Sharps Safety:
Presenting the Evidence

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No disclosures
The OR is a dangerous place

Highest proportion (33%) of hospital-based percutaneous injuries (Epinet 2003)

Overview

- 80,000 (est.) suture needle injuries per year
- Cost = $40 million per year
- Most common cause of accepted worker’s compensation claims in hospitals
- Fines and liability can reach $ millions
HIV, Hepatitis B & C in Surgical Patients

<table>
<thead>
<tr>
<th></th>
<th>HIV (n=284)</th>
<th>HBV (n=304)</th>
<th>HCV (n=296)</th>
<th>HCV+HIV (n=221)</th>
<th>Any pathogen (n=373)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>32%</td>
<td>4%</td>
<td>40%</td>
<td>18%</td>
<td>47%</td>
</tr>
<tr>
<td>Females</td>
<td>21%</td>
<td>40%</td>
<td>29%</td>
<td>16%</td>
<td>29%</td>
</tr>
<tr>
<td>Total tested</td>
<td>26%</td>
<td>40%</td>
<td>35%</td>
<td>17%</td>
<td>38%</td>
</tr>
</tbody>
</table>

HIV 0.25%-0.4%
HBV 6%-30%
HCV 0.4%-1.8%

OR vs. Non-OR Sharps Injury Rates

EPINet 1993-2006: 87 hospitals; total injuries = 28,895

The Needlestick Safety and Prevention Act

-30%
1998-2005 data represents all U.S. hospitals; data for 1998 and 2001 additionally includes alternate sites (clinics, offices, labs)

- Disposable syringes: 14
t- Phlebotomy sets/needles: 52
t- I.V. catheters: 63

Blunt Suture needles: 3%
safety scalps: 5%

Devices causing injuries among surgical personnel
87 U.S. hospitals 1993-2004; total injuries = 7,272
Exposure Prevention Information Network, University of Virginia

% of Injuries

- Scalpel: 30
- Suture needle: 15
- Syringe: 10
- IV catheter: 5
- Rescor: 5
- Orthopedic: 5
- Orthopedic pin: 5
- Hypodermic needle: 5
- Other: 5

* Source: Advances in Exposure Prevention
** Source: Healthcare Products Information Services, Philadelphia
Number of injuries from suture needles, syringes, and scalpel blades by job category
87 U.S. hospitals 1993-2004; total OR injuries = 7,272
Exposure Prevention Information Network, University of Virginia

![Graph showing number of injuries by job category and device.

Mechanism of injury for all devices by job category
87 U.S. hospitals 1993-2004; total OR injuries = 7,272
Exposure Prevention Information Network, University of Virginia

![Graph showing mechanism of injury by job category and device.]
How can suture needle injuries occur?

- Loading or repositioning the needle into the needle holder
- Passing the needle hand-to-hand between team members
- Sewing toward the surgeon or assistant while the surgeon or assistant holds back other tissue
- Tying the tissue with the needle still attached
- Leaving the needle on the operative field
- Placing needles in an over-filled sharps container
- Placing needles in a poorly located sharps container

Sharps risk is shared by all members of the surgical team

- Surgeons and surgical residents were most often the original users of devices causing their injuries (81.9% and 67.3% of injuries, respectively)

- Conversely, nurses and surgical technicians were most often injured by devices originally used by others (77.2% and 85.1% of injuries, respectively).

Needlestick Injuries Among Surgeons-in-Training


International Healthcare Worker Safety Center, U.Va. Health System Fact Sheet:

- Follow-up for percutaneous injuries costs between $500 and $2,500 (if no infection is contracted), with an average of $672 reported in one study; for the estimated 54,000 injuries caused by suture needles each year, this translates to a potential cost to U.S. hospitals of $36.3 million per year.

- The large number of injuries from suture needles increases the risk that a bloodborne pathogen, such as HIV, hepatitis B or hepatitis C, could be transmitted from a patient to a healthcare worker, or from a healthcare worker to a patient.
The ACS [ST-58] Statement on preventing sharps injuries in the OR

- “The ACS recommends the universal adoption of the double glove (or underglove) technique in order to reduce body fluid exposure due to glove tears and sharps injuries in surgeons and scrub personnel”
- “The ACS recommends the universal adoption of blunt tip suture needles for the closure of fascia and muscle in order to reduce needle-stick injuries in surgeons and OR personnel”
- “The ACS recommends the use of HFT as an adjunctive safety measure to reduce sharps injuries during surgery except in situations where it may compromise the safe conduct of the operation. In situations where the surgeon must not lift his gaze from the operative field, a partial HFT may be used instead.”
- “Until clinical data is available, the ACS supports the use of ESIP devices as an adjunctive safety measure to reduce sharps injuries during surgery, except in situations where it may compromise the safe conduct of the operation, the safety of the patient, or staff safety.”
The American College of Surgeons

