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Workplace Safety Equals Patient Safety

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For many years, AORN has been a leader in creating a safe environment for the patient in the OR and other procedural areas. Perioperative nurses provide care that adheres to the AORN standards and recommended practices. AORN provides orientation tools like Periop 101: A Core Curriculum™. Collaborations among AORN staff members, member volunteers, and representatives of other organizations have resulted in tool kits to address safety factors such as surgical briefings, time out, and debriefings.

I believe that workplace safety is an integral part of patient safety. There are many pieces to creating a safe work environment, and much work has been done by AORN in cooperation with experts in various fields and health care organizations. Therefore, I have asked my colleagues to discuss a variety of topics related to workplace safety, including fire safety, sharps safety, safe patient handling, and smoke in the OR environment. I have also solicited general discussions on workplace safety in the OR and the sterile processing department and on workplace safety issues from AORN's perspective. I posed the following question:

> From your professional perspective, what work related to workplace safety have we done, and what has been its impact on the surgical team?

Fire safety

No one who brings a patient into the OR after reassuring the patient and family members that only the best of care will be provided ever imagines that the patient will catch fire and suffer disfiguring burns requiring subsequent reconstructive surgeries, but this is what happens at least 650 times per year in the United States.[1] What makes this even more tragic is that surgical fires are one of the few completely preventable complications, and prevention costs almost nothing. Because fire is a combination of a fuel, an oxidizer, and an ignition source—the fire triad—when these elements are separated, fire cannot exist. Likewise, when one of these elements is removed from a fire, the flame will be extinguished.

Likely one of the main causes of disabling OR fires is the open delivery of oxygen for surgical procedures when the surgical site is above the T5/xiphoid process.[2,3] Simple education would prompt the anesthesia professional to reduce the concentration of oxygen delivered to below 30%, use only room air (ie, avoid oxygen altogether), or secure the

airway with an endotracheal tube or supraglottic device. Drapes can be configured to allow sufficient airflow to prevent accumulation of oxygen underneath drapes and barriers.

The surgeon uses the ignition source, which can be the monopolar electrosurgical unit, a laser, or a fiber optic light source. These devices should not be used in close proximity to an oxidizer, such as oxygen or nitrous oxide, or near fuel sources, such as wet, alcohol-based preps or dry sponges and gauze.

The perioperative nurse should be aware that all drapes, barriers, and even patients are fuel sources for fires. Alcohol-based prep solutions are extremely flammable and should be allowed adequate drying time. The package inserts for these prep solutions give care providers guidance in their safe use. To illustrate, a 26-mL surgical applicator must never be used for head and neck procedures, and usually a three-minute drying time is needed, but increased time is needed for body sites that have hair or skin folds.[4,5] Before the area is draped or an adhesive barrier is placed, the area should be inspected for pooling of alcohol-based prep solution.

Surgical fires also may occur because an unplanned change in treatment occurs. For example, when the field is contaminated and the patient is reprepped, sufficient drying time may not be observed, or when bleeding occurs during a minor procedure being performed with oxygen supplementation, the electrosurgical unit may be used without consideration of the high concentration of oxygen nearby.

Each of the elements described here is certainly important for the prevention of surgical fires, but unless there is awareness and communication, the risk of fire is still present. The need for all surgical team members to assess fire risks and voice their concerns is the key to success in OR fire prevention. This communication can be fostered by having all surgical team members participate in OR-specific fire drills. Also, at the beginning of each surgical procedure, an assessment of fire risk can be conducted along with the assignment of appropriate tasks should a fire occur. If an increased risk of a fire exists, the first intervention should be decreasing the risk by separating the elements of the fire triangle.

The key to prevention of surgical fires is the education of all surgical team members about what contributes to increasing the risk of fires. When team members identify fire risks, they must communicate their concerns to others in the OR. Organizations such as the AORN and the Anesthesia Patient Safety Foundation (APSF) have created educational resources such as AORN's *Fire Safety Tool Kit*[6] and the APSF's free *Prevention and Management of Operating Room Fires* DVD and online video.[3] A culture of safety with vigilance by all team members must be the focus for the OR of the present and future. We must work together and train together to achieve a safe environment for our patients and fellow surgical team members.

