



Part A: Primer



Background

This section discusses the rationale for implementing a surgical safety checklist, describes the CPSI Surgical Safety Checklist and how it was developed, and explains how implementing the checklist can help hospitals meet their accountability and public reporting requirements.

1.1 The Rationale for a Surgical Safety Checklist (SSCL)

Surgery is a High Risk Activity

Between 187 and 281 million operations are performed each year in the world: one for every twenty five people.¹ Every surgery carries an element of risk. Members of surgical teams are highly competent health professionals, but they work in high pressure, complex environments, and with patients having a wide spectrum of risk factors.

There are many critical steps and interdependent factors needed for a team to achieve a successful surgery. Most of the time, results are good and patient outcomes are expected. However, occasionally steps can be omitted and errors in process or teamwork can occur. These can result in adverse events that may affect a patient's clinical outcome. According to the Canadian Adverse Events Study, 7.5% of all patients admitted to acute care hospitals in Canada in the year 2000, experienced one or more adverse events - and 51.4% of those adverse events were related to surgery.² Complications from surgical care are a major cause of death and disability worldwide.³ In a U.S. study during the 1990s, nearly one in seven surgical patient safety incidents resulted in permanent disability or death, and half of these events were preventable.⁴

Standardizing the delivery of some aspects of health care may help improve patient safety and quality.

Mathews S, Pronovost P: Physician Autonomy and Informed Decision Making: Finding the Balance for Patient Safety and Quality. JAMA 2008; 300(24):2913-2915

Learning from Other High Risk Industries

Other high-risk industries have long recognized that variability in process and/ or performance pose a threat to the quality of a product or service.⁵ For example, over the last few decades, the aviation and nuclear power industries have worked to standardize many of their routine procedures and have embraced the use of team checklists to reduce avoidable errors.⁶ This has helped to transform these previously high-risk businesses into the high reliability safety organizations they are today.⁷

Why Use a Checklist?

The health care industry can learn from these other industries, which share elements of risk. Routine processes and practices in operating rooms can vary significantly from one surgery to the next, and from one operating theatre to another. This variability can be attributed to many factors, including excessive fatigue on the job; staff shortages; information overload; inadequate knowledge; ability or experience; a stressful work environment; or mental fatigue or boredom.^{8,9} The development of practice guidelines and checklists helps standardize the care for patients and reduces errors by prompting teams to share critical information in the same way for every surgery.^{10,11}

Well designed checklists incorporate key principles from human factors engineering and patient safety such as: less reliance on memory, standardization of process, and better access to information and feedback.¹² They provide a uniform framework to guide how care teams plan, prepare for, and complete high-risk procedures. Checklists help reduce avoidable complications and errors by ensuring that teams share critical information and deliver evidence-based interventions for every single patient, in every surgical procedure, at the right time.^{13,14,15,16} Checklists help confirm that no crucial items are overlooked, all equipment is available, the operative plan is shared, variations in routine procedure are made apparent to everyone, and that everyone is aware of how the case is expected to proceed.^{17,18}

Checklists Have the Potential to Improve Surgical Safety

Several studies show that the use of checklists can improve health outcomes for patients receiving surgical interventions.

For example, a pilot study of the WHO Surgical Safety Checklist in eight sites around the world (Toronto, Canada; New Delhi, India; Amman, Jordan; Auckland, New Zealand; Manila, Philippines; Ifakara, Tanzania; London, England; and Seattle, USA) tracked changes in the rates of inpatient complications or death within 30 days of surgery.¹⁹ Findings demonstrated that the checklist improved patient safety and reduced risk in a number of ways:

- The rate of major complications in the operating room fell by one-third: from 11% in the baseline period to 7% after the introduction of the checklist.
- Inpatient deaths following surgery fell by over 40%: from 1.5% to 0.8%.
- Both high income (i.e., developed countries) and lower income (i.e., developing countries) sites had reductions in complications: 10.3% to 7.1% at high income sites and 11.7% to 6.8% at lower income sites.

If hospitals could achieve these same reductions for the approximately two million operations performed annually in Canada, almost 60,000 patients could be spared complications from their surgeries.

Another recent study in Ontario examined the timing of antibiotic prophylaxis pre- and post-surgical checklist. The delivery of “on time” antibiotic administration increased from 77.6% of cases in the pre-intervention phase to 87.6% of cases in the post intervention phase,²⁰ suggesting that “*getting teams to talk preoperatively about salient case details positively influenced their antibiotic administration practices.*”²¹ The checklist reinforces the administration of antibiotics in the operating room instead of on the preoperative nursing units, where delays are more frequent.²² The inclusion of antibiotic prophylaxis on the surgical safety checklist may help hospitals to reach *Safer Healthcare Now!*'s goal of 95% compliance with appropriate prophylactic antibiotic administration.²³

Case Study: Using a Checklist to Reduce Catheter-Related Infections in the ICU

A checklist of five evidence-based procedures to reduce catheter-related infections in the intensive care unit (ICU) was implemented in 108 ICUs in Michigan (85% of the ICU beds in Michigan) over an 18-month study period. Results showed a sustained reduction (up to 66%) in rates of catheter-related bloodstream infections in ICU patients at 16 to 18 months after implementation. Results like these, along with the WHO's study of the surgical safety checklist, provide evidence that the use of checklists can improve outcomes in patients receiving medical and surgical interventions.

Pronovost P, Needham D: An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU. N Engl J Med 2006.355:26:2725-32. Retrieved from <http://content.nejm.org/cgi/reprint/355/26/2725.pdf>

Increased efficiency and capacity mean that more operations can be performed in the daytime, when more backup personnel are available, and this can be associated with improved patient safety.

