preventing surgical errors

the role of the surgical technologist

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Medical errors account for over one million injuries and over 100,000 deaths each year in the United States alone.[1] While it is difficult to determine the exact number of errors traced directly to the surgical setting, several reports have provided insight into errors that do occur within the operating room. For example, the estimated prevalence of retained abdominal foreign bodies is one per 1,000 to 1,500 procedures.[2] Wrong-sided surgery occurs approximately 150 times each year.[3] Surgical procedures performed on the wrong patient, medication errors, patient falls and postoperative wound infections are also commonly noted mistakes relating to surgical patient care. One adage relating to mistakes is that "complex systems fail in complex ways." The economic burden relating to medical negligence and malpractice is staggering.[4] One of the reasons cited as leading to an explosion in health care costs is the increase in jury awards for medical negligence or malpractice. Monetary awards for medical malpractice and medical negligence have increased 300% over the past decade. This article will discuss ways in which the surgical technologist can help in the prevention of surgical errors.

Surgical errors

As far back as the early 1900s, surgeons have recognized the catastrophic results associated with retained foreign bodies. A piece written by a Polish surgeon at that time documented 101 cases involving retained foreign bodies. In 38 of these cases, the foreign body was only discovered on postmortem examination. Of these 38 cases, 19 involved a retained surgical sponge. In other cases, the retained object migrated through the bowel or vaginal wall and was subsequently purged from the patient. At least three other patients were re-explored later to have foreign objects removed. In one case, a signet ring was removed from Douglas's pouch.[5] Today, surgical sponges, instruments, towels and suture needles make up the bulk of objects retained during surgical procedures. In many of these cases, counts were documented as correct at the time.

Wrong-site or wrong-sided surgery is another frequently recognized error. News networks have widely publicized stories about the wrong foot being amputated or of a biopsy being performed on the incorrect breast.[6] These errors result in a delay of appropriate treatment or in the case of biopsies, the misdiagnosis of a patient's condition. Several cases have been identified that involve surgery performed on the wrong side of a patient's brain. In a Rhode Island case, this occurred after a CT scan was placed backward on the view-box. Arthroscopy on the ipsilateral (opposite) joint is another frequent error. Ophthalmic procedures performed on the wrong eye and removal of the incorrect anatomic structure have also been noted.

Medication errors account for significant morbidity in the health care setting. In surgery, these errors typically involve the incorrect medication being used, the incorrect dosage of medication administered or an inappropriate medication or solution injected. Extreme cases have included the injection of formaldehyde (Formalin™) into the eye and hydrogen peroxide or isopropyl alcohol injected or used as internal irrigants.[7] The use of local anesthetics with epinephrine on structures with poor vascularity has also been reported.

Other errors that occur in surgery lead to patient falls, neurological injuries, misdiagnosis of a patient's condition and postoperative wound infections. Many of these mistakes can be traced directly back to the circulator and/or the surgical technologist in the scrub role (STSR).

Legal issues

The current attitude in American society is that, if an unsatisfactory outcome related to medical intervention occurs, it must be due to an error committed by health care professionals. All too frequently, patients (or their next-of-kin) elect to sue the provider(s) and/or the facility in these situations. These lawsuits are broadly grouped into two areas: negligence and malpractice. Generally speaking negligence involves the commission (or omission) of an act that a reasonable person in a similar situation would not have committed (or omitted). Malpractice is essentially deliberate conduct that violates an individual's scope of practice. In simpler terms, negligence consists of a lapse in judgment while malpractice involves an element of intent. Most litigation relating to medical error committed by unlicensed personnel is associated with negligence.

When an individual claims that an act of negligence occurred, she or he must usually be able to prove four elements. These elements are: duty, breach of duty, injury and a relationship of the injury to the breach of duty which is also referred to as proximate cause. For example, surgical technologists have a responsibility to account for surgical sponges. This is referred to as a duty. If the surgical technologist fails to count each of the sponges as required by the facility's policies, she or he has committed a breach of duty. If a sponge is retained after the surgical procedure, the courts will recognize that an injury has occurred. This injury occurred because the surgical technologist failed to count the sponges. This is known as proximate cause.

