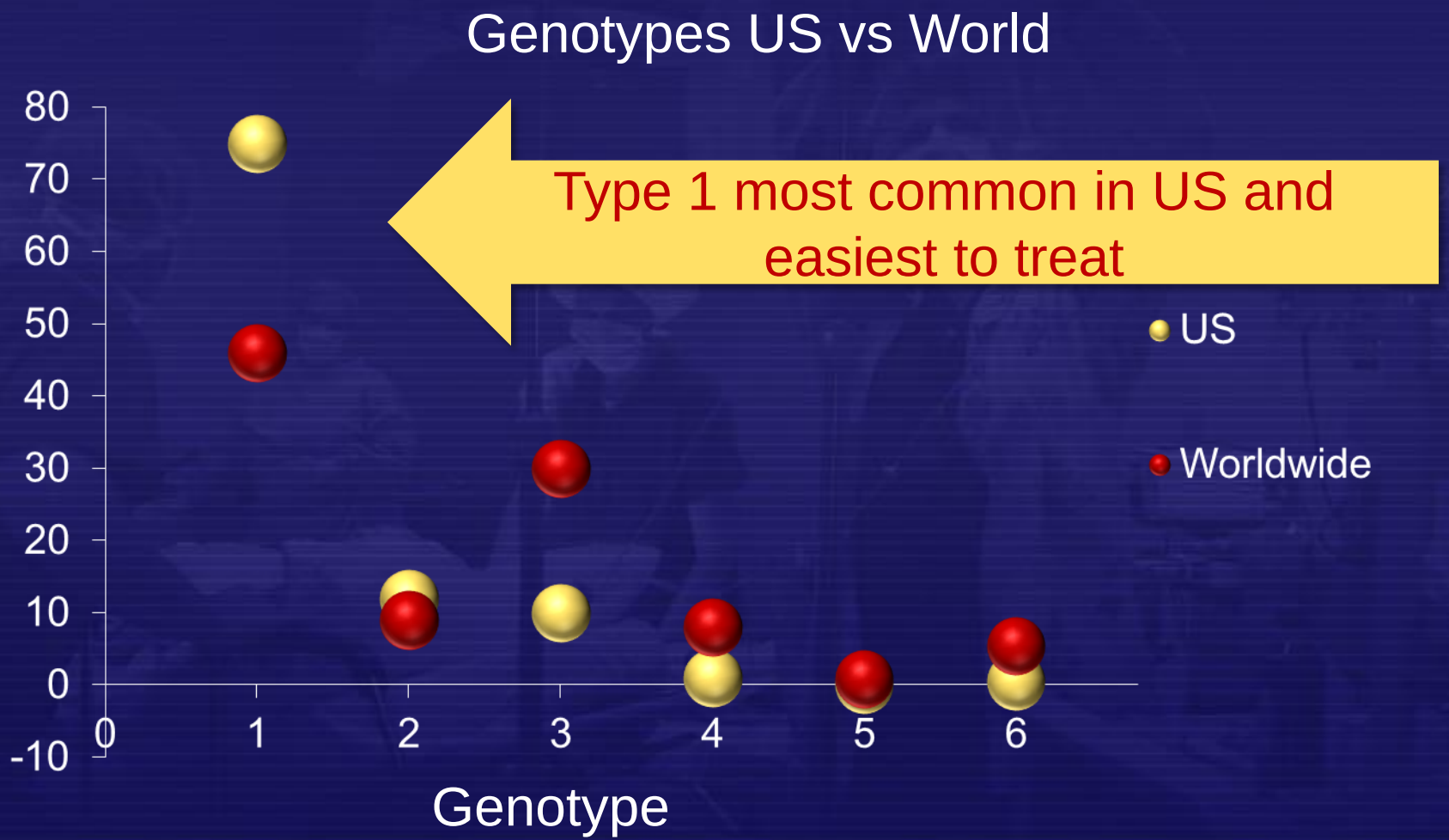
Hepatitis C


Genotypes US vs World
80
70
60
50
40
30
20
10
0
-10
0
1
2
3
4
5
6
Genotype
US
Worldwide
Type 1 most common in US and easiest to treat