Nundy S., Mukherjee A., Sexton B., et al. Impact of Preoperative Briefings on Operating Room Delays. Arch Surg. 2008;143 (11): 1068-1072.

Checklists Can Increase Operating Room (OR) Efficiency

Checklists and preoperative briefings have been shown to reduce preventable delays, improve OR efficiency, and increase surgical capacity, meaning shorter wait times for patients with acute illnesses, lower nurse turnover rates, and increased job satisfaction.²⁴ For example:

- In one study, the use of a two-minute briefing and checklist reduced unexpected OR delays by 31% and team communication breakdowns by 19%. Surgeons reported an 82% reduction in unexpected delays (from 38% pre-intervention to 7% post-intervention).²⁵
- Using a surgical safety checklist ensures that teams are prepared for cases in advance of surgery and the right patient, right equipment, and the right materials/resources are available at all the right times.²⁶

Some Elements of Surgical Safety Checklists are Already Widely Used in Ontario

Many hospitals are using checklists to improve patient safety, help standardize processes in the operating room, and to improve communication and teamwork. According to a 2009 OHA survey of current surgical practices in Ontario, 93% of hospitals responded (n=101) that they are already using some form or part of a surgical safety checklist such as “surgical time out”.

However, practice (including “time out”) varies widely between ORs, individual services within hospitals, and between hospitals. Until now, there has been no recommended consistent approach to how OR teams ensure that important patient safety information is shared about every case. By using a common standardized approach in the form of a surgical safety checklist, practices such as a “surgical time out” will be enhanced, thereby leading to more consistent approaches to evidence-based practices and improving overall patient safety.

1.2 How the Surgical Safety Checklist was Developed

October 2004

WHO Highlights Importance of Surgical Safety: In October, 2004, WHO launched the *World Alliance for Patient Safety* to promote patient safety initiatives. In January, 2007, WHO introduced the “*Safe Surgery Saves Lives*” campaign to improve the safety of surgery across the globe and reduce the number of surgical complications and deaths.

The Alliance set out to establish universal guidelines for safety in the operating room that would identify the most effective interventions to improve surgical safety. Through an international collaboration, an expert working group reached consensus on four interventions for safe surgical practice: (1) safe surgical teams, (2) safe anaesthesia, (3) prevention of surgical site infections, and (4) measurement of surgical services. These detailed guidelines, as well as the *Ten Essential Objectives for Safe Surgery*, were published as the *WHO Guidelines for Safe Surgery 2009*.²⁷

June 2008

WHO Develops the Surgical Safety Checklist: Many surgical teams were adhering to some of the universal guidelines for safety in the operating room but very few did all checks consistently for every patient.²⁸ To improve uptake in the field and encourage all surgical teams to use best practices for all patients, the guidelines were translated into a Surgical Safety Checklist. The WHO officially launched the Surgical Safety Checklist in June 2008, and eight pilot sites were chosen from around the world to test it, including Ontario’s University Health Network’s (UHN) Toronto General Hospital site.

Canada Adapts the Surgical Safety Checklist: In June, 2008, the CPSI publicly endorsed the WHO Safe Surgery Saves Lives Initiative, and adapted the Surgical Safety Checklist to the Canadian health care setting. The adaptation included: changing language and terms (e.g., “Briefing” instead of “Sign In”), providing better role clarity, promoting communication between team members (e.g., surgeon, anesthesiologist, nurse), and adding items such as venous thromboembolism (VTE) prophylaxis and surgical site infection (SSI) prevention to align the Canadian checklist with the national *Safer Healthcare Now!* initiative.

September 2009

Ontario Adopts the Safe Surgery Saves Lives Initiative: In support of the WHO’s Safe Surgery Saves Lives campaign, the Ontario government announced on September 30, 2009, that all hospitals with operating rooms would be required to publicly report on their compliance with a surgical checklist by July 30, 2010. Although Ontario considers the CPSI Surgical Safety Checklist to be the standard, the province acknowledges that modifications might be appropriate for some surgeries that do not require every intervention on the checklist.

A World View of the Surgical Safety Checklist

The Surgical Safety Checklist is used in highly respected hospitals around the world. In fact, many hospitals in Canada and Ontario are leading the way in its use.

Refer to *appendix 9 - A38* to find out what others around the world are doing with the surgical safety checklist




1.3 An Overview of the CPSI Surgical Safety Checklist

CPSI's vision: a surgical safety checklist is used in all operating rooms in Canada, all the time, and for all patients.

The CPSI Surgical Safety Checklist is a one-page list of 26 important patient safety processes/items that surgical teams should discuss at three critical points in surgery with all team members present:

- 1) The preoperative evaluation of the conscious patient prior to induction of anesthesia or **"Briefing"**.
- 2) The time out immediately prior to incision or **"Time Out"**.
- 3) The preparations for appropriate postoperative care prior to the patient leaving the operating room or **"Debriefing"**.

 <p style="text-align: center;">SURGICAL SAFETY CHECKLIST & SCORECARD www.safesurgerysaveslives.ca</p> <p style="text-align: right;">Your Organizational Logo</p> <hr/> <p>BRIEFING – Before induction of anesthesia</p> <p><i>Hand-off from ER, Nursing Unit or ICU</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Anesthesia equipment safety check completed <input type="checkbox"/> Patient information confirmed <ul style="list-style-type: none"> - Identity (2 identifiers) - Consent(s) - Site and procedure - Site, side and level marked - Clinical documentation - History, physical, labs, biopsy and x-rays <input type="checkbox"/> Review final test results <input type="checkbox"/> Confirm essential imaging displayed <input type="checkbox"/> ASA Class <input type="checkbox"/> Allergies <input type="checkbox"/> Medications <ul style="list-style-type: none"> - Antibiotic prophylaxis: double dose? - Glycemic control - Beta blockers - Anticoