Phlebotomy: Needle Stick Prevention and Safety

Kathleen Finnegan, MS MT(ASCP)SHCM
Clinical Associate Professor and Program Director of the Phlebotomy Training Program, Dept. of Clinical Laboratory Sciences, Stony Brook University, New York

DESCRIPTION:

Needle sticks are always a concern of the phlebotomist. It is important to know how to avoid a needle stick and what to do if one does occur, including the treatment options.

OBJECTIVES:

At the end of the session, participants will be able to:

- Define occupational exposures
- Discuss what are considered occupational exposures
- Discuss the risk of infection after an occupational exposure
- Define circumstances, locations and personnel that are involved with accidental needle sticks
- Discuss how we can prevent accidental needle sticks
Objectives

- Define and discuss occupational exposures
- Define circumstances, locations and personnel that are involved with accidental needle sticks
- Discuss how we can prevent accidental needle sticks
- List strategies for creating a safety culture
Occupational Exposure:

- **Defined as:**
  - Skin, eye, mucous membrane, nonintact skin or parenteral contact with blood or other potentially infectious material (blood, saliva, tissue or body fluids)

- **Parenteral contact includes:**
  - piercing mucous membranes or the skin barrier through a needle stick, bite, cut or abrasion
  - Needlestick or cut with a sharp object

The Problem of Sharps Injuries

- CDC estimates ~385,000 sharps injuries annually among hospital-based healthcare personnel*

- According to NIOSH Alert Preventing Needlesticks in Health Care Settings, it is estimated 600,00 to 800,000 needlesticks injuries occur annually among health care workers*

- Sharps injuries are a hazard
  - Increased risk for bloodborne virus transmission
  - Cost to workers and healthcare system

*Bloodborne Pathogens and Needlestick Prevention, www.OSHA.gov
  * Accessed 1/17
Sharp Injuries Prevention

- Eliminating the unnecessary handling of needles
- Using safety device features
- Promoting education and safe work practices
- Engineering controls to remove or isolate bloodborne pathogens
- Personal protective equipment
- Comprehensive program to prevent transmission of bloodborne pathogens

Occupational Exposure

- Hepatitis B Virus (HBV)
- Hepatitis C Virus (HCV)
- Human Immunodeficiency Virus (HIV)

- Blood is the single most important source of these viruses in the workplace
- More than 20 pathogens can be transmitted via sharps
Risk of Infection

- Depends on:
  - Pathogen involved
  - The type of exposure
  - The amount of virus in the patient’s blood at time of exposure
  - Immune status of worker
  - Severity of the needle stick
  - Appropriate Post exposure Prophylaxis

- HIV
  - Needle stick: 0.3% (1 in 300)
  - Eye, nose mouth: 0.1% (1 in 1,000)
  - Non-Intact Skin: 0.1% (1 in 1,000)

- HBV: 6 – 30% (Not immunized)

- HCV: 1.8%

- Workbook for Designing, Implementing and Evaluation of Sharps Injury Prevention Program Blood, CDC 2008
- Accessed 1/17

What is EPINet

- Exposure Prevention Information Network
- Provides a standard method for tracking percutaneous injuries and blood and body fluid contacts
- Introduced in 1992
- Can identify injuries that may be prevented with safer medical devices
- Analyze injury frequencies by job, device and procedure
- Evaluate the efficacy of new devices
- Accessed 1/17
EPINet

- Exposure Prevention Information Network

<table>
<thead>
<tr>
<th>Job Category</th>
<th>2006</th>
<th>2009</th>
<th>2011</th>
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</thead>
<tbody>
<tr>
<td>Nurse</td>
<td>40.5%</td>
<td>43.4%</td>
<td>41.9%</td>
</tr>
<tr>
<td>Doctor Intern</td>
<td>10.9%</td>
<td>6.9%</td>
<td>8.9%</td>
</tr>
<tr>
<td>Doctor Attending</td>
<td>9.5%</td>
<td>13.9%</td>
<td>13.9%</td>
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<tr>
<td>Phlebotomist</td>
<td>5.0%</td>
<td>4.4%</td>
<td>3.5%</td>
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<tr>
<td>Clinical Lab Worker</td>
<td>1.9%</td>
<td>0.9%</td>
<td>0.4%</td>
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</table>

EPINet 5 year summary 2009-2013

Where did the injury occur
- Patient room: 54.0%
- Operating Room: 13.8%
- ER: 7.6%
- ICU/CCU: 7.6%
- Outpatient/Clinic: 5.5%

Type of device
- Syringe Disposable: 53.0%
- Winged Needle: 3.9%
- Needle Vacuum: 1.8%
- Lancet: 0.4%
- Suture Needle: 5.2%
EPINet

