



## **Considerations for the purchase and distribution of needles and syringes**

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## Introduction

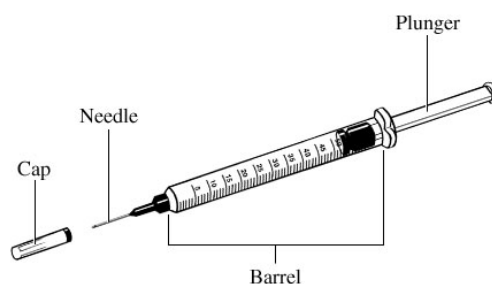
The syringes and needles used by injection drug users (IDUs) vary in both design and size (Zule, Desmond & Neff, 2009). The choice of which needle and syringe to use for injecting depends on a range of factors including accessibility to supplies, what drugs are being injected, how many people are going to share the drug solution, where on the body drugs are injected and the condition of the veins (Harm Reduction Coalition, 2009). Sharing of any type of needle/syringe carries with it a potential risk of transmission of HIV and HCV, however, there is a small body of evidence of an increased risk associated with sharing of certain types of needles and syringes versus other types.

Available evidence and best practice recommendations encourage needle and syringe programs (NSP) to distribute a wide variety of the types of needles and syringes preferred by clients to increase the likelihood that the program will be well utilized (Strike et al., 2006). A thorough understanding of the issues related to preferences and transmission can help NEPs to make decisions regarding the types of needles and syringes that they wish to purchase and distribute to their clients.

Using scientific literature search engines and a search for on-line resources, we identified a small body of work regarding needle and syringe preference and risk. To search the scientific literature we used PubMed & MedLine with the search terms: syringe, preference, needle, injection drugs, IDU; and wound, needle gauge, HIV, HVC. To search the grey literature, we used the same search terms with Google and Google Scholar.

The evidence presented in this document is a mix of both academic and user directed resources. The academic literature available on the subject is limited, however the user informed literature provides a comprehensive picture of user preferences and practices. Please note references are listed according to their academic and non-academic status at the end of this report.

### Parts of a needle and syringe



In this document we refer to several parts of a needle and syringe. First, there is the needle which is used to puncture the skin and through which the drug solution flows into

the vein or muscle. The syringe is the barrel or container that holds the drug solution prior to injection. The plunger pushes the solution from the syringe through the opening of the syringe called the cannula and into the needle. While some needle and syringes are made of two pieces, an attached needle/syringe and plunger, others have a syringe, plunger and detachable needle.

## **Needle Gauge**

The needle gauge refers to the diameter of the bore (hole) in the needle. Higher gauges have thinner needles with smaller bores (Harm Reduction Coalition, 2009). For example, a 28-gauge needle (28G) is thinner than a 22-gauge (22G) needle. The gauge of the needle determines the size of the puncture wound. A smaller puncture wound, made with a higher gauge needle, facilitates less bleeding and less opportunity for infection to occur (Harm Reduction Coalition, 2009). Whenever possible, it is necessary to match the size of the needle to the size of the vein. However, intramuscular injections (e.g., steroids or hormones) and piercing require larger bore/lower gauge needles than intravenous injections.

Having access to the preferred gauge needle makes it more likely that IDUs will use exchange services (Strike et al., 2006). Many IDUs, especially those who have begun injecting more recently and those who still have good veins, prefer higher gauged needles (i.e. 28G) as they tend to be less painful and damage veins less (Zule et al., 2002). Conversely, those who have been injecting longer often prefer lower gauged needles (i.e. 25G) because they do not clog as easily and are able to pierce thick scar tissue without bending (Zule et al., 2002). Although there is no evidence, anecdotal reports suggest that women may require higher gauge needles to accommodate their smaller veins.

### *Considerations*

- Higher gauges: Smaller veins, such as those in the hands and feet require the use of thinner needles. 27G or 28G insulin needles are recommended for those injecting in the small veins of the hands and feet (Balian, 2009; Harm Reduction Coalition, 2009)
- Lower gauges: Lower gauged needles are necessary for intramuscular injections and piercing (such as 21G or 23G). Certain substances, such as injectable steroids and hormones, can only be administered intramuscularly and require smaller gauged, thicker needles (Harm Reduction Coalition, 2009). Furthermore, recent research suggests that newer injectors may inject intramuscularly at first, due to apprehension about finding a vein (Strike et al., *in press*).

## *Recommendations*

- Purchase and distribution of a variety of differently gauged needles to meet the needs of intravenous and intramuscular injections and piercing.
  - Thinner, higher gauged needles are necessary for venous injections, especially those in smaller veins (i.e. hands and feet).
  - Thicker, lower gauged needles are necessary for intramuscular injections and piercing

## **Needle Length**

Longer needles are needed for intramuscular injections, while shorter needles are necessary for venous injections (Harm Reduction Coalition, 2009). Insulin needles are typically ½ inch in length, whereas tuberculin needles are usually 5/8 of an inch.