Sharps safety

Every member of the perioperative team likely knows someone whose life and profession have been deeply and negatively affected by a sharps injury in the OR. Although surgeons, nurses, and surgical technologists have historically accepted the risk of contracting a

bloodborne illness through a sharps injury as part of their work, the patient safety movement has begun to significantly change the culture of health care in positive ways for both patients and health care workers. There is a growing awareness of the risks of sharps injuries among leading health care organizations, along with the recognition that we now have the knowledge and the tools to definitively address this issue.

The most recent US data, published in 2010, demonstrates that sharps injury rates in the OR have increased slightly during the past 10 years while they have concomitantly decreased by about 30% outside the OR.[7] The use of safety devices and work practices outside the OR has become commonplace, while the implementation of sharps safety measures in the OR has been lacking nationwide.[7] Obstacles to the implementation of sharps safety in the OR include surgeon resistance, lack of awareness and training, the unsatisfactory design of some safety devices, and cost concerns among hospital administrators.[7]

Existing data clearly demonstrate that sharps injury is a shared risk among OR team members[7]; thus, the argument for implementing sharps safety measures cannot be subjugated to individual preferences and general resistance to change. A surgeon or OR staff member who chooses not to use a validated safety device or work practice in a setting in which it does not affect patient care (most do not) is placing the rest of the surgical team at risk for a sharps injury. This can no longer be accepted.

Core sharps injury prevention strategies, summarized in a 2011 Consensus Statement,[8] are supported by the major professional societies involved in surgical care. These evidence-based practices include the use of blunt suture needles for the closure of fascia, double gloving, the use of the hands-free zone, and the use of safety-engineered sharps devices, such as the sheathed scalpel. AORN has developed a Sharps Safety Tool Kit[9] in collaboration with the American College of Surgeons to increase the awareness and implementation of sharps safety measures.

Blunt suture needles are now available from all major manufacturers in commonly used sizes and suture types. In my experience, second- and third-generation sheathed scalpels have received a better reception from surgeons and OR staff members. Industry marketing and sales efforts have increased noticeably in this area to the point that it is no longer difficult for an OR to regularly order and stock these products. From a legal and public policy standpoint, the Occupational Safety and Health Administration (OSHA) mandates the use of safety devices in the OR when they are available.[10] Unfortunately, enforcement of OSHA mandates at both a state and federal level has been limited until now. However, the publication of data indicating a lack of progress in sharps injury prevention in the OR has increased OSHA awareness at a state level of the need for a proactive regulatory approach to sharps safety.[11]

The recent 10th anniversary conference celebrating the passage of the 2000 Needlestick Safety and Prevention Act highlighted the successes of the program in non-OR health care settings along with the need to redouble efforts to implement sharps safety strategies in the OR setting.[11] We are now at a time where we can achieve the goal of a national sharps

safety program and forever remove the risk of bloodborne illness transmission between patients and health care workers.

Smoke evacuation

Surgical smoke has been shown conclusively to be hazardous to the health of surgical team members.[12] Equipment and supplies are available to effectively and easily evacuate smoke plume, but compliance is still inconsistent.[13,14] Research by Ball[14] showed unacceptable compliance and highlighted health problems nurses have after years of inhaling surgical smoke. Strategies and tools are needed to ensure sufficient compliance with smoke evacuation.

The AORN position statement on surgical smoke and bio-aerosols[15] was approved by the House of Delegates at the AORN Congress in 2008. The position statement states that "exposure to surgical smoke and bio-aerosols can and should be controlled. Health care professionals are responsible for learning about surgical smoke and bio-aerosols and taking steps to minimize the risks associated with these hazards."[15]

The AORN Surgical Smoke Task Force was instrumental in the development of a Surgical Smoke Evacuation Tool Kit[16] that was launched at the AORN Congress in 2009. The tool kit includes

- a sample competency skills check list;
- an educational PowerPoint™ presentation;
- a sample policy and procedure;
- a bibliography of smoke evacuation articles and research;
- a link to the *OR Product Directory* (*http://products.aornjournal.org*), which features vendors who sell smoke evacuation equipment, devices, and supplies; and
- seven awareness posters.

