Needlestick

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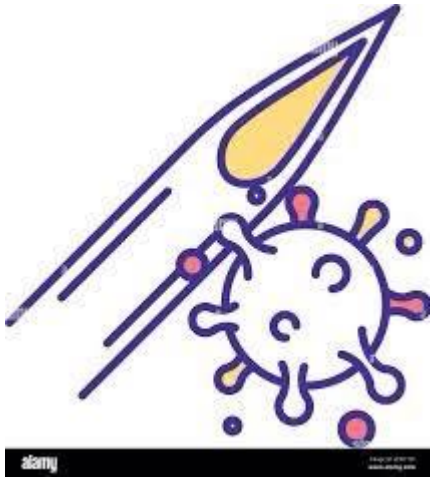
Needlestick injuries are frequent occurrences in healthcare settings and can lead to serious complications

The introduction of universal precautions and safety conscious needle designs has led to:

- ❑ a decline in needlestick injuries,
- ❑ But still continue reported
  on a much smaller scale

- ➢ Awareness of needlestick injuries started:
  soon after the identification of HIV in the early 1980s.

Today the major concern is



not HIV

but hepatitis B or hepatitis c.

Of the viruses, the most common organism acquired via a needlestick injury is:

hepatitis B

- Healthcare professionals at the highest risk for needlestick injuries:

- Surgeons
- emergency room workers
- laboratory room professionals
- nurses

- In most cases, needlestick injuries occur chiefly because of:

- unsafe practices
- gross negligence on the part of the healthcare workers.

- In the past ,the majority of needlestick injuries occurred during resheathing.

- Resheating:

- no longer recommended
- not resheathing the needle greatly increases the risk of needlestick injuries in house cleaners and porters.

- Further, this is more of a concern when:

- ignore policies
- plastic bags instead of the sharps containers.

- To prevent these injuries:

1. unique ways of resheathing needles.

   For example,in the operating room:

   established protocols on how
   pass sharp instruments and needles to the surgeon and vice versa.

2. double gloving.

Factors that increase the risk of exposure to body fluids:

1. Failure to adopt universal precautions.

2. Not following established a protocol of safety.

3. Performing high-risk procedures that increase the risk of blood exposure such as withdrawing blood, working in the dialysis unit, administering blood.

4. Using needles and other sharp devices that lack safety features.

What Organisms are Involved in Needlestick Injuries?

- In reality,

almost any microorganism

- but practically:

only a handful of organisms are of clinical concern.

- The most important organisms :

1. HIV
2. hepatitis B
3. hepatitis C
4. Tetanus

Etiology

The risk of a healthcare professional for developing any infection depends on:

1. the type of needle
2. the severity of the injury
3. the type of organism in the patient's blood
4. prior vaccination status.

Finally, one major determining factor in whether an infection will develop is:

5. the availability of post-exposure prophylaxis (PEP)

HIV

However, after a needlestick injury developing HIV is not common at all.
In fact, from 1981 to 2010, there have only been 143 possible cases of HIV that were reported among healthcare professionals.
Of these only 57 of the exposed workers seroconverted to HIV.
Percutaneous needlestick injury was the known cause in 84% of these cases. Other infections acquired from exposure were 9% by the mucocutaneous route and 4% by both routes.

Several prospective studies on healthcare workers reveal that:

- ✓ The risk of transmission from a single percutaneous needle stick or cut with a scalpel from an HIV-infected individual is about 0.3% or 3 out of every 1000 healthcare workers.

✓ several other studies indicate that:

The risk of HIV actuating after a needlestick injury is:
a lot higher especially in:

1. exposed to a higher quantity of blood
2. struck with a large-bore needle
3. high viral titers
4. patients who have just seroconverted at the time of the needlestick injury.

- About 30% to 50% of individuals who do contract hepatitis B may develop:
jaundice, fever, nausea, and vague abdominal pain.

- In most individuals,these symptoms will spontaneously subside in 4 to 8 weeks.

- About 2% to 5% develop chronic infection with hepatitis B.

- Over a lifetime, there is a 15% risk that these individuals will develop liver cancer or cirrhosis.

- The management depends on the recipient's vaccination status.
- Hepatitis B virus immunoglobulin is not recommended until serological data are obtained.
- In individuals who have not been vaccinated, hepatitis B immunoglobulin can prevent a full-blown infection.
- If the person is already infected, the immunoglobulin has been shown to produce a much milder infection.
- For hepatitis B immunoglobulin to be effective, it needs to be administered within the first 24 hours after exposure.
- It is used in combination with active immunization.

