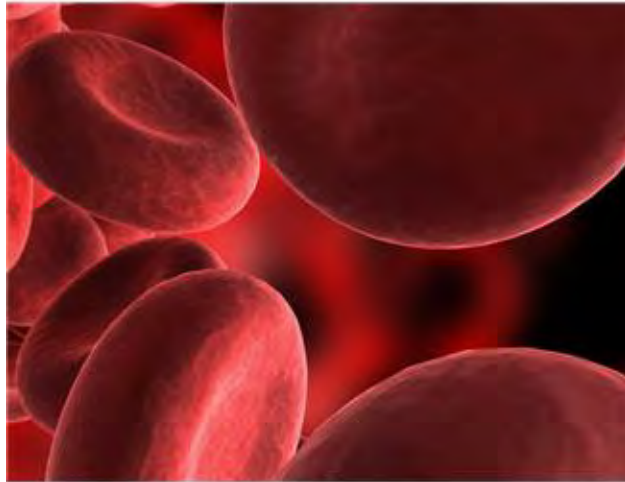


University of Florida Bloodborne Pathogen Training



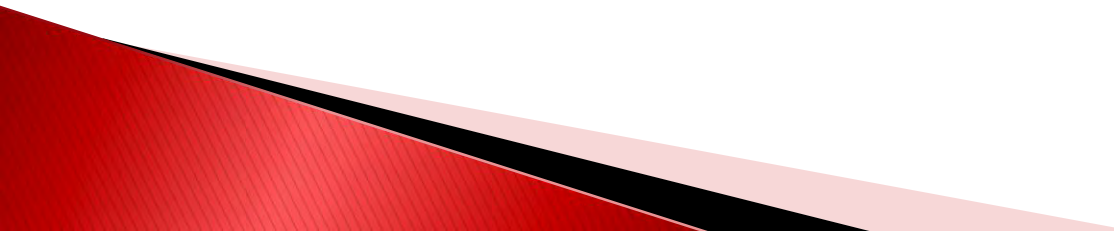
Biological Safety Office
Environmental Health & Safety

352-392-1591

www.ehs.ufl.edu

bsa@ehs.ufl.edu

Overview

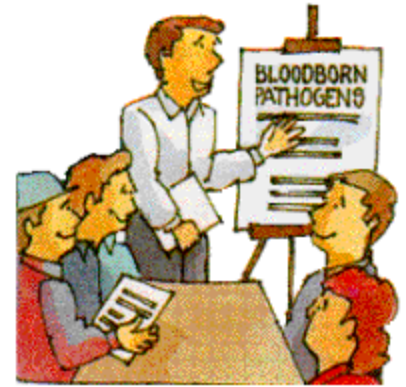
- What is the BBP standard and why do I need to be trained?
 - BBP diseases
 - What are they, how are they transmitted, what are the symptoms, what are the treatments?
 - How do I protect myself and others?
 - What steps do I take if I have an exposure?
- 

BBP Standard



- ♦ 1990: OSHA estimates that occupational exposure to BBPs cause >200 deaths & 9000 infections/year
- ♦ BBP standard took effect in March 1992
 - ♦ [29 CFR 1910.1030](#)
- ♦ Needlestick Safety and Prevention Act (April 2001)
- ♦ Covers all employees with potential exposure to blood or OPIM (at UF, students and volunteers are included)

BBP Training Requirement



- ♦ ***Initial*** and ***Annual*** training required
- ♦ General and site-specific
- ♦ Must have access to:
 - ♦ A copy of the regulatory text (29 CFR 1910.1030) and an explanation of its contents (training material is appropriate)
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051
 - ♦ A copy of the UF Exposure Control Plan
http://webfiles.ehs.ufl.edu/BBP_ECP.pdf
 - ♦ Site-specific Standard Operating Procedures (SOPs)
<http://webfiles.ehs.ufl.edu/BBPSOPS.pdf>

Bloodborne Pathogens (BBPs)

- ♦ Pathogenic microorganisms present in blood and other potentially infectious material (OPIM) that can cause disease in humans
 - ♦ **Hepatitis B virus (HBV, HepB)**
 - ♦ **Hepatitis C virus (HCV, HepC)**
 - ♦ **Human immunodeficiency virus (HIV)**
 - ♦ *Brucella*
 - ♦ *Babesia*
 - ♦ *Leptospira*
 - ♦ *Plasmodium*
 - ♦ Arboviruses (WNV, EEE)
 - ♦ Human T-lymphotropic virus (HTLV-1)



What constitutes OPIM?

YES	NO (unless visibly contaminated with blood)
Cerebrospinal fluid	Tears
Synovial fluid	Feces
Peritoneal fluid	Urine
Pericardial fluid	Saliva
Pleural fluid	Nasal secretions
Semen/Vaginal secretions	Sputum
Breast milk	Sweat
Amniotic fluid	Vomit
Saliva from dental procedures	
Unfixed human tissue or organs (other than intact skin)	
Cell or tissue cultures that may contain BBP agents	
Blood/tissues from animals infected with BBP agents	

Human Cell Lines

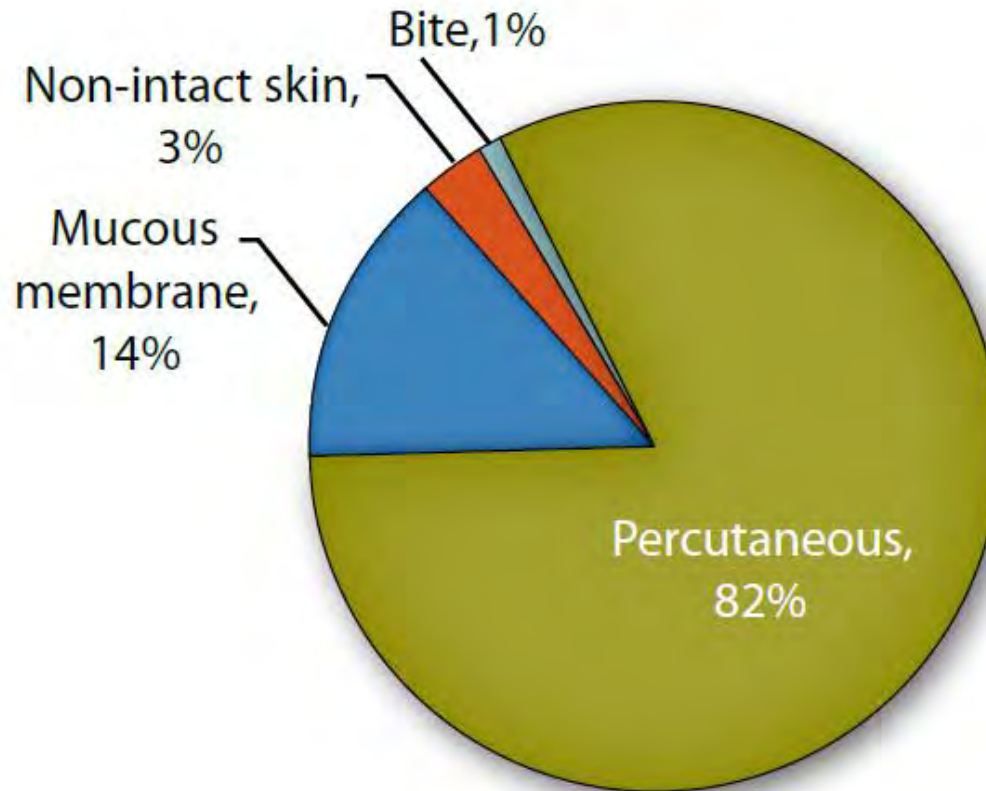
- ♦ Handle cell lines as if infectious/potentially infectious
- ♦ ATCC started testing newly deposited cell lines for HIV, HepB, HepC, HPV, EBV, CMV in January 2010
- ♦ Cell lines may become infected/contaminated in subsequent handling/passaging
 - ♦ LCMV infected tumor cells
- ♦ Many infectious agents yet to be discovered and for which there is no test
 - Remember HIV?

