Thinking in three's: Changing surgical patient safety practices in the complex modern operating room

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Abstract

The three surgical patient safety events, wrong site surgery, retained surgical items (RSI) and surgical fires are rare occurrences and thus their effects on the complex modern operating room (OR) are difficult to study. The likelihood of occurrence and the magnitude of risk for each of these surgical safety events are undefined. Many providers may never have a personal experience with one of these events and training and education on these topics are sparse. These circumstances lead to faulty thinking that a provider won’t ever have an event or if one does occur the provider will intuitively know what to do. Surgeons are not preoccupied with failure and tend to usually consider good outcomes, which leads them to ignore or diminish the importance of implementing and following simple safety practices. These circumstances contribute to the persistent low level occurrence of these three events and to the difficulty in generating sufficient interest to resource solutions. Individual facilities rarely have the time or talent to understand these events and develop lasting solutions. More often than not, even the most well meaning internal review results in a new line to a policy and some rigorous enforcement mandate. This approach routinely fails and is another reason why these problems are so persistent. Vigilance actions alone have been unsuccessful so hospitals now have to take a systematic approach to implementing safer processes and providing the resources for surgeons and other stakeholders to optimize the OR environment. This article discusses standardized processes of care for mitigation of injury or outright prevention of wrong site surgery, RSI and surgical fires in an action-oriented framework illustrating the strategic elements important in each event and focusing on the responsibilities for each of the three major OR agents—anesthesiologists, surgeons and nurses. A Surgical Patient Safety Checklist is discussed that incorporates the necessary elements to bring these team members together and influence the emergence of a safer OR.

INTRODUCTION

Operating rooms (ORs) used to be just complicated places, but the modern OR has changed. No place epitomizes the complexity of health care delivery better than the OR where there is the routine interface of heterogeneous, variously trained personnel using high technology...
equipment while providing service to an unconscious, anesthetized patient. In fact it is most helpful to think of the modern OR as a complex adaptive system that consists of (1) heterogeneous interdependent decision making agents; (2) who interact frequently with each other; and (3) develop a characteristic called emergence which arises when the whole actually begins to perform better than the sum of its parts[1]. That is through the learning and interdependence of the heterogeneous agents a larger, higher functioning system is created. Anyone who has worked in a highly functioning OR over time can understand how this entity can evolve but also how rare and difficult it is to achieve.

Today it is expected that the delivery of surgical care will be (1) knowledge-driven (safe, effective); (2) patient-centered; and (3) system-based (timely, efficient and equitable)[2]. Hospitals and the surgeons who operate within them are also learning that if the care is not of high value, that is high quality surgical outcomes at low total costs of care, there will be low or no reimbursement for their effort[3]. Thus begins another step in the journey to stimulate hospitals and surgeons to accelerate improvement in the quality of surgical care and increase efforts to prevent errors and treatment complications. Multiple stakeholders have begun to reengineer or design, adopt and implement new OR practices and refined communication methods in order to reduce errors and waste. The specific surgical patient safety events are uncommon but the effort needed for prevention requires innovative solutions and illustrate the difficulty in changing OR culture (e.g., shared customary beliefs, values and behaviors).

The three main preventable surgical patient safety events which occur within the OR are (1) the surgical wrongs; (2) retained surgical items (RSI); and (3) surgical fires. The incidence of all three combined may affect at most 5000 patients a year (approximately 2000 wrong surgery events, 2000 RSI, 500 surgical fires) in the United States. National sentinel event disclosure is disparate and depends on state-based and regulatory agency voluntary reporting. Data on close-calls, which are likely to be more frequent, remain sketchy. No matter the total number of events, we do know that the number is greater than zero and therefore these are still not “never events”.

