



WGO Practice Guideline: Needle Stick Injury and Accidental Exposure to Blood

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Definitions

Needlestick Injury : the accidental puncture of the skin by a needle during a medical intervention

Accidental exposure to blood: the unintended contact with blood and or with body fluids mixed with blood during a medical intervention.

2. Risks

Accidental exposure to blood caused by needle injuries or injuries following, cutting, biting or splashing incidents carries the risk of infection by blood-borne viruses such as the hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV).

HBV risk= 5 - 40%
HCV risk= 3 - 10%
HIV risk = 0.2 - 0.5%

HBV prevalence is higher than average in intravenous drug users, homosexual men and in people from developing countries.

HCV prevalence is higher in people who have had multiple blood transfusions, in dialysis patients and intravenous drug users.

HIV prevalence is also higher in homosexual men, in intravenous drug users and in people from areas where the condition is endemic.

Accidental contact with blood occurs especially in the following situations:

1. During re-capping

2. During surgery, especially during wound closure
3. During biopsy
4. When an uncapped needle has ended up in bed linen, surgery clothing etc
5. When taking an unsheathed used needle to the waste container
6. During the cleaning up and transporting of waste material
7. When using more complex collection & injection techniques
8. In A&E (Accident and Emergency) departments
9. In high-stress interventions (diagnostic or therapeutic endoscopy in patients with gastrointestinal bleeding)

Although this does not occur very often, there are other blood-borne microorganisms which can be transmitted via blood exposure:

- Other hepatitis viruses
- Cytomegalovirus (CMV)
- Epstein-Barr virus (EBV)
- Parvovirus
- Treponema pallidum (syphilis)
- Yersinia
- Plasmodium

Accidental exposure to blood following a needlestick injury is probably one of the most common occupational health accidents in medical care.

3. Avoiding needlestick injury and avoiding infection

3.1. General

The single most important measure to prevent needlestick injury is to not put the used needle back in its original cover; re-capping and re-sheathing must be avoided. Instead use a rigid puncture-proof container for used needles. It is important that the container is always close to hand to avoid the temptation of re-capping. It is equally important to use proper protective clothing such as gloves, mouth mask, and goggles which are appropriate during the performance of endoscopy.

3.2. Prevention

The most important rule for preventing needlestick injury is not to put the needle back in its cover, instead, the needle should be put in a specially designed, rigid, puncture-proof needle container. Make sure the container is always at hand.

3.2.1. Vaccination

Every hospital employee or any healthcare personnel at risk from accidental exposure to blood should be vaccinated against HBV. There are no preventive vaccines available yet for HCV and HIV.

3.2.2. Prevention of accidental blood contact

Personal protective equipment and clothing is very important. Use mouthmasks, gloves and gowns. Double gloving is safer than single gloving. Each additional layer of protective barrier (such as one or two gloves) significantly reduces the threat of any infectious agent present on the outside of the needle. Research shows a decreased or absent needlestick injury risk when using prior skin puncture techniques, or when using a needle-free delivery mechanism

such as jet-injection devices. Needle type and design is also important. For example needles with safeguard mechanisms (safety barrel) or blunt tipped needles, can reduce the frequency of needlestick injury.

Adequate training in safety procedures and improved compliance with safe operating room behavior can significantly reduce injury and infection risks. The maintenance of a safe operating room atmosphere is totally dependent on the atmosphere set by the operator.

3.2.3. Disinfection of contaminated material

After spilling possibly contaminated materials the affected area should be cleaned immediately (wearing gloves!) and then disinfected. Nursing equipment and materials, tools and small surfaces are cleaned with 70% alcohol. Large surfaces such as floors are disinfected with a chlorine solution 1000 ppm.

4. Immediate action after injury

Taking care of the wound immediately after the accident

Let the wound bleed for a moment and then cleanse thoroughly with water or a saline solution. Disinfect the wound using an ample amount of soap and water followed by 70% alcohol. In case of contact with mucous membranes it is important to rinse immediately and thoroughly, using water or a saline solution only, not alcohol.

Reporting the incident

It is important to report the incident immediately to the department dealing with occupational accidents. This will allow proper registration and subsequent management of the event.