## *Recommendation*

- Purchase and distribution of a variety of different lengths of needles to meet the needs of intravenous and intramuscular injections and piercing.
  - Longer needles are required for intramuscular injections
  - Shorter needles are required for venous injections (Harm Reduction Coalition, 2009)

## **Syringe Size**

There is a range of syringe sizes available on the market and IDUs have different preferences dependent on the different volumes of solution necessary for different drugs (Baillan, 2009). Most standard insulin and tuberculin syringes are 1cc (1cc=1ml) in size. While 1cc syringes are most commonly used, syringes are available in larger, 10cc and 3cc syringes, as well as smaller ½ cc syringes (Harm Reduction Coalition, 2009). Anecdotal reports suggest that people who mix their drugs within their syringes (i.e., otherwise known as shake and bake) prefer larger syringes to accommodate the mixing. Larger syringe sizes also accommodate the groups of IDUs who purchase their drugs together, mix a common solution and then either inject a predetermined amount into each person or divide the solution between multiple syringes.

## *Considerations*

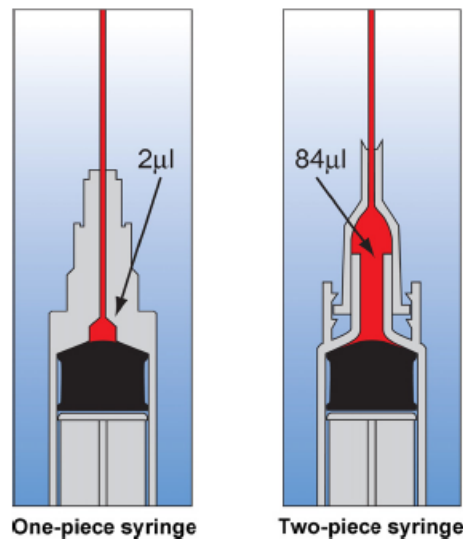
- The size of the syringe is crucial, as 3cc syringes and larger syringes typically have detachable needles (Zule et al., 2002)
  - This can be both a pro and con, please see below section on *Detachable needles*
- IDUs who report sharing prefer larger syringes, as there is considerably more room to mix the appropriate amount of drug solution for multiple injections (Fisher et al., 2001).

### Recommendations

- Purchase and distribution of a variety of differently sized syringes to meet the needs of clients.
- Reinforcement of safer injection education regarding the risks of sharing needles, syringes and drug solutions mixed in common containers.

### Syringes with Detachable Needles

While all needles contain some “dead-space” (or fluid) when fully depressed, the volume of residual fluid depends on whether the needle is permanently attached or detachable (Zule & Bobashev, 2009). This is key, given that the residual volume of blood in a syringe after use is the most important determinant of HIV virus survival (Zule et al., 2002).



Picture 1. Mean volume of fluid retained with plunger depressed in one-piece and two-piece syringes.

(From: Gyarmathy, V.A., Neaigus, A., Mitchell, M.M. & Ujhelyi, E. (2009). The association of syringe type and syringe cleaning with HCV infection among IDUs in Budapest, Hungary. *Drug and Alcohol Dependence*, 100, 240-247.)

Syringes with detachable needles are typically classified as *High Dead Space Syringes* (HDSS), with fluid being retained in the syringe tip, needle hub, and needle when the plunger is fully depressed (Zule & Bobashev, 2009). In comparison, *Low Dead Space Syringes* (LDSS) usually have permanently attached needles, and when the syringe plunger is fully depressed, fluid is only contained in the needle (Zule & Bobashev, 2009).

There are several reasons why syringes with detachable needles are **preferred** by IDUs. One perceived benefit of using a syringe with a detachable needle is the ability to remove the needle during the preparation of drugs, which reduces the chance of dulling the needle in a spoon or cooker (Zule et al., 2002). Another benefit of the detachable needle syringes, is the ability to draw the drug solution up into the syringe through the

cannula much more quickly than that of the smaller needle opening (Zule et al., 2002). If a needle becomes clogged during an injection, it can be replaced. Integrated cannula syringes require the plunger to be removed, and the contents of the drug solution, which may contain some flagged blood, be poured back into a cooker or spoon prior to unclogging the needle (Zule et al., 2002). Additionally, using a syringe with a detachable needle is desirable for some as it allows the injector to change the needle every time they do not get a vein and the syringe becomes bloodied (Bailian, 2009).

However, the primary reason IDUs **dislike** syringes with detachable needles is that increased dead-space results in significantly more wasted drugs (Zule et al., 2002).