It has been tempting to use a “person approach” (e.g., the forgetfulness, inattention, ignorance, carelessness of individuals) in the analysis of why these events occur but we know that a “system approach” (e.g., analysis of the conditions under which individuals work and how defenses failed) that incorporates human factors (e.g., the interaction of human abilities, expectations and limitations) while harder to design and implement is likely to be more successful[4]. These safety problems are reflective of the culture of safety in the OR rather than on patient or case characteristics. The people who work in the OR make it safe and it is important to know that there are subtle behaviors that aren’t well quantified but are highly valued that arise from the development of expertise. Expertise is the result of knowledge and experience. The behaviors are intuitive and have been recognized as characteristics of “safe people”[5]. These feelings and intuitions are very important to nurture and develop but do have a quality of mystery to them but it is highly desirable for an organization to value expertise and develop “safe people”. When hospitals address these safety issues and there is culture change there may be positive consequences which decrease or prevent other more common perioperative occurrences such as surgical infections and venous thromboembolic events. ORs have not yet been characterized as highly reliable organizations (akin to nuclear reactors or aircraft carriers) so there is much room for improvement.

The current projects developed to help hospitals take action to prevent wrong site surgery, RSI and surgical fires focus on specific OR practice and communication problems. Unsafe OR practices are usually highly variable and efforts to standardize multi-stakeholder processes of care and develop specific communication modes are shared core elements in prevention strategies. Practice change and communication improvements are often viewed disparagingly as “soft” approaches which lack rigorous data and experimental validation however making sense of the rare and unexpected requires different tools and approaches[6]. Increasingly, event reporting and analysis of close calls have informed failure modes and collective learning on how to manage unsafe acts which is just as important as preventing them. To change OR culture requires change in the practices of the people who are engaged in the work. To change their practices you have to change the relationships with whom they work and the environment in which they work.

Finally, a surgical patient safety checklist which is a simple, widely applicable, inexpensive, unifying tool, can be used by all OR personnel to enforce the individual safe practices which have programmatically been developed and enhance inter-personnel communication[7]. We describe how one can be used to teach and enforce safer practices and address serious and avoidable surgical complications[8].

WRONG SURGERY

The three types of wrong surgery are (1) wrong patient surgery, where the performance of an operation or procedure is carried out on a person other than the one for whom the procedure was intended; (2) wrong procedure surgery, is the performance of a procedure other than that intended or indicated for a specific patient; and (3) wrong site surgery where a planned procedure is performed at the wrong place, part, level, side or site[9]. Wrong site surgery is a type of wrong procedure surgery and is the most common occurrence of the three[10]. All three of these events are usually the result of mistakes in correctly applying identification procedures.

The Joint Commission (TJC) has been at the fore-
front of the wrong site surgery issue since 1998 when the first Sentinel Event Alert newsletter on the subject was printed. Subsequently TJC published a follow-up alert in 2001, in 2003 the first Wrong-Site Surgery Summit was held and in 2004 the Universal Protocol was launched. In spite of all of these efforts, it has most recently been estimated that wrong site, wrong procedure and wrong patient cases still occur more than 40 times a week in the United States[11].

The essential elements of the Universal Protocol mandate that OR teams must (1) complete a preoperative verification process; (2) mark the operative site; and (3) take a “time out” immediately before starting the procedure. The verification process is to ensure that the correct patient has been consented and is present for the operation and all relevant documents and studies are available before the procedure is performed.

The most important elements are that the three major primary operative sources: the history and physical, the consent, and the official OR schedule are in exact agreement. If there are discrepancies the patient is considered the primary source for rectification. Patient verification and identification practices are usually performed by nursing and anesthesia personnel with requirements that at least one of these stakeholders must remain in constant attendance with the patient while being brought into the OR once patient identification has been performed. The site marking is within the domain of the surgeon and must be performed before the patient is brought into the OR and should be visible while the patient is prepped and draped. The mark must be visible within the operative field and referenced during the time out. Recent alcohol based prep solutions frequently diminish the site mark and practices must be established to use different inks or have a process in place whereby the person who performed the prep can refresh the diminished mark with a sterile surgical marker to ensure that it will be able to be seen before an incision is made. The time out is truly a team based activity called by the surgeon, monitored and orchestrated by the circulating nurse with responses from anesthesia and any other providers. The time out is usually performed just before the incision is made and all team members have to stop all activities. At the time out the three questions are answered: (1) Who is this patient? (2) What operation is to be performed? and (3) Is this the correct site mark, using secondary confirmatory evidence present on an armband or on the operative consent and unanimity from all stakeholders is required. Many facilities have checklists and scripted procedures with hard stops (e.g., the scalpel isn’t passed until the time out is completed) to enforce compliance. All questions are supposed to be asked in a non-intimidating environment where all staff feel equal in their contribution to safe patient care. These conditions have been challenging to meet.