The rapid protocol for hepatitis B vaccine is :

✓ Intramuscular injections at times

1. 0
2. 1
3. 2

followed by a booster shot at

4. 12 months.

- Unfortunately the exact number of healthcare workers who have developed hepatitis C after a needlestick injury remains unknown, because of lack of follow-up.

- Today it is estimated that healthcare workers who suffer a needlestick injury and develop hepatitis C make up about 2% to 4% of the total number of hepatitis C cases.

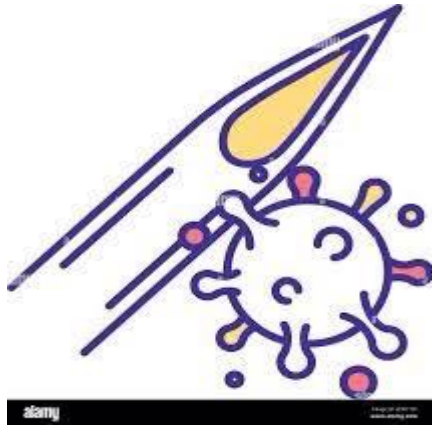
After a needlestick injury:

Most people do not have symptoms of hepatitis C,
or if they do develop symptoms, they are vague and may resemble a flu-like syndrome.
Unlike hepatitis B virus, where less than 6% of adults develop a chronic infection, with hepatitis C more than 75% of adults will develop a chronic infection.

About three-quarters of patients will develop acute liver disease, and of these, about 20% will go on to develop end-stage liver disease or cirrhosis.
About 1% to 5% of them will develop hepatocellular cancer over the next 2 to 3 decades.
While there is no post-exposure treatment for hepatitis C,
there are some newer drugs that have shown promise in preventing the progression of liver damage and lowering the rates of liver cancer.

Epidemiology

The exact number of needlestick injuries
not known
because many go unreported.



In the operating room, minor needlesticks :
not uncommon at all.

In the US alone, there are nearly 600,000 needlestick injuries of which half are not reported.

Needlestick injuries not only occur in hospitals but occur in every type of healthcare facility like:

- a clinic
- outpatient surgery
- day surgery
- urgent care center
- nursing homes
- cosmetic surgery clinics.

Impact of Safety Devices on Needle Stick Injuries

- Special safety engineered devices (SEDs) have been marketed widely in an effort to reduce the incidence of needlestick injuries.
  Contrary to an expected drop in needle sticks with greater use of SEDs, studies suggest that the incidence of needle sticks may have increased.

- The most common causes reported for needle sticks in the study were difficulties in operating the safety device and continued improper disposal of needles.

History and Physical

History:

- All previous immunizations and booster shots
- Any body piercings and when they were done
- Any history of hemodialysis
- Any prior exposure to bodily fluids and or treatment
- Complete medical history
- History of hepatitis B vaccination
- History of intravenous drug use
- Last tetanus shot
- Prior blood transfusion history
- Risk factors for HIV and viral hepatitis
- Sexual history
- Travel history outside the United States within the past 12 months

Physical

- a baseline physical exam of the skin, heart, lung, liver, and lymphadenopathy should be done.
- If the patient whose blood was involved in the needlestick injury is still in the hospital, then their blood work should be obtained to rule out the presence of HIV, HBV, and HCV.
- The injured healthcare worker should also have complete blood work, electrolytes, and baseline liver function studies.
- In addition, a serological profile of HIV, hepatitis B, and hepatitis C should be obtained.

- A pregnancy test must be done on all women of childbearing age.
- If the patient has not had a tetanus shot within the past 10 years, a tetanus booster shot must be administered.
- There is no vaccine against hepatitis C.
- Once the initial workup is completed, the infectious disease expert should be consulted ASAP to determine the need for post-exposure prophylaxis.

Evaluation

Usually, the only evaluation is a thorough history and physical exam. Rarely, there may be a

concern of a foreign body in which case an x-ray, ultrasound, or CT should be considered.

Laboratory studies include HIV and a hepatitis panel.

