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CLINICAL PERSPECTIVE

SHARPS-RELATED INJURIES IN THE OR

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Sharps-related injuries are a significant issue for health care workers (HCWs), especially within the surgical practice setting due to the risks associated with the procedures performed.[1] These injuries carry the risk for transmission of bloodborne pathogens and subsequent infection for HCWs, depending upon the prevalence of disease in the patient population and the nature and frequency of exposures.[2] Therefore, it is imperative that perioperative nurses and other personnel involved in surgical patient care remain aware of the clinical implications of sharps-related injuries as well as best practices and solutions available today to make the operating room (OR) a safer environment of care.

Causes of Sharp Injuries

A sharps injury is defined as a penetrating stab wound from a sharp object (eg, a scalpel, needle, or other sharp item) that may result in exposure to blood or other body fluids.[3]

Historically, the OR has been second only to patient rooms in the frequency of reported sharps-related injuries.[4] The inherent nature of the blood-intensive OR, combined with the use of sharp instruments and other devices, often with limited visual cues, and the teamwork required by members of the surgical team place perioperative personnel at higher risk of sharps-related injuries and exposure to blood than other HCWs.

Sharps injuries can also be the result of the stress, fast pace, and sometimes understaffed nature of the OR environment.[5] For example, in the OR, personnel do not always have the ability to take a break and must continue until the procedure is completed; these strenuous demands often result in feelings of frustration, fatigue, and sometimes anger, all of which can increase the risk of injury and subsequent infection. The use of improper procedures (eg, hand-to-hand passing of sharps between staff members, placing sharps in a disposal container, or failure to use safer sharps devices) is also associated with sharps-related injuries.

The majority of the sharps-related injuries in OR personnel are caused by suture needles (43.4%), followed by scalpel blades (17%), and then syringes (12%); 75% of injuries to nurses and 74% of injuries to surgical technologists occur while passing or disassembling sharp devices or during or after their disposal.[6]

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The Exposure Prevention Information Network (EPINet) centered at the University of Virginia, reported that nearly 50% of all sharps injuries occur during the use of a sharp; in addition, of the approximately 40% of needle injuries that involved a safety designed needle, the majority of injuries were sustained before the safety feature of the device was activated.[7]

Today, there is a quiet revolution occurring in Japan, in regards to validating the issue of sharps reporting and the consequences and impact of sharps-related injuries with data.[8] EPINet data frameworks and reporting systems allows countries to share and compare data and also learn best practices and identify high risk practices wherever they are in use. EPINet Japan represents one of the first collaborations with the University of Virginia.

Incidence of Sharp Injuries

In United States hospitals, the Centers for Disease Control and Prevention (CDC) estimates that there are approximately 385,000 sharps-related injuries reported annually among HCWs; however, it has been estimated that about half or more of all sharps injuries are not reported.[9] The average sharps injury rate per 100 occupied hospital beds in the United States is reported to be 30.[10] An analysis of percutaneous injury surveillance data from 1993 through 2006 obtained from 87 hospitals in the United States showed that, of the 31,324 total sharps-related injuries, 7,186 were sustained by surgical personnel.[11]

In Japan, the annual mean needlestick and sharps injury rate per 100 beds was 6.2; this is lower than the corresponding rates in the United States, South Korea, and Taiwan.[12] The lower rates of sharps-related injuries in Japan may be due to the fact that fewer sharps devices are handled per unit bed, because the average length of hospital stay is longer in Japan than in the United States (18.8 days in Japan versus 4.9 days in the United States); therefore, the number of devices used in Japan per bed on a daily basis may also be lower, which could potentially have decreased the overall sharps-related injury incidence rates per hospital bed.

There are differences in the incidences of sharps-related injuries between health care facilities in Japan and the United States in relation to cause; in Japan, a higher proportion of injuries are caused:

- while using butterfly needles (22% compared to 7% in the United States);
- while starting an intravenous (IV) line or setting up a heparin lock (16.5% compared with 6.9% in the United States); and
- when recapping needles (25.6% compared with 3.4% in the United States).[13]

In Australia, reported needlestick injury data from state and local data collections confirm that these types of injuries are consistent and also concerning within health care settings; a revised estimate suggests that approximately 19,355 injuries may be reported in Australian hospitals annually.[14] Data published in 2011 regarding 1,191 injuries sustained in 20

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Queensland public hospitals found a rate of 2.86 percutaneous exposures per 100 full time equivalent staff.

HCW Health Risks Associated with Sharps-Related Injuries

Sharps-related injuries increase the risk for HCW infections due to occupational transmission of bloodborne pathogens, primarily hepatitis B (HBV), hepatitis C (HCV), and the human immunodeficiency virus (HIV).[15] However, many other pathogens have been responsible for occupational infections in HCWs after an exposure to blood and body fluids, some with unfavorable prognosis; these include various viruses, bacteria, parasites, and yeasts.[16] In addition to the risk of illness after an occupational exposure, the resulting psychological trauma and long-term disability are also areas of concern.[17] Because these infections are largely preventable, they should be eliminated.[18]

Costs Associated with Sharps Injuries

Just one sharps injury can result in a number of both direct and indirect costs for the health care facility and therefore is often an incentive to implement safer sharp practices; the costs associated with a sharps injury include:

- loss of employee work time;
- cost of staff time in investigating the injury;
- cost of laboratory testing;
- expense of treatment for the infected staff member(s); and
- costs associated with replacing staff.[19]

Prevention of sharps injuries is cost-effective;[20] the cost of follow-up for a high-risk exposure is approximately $3,000 per needlestick injury, even without subsequent infection.[21] Data from the American Hospital Association show that one case of serious infection due to bloodborne pathogens can quickly add up to $1 million or more in expenses for testing, follow-up, lost work time, and disability payments.[22] For example, a liver transplant due to hepatitis C costs hundreds of thousands of dollars; additional costs associated with needlestick and sharps injury include workers' compensation, overtime, and expenses related to recruitment and training of staff to replace a worker who becomes ill.[23]

In addition to the costs incurred by the health care facility, stress on the affected worker and the worker's family can also be very costly in regards to the initial health/infection concern; the testing period for bloodborne pathogens, which often can take several months; and the resulting feelings of anxiety and distress that may last for a lengthy time period.[24]

Even without transmission of serious infection, the emotional impact of a needlestick or sharps injury can be severe and long lasting; the impact is especially severe when the injury involves HIV exposure.[25] In a study of 20 HCWs with HIV exposure, 11 experienced acute severe distress, 7 reported persistent moderate distress, and 6 had quit their jobs as a result of the exposure.[26] Other stress reactions that required counseling have also been reported.[27] Additionally, not knowing the infection

status of the source patient can intensify the HCW's stress; the colleagues and family members of the exposed HCW may suffer emotionally as well.[28]

Policy/Mandates Recommending the Use of Sharp Safety Devices

United States

In the United States, preventing percutaneous injuries among HCWs has been the subject of national regulation since the early 1990s.[29] The passage of the Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens Standard of 1991to eliminate or minimize occupational exposure to HBV, HIV and other bloodborne pathogens took effect in March 1992.[30]

In November 2000, The Needlestick Safety and Prevention Act was signed into law because occupational exposure to bloodborne pathogens from accidental sharps injuries in health care and other settings continued to be a serious problem.[31] This act modified the OSHA Bloodborne Pathogens Standard by outlining greater detail, and making the OSHA requirement for employers more specific to identify, evaluate, and implement safer medical devices. It further clarified the definition of "engineering controls" specified in the original 1991 Bloodborne Pathogens standard by adding language that reflected the development and availability of new, safer medical devices that had occurred since the early 1990s. It defined Engineering Controls as:

> *"controls (eg, sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems) that isolate or remove the bloodborne pathogens hazard from the workplace."*[32]

This revised standard also mandated additional requirements for maintaining a sharps injury log and for the participation of non-managerial HCWs in the process of evaluating and selecting devices.

The Needlestick Safety and Prevention Act of 2000 pertains equally to surgical and nonsurgical practice settings; however, recent data suggest that compliance with its provisions is low in surgical settings and therefore, preventable injuries persist.[33]

Asia/Pacific

It appears from a review of the literature that no country in the Asia/Pacific region currently has laws or policies mandating the use of safety-engineered safety devices.

In Australia, the Australian Commission on Safety and Quality in Health care has developed new National Safety and Quality Health Service Standards.[34] Standard 3 is the prevention and control of health care associated infection; under this standard, all Australian health service organizations must:

"implement systems to prevent and manage health care associated infections and communicate these to the workforce to achieve appropriate outcomes."[35]

Action 3.7 specifies the promotion of collaboration with occupational health and safety programs in order to reduce the risk of infection or injury to HCWs.[36] The actions required include implementing procedures and/or protocols are implemented to address occupational management and prophylaxis, personal protective equipment, and evaluation of new products and procedures.

Best Practices for Preventing Sharps-Related Injuries

EPINet data from 2001 to 2006 suggest that sharps-related injuries can be reduced, since in nonsurgical hospital settings, they decreased 31.6% after The Needlestick Safety and Prevention Act of 2000; however, sharps injuries in surgical practice settings increased 6.5% during that same period, where the use of safety devices was limited in comparison to that in nonsurgical settings.[37] Several organizations and professional associations have developed best practices for preventing sharps-related injuries, as described below.

World Health Organization (WHO)

The WHO recognizes that the following simple measures can be effective in the primary prevention of sharps injuries.[38]

- Avoid unnecessary injections.
- Manage sharps waste safely. Strategies includes collecting contaminated sharps waste immediately after use (without recapping the needle), using puncture-proof sharps containers that will not leak liquids.
- Immunize at-risk health-care workers against the HBV.
- Provide appropriate personal protective equipment (PPE) (eg, gloves, gowns, masks etc).
- Train HCWs on the risks of transmission of bloodborne pathogens and on safe practices to reduce occupational exposure.

Association of periOperative Registered Nurses (AORN)

The 2015 AORN Guideline for Sharps Safety recommends the use of the following best practices in the surgical practice setting:

- blunt suture needles, unless clinically contraindicated;
- safety scalpel devices (eg, single use scalpel handles and blades that do not require disassembly, retracting scalpel blades, shielded or sheathed scalpel blades, rounded tip scalpel blades, scalpel blade removal devices) whenever feasible;

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- safety-engineered syringes, needles, and IV catheters (eg, a syringe or needle with a sliding sheath, a hinged needle guard attached to the needle hub, a syringe with a retractable needle, needless systems, and blunt cannulae);
- a sharps containment device or specified areas of the sterile field to confine and contain sharps;
- a neutral zone or hands-free technique to pass blades, needles, and sharp instruments; and
- a no-touch technique when handling sharps.[39]

American College of Surgeons (ACS)

In 2007, the ACS issued a statement on sharps safety, which supports the use of blunt tip suture needles, the neutral zone/hands-free technique for passing sharps, and engineering sharps injury prevention devices.[40]

Centers for Disease Control and Prevention (CDC)

In the United States, the CDC also recommends the use of safer sharps devices that incorporate engineering controls built into the product to prevent sharps injuries, noting that all traditional devices have safer alternatives, which are very effective in significantly reducing sharps injuries.[41] In addition to strategies that focus on specific task-level improvements (eg, using appropriate safety devices or safe work practices), maintaining an organizational perspective on a culture of safety is essential to protect HCWs, patients, and other personnel in any health care practice setting.[42]

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