While the Universal Protocol as a directive was comprehensive and widely mandated the implementation and effectiveness of the protocol was variable[12]. Review of wrong site surgery cases reveal that multiple errors occurred along the OR journey and multiple defenses failed which might have caught the mistakes[9]. Inadequate standardization of practices and poor training and enforcement of practices provide the latent factors which exist that sets OR personnel up for failure. More than just the directive to use the Universal Protocol appears to be needed and hospitals need guidance on how to effectively make the process work.

To meet this goal, in July 2009 TJC started an eight hospital demonstration project using a Robust Process Improvement method that is a fact based, systematic and data-driven problem solving methodology[16]. Project teams are developed for observational audits looking to discover specific risk points and contributing factors that lead to close calls and wrong site surgery events. The timeframe begins at the time of scheduling a surgical procedure and ends with confirmation that the intended operation was correctly performed.

Preliminary results from TJC project have shown that in 39% of cases, errors were introduced in the verification step that increased the risk of a wrong site surgery event[11]. Usually these errors involved inadequate information about the patient and scheduling confusion. Identifying this failure mode lead to the development of standardized ways of collecting and having the information accessible. Site marking and time out practices have been contributory but were not as frequent a source of errors as the initial verification process[11]. Further refinements to improving this practice will be available at TJC Targeted Solutions Toolkit which will provide a step-by-step process to measure performance[18].

**RETIRED SURGICAL ITEMS**

A RSI occurs when surgical material, usually a sponge, needle, instrument or miscellaneous small item or device fragment is inadvertently left inside a patient. Retained surgical item is the preferred term rather than retained foreign body or object since bullets, shrapnel or ingested objects can be retained but aren’t the result of surgical error. An RSI is a surgical patient safety problem and results from problems in unreliable surgical OR practices and problems with communication between OR stakeholders[19].

Reports of RSI have relied on mandatory state and voluntary regulatory agency reporting requirements which vary as does the definition of what is considered retention. The National Quality Forum’s (NQF) definition is most frequently referenced and in 2011 all NQF Serious Reportable Events were reviewed which included the issue of surgical retention. The new directive excludes reporting of unremovable items intentionally left at the judgment of a surgeon and most importantly addressed the definition of when an item is considered retained after surgery. Many states construed “after surgery” to mean closure of the incision, which meant even in cases where the sponge or surgical item was
discovered to be missing while the patient was on the OR table, and was removed in the OR without delay or harm, if the wound had been closed these cases were reported as a RSI. With the new 2011 definition, this area has been corrected and the operation ends after all incisions or procedural access routes have been closed in their entirety, devices have been removed and if relevant, final surgical counts have concluded and the patient has been taken from the operating/procedure room\textsuperscript{[15]}. In 2011 an item is considered to be retained only if found after the patient is out of the OR or procedure room. This change alone may lead to decreased numbers of RSI cases.

The most common RSI is the cotton gauze surgical sponge which has been found in the abdomen/pelvis, chest and increasingly in the vagina. Retained sponges occur after any type of surgical procedure and the risk of retention is unrelated to the number of sponges used during an operation. Sponges have been retained when only 10 sponges were used and small biopsy or skin incision made. This finding has lead to policy changes which should require that surgical sponges must be accounted for in all cases in which surgical sponges are used and an incision is made\textsuperscript{[16]}. There should be no determinates for case exclusion because of size of the incision or length of the case.

