

SYRINGE DISINFECTION FOR INJECTION DRUG USERS

*For 20 years, syringe disinfection has been a part of HIV prevention efforts for injection drug users (IDUs). Questions about it persist, however, because of limited scientific studies, varying recommendations on the right way to disinfect, and evidence suggesting that IDUs do not use this approach very much. This fact sheet presents basic information on disinfection, especially bleach disinfection. The **central message** is that disinfection is a back-up prevention strategy if the user cannot stop injecting; does not have a new, sterile syringe; and is about to inject with a syringe that has been used before.*

How Did Disinfection Become a Widely-used HIV Prevention Strategy?

The strategy of disinfecting syringes to prevent HIV emerged in California in the 1980s. East Coast epidemics among IDUs (especially in New York) made public health officials fear that HIV would be a major threat to California IDUs.

California IDUs, like those in other parts of the country, shared and reused syringes, in part because it was hard for them to get new, sterile ones. This greatly increased their risk of HIV transmission (see box, page 2). State law made it illegal for drug users to buy syringes from pharmacies and a crime to possess them. Restricted access to sterile syringes, combined with limited capacity of substance abuse treatment programs, forced prevention programs to focus on reducing injection-related risks among IDUs who would not or could not stop

injecting. Field research in California showed that IDUs would act to reduce their risks if acceptable measures were available to them. One such measure was syringe disinfection with household bleach. (Disinfection means using something to kill viruses and bacteria that cause infection.) Laboratory tests had shown that bleach killed HIV. Bleach also was cheap, quick, and available everywhere.

This led community programs to train outreach workers to teach IDUs how they could reduce the risk of infection by disinfecting their syringes and needles.

Distribution of bleach kits — small (usually 1-oz. size) bottles of full-strength household bleach with instructions on how to disinfect syringes — quickly became a standard component of IDU prevention in San Francisco. Other U.S. cities then rapidly adopted this strategy.

Substance abuse treatment and access to sterile syringes through pharmacies, physician prescription, and syringe exchange programs are essential components of HIV prevention efforts among injection drug users. See [To Learn More About This Topic](#) at the end of this fact sheet for information on how to get fact sheets on these topics as well as other materials on HIV prevention among IDUs.

How Disinfection Can Reduce Transmission Risk: It Reduces the Number of Viruses and It Kills Them

Current disinfection recommendations are based on the following steps:

- Flush out blood, drugs, and other organic matter from the syringe. These can contain viruses and do interfere with the disinfection process.

- Disinfect the syringe.
- Rinse out the disinfectant.

The idea behind these steps is to reduce the risk of HIV transmission in two ways. First, flushing removes blood and drugs from the syringe, which **reduces the number** of viral particles. Second, using a disinfectant can **kill** remaining viruses so they can't infect anyone else.

Instructions for disinfecting syringes usually include ways to make sure that viruses are removed and killed:

- **Fill** the syringe with clean water (such as water right from a tap or a new bottle of water).
- **Shake or tap** the syringe containing water or disinfectant (this dislodges

particles and thoroughly mixes the water or disinfectant with material in the syringe); then squirt out and throw away the water; **repeat** until no more blood can be seen.

- **Leave the water or disinfectant, especially the disinfectant, in the syringe for a while** (in principle, the longer the better; for example, **30 seconds** is better than 15 seconds); then squirt out the disinfectant.
- **Rinse out the syringe** with clean water (fill syringe, shake or tap, squirt out and throw away water); rinsing is done to get rid of disinfectant and any viruses left in the syringe.

Does Disinfection Work Against Viral Hepatitis?

Hepatitis B virus (HBV) and hepatitis C virus (HCV) cause serious illness among millions of people. They also are closely connected with HIV, injection drug use, and high-risk sexual behaviors. Many people think that disinfection doesn't work against HBV or HCV, but laboratory studies on HBV show that disinfection works against this blood-borne virus in the same ways that it does against HIV.

An important thing to remember about HBV and HCV is that the numbers of viruses in blood are much higher for HBV and HCV than they are for HIV. As a result, getting rid of as much blood as possible by flushing out and rinsing is especially important in reducing the risk of becoming infected with viral hepatitis.

