

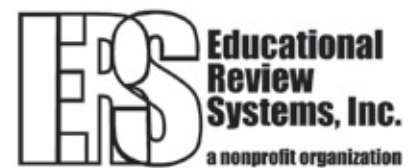


Independent Study Guide

Prevention of Retained Sponges and Towels Following Surgery

A continuing education activity sponsored by Educational Review Systems.

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OVERVIEW

“Final count is correct.” This is a common phrase heard in operating rooms around the country on a daily basis. The truth is that even though the team believes and reports that a sponge count is correct, it may not be. Perioperative nurses are taught early in their training that counts are an important procedure to ensure the safety of their patients. The outcome statement O2 from the Perioperative Nursing Data Set (PNDS) states “The patient is free from signs and symptoms of injury caused by extraneous objects.” These extraneous objects include sponges and towels. The nursing intervention, I93 “performs required counts” is an expectation of every perioperative nurse.¹

A retained foreign body can result in patient death and must be avoided. The significance of a retained foreign body is so great that several organizations provide guidelines for the counting process in an effort to promote positive patient outcomes. The purpose of this educational opportunity is to provide information that will support the perioperative nurse in providing a safe surgical experience through enhanced awareness. This activity will discuss the incidence of incorrect counts, the potential complications from an incorrect count, and guidelines for performing counts to prevent incorrect counts. New technology for performing sponge counts will be presented for consideration.

OBJECTIVES

After completing this continuing nursing education activity, the participant should be able to:

1. Identify risk factors for incorrect sponge and towel counts.
2. Describe complications that can occur from retained sponges and towels.
3. Discuss the guidelines provided by regulating agencies related to count procedures.
4. Outline the process for handling an incorrect count.
5. Discuss new technology available that may decrease the risk of retained sponges and towels.

INTENDED AUDIENCE

This continuing education activity is intended for perioperative registered nurses who are interested in learning more about the prevention of retained sponges and towels following surgery.

CONTINUING NURSING EDUCATION CREDIT INFORMATION

Instructions

This booklet is intended as a self-study activity. Please take the following steps to complete this activity:

1. Read the overview and objectives for this educational activity and compare them with your own learning objectives.
2. Read the booklet, paying particular attention to those areas that reflect the objectives.
3. Consult the glossary or a dictionary for definitions of unfamiliar words.
4. Complete the post-test. If some areas are unclear, review those sections of the booklet.
5. For further information, consult the References/Suggested Readings/Bibliography.

Instructions for nursing CE credits:

Please complete the test on pgs 25–27 and place your answers on pg 28 (evaluation form.) Please mail, e-mail or fax the completed form to Educational Review Systems, 3015 Shannon Lakes North, Ste 303, Tallahassee, FL 32309; Fax 678-401-0259; sglass@edu-review.org. Certificates will be mailed to the address provided.

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INCIDENCE OF RETAINED ITEMS DURING SURGERY

Items that are routinely used to perform a surgical procedure may become a foreign body if they are not correctly accounted for and removed prior to closing a surgical site. Such items include sharps such as needles and cautery tips, instruments, and sponges or towels.

According to its Sentinel Event Policy, the Joint Commission does not require reporting an unintentionally retained foreign body if it does not cause a major permanent loss of function.² Therefore, underreporting of retained foreign bodies, including sponges and towels, is probable. There is an estimated rate of 1 retained object for every 1000 to 1500 intraabdominal surgeries.³ In a 15-year study by Gawande, et al., there were 54 confirmed instances of retained foreign bodies, with 61 total objects retained. The objects were retained in the abdominal cavity (54%), the vagina (22%), the thorax (7.4%), and the spinal canal, face, brain, or extremities (17%). The most commonly retained object was a surgical sponge, occurring in 69% of the cases of retained objects.⁴

THE ECONOMIC PICTURE

The costs related to count discrepancies and retained foreign bodies following surgery can be devastating to everyone involved. Count discrepancies add additional procedural time and the cost of imaging. The New York Cardiac Surgery Report (2000-2004) is the source of data gathered for CABG procedures. The average cost of CABG surgery in which a count discrepancy occurred was \$16,333 compared to \$15,349 when it did not occur; therefore, the projected additional cost for a discrepant count was determined to be \$932. On a basis of the national volume of CABG operations per year (347,570 in 2004), with portable x-ray costing \$122 and additional procedural time at \$810, the estimated cost of count discrepancies for this procedure alone is \$24 million.⁵

The costs related to retained foreign bodies following surgery are much higher. According to a report by Blue-Cross, Blue Shield on thoracic procedures, reoperating on a thoracic patient to retrieve a sponge and then treat for an infection or foreign body reaction can cost \$50,000 or more than the original surgery.⁶ The Agency for Healthcare Research and Quality indicates that a retained foreign body adds approximately four days to an average hospital stay.⁷

The pressure on surgical teams to avoid unnecessary costs is becoming intense. The Joint Commission is urging hospitals to develop systems to prevent errors and the federal Medicare program will not pay providers for procedures involving a foreign object left behind from a surgery, part of a new effort to curtail errors.⁸

RISKS FACTORS

There are many risk factors that can contribute to a retained foreign body. The process by which counts are performed is not standardized from operating room to operating room across the country, or even within the same institution. A lack of a systematic approach to the count may result in missed or overlooked items.

Poor communication among the surgical team can result in misunderstandings and conflict. Surgeons may dismiss a report of an incorrect count, believing it is in error and continue to close the wound without further exploration for the object. There may be several staffing changes within a surgical procedure and poor reporting between staff could result in unknown changes in the count. For example, an additional pack of laparotomy sponges may be added to the procedure table, but the circulator did not record them on the count sheet, resulting in an inaccurate count.

Timing for emergence from anesthesia can occur prematurely if the surgical team is not communicating effectively. As the patient begins to emerge from anesthesia, the count may be rushed in an attempt to close quickly before the patient awakens. But, if a sponge or other item is determined to be missing, extra time is required to rectify the count. If the anesthesia provider is not aware or did not receive appropriate communication, the patient may continue to emerge from anesthesia. This can create a rushed situation and may shorten the time taken to explore the wound or to take an x-ray.

HUMAN FACTORS IN THE COUNTING PROCESS

Human beings can make mistakes. There are aspects of the daily activities in the operating room that can enhance the risk of making mistakes during the counting process. Distractions, pushing for increased productivity, the addition of more technology in the form of computer documentation and new equipment in the operating room, and communication failures can all be factors in the counting process.

Communication

Communication failures may result from a variety of reasons. The different cultures that exist in an operating room have a great influence on communication. These cultures include:

- Cross-cultural: nurse to surgeon
- Gender-related: male to female
- Hierarchical: captain to crew, surgeon to OR team
- Structural: medical staff to hospital staff ⁹

Other aspects of culture include the levels of education, training, and experience. Those with less experience may feel intimidated by those who have been working in the operating room for a long time. There are also many styles of communication and some may be harsher or closed, which do not support effective exchange of information.

While differences exist, they can be managed. The use of the crew training model used by airline crews has been introduced in hospitals and has proven to be a successful tool for improving communication and patient safety.

Environment

Other human factors that can impact the counting process include such things as distractions, interruptions, noise, conversations, and traffic in and out of the operating room.¹⁰ Distractions can occur routinely during a count procedure. It is important that the participants in the count procedure define some method for redirecting the count after a distraction has occurred. This may require starting the count again.

Noise can and should be controlled. High music volume, excessive conversations and laughing, and powered equipment running can contribute to noise that can mask important information being conveyed from members of the surgical team. The perioperative nurse has an obligation to control the noise levels in the operating room.

Traffic and interruptions can create a stressful setting in the operating room. People come and go in the operating room transferring responsibility from person to person.¹¹ This requires focus on passing pertinent information accurately. Traffic and interruptions should be at a minimum, particularly while counting, to avoid errors in the counting process.

Surgery can sometimes be very lengthy and difficult, resulting in fatigue among the members of the surgical team. This fatigue can contribute to counting errors. Sponges sticking together or the use of a poor counting system can be other contributing factors, especially in conjunction with fatigue.¹²

Counts may be abbreviated or omitted during an emergency situation, during surgery when a body cavity is not expected to be entered, or for transvaginal surgery or vaginal deliveries. It is interesting to note that the risk of a retained foreign object increases with emergencies and unplanned changes in a procedure. Higher body mass index is another risk factor for a retained foreign object.¹³

All members of the perioperative team must take responsibility for minimizing the human factors that can contribute to errors in the counting process. The result can be an inaccurate count and a retained foreign body.

PATIENT COMPLICATIONS

The term gossypiboma refers to a surgical sponge or towel that is inadvertently retained in the body following surgery. A retained foreign body can result in a foreign body reaction that can be quite severe. Complications after retention of a foreign body in intraabdominal surgery can include perforation of the bowel, sepsis, obstruction, fistulae, or other visceral perforation.¹⁴ Root cause analysis case reviews performed by the Department of Veterans Affairs indicated that retained sponges were not always apparent until days, weeks, or years later. Symptoms included pain, swelling, or signs of occult infection.¹⁵ Patients who have a retained foreign body may require readmission to the hospital if the problem was not discovered during the initial hospitalization. Reoperation to remove the object may be required, subjecting the patient to another surgery and anesthesia encounter.

PROFESSIONAL ORGANIZATION GUIDELINES

Association of periOperative Registered Nurses (AORN)

The *Recommended Practices for Sponge, Sharp, and Instrument Counts* provide clear direction in the system for performing counts to decrease the risk of a retained foreign body.¹⁶ Since the focus of this educational activity is surgical sponges and towels, that guideline is outlined below.

Recommended Practice I- Sponges should be counted on all procedures in which the possibility exists that a sponge could be retained.

