

Research from the International Safety Center, a nonprofit research and advocacy organization for safer healthcare workplaces, finds an increasing prevalence of sharps injuries. The authors present some alternative suture and skin closure technologies that could increase safety in the OR.

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## Sharps inflicting increased wounds in the OR

Injuries from needlesticks—whether from disposable syringes, IV catheters, or blood collection devices—accounted for more than 30% of all sharps injuries in 2016, especially among nurses. Injuries from skin injections alone accounted for 25.7% of all sharps injuries that year. And, for the first time, injuries occurring from suturing during procedures (25.8%) surpassed those from skin injection needlestick injuries, according to the Exposure Prevention Information Network surveillance system (EPINet®).

In addition, injuries occurring in the OR and postanesthesia care unit in 2016 were reported more frequently (46.5%) than those occurring in patient rooms (27%) and the emergency department (7.1%).

Data increasingly show the need for a focus on hands-free (neutral zone) passing as well as safe and immediate sharps disposal to prevent injuries from occurring to non-users or those downstream (eg, surgical team members, environmental services staff, or housekeeping staff). This is truer for suture needles than for any other device category. In fact, 30.4% of suture needle injuries occur to someone other than the user, compared to 16.8% of hollow bore needle injuries and 12.5% of disposable syringe injuries.

Sharps injuries in the OR typically happen while a surgical procedure is being performed. The injured person—often the surgeon—can potentially bleed into the patient.

Data show that, among devices, the highest percentage of sharps injuries occurs with suture needles (Figure 1, p 21). Given the increasing incidence of injury and exposure—which pose considerable risks to healthcare staff, patients, and organizations—this is an issue of public health concern that needs more attention.

At the International Safety Center, a nonprofit research and advocacy organization for safer healthcare workplaces, we ran several customized EPINet reports with these two variables (OR and suture injuries) in mind. The data helped determine if there were changes over time and if those changes warrant consideration of novel technologies or engineering controls that can eliminate or reduce sharps injuries.

### EPINet data

When analyzing incident data from the OR only, for the 2015-2016 EPINet reporting years, physicians experienced 49.7% of all sharp object and needlestick injuries; surgical attendants/technicians, 22%; and nurses, 16.7%. Of those injuries, 60.1% occurred to someone other than the original user of the device.

Incidents were associated with suturing (48.6%), cutting (10.4%), and injections or other procedure types the rest of the time. More than 50% of all injuries occurred during use, and just over 20% between steps in a multistep procedure.

In the OR, 46.3% of all sharps inju-

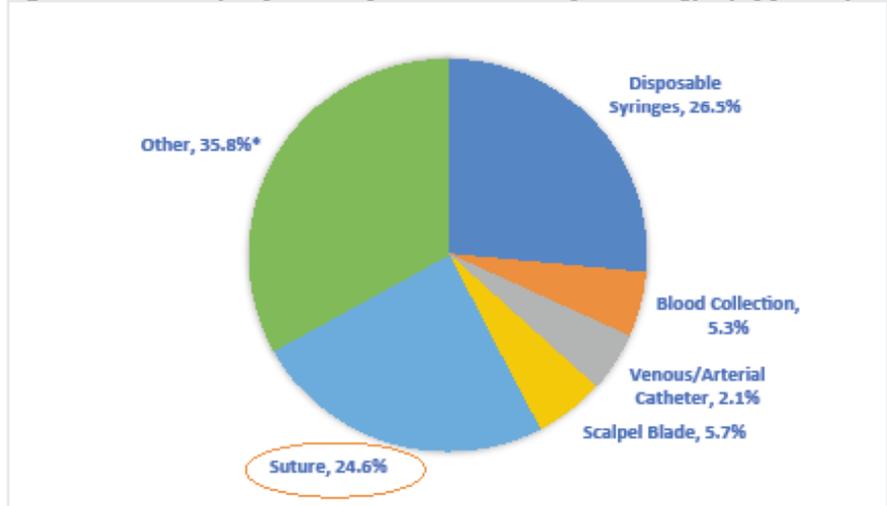
ries were from sutures, and only 8.3% from disposable syringes. Unlike nearly all other departments in the hospital, where devices with safety mechanisms are used more broadly, just 5.7% of injured employees in the OR stated that they were using a device with a “safety design.” Of those, 71.2% said they did not activate the safety mechanism.