Traditional means of accounting for sponges has relied on the longstanding practice of counting. Observational audits and focused reviews of cases of retained sponges has shown that the practice of counting sponges is highly variable between ORs and even within rooms in the same OR suite. This variation leads to sources of error and with increased demands of the OR environment, frequent change of shift between nursing personnel and multiple diversions the common practice of counting has proven unreliable. Examination of cases of retained sponges have often revealed that the sponges were counted during the procedure but no one knows where the error occurred or how the sponge was retained. In fact, overall about 80\% of retained sponge cases occur in the setting of a correct count\textsuperscript{[17]}. That is at the end of the case the counts were called correct. In about 20\% of cases of retention there was a known incorrect count at the end of the case, something was missing, yet the patient still got out of the OR without finding the sponge. The missing item is subsequently discovered sometime later. This occurs because of knowledge and communication problems usually at the interface with radiology, the taking and interpretation of x-rays or with inadequate follow-up at the next level of care to determine if a sponge has been retained. Because of these observations about the counting of sponges a revised manual sponge management practice was developed by the NoThing Left Behind\textsuperscript{®} Surgical Patient Safety Project\textsuperscript{[17]}. The practice is called Sponge ACCOUNTing that uses the adjunct of plastic blue-backed hanging sponge holders and wall mounted dry erase boards posted in each OR on which to record in a standardized manner the surgical counts.

Sponge ACCOUNTing was developed to standardize and improve the transparency of the practice of sponge management. The guiding principles have outlined three important steps to ensure that all sponges used in the procedure have been accounted for with important unique actions for each OR stakeholder during the case and a team based “show me” step at the debriefing or end of the case. The nursing essence is (1) that all sponges are only used in groups of 10 and each plastic sponge holder contains 10 pockets; (2) at the natural pause point which occurs at the time wound closure begins, it is the job of the surgeon to perform a methodical wound exam (MWE), not just a swish or sweep of the wound, but to do the best job possible to look for and remove any sponges (or other items not intended to remain in the patient) and give them to nursing staff; and (3) the last step is at the end of the case when the skin is closed and all of the sponges (the used and unused sponges) must be off the field and in the pockets of the plastic hanging sponge holders. Since there are 10 pockets per holder and sponges are managed only in multiples of ten there should be one holder for each 10 sponges and there should be no empty holder pockets at the end of the case. The team based activity is for the surgeon to say “show me the holders” so they can see that there are no empty pockets or for the nurse to say to the surgeon “here let me show you”, there are no empty pockets. Who shows who doesn’t matter, it’s that there is a visual confirmation that all sponges have been accounted for.

There are now three technological adjuncts for sponge management (1) a device which counts 2D matrix labeled sponges; (2) a device which detects radiofrequency tagged sponges; and (3) devices which can count and detect RadioFrequency IDenification (RFID) chip embedded sponges. The essential components of each device are a distinct type of detection element attached to a surgical sponge and a distinct compatible electronic readout system.

The computer assisted sponge counting system consists of two-dimensional matrix labeled sponges and a scanning device that can read the label\textsuperscript{[18]}. The matrix label is scanned in with a handheld or table mounted scanner as the sponges are put on the sterile field and then each sponge is scanned out when the sponges are removed from the table. The matrix labels are embedded onto surgical sponges of various sizes and each sponge has a unique identifier that enables the scanner to count different types of sponges. The sponges are counted maintaining “line of sight” for each sponge. In order to account for all sponges at the final count, the sponges must be removed from the patient and individually passed under the scanner. The scanner has no capacity to “read-through” the patient and detect the presence of a matrix labeled sponge. In the event of a missing sponge an X-ray is used to determine if it is in the patient. This system is in place in many hospitals and most recently the experience from the Mayo Clinic has been reported\textsuperscript{[19]}. After 18 mo of use the device accurately
counted all sponges in all cases throughout the hospital and there were no cases of retained sponges.