- Counts should be performed before a procedure begins to establish a baseline, again before closure of a cavity within a cavity, before wound closure begins, and at skin closure or the end of the procedure. A count should also be performed when there is permanent relief of the scrub or circulator.
- Accurate accounting of all surgical sponges throughout the surgical procedure should be a priority for all members of the surgical team so that the risk of retaining a sponge or towel is minimized.
- When counting sponges, the sponges should be separated, counted audibly, and concurrently by two people with one of them being a registered nurse. This should occur during the baseline count and when counting used sponges.
- When sponges are added to the surgical field, they should be counted at the time of addition and recorded to keep the count current and accurate.
- All prepackaged sponges should be counted for accuracy. One should not assume that a package has the correct amount of sponges. If a pack contains the incorrect number, remove the package and the sponges immediately from the field, bag and label them, then isolate them from the rest of the sponges in the operating room.
- The practice for counting should occur in the same sequence every time. By using a standardized procedure, there is greater continuity and efficiency resulting in better accuracy.

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- All sponges and towels used in a surgical procedure should be x-ray detectable.
 - Sponges should not be cut or changed from their original configuration.
 - All sponges should remain in the operating room until the procedure is complete. Linen and waste receptacles should not be removed from the room until the count is completed and resolved.
 - Counted sponges should not be used for packing or dressing. If a counted sponge is intentionally left in a wound, it must be clearly documented on the operative record, including the type and number of sponges. The intraoperative record should reflect that counted sponges were left in the patient.
 - At the end of the procedure, all sponges should be removed from the operating room to avoid potential discrepancies with future cases in that room.
 - Handle contaminated sponges appropriately using bloodborne pathogen precautions.

American College of Surgeons (ACS)

Because the ACS recognizes patient safety as a very high priority, it recommends that all hospitals and health care professionals take reasonable measures to prevent retention of foreign objects after surgery. In support of this, the ACS provides guidelines contained in the *Statement on the Prevention of Retained Foreign Bodies after Surgery*.¹⁷ The guidelines may be adapted to a variety of practice settings including ambulatory surgery, traditional operating rooms, surgeons' offices, or other areas where invasive and operative procedures are performed.

The ACS Statement contains the following expectations:

- "Surgical procedures take place within a system of perioperative care composed of surgeons, perioperative registered nurses, surgical technologists and anesthesia professionals. These individuals share a common ethical, legal and moral responsibility to promote an optimal patient outcome."
- Good communication is essential among perioperative personnel and consistent application of reliable and standard processes of care are required to prevent foreign body retention.
- "Recommendations to prevent the retention of sponges, sharps, instruments and other designated miscellaneous items include:
 - Consistent application and adherence to standardized counting procedures
 - Performance of a methodical wound exploration before closure of the surgical site
 - Use of x-ray detectable items in the surgical wound
 - Maintenance of an optimal OR environment to allow focused performance of operative tasks
 - Employment of x-ray or other technology...as indicated, to ensure there is no unintended item remaining in the operative field
 - Suspension of these measures as required in life-threatening situations"

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- Documentation should include results of surgical counts, notification of the surgical team members, items intentionally left in the surgical wound as packing, and actions taken if count discrepancies occur.
 - Resources should be provided to ensure that necessary equipment and personnel are available for support of the perioperative surgical safety measures.
 - Policies and procedures should be developed and implemented to support the prevention of retained foreign objects after surgery.

Institute for Clinical Systems Improvement (ICSI)

The mission of the ICSI is to support health care quality and improve the value of the health care that the member organizations provide. ICSI has a vision to be viewed as a trusted voice for the community for quality in health care. To that end, ICSI has published a health care protocol: *Prevention of Unintentionally Retained Foreign Objects in Surgery*. The key recommendations are taken directly from the September 2007 edition and are quoted or paraphrased in the sections below.¹⁸

- A preformatted whiteboard should be used as the primary record of the count.
- This allows all surgical staff to independently view the count at any time. Having this in public view is likely to reinforce the importance of performing and tracking the count.
- A count worksheet should be used when a whiteboard is not readily available.
- This should be used as a memory aid in place of scratch paper and should only be used if no whiteboard is available or accessible.
- Distractions and interruptions should be kept to a minimum during the count process.
- “Red rules should be established and followed by staff and physicians. They are key rules that, if followed, will prevent or address specific actions that pose the highest risk of safety to patients or staff. These red rules are:
- Sponges/soft goods and sharps will be counted for surgical procedures
- Baseline counts are accurately performed and completed before incision starts
- If the count cannot be reconciled, imaging must be done appropriate to the patient’s condition as outlined in this protocol.”

The actual Protocol in the Prevention of Unintentionally Retained Foreign Objects (RFO) in Surgery is provided in a flow diagram. The steps in the diagram are as follow:

- Counts compromised – continue to follow the surgical RFO process
- Safety Check – Circulator performs room survey prior to baseline count
- Safety Check – Perform count process
- Safety Check – Perform wound exploration
- Close wound and finish procedure
- Wound closure delayed/open wound packing
- Reconciliation process for count discrepancies

Counts Compromised

If any of the steps in the protocol cannot be followed, the count is considered compromised and the procedure for reconciliation of RFO should be followed. This process includes obtaining radiographic imaging for potentially retained foreign objects.