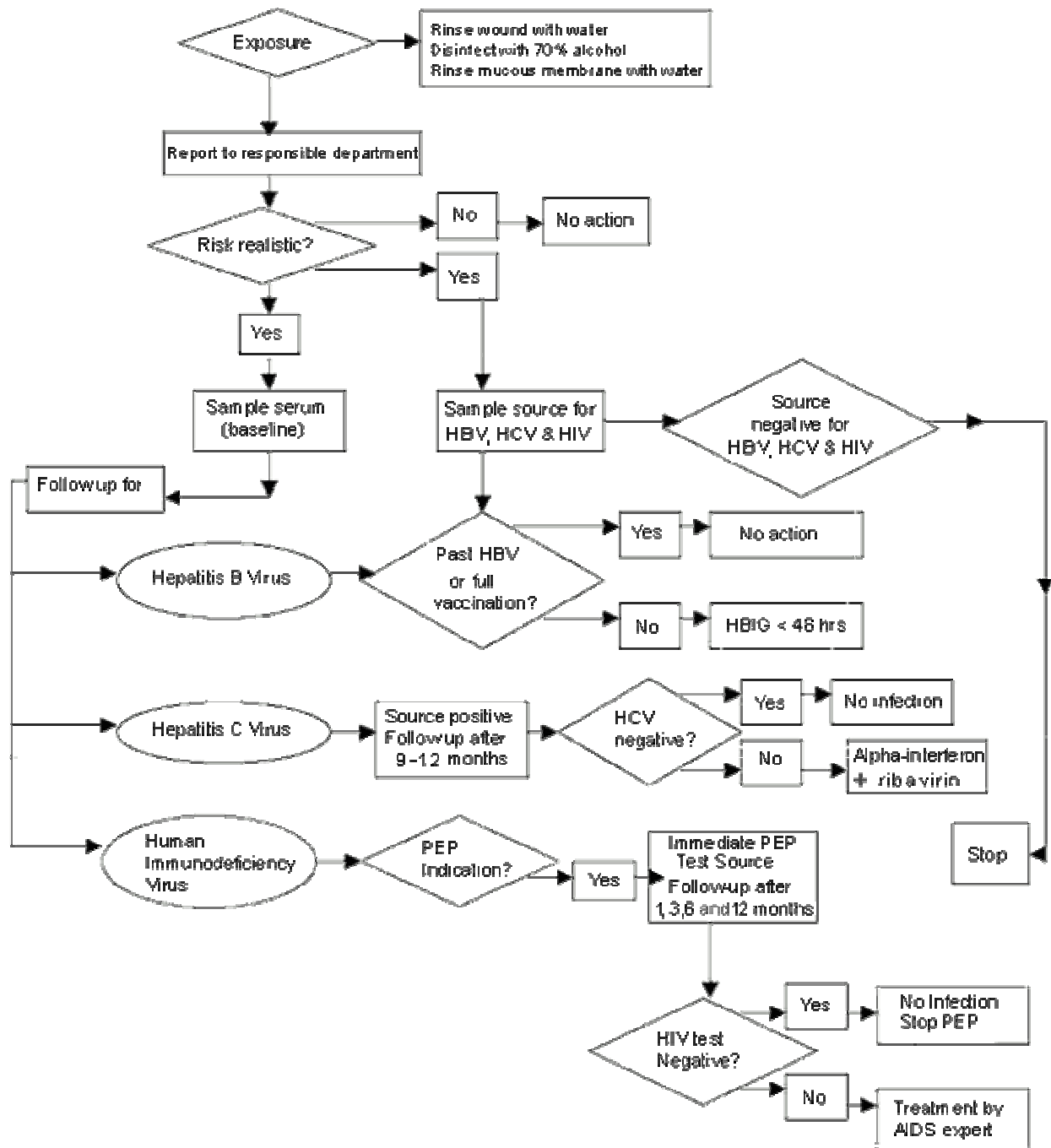
Immediate action (injured person)

A blood sample should be taken as soon as possible after the injury. This sample should be kept for at least one year. It can act as a baseline value in case infection takes place and it becomes necessary to determine whether infection by one of the three viruses occurred at work. The kept sample may only be analysed for this particular purpose. Further blood samples to test for HBV, HCV and HIV are collected after 1, 3, 6 and 12 months.