The radiofrequency detection system consists of sponges that have a small passive radiofrequency tag sewn into a pocket on each sponge and a handheld wand or mat which contain the antennae and detection system. The tag is 4 mm × 12 mm and is recognized as only a yes or no signal. The tag is detected when the handheld wand or mat is activated and the computer console presents a visual and audible signal that a sponge has been detected. The system does not distinguish between sponge types or number of sponges. The signal readout will be the same intensity if there are one or five sponges. In the event of a missing sponge the mat can be activated to determine if the sponge is in the patient or the wand can be used to wand the patient or scan the trash to find the sponge. This system does not count sponges so at this time is usually used in conjunction with a manual counting practice such as Sponge ACCOUNTing. Some hospitals have adopted mandatory wanding protocols to be used for specific types of cases, others require wanding in lieu of using xray to find a missing sponge. There is an early trial from the University of North Carolina in the assessment and safety of this device and after 24 mo they have not had any retained sponges.

RFID systems have a unique RFID chip sewn into each type of sponge and a separate computer console with a scanning bucket into which used sponges are placed. Each sponge has a specific RFID chip and thus sponges of different types pooled together can be distinguished and counted. Unopened packages of sponges are placed on a front panel of the console to be electronically counted-in and the sponges are then opened and placed on the sterile field. Used sponges can be put directly into the bucket or into plastic-bag lined kick buckets and the entire plastic bag full of sponges then placed into the scanning bucket. The sponges will all be individually counted-out. If there is a missing sponge it can be detected with a wand. All of these devices are undergoing clinical assessments in different hospitals around the world.

With the continued improvement in the prevention of retained sponges, reports of retained miscellaneous small items and unretrieved device fragments are increasing. The preventive strategy for these types of items are not applicable only to the OR since retained guidewires, sheaths and catheters are found after interventional vascular, cardiac and radiological procedures performed in various sites throughout a hospital. In addition various types of providers now must develop standardized processes to account for all of the items and parts of devices at the conclusion of invasive procedures. This is new territory for interventional radiologists and cardiologists and practices originating in the OR can be shared with these other clinical groups to help speed accountability.

In the OR, small miscellaneous items or broken parts or pieces of tools and material used during an operation when found to be missing may require a clinical decision to leave the item behind because the risk of removal may cause greater harm than leaving the object behind. If a small item or unretrieved device fragment is intentionally left behind, the patient must be informed. Leaving fragments and small objects in patients can be prevented because often human factors are involved in why the devices or objects break or fracture. Identifying early when an item is missing or broken means best practices in the OR will involve the coordination of actions between the surgeon and the surgical technologists who must become the content experts on the equipment. If something is missing or broken the scrub person has to recognize the defect and speak up so actions to find the missing part can be undertaken. Retained whole instruments are exceedingly rare and previous reports that indicated instruments as the second most common item most certainly included small devices and fragments in this category rather than the separate class in which they are now considered. Inside or out of the OR, standardized practices have to be established that are transparent, widely applicable and simple to perform so multiple providers at the completion of every case, delivery or invasive procedure can be sure there is “NoThing Left Behind”.

SURGICAL FIRES

OR fires occur near or around a patient but a surgical fire is a fire that occurs in or on a patient and includes airway fires. Surgical fires are the rarest of the three surgical patient safety events with an estimate from a 2009 study suggesting that between 500-600 fires a year occurred in the United States. This national estimate was based on data from the Pennsylvania safety event reporting system which is the best available evidence. Surgical fires are dangerous, lethal and preventable but are so infrequent that most surgeons are painfully unaware of what preventive measures need to be taken.

A surgical fire requires the classic constellation of three components, “the fire triad”: (1) an oxidizer; (2) an ignition source; and (3) fuel. The breadth of elements and circumstances that exist in each of these components are underappreciated and make it difficult to easily standardize or develop simple practices. For example, possible fuels sources can include almost anything on the patient or in a surgical field: tracheal tubes, sponges, drapes, gauze, alcohol or other volatile compound containing solutions, oxygen masks, nasal cannulae, hair, fat, dressings, gowns, gastrointestinal tract gases, suction catheters, cable coverings, gloves and packaging materials. The ignition sources can be from almost any energy generating device and all differentially function or have the potential to cause injury based upon the oxidizer enriched atmosphere.