HIV/Hepatitis Research Labs



- Work must be registered with EH&S Biosafety Office (rDNA or BA registration – forms online at <http://www.ehs.ufl.edu/programs/bio/forms/>)
- Follow CDC/NIH BSL-2 containment practices at a minimum
- Baseline serum sample obtained prior to work with HIV

Primary routes of occupational exposure to BBPs



NaSH Summary Report for Blood and Body Fluid Exposure Data Collected from Participating Healthcare Facilities (June 1995-Dec 2007; n=30,945)

Hepatitis = inflammation of the liver

- ♦ Leading cause of liver cancer and main reason for liver transplantation in the U.S.
- ♦ Symptoms of acute infection:

Fever

Abdominal pain

Fatigue

Loss of appetite

Nausea

Vomiting

Jaundice

Joint pain

Dark urine

*Many people acutely infected with HepB or HepC are asymptomatic

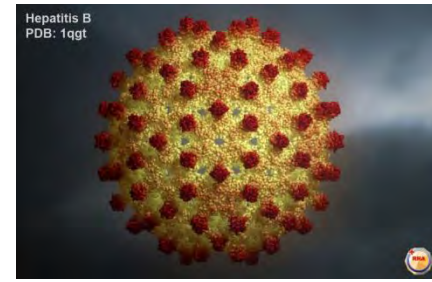


Above is a normal healthy liver; the surface is smooth and uniform.



The surface of this liver with cirrhosis is nodular and deformed.

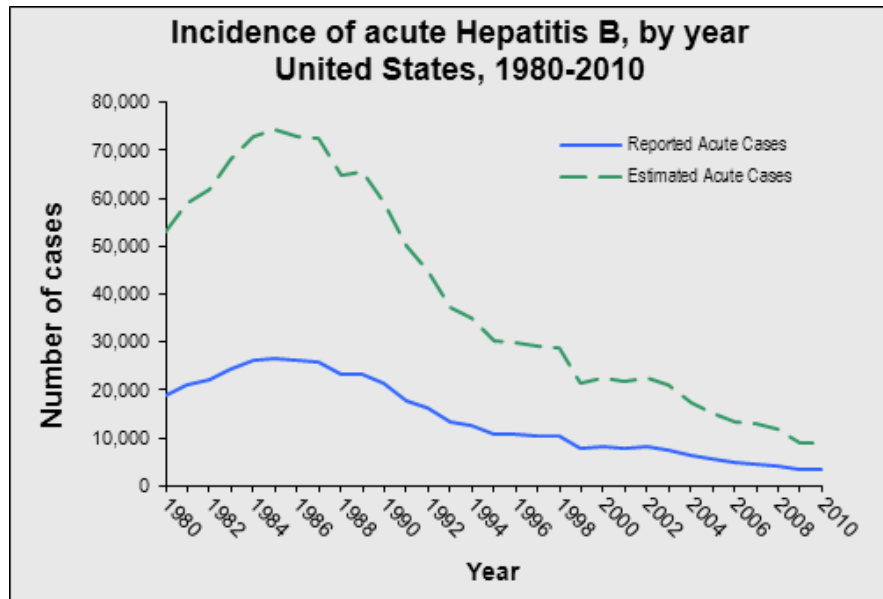
Hepatitis B (HepB, HBV)



- ♦ Risk of becoming infected after a percutaneous exposure ~30% in unimmunized people
- ♦ 5-10% of infected adults will develop chronic infection; ~1.25 million people with chronic HBV in the U.S.
- ♦ 15-25% of those chronically infected will develop cirrhosis, liver failure or liver cancer resulting in 2000-4000 deaths/per year in the U.S.
- ♦ HepB is 100 times more infectious than HIV yet it can be prevented with a safe and effective vaccine!

Hepatitis B Vaccine

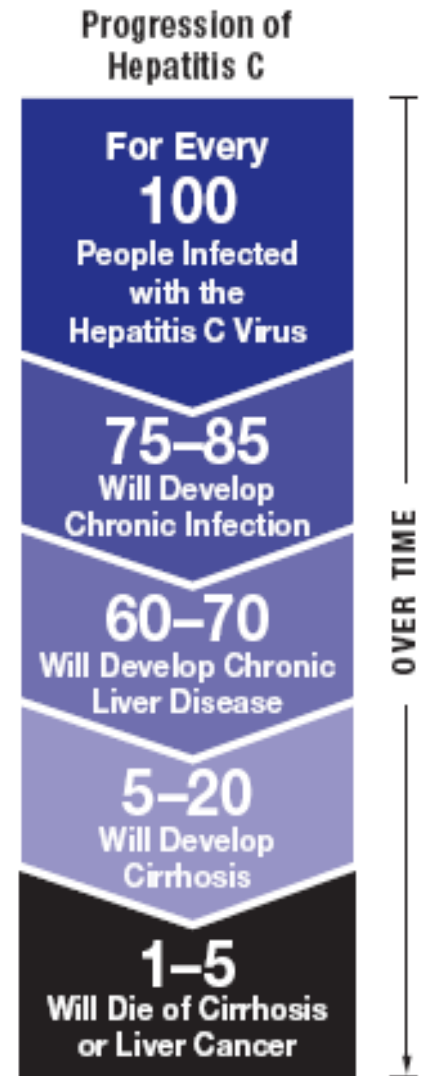
Rate of new infections has declined ~82% since 1991 when routine vaccination of children was implemented



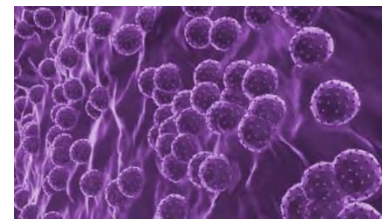
- ♦ 3 intramuscular injections – typical schedule is 0, 1, and 6 mos
 - ♦ 32-56% people develop immunity after 1st dose, 70-75% after 2nd dose and >90% after 3rd dose
- ♦ UF employees receive vaccine free of charge @SHCC (294-5700)
 - ♦ Bring completed Acceptance/Declination statement (<http://webfiles.ehs.ufl.edu/TNV.pdf>)
 - ♦ If you decline, can change mind at any time
 - ♦ Post-vaccination testing available but only recommended for those at high risk of an exposure

Hepatitis C (HepC, HCV)

- ♦ Risk of becoming infected after percutaneous exposure ~2%
- ♦ Most infected individuals develop a chronic infection (75-85%)
- ♦ ~3.2 million Americans have chronic infection and at least 50% of these people do not know they are infected
 - ♦ 75% of people with chronic Hep C born between 1945-1965
- ♦ Kills more people annually in the U.S. than HIV (16,627 deaths vs. 15,529 in 2010)