Interestingly, of the 5.7% injured by a device with a safety mechanism, 26.9% reported that the safety mechanism was activated fully or partially before or during the injury. This can mean that devices such as scalpels, blades, and anesthesia needles do not yet have designs that are as safe as possible, or it may mean that better training and education are needed for device use and safety feature activation.

There is not a great deal of information on the impact of double gloving on decreasing potential seroconversion to a bloodborne disease or other illness. However, double gloving is recommended for several reasons—notably, the ability for the second glove to reduce the physical bioburden from the device that may go through and into the skin, soft tissue, or muscle tissue. More than 60% of staff reporting injuries in the OR state that they were double gloved when the injury occurred.

As one would expect, the great majority of suture injuries occur in the OR (85.2%). They also occur but are far less prominent in patient rooms (5.3%), the emergency department (3.8%),

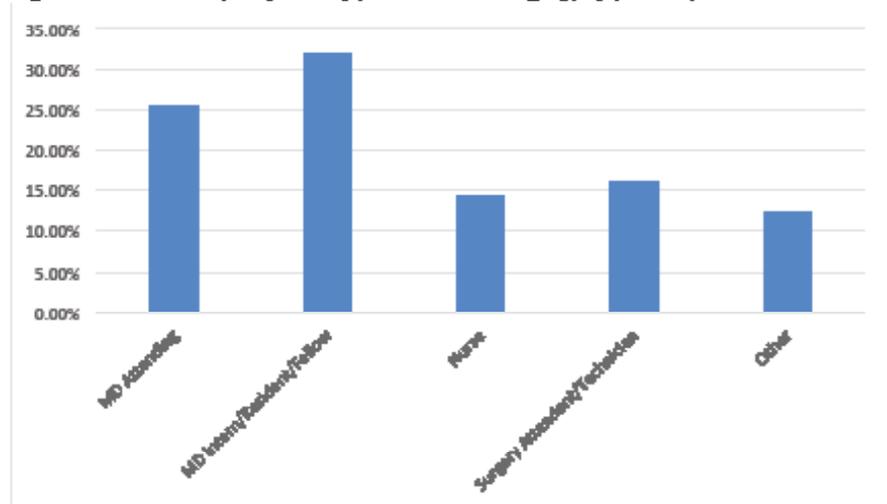
**Figure 1. Suture sharps injuries compared to all other major device types, by percent, 2016.**



\*Other devices include pins, drills, spinal needles, scissors, glass, etc, all with frequencies 1.0% or less.

Source: Amber H. Mitchell, DrPH, MPH, CPH. Used with permission.

**Figure 2. Suture sharps injuries by professional category, by percent, 2016.**



Source: Amber H. Mitchell, DrPH, MPH, CPH. Used with permission.

and outpatient clinics or office settings (1.3%). Sutures used in other units or departments, including procedure rooms, catheter labs, and labor and delivery, represent less than 5% of the total, according to EPINet data.

Suture injuries, more so than all other devices causing injuries in the OR, happen almost 70% of the time during use and less than 20% of the time between steps of a multistep procedure. This may mean that, compared to other devices used during surgical procedures

(scalpels, trocars, multidose syringes, etc), sutures are less frequently used multiple times.

In 2015-2016, physicians sustained the highest percentage of suture injuries (57.2%), followed by surgical attendants/technicians (16.1%), and nurses (14.4%) (Figure 2, above). Safer options for suturing include blunt sutures for internal fascia (nonskin closure), adhesives (for skin closure), staples, and zip tie-like closures. For all suture injuries occurring in the last 2 reporting years,

however, only 0.2% of injured employees stated that they were using a device with a safety design.

## Financial burden

Determining the exact cost of needlesticks and sharps injuries is difficult because the situations involving each exposure are different (eg, type of exposure, amount of blood, amount of bleeding, source patient status, time to receive medical follow-up, emotional distress, time away from work). Statistics in the peer-reviewed literature suggest that managing occupational exposures can range from \$375 to \$2,456 per incident if there is no seroconversion, and up to \$1 million or more if there is.

There are direct and indirect costs associated with each incident and injury. There is also a financial burden associated with failure to comply with the Occupational Safety and Health Administration's (OSHA) Bloodborne Pathogens Standard (29 CFR 1910.1030) should an inspection take place. Violations of the standard are typically categorized as "serious" violations because they can result in serious physical harm (bloodborne infection/illness) and up to \$12,934 per cited violation.

