

Published by the
International
Healthcare Worker
Safety Center
at the University of Virginia

Center website:
[www.healthsystem.virginia.edu/
internet/epinet](http://www.healthsystem.virginia.edu/internet/epinet)

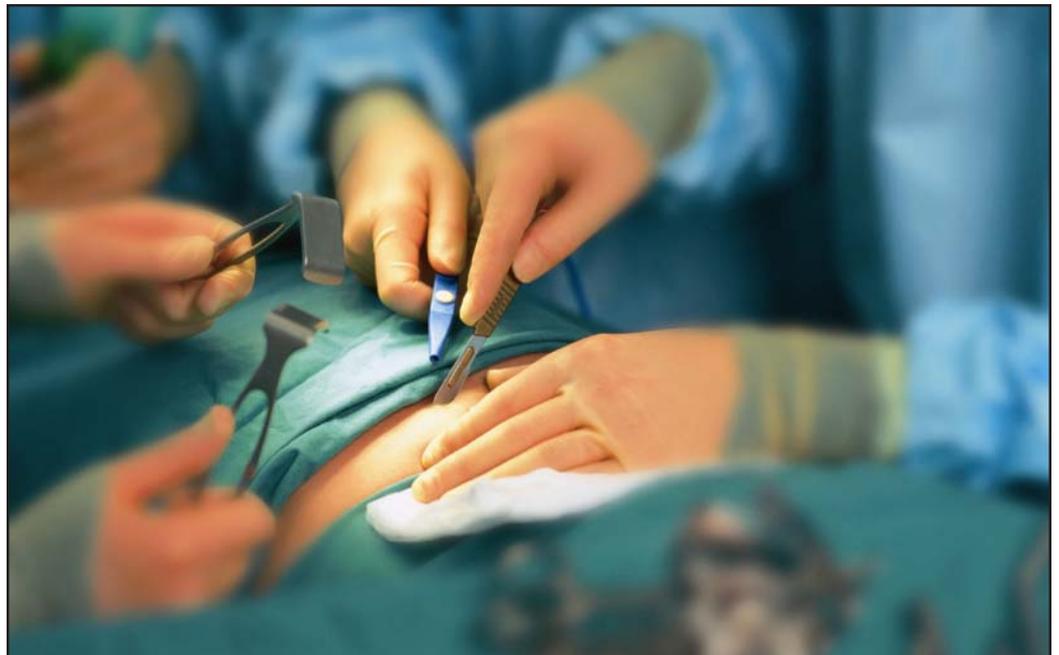
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Scalpel Blades: Reducing Injury Risk

By Jane Perry, M.A., Ginger Parker, M.B.A., and Janine Jagger, M.P.H., Ph.D.

- *As a surgery attendant passed a scalpel to the surgeon, the surgeon simultaneously reached for it; they bumped hands and the attendant's left index finger was cut.*
- *A physician and nurse completed a c-section and were cleaning the patient. As the nurse reached back for a towel, she was cut by a scalpel held by the OR technician.*
- *An attending surgeon was assisting the primary thoracic surgeon with a lobectomy. As the attending withdrew his left hand from the chest incision, he was cut by the scalpel held by the primary surgeon.*
- *Following an outpatient procedure a nurse was cleaning up the equipment, and used a hemostat to remove the blade from a reusable scalpel handle. The blade slipped and the nurse cut her middle right finger.*
- *A surgery attendant was reaching across a mayo stand to place a suture needle on a needle board and was stuck by a scalpel blade lying on the stand.*

THESE DESCRIPTIONS OF SCALPEL BLADE INJURIES to healthcare workers, from the EPINet multihospital sharps injury database coordinated by the International Healthcare Worker Safety Center at the University of Virginia, illustrate how scalpel injuries can occur in surgical settings. In EPINet data from 1993 to 2001, reusable and disposable



Scalpel Blades: Reducing Injury Risk

scalpels together ranked third as a cause of sharps injuries across all healthcare settings, accounting for 7% of injuries. In operating rooms (ORs) specifically, scalpels caused 18% of injuries—second only to suture needles, which caused 41% of injuries.