What if the STSR and circulator did count the sponges according to the facility's policies and identified that all of them were outside of the patient before the wound was closed, yet later the

patient was found to have a sponge retained? Who is responsible for this?

In this light, let's look at the four elements again. First, there must be a duty. The circulator and STSR were required to count each sponge. Second, there must be a breach of duty. As identified above, the STSR and circulator did account for the sponges, therefore there is not a breach of duty in this case. Third, there must be an injury. In this case, a sponge was left in the patient. This is considered an injury. Finally, the injury must be related to a breach of duty. This is referred to as proximate cause. As noted, there was not a breach of duty in this case because the staff counted according to policy. Does this mean the patient lacks grounds to sue for damages? Most likely the patient will prevail in this case. The courts recognize that there are situations when an individual may not be able to prove each of the four elements of negligence.

In this situation, a legal doctrine known as the doctrine of *res ipsa loquitor* applies. *Res ipsa loquitor* is a Latin term that means, "the thing speaks for itself." In this case, it is obvious that a sponge has been left in the patient and that the only way this could have occurred is if someone in surgery made a mistake. This doctrine will apply in almost every instance in which a foreign body is mistakenly left in the patient during surgery. The normal elements of a negligence claim would be followed if it is demonstrated that the circulator and/or STSR failed to count according to established policies.

Medical malpractice is another common legal issue. Although this commonly applies to licensed medical practitioners (eg, physicians, nurses) it may be alleged that a surgical technologist committed malpractice. Malpractice generally refers to gross misconduct or intentional conduct that places the patient or others at risk of injury. The surgical technologist may commit malpractice in several ways. One way is to act outside the scope of her/his practice. For example, a surgeon may allow the STSR to perform the nerve block during local anesthesia. If this task is prohibited in the state where the STSR is employed and the STSR performs the block, she or he has committed malpractice even if no injury occurs. Another situation in which malpractice is committed is if the STSR is impaired (namely under the influence of drugs or other substances) yet participates in patient care. Fortunately, this is a very rare situation. Both of these examples involve the element of intent. In the first case, the STSR intentionally performed a nerve block and, in the second case, the STSR intentionally performed patient care while impaired. As noted earlier, intent typically separates negligence from malpractice.

Retained foreign bodies

Retained foreign bodies are probably the costliest error related to surgery. In addition to the legal fees of the facility, the hospital or clinic will have to pay costs associated with subsequent surgical procedures to remove the item and to correct any damages caused by it. It is important for the surgical team to reduce the potential for this type of event.

FIGURE 1

Disposable items should be counted individually. If the number of counted items does not match the quantity on the package, the entire package should be discarded from the field and bagged separately.

A number of steps can be taken to prevent this tragic occurrence. Following the facility's policies is a good first step. Most facilities have developed policies that detail when counts must be performed and which items are to be counted. In some cases, however, the wording of the policy is vague. For example, a policy may state, "Items that may reasonably be left in a patient should be counted." The word "should" does not indicate a

mandatory action and is considered vague. Even if the word "should" in the previous sentence is changed to "must," there is a problem with the phrase, "reasonably be left in a patient." While everyone would all agree that sponges, needles and suture boots qualify, what about certain instruments? Should this apply to all instruments? Is it important to count retractors? What about large vascular or intestinal clamps? Bone clamps? In surgery, patients range from neonates to adults. An item that is too large to be left in a neonatal patient could easily become lost in an obese adult patient.

The standard of care relating to surgical instruments is that, regardless of the facility's policies, the STSR must remain aware of what instruments are on the surgical field throughout the surgical procedure. This standard holds true even if the institution does not have a specific policy in place for counting surgical instruments. Therefore, it is beneficial for the STSR to prepare the Mayo stand in a consistent fashion for a particular procedure. For example, each general abdominal procedure is set up the same way each time. In this way, a routine is established that allows the experienced STSR to quickly note if an item is missing from the Mayo stand. When an item is noted as missing, the STSR can immediately search the surgical field instead of waiting until the end of the procedure. When counting instruments consisting of multiple parts (eg, screws) all parts must be accounted for at the beginning of the procedure as well as at the end of the case.