Safety Check – Circulator Performs Room Survey Prior to Baseline Count

In this step, the circulator should limit the number of receptacles for discarded items and designate those specific containers. The circulator should also ensure that the receptacles are empty and that no items from the previous case are in the room. The whiteboard must be clean and free of any information from the previous case.

Safety Check – Perform Count Process

For the purpose of this discussion, the count process will include sponges and soft goods (such as towels). These items must be radiopaque.

- A baseline count will be performed before the patient is brought into the room.
- If parallel processing is taking place, a separate team will attend the patient and the other team will perform the count process.
- Counts will take place before closure of a cavity within a cavity, before wound closure, at the end of the procedure, any time there is concern about the count from a member of the surgical team, and when there is a permanent change of any member of the surgical team.
- The count will be performed with a circulator and scrub person – one must be an RN, directly viewing the items being counted. The count is audible and concurrent.
- The circulator documents the count on the preformatted whiteboard or count worksheet.
- All items are counted in the same order for each count. This may be noted on the preformatted whiteboard.
- Sponges and towels will be separated and counted individually; as items are added to the surgical field, they are counted and documented immediately.
- Any used sponges will be pulled apart and unballied to perform the count.
- After the procedure, all items will remain in the operating room until the count is completed and reconciled. After the count is reconciled, all items will be removed from the room in preparation for the next case.

Safety Check – Perform Wound Exploration

Wound exploration is performed before closure of the wound and any cavity.

Close Wound and Finish Procedure

If the count processes are followed carefully, radiographic imaging is not necessary prior to wound closure.

Wound Closure Delayed/Open Wound Packing

An open wound or delayed closure presents a high risk for a retained foreign body. Several actions should take place to decrease risk.

- The number and type of items used in wound packing are documented in the procedure record.
- Any items removed or added to the wound must be counted and documented in the patient's medical record.
- When the patient returns to surgery for removal of packing and final wound closure, the original packing will be removed, isolated, and counted separately from the items used in the final wound closure procedure. Both of these counts should be reconciled prior to wound closure.
- A thorough wound exploration will be performed.
- Portable intraoperative radiographic imaging should be used if radiopaque items were used during surgery. This should be performed prior to the final wound closure.

Veterans Health Administration (VHA)

The VHA Directive 2006-030, *Prevention of Retained Surgical Items*, provides guidelines similar to the organizations previously discussed. The guidelines are based on AORN Recommended Practices. This discussion focuses on Attachment B – Counting Surgical Items, particularly #8: Sponge Counts.¹⁹

The practices recommended by AORN pertaining to performing counts will be followed.

- All sponges used during a surgical procedure must be left in their original configuration and must be detectable by a radiograph. Any sponges that are not x-ray detectable, such as those used during the surgical prep, must be isolated and removed from the OR before the procedure starts. The radiopaque sponges used for surgery are not to be used for prepping.
- All counted sponges remain in the OR during the procedure. The linen and trash containers are not to be removed from the room until the procedure is finished and all counts are completed and resolved.
- When sponges are removed from the sterile field, they are counted and placed in a count bag or other device designed for counting sponges.
- Different types of sponges should not be mixed in the same container.
- Each sponge must have the radiopaque tape visible to enhance the viewing and counting process.
- When a counted sponge is intentionally left in the wound as packing, this must be documented on the patient record. The count is verified as correct because all items are accounted for.
- The count should be recorded on a dry erase board or on a locally developed count sheet as each category of sponge is counted. Additional sponges are recorded on the OR count sheet or dry erase board.

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- In an extreme emergency when counts are omitted, the circulating nurse will document this in the intraoperative report and the surgeon will document on the OR record.
 - In this situation, a radiograph should be taken while the patient is still in the OR or Post Anesthesia Care Unit (PACU).

PREVENTION OF INCORRECT COUNTS

The guidelines that have been reviewed focus on the processes required to prevent incorrect counts and the retention of foreign bodies following surgery. The fact that many organizations share the same concerns and support the same procedures illustrates the importance of this aspect of patient safety.

Some of the common themes outlined for preventing incorrect counts include focus on the human factors that increase risk. Avoiding distractions and interruptions and providing appropriate staffing to support accurate counting processes are key points in error prevention. The use of a preformatted white board or a printed count sheet that enforces counting in the same order each time are other recommended tools. A clear plastic hanging pocket device designed to hold one sponge per pocket is another tool that may help prevent missing a sponge during a count or double counting a sponge.

Extensive wound exploration is indicated for all procedures. Extra care should be used when operating on patients with high body mass since these patients have been recognized in research studies to have a higher incidence of retained foreign bodies. Radiographic imaging may be necessary when visual detection of a sponge is difficult or impossible.