When did the injury occur
- Injection into the skin: 33.0%
- After use, before disposal: 22.9%
- Between Steps: 7.0%
- Putting into the disposal container: 5.5%
- Recapping: 3.7%
- While disassembling device: 4.8%
- Device left on table, bed etc.: 5.2%

Was the sharp item contaminated?
- Yes: 92.2%
- No: 2.8%

EPINet

Was the safety mechanism activated
- No: 64.3%
- Yes partially: 27.0%
- Yes fully: 8.0%

When did the injury occur
- Before activation: 50.4%
- During activation: 32.3%
- After activation: 16.2%
EPINet

Did the sharp item penetrate
- Single pair of gloves 68.9%
- Double pair of gloves 18.4%
- No gloves 12.7%

Depth of the Injury
- Superficial 59.2%
- Moderate 38.1%
- Deep 2.2%

Blood and Body Fluid Exposure
- Which body fluid were involved in the exposures?
  - Blood/blood products 69.9%
  - Vomit 3.6%
  - Sputum 11.9%
  - Salvia 11.6%
  - Urine 4.0%
  - Other 17.6%
- Was the body fluid visibility contaminated with blood?
  - Yes 67.7%
  - No 22.3%
  - Unknown 10.0%
EPINet SUMMARY

<table>
<thead>
<tr>
<th>Year</th>
<th>Daily Census</th>
<th>Needlestick Injury</th>
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<tbody>
<tr>
<td>2011</td>
<td>3638</td>
<td>708</td>
</tr>
<tr>
<td>2009</td>
<td>4,440</td>
<td>897</td>
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<tr>
<td>2008</td>
<td>4,920</td>
<td>1194</td>
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<tr>
<td>2007</td>
<td>3,400</td>
<td>951</td>
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<tr>
<td>2006</td>
<td>3,450</td>
<td>950</td>
</tr>
<tr>
<td>2006</td>
<td>3,885</td>
<td>1055</td>
</tr>
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</table>

Assessing the Need for Follow-up

- **Type of exposure**
  - Percutaneous injury
  - Mucous membrane exposure
  - Non intact skin exposure
  - Bites resulting in blood exposure

- **Type and amount of fluid/tissue**
  - Blood
  - Fluids containing blood
  - Potentially infectious fluid (semen, vaginal, etc..)
  - Direct contact
Assessing the Need for Follow-up

- **Infectious status of source**
  - Presence of HBsAg
  - Presence of HCV antibody
  - Presence of HIV antibody
- **Susceptibility of exposed person**
  - Hepatitis B vaccine
  - Vaccine response
  - HBV, HCV, and HIV immune status

What Should I Do If I Am Exposed?

- **Immediately following exposure:**
  - Wash needle sticks and cuts with soap and water
  - Flush splashes to the nose mouth or skin with water
  - Irrigate eyes with clean water, saline or sterile irrigates
  - Report the exposure to your supervisor
  - Discuss possible risks of acquiring an infection
  - Have baseline labs drawn
  - Counseling
Hepatitis B

- Partially double stranded circular DNA virus
- Virus consists of a central core nucleocapsid containing viral DNA
- Surrounding envelope containing the surface protein or surface antigen

Hepatitis B

- **US Statistics**
  - Estimated 19,000 new infection in 2012
  - Estimated 1.2 million people with Chronic HBV infection
- **Symptoms**
  - Incubation period 45 – 160 days
  - Onset insidious
  - Flu like, symptoms generally don't appear until 6 months after viral infection
  - Can include jaundice, fatigue, abdominal and joint pain, nausea, vomiting, low grade fever, dark urine, skin rashes
  - Most HBV infected adults will recover within six months
Hepatitis B Routes of Transmission

- Percutaneous
  - Contaminated needle stick
  - Hemodialysis
  - Human bite
  - Transplant or transfusion of unscreened blood product
  - Acupuncture, tattooing, body piercing
- Permucosal
  - Sexual intercourse
  - Perinatal (infant born to an HBV infected mother)
  - Contact with infected objects (razor with blood contamination)

Hepatitis B

- **Effects**
  - Death can result in chronically infected (2 – 3%)
  - Self limiting 95%
  - Chronic carriers can develop long term active hepatitis which can progress to cirrhosis and hepatic cancer
  - Individuals who are both Hepatitis B surface antigen positive and HBe Ag positive have more virus in their blood and are more likely to transmit HBV
- **Prevention**
  - Hepatitis B vaccine
  - Post exposure should begin as soon as possible 24 hours, no later than 7 days
- **Trends**
  - 10 – 49 year – old most affected
  - About 1.25 million chronically infected
Testing to Determine Immunity

- Anti-HBs: antibody to the surface antigen
- Is the only marker for determining immunity to HBV
- The level of circulating anti HBs is used to determine the effectiveness of vaccination
- The hepatitis B vaccine is designed to introduce only anti HBs (the protective antibody) not anti HBC
- In the U.S. an antibody of 10 mIU/mL or higher indicates immunity