FIGURE 2

By maintaining awareness of the surgical field, the STSR can prevent the retention of a foreign body.

Consider this scenario: A facility has a policy that states that instruments should be counted if they may reasonably be retained in a patient. The procedure being performed is an appendectomy and it is not the routine at this facility for instruments to be counted on appendectomies due to the fact the incision is fairly small (6 to 8 cm). However, after exploring the appendix, it is noted there is a mass in the cecum and the procedure immediately converts to a right hemicolectomy. At this point, it is impractical to begin an instrument count as some instruments are already on the surgical field and more instruments are being added to the back table. Stopping the surgical procedure and retrieving all of the instruments on the field, so they may be visualized by the circulator as they are counted by the STSR, is probably not an option as it will delay patient care. Many staff members who work in facilities with policies that mandate the performance of instrument counts on major abdominal cases would probably conduct an instrument count in this situation. However, the potential for error in counting the instruments at this point in a surgical procedure is great. While some would argue this is an acceptable practice, it would be considered prudent to obtain a postoperative abdominal X-ray to ensure that no instruments have been retained in the patient.

With regard to sponges or towels used to pack the surgical wound, the STSR can use a sterile marker and glove wrapper to note the size and number of sponges or the number of towels that have been packed into the wound. The STSR can then mark off each of these as they are removed from the wound. Alternately, the STSR can notify the circulator when sponges or towels are packed into the wound and again when each is removed. This refers to items used for packing the wound during the procedure, not to sponges used for routine blotting of the wound edges.

When counts are performed, it is vital that both the circulator and the STSR verify that each counted item is accounted for. Both must see the

items that are counted. This applies for initial counts, each closing count, and anytime items are counted off the field (eg, sponges discarded into the kick-bucket during the surgical procedure). Using packaging materials to verify the actual quantity of items is not acceptable in the case of an incorrect count.

Sponges are to be recorded by size and by the number in the package. It is important for the STSR and the circulator to verify that the radiopaque strip is present in each sponge that is counted. Prior to counting sponges, the band securing them should be removed so each sponge can be counted individually. In a situation where the actual number of sponges in a package is not identical to the number of sponges identified on the package wrapper, the entire package should be discarded from the field. In general, radiopaque 4" x 4" sponges (Raytec™) are packaged in groups of 10 sponges and laparotomy pads are packaged in groups of five sponges (Figure 1).

Suture packs that contain multiple needles pose a special challenge. When the initial count is performed, the number of needles identified on the package may be recorded. When the STSR actually opens the package to use the sutures within, the number of needles in the package is verified by both the STSR and the circulator. If the number of needles verified upon opening the package does not match the number on the package, the package should be discarded from the field and subsequently deleted from the count. The rationale for not opening all suture packages during the initial count is that it is dangerous to have opened packages of suture on the field. This practice also leads to an increased likelihood of lost needles.

The actual number of all countable, disposable items used during a surgical procedure must match the number on the package when they are first counted. Any disposable item that is counted and does not match the quantity identified on the package should be discarded from the field and bagged separately. The reason for this practice is to ensure consistency of counts and to prevent confusion when performing closing counts. This is particularly important if the team performing closing counts is not the same as the team that performed the initial counts.

Items discarded from the field, such as sponges, will be counted according to the initial number counted (eg, 10 Raytec™, 5 laparotomy pads), bagged, tied and placed off to the side. Suture needles that are removed from the field during the procedure due to contamination are secured by a piece of tape in a location that can be seen by the STSR and the circulator. Instruments that are removed from the field for any reason are placed in a location that is visible to the STSR as well as the circulator. Any item that is broken during the procedure must be accounted for in its entirety.

Counts are usually not performed prior to true emergency surgery due to a lack of time to conduct them properly. In this case, X-rays should be performed prior to removing the patient from the operating table at the end of the case. In certain situations, this is not possible as the patient is quite unstable and must be transferred to the Intensive Care Unit (ICU) immediately. When this occurs, the surgeon will order films on the patient after she or he has stabilized.