Although every effort is made to ensure a correct sponge count, errors can occur. The result is an incorrect count. The following section discusses the guidelines and recommendations for handling an incorrect sponge count.

PROCESS FOR HANDLING INCORRECT COUNTS

When a sponge is lost or unaccounted for during surgery, several things happen. The surgery is delayed as the surgical team searches for the lost sponge. Anesthesia must be extended for an uncertain period of time until the discrepancy is resolved. If the sponge cannot be located, another delay occurs while an x-ray is taken and reviewed. If the x-ray cannot be taken while the patient is in OR, there is a possibility the patient must be brought back to OR to remove a retained sponge. If the sponge is not located, the patient must still be observed for complications from a gossypiboma.

AORN and the VHA provide recommendations for the treatment of an incorrect count. The AORN Recommended Practice IV for counts²⁰ states:

“Additional measures for investigation, reconciliation, documentation, and prevention of retained surgical items should be taken.”

- Steps should be taken when a discrepancy in the count is determined.
- The discrepancy should be immediately reported to the surgeon and the surgical team.
- A verbal acknowledgement from the surgeon should be received by the circulator.
- The procedure is suspended, if feasible, as the operative site is inspected manually.
- The team also performs a visual inspection of the area surrounding the surgical field including the kick buckets, floor, and the linen and trash receptacles.
- If the item is not recovered, an intraoperative x-ray should be taken before leaving the OR if the patient's condition permits or as soon as possible if the patient's condition is unstable.
- The film should be read immediately, as the purpose is to establish the presence or absence of the foreign body in the surgical site.
- Appropriate documentation on the patient's medical record should include the measures taken to resolve the discrepancy and the outcomes.
- The incident should be reported per organizational incident/variance reporting policies and practices.

The VHA directive 2006-030 states that if a count is incorrect, the circulating nurse will notify the surgeon, the nurse manager, and/or the charge nurse. The surgeon is then expected to perform a manual search of the wound or cavity. The room, including linen and trash are searched. If the sponge cannot be located, an x-ray is required postoperatively while the patient is still under anesthesia and on the operating room table. This should be completed before wound closure. If the sponge is still not located, the appropriate incident paperwork is completed, and the procedure followed to locate the missing sponge along with the outcome are documented.²¹

The ICSI outlines the same procedure as AORN and VHA for incorrect sponge counts. The steps are listed in the section of the ICSI Prevention of Unintentionally Retained

Foreign Objects in Surgery under the section – Reconciliation Process for Count Discrepancy. Since these duplicate the AORN recommended practice, they will not be listed here.

NEW TECHNOLOGIES

Technology surrounds the perioperative nurse. Radiographic images are now digital and readily available by computer. Computer documentation is being used in more operating rooms on a daily basis. Video equipment now provides high definition resolution images that are captured on plasma OR dashboards. By comparison, sponge counting practices have changed very little in the last six decades. The existing AORN sponge counting practices date to 1978 and are not reflective of the technology that is available to the perioperative nurse today.

The first technological approach to retained surgical sponges utilizes advanced two-dimensional (2d) bar codes. This is the same technology deployed by leading companies worldwide such as UPS, Walmart, and the US Postal Service for their inventory tracking and supply-chain management disciplines. Numerous large-scale independent studies and extensive research is available regarding the reliability and efficacy of such bar codes.²²

This 2D bar coding approach is designed to eliminate the largest cause of RFO's – false correct counts, by keeping a complete inventory list of all the sponges used in each patient in the OR. A 2003 study published in the NEJM calculated that at least 88% of retained sponge cases occurred after a false positive count.²³ Using surgical sponges, laps, and towels affixed with bar codes in combination with handheld counting computers, staff members are now able to keep an accurate count of all the items in use.

Because each sponge is identified with a unique code, the counting device will not allow for duplicate counting. During the count in, users can either scan each individual item one at a time or can scan a “master” tag on the band around each pack of sponges which contains all the codes of the sponges inside the pack for convenience. During the count out, sponges are scanned out individually and staff members are immediately notified of any discrepancies such as scanning the same sponge twice or scanning out an unknown and extraneous sponge that is not part of the current count. It has been documented that sponges accidentally left in the room from previous procedures or dragged in from another room have contributed to false correct counts. All such extraneous sponges could now be immediately traced back to the OR they originated from to harmonize that count as well. The methodical process of scanning every item allows for the individual item-level electronic documentation of the all sponges used and those sponges' final disposition along with all staff and patient information. This data could be exported to paperless documentation systems or could be used in conjunction with specialized software to allow for statistical analysis of measured outcomes in the OR.

Data matrix systems work in conjunction with current AORN Recommended Practices for Sponge Counts and support existing protocols established and practiced by perioperative nurses within their individual facilities.