This fine can add up quickly as the dollar amount is then charged per day if the employer does not fix the hazard beyond an agreed-upon abatement date. If it is determined during the inspection that an employer willfully violated the requirements of the standard, fines can be as high as \$129,336 per violation.

Cost should not be the primary driver of change, but it seems to be the most compelling reason to move to safer technologies to prevent occupational exposures. The costs illustrated above are related to the employee incident itself, and do not include the liability costs associated with potential patient exposures.

If an injury occurs to an employee inside the sterile field (eg, a suture pierces through double gloves, resulting

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in bleeding), that employee's blood may enter a patient, and additional treatment may be needed that is not covered by insurance. Such a scenario may lead to loss of reimbursement, fines, legal fees, loss of business, and a tarnished reputation for the organization.

## OSHA requirements

The OSHA Bloodborne Pathogens Standard is in place to protect employees from occupational exposure to blood and other potentially infectious materials (OPIM). It applies not just to health-care workers, but to any employee who has reasonably anticipated exposure to blood or OPIM.

With regard to contaminated sharps, that means any staff member who may come into contact with a device throughout its lifetime (use, disposal, transport, waste). When we think about sutures and other sharp devices used in the OR, especially those that do not have safety features, they can pose an injury risk beyond just the use period (ie, during the surgical procedure).

This is one reason to consider moving to newer and safer device technologies. Another reason is simply because the standard requires it. The requirements within the Exposure Control Plan portion of the standard include annual consideration and implementation of "commercially available and effective safer medical devices designed to eliminate or minimize occupational exposure." The employer is also required to "solicit input from non-managerial employees responsible for direct patient care who are potentially exposed to injuries from contaminated sharps in the identification, evaluation, and selection of effective engineering and work practice controls."

In short, employers are required to evaluate the effectiveness of new, safer technologies on the market and the appropriateness of use for procedures



*Examples of alternative technologies include metal skin staples, blunt suture needle, skin glue, adhesive strips, and zip tie-like adjustable skin closures. Photo courtesy of Amber H. Mitchell, DrPH, MPH, CPH.*

performed in their facilities. They also need to include frontline employees in evaluating and selecting devices.

Healthcare organizations should adopt use of safer devices that are deemed to be effective for performing a procedure with no added hazard. If, after the evaluation, it is decided that they cannot be used because they add harm to worker, patient, or organization, the reasons must be documented in the annual updates to the Exposure Control Plan.

## New alternatives

We know that 2016 data show injuries are occurring more frequently in the OR than in any other hospital depart-

ment. We also know that reported suture injuries have surpassed injuries from disposable syringes and all other device categories for the first time ever. We know that sutures cause injuries not just to users, but also to non-users at both the point of care and downstream. Finally, we know that there are alternative technologies available for suturing and that evaluation of these devices is a requirement of the OSHA Bloodborne Pathogens Standard.

Alternative technologies include:

- staples
- blunt tip (end) suture needles used to close less dense tissue such as muscle and fascia

# Patient safety

- skin glues, where incision edges are chemically bonded together and are not subject to distraction forces
- adhesive strips for minor lacerations and small incisions
- zip tie-like adjustable skin closures (photos, p 22).

During device evaluation in your facility, assess the pros and cons for patients and personnel, and document these in the Exposure Control Plan.

Many of the manufacturers and distributors for alternative technologies provide in-services, training, and ongoing education. Employers must ensure that training is done not just annually, but as new devices are implemented and used and as new employees who will be using those devices are onboarded.

There may also be studies to aid in the evaluation and final selection

of engineering controls designed to reduce sharps injuries and improve patient outcomes. These studies include information on patient outcomes, cosmetic outcomes, differences in surgical site infection rates or risk, effectiveness of different types of closure procedures, staff satisfaction, and ease or difficulty of use. A facility may want to incorporate elements and outcomes like these in a suture alternative evaluation checklist.

Ultimately, given the high prevalence of injuries in the OR and suture injuries, the requirements of the OSHA Bloodborne Pathogens Standard, and potential for improvements in safety, quality, and aesthetic outcomes, healthcare administrators and employers are encouraged to evaluate and implement alternative suture and skin closure technologies wherever feasible. ❖



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