As mentioned earlier, it is good practice for the STSR to consistently prepare the Mayo stand for a particular procedure. By having practiced this routine, the STSR can have a reasonably good idea if all instruments are accounted for prior to transferring an emergency patient. Similarly, sponges can be quickly counted by the STSR and at the end of the case, if the circulator has time, he or she may count the discarded sponges. In the author's experience, although an official count has not been taken, this practice has eliminated the need for an otherwise stable postoperative patient to return to the OR for removal of a retained object.

When performing counts, a consistent method should be followed regardless of the item being counted. There are two acceptable methods of performing counts. The policy of the institution will determine which will be used. One is to count from the incision site to the Mayo stand to the back table, ring stand and ending with items in the kick-bucket or otherwise away from the sterile field. The second method reverses the

process. The count begins off the field and progresses to the ring stand, back table, Mayo stand and, finally, to the incision.

At no point following initial (preoperative) counts should linen or trash be removed from the room. In the event that subsequent counts are incorrect, the linen and trash may need to be examined to find the missing item(s). No items that have been part of a count should be removed from the room until the final closing counts are completed and verified as correct. In the event that an individual instrument is needed for another surgical procedure in a different room, the item must be recorded as being removed and its new location noted.

Initial counts of sponges, needles and other small items should be performed on every case prior to the incision being made. Initial instrument counts are performed according to each institution's policies. The number of closing counts will vary based on the type of procedure performed. The general rule is that a count is performed when a hollow viscous structure is closed (eg, urinary bladder, intestine, stomach, uterus). This is followed by a count when the cavity is closed (peritoneum or internal fascia). Finally, a count is performed when the subcutaneous layers are approximated. Counts should be completed prior to the approximation of the skin edges of the incision.

If during any closing count, an item is noted as missing, the surgeon must be notified immediately by the STSR or circulator. The STSR and circulator will repeat the count and, if the item remains unaccounted for, a search for the item is conducted.

The STSR will search all sterile fields including in and under instrument pans, under basins, under the Mayo stand and in the folds of drapes. It is not uncommon to discover that a surgeon or assistant has trapped a sponge between themselves and the surgical drape. It is appropriate to ask the surgeon/assistants to step back to see if this is the case. Sponges or suture needles used during laparotomies may also have been discarded on the drapes near the head of the patient and these areas should be searched thoroughly. Items may have also fallen through a gap in the fenestration of the surgical drape where they cannot be retrieved without contaminating the sterile field. This area should also be examined if possible, although the item(s) should not be retrieved until the incision is closed and the dressing applied. Extreme caution should be exercised if the missing item is a needle or other sharp device.

The circulator will search for missing items in any of the areas considered nonsterile. In the case of a missing needle, a magnetic device may be utilized. Items that have been separated and bagged, namely sponges, will be opened, recounted and re-bagged. The floor around the surgical field will be examined. This includes the area under the operating table and the anesthesia area. An item that has fallen to the floor may have been inadvertently kicked under the operating table. Another area where missing sponges are commonly found is immediately beneath the kick-bucket stand. Items that are not located after a search may have been carelessly discarded in a trash or linen hamper. Each of these must be thoroughly examined.

While the circulator and STSR are conducting searches for the missing item, the surgeon should take the opportunity to explore the wound for the item. If after a thorough examination of the wound, the sterile fields and the nonsterile areas of the room the missing item is not located, the surgeon should be appraised so she or he may order an X-ray to ensure the item is not within the patient. At this point, it is up to the surgeon to decide whether or not to continue wound closure. The circulator and STSR will continue to search for the missing item or items. After the wound is closed and dressed and the patient is transferred to the stretcher, the STSR and circulator will carefully examine all of the surgical drapes and linen for the missing item. This should be done while the patient is still in the room.

If all efforts have been exhausted, a variance (incident) report should be completed that documents, factually, what is missing and what steps were taken to locate the item(s). The variance report is not intended to affix blame to any party and care should be taken to avoid this. A variance

report is not part of the patient's medical record and the patient's chart should not identify that such a report was completed. The patient's chart should specifically identify the missing item or items and that the surgeon was properly notified. This documentation will be on the operative record or in the nurse's notes depending on institutional policy. The variance report is designed to be a quality improvement tool and is generally not subject to review in court. However, a notation in the patient's chart that a variance report was completed allows patient's attorney to subpoena this document and introduce it into the litigation process.