A detailed analysis of scalpel blade injuries in surgical settings, based on the most recent two years for which EPINet data is available (2000-2001; 133 scalpel injuries, 35 healthcare facilities contributing data), reveals that scalpel blades are more likely than needles to cause deep or otherwise severe injuries. While 39% of suture needle injuries were classified as moderate (skin cut, some bleeding) and 2% as severe (deep cut, profuse bleeding), these fractions were much higher for scalpels: 58% of injuries were classified as moderate, and a full 11% as severe. This suggests a higher probability of significant blood contact between patients and surgical personnel from injuries involving scalpel blades. Cases of HIV transmission to healthcare workers following scalpel injuries have been documented in both the United

States and Italy; they involved, respectively, a pathologist performing an autopsy and a surgeon.¹ When a scalpel injury results in bleeding and the healthcare worker's hands are in or near the surgical site, there is a further risk of healthcare worker-to-patient transmission of bloodborne pathogens such as HIV or hepatitis C.

Reusable vs. Disposable Scalpels

Reusable scalpels, which require removal of the blade in order to reuse the handle, caused more than twice as many injuries in this analysis as disposable scalpels, which eliminate this step (68% of scalpel injuries were caused by reusables, 32% by disposables). It appears, however, that use of reusable scalpels may be declining: in EPINet data from 1993-94 for percutaneous injuries in ORs, 21% of OR injuries were caused by reusable scalpels, while only 0.2% were caused by disposables; in 2000-2001 data, the fraction of injuries caused by reusables—9.5%—was much lower, while the proportion of injuries from disposables, 4.4%, had increased significantly (see figure 1).

Who is Injured, and When

In EPINet data for 2000-2001, surgery attendants sustained the largest proportion of scalpel injuries (36%), followed by nurses (27%), physicians (18%), and surgery technicians (9%) (see figure 2, page 39). In 76% of cases, the injured worker was *not* the original user of the scalpel. This is particularly significant because many injuries from scalpels occur when surgeons are passing them to nurses or other OR personnel. The largest proportion of scalpel injuries occurred “between steps of a multi-step procedure” (41% or 54/133) (see figure 3, page 39). Of these 54 cases, 12 workers specifically noted in the description area of the EPINet form that the injury occurred during passing (other “between steps” injuries may have involved passing as well, but were not noted as such by the injured worker). An additional 31% of scalpel injuries occurred during use, and 10% during disassembly. When we separated injury data in the “disassembly” category for reusable and disposable scalpels, we found twice as many injuries during disassembly for reusables compared to disposables. (When workers indicate “during disassembly” for disposable scalpels, they may possibly mean the injury occurred during activation of the safety shield. Injuries can occur during this step if two hands are used to activate the shield instead of one. Activating the shield should be a one-handed operation, using the thumb to slide the shield over the blade or the blade into the handle. All parts of the hand thus remain behind the blade.)

An additional 14% of scalpel injuries occurred after use but before disposal (this category excludes disassembly injuries) or during or after disposal; these injuries could potentially be eliminated by using safety-designed scalpels where the blade can be covered between uses

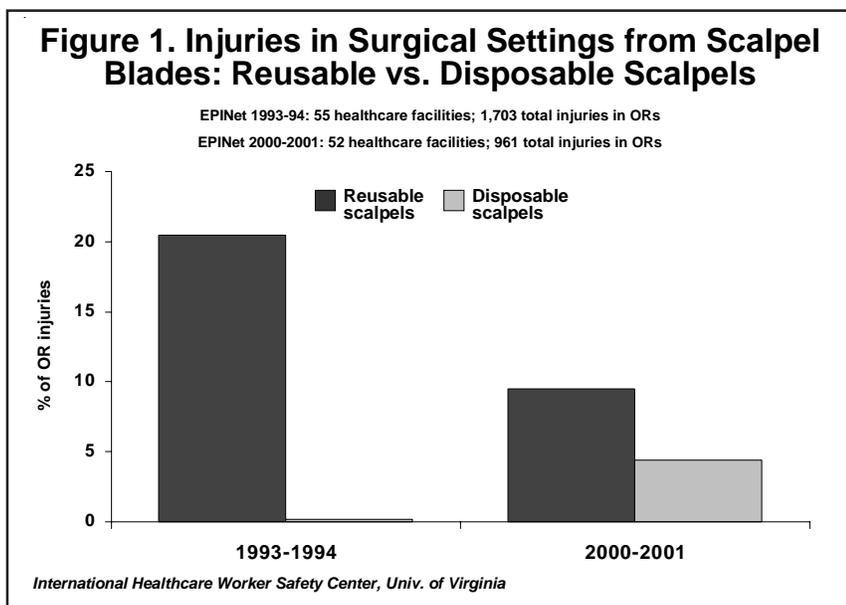


Figure 2. Job Category of Workers Sustaining Injuries from Scalpel Blades in Surgical Settings

EPINet, 35 healthcare facilities, 2000-2001, 133 cases

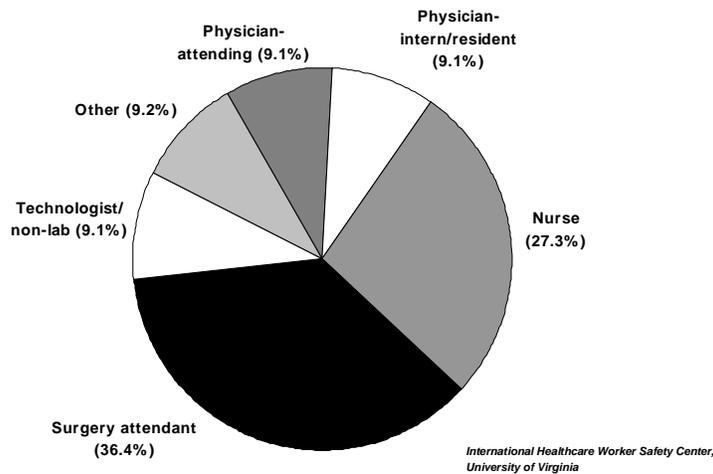
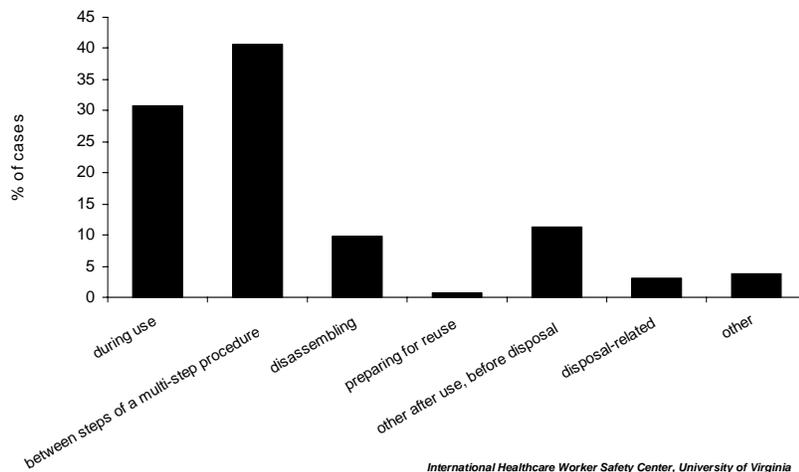


Figure 3. Mechanism of Scalpel Blade Injuries in Surgical Settings

EPINet, 35 healthcare facilities, 2000-2001, 133 cases



Scalpel Blades: Reducing Injury Risk

and after use. But, in 90% of cases workers reported that the scalpel that injured them was not a safety design.

The largest proportion of scalpel injuries, 94%, were to the hands; 3% were to the arms, and 2% to the feet. The right hand sustained 56% of injuries, and the left hand, 38%; this injury pattern may be related to hand-to-hand passing, in which the dominant hand (usually the right one) is used to receive instruments.

Preventing scalpel injuries

To reduce injuries from scalpel blades, a variety of prevention strategies are needed that target the different mechanisms of scalpel injuries.

Scalpels with shielded or retractable blades that can be placed in a protected position during passing and after use have the potential to prevent a large proportion of scalpel injuries—as many as 65%—if used consistently and correctly. However, it is important to document actual compliance in activating the safety feature, as well as prevention efficacy.

Disposable safety scalpels should be used preferentially to reusable ones, to reduce injuries associated with disassembly. However, there may be some procedures for which reusable scalpels are still the only option. For example, some surgical procedures (such as those in deep cavities like the chest) require an “extended length” scalpel to reach the tissue being cut. Disposable safety scalpels are not yet available in these extended length sizes.

Injuries that occur during cutting may be prevented by using alternative cutting methods when appropriate, such as blunt-tip scissors, blunt electrocautery devices, and laser devices. Other strategies include substituting round-tip for sharp-tip scalpel blades (blades with pointed tips cause more severe injuries than ones with round tips), and choosing endoscopic surgery instead of open surgery when possible. Manual tissue retraction (which puts fingers in closer proximity to the scalpel blade) should be avoided by using mechanical retraction devices.