Immediate action (dealing with the potential source)

If the source of the blood is known the patient must be asked for permission to sample blood for a HCV and HIV test. If the patient refuses then it must be assumed the patient is a carrier of the virus. If the origin of the blood is unknown then any blood present on the needle can be used for a serological examination.

Table One: Accidental Exposure to Blood - Flowchart



Note: PEP = Post Exposure Prophylaxis (see 5.4.2)

5. Treatment approaches

5.1. General Prophylaxis

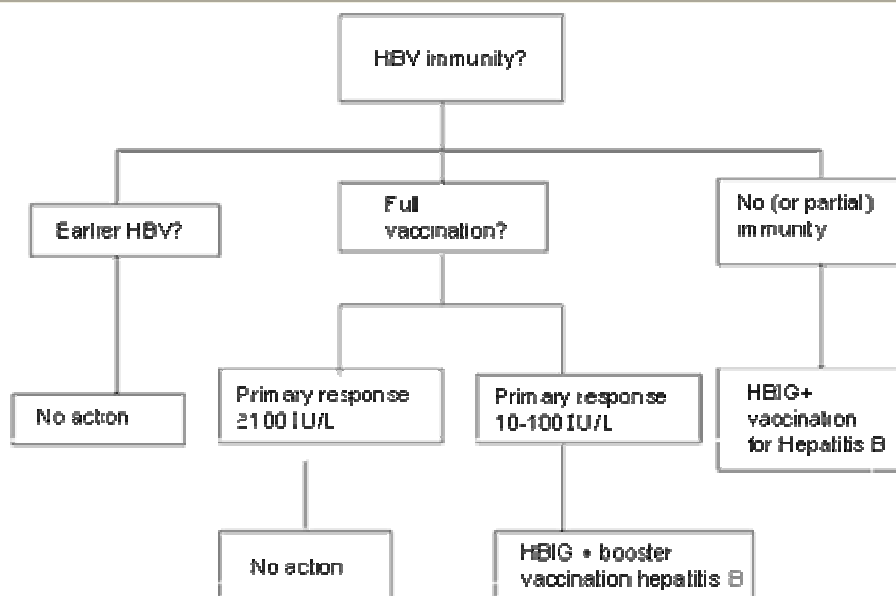
Management is based on finding out whether there is a risk of HBV, HCV or HIV . Depending on the serological analysis of the sample, steps must be taken to limit infection risks from the identified virus.

5.2. What to do after a potential HBV infection

Management of the situation is based on whether or not the injured person is immune for HBV, either as a result of vaccination or otherwise. There are two possibilities:

1. **Subject has full immunity, if:**
 - a. the person has had at least three vaccinations against HBV plus a subsequent check for antibodies
 - b. the response after vaccination is more than 10 IU/l
 - c. the person has had hepatitis B in the past.
2. **Subject has a partial (or no) immunity, if:**
 - o there was only a limited vaccination against HBV or none at all. Should this be the case then 5 ml intramuscular hepatitis B immunoglobulin (HBIG) should be given within 48 hours of the injury.

Table Two: Prevention of HBV infection after accidental exposure to blood



5.3. What to do after a potential HCV infection

There is no effective drug prophylaxis for HCV. There are some experimental treatment possibilities provided the infection is diagnosed at an early stage. The case should be followed closely for 12 months and a serological examination for HCV should be done after 3, 6 and 9-12 months. If one of these follow up analyses finds HCV antibodies then a comparison with the baseline blood sample taken immediately after the accident will show whether or not this involves an occupational accident. In case of a positive HCV test, a combination treatment of interferon and ribavirin is the treatment of choice. A liver specialist should be consulted.

5.4. Risks and what to do after a potential HIV infection

5.4.1. Risk of HIV Infection

The risk of a HIV infection following exposure to blood is very small (0.1-0.5%). The actual risk depends on type of contact and on the amount of virus in the contaminated material.