The surgical technologist, by maintaining an awareness of her/his surgical fields, can help to prevent the inadvertent retention of a foreign body (Figure 2). Adhering to facility policies regarding the counting of items and maintaining an orderly surgical field will also help prevent the loss of items which may be retained within the patient.

Wrong-site surgery

Too frequently, the news reports that the wrong extremity of a patient has been operated on. Nonsurgical personnel wonder how this could be possible. Surgical professionals know that it is the failure of processes designed to prevent such tragic occurrences. In light of numerous occasions where the wrong body part has been operated on, many hospitals have drafted policies designed to prevent such events. Most of these policies mandate that the surgeon and/or the patient identify the correct location for surgical intervention. These policies are often referred to as, "sidedness" policies, and they create guidelines that are to be followed from the preoperative holding area up to the point the scalpel is actually passed to the surgeon prior to incision. Many of these policies describe the marking of the correct surgical site by the patient or the surgeon. In some situations, patients have actually inscribed, "not here" or "this side" prior to coming to the hospital.

Commonly, the surgeon or the patient will mark an "X" over the surgical site. Identification of the site in such a fashion can potentially lead to errors. While many would recognize that "X marks the spot," to some an "X" indicates something that is wrong (Figure 3). Think of the many tests taken in school and how an incorrect answer is marked. Therefore, it is becoming a standard practice that the surgeon and/or the patient place their initials over the correct site. This must be performed prior to the patient being sedated.

Another common mistake that leads to wrong-site surgery is assuming the surgical schedule is correct. It is not unheard of for miscommunication between the surgeon's office staff and the surgical scheduling staff to lead to an incorrect surgical procedure or an incorrect side to be identified on the printed schedule. It is up to the staff caring for the patient to ensure the correct surgical procedure is performed at the correct location. It is vital that this is determined prior to the patient being sedated in order to prevent a potentially catastrophic injury to the patient when they get to the operating room.

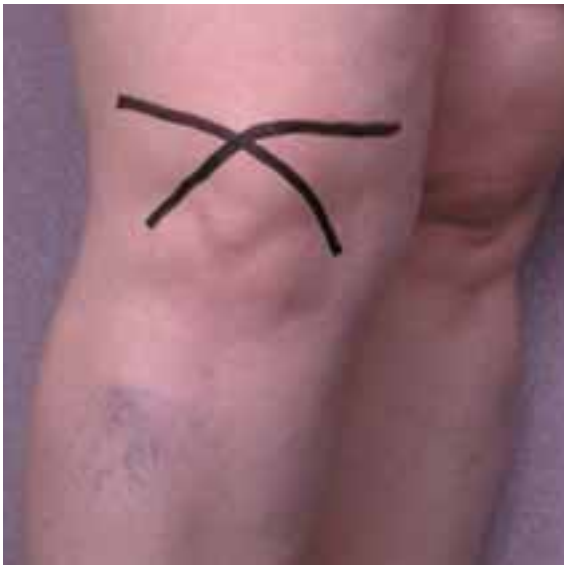

FIGURE 3

Does an "X" mark the site for surgery or indicate the wrong site? Misunderstandings can lead to wrong-site surgery.

Wrong-site surgery does not occur because of one mistake. This situation is the result of a series of errors. The Joint Commission on Accreditation of Health Organizations (JCAHO) recognizes wrong-site surgery as a sentinel event. A sentinel

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event requires an in-depth review of the processes leading up to the injury or potential injury.

