Minimizing Occupational Exposure to Biohazards

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Exposure to body fluids via needlestick injury or otherwise is a risk inherent to interventional radiology. Although the incidence of occupational exposure to biohazards appears to be decreasing in the era of universal precautions, in IR, safety needles are the exception rather than the rule. In the United States, hepatitis C and human immunodeficiency virus (HIV) are the major risks because most health-care workers have access to the hepatitis B vaccine. As a general rule, hepatitis B is most easily transmitted (2 to 40%) from a needlestick injury, followed by hepatitis C (2.7 to 10%) and HIV (0.3%). With postexposure prophylaxis, the risk of contracting HIV is likely even lower than the figure commonly quoted. Unfortunately, there is no effective prophylaxis for hepatitis C exposure.

DISCUSSION

In 2003, the *Journal of Vascular and Interventional Radiology* published a sobering clinical study entitled, "Potential Exposure to Hepatitis C Virus Through Accidental Blood Contact in Interventional Radiology." In this report, interventional radiologists' compliance with standard precautions was poor, and nearly 10% of patients tested positive for hepatitis C. The authors concluded that on average, accidental blood contact with a patient with hepatitis C occurs once per 1000 procedures. In an editorial accompanying the article, Dr. Vicki Marx calculated a "worst-case" scenario for interventional radiologists as a 1% risk. She notes that she has been surprised on numerous occasions by how many drops of blood or contrast are scattered on a face shield at the end of a long case. I've noticed the same thing.

Over the past 10 years, I have witnessed several incidents of occupational exposure to bodily fluids. Fortunately, none has resulted in adverse sequelae. I review

here the 10 most common reasons the exposure occurred (Table 1).

Using a Scalpel Instead of Scissors

The Centers for Disease Control and Prevention studied devices involved in percutaneous injuries. The most common ones were hollow-bore needles (59%), suture needles (19%), scalpel (7%), and glass (2%). Note that scissors did not make the list. One of the first things I teach residents and fellows is never to use a scalpel if a scissors will suffice. It never fails to surprise me how often people use a scalpel to cut bandages, sutures, or gauze. I have witnessed numerous occasions when a resident or fellow got injured by a scalpel or the patient was stuck. *Use scissors* whenever possible! It will prevent you from injuring yourself or your patient. If you must use a scalpel, round-tipped ones are less likely to cause injury than sharp-tipped ones.

Recapping Needles

By now every medical student should know to avoid recapping needles and how to recap needles properly if absolutely necessary. If you need to recap needles, do so this way: Place the cap on a flat surface, direct the needle into the cap, and grasp the barrel of the cap and firmly attach it to the needle (Fig. 1). Currently, many needles come with safety sheaths that lock around the needle. These are particularly helpful for nurses who don't have immediate access to a sharps box but may have their own problems.

Using Unfamiliar Instruments

In my hospital, we recently began using needles that have safety locking sheaths. The needle has two Luer

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Table 1 Common Errors Resulting in Exposure to Biohazards

1. Using a scalpel instead of scissors
2. Recapping needles improperly or unnecessarily
3. Using unfamiliar equipment
4. Reaching before looking
5. Splashes from syringe purges into open cups
6. Disorganized sharps
7. Grabbing suture needles with fingers instead of a hemostat
8. Forcefully injecting through a syringe and breaking it
9. Not changing gloves often enough
10. Trying to catch falling objects

locks: one where the needle is attached to the sheath and the second where the sheath is attached to a syringe. I rarely use these needles but recently had a case when one was handed to me. After attaching the needle to a syringe, I attempted to inject subcutaneous lidocaine into a patient. When I did so, I was sprayed from a “leaking” needle. After inspecting the needle I found that the connection between the protective sheath and the needle was loose (Fig. 2). Thus when the needle is tightened on a syringe, both attachment sites should be firmly tightened rather than simply the bottom Luer lock. I opened a few additional needles and found that several others had a very loose connection. Lesson learned.