Hepatitis C

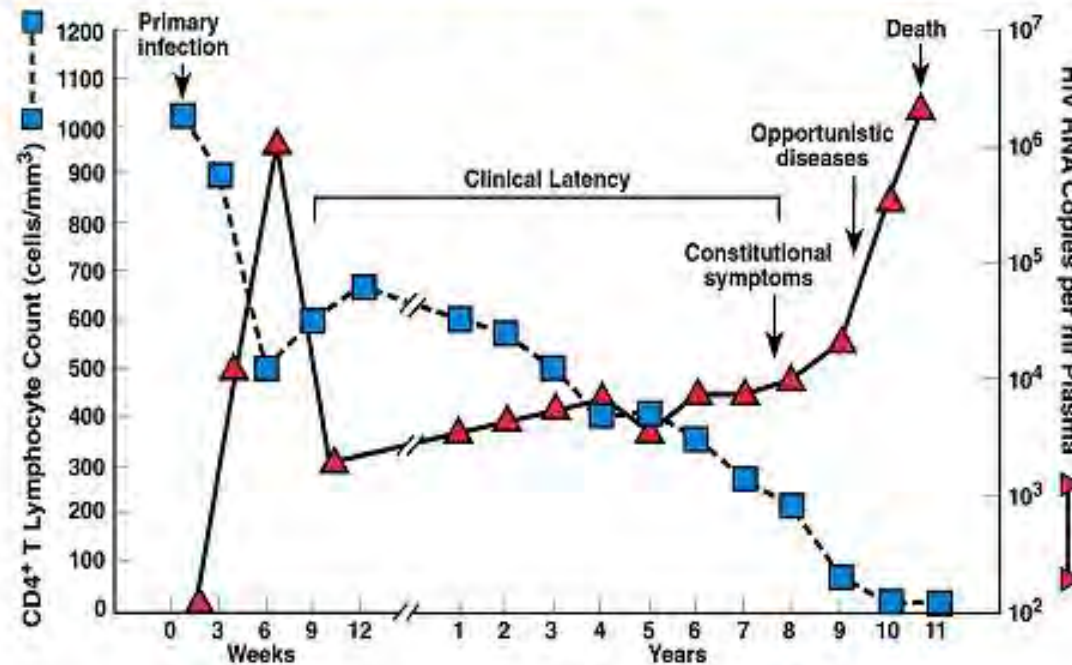


- ◆ No vaccine available
- ◆ Treatment can have severe side effects, be costly, and can last up to 48 weeks
 - ◆ Standard treatment = ribavirin + peg-interferon
 - ◆ Protease inhibitors (Victrelis, Incivek, Olysio) + ribavirin + peg-interferon
 - ◆ Nucleotide analog (Sovaldi) approved in Dec. 2013 – once daily oral treatment given in combination with ribavirin or ribavirin plus peg-interferon
 - ◆ Cost of one pill is \$1000 – treatment lasts 12-24 weeks!
- ◆ Sustained virologic response rates can be as high as 90%
 - ◆ Depends on numerous factors – genotype, how soon treatment is initiated, drugs used, etc.

HIV

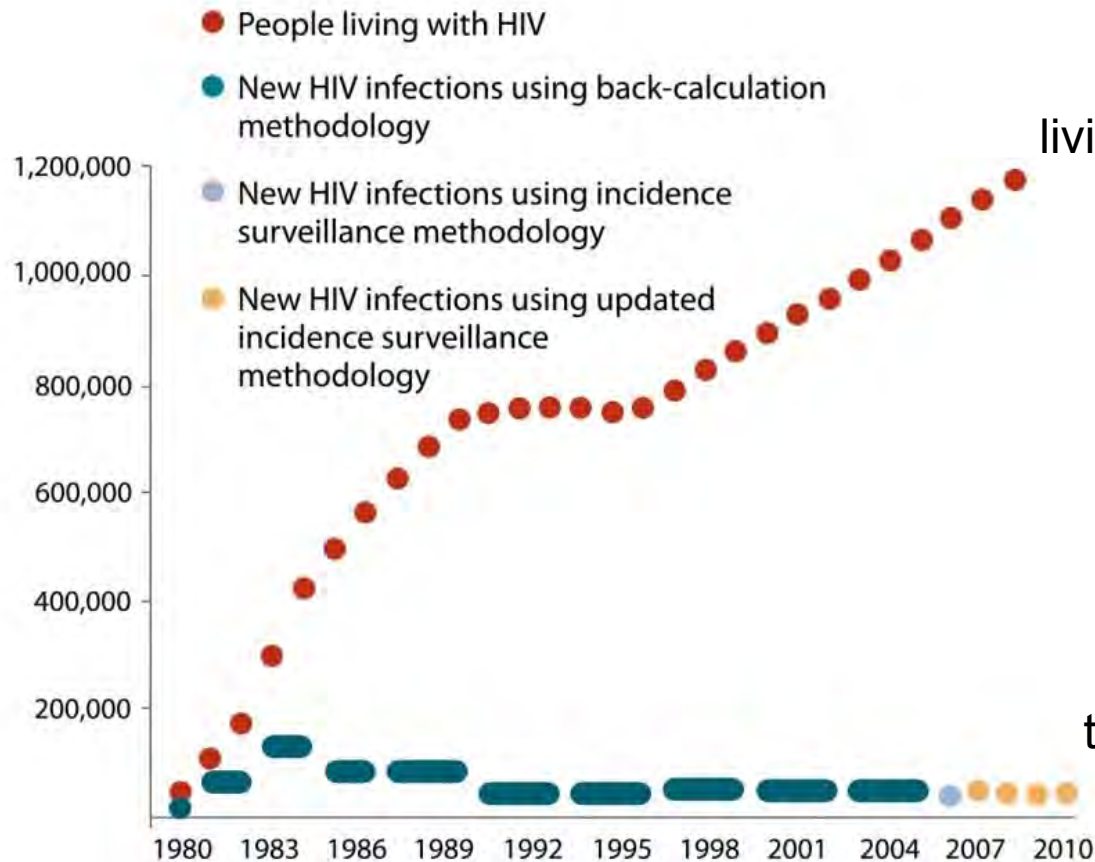
- Attacks & destroys CD4+ T cells; leads to loss of cell-mediated immunity and increased susceptibility to opportunistic infections

Typical Course of HIV Infection



Modified From: Fauci, A.S., et al, *Ann. Intern. Med.*, 124:654, 1996

Figure 7: HIV Prevalence and Incidence, 1980-2010



~1.1 million people living with HIV in the U.S.

New infections have remained steady at ~50,000/year since the height of the epidemic

The Epidemic in Florida

Population: 19.1 million →

(4th in the nation)

Newly reported HIV infections: 5,388

(2nd in the nation in 2011)

Newly reported AIDS cases: 2,775

(3rd in the nation in 2011)

Cumulative pediatric AIDS cases : 1,544

(2nd in the nation in 2011)

57% White
15% Black
23% Hispanic
5% Other*

Persons living with HIV disease: 98,530→**

(3rd in the nation in 2010)

HIV prevalence estimate: at least 130,000

(11.3% of the U.S. estimate for 2010)

29% White
49% Black
20% Hispanic
2% Other*

HIV Incidence Estimates 2010: 3,454

(There was a 30% decrease from 2007-2010)

HIV-related deaths: 923 (2012)

(Down 8.2% from 2011. The first time to ever be under 1,000 deaths in a given year.)