Here is one example: Following physical examination the surgeon determines a patient is a candidate for arthroscopy of the left knee. The surgeon has his office staff schedule the procedure at the local hospital. The scheduling office personnel at the hospital generates the surgical schedule identifying a right knee arthroscopy which is then posted for the OR staff to read. The patient is checked into the preoperative holding area where the surgeon, circulator, surgical assistant and anesthesia provider each interview the patient. While interviewing the patient, the surgical assistant touches the patient's left leg and asks, "Are we doing the right leg?" to which the patient agrees. The surgeon arrives in the holding area, marks an "X" on the left knee of the patient, then the patient is sedated and wheeled into the operating room. A spinal anesthetic is administered, the assistant applies a tourniquet to the right leg without uncovering the left leg (to maintain the patient's dignity) and leaves the room to scrub. The circulator proceeds to prep the right leg and the STSR and assistant properly drape the right leg. The surgeon scrubs in and proceeds to perform the arthroscopy on the right leg, which is noted as unremarkable. After the incisions are dressed, the drapes are removed, and the surgeon realizes the error. What went wrong?

In this case, the surgeon directed his office staff to schedule the patient for a left knee arthroscopy. Either the surgeon's office staff mistakenly stated to the scheduling office clerk the procedure was to be performed on the right, or the clerk mistyped "right" instead of "left" on the surgical schedule. At least five individuals (six including the preoperative holding area nurse) spoke with the patient in the preoperative area and should have asked which knee was to be operated on. The assistant, in this case, while touching the left leg asked if they were doing the right leg. In this situation, the assistant was referring to the right (anatomically speaking) as opposed to the correct leg. The surgeon did mark an "X" on the left knee, which was not uncovered prior to the application of the tourniquet. Would the assistant (had she or he noticed the mark) have assumed that the "X" meant incorrect? The circulator performed a skin prep on the right (incorrect) leg which was then draped by the STSR and the assistant. The surgeon arrived at the room and after gowning, proceeded to perform the arthroscopy on the right (incorrect) leg. How could the surgical technologist(s) in this case have prevented this error?

First, the circulator (RN or ST) should have asked the patient to state which leg was the correct leg. This may or may not have occurred in this example. Second, the surgical assistant (perhaps a surgical technologist), instead of asking if the team was doing the right leg, should have also asked the patient to state which leg was the proper leg. Third, the surgeon should always be present in the operating room prior to the positioning of a patient for a procedure. It is often difficult to identify anatomic structures when they are covered by the drapes. In this case the surgeon may also have noticed the absence of her/his mark prior to the application of the tourniquet. The circulator had a second opportunity to catch this error as she or he was prepping the leg. Finally, the STSR (RN or surgical technologist) could (should) have asked the surgeon which was the correct leg prior to passing the scalpel. Assuming that a surgical technologist was functioning in the roles of circulator, scrub and assistant in this scenario, there were at least four separate instances when this error could have been identified and prevented by a surgical technologist.

Another error related to wrong-site surgery occurs when films (X-rays, CT scans) are placed backward on the view-boxes. This error has resulted in surgery being performed on the wrong foot, the wrong hip, wrong side of the chest and the wrong cerebral hemisphere. Although an experienced surgical technologist may become quite adept at reading films, the responsibility of positioning films on the view-

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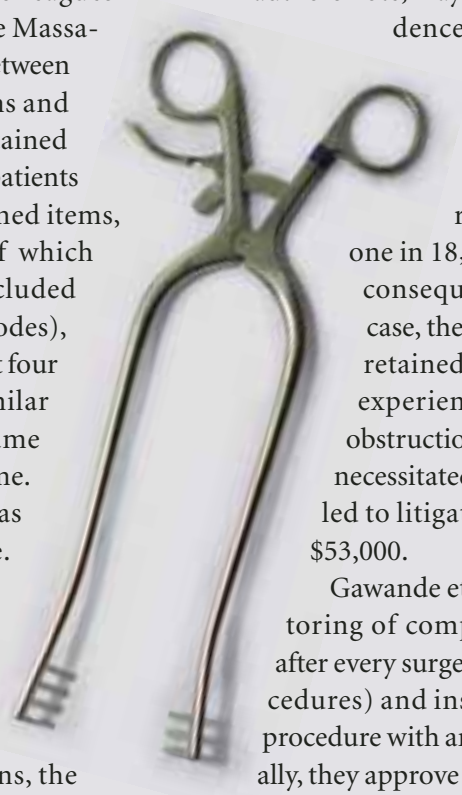
How surgical instruments get left behind

Emergency surgeries and procedures with unforeseen changes are more likely to result in retained instruments and sponges than are other operations, report Boston researchers in the *New England Journal of Medicine*. Additionally, surgical items appear somewhat more likely to be left in patients with high body mass index (BMI) than in patients of normal weight.

