Needles used for blood drawing have long been recognized as presenting a high risk of bloodborne pathogen transmission following needlestick injuries. Among 46 health care workers with documented, occupationally acquired HIV, 20 cases (43%) were associated with injuries from blood drawing needles. Conversely, needles used for intramuscular and subcutaneous injections were associated with only one case (2%) of occupational HIV infection, despite the fact that injections are administered much more frequently than blood is drawn. While the average transmission rate following percutaneous exposure to HIV has been estimated at .3%, an Italian study of 1,610 HIV-exposed health care workers showed a .55% (2/365) transmission rate for exposures involving blood-filled needles, and no transmissions (0/840) from exposures involving non-blood filled needles.

Disposable syringes are unique among sharp medical devices in that they are multi-purpose. Their most common use is for subcutaneous or intramuscular injection of medication. They are also used as tools for manipulating body fluid specimens in clinical laboratories and for mixing drugs in the pharmacy. Among their most hazardous uses, however, is venous blood drawing. In 1998, the national EPINet database, including 52 hospitals, showed disposable syringes to be the device causing the most reported percutaneous injuries, accounting for 30% (950/3,180) of all reported injuries. It also showed that 19% (179/950) of syringe injuries involved syringes that had been used for venous blood drawing. Syringes are unique, therefore, in that they can be associated with injuries having either the lowest or the highest risk of bloodborne pathogen transmission, depending on the purpose for which they are used.

Venous blood drawing is a procedure for which a variety of devices are used. Figure 1 shows that there were 548 injuries related to venous blood drawing in the national EPINet database in
Drawing Blood With Syringes

1998. Of those, 38% were associated with winged steel needles, 31% with vacuum tube phlebotomy devices, and 25% with disposable syringes. These data show that drawing venous blood with disposable syringes remains a common practice that results in a significant number of needlesticks.

Since there are better alternatives, why do health care workers use syringes for venous blood drawing? The reasons vary. In some cases, health care workers prefer to control the vacuum during blood drawing if patients have difficult veins. In many cases, it is just a question of habit; it is what the health care worker has always used or it was the device most readily available when blood drawing needed to be performed. With that choice comes a particular set of risks.

Figure 2 compares the way needlesticks occur with syringes used for venous blood drawing versus syringes used for intramuscular or intravenous injections. These data highlight one of the specific hazards caused by drawing blood into syringes: the requirement of transferring the blood from the syringe into a specimen container. The figure shows that injuries resulting from pulling a needle out of a resistant substance such as rubber are uniquely associated with drawing blood into syringes. Once blood is drawn into a syringe it is often injected into a vacuum tube through its rubber stopper. (See Figure 3.) This involves an additional manipulation of the needle with an extra set of risks. First, the needle must not miss the rubber stopper, which is a nar-
row target. If it misses, it is likely to stick the hand holding the tube. But even if the needle is inserted into the tube without incident there remains another risky hurdle: it must be removed. Pulling a needle from a resistant substance can result in a “rebound” needlestick, when the needle suddenly disengages and the hand holding the needle lurches forward in a reflex motion and sticks the opposing hand with the needle. Another adverse event can occur if the injection of blood into the tube overcomes the vacuum. The stopper can pop off and splash the worker with blood.

Syringes with needles are sometimes inappropriately used to draw blood from rubber ports on intravenous or arterial lines. Again the problem arises of pulling the needle out of the port against resistance and risking a “rebound” needlestick. Also, there is the additional exposure risk of transferring blood to a specimen container.

Another risk that is unique to drawing blood into syringes is that of accidental blood injections. These rare incidents inoculate health care workers with much larger quantities of blood than needlesticks. Some documented cases of occupational transmission of HIV were the result of accidental blood injections. In one case, a syringe full of blood was left on a table. A health care worker inadvertently backed into the table, pushing against the syringe. The syringe was pushed back against a rigid surface which caused the plunger to depress, injecting the health care worker with blood. This type of incident, which can only happen with syringes, carries a much higher risk of pathogen transmission.

A recent twist on the inappropriate use of syringes is the use of safety-engineered syringes (with shielding or retracting features) for venous blood drawing. Figure 4 (page 28) shows that both conventional syringes and safety syringes were associated with injuries during venous blood drawing procedures. Unfortunately, “safety syringes” are unlikely to reduce the hazards of venous blood drawing. Their use for this purpose defeats the benefit of the safety design. Since the protective feature can only be put in place after the blood has been injected from the syringe into a specimen container, the user has already been exposed to the additional risks described with conventional syringes before the safety feature can be activated.

Figure 4 also shows that both conventional and safety syringes caused injuries when they were inappropriately used for injections into intravenous ports and for intravenous flushes, both procedures for which needles are not necessary. In fact, 28.7% of injuries from conventional syringes and 38.7% of injuries from safety-engineered syringes were associated with inappropriate uses of a syringe. These findings emphasize the need for education in limiting the use of injection equipment, whether conventional or safety-engineered, to appropriate applications.

In conclusion, the practice of drawing venous blood into syringes should be reduced to a minimum. Devices that draw blood directly into vacuum tubes or other specimen containers should be preferentially employed. The “needle end” of the blood-drawing device should have an integrated safety feature such as a needle-shielding or blunting feature. Such devices have been shown to reduce injury rates from phlebotomy devices by 25% to 76% in a CDC study. If there is no other alternative to syringes for venous blood drawing in specific clinical situations, then large-volume syringes with a sliding shield should be employed. The safety shield should have a larger diameter than the vacuum tube into which the blood will be injected. The safety shield should be locked in place over the needle and the tube inserted into the shield for the injection of blood.

References