The Link Between Preparing Injection Drugs and the Risk of Transmission

The drugs used by IDUs (heroin, cocaine, amphetamines) usually are sold as a powder that must be dissolved in water before they can be injected. Some injection drugs, such as black-tar heroin, which is a gummy solid not a powder, must be heated in a spoon or bottle cap (a [cooker]) to speed up the dissolving. Once dissolved, the drug is drawn into a syringe through a filter (a [cotton]) that prevents small particles in the solution from clogging the needle. The drug is then injected into a vein. Sometimes, two or more IDUs will draw up drugs from the same cooker.

Before injecting, a user must be sure that the needle is in a vein. He or she does this by pulling back on the plunger after pushing the needle through the skin in a likely spot. Blood entering the syringe ([registering]) shows that the needle is in a vein. Once the drug has been injected, the IDU may pull back the plunger, drawing blood back into the syringe, and then re-inject it into the vein ([booting] or [acking]). After injecting, the user rinses out the syringe with water to prevent any remaining blood from clogging the needle. Users often dissolve drug powder and rinse their syringes with water from the same container.

HIV, hepatitis B virus (HBV), and hepatitis C virus (HCV) can be transmitted when IDUs share the same syringe. These viruses also can be transmitted when users divide drug solution among several syringes, share rinse water or a cotton or cooker, or mix the drug solution with a used syringe. Transmission can occur when **any element** [syringe, water, cotton, cooker, drug solution] becomes contaminated with blood that is infected with HIV, HBV, or HCV because that element can contaminate any other element it touches. Even if an IDU is careful to always use a new, sterile syringe to inject drugs, the **process of sharing contaminated equipment, drug solution, or water** can increase his or her risk of acquiring or transmitting HIV, HBV, or HCV. (For more information about drug preparation and viral transmission, see Koester, 1998.)

Disinfection Seems to Make Sense. What's the Problem?

A Disinfected Syringe is NOT a Sterile Syringe

If it is done carefully and thoroughly, disinfection can reduce the amount of live HIV, HBV, and HCV in a syringe. However, even the best disinfection procedure cannot guarantee that all viruses have been killed. The plastic syringes usually used by IDUs are designed for one-time use. They are not designed to be cleaned and used again.

Disinfected syringes do **NOT** meet the standards that are applied in all other settings in which people use syringes (such as hospitals, other health care settings, and insulin injections by people with diabetes). In these settings, people must use a new, sterile syringe for every injection.

For these reasons, a disinfected syringe is **NOT** as safe as a new, sterile syringe. Recommendations about disinfecting

syringes with bleach or other agents apply **ONLY** to situations in which IDUs do not have sterile syringes.

Scientists Have Limited Laboratory Evidence that Disinfection Works Against HIV in Syringes and Other Injection Equipment

Scientists have published a small number of laboratory studies on the ability of bleach and other agents to kill HIV. These experiments try to mimic conditions faced by IDUs and usually test the impact of disinfection on blood to which HIV grown in a test tube has been added.

However, these conditions are not the same as those faced by IDUs, and findings are not definitive. In laboratory studies, fresh undiluted household bleach (5.25% sodium hypochlorite) appears to kill HIV pretty well. Scientists also have tested whether other liquids can disinfect syringes. These liquids, which are sometimes used by IDUs, include dish detergent, rubbing alcohol, hydrogen peroxide, and fortified wine. Results of these few studies are limited.

Some research has found that even several vigorous rinses with clean water may be as effective as undiluted household bleach because they do a good job of reducing the number of infectious viruses.

Results of these studies depend on many things, including the strength of the agent, whether the HIV is in whole blood or by itself, and the steps used. Because few laboratory studies have been published, we have only limited data on disinfection as it is done by IDUs. As a result, we don't have clear answers to questions about which agents work best, the best disinfection procedures, or the time necessary for adequate disinfection.