Reaching for Instruments before Looking

When performing a procedure, it is easy to become focused on what you are doing and be inattentive to the sharp objects around the field. *Never* reach for a sharp object without looking directly at it. A corollary to this: Avoid having anyone hand you a sharp object unless you are completely focused on receiving the object from that person. I usually ask an assistant to place any sharp object on the field in a “neutral zone” in my direct vision, and I pick it up myself. You should also announce when a sharp is in the field so everyone within reach knows it is there. It is easy to become

distracted when you are doing two things at once—especially when you are performing a new procedure or encounter a complication. Always try to focus on the sharp object whenever one is in the vicinity. I perform most of my procedures with residents or fellows. I avoid having any of them hold sharp objects for any prolonged period of time. If a sharp object is not in anyone’s hands, it is unlikely to injure anyone.

Splashes from Syringes

The practice of purging a syringe into a cup or basin should be avoided when possible. It is better to purge via a Luer lock into a closed bag. Sometimes people fail to use the closed bag system because purging into a cup is faster. At other times, people purge syringes into basins due to frustration. Viral transmission via mucous membranes is rare but possible. It is estimated to be 10-fold lower than blood contact with HIV. The risk is unknown for hepatitis C. Why take the risk? Some splashes are unavoidable, which highlights the importance of proper face protection. Until relatively recently, radiologists were slow to accept universal precautions. I personally have been splashed in the face on more than one occasion. Fortunately, I had both protective eye ware and a mask covering my nose and mouth. Without these simple precautions, I would have lost a lot of sleep.

Disorganized Sharps

If you’re going to be compulsive about anything, be compulsive about your sharps. Many interventionalists have a huge pile of equipment on the back table, particularly in complicated or protracted cases. That pile should never include sharp objects. In our laboratories, we have a special area for all sharp objects—needles and scalpels are placed into a needle sponge and never left out anywhere else on the table (Fig. 3). I always stick needles and scalpels in a sponge tray positioned on the far corner of the back table.

Figure 1 Recapping needles. (A) Needle being advanced into cap placed on flat surface. (B) Cap being secured on needle.

Figure 2 Safety needle. (A) Two Luer lock attachment sites (white arrows). (B) Protective sheath over needle.

Grabbing Suture Needles with Your Fingers Rather Than a Hemostat

I cringe every time I see residents do this. Most of the time they avoid sticking themselves with suture needles but not always. Even if it is awkward at first, use a hemostat or needle driver, not your hands.

Forcefully Injecting Through a Syringe and Breaking It

Syringes come in a variety of sizes; those that are ≤ 10 mL can be broken by forceful manual injections. Remember that smaller syringes enable more forceful antegrade injection pressures and larger syringes enable more forceful aspiration. With that in mind, you should not have to exert yourself when handling a syringe. Use an inflation syringe or power injector. As a general rule, you should not have to “force” anything in interventional radiology. Doing so increases the chance that you

will lose control of whatever you are doing and risk injury.

Not Changing Gloves Often Enough

During long cases, gloves can develop imperceptible perforations so it is best to change gloves often, particularly for protracted cases. Similarly, if you have abrasions or cuts on your hands, wrap them or double-glove. The latter reduces the risk of exposure during surgery. Whether it reduces risk in interventional radiology is unclear, but if you can accept the slight loss of tactile sensitivity, it may be a good practice.

Trying to Catch Falling Objects

The natural tendency for nearly everyone is to attempt to catch a falling object. You must break yourself of this habit in IR. Let it fall to the ground. Even objects that are not particularly sharp may cause injuries if you try to grab them in midair. Your life is more important than any device in an IR suite.

In summary, most of these precautions fall under the category of common sense. And yet I've seen people injure themselves (often more than once) by not following these simple rules. Following these practices will significantly reduce your risk of occupational exposure to biohazards.

Figure 3 Sponge box for needles and other sharp instruments.

SUGGESTED READINGS

- Baffoy-Fayard N, Maugat S, Sapoval M, et al. Potential exposure to hepatitis C virus through accidental blood contact in interventional radiology. *J Vasc Interv Radiol* 2003;14:173–179
- Hansen ME, Bakal CW, Dixon GD, et al. Guidelines regarding HIV and other bloodborne pathogens in vascular/interventional radiology. SCVIR Technology Assessment Committee. *J Vasc Interv Radiol* 1997;8:667–676
- Marx MV. Hepatitis C virus risk in the interventional radiology environment. *J Vasc Interv Radiol* 2003;14:129–131