Hepatitis C

Prevention is the best strategy

- Reducing risk is the best strategy when trying to reduce Hepatitis C exposures as there is no vaccine
- Post exposure prophylaxis with antivirals or immunoglobulin is not recommended
- Currently there is no vaccine

HIV

- More than 1 million infected in US
- Recent resurgence in IV heroin use is causing outbreaks of HIV and Hepatitis C
- No vaccine

High Risk Fluids

- Blood
- Semen
- Vaginal fluids
- Spinal fluid
- Pleural fluid
- Peritoneal fluid
- Pericardial Fluid
- Amniotic fluid
- Synovial fluid
- Saliva (bloody)
- Any bloody fluid

Low or Non-Risk Fluids

Assuming that the following fluids are non-bloody they are consider low or non-risk:

- Emesis
- Feces
- Urine
- Sweat
- Nasal discharge
- Saliva
- Tears

HIV

Occupationally Acquired HIV Cases

- As of 2010, 57 confirmed and 143 probable conversions
  - 48 percutaneous (needle/cut)
  - 5 mucocutaneous
  - 2 both mucocutaneous and percutaneous
- No confirmed new cases since 1999
- Last possible case reported in 2009

HIV

Transmission Risk

- Risk of transmission is 0.3% (1/200-250) from all needle stick injuries
- Risk of transmission is 0.09% for splash injuries
- Risk of transmission via skin exposure is unknown but REAL
- Simultaneous exposure to both HIV and Hep C increases risk of transmission

HIV

Transmission Risk

- There have been three instances of delayed HIV conversion after the recommended follow up period of 6 months.
- In 2 of the cases, hepatitis C infections were identified which is believed to have caused the delayed response

Take Away Message:

Simultaneous infection with Hepatitis C and HIV may delay seroconversion

PART III:

EXPOSURE CONTROL PLAN

Exposure Control Plans

- OSHA required written document addressing
  - BBP and other infectious hazards in each workplace
  - Exposure Prevention Plan
- Each facility your train in will have its own exposure control plan.

PART IV:

COMPONENTS OF BBP PLAN

Five Principals of BBP Plan

- Universal Precautions
- Pre-exposure Prophylaxis
- Personal Protective Equipment
- Workplace Practice Controls
- Post-exposure Prophylaxis

Universal Precautions

Most occupational exposures can be avoided with proper safety precautions

Universal Precautions

Treat **all blood, body fluids or tissues** are treated as if they are infectious

Universal Precautions

If its wet and it’s not yours,

DON’T TOUCH IT

--unless you have proper personal protective equipment

Pre-exposure Prophylaxis

- Immunizations to prevent transmission of a BBP if you are exposed
- Immunization of healthcare workers against Hepatitis B is an example
- Best way to prevent transmission

Pre-exposure Prophylaxis

Definition

- Immunizations to prevent transmission of a BBP if you are exposed
  - Hepatitis B vaccine is one example
- Best way to prevent transmission

Pre-exposure Prophylaxis

Hep B Immunization Protocol for HEALTHCARE workers

- Primary series with 3 doses of vaccine
- Surface antibody levels should always be measured 4-8 weeks after the last shot of the series
- If no or insufficient antibody response, complete second series of 3 doses of vaccine.

Pre-exposure Prophylaxis

Hep B Immunization Protocol for HEALTHCARE workers

- Once antibody positive titers do not need to be rechecked and booster doses of vaccine are not required

- Know your antibody status… its your best protection

Pre-exposure Prophylaxis

Hep B Vaccine Protocol for Vaccine Non-Responders

- If trainee fails to develop Hepatitis B Surface Antibodies after the completion of 2 Hepatitis B vaccine series THEN:
  - Must be counseled on how to respond in the event of a Hepatitis B exposure.
  - If exposed, individual should receive Hepatitis B Immune Globulin (HGIB) up to 7 days following exposure
    - Ideally give HBIG 1-2 days after exposure (70%) effective

Personal Protective Equipment

- Must be provided
- Commonly known as PPE
- Includes gloves, masks, gowns, booties, face masks, face shields, masks
- Respirators include N95 masks (orange duck bill) in addition to full blown respirators
- Powered Air Breathing Respirator (PAPR) is a hood with a HEPA filtration unit which attaches at the waist l

Examples of PPE

Eye Shields

Face Mask

Face Shield

Goggles

Gloves

PABR

Shoe Covers

Gowns

N95 Respirator

Personal Protective Equipment

Occasionally you might even need this much personal protective equipment.