*Table 3: HIV infection risk after accidental contact with blood
Post Exposure Prophylaxis (PEP) recommendation*

Type of contact	Infection Risk	PEP?
Percutaneous injury		
- Deep	> 0.3%	Recommend
- Surface	< 0.3%	Recommend
Mucous membrane/broken skin		
- Large surface	0.1%	Recommend
- Small surface		Offer the option
Unbroken skin	<0.1%	Advise against

The chance of an HIV infection can be reduced considerably if an early start can be made - within 2- 8 hours - with HIV inhibitors.

There are some factors which are associated with a higher risk

1. Deep wounds
2. Visible blood on the instrument
3. Needlestick injury by using hollow-bore needles containing blood
4. Intravenous or intramuscular injection of contaminated blood
5. Blood from a patient with a high virus level (for example untreated or terminal AIDS patients)

Immediate action after Needlestick Injury

After a review of the accident with the doctor responsible for occupational health and safety a recommendation is given whether or not to prescribe Post Exposure Prophylaxis (PEP). If in doubt it is best to contact an AIDS expert. If PEP is advisable then it is important to discuss :

1. the advantages and disadvantages of PEP
2. the necessary follow-up examinations (of liver and kidneys) after 2 weeks, 1, 3 and 6 months)
3. follow up examination for HIV infection (after 1, 3 and 6 months)
4. the importance of avoiding transmission to sexual partner(s) (use of condoms)

Start PEP as soon as possible after this.

Table 4: PEP or no PEP

Type of exposure to HIV infected material	Source Material	Antiviral prophylaxis	Treatment
Percutaneous	Blood		
	Increased risk	Recommended	IDV+3TC+ZDV
	No increased risk	Consider	IDV+3TC+ZDV
	Fluid with visible blood; other fluids which may be infected or tissue	Consider	IDV+3TC+ZDV

	Other body fluids eg urine	No prophylaxis	IDV+3TC+ZDV
Mucous Membranes	Blood	Consider	IDV+3TC+ZDV
	Fluid with visible blood; other fluids which may be infected or tissue	Consider	IDV+3TC+ZDV
	Other body fluids eg urine	No prophylaxis	
Skin Increased risk	Blood	Consider	IDV+3TC+ZDV
	Fluid with visible blood; other fluids which may be infected or tissue	Consider	IDV+3TC+ZDV
	Other body fluids eg urine	No prophylaxis	

5.4.2. Post Exposure Prophylaxis (PEP) for high HIV infection risk cases

General

PEP is the treatment of choice. Recommended is a 3-drug combination consisting of 2 RT (reverse transcriptase) inhibitors and 1 protease inhibitor. If the source patient is infected with a resistant virus it may be advisable to discuss a modified regimen with an internist-AIDS specialist.

The standard PEP consists of :

**Indinavir
Lamivudine
Zidovudine**

Early monotherapy with zidovudine reduces the likelihood of HIV infection by as much as 80%. The main disadvantages of PEP concern the potentially harmful side-effects and the fact that its longterm drug toxicity is unknown.

Commence treatment early

Considering the speed with which the virus multiplies and the results of animal experiments it is recommended to start PEP within 6 hours of suspected exposure. Do not wait for laboratory results , start PEP at once. In most cases it is possible to stop PEP immediately after the results prove negative and thus avoid potential adverse events.

Which drugs to use

A standard PEP set can be used. The total course should take 4 weeks (28 days). See tables 5 and 6 for dosing information.

Potential side-effects

Indinavir

stones in kidneys and urinary tract if not drinking enough water

Lamivudine

side effects are rare

Zidovudine

headache and nausea (temporary)

anemia

liver function disorders

Follow-up

Follow-up examinations are important. Privacy should always be respected and laboratory results should be anonymous. Blood samples in connection with possible side effects (hematologic, hepatic, renal, etc) are taken at the start of treatment and after 2 and 4 weeks. Blood samples for HIV are taken at the start of the treatment and after 1, 3, 6 and 12 months. If the results are still negative after 6 months, it is very unlikely that an HIV infection has taken place, but blood should be taken after 12 months to exclude rare delayed seroconversion. More than 95% of well-documented HIV seroconversions occur within the first 3-12 weeks.