Hepatitis C Virus

- Single positive stranded RNA viruses
- Small in size
- Lipid enveloped virus
Hepatitis C

- **US Statistics**
  - Estimated 22,000 new infection in 2012
  - Estimated 3.2 million people with chronic HCV infection

- **Symptoms**
  - Onset insidious
    - Average 6-7 weeks with a range of 2-26 weeks
  - Majority of infected people (60 – 70%) asymptomatic
    - 10 – 20% develop nonspecific symptoms
  - When symptoms do appear they generally occur 1-2 months after exposure
  - Jaundice, fatigue, dark urine, abdominal pain, nausea, vomiting

- **Individuals at Risk**
  - Injecting drug users
  - Persons occupationally exposed to blood
  - Hemodialysis
  - Transfusion and transplant prior to 1992

- **Transmission**
  - IV drug abuse, body piercing, organ and blood transfusions, contaminated needle, sexual activity
  - Contaminated needles
    - 10 – fold greater than of HIV
Hepatitis C

- **Effects**
  - 60 - 85% of infected individuals acquire chronic form
  - Of those 1-15% develop cirrhosis
  - Hepatocellular carcinoma develops in 1-5% of individuals with chronic HCV
  - HCV is now the leading cause for liver transplantation in the US

- **Prevention**
  - Immune Globulin
  - Heptazyme: inhibits viral synthesis
  - Alpha interferon
  - Direct oral agents *Harvoni

- **Trends**
  - 2.7 million with the chronic form
  - Expected to triple in the next 10–15 years

Hepatitis D

- Small virus
- Single stranded RNA virus
- HDV prevalence corresponds to the prevalence of chronic HBV infection
- HDV requires the help of HBV to exist
- Infects an average of 4% of acute hepatitis B cases
Route of Transmission

- **Percutaneous**
  - Contaminated drug use equipment
  - Contaminated needles
  - Person to person
  - Transfusion of infected blood and blood products
- **Per mucosal**
  - Sexually transmitted but less efficient than HBV

Hepatitis D

- **Symptoms**
  - Can be acquired either as a co-infection or a super infection in persons already infected with HBV
  - Incubation period 3 – 7 days
  - Symptoms of a co-infection HBV-HDV are similar to HBV but can be more severe
- **Prevention**
  - No vaccine
- **Effects**
  - 70-80% of chronic HBV carriers with HDV super infection develop chronic liver disease with cirrhosis
HIV

- **Symptoms**
  - Flu-like symptoms, fever, diarrhea, swollen glands and fatigue

- **Transmission**
  - Contact with infected blood or blood products, semen, vaginal secretions, perinatal transmission
  - Must get into the bloodstream by direct entry into a vein, a break in the skin or through mucous linings

- **Treatment**
  - Post exposure Prophylaxis 1 – 2 hours

**Relative Risk for HIV Transmission**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep Injury</td>
<td>15%</td>
</tr>
<tr>
<td>Visible Blood on Device</td>
<td>6.2%</td>
</tr>
<tr>
<td>Terminal Illness in Source Patient</td>
<td>5.6%</td>
</tr>
<tr>
<td>Device in Source Patient Blood Vessel</td>
<td>4.3%</td>
</tr>
<tr>
<td>ZDV used by HCW post Exposure</td>
<td>0.19%</td>
</tr>
</tbody>
</table>
Post exposure Prophylaxis (PEP)

- Public Service recommends a 4 – week course of a combination of antiretroviral drugs
- Antiretroviral therapy (ART) results in better clinical outcomes
- Failures have occurred & recommendations change due to approval of new antiretroviral drugs

When Does Treatment Start?

- 1-2 hours after exposure
  - Effective within 24 hours of exposure
  - No later than 36 hours
- Interval after which PEP is not effective is unknown, but holding up treatment may increase risk of transmission
- It does not prevent, early treatment is proven beneficial
- Public Health Services recommend 4 weeks of treatment
Recommendations:

- Not all exposures result in HIV transmission, the side effects may exceed the risk of HIV infection
- HIV status of the patient known?
- Must obtain consent, confidentiality maintained at all times
- Report your exposure
- Baseline testing should be performed

PEP Recommendations

- Break in the skin by a sharp object which is visibly contaminated with blood
- Bite from a HIV – infected patient with visible bleeding
- Splash of blood or bloody fluid to a mucosal surface
- A non – intact skin exposure to blood or bloody fluid (open wound, chapped skin)
- Source patient is potentially HIV infected
Treatment Side Effects

- 50-90% report side effects
- 24-36% stop
- Common side effects: upset stomach, nausea, vomiting, diarrhea
- Other: Headaches, malaise, fatigue, insomnia, pancytopenia, kidney stones, hepatitis
- Newer drugs may not have as many side effects