In a search for possible risk factors for such mishaps, Gawande and colleagues reviewed records from a large Massachusetts malpractice insurer between 1985 and 2001, seeking claims and incident reports involving retained foreign bodies. For each of 54 patients they identified (with 61 retained items, approximately two thirds of which were sponges; others included clamps, retractors, and electrodes), the investigators selected about four controls who had had a similar operation, usually at the same facility, within six months' time. All surgeries were classified as emergent, urgent, or elective. The date of detection ranged from one day to 6.5 years postsurgery, with day 21 the median date of discovery.



From the literature and from interviews with surgeons, the researchers compiled a number of possible risk factors for retained objects: excessive patient blood loss, patient obesity, a fatigued surgical team, urgent surgery, necessity for more than one procedure, perioperative nursing staff changes, involvement of more than one surgical team, unexpected occurrences during surgery, and failure to account for all sponges and instruments.

Thirty-four percent of case patients underwent surgery that involved a change in procedure (vs 9% of control patients), 33% an emergency procedure (vs 7% of controls), and 88% a surgery ending with a reportedly correct item count (vs 92%; this was not considered a significant difference). BMI averaged 28.2 ± 6.3 in patients with retained objects and 26.4 ± 5.2 among controls, but this information was incomplete. None of the procedures with retained objects was a laparoscopy, an endoscopy, or a catheterization.

Malpractice claims and incident reports, the authors note, may not represent the actual incidence of any surgical mishap. Although they found instrument retention relatively rare (among the institutions studied, incidence ranged from one in 8,801 to one in 18,760 inpatient surgeries), the consequences were serious. In one case, the patient died as a result of the retained object, and 69% of patients experienced complications (eg, obstructions, visceral perforations) that necessitated repeat surgery. In cases that led to litigation, claims averaged nearly $53,000.

Gawande et al recommend active monitoring of compliance with sponge counts after every surgery (including obstetrical procedures) and instrument counts after every procedure with an open body cavity. Additionally, they approve the practice in some facilities to require radiographic screening after every open-cavity surgery; "given costs of more than $50,000 per case for malpractice-claims expenses alone, a $100 plain film could prove a cost-effective intervention," they observe.

- Gawande AA, Studdert DM, Orav EJ, et al. Risk factors for retained instruments and sponges after surgery. *N Engl J Med.* 2003;348:229-235. Reprinted by permission from *Clinician Reviews* (Vol 13, No. 4, pp 98,101). © 2003 Jobson Publishing, LLC.

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box should be left to the surgeon. In at least two cases of surgery being performed on the wrong cerebral hemisphere, the surgeon involved attempted to deflect responsibility by claiming members of the surgical team, in one case the circulator, had positioned the films on the view-box.

Although the responsibility for correctly identifying the correct operative site ultimately lies with the attending surgeon, the surgical technologist has a duty to act as an advocate for the patient and can, in fact, spare the patient from a potentially disastrous outcome. Asking a simple question prior to passing the scalpel to the surgeon can give pause to the entire team and allow a few extra moments to ensure accuracy and prevent tragedy. "What is the correct side?" Five simple words will eliminate the pain and grief associated with a preventable error.

Medication errors

Two areas that require dual-confirmation between the STSR and the circulator are counts and medication administration. Medication errors have great potential to cause serious injury and death for the surgical patient. Most of these errors result from failure to correctly identify a medication or solution that is introduced to the surgical field. Documented cases include the administration of medications that the patient has a known hypersensitivity to, an incorrect medication being delivered or an inappropriate solution being used during the surgical procedure. A majority of these mistakes could be directly prevented by the STSR or circulator.