Research has been performed explicitly on the efficacy of bar coded sponges.²⁴ In 2006, a team of researchers at Brigham and Women's Hospital, led by Dr. Atul Gawande, performed a 350 patient clinical study. The study found that the bar coded sponge system detected significantly more counting discrepancies than the traditional protocol – 32 v. 12 in total. Specifically, it detected 21 misplaced sponges versus 12 through traditional methods but more importantly, it detected 11 miscounted sponges versus only 1 detected miscount by traditional methods. This was an improvement of 1100% in eliminating miscounts. There is also an acclimation period as nurses become more familiar and competent with the system. This is consistent for all the emerging technologies.

The bar coded sponge system as a tool for sponge and towel counting is available and in use today. The efficacy and cost effectiveness of this system must be evaluated as published reports put the costs at approximately \$12-\$15 per procedure.

The second technological process available on the market is radio frequency detection. This system, by definition, does not focus on improving the accuracy of counting. The technology focuses on the detection of a sponge through the use of proprietary radio frequency (RF) beacons.²⁵

This system is composed of a disposable radio frequency reader attached to a base station and used in conjunction with a RF beacon sewn into surgical sponges, laps and towels. The RF beacons cause the base station to emit a “beep” when the attached reader detects a beacon underneath it. Since this is only a detection approach, the count in and out processes must still performed and verified manually by two operators. After the manual count is performed, the disposable RF wand would be waved over the patient in the twelve-step manner specified by the manufacturer (six scans vertically and then horizontally). A retained beacon would be detected by the reader, indicating its presence in the wound.

There is very limited published research available that can be cited for reliability and efficacy of RF-based technology. Additionally, we could not cite any published research for the proprietary RF-based sponge system.

RF technology as a tool for sponge and towel detection is available today. Some hospitals are already using the technology. The cost effectiveness of this tool must be evaluated as published reports put the costs at \$50-\$60 per procedure.

RFID is a somewhat similar technology to RF but adds the ability to add identifying information to each tag. In 2006, an eight patient investigational evaluation²⁶ was performed involving sponges in which a RFID tag was sewn into the sponge. In the evaluation, after the initial procedures were finished and just before the patients were closed, a wand scanning device was used to detect a sponge that was deliberately placed immediately underneath the incision. The evaluation indicated that the wand device detected all sponges within 3 seconds of scanning and there were no false positives. While this evaluation indicated 100% accuracy in only eight patients, the author voiced concern regarding the possibility that the scanning process could be performed incorrectly and a sponge thus left undetected and retained.

At the time of this writing, RFID technology as a tool for sponge and towel detection has not yet reached the commercial market. The efficacy and cost effectiveness of this system would have to be evaluated as reports published on the manufacturer's website put the cost at \$140-\$150 per procedure.

Researchers have identified challenges to any radio frequency-based technology for the prevention of retained items for several important reasons²⁷:

1. By definition it cannot eliminate false positive correct manual counts by staff members since it focuses on detection.
2. If the wand is held too far away or the scan performed incorrectly, the sponge may be missed.
3. Large scale studies on the accuracy and reliability of RF-based detection have not been performed and published.
4. Studies regarding the interference of such products with other machines and technologies have not been performed and published.
5. The size and rigidity of RFID tags used in evaluations precluded the use of such sponges with laparoscopic equipment such as trocars.

SUMMARY

Leaving sponges, lap squares, or towels in a patient following surgery is devastating. It can result in a life threatening situation for the patient, negligence for the team members, and extended costs, not to mention litigation problems. The risk factors include lack of systematic approaches to the counting process, poor communications, staffing changes, and poor reporting. Human factors and the environment play significant roles in erroneous counts. The problem is so concerning that many professional organizations have offered statements, guidelines, and recommended practices aimed at helping team members with accuracy and the event of incorrect counts. Radiofrequency technology for finding lost items is available but does not help with the counting procedure. Data matrix systems address the process of counting as well as the identification of lost items. This computer-assisted technology helps eliminate the risks, aids with reporting, and supports protocols taught surgical team members. Systems that help prevent counting errors will more than likely become the standard of care in the near future as more and more perioperative team members focus on patient safety and procedural accuracies.

CASE STUDY - MRS. L

Mrs. L, a 45 year old female, entered the operating room for an elective abdominal hysterectomy. Her surgical team consisted of the surgeon, Dr. Z; a resident in OB/GYN, Dr.S; a student surgical technologist, PW; the surgical technologist acting as preceptor, IK; and the circulating nurse, NN.

The initial sponge count was completed as the patient was entering the operating room. NN glanced over to the back table while PW counted sponges, but NN's focus was on the patient and induction of anesthesia. After induction, the circulator jotted the count on a piece of scrap paper that was near her computer.

The procedure was essentially uneventful. During the early exposure phase of surgery, the resident took a laparotomy sponge from the field and used it to protect tissue from the retractor that was placed in the abdomen.

Dr. Z loves his music and he requested that it be played loudly. NN complied as she always does, because Dr. Z gets upset if he can't hear the music.

Near the end of the case, just as the team was starting the sponge count, a relief nurse came in to offer NN lunch. Her relief was in a hurry because she had two other lunches to give, so she encouraged NN to leave quickly. They did not perform a hand-off report.