Monitoring

The Long Year Wait
- Continue testing 6, 12, 24, 52 weeks post exposure
- Sero conversion is usually detected within 6 months
- Antibody production usually produced 6 – 12 weeks after infection
- CBC and liver enzymes
Needle Stick Exposures

- The likely hood of a needle stick following a blood draw is 7 times greater than any other point during the procedure
- OSHA requires employers to provide free medical evaluation and treatment
- Decontamination
- Report incident to supervisor
- Medical Evaluation
- Counseling

Sharp Hazards

- Never recap needles or cut needles
- All needles, lancets, etc.. Must be disposed of in a puncture resistant container immediately after use
- Puncture resistant containers with a biohazard label should be conveniently located
- Use safety equipment correctly
**COST:**

- 1 NEEDLE STICK $71 - $5000
  - IF HIV positive > $500,000
    - Testing
    - Counseling
    - Follow up
    - Medications

**Indirect Costs**

- Loss of employee time
- Cost of tying up staff to investigate the injury
- Expense of laboratory testing
- Cost of treatment for infected staff
- Cost of replacing staff
OSHA: Know Your Rights

- Employee Training: 1910.1030(g)(2)
- Post-exposure Evaluation and Follow up: 1910.1030(f)
- Hepatitis B Vaccination 1910.1030(f)(2)
- Record keeping 1910.1030(h)

www.oshs.gov
Accessed 1/17

Revised Directive

- **Development of an Exposure Control Plan (ECP)**
  - ECP must document changes in technology that helps eliminate or reduce exposure
  - Documentation of an employer’s annual consideration and implementation of safe medical devices
  - Employers must record the solicitation and input provided by employees in their selection of safer devices

- **New Record Keeping rule**
  - Record all work related needle sticks and cuts from sharp objects contaminated with blood
  - Devise a way to maintain the privacy of the employee
Occupational Report Recommendations

- Date and time of exposure
- Details of the procedure being performed
- Type of device involved
- Presence of absence of a safety device
- Details of the exposure
- Details about the exposure source
- Details about the exposed person
- Details about post exposure

Evaluation Tool Box

- Provides:
  - Guidance on the evaluation
  - Selection of equipment
  - Appropriate use of engineering and work practice controls
  - To provide the highest degree of control to prevent injury
Choosing Needle Safety Devices

- **Device Selection**
  - The device must be effective to decrease injuries
  - The device must be acceptable to users
  - The device should not adversely affect patient care

Device Selection

- **Identify Need**
  - What type of device is needed
    - Examine injury surveillance data
  - **Select Device**
    - Frontline users should be included
  - **Conduct a Product Evaluation Trail**
    - Choose a usage area evaluate with definite criteria
- **Implementation**
  - Distribution and training
  - Obtain feedback
- **Evaluation of Effectiveness**
  - Examine injury surveillance, satisfaction, and compliance
Device Criteria

- Does the device work as promised?
- What studies have been conducted on the use of the device?
- Is it FDA approved?
- Is the device designed in such a way that the user will deploy the safety mechanism?
- Is it user friendly?
- What are the pros and cons of the device?

Equipment Selection

- Passive safety devices
  - Workers do not have to activate them
- Active devices
  - Are required to activate the safety device
- Integrated safety device
  - A built in safety device that can't be removed
Additional Control Measures

- Post-exposure evaluation
  - Within 2 hours of injury
- Sharps purchasing decisions
  - Purchasing decision on safety not cost
- Prohibited work practices
  - Facilities should prohibit practices like not using a safety transfer device
- Work surfaces should be cleaned and decontaminated
  - Cleaning of work surfaces
- PPE provision
  - In sizes that fit all workers

Additional Steps

- Get vaccinated HBV
- Treat sharps as dangerous
- Use safety devices
- Use safety devices correctly
- Dispose of sharps properly
CDC Five Strategies for Creating a Safety Culture

- Ensure organizational commitment
- Involve workers in planning and implementing activities that promote a safe environment
- Identify and remove sharp injury hazards in the work environment
- Develop feedback systems to increase safety awareness and promote individual accountability
- All advocates must work together to unify agendas and maximize efforts to protect healthcare workers, patients and families

STOP THINK ACT SAFELY
Thank You
References

- **EPINet Report**

- **Centers for Disease and Prevention. Workbook for Designing, Implementing, and Evaluating a Sharps Injury Prevention Program.2008**

References

- **NIOSH ALERT: National Institute for Occupational Safety and Health**
- What every worker should know: How to protect yourself from Needle stick Injuries, Preventing Needle stick Injuries in Health Care Settings
  [www.cdc.gov/niosh](http://www.cdc.gov/niosh)

- **OSHA Revisions to OSHA’s Bloodborne Pathogens Standard**