In 2007 the American Society of Anesthesiologists published a practice advisory for the prevention and management of OR fires which provides a complex algorithm that outlines a risk assessment approach and action plans for surgical providers. In 2009, further
recommendations were promulgated for oxidizer management and communication guidelines to follow for prevention. These efforts are thorough but the end results are still highly complex and detailed and because of the rarity of surgical fires it remains difficult to engage providers. Otolaryngology surgeons are the most familiar with surgical fire prevention measures because they frequently operate with ignition sources near the airway, within a highly oxidized atmosphere however all types of surgeons need to learn and adopt safer surgical fire preventive strategies because all types of cases actually provide risky conditions. To this end a provider oriented accountability approach for surgical fire management has been developed which assigns responsibility for action to specific stakeholders. This protocol teaches providers to know their role in preventing fires and respond quickly should a fire occur. The roles for prevention are based on the domains of control for each of the elements in the fire triad. Anesthesiologists have the control and direct ability to act on the management of oxidizers which includes oxygen and nitrous oxide. Nurses have control and direct ability to monitor the fuel sources and provide immediate remedy to extinguish flames with saline. The Surgeon has control over the ignition source and is responsible for assessing the environment before starting or using electrocautery.

Surgical fire prevention requires constant situational awareness because of the changing nature throughout an operation of the availability of different fuels, oxidizer status and ignition sources. Information exchange between the anesthesiologist, nurse and surgeon are key. If a fire breaks out rapid responses from all three stakeholders are important and some suggest fire drills should be conducted for high risk cases so team members are adequately primed to respond appropriately. If there is the risk of an airway fire the anesthesiologist must keep the surgeon aware of oxidizer concentrations and atmospheric conditions and be ready to stop all airway gases and remove the tracheal tube. The surgeon must have thoughtful control and use of cutting devices while nursing personnel in the scrub position must be ready with saline and wet sponges. All of these coordinated actions will have to take place in seconds in order to save the patient from extensive injury. To this end, surgical fire case-specific risk assessment strategies are useful activities and allow all providers to be primed at the time and ready to go rather than relying on memory or remote training. Surgical fire risk assessment can be incorporated into part of the operative briefing and safety checklist so each case can be assessed and necessary steps taken before the case starts to make sure all team members know what to do and are on the same page.

SURGICAL PATIENT SAFETY OR CHECKLIST

Common to the prevention of surgical patient safety events and mitigation of harm is the need to have all team members prepared to address events as they occur. The nature of preparedness involves having knowledge and the appropriate skills and tools available. Simulation training and drills are ways in which many industries maintain preparedness. The use of checklists as an adjunct to the pre-existing skill set of team members who come together has also been important to make sure all necessary tools and practices are performed correctly.

In 2009 a surgery safety checklist was first introduced which was beyond what was traditionally used by nursing services to make sure the patient was prepared for surgery. This 19 item checklist was divided into three parts: (1) sign in activities; (2) time-out activities; and (3) sign-out activities which covered the recommended practices the World Health Organization (WHO) had developed to ensure the intraoperative safety of surgical patients worldwide. The elements were simple and were intended to enhance inter-professional communication and prevent surgical events that may result from poor teamwork and inadequate surgical operative preparation. This checklist was adopted and disseminated by the Institute for Healthcare Improvement and has been in place in more than 3900 hospitals around the world. Each facility is encouraged to develop a surgical safety checklist that will conform to their site-specific conditions but at the minimum the original 19 points are strongly encouraged to remain. Many surgical subspecialties e.g., ophthalmology have customized the original WHO safety checklist to their needs and recent work has been started on the development of crisis checklists for the operating room which aim to guide providers to perform the correct actions in intraoperative crises. Implementation of some form of a surgical safety checklist has been widespread and the benefits of checklist use continue to be evaluated.