In order to prevent drug-related mistakes, it is important for the surgical technologist to have a basic understanding of the principles of pharmacology and an awareness of the types of medications and solutions used in the surgical setting. Most nurses who have completed an accredited nursing program have taken courses in pharmacology. However, most of these courses do not address medications or solutions used within the surgical arena. Accredited surgical technology programs are required to teach the basics of pharmacology, and these courses focus on areas specifically related to surgery. Specific drug classes that are discussed in surgical technology programs include anesthetic agents (inhalation and injectable), muscle relaxants, sedatives, diagnostic agents and emergency drugs (eg, cardiovascular agents, MH agents).

Prior to the introduction of any medication or solution onto the surgical field, the STSR and circulator must verify the drug name and concentration (dosage) and expiration date. Any pharmacologic substance on the surgical field must be identified in such a way that each member of the team can see what is present in a specific container. This is vital if the STSR is relieved during the surgical procedure in order to ensure accurate reporting to the relief person. Ideally, identification of medications or other solutions on the sterile field is performed by labeling each container with the name of the drug, the concentration of the drug and any additives to the drug (eg, epinephrine).

It is not sufficient to simply label a container, "local," as this does not identify what the medication or solution is. Many surgical technologists think of a local as an anesthetic. Some surgeons use a saline and epinephrine solution around the incision site to control bleeding and often refer to this as local; however, this has no anesthetic properties. Likewise, the term local does not identify if a solution includes epinephrine, which is a potent vasoconstrictor.

The inclusion of epinephrine in a local anesthetic affects the amount of anesthetic that can safely be administered to a patient. Epinephrine is contraindicated for use in areas with poor circulation, namely fingers, toes, the tip of the nose, ears and the penis. An STSR who gives a surgeon a syringe containing a local anesthetic with epinephrine can be found negligent if she or he did not identify the solution as containing epinephrine. The STSR should always identify the substance that is being handed to the surgeon, especially if it is in a syringe. It is not proper for the STSR to initially hand the surgeon a syringe and say, "Local!" As the surgeon is actually administering the agent she or he has a duty to know what

the drug is. The STSR should instead state the name of the medication, including additives. For example, "1% Lidocaine with epinephrine" would be an acceptable method of notifying the surgeon what is being passed to her/him. Subsequent use of the agent can be then referred to as, "Local." However, in a situation where a surgeon may use two different local anesthetics during the procedure, the name of the anesthetic should be clearly stated each time a syringe is passed to the surgeon.

It is likewise important to label each item that contains a pharmacological substance. The medicine glass that the local anesthetic is poured into should be labeled, and each syringe containing the drug should be similarly identified. In a situation where two agents are to be mixed on the field, each agent is labeled in its appropriate container and when combined, each container containing the mixture is labeled to identify the components of the mixture.

Certain medications must be administered through a certain route. For example, cocaine (4% USP) is specifically used as a topical anesthetic. Injection of cocaine may result in serious injury or death. For this reason, cocaine should never be drawn up into a syringe. Likewise, irrigating water, irrigating saline and other agents are not to be injected and should generally not be drawn into syringes. It is important for the surgical technologist to maintain an understanding of common medications and solutions in order to prevent drug-related errors.

Conclusion

The surgical technologist plays a vital role in the prevention of surgical errors. As the only member of the surgical team who is specifically trained for work in the operating room environment, it is important for the surgical technologist to have a thorough understanding of the hazards, as well as the ways to prevent these dangers from negatively affecting the care of the surgical patient. Awareness of the potential dangers allows the STSR to protect the surgeon and other members of the surgical team from physical injury as well. It is not acceptable to claim the STSR is immune from liability, because it is the nurse who holds a license. The surgical technologist code of ethics demands a strict adherence to the principles of safe patient care.

This article has identified several of the most common, yet tragic, errors that can affect our surgical patients. Also addressed are ways in which the surgical technologist can help to prevent these errors. By adhering to simple principles the STSR can reduce the risk of injury to patients, coworkers and surgeons. Following a standard of care can reduce or eliminate the liability an STSR may bear should an unanticipated outcome occur in surgery. Knowledge and vigilance are the keys to safety in the operating room.

About the author

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