PW and the relief nurse began the closing count. A laparotomy sponge was missing. Dr. Z was sure the nurse and tech just missed a sponge, so he kept on closing. After searching the room and re-counting, the sponge was still missing. Finally, Dr. S did an exploration of the wound and found the laparotomy sponge deep inside the abdominal cavity. He muttered something about putting that in early in the procedure. The closure continued and the final count was correct.

Points to Consider:

- How was the baseline count performed and recorded?
- What factors were involved that could have affected the counting process?
- What processes were missed or neglected regarding placing a sponge in the surgical wound?
- How could the circulator and relief have improved the hand-off of care?
- What part did Dr. Z play in the closing count process?
- How could the lengthy delay at the closing count have been avoided?

Discussion of the Points to Consider:

- ***How was the baseline count performed and recorded?***

The count was performed as the patient came into the OR. The count was not performed according to AORN Recommended Practices – concurrently, audibly, with both parties looking at the sponges as they are separated and counted.

The circulator recorded the count on a scrap piece of paper and not during the counting process.

There was no standard formatted paper or white board to document the count.

- ***What factors were involved that could have affected the counting process?***

With the nurse's focus on the patient during the counting process, she was distracted from the count. There was a potential for missing sponges or incorrectly recording the count because she wrote it after attending to the patient.

The music and noise in the room create interference in focus and can lead to increased errors. The physician-nurse dynamic inhibited NN from requesting that the music be turned down.

- ***What processes were missed or neglected regarding placing a sponge in the surgical wound?***

The resident took the sponge from the surgical field and packed it off with a retractor. There should have been a communication with the scrub person that the sponge was packed and it should also have been communicated to the circulator.

The cultural dynamics may have had an influence here, as the student being inexperienced did not feel he could question the action of the resident or did not know he should tell anyone about the sponge. He may not have seen the sponge being taken from the field. The preceptor should have been paying attention to the surgical field, but often as the "extra scrub," conversations are taking place that cause inattention to the activities at the field.

- ***How could the circulator and relief have improved the hand-off of care?***

Because the counting process had begun, the circulator could have requested the relief to offer someone else lunch first so she could be there for the count. There was no hand-off communication about the status of the procedure or the patient. Because there is no preformatted white board or count sheet, the two should have discussed the count and how it was recorded.

- ***What part did Dr. Z play in the closing count process?***

When the count was announced as incorrect, Dr. Z should have begun the wound exploration. Instead, he dismissed the concern as an erroneous count and continued to close the wound. Again, the cross-cultural physician-nurse and/or gender male-female dynamics may have had an influence here.

- ***How could the lengthy delay at the closing count have been avoided?***

Dr. Z should have begun the wound exploration immediately. Nurse NN should have insisted that the count was incorrect and that the wound exploration be performed. Overall, lack of communication by the entire surgical team was a causative factor in delaying wound closure and creating an inaccurate accounting of the sponges used in the procedure.

- ***What can be done to improve the count procedure in the future?***

Staff should review the recommended standards for counting. Educational programs should be provided that emphasize the importance of the count procedure.

The administration should look at the staffing and the patient flow process to identify ways to provide the circulator time to perform the count procedure uninterrupted or without distractions.

The staff should look at processes to develop a standardized format for counting using either a preformatted white board or a newer count system.

Efforts should be made to enhance communication among surgical team members.

Consider evaluating and introducing new technology such as data matrix into the OR setting.

GLOSSARY

Gossypiboma	Surgical gauze or towel inadvertently retained in the body following surgery. From the Latin <i>gossypium</i> meaning linen and the Swahili <i>boma</i> which means place of concealment.
Intraoperative	A radiographic image obtained within the surgical suite, usually with portable
Image	radiographic equipment.
Parallel	Two separate activities performed simultaneously in the same area
Process	with two entirely separate groups of staff. In reference to a sponge count, two circulators will be needed – one to care for the patient and the other to perform the count process.
Sentinel Event	Term used by the Joint Commission – an unexpected occurrence that involves death or serious physical or psychological injury or the risk of such occurrence. Serious injury includes loss of limb or function.
Sponges	Soft goods such as gauze pads, cottonoids, peanuts, dissectors, tonsil sponges, laparotomy sponges, and towels used to absorb fluids, protect tissues, or apply pressure or traction.
Surgical Retained Foreign Object (RFO)	An object unintentionally retained after final closure of the wound.
Tucked sponge	Any soft good used to stop bleeding or absorb liquid or used in conjunction with an instrument or the surgeon's hand to obtain traction, that is left in location for the duration of the procedure.
White board	A preformatted dry erase board that is directly viewable by the entire surgical team and used to document sponges/soft goods, sharps and miscellaneous items. The whiteboard is used to promote safety during the counting process.

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POST TEST

Multiple Choice/True or False. Please choose the word or phrase that best completes the following statements.