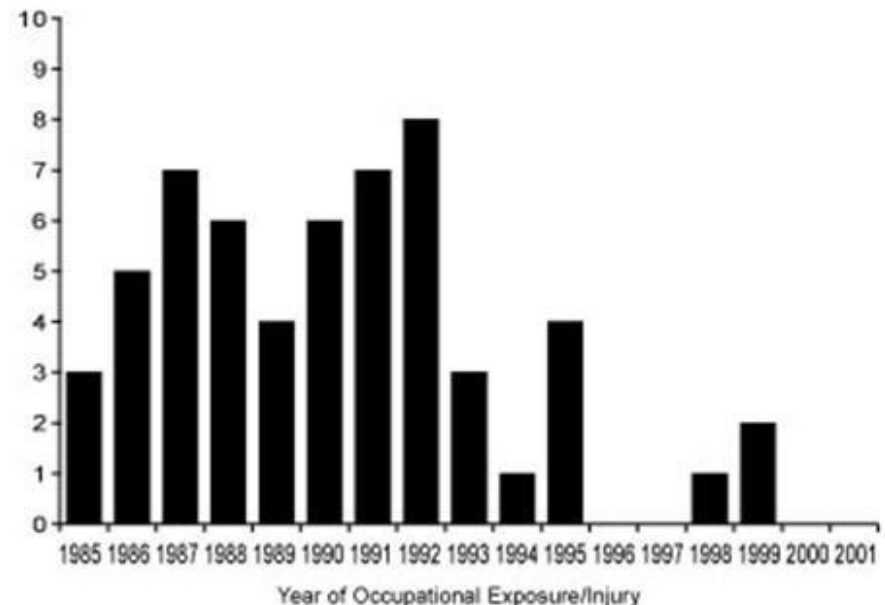
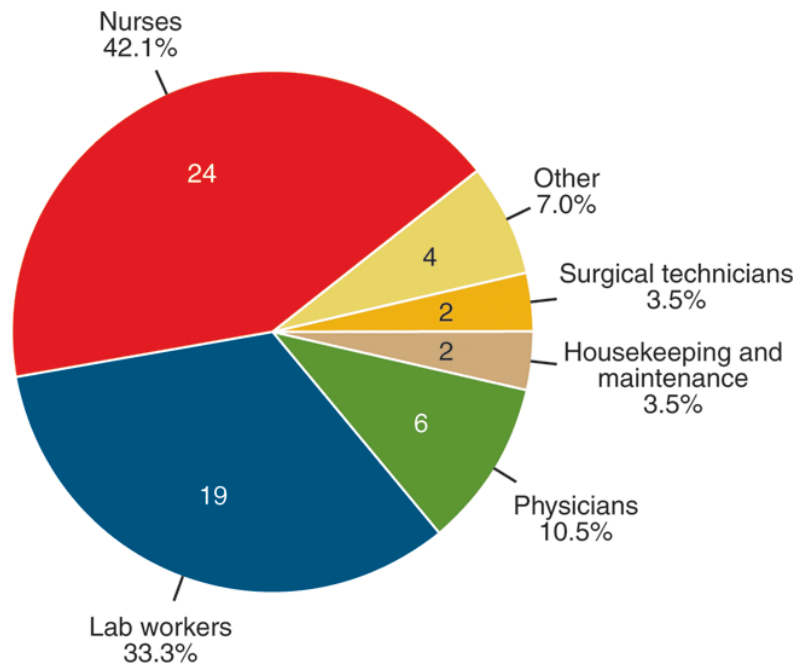
*Other = Asian/Pacific Islanders; American Indians/Alaskan Natives; multi-racial.

Trend data as of 12/31/2012, ** Living data as of 06/30/2013



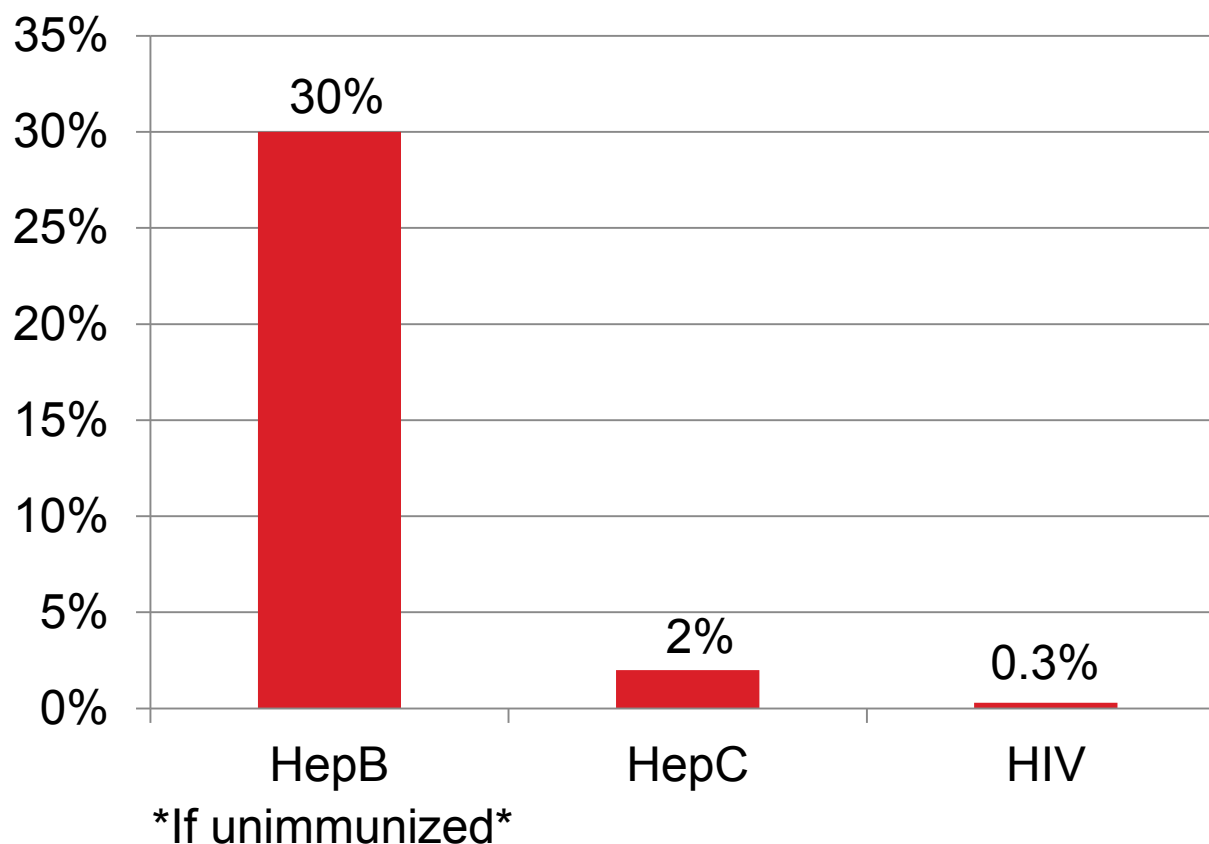
Occupational HIV Exposures

- ♦ Risk for HIV transmission after:
 - ♦ Percutaneous injury – 0.3%
 - ♦ Mucous membrane exposure – 0.09%
 - ♦ Nonintact skin exposure – low risk (< 0.09%)
- ♦ 57 documented occupational infections and 143 possible between 1981-2010 in U.S.
 - ♦ 84% of documented cases resulted from percutaneous exposure