Notice the use of mask with PAPR with N95 Mask

This is similar to what the staff used at Emory Hospital with the recent Ebola outbreaks.

Work Place Practice Controls

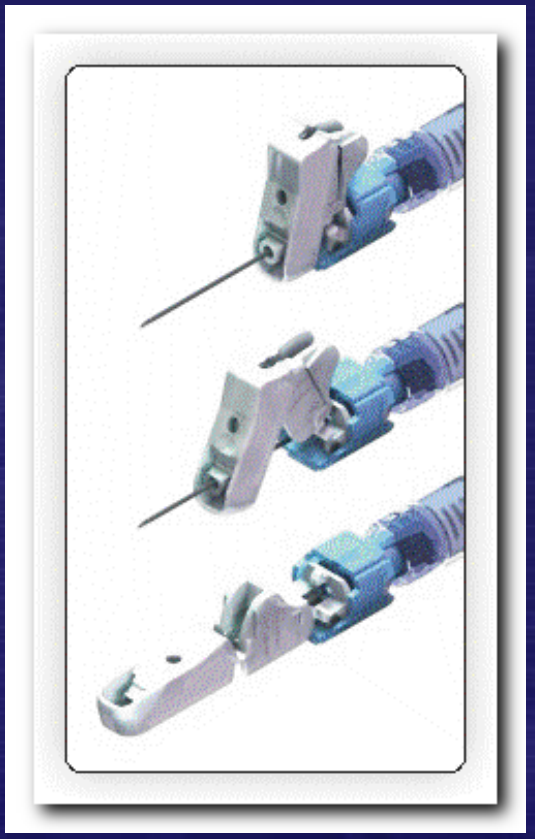
Definition

Processes and/or equipment employed throughout an organization to minimize the risk of acquiring a BBP infection

Examples Practice Controls

Needleless IV Systems

Retractable Needle Syringes



Safety Needles

Biohazardous Waste Containers

Post-Exposure Prophylaxis

- Utilization of medications, vaccines and/or immunoglobulin in the event of an TRUE BBP

- **ONLY** happens in in cases where all other components of BBP program fail

PART V:

EXPOSURE MANAGEMENT

Exposure Criteria

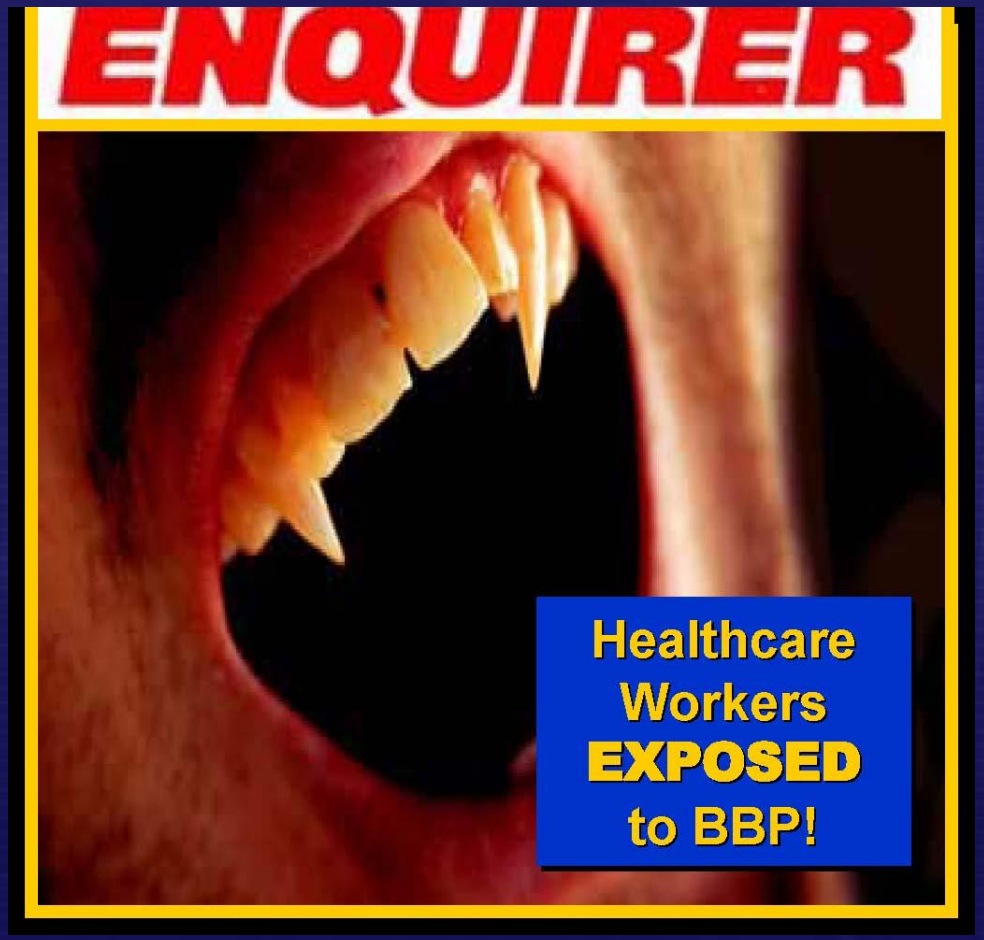
In order to have an exposure
two things must happen