Table 5: PEP dosage Adults

Generic	Tradename	Dose in mg	Dose in caps/tablets	When	Remarks
Indinavir	Crixivan	800 mg 3 dd	2 caps 3dd	07-08.00 15-16.00 23-24.00	Fasting or ½ hr before light meal or 2hr after normal meal
Lamivudine	Epivir	150 mg 2dd	1 tablet 2 dd	07-08.00 19-20.00	With food is OK
Zidovudine	Retrovir	300 mg 2dd	1 caps 2dd	07-08.00 19-20.00	With food is OK

Table 6: PEP dosage Children

Generic	Tradename	Dose form	Dose in mg/kg or mg/ml	Remarks
Indinavir	Crixivan	Capsules 200 or 400 mg	100mg/kg, day in 3-4 doses	Fasting or ½ hr before light meal or 2 hrs after normal meal
Lamivudine	Epivir	Tablet 150 mg or 10mg/ml from 240 ml bottle	4mg/kg 2dd (if <30kg) 150mg 2dd (if >30kg)	With food is OK
Zidovudine	Retrovir	Capsules 100, 250 mg or 10mg/ml from 200 ml bottle	120mg/ml 3dd	With food is OK

Table 7: Indinavir dosages - Children

Weight (kg)	When
	07–08.00 12–13.00 21–22.00

<10	Consult pediatrician/AIDS expert			
10–15	200 mg	200 mg	200 mg	
15–20	200 mg ¹	200 mg ¹	200 mg ¹	200 mg ¹
20–25	200mg	400mg	400mg	
25–40	400mg	400mg	400mg	
40–50	400mg ¹	400mg ¹	400mg ¹	400mg ¹
50–60	400mg	400mg	400mg	
>60	800mg	800mg	800mg	

¹Divide dose over the day with a minimum 4 hours between each dose and a maximum of 6 hours between each dose.

6. Implementation and registration

Compliance and Training Issues

There is a clear relationship in the literature between risk, compliance and training. Good training will improve compliance with safe operating room behavior and reduce the risk of Needlestick Injury.

All healthcare staff should be vaccinated for HBV. All Needlestick Injury events should be registered and carefully documented.

7. Literature references

A comprehensive list of literature references plus a copy of the online search strategies used is available on request by clicking the feedback box below.

- For published literature about avoiding Needlestick Injury, start at the CDC website at: <http://www.cdc.gov/>
- For published literature dealing with HBV and HCV start at the HEPNET website at: <http://hepnet.com>
- For literature dealing with HIV and PEP go to the excellent Johns Hopkins website with its major review with over 100 references: http://www.hopkins-aids.edu/guidelines/pep/gl_may99.html.

8. Links to useful websites

- **Practice Guidelines**
WGO is the only organisation with a Practice Guideline on Needlestick Injury at: <http://www.omge.org>
- **Avoiding Needlestick Injury**
The most comprehensive site for information on 'How to avoid Needlestick Injury is published by the US Centre for Disease Control (CDC) at: <http://www.cdc.gov/>
Use their Search interface and type in -- needlestick

The Johns Hopkins University Department of Infectious Control has excellent library resources for this topic: http://www.hopkins-id.edu/infcontrol/index_inf.html

- **HBV, HCV**

For HBV and HCV the best source to start is HEPNET.

<http://hepnet.com>

Of especial interest is the HepUpdate Issue no 19 (March 2000):

Clinical Application of the Canadian Consensus Conference Guidelines for HCV at:

<http://www.hepnet.com/update19.html>

- **HIV**

Go to the Johns Hopkins Site at http://hopkins-aids.edu/index_search.html and type in --PEP-- to find the excellent paper on HIV risk management and PEP at:

http://www.hopkins-aids.edu/guidelines/pep/gl_may99.html

This is probably one of the best sources of information on all aspects of PEP available to date.

A very good reference for post-exposure advice and protocols is the National Clinicial Post-Exposure Prophylaxis Hotline. This is provided out of San Francisco General Hospital. Their phonenumber is: 888 448 4911. Their website is at:

<http://www.epi-center.ucsf.edu>

9. Queries and feedback from you

INVITATION TO COMMENT

The Practice Guidelines Committee welcomes any comments and queries that readers may have. Do you feel we have neglected some aspects of the topic? Do you think that some procedures are associated with extra risk? Tell us about your own experience. You are welcome to click on the link below and let us know your views.

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