Laboratory studies of the effect of disinfection on HBV and HCV are difficult because these viruses cannot be grown in a test tube. Studies with ani-

mals have shown that disinfection can prevent HBV transmission. Because HBV and HCV are similar, these findings may also be true for HCV. However, it's important to note that conditions in animal studies are not the same as those faced by IDUs.

Studies of IDUs Do Not Prove That Bleach Disinfection Protects them Against HIV or Viral Hepatitis

Studies have looked for differences in the number of new infections between injectors who say they always disinfect and injectors who say they do not disinfect. They have found no significant difference in new infections among IDUs in the two groups. Several factors may help explain these findings.

- **Studies don't measure risk behaviors completely.** Studies don't always collect detailed risk information and may focus only on an IDU's risky drug practices. As a result, a study focusing on disinfection may not show anything if the infection is due to something else, such as having unprotected sex with infected partners.
- **Some studies have technical limitations.** For example, sometimes it is hard for a scientist to know whether a person is really a "disinfecter" or a "non-disinfecter." IDUs in the study may not remember correctly whether or how many times they used bleach during a certain period in the past. Or, they may think that saying they used bleach is the answer the scientists want to hear. As a result, IDUs who say they disinfect may seem to be at the same risk of infection as those who say they don't disinfect.

Barriers Make it Hard for IDUs to Disinfect Correctly and Can Prevent Them from Doing It At All

IDUs may agree that disinfection is a good idea if they cannot get new, sterile syringes. However, some investigators have found that few IDUs actually use

bleach to disinfect syringes or they don't go through all the recommended steps if they do use it. Many factors make it hard for IDUs to disinfect:

- Current instructions involve a lot of steps and IDUs may think it is impossible to do correctly.
- IDUs may not be able to get clean water.
- They may not want to carry bleach or other disinfectants because it marks them as drug users.

Bleach has Advantages and Disadvantages as a Disinfectant

Advantages:

- It can reduce the amount of infectious HIV, HBV, and HCV in a used syringe.
- It is readily available.
- It is inexpensive.

Disadvantages:

- IDUs, outreach workers, and policymakers may mistakenly believe that disinfecting with bleach is as safe as using a new, sterile syringe.
- It does not sterilize the syringe, so the syringe may still carry infectious organisms after disinfection.
- Studies have not shown that bleach disinfection prevents HIV or HCV transmission among IDUs.
- If a person carries small bottles of bleach, police may assume he or she is a drug user.
- Sunlight, warm temperatures, and exposure to air gradually weaken bleach so that it doesn't work anymore; IDUs have to be sure to use fresh, full-strength bleach.
- It damages the syringe.

- Withdrawal symptoms (being “drug sick”) and the overpowering need to inject as soon as possible also may drive an IDU to inject without disinfecting.
- Some IDUs need help to inject and other people give them the injection. The person doing the injecting may not disinfect thoroughly.
- Drug users may not have time to disinfect carefully because they must prepare the drug solution and inject quickly (for example, police are nearby).
- Once the IDU has injected, the effects of the drug may prevent him or her from disinfecting carefully before the next injection (this may be especially true with cocaine, which is commonly injected multiple times in a drug use session).

What are the Take-Home Messages?

- The way that an IDU prepares and injects drugs is important in determining the risk of that person getting or transmitting HIV, HBV, and HCV:
 - Any item — syringe, water, drug solution, cooker, cotton — that is contaminated with blood containing these viruses can contaminate all the other items.
 - Even if an IDU uses a sterile syringe each time, he or she can become infected if the drug solution or preparation equipment is shared with others who are infected.
- Disinfection will not make injecting drugs “safe.” It may make injecting “less risky” because it can reduce the

number of and kill some of the HIV, HBV, or HCV in a syringe. As a result, disinfection can be a useful back-up strategy for IDUs.

- We don’t have clear, consistent laboratory evidence about the best disinfection procedure and we don’t know how effective this strategy is. So, we suggest steps that seem logical.
- Disinfection should be used **only when an IDU has no safe options** for preventing transmission.
 - Disinfection is not as good as stopping injecting, getting into substance abuse treatment, using a new sterile syringe, and not sharing drug solution and equipment.
 - Bleach and other disinfectants do **NOT** sterilize the syringe.