Evaluating for HIV:

CDC 3-Step Risk Assessment

The prerequisite for starting PEP for HIV with antiretrovirals is based on evaluating the risk by using the 3-step process developed by the CDC (2014b) and other agencies (Level B) as follows:

Step 1 Determine the Exposure Code:

One determines the exposure source which may be blood, bodily fluid or an instrument contaminated with blood (e.g., scalpel). If none, then the risk of HIV transmission is nil. If the answer is yes, then one has to determine the type of exposure:

- ❑ If exposure occurred to intact skin, then the risk of acquiring HIV is nil
- ❑ If exposure occurred to mucous membranes or in an area of the body where the skin was not intact (e.g., ulcer), one should determine the volume of fluid exposure - a few or large drops and the duration of contact.
- ❑ If the exposure was percutaneous, then was it via a superficial abrasion or a solid needle?
- ❑ What type of needle was involved? Large bore hollow needle and was it used to obtain blood from the patient's vein or artery?

Step 2 Status of Patient:

- It is important to know the HIV status of the patient.
- If negative, then PEP is not required.
- If the patient was HIV positive, what was the viral titer (low or high?) and CD4 count.
- If the HIV status of the patient is unknown, clinical judgment and the patient's past medical history is necessary to determine the status.

Step 3 Decision on Treatment:

Once the above data are collected post-exposure prophylaxis is determined.

- In general, if the risk of HIV exposure is low, then there is no need for treatment, but the observation is recommended.
- Individuals at high risk for HIV exposure are offered post-exposure prophylaxis.

There are always some cases where the risk may be indeterminate because the patient may not be available for testing. In such cases, one should weigh the benefits of HAART versus the potential adverse effects.

TABLE 1. Recommended HIV postexposure prophylaxis (PEP) for percutaneous injuries

Exposure type	Infection status of source				
	HIV-positive, class 1*	HIV-positive, class 2*	Source of unknown HIV status†	Unknown source§	HIV-negative
Less severe¶	Recommend basic 2-drug PEP	Recommend expanded ≥3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP** for source with HIV risk factors††	Generally, no PEP warranted; however, consider basic 2-drug PEP** in settings in which exposure to HIV-infected persons is likely	No PEP warranted
More severe§§	Recommend expanded 3-drug PEP	Recommend expanded ≥3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP** for source with HIV risk factors††	Generally, no PEP warranted; however, consider basic 2-drug PEP** in settings in which exposure to HIV-infected persons is likely	No PEP warranted

* HIV-positive, class 1 — asymptomatic HIV infection or known low viral load (e.g., <1,500 ribonucleic acid copies/mL). HIV-positive, class 2 — symptomatic HIV infection, acquired immunodeficiency syndrome, acute seroconversion, or known high viral load. If drug resistance is a concern, obtain expert consultation. Initiation of PEP should not be delayed pending expert consultation, and, because expert consultation alone cannot substitute for face-to-face counseling, resources should be available to provide immediate evaluation and follow-up care for all exposures.

† For example, deceased source person with no samples available for HIV testing.

§ For example, a needle from a sharps disposal container.

¶ For example, solid needle or superficial injury.

** The recommendation "consider PEP" indicates that PEP is optional; a decision to initiate PEP should be based on a discussion between the exposed person and the treating clinician regarding the risks versus benefits of PEP.

†† If PEP is offered and administered and the source is later determined to be HIV-negative, PEP should be discontinued.

§§ For example, large-bore hollow needle, deep puncture, visible blood on device, or needle used in patient's artery or vein.

From: https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5409a1.htm

Treatment / Management

Hepatitis B Treatment

The following 3 options are available for hepatitis B vaccine in healthcare workers who already have been vaccinated:

1. If the patient is HBsAg positive, the recipient's serology must be assessed. If the post-vaccination anti-HBs level is high (greater than 10 mIU/mL), this is known to be protective, and there is no need for further treatment, and a booster shot is not recommended. However, if the post-vaccination anti-HBs titer is low or if there is no HBV vaccine available, the healthcare worker should be administered hepatitis B immunoglobulin.

2. If the patient is HBsAg negative, the healthcare workers should be observed, and his or her anti-HBs levels should be monitored

3. If the patient has been discharged or is not available for testing, this requires a significant amount of clinical judgment. Most infectious disease experts treat such cases as if the source was HBsAg negative unless the source has a high risk for HBV infection (such as current or former IV drug use). In this case, the assumption is made that the patient is HBsAg positive, and Post-exposure prophylaxis is initiated (Level B).

If the healthcare worker is not vaccinated against hepatitis B, then these are the following 3 options:

1. If the patient is HBsAg positive, the healthcare workers should be administered HBV immunoglobulin immediately, followed by a rapid course of active immunization starting 14 days later.

2. If the patient is HBsAg negative, then there is no need to administer hepatitis B immunoglobulin; however, the healthcare worker should strongly be recommended to get the Hepatitis B vaccine.