Since hands are the body area most frequently injured by scalpel blades, their protection requires special attention. No gloves provide total protection from cuts, but ones made of steel mesh, Kevlar, leather, or knitted cut-resistant yarn are resistant to lacerations and can be worn under latex or vinyl gloves²; these are particularly relevant for the non-dominant hand, where the added bulk interferes less with dexterity.

No-hands-passing of sharp devices during surgery can help reduce passing-related injuries that result from collisions between hands and sharp instruments; it involves designating a neutral or “safe” zone, such as a mat, tray, or specially designed surgical drape, where instruments can be placed and picked up.³

Scalpel Blades: Reducing Injury Risk

Another important safety strategy is avoiding unnecessary speed and motion. Surgeon Mark Davis, in his book *Advanced Precautions for Today's OR*, notes: "When sharps are in use on the [surgical] field, there is rarely a need for excessive speed. The most technically proficient surgeons finish procedures faster than less experienced surgeons not by the use of rapid hand motion but by avoiding unnecessary and repetitive movements." Good verbal communication is also important for injury prevention: "When a sharp is in use, avoid anticipating motion of anyone's hands; wait for the surgeon to request sponging. *Do not assume anything*. Often students or new graduates, eager to help, place their hands unnecessarily near sharps in use or perform needless maneuvers."⁴

By implementing and using these prevention strategies, OR managers and personnel can significantly reduce the risk of scalpel injuries and bloodborne pathogen transmission in surgical settings. □

Using safety scalpels safely: Who should activate the protective feature during surgery?

Mark Davis, MD, FACOG, a surgeon who consults on exposure prevention issues in surgical settings, describes a current controversy relating to the use of safety scalpels:

"Who should activate and deactivate the safety feature of a safety scalpel? During simple unassisted procedures, such as insertion of a central line or newborn circumcision, the one using the scalpel clearly has that responsibility. But what about during assisted procedures in the operating room, where the scalpel must be passed between personnel? At a number of hospitals where I've consulted recently, I've heard that the OR staff wants the surgeon to uncover and cover the blade before and after each use. But many surgeons object, because during surgery their gloves may be wet and slippery, making such additional manipulation potentially hazardous. And the surgeons may have a point. If—and only if—a neutral or safe zone for no-hands-passing of the scalpel is established, it would be reasonable to allow the blade to remain exposed during no-hands-passing. Then the scrub person would activate the safety shield at the end of the procedure.

OSHA says we need to involve the users of the devices in these kinds of decisions, as common sense would dictate. It's important that surgeons and OR staff weigh in on this and other device-related safety issues."

NOTE: A new version of EPINet is available that is designed specifically for surgical settings. Access/EPINet-OR can help facilities track sharps injuries in this unique environment; it is suitable for both inpatient and outpatient surgical settings as well as labor and delivery

suites. To obtain a copy, send an e-mail to the Center's EPINet coordinator, Ginger Parker, at: gingerparker@virginia.edu.

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Products Designed to Reduce Risk of Scalpel Blade Injuries*

- **Retracting and shielded scalpel blades** (examples: BD Bard Parker Protected Disposable Scalpel, DeRoyal Retractable Safety Scalpel, Futura Safety Scalpel, Persona Safety Scalpel, Shackelford Retractable Safety Scalpel)
- **Rounded-tip scalpel blades**
- **Disposable scalpels** (which eliminate the need for blade removal)
- **Ultrasonic scalpels** (e.g., Harmonic scalpel/Ethicon Endo-Surgery)
- **"Neutral" or "safe" zones**, and products that facilitate no-hands passing (example, BladeSafe Scalpel Transfer Device from Future Medical Devices; Devon Hands-Free-Transfer Magnetic Drapes from Kendall Devon)
- **Quick-release blade handles** to facilitate blade removal for reusable scalpels
- **Scalpel blade removal devices** (e.g., Qlicksmart Scalpel Blade Remover; Swann-Morton Surgical Blade Remover; BLDX-2260-K Scalpel Blade Exchanging System), for removing blades from re-usable handles, to eliminate manual removal of blades.

* This list is not exhaustive and does not necessarily represent all such devices currently on the market. Inclusion on this list is not, and should not be interpreted as, an endorsement by the Center.