Keeping Everything Clean is an Important Part of Reducing HIV and Viral Hepatitis Risk

More and more, health workers are realizing that cleanliness and good hygiene can help reduce an IDU’s risk of getting or transmitting HIV or viral hepatitis. Good hygiene can also help prevent sores and bacterial infections in the skin where IDUs inject. The following tips are an important part of the prevention message to IDUs who cannot or will not stop injecting:

- Wash your hands and arms before preparing to inject.
- Use a clean surface to prepare drugs for injection, or spread out a piece of clean paper.
- Use an alcohol pad to clean the skin where you’re going to inject.
- After injecting, use a gauze pad to stop the bleeding.
- Put a bandage on the place where you injected.
- Throw away the used alcohol pad and gauze and all the other drug preparation equipment.
- Clean anything else blood might have touched (such as the tourniquet, your injecting space, or your clothes).
- Safely dispose of the syringe.
- Wash your hands again to clean off dirt, blood, and viruses.

Sources: Marcia Bisgyer of SafetyWorks, Inc., Mamaroneck NY, and Allen Clear of Harm Reduction Coalition, New York, NY (www.harmreduction.org)

What Should We Tell IDUs?

Education and outreach workers should stress the following messages when they talk to IDUs:

- The best way for you to prevent HIV, HBV, and HCV transmission is to **NOT** inject drugs.
- Entering substance abuse treatment can help you reduce or stop injecting. This will lower your chances of infection.
- Get vaccinated against hepatitis A and hepatitis B. You can prevent these kinds of viral hepatitis if you get vaccinated.
- If you cannot or will not stop injecting, you should:
 - Use a new, sterile syringe obtained from a reliable source to prepare and divide drugs for each injection.
 - Never reuse or share syringes, water, cookers, or cottons.
 - Use sterile water to prepare drugs each time, or at least clean water from a reliable source.

- Keep everything as clean as possible when injecting (see box, left).
- If you can't use a new, sterile syringe and clean equipment each time, then disinfecting with bleach may be better than doing nothing at all:
 - Fill the syringe with clean water and shake or tap. Squirt out the water and throw it away. Repeat until you don't see any blood in the syringe.
 - Completely fill the syringe with fresh, full-strength household bleach. Keep it in the syringe for 30 seconds or more. Squirt it out and throw the bleach away.
 - Fill the syringe with clean water and shake or tap. Squirt out the water and throw it away.
- If you don't have any bleach, use clean water to vigorously flush out the syringe:
 - Fill the syringe with water and shake or tap it. Squirt out the water and throw it away.
 - Do this several times.

Disinfection should be used **ONLY** when an IDU has no safe options for preventing transmission.

To Learn More about This Topic

Visit websites of the Centers for Disease Control and Prevention (www.cdc.gov/idu) and the Academy for Educational Development (www.healthstrategies.org/pubs/publications.htm) for these and related materials:

- *Preventing Blood-borne Infections Among Injection Drug Users: A Comprehensive Approach*, which provides extensive

background information on HIV and viral hepatitis infection in IDUs and the legal, social, and policy environment, and describes strategies and principles of a comprehensive approach to addressing these issues.

- *Interventions to Increase IDUs' Access to Sterile Syringes*, a series of six fact sheets.
- *Drug Use, HIV, and the Criminal Justice System*, a series of eight fact sheets.
- *Substance Abuse Treatment and Injection Drug Users*, a series of six fact sheets.
- *Viral Hepatitis and Injection Drug Users*, a series of five fact sheets.

Small numbers of these publications can be ordered at no charge from www.cdc.gov/idu.

See the July 1994 issue of the *Journal of Acquired Immune Deficiency Syndromes*. This issue of the *Journal* includes seven papers from a workshop on the use of bleach to disinfect drug injection equipment. The papers provide an historical perspective on the use of bleach in HIV/AIDS prevention activities, review results of laboratory studies on the effectiveness of various agents in inactivating HIV, and describe the results of field studies on the disinfection practices of IDUs. (*Journal of Acquired Immune Deficiency Syndromes* 1994;7(7):741-776.)