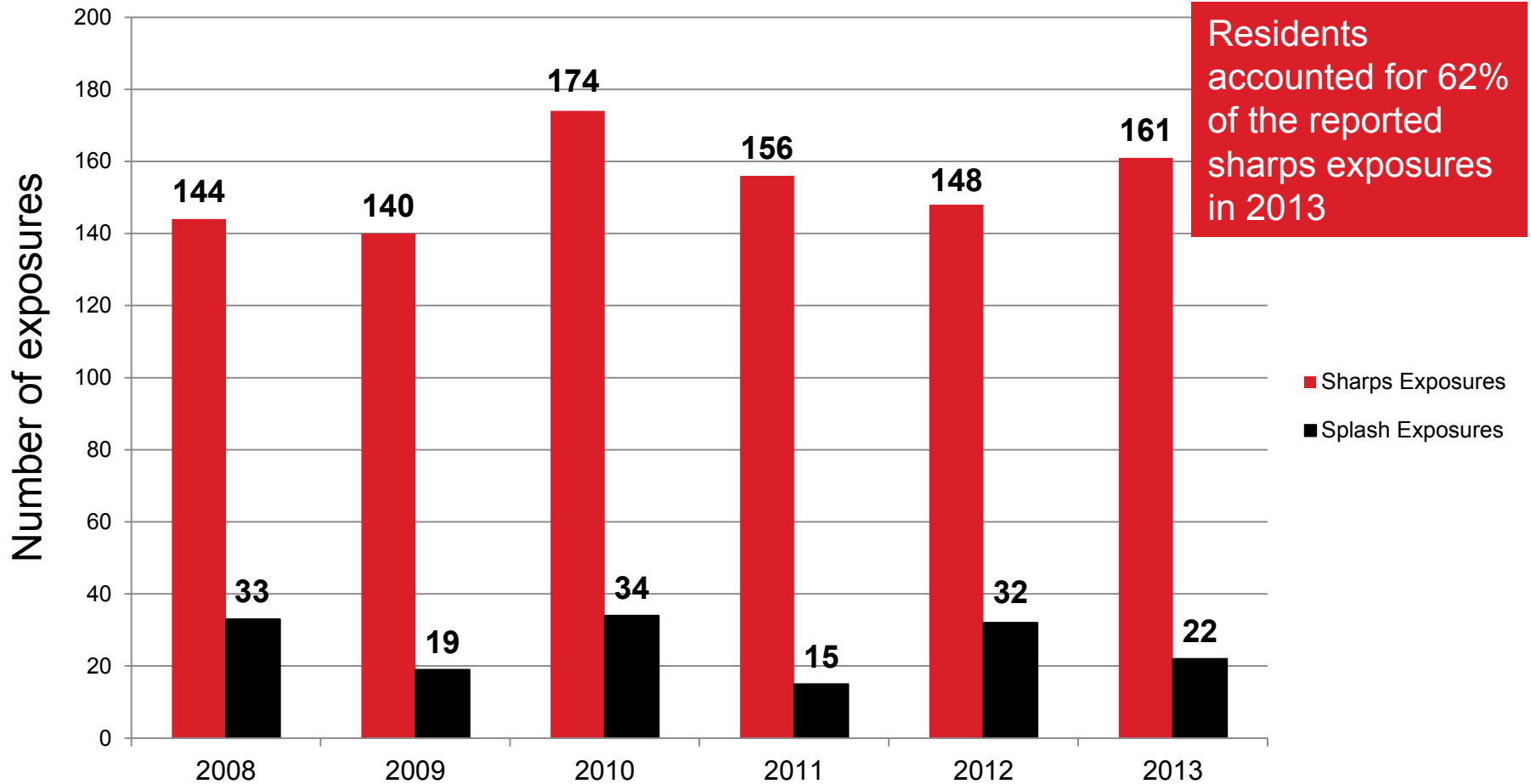


Comparing the risks...

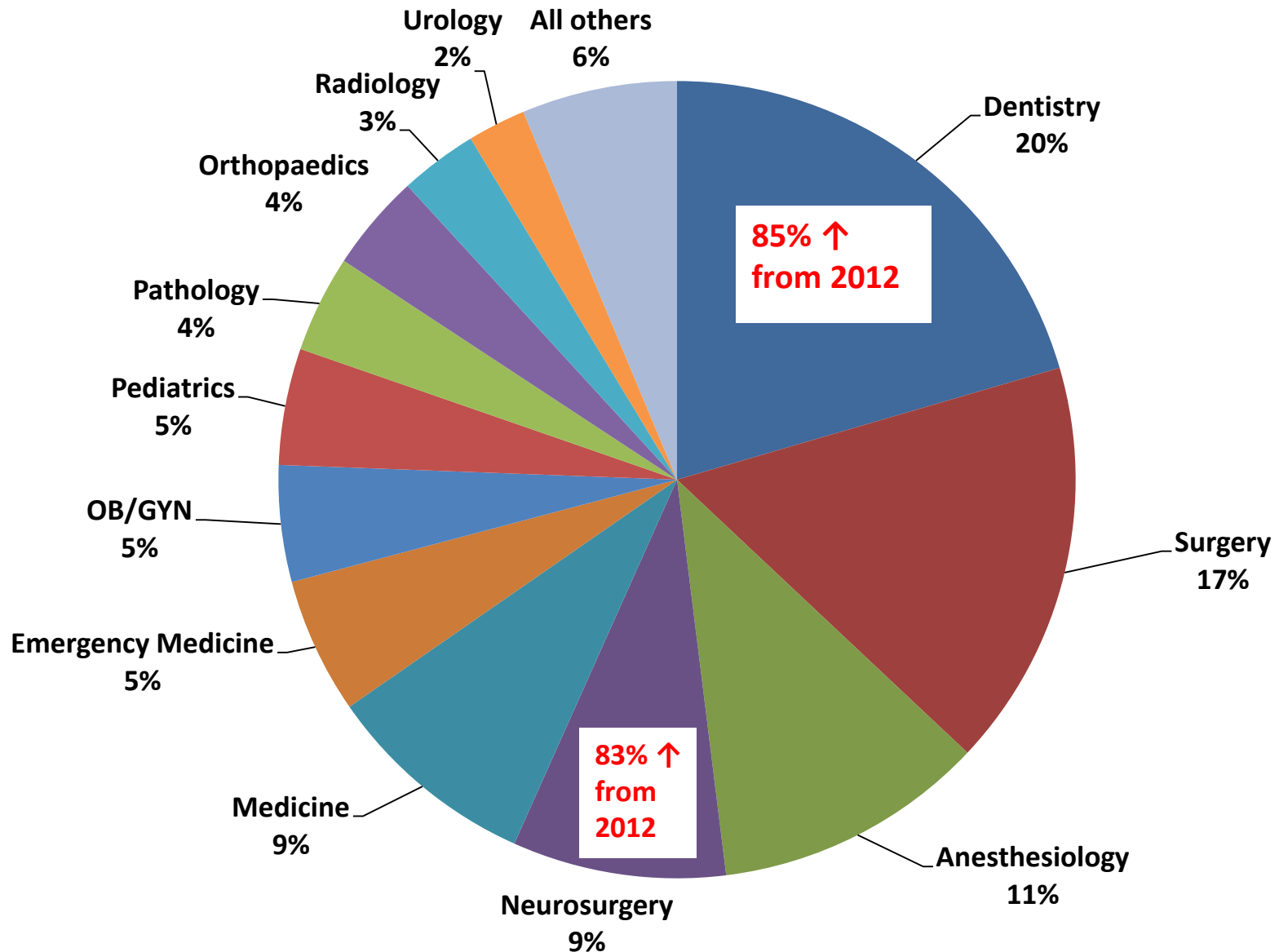
- Risks of becoming infected after a percutaneous injury:



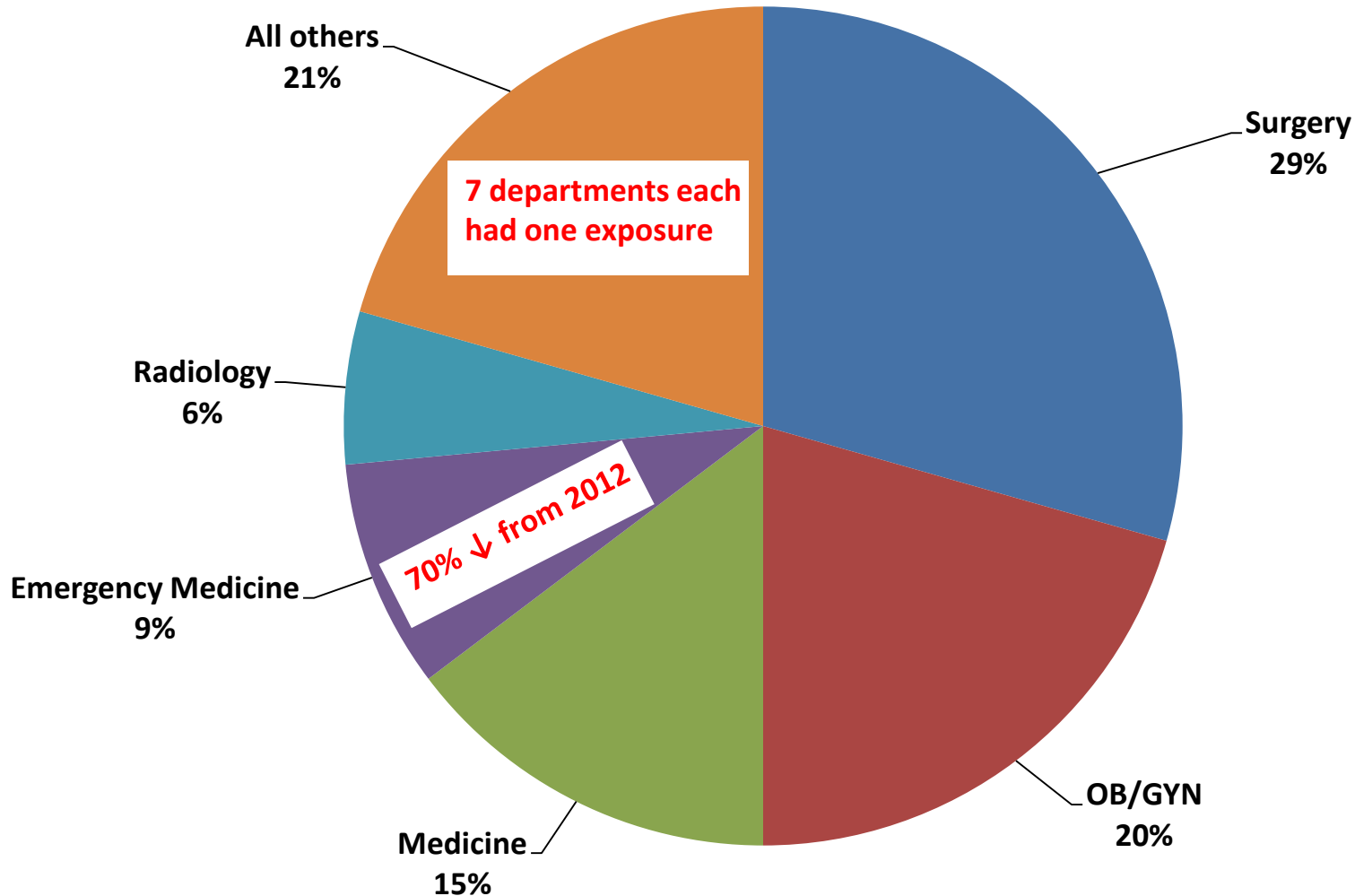
UF Exposures (2008-2013)



UF Sharps Exposures by Department (n=127)



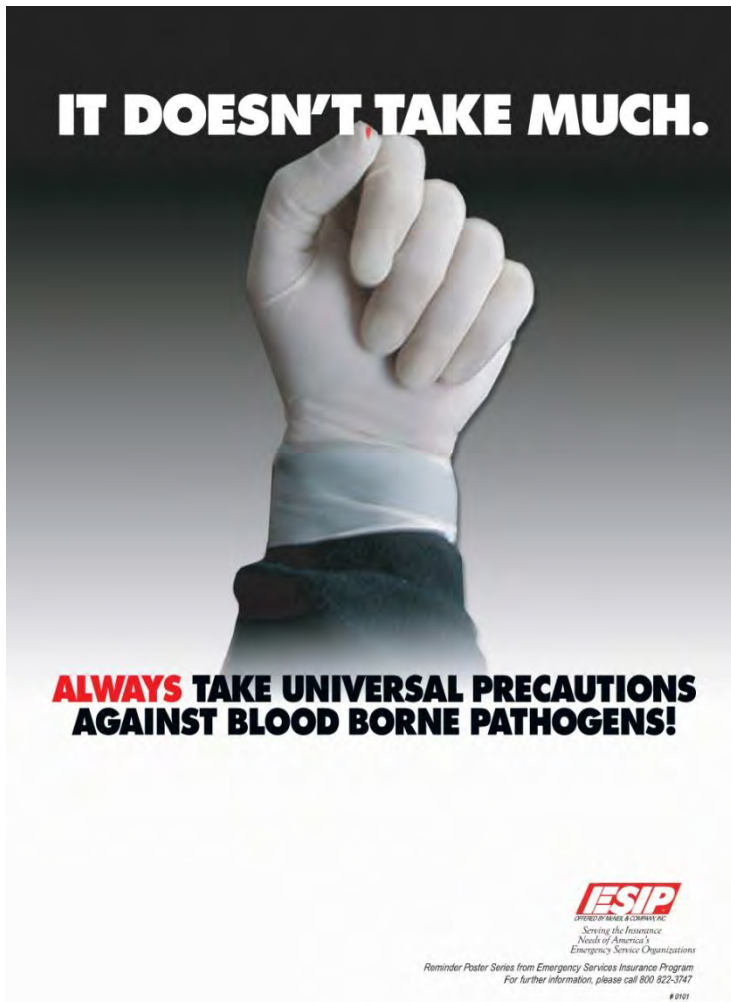
UF-HSCJ Sharps Exposures by Department (n=34)



Controls to Protect Against BBP Exposures

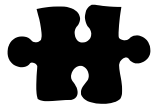
“UNIVERSAL PRECAUTIONS”

Cornerstone of exposure prevention



- ♦ **Treat all human blood and OPIM as if it is infectious.**
- ♦ Standard precautions = universal precautions + body substance isolation. Applies to blood & all other body fluids, secretions, excretions (except sweat), nonintact skin, and mucous membranes