3. If the patient is not available for testing, then the healthcare workers should be managed as if he or she is HBsAg negative.

- If there is any suspicion about the patient's clinical status, for example, if the patient had been admitted for a complication of intravenous drug abuse or had risk factors for hepatitis B, then the healthcare workers must be offered Hepatitis B immunoglobulin, and active vaccination should be recommended in 14 days time.
- According to the CDC, vaccination should be initiated if the exposed person is unvaccinated, and treatment with HBV immunoglobulin should be initiated if the source person is in a high-risk category (Level A)

HIV Prophylaxis

Today the recommendations for postexposure prophylaxis involve the use of 3-antivirals.
The drug treatment should be initiated as soon as possible, preferably within hours of exposure.

The duration of treatment is for 4 weeks.

Currently, the CDC recommends using two nucleoside reverse transcriptase inhibitors (NRTIs) combined with a third drug, which is usually a protease inhibitor.

For example, one may combine Tenofovir, emtricitabine plus either dolutegravir or raltegravir.
Zidovudine is no longer utilized in this drug regimen because it has not been shown to offer any additional advantage.

- Once a needlestick injury has occurred, the healthcare worker must seek emergency care.
- The site of the needlestick must be thoroughly rinsed with saline or water, and the wound must be cleaned.
- In most cases, there is no need to use antiseptic solutions to wash the area.
- Wound infections usually do not develop within the first 24 hours.
- Following the injury, there is acute pain, and then most individuals have no other immediate symptoms.
- However, anxiety, panic, and apprehension are very common because of the fear of contracting a viral infection.
- There is also a federal law that ensures that all employers of such injuries receive complete medical coverage, including post-exposure prophylaxis and vaccine within a reasonable time at no cost to the employee.

Differential Diagnosis

- Rapid HIV testing
- Sexual assault
- Viral hepatitis
- Workers compensation

Prognosis

- Once a needle stick injury occurs, all healthcare workers need to follow up with the local Occupational Health and Safety Clinic within 12 to 72 hours.
- During the workup, the individual must be asked to abstain from sexual intercourse until the HIV testing is negative.
- In fact, most infectious disease experts recommend safe sex or no sex until the second confirmatory HIV test is also negative, which is usually 4 to 6 months.
- If the initial workup is negative, then the individual needs to be followed up at 2 and 6 months.
- The prognosis is the same as if they had acquired the organism via any other route.

Consultations

Consider consultation with an infectious disease nurse or infectious disease specialist.

Enhancing Healthcare Team Outcomes

Experts suggest that no one safety policy can work all the time and thus, one should have an all-inclusive policy that recognizes the behavior of the healthcare workers, institutional policies, and safe use of sharps and other devices.

A critical part of any preventive program is to reduce the use of needles whenever possible and utilize other options when available.

Hospital workers may also undergo continuous education and training on the newer devices used during dialysis and blood withdrawal.

A monitoring program is essential as it can help eliminate potential risk factors that are responsible for needlestick injuries to ensure that the system is working.

Today, most hospitals have an infectious disease committee that consists of:

nurse

Pharmacist

laboratory technologist

Physician

Risk manager

that recommends and introduces safety policies.

However, because of the nurse's position, she or he is in a prime position to ensure that the safety rules are being adhered to.

The only way to reduce needlestick injuries is by being aware, enforcing the rules, and performing random audits on other healthcare workers.

Outcomes

Although many advances have been made in the development of safer needles and sheathing devices,

these devices are not fail-safe and only work in settings where the work environment is constantly monitored.

Today most hospitals have instituted policies and protocols to prevent needlestick injuries by advocating the following:

- ❑ Establish an occupational health and safety program that primarily monitors and identifies any high-risk procedure and recommended safety maneuvers
- ❑ Introduce safe needle use procedures, and use of needleless devices where possible
- ❑ Establish the cause of all injuries that occur and how they could have been prevented
- ❑ Minimize the use of needles where possible
- ❑ Encourage the use of needles with safety features
- ❑ Alters any dangerous work practice on the floor and in the operating room

- ❑ Provides healthcare professionals with education in needlestick injuries, their prevention, and the current management guidelines
- ❑ Promotes a safety culture free of retribution
- ❑ Encourage reporting of unsafe practices without fear of reappraisal
- ❑ Conducts random audits to ensure that hospital policy and procedures are being followed
- ❑ Assesses outcomes periodically

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THANK YOU