See the April 1993 CDC/CSAT/NIDA *HIV/AIDS Prevention Bulletin*. This publication reviews the topic of disinfection and concludes that stopping injection or using new, sterile syringes is superior to disinfection. (Curran JC, Scheckel LW, Millstein RA. HIV/AIDS prevention bulletin. Centers for Disease Control, Center for Substance Abuse Treatment, and National Institute on Drug Abuse, April 19, 1993.) www.cdc.gov/idu/pubs/bleach_letter.htm

Check out these sources of information:

Abdala N, Crowe M, Tolstov Y, Heimer R. Survival of human immunodeficiency virus type I after rinsing injection syringes with different cleaning solutions. *Substance Use & Misuse* 2004;39(4):581-600.

Abdala N, Gleghorn AA, Carney JM, Heimer R. Can HIV-I-contaminated syringes be disinfected? Implications for transmission among injection drug users. *Journal of Acquired Immune Deficiency Syndromes* 2001;28(5):487-494.

Bourgeois P. Anthropology and epidemiology on drugs: the challenges of cross-methodological and theoretical dialogue. *The International Journal of Drug Policy* 2002;13(4):259-269.

Centers for Disease Control and Prevention. Recommendations for prevention and control of hepatitis C virus (HCV) infection and HCV-related chronic disease. *Morbidity and Mortality Weekly Report* 1998;47(RR 19):I-39. www.cdc.gov/mmwr/preview/mmwrhtml/00055154.htm

Ciccarone D, Bourgeois P. Explaining the geographical variation of HIV among injection drug users in the United States. *Substance Use & Misuse* 2003;38(14):2049-2063.

Clatts MC, Heimer R, Abdala N, et al. HIV-I transmission in injection paraphernalia: heating drug solutions may inactivate HIV-I. *Journal of Acquired Immune Deficiency Syndromes* 1999;22(2):194-199.

Hagan H, Thiede H. Does bleach disinfection of syringes help prevent hepatitis C virus transmission? [letter] *Epidemiology* 2003;14(5):628-629.

Hagan H, Thiede H, Weiss NS, et al. Sharing of drug preparation equipment as a risk factor for hepatitis C. *American Journal of Public Health* 2001;91(1):42-46.

Hughes RA. Drug injectors and the cleaning of needles and syringes. *European Addiction Research* 2000;6(1):20-30.

Kapadia F, Vlahov D, Des Jarlais DC, et al. Does bleach disinfection of syringes protect against hepatitis C infection among young adult injection drug users? *Epidemiology* 2002;13(6):738-741.

Koester SK. Following the blood: syringe reuse leads to blood borne virus transmission among injection drug users. [letter] *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology* 1998;18(Suppl 1):S139-S140.

Normand J, Vlahov D, Moses LE, eds. Preventing HIV transmission: the role of sterile needles and bleach. Washington, DC: National Academy

Press, 1995. Chapter 6, The effectiveness of bleach as a disinfectant of injection drug equipment. www.nap.edu/books/0309052963/html/

Sattar SA, Tetro J, Springthorpe VS, Giulivi A. Preventing the spread of hepatitis B and C viruses: Where are germicides relevant? *American Journal of Infection Control* 2001;29(3):187-197.

Thorpe LE, Ouellet LJ, Hershow R, et al. Risk of hepatitis C virus infection among young adult injection drug users who share injection equipment. *American Journal of Epidemiology* 2002;155(7):645-653.

United States Public Health Service (USPHS). HIV prevention bulletin: medical advice for persons who inject illicit drugs. Atlanta (GA) and Rockville (MD): USPHS, May 9, 1997. www.cdc.gov/idu/pubs/hiv_prev.htm



<http://www.cdc.gov/idu>

Through the Academy for Educational Development (AED), IDU-related technical assistance is available to health departments funded by CDC to conduct HIV prevention and to HIV prevention community planning groups (CPGs). For more information, contact your CDC HIV prevention project officer at (404) 639-5230 or AED at (202) 884-8952.