Biohazard Controls



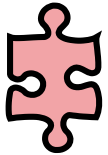
Engineering Controls

- Devices/equipment that isolate and contain a hazard



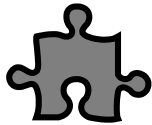
Work Practice Controls

- Tasks performed in a way that reduces the likelihood of exposure



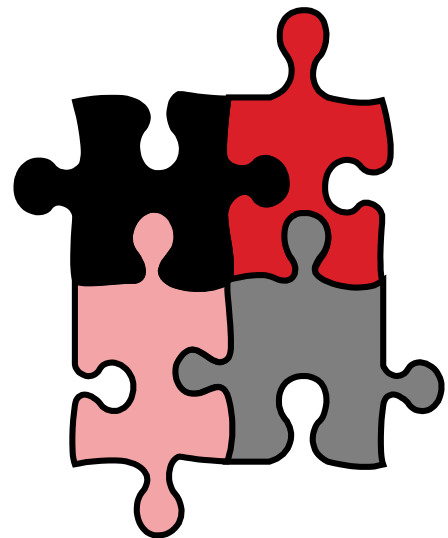
Administrative Controls

- Policies/procedures designed to reduce risk

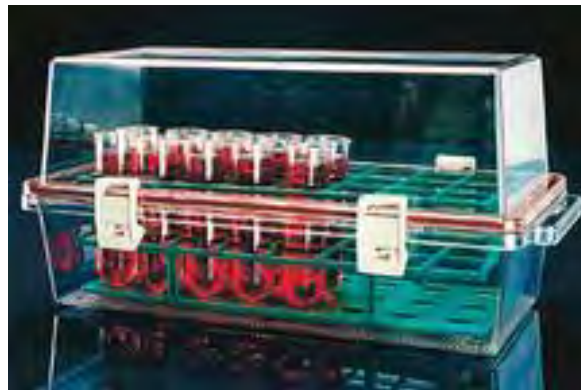


Personal Protective Equipment

- Clothing/equipment worn to reduce exposure



Engineering Controls for BBPs



NOW
YOU SEE IT.



NOW
YOU DON'T.



PROTECT YOURSELF AND OTHERS- USE SHARPS WITH SAFETY FEATURES

BE PREPARED. Anticipate injury risks and prepare the patient and work area with prevention in mind. Use a sharps device with safety features whenever it is available.

BE AWARE. Learn how to use the safety features on sharps devices.

DISPOSE WITH CARE. Engage safety features immediately after use and dispose in sharps safety containers.



Support for printing this poster came from an unrestricted educational grant provided by Safety Institute, Premier, Inc.

DISCLAIMER: Mention or depiction of any company or product does not constitute endorsement by CDC.



List of safety sharps devices available can be found at:

<http://www.healthsystem.virginia.edu/internet/epinet/safetydevice.cfm#1>

Not all safety devices are equal

<https://www.osha.gov/SLTC/etools/hospital/hazards/sharps/sharps.html>

- ♦ Desirable characteristics of a safety device:
 - ♦ Safety feature is an integral part of device and passively enabled.
 - ♦ Device is easy to use and performs reliably.
 - ♦ Safety feature cannot be deactivated and remains protective through disposal.
 - ♦ Cost is not the main decision factor – employee feedback is essential!
- ♦ Switching from a resheathable needle to a retractable needle for phlebotomy procedures reduced percutaneous injuries by almost half at Mount Sinai Medical Center

<http://www.medscape.com/viewarticle/805640>



Handle sharps safely!

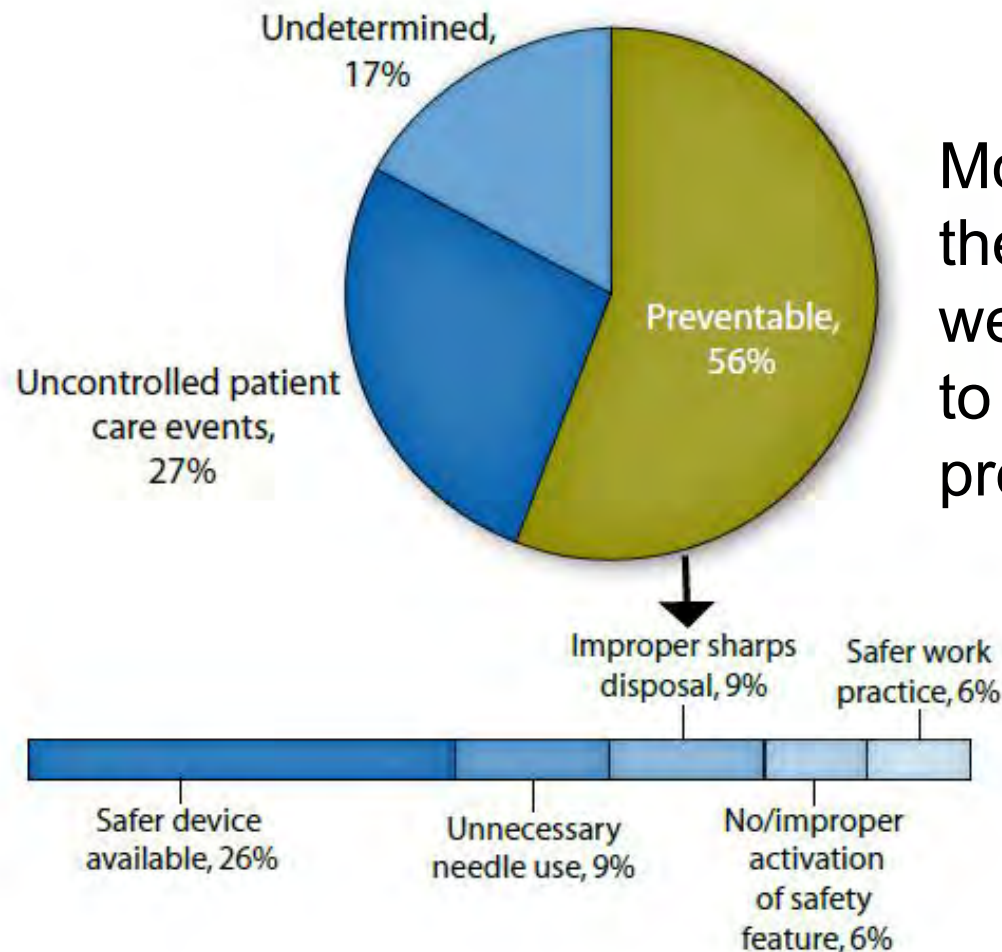
DO NOT RECAP NEEDLES

Don't bend, break, or detach from syringe



- ♦ Recapping needles and improper disposal are common causes of sharps injuries in the laboratory.
- ♦ Discard needles **directly into sharps container**
- ♦ Do not overfill the sharps box – close and replace when $\frac{3}{4}$ full
- ♦ Never attempt to re-open a closed sharps box

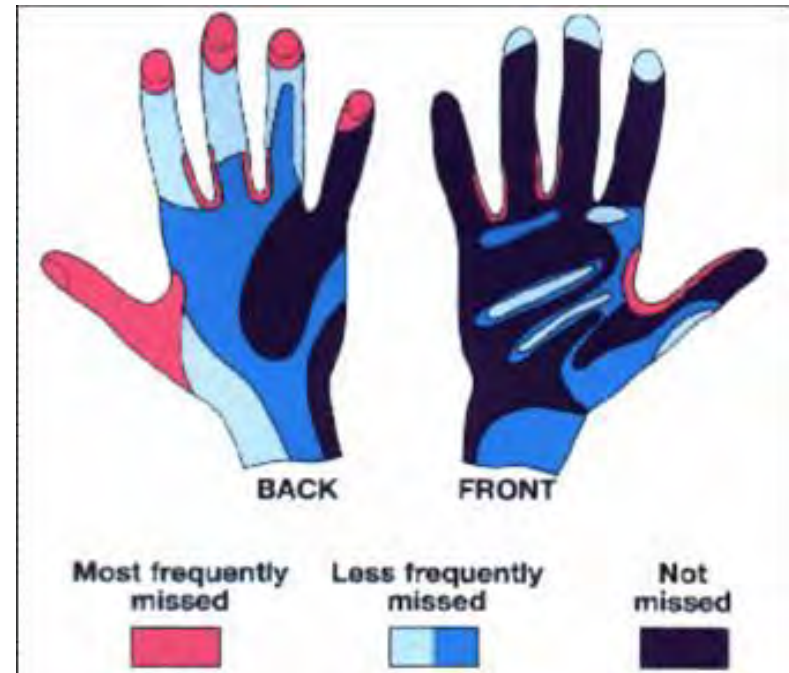
Estimated Preventability of Percutaneous Injuries Involving Hollow-Bore Needles NaSH June 1995—December 2007 (n=13,847)



More than half
the injuries
were believed
to be
preventable!