• [ST-58] Statement on preventing sharps injuries in the operating room
  – “The ACS recommends the universal adoption of the double glove (or underglove) technique in order to reduce body fluid exposure due to glove tears and sharps injuries in surgeons and scrub personnel”

Double Gloving: Inoculation data

• Multiple studies demonstrate decreased perforation rates of the inner glove when two gloves are used
• J Am Coll Surg. 1994 Bennett et al
  – Two gloves were even more efficient (p < 0.001) than one glove at removing blood from all suture needles, including the cutting needle.
• J Am Coll Surg. 2008 Lefebvre et al:
  – With an aqueous needle contaminant, a single glove layer removes contaminant from tapered needles as effectively as multiple glove layers. For cutting needles, double-glove layering offers superior protection. There is no advantage to triple-glove layering.
The American College of Surgeons

- [ST-58] Statement on preventing sharps injuries in the operating room
  - “The ACS recommends the universal adoption of blunt tip suture needles for the closure of fascia and muscle in order to reduce needle-stick injuries in surgeons and OR personnel”

Suture needle injury rates

<table>
<thead>
<tr>
<th>Type of needle</th>
<th>Injuries/1000 needles used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blunt</td>
<td>0</td>
</tr>
<tr>
<td>Straight</td>
<td>14.2</td>
</tr>
<tr>
<td>Curved</td>
<td>1.9</td>
</tr>
</tbody>
</table>

CDC 1997
Blunt suture needles: The data

Figure 1. Rate of injury associated with the use of curved suture needles during gynecologic surgical procedures and percentage of suture needles used that were blunt, by quarter—three hospitals, New York City hospitals, April 1993–June 1994.

Three studies with 1,054 individuals showed that blunt suture needles reduced needlesticks from an average of 18% to 6% (relative risk=0.34).

Cochrane review


Blunt suture needles: The data

- Stafford et al (1998) No increased wound morbidity with blunt needles for CS
- Sullivan et al (2009): RR 0.66 (Surgeon) and 0.54 (assistant) with blunt needles. Less satisfaction
- Wilson et al. (2008) No difference in glove leaks or injuries with blunt needles.
- Wright et al. (1996) Fewer glove perforation during THA
- Rice et al (1996) Seven-fold reduction in needlesticks during abdominal wall closure
The American College of Surgeons

- [ST-58] Statement on preventing sharps injuries in the operating room
  - “The ACS recommends the use of HFT as an adjunctive safety measure to reduce sharps injuries during surgery except in situations where it may compromise the safe conduct of the operation. In situations where the surgeon must not lift his gaze from the operative field, a partial HFT may be used instead.”

“Neutral Zone”

- A previously agreed upon location on the field where sharps are placed from which the surgeon or scrub can retrieve them. Therefore, hand-to-hand passing of sharps is limited
- Partial technique: Scrub hands surgeon sharp directly, surgeon returns sharp via neutral zone

*American College of Surgeons
*Association of periOperative Registered Nurses
*OSHA
Neutral Zone: Evidence

- The Effectiveness Of The Hands-Free Technique In Reducing Operating Room Injuries B.Stringer, Ph.D., C. Infante-Rivard, MD, Ph.D., J. Hanley, Ph.D.
  - Hands-Free Technique (HFT) use 75% or more of the time was associated with a 59% reduction in exposure incidents (precutaneous injuries, glove tears, and contamination) in operations with >100ml blood loss
- A study on the hands-free technique’s ability to reduce bloody occupational exposures during surgery and a training video’s ability to increase use of the hands-free technique. B. Stringer et al (in press)
  - HFT use 75% or more of the time was associated with a 35% reduction in exposure incidents
  - No difference in glove perforations with the use of the neutral zone

The American College of Surgeons

- [ST-58] Statement on preventing sharps injuries in the operating room
  - “Until clinical data is available, the ACS supports the use of ESIP devices as an adjunctive safety measure to reduce sharps injuries during surgery, except in situations where it may compromise the safe conduct of the operation, the safety of the patient, or staff safety.
ESIP devices