1. Retained foreign objects following abdominal surgery can result in a(n)
 - a. Gossypiboma
 - b. Intestinal obstruction
 - c. Perforated bowel
 - d. All of the above

2. The Joint Commission requires reporting any retained sponge as a sentinel event
 - a. True
 - b. False

3. It is estimated that in intraabdominal surgery, retained foreign objects occur once every
 - a. 1000-1500 surgeries
 - b. 2000-5000 surgeries
 - c. 3000-60000 surgeries
 - d. None of the above

4. The most common retained foreign object is a(n)
 - a. Instrument
 - b. Sponge
 - c. Sharp
 - d. All of the above

5. Risk factors involved in incorrect sponge counts include
 - a. Poor communication
 - b. Lack of a systematic method for recording counts
 - c. Inaccurate recording of added sponges to the sterile field
 - d. All of the above

6. Which communication culture would not result in communication failure?
 - a. Structural: nursing staff to nursing supervisor
 - b. Cross cultural: nurse to surgeon
 - c. Hierarchical: surgeon to OR team
 - d. Gender-related: male to female

-
7. Which human factors are involved with potential counting errors?
 - a. Level of education and experience
 - b. Communication styles
 - c. Economic status
 - d. Both a & b

 8. Environmental factors that may influence the counting process include
 - a. Distractions
 - b. Interruptions
 - c. Noise
 - d. All of the above

 9. Frequent traffic in the operating room and multiple staffing changes can create a risk for improper sponge counts.
 - a. True
 - b. False

 10. It is acceptable to omit a sponge count if the surgeon is pushing to start the case.
 - a. True
 - b. False

 11. The sponge count may be omitted if
 - a. A body cavity is not expected to be entered
 - b. During an emergency surgery
 - c. The surgeon states it does not need to be performed
 - d. A & B

 12. Higher body mass index may be a risk factor for incorrect sponge counts.
 - a. True
 - b. False

 13. A gossypiboma will always demonstrate symptoms within several weeks.
 - a. True
 - b. False

 14. Human factors are rarely a risk for retained foreign bodies.
 - a. True
 - b. False
-

-
15. Based on AORN Recommended Practices, the appropriate personnel to perform a sponge count should be
 - a. An registered nurse and scrub technician
 - b. A scrub technician and surgical/physician assistant
 - c. Two Scrub Techs
 - d. None of the above

 16. According to the American College of Surgeons, safe counts result from
 - a. Standard processes
 - b. Good communication among the surgical team
 - c. A & B
 - d. None of the above

 17. The Institute for Clinical Systems Improvement recommends which of the following when performing a count procedure?
 - a. A preformatted whiteboard
 - b. A manual documentation program
 - c. Partitioned plastic bag sponge holders
 - d. None of the above

 18. Performing a count in the same order every time promotes safety by reducing risk of omission.
 - a. True
 - b. False

 19. When an incorrect sponge count is noted, which actions should be taken?
 - a. The circulator notifies the surgeon and the team
 - b. The surgeon explores the wound or cavity
 - c. The room, garbage, and linen are searched
 - d. All of the above

 20. Data matrix technology provides a technique for counting sponges that may reduce time and error.
 - a. True
 - b. False
-

EVALUATION OF STUDY GUIDE

Activity Title: Prevention of Retained Sponges and Towels Following Surgery

Rate the following on a scale of 1-5. (1 = poor, 2 = fair, 3 = average, 4= good and 5 = excellent)

OBJECTIVES: <i>To what extent did you achieve each of the following?</i>	1	2	3	4	5
1. Identify risk factors for incorrect sponge and towel counts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Describe complications that can occur from retained sponges and towels.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Discuss the guidelines provided by regulating agencies related to count procedures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Outline the process for handling an incorrect count.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Discuss new technology available that may decrease the risk of retained sponges and towels.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

OVERALL ACTIVITY: <i>To what extent...</i>	1	2	3	4	5
1. Did the objectives meet the overall goals/purpose of the self-study activity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Was the subject presented at an appropriate level?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Was the content accurate and current?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were the self-assessment exercises related to the objectives?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Was this learning method effective?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Will the information be useful in your practice setting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Did this activity present issues and products in a fair, unbiased and balanced manner?	<input type="checkbox"/> Yes	<input type="checkbox"/> No			

Will the information you gained from participating in this program change your practice?

No

Yes, (Please Explain: _____)

NAME _____

ADDRESS _____

CITY/STATE/ZIP _____

PHONE _____

COMMENTS:

TEST QUESTION RESPONSES: *Please indicate the correct responses below.*

- | | | | | |
|---------|---------|----------|----------|----------|
| 1. ABCD | 5. ABCD | 9. ABCD | 13. ABCD | 17. ABCD |
| 2. ABCD | 6. ABCD | 10. ABCD | 14. ABCD | 18. ABCD |
| 3. ABCD | 7. ABCD | 11. ABCD | 15. ABCD | 19. ABCD |
| 4. ABCD | 8. ABCD | 12. ABCD | 16. ABCD | 20. ABCD |

Independent Study Guide

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