Hand Washing

- “Employees shall wash their hands immediately or as soon as feasible after removal of gloves or other PPE”
 - Best practice is to also wash hands before leaving laboratory
- Average person washes their hands for ~10 seconds – CDC recommends at least 20 seconds (sing “Happy Birthday” twice!)



Personal Protective Equipment (PPE)

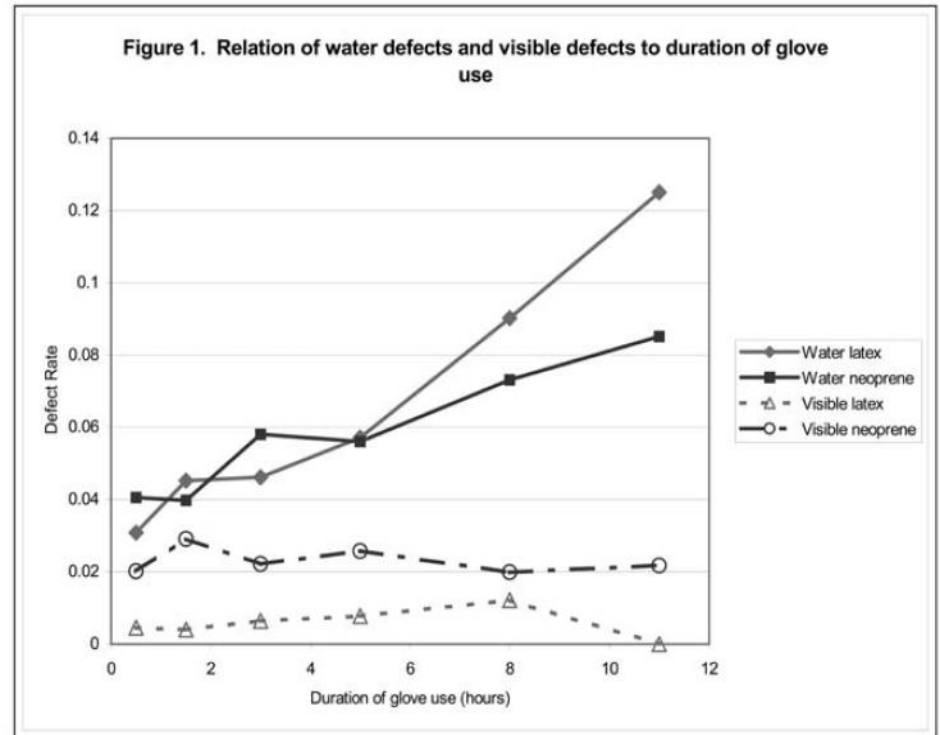
- ♦ Must be supplied by the employer
- ♦ Wear it WHEN and WHERE you are supposed to
 - ♦ Do not wear in common areas (offices, hallways, bathrooms, cafeterias, etc) or when handling common-use items (doorknobs, elevator buttons, telephones)
- ♦ It must fit, be suitable to the task (use common sense), and be cleaned or disposed of properly (this does not mean taking it home to wash!)
 - ♦ Gloves
 - ♦ Latex or nitrile – vinyl does not hold up well!
 - ♦ Face and Eye Protection
 - ♦ Surgical mask, goggles, glasses w/side shield, face shield
 - ♦ Body
 - ♦ Gowns, aprons, lab coats, shoe covers

Absolutely no open toed shoes in the lab!



Gloves

- ♦ Jewelry, long fingernails & other mechanical stresses can cause holes.
- ♦ Pinholes may be present without noticeable visible defects.
- ♦ Change gloves frequently!



Decontamination/Disinfection

- ♦ HepB and HepC can remain infective in dried blood for long time periods
 - ♦ HepB infective in dried blood at RT for at least one week (MacCannell et al., Clin Liver Dis 2010; 14:23-36)
 - ♦ HepC for 16 hours (Kamili et al., Infect Control Hosp Epidemiol 2007; 28:519-524)
- ♦ Decontaminate work surfaces daily and after any spills
- ♦ FRESHLY DILUTED (w/in 24 hrs) solution of bleach or any EPA registered tuberculocide product effective against *M. tuberculosis*
 - ♦ http://www.epa.gov/oppad001/list_b_tuberculocide.pdf
- ♦ Ethanol evaporates too quickly to be an effective disinfectant!



How do I dilute my bleach?

Regular
household
bleach = 1:10
dilution



Concentrated
or germicidal
bleach = 1:14
dilution

Other safe work practices

- ♦ No eating, drinking, smoking, handling contacts or applying cosmetics in areas where blood/OPIM is handled or stored
- ♦ No mouth pipetting
- ♦ Work in ways that minimize splashes/aerosols
- ♦ Know how to handle spills and how to properly dispose of contaminated waste (covered in BMW training)



"What's the safest way to clean this up?"

Labeling

- ♦ Warning labels must be placed on:
 - ♦ Containers of regulated waste
 - ♦ Refrigerators & freezers containing blood or OPIM
 - ♦ Containers used to store, transport, or ship blood or OPIM
- ♦ Use red bags for waste containers



If you have an exposure:

- ♦ Wash wound with soap & water for 5 minutes; flush mucous membranes for 15 minutes
- ♦ **Seek immediate medical attention** (1-2 hrs max)
 - ♦ In Gainesville, call 1-866-477-6824 (Needle Stick Hotline)
 - ♦ In Jacksonville, 7am-4pm, go to Employee Health Suite 505 in Tower 1; Other hours, go to ER
 - ♦ Other areas, go to the nearest medical facility
- ♦ Notify supervisor
- ♦ Contact UF Worker's Compensation Office, 352-392-4940
- ♦ Allow medical to follow-up with appropriate testing & required written opinion



Needle Stick Hotline Cards – Gainesville Use Only

- ♦ The number for the needle stick hotline has not changed but this number will no longer handle general biohazard exposures – only exposures to blood/OPIM.
- ♦ Discard your old cards and replace them with a new one.

Old card



New card



Factors considered in assessing need for PEP

Type of exposure	Type/amount of fluid/tissue	Infectious status of source	Susceptibility of exposed person
Percutaneous injury (depth, extent, device)	Blood	Presence of HepB surface antigen (HBsAg) and HepB e antigen (HBeAg)	HepB vaccine and vaccine response status
Mucous membrane exposure	Fluids containing blood	Presence of HepC antibody	Immune status
Non-intact skin exposure		Presence of HIV antibody	
Bites resulting in blood exposure to either person			

U.S. Public Health Service Guidelines for postexposure management/prophylaxis:

<http://www.jstor.org/stable/10.1086/672271> (HIV - 2013)

<http://www.cdc.gov/mmwr/PDF/rr/rr5011.pdf> (HBV/HCV – 2001)