The body fluid must contain live organisms

AND

The contaminated fluid must enter the body

I think I was exposed!



Now what?

Was I exposed?

Only you can ultimately determine if you had an exposure

Example:

Only you can determine if something splashed into your eye

Exposure Management

Initial Steps

- Local wound care
  - Wash the wound well with soap or irrigate the area
- Gather information about the source patient

Exposure Management

Source Patient Information

- If possible, gather the following information on the source patient in order to help determine how to manage your exposure:
  - Source Patient's HIV, Hepatitis B and C status if known
  - Source Patient's viral loads if HIV or Hep C positive

Exposure Management

Call for Help

After treating the wound and gathering information about the patient—

CALL THE HOTLINE

502-852-6446

Exposure Management

Risk Assessment

- Once it has been determined that an exposure has occurred risk is determined by:
  - Source Patient's HIV, Hepatitis B and C status if known
  - Source Patient's viral loads
  - Volume of fluid/material

EXPOSURE MANAGEMENT

Pathogens

- Pathogens that are routinely considered during an exposure evaluation are:
  - Hepatitis B
  - Hepatitis C
  - HIV
- Depending on the patient's history and diagnosis, other microbial agents may be important to consider

Exposure Management

Your testing is not urgent
and
can wait for 2-3 days.

Getting the source patient tested is what is urgent.

Exposure Management

Initial Testing

- **Source Testing**
  - Hepatitis B Surface Antigen
  - Hepatitis C Antibody
  - RAPID HIV Antibody (SUDS)
  - Viral load/CD4 count if known positive for HIV
- **Student/Resident**
  - Hep B Antibody if unknown
  - Hep C Antibody
  - HIV Antibody
  - Pregnancy testing if starting medications

Exposure Management

Post Exposure Prophylaxis (PEP)

- Thought to reduce HIV transmission by 80%
- Ideally should be started within one hour of exposure
- Initiation of PEP is dependent up the amount of fluid and the viral load of the source patient
  - Low Risk - Typically therapy or Combivir
  - Moderate - Isentress/Truvada
  - High Risk - Isentress/Truvada

Exposure Management

Follow Up Testing

- Low Risk
- Usually no follow up report
- Moderate and High Risk
- Repeat testing at 6 weeks, 12 weeks and 6 months
- Onset of viral illness within 30 days of exposure consider HIV/Hepatitis C PCR testing

Special Situations

- Remember to consider how you will initiate antiviral therapy on off-site and out of town rotations especially international including mission trips
- Ideally access to appropriate drugs should take no longer than 1 hour
- Emergency departments may not be prepared to deal with these types of exposures

PART V:

EXPOSURE MANAGEMENT

Conclusions

- Be sure to complete your immunizations. Its your best protection against Hepatitis B
- Know your antibody status for Hepatitis B in the event of an exposure

Conclusions

- Keep your exposure card with your ID and HID cards.

Conclusions

- Call the hotline if you have been exposed or need help in evaluating if you were exposed.

Conclusions

- Always carry your exposure card with your University ID
- Call whenever you have a problem or a question