There is no one surgical safety checklist that is “the best” but there are many which provide the necessary information for all stakeholders to come together and make sure the correct patient is being operated on, the correct operation is known and the operating team is properly prepared to perform that operation safely. A surgical patient safety checklist should help surgical providers address the preventative solutions to prevent the wrongs, RSI and surgical fires at a minimum. An example of a surgical patient safety checklist that covers this territory is included in the reference section. The checklist is used three times during a patient’s operation (1) as an aid during a pre-operative briefing that is conducted when the patient is first brought to the OR; (2) during the time-out; and (3) as a reporting tool during the de-briefing that is held at the end of the case to discuss what problems occurred and also what went well.

During the pre-operative briefing patient elements are reviewed, such as procedure verification and imaging, antibiotic administration, venous thromboembolism prophylaxis management, beta-blocker use, allergy history and blood availability but more importantly the surgical team puts together a surgical fire risk assessment score.
If the fire risk is considered high, based on a simple 3 point scoring system, then each of the three stakeholders in fire prevention go over what they are supposed to do as outlined on the back of the checklist. In this way the circulating nurse and surgical technologist, the surgeon and the anesthesiologist discuss what maneuvers and actions will be taken during that specific high risk case. During the time-out the three essential questions are answered using the checklist as a memory jogger and confirming primary source information in the computer or on the patient’s armband. These actions prevent the occurrence of a wrong site surgery. At the de-briefing, all surgical items are accounted for, pathology specimens are reviewed to determine that they are correct and labeled correctly and any equipment or instrument problems are noted with specific referral units noted who are to take action for remediation thus preventing RSI.

CONCLUSION

The three surgical patient safety events, wrong site surgery, RSI and surgical fires can be prevented and even if prevention strategies fail mitigation of patient harm can be accomplished with application of consistent safety practices and effective communication. Effective communication includes the use of a comprehensive surgical patient safety checklist which brings all surgical providers together for at least a few minutes to have a shared mental model for the patient’s surgical care. The three major stakeholders working together in our complex OR environment are nurses, surgeons and anesthesiologists who face ever increasing work demands and knowledge requirements. It is not humanly possible to master all the knowledge domains for all safe practices for these three events, let alone all the other things that are necessary for the performance of an uncomplicated procedure. However, thought modules, checklists and assignment of areas of expertise and responsibility can be helpful in getting humans to work effectively and efficiently together. Of the three surgical patient safety events, it is not a stretch to see that there are knowledge domains which can drive improved performance and the three domains of expertise are possessed by each of the three major stakeholders. The content experts for wrong site surgery are surgeons, for RSI it is nurses and for surgical fires it is anesthesiologists.

Prevention of wrong site surgery is highly dependent on preoperative practices of patient identification and patient preparation in which the surgeon’s knowledge and preparation of the primary documents and materials falls within their care domain. It is the surgeon who has determined what operation is to be performed, has marked the operative site and has seen the patient at some time prior to their arrival in the OR. During the surgeon activated time-out confirmatory actions are conducted in concert with the use of a checklist to become the primary means of wrong site surgery preventive actions. The prevention of RSI strongly depends on actions under the control of the scrub person and circulating nurse who track and account for all the surgical material which is used. The use of a reliable sponge management practice in concert with a MWE is essential to prevent retained surgical sponges. The nurse also provides the interface with other stakeholders such as radiology should intra-operative x-rays be needed. For prevention of surgical fires it is the anesthesiologist who monitors oxygen status and has the situational awareness to alert and direct actions of the other stakeholders in the event of a fire. This is not to say that the other stakeholders don’t have roles and responsibilities but when providers of care come together to perform a surgical case there is a team leader. The role of team leader is actually not fixed and immutable. It will have to change as the circumstances of the operation change and the team leader interestingly enough should be the person who is the content expert of that situation as it arises.

It is not possible for everyone to know everything about all things. It is possible for the content experts of each of their domains to be present, willing and able to share their knowledge and communicate effectively with other personnel. Rather than thinking one person has to know it all and do everything, thinking in threes can help all providers put a vast amount of information into some useable context where it will be up to the three major stakeholders to work together consistently in every case to prevent the three major surgical patient safety events.

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