- Safety scalpels
- Scalpel blade remover
- Suturing devices

Table 4

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Reusable</th>
<th>Disposable</th>
<th>N (%)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before use of item</td>
<td>28 (2.8)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>During use of item</td>
<td>294 (29.5)</td>
<td>76 (32.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between steps of a multi-step procedure (passing)</td>
<td>187 (18.7)</td>
<td>22 (9.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disassembling device or equipment</td>
<td>15 (1.5)</td>
<td>3 (1.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Device left on floor, table, bed/inappropriate place</td>
<td>6 (0.6)</td>
<td>2 (0.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After use, before disposal</td>
<td>113 (11.3)</td>
<td>22 (9.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item left on or near disposable container</td>
<td>3 (0.3)</td>
<td>1 (0.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>While putting the item into the disposal container</td>
<td>10 (1.0)</td>
<td>3 (1.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After diag, stuck by item protruding from container</td>
<td>5 (0.5)</td>
<td>3 (1.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item pierced side of disposal container</td>
<td>0 (0.0)</td>
<td>2 (0.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After disposal, item protruding from inappropriate trash bag/container</td>
<td>1 (0.1)</td>
<td>1 (0.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reusable scalpels</td>
<td>294 (29.5)</td>
<td>76 (32.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disposable scalpels</td>
<td>996</td>
<td>236</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Scalpel Injuries

Shielded scalpels could reduce scalpel injuries by up to 70%...
But there is no data to support this claim at this time
Scalpel injuries

- EPINet 2003
  - 76% of scalpel injuries not the original user
    - 31% during direct use, 41% during other steps
  - CDC data
    - 1700 injuries: 19% during safety device activation, 7% of those due improper activation, in 27% of injuries the user did not activate safety at all
  - Alternative PEAK plasma mediated radiofrequency device

Evidence-based interventions

- Gloves (high-level evidence)
  - Always double glove
  - Change gloves at intervals throughout the procedure
- Needles: (high-level evidence)
  - Always use blunt suture needles for the closure of muscle and fascia
- Passing Sharps: (supportive evidence)
  - Pass all sharps via a neutral zone when appropriate
- ESIP: (no evidence regarding safety scalpels)
  - Use mechanical protective devices and safety accessories when effective, possible, and appropriate
“Sharpless” Surgery

• Martin Makary, M.D., M.P.H.
• Techniques:
  – Laparoscopy, electrocautery, skin clips or glue, and blunt needles

How are we doing?

• Surg Infec 14:288, 2013
  – Survey 107/324 respondents 1/3 res 1/3 attend
  – >50% believed in DG but < 50% used it
  – > 50% believed in HFZ for <10% used it
  – <50% believed in BTSN < 10% used it
  – Tactile sensation, training, availability
National Sharps Safety Adoption Strategy for the OR

- Professional Society leadership:
  - AORN, ACS, AST, CSPS, ACGME, CIR
  - Data, statements, sharps “bundle”, and training
- Local hospital enforcement
  - Implementation of OR sharps policies
- Regulatory pressure NIOSH, OSHA
- Industry support, marketing, and innovation

CONTRA COSTA REGIONAL MEDICAL CENTER
NURSING DEPARTMENT
OPERATING ROOM

SHARPS SAFETY

I. PURPOSE
To provide guidelines prevent sharps injury and exposure to blood pathogens for all workers in the Preoperative setting.

II. POLICY
Based on recommendations by the American College of Surgeons and the Association of PeriOperative Nurses, CCRMC Sharps safety practices will include:
A. Double Gloving will be used in all surgery to reduce the risk of exposure to patient blood. Undergloves will be provided whenever possible to improve comfort and tactile sensation.
B. Blunt Tip Suture Needles will be used for the closure of muscle and fascia to reduce and/or eliminate needlesticks to the surgeon and OR team.
C. Neutral Zone (Hands Free Technique) will be used in all operations to reduce the risk of sharps injuries. If the surgeon cannot break eye contact with the surgical field during critical parts of the operation when patient safety or workflow might be compromised, a partial HFT may be used whereby sharps are directly handed by the scrub person to the surgeon, but then returned to the scrub person via a neutral zone.
D. Engineered Sharps Injury Prevention (ESIP) devices: A shielded scalpel will be used in all cases to prevent sharps injuries to the surgeon and OR personnel.
E. Surgeons will be encouraged to eliminate the use of sharp instruments and supplies whenever safe and feasible.

III. PROCEDURES
A. Adapt and incorporate safe habits into daily work activities when preparing and using sharp devices.
Adoption Steps

- Establish an OR sharps policy
- Provide ease of ordering and good selection
- Surgeon and OR staff education
- Identify one or more champions
- Introduce into resident training
- Re-train and review injury data

Thank you