### *Considerations*

- Experimental research suggests that syringes with detachable needles, or HDSS, retain approximately 1000 times more blood than an integral cannula syringe (syringes with a permanently attached needle) (Zule et al., 2002), which represents a considerable risk to those who share syringes.
- Preliminary research has linked using and sharing of HDSSs with prevalent HIV/HCV infection (Zule & Bobashev, 2009; Gyarmarthy et al., 2009). However, little to no evidence demonstrating **actual** transmission increase from HDSS, although further research is needed

### *Recommendations*

- Purchase and distribution of a variety of differently sized needles and syringes to meet the needs of clients
- Injectors should be encouraged to use a single-unit needle and syringe such as the 1ml diabetic disposable syringe whenever possible (WHO, 2007).
- Reinforcement of safer injection education regarding the risks of sharing needles, syringes and drug solutions mixed in common containers.

## **Brand**

A variety of brands of needles exist. The Harm Reduction Coalition reports, “most drug injectors find that, given the opportunity to try out different brands of needles and syringes, they will find one that they prefer over all others” (p.7).

### *Recommendations*

- Purchase and distribution of a variety of different brands of needles and syringes to meet the needs of clients

## **Difficult to Reuse Syringes**

DTRs (also known as single-use syringes) are designed so that once the plunger has been depressed it cannot be retracted; in some designs (e.g., Safety Syringes) the needle retracts into the barrel of the syringe when the injection is complete. The

benefits of DTRs are that they can prevent inadvertent re-use and needlestick injury and help prevent transmission of bloodborne pathogens. However, research on the use of DTRs among IDUs has raised several concerns. In a study to test the acceptability of DTRs among 50 City of Ottawa NEP clients (participants did not inject with the DTRs), 54% raised concerns about difficult handling (Flett Consulting Group Inc./Social Data Research Ltd., 2002). Clients commented that the plunger was “too stiff”, the retractable feature was hard to manipulate, and the absence of a lip made it seem difficult to use with one hand. Similarly, Des Jarlais (1998, 2000) reviewed the sparse literature on DTR use among IDUs, and raised the following concerns:

- Any needle, regardless of design, can be re-used
- DTRs are difficult to disinfect
- A faulty mechanism may misfire, resulting in the loss of drugs
- The mechanism prevents users from aspirating or “registering”, i.e., drawing blood into the syringe to check whether they have found a usable vein and then continuing with injection
- DTRs prevent users from “booting” or “flagging” – a process of injecting part of the drug solution, then retracting the plunger to draw blood into the drug mixture and injecting again. It has been anecdotally reported that booting, flagging and registering may be associated with risk for embolism. DTRs would help reduce this risk. However, booting and flagging serve to extend the pleasurable effects of drug injection, and IDUs may want to repeat this process several times
- A user cannot recover the drug if something goes wrong with an injection, e.g., if a vein collapses.

#### Recommendations

- Do not purchase DTRs for NSPs to distribute to their clients.

#### Scientific references

Fisher, D.G., Harbke, C.R., Cagle, H.H. (2001). Syringe Type Preference Among Injection Drug Users. *Journal of Acquired Immune Deficiency Syndromes*, 26(5), 515-516.

Gyarmathy, V.A., Neaigus, A., Mitchell, M.M. & Ujhelyi, E. (2009). The association of syringe type and syringe cleaning with HCV infection among IDUs in Budapest, Hungary. *Drug and Alcohol Dependence*, 100, 240-247.

Strike, C., Leonard, L., Millson, M., Berkeley, N., & Medd, E. (2006). *Ontario needle exchange programs: Best practice recommendations*. Toronto: Ontario Needle Exchange Coordinating Committee.

Strike, C., Kolla, G., Balian, R., Altenberg, J., & Millison, M. (in press, 2009). *Injecting For the First Time. Final Report*. CAMH.

World Health Organization (2007). *Guide to Starting and Managing Needle and Syringe Programmes*. Department of HIV/AIDS. Retrieved June 9, 2009 from [http://www.who.int/hiv/idu/Guide to Starting and Managing NSP.pdf](http://www.who.int/hiv/idu/Guide%20to%20Starting%20and%20Managing%20NSP.pdf)

Zule, W.A., Bobashev, G. (2009). High dead-space syringes and the risk fo HIV and HCV infection among injecting drug users. *Drug and Alcohol Dependence*, 100, 204-213.

Zule, W.A., Desmond, D.P., & Neff, J.A. (2002). Syringe type and drug injector risk for HIV infection: a case study in Texas. *Social Science & Medicine*, 55, 1103-1123.

### **Grey literature resources**

Bailan, Raffi (2009). Injection Techniques: The Art of Injecting into Smaller Veins. *Total Hype: COUNTERfit Harm Reduction Program's Community Newsletter*. May, 2009.

Harm Reduction Coalition (2009). *Getting Off Right: A Safety Manual For Injection Drug Users*. Last accessed June 15, 2009 from [www.harmreduction.org/downloads/idu\\_manual.pdf](http://www.harmreduction.org/downloads/idu_manual.pdf)