In addition, the tool kit contains testimonials on the effects of years of breathing in surgical smoke and includes valuable strategies to assist in promoting compliance.

The standard precautions for the removal of surgical plume must remain a priority for perioperative nurses. AORN recommends the following risk reduction strategies:

- Use local exhaust ventilation (.1 micron filtration at 99.999% efficiency)
  - *Central smoke evacuation systems*
  - *Portable smoke evacuation units*
  - *Wall suction with inline filter*
  - *Laparoscopic evacuation/filtration systems*
- *Use personal protective equipment*
  - *High-filtration surgical masks worn properly*

- *Protective eyewear*
- *Skin protection (eg, gloves)*
- *Educate perioperative staff*
- *Develop and implement training programs*
- *Demonstrate competencies on equipment and supplies*
- Comply with federal, state, and local regulations and standards
- *Document and maintain educational activities*.[15]

Smoke plume and aerosols are hazardous to health care workers but can be removed with proper smoke evacuation equipment and accessories. Wall suction alone typically is not adequate except during laparoscopic and endoscopic procedures and, if used, must be an inline wall filter.[17] Proper equipment selection and filter construction make a difference.

Safe patient handling

A partnership between AORN, the Veterans Health Administration, and the National Institute for Occupational Safety and Health resulted in development of a series of ergonomic guidelines for safe patient handling in the OR environment.[18-25] The guidelines incorporated the latest scientific knowledge in biomechanics, psychophysics, and physiology to develop safe recommended exposure limits for various patient handling and lifting tasks with high risk of causing musculoskeletal disorders, such as back and shoulder disorders. The guidelines address recommendations for

- transferring a patient laterally from a stretcher to an OR bed,[19]
- positioning a patient on an OR bed,[20]
- lifting and holding the patient's limbs,[21]
- prolonged standing in the OR,[22]
- manual retraction tasks,[23]
- lifting supplies and equipment in the OR,[24] and
- pushing and pulling wheeled objects and equipment.[25]

From a safety engineering standpoint, the data used to derive the guidelines (ie, muscle strength capability, spinal force limits, and physiological fatigue limits) were selected with the goal of providing a safe level of exposure for nearly all OR personnel. The goal of ergonomics is to design jobs and work tasks so they are safe for workers, but to also maintain productivity and efficiency. These two goals are not always in alignment and do not necessarily result in agreement about what ergonomic intervention or job design is best. Therefore, the goal of the AORN guidelines is to maximize what can be done in the workplace, but at the same time to make sure that the work is performed in the safest way possible. As noted in the guidelines, use of technology, such as specially designed patient lifting devices and equipment, is recommended to ensure that the work is done safely, but the equipment must also allow the work to be done in an efficient and timely manner.[18]

Widespread application of the AORN ergonomic guidelines should result in a number of positive benefits. First, use of the guidelines should lead to a significant reduction in the number and severity of work-related back, shoulder, and elbow disorders for personnel who routinely perform patient handling tasks in the OR environment. The most obvious result of a decrease in severe injuries would be a reported reduction in the number of expensive debilitating work disability cases and lost work time cases. Second, workers should be able to extend their careers for longer periods, resulting in a larger percentage of highly skilled workers remaining in the workforce. Finally, application of the ergonomic guidelines should improve the work environment by making the work easier for the workers, who should be less tired, fatigued, and stressed at the end of each work day. Physical fatigue builds in a cumulative manner over the course of the work week and work necessitating high physical demands requires longer recovery periods between exposures. Risk of a musculoskeletal disorder is increased, therefore, when physical demands and task repetition are high or when recovery is inadequate. If the AORN ergonomic guidelines for patient handling are followed, the physical task demands should be sufficiently low to ensure that typical recovery periods between work days will be sufficient to reduce the risk of developing a work-related musculoskeletal disorder caused by patient handling and lifting in the OR.

The impact of workplace safety issues in the OR

Workplace safety is an enormous, multifaceted topic that encompasses everything from patients to professionals to processes. I have seen the focus of safety in the OR expand from primarily patient centered to include the physicians, nurses, and allied health professionals who comprise the surgical team and their need for a safe workplace. Despite this broadened field of view, high-functioning teams of dedicated individuals have been unsuccessful in eradicating surgical misadventures and sentinel or “never” events. Therefore, the microscope has been readjusted to examine the “how” of what these teams do (ie, process improvement).

When an individual in the OR suffers harm, a root cause analysis is conducted to determine the mechanism by which the process failed. Typically, lack of adherence to recommended standards of practice (RSOP) is identified as the culprit. AORN has developed a vast treasure trove of RSOPs, position statements, and guidelines for perioperative nurses as well as sterile processing personnel and other surgical partners to provide a framework for development of policies and procedures.[26-28] Similarly, the Association of Surgical Technologists has developed RSOPs, guidelines, and position statements for surgical technologists and surgical first assistants that are specific to these areas of responsibility.[29]

I believe that safety for everyone entering the perioperative environment could be an achievable outcome if everyone followed the processes developed, which are based on those standards of practice that, in turn, are based on extensive research and review of existing evidence. Students of every profession are taught the basics “by the book.” They enter the clinical site filled with excitement, expecting to witness the epitome of patient care. Some see just that. Unfortunately, what many experience is far below that pinnacle, and they leave confused at the apparent abandonment of safety practices. Whether it is failure to perform a time out or use a neutral zone or hands-free sharps technique, lack of proper eye protection

on scrubbed personnel, electrosurgical pencils unholstered on the sterile field, or medications left unlabeled on the back table, the example set for a student or new employee is that safety measures are superfluous and unnecessary.

We are all responsible for our own actions. If we revisited our student days when we were excited about learning and having the opportunity to positively affect patients and if we performed as if we were being evaluated on our technique and safety measures were non-negotiable, there would be a dramatic reduction in errors. We must practice what we were taught, police our own behavior first and foremost, adhere to the standards, maintain currency through continuing education, and work as a cohesive team that inspires others to do the same. These are the basics of safe surgery, regardless of a person's title or position around the patient on the OR bed.

The impact of workplace safety issues in the sterile processing department

Patient safety has always been a critical component of patient care. A safe patient outcome is good for the patient and contributes to achieving goals required by accrediting agencies. Safe patient care also supports the "bottom line" because adverse outcomes that could have been prevented and that result in extended patient stays or costs for care will not be reimbursed. The focus on staff safety, however, has not always been as high a priority as patient safety. Fortunately, staff safety is increasingly recognized as an equally important issue. The Occupational Safety and Health Act of 1970 under its General Duty Clause states that "each employer shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees."[30]

Hazards in the OR are well known. Less well known are the workplace hazards within the sterile processing department (SPD). Identification of the hazards associated with working in the SPD is the first step in providing a safe workplace and complying with the Occupational Safety and Health Act. Hazards in the SPD are physical, chemical, and biological.

- Repetitive lifting and moving of instrument sets and equipment can cause muscle and disk injury.[24] Sterile processing personnel lift instrument sets, many weighing close to 25 lb, and other equipment repeatedly throughout each shift.
- Floors that become wet create the potential for slips and falls. Washing instruments is a primary and full-time activity in the SPD. Water can easily spill on the floor and create a slip and fall hazard.
- Contaminated instruments, many of which have sharp edges or points, pose a risk of puncture wound injury to SPD personnel who must handle them.
- Contact with steam generated for purposes of sterilization can cause severe burns.
- Exposure to detergents, disinfectants, and sterilants is an ongoing hazard in the SPD. Chemicals in these products can cause respiratory and skin irritation, and ethylene oxide is a recognized carcinogen.

■ Exposure to harmful microorganisms through a puncture wound while handling contaminated sharps is an ever-present danger in sterile processing.

AORN has fostered safety in SPD in a variety of ways. The Sterile Processing/Materials Management Specialty Assembly[31] provides a forum and a community where issues of safety are discussed and where initiatives to prevent injury are shared. Safety policies and procedures that have been successful in a particular institution are often disseminated to other interested specialty assembly members. Poor communication, lack of communication, and the omission of key stakeholders in decisions that affect workplace safety are often cited as the causes for safety issues that may arise. Poor communication or lack of inclusion between the OR and SPD is not unknown. AORN promotes inclusion and communication between these departments through its specialty assembly and through educational programs and webinars that promote workplace safety in both the OR and the SPD. That AORN considers OR and sterile processing concerns to be aligned is evident in AORN's leadership. The AORN Board of Directors has included nurses whose primary background is sterile processing. For example, President Spratt has a long history in sterile processing.

AORN has created several tools and position statements that encompass workplace safety issues in the SPD. For example, the AORN position statement on ergonomically healthy workplace practices[32] identifies risk reduction strategies to be considered when developing a plan for a safe workplace. Administrative, engineering, and behavioral controls that should be considered are identified. With regard to sharps injury, AORN has developed a Sharps Safety Tool Kit[9] that includes a PowerPoint program, educational material, and many other resources helpful in reducing the incidence of sharps injury. In addition, the AORN recommended practices that relate to instrument processing include recommendations for staff safety. For example, the "Recommended practices for selection and use of packaging systems for sterilization" states that "the total weight of instrument containment devices should not exceed 25 pounds including the contents and containment method…"[33(p538)]

The many *AORN Journal* articles[34] devoted to safety in the workplace, safety tool kits,[27] and safety position statements[28] along with their ready availability speak to AORN's commitment to safety. The presence of a dedicated specialty assembly for discussing and sharing safety concerns that is fully supported by AORN is also a testament to AORN's commitment to safety in all areas.

AORN's perspective

Workplace safety for health care professionals has been a strategic issue at AORN for more than 20 years. The first position statement to address this issue, "Patients and healthcare workers with bloodborne diseases,"[35] was published in 1988. Several occupational hazards have been identified as posing a risk to perioperative staff members, and many of these have been cited by the contributors to this article. The hazards in the perioperative area can be classified as follows:

■ biological (eg, smoke plume, bioaerosols, protein allergens in latex gloves, exposure to infectious microorganisms),

■ ergonomic (eg, back injuries, repetitive motion, lifting heavy instruments),

- chemical (eg, disinfecting/sterilizing agents, formalin, anesthetic gases),
- physical (eg, lasers, fire, radiation, sharps),
- psychological (eg, mental fatigue from long call hours or 12-hour shifts), and
- cultural (eg, verbal abuse, bullying, nonconformity with a code of conduct).

In response to these workplace safety issues, AORN has developed the following position statements and tool kits to assist perioperative practitioners in addressing potential work-related hazards and unsafe practices:

- Patients and healthcare workers with blood-borne diseases[35]
- Noise in the perioperative practice setting[36]
- Safe work/on-call practices[37]
- Surgical smoke and bio-aerosols[15]
- Workplace safety[38]
- Ergonomically healthy workplace practices[32]
- Key components of a healthy perioperative work environment[39]
- Creating a practice environment of safety[40]

In addition to the position statements, AORN has developed six tool kits that will assist in creating a safe work environment:

- Fire Safety[6]
- Human Factors in Health Care[41]
- Just Culture[42]
- Safe Patient Handling & Movement[43]
- Sharps Safety[9]
- Surgical Smoke Evacuation[16]

AORN recognizes the link between the work environment and the provision of safe patient care and, to support that philosophy, has endorsed the American Association of Critical-Care Nurses “Standards for establishing and sustaining healthy work environments”[44] and the Nursing Organizations Alliance “Principles and elements of a healthful practice/work environment.”[45]

AORN is the professional organization that represents the universe of 160,000 perioperative nurses, and we accept the responsibility and accountability to provide resources for evidence-based practice and education that perioperative professionals can use to create a safe work environment. However, using the knowledge and resources to develop policies, procedures, and education for the workplace is the responsibility of each and every individual who practices in the perioperative arena. AORN believes that every staff member has a responsibility to review new position statements, to examine practices in the environment, and to voice suggestions and concerns to facility leaders. The position

statements can be used to stimulate discussions at a staff meeting or to formulate a policy or procedure to improve or enhance the work environment.

Since the Institute of Medicine report *To Err Is Human*[46] was published in 2000, there has been a focus on the responsibility of leaders to create safety systems at health care facilities with a focus on delivering safe care to patients. AORN supports the concept that leaders cannot independently promote patient safety without promoting workplace safety. These two concepts must be strategically aligned to achieve the outcomes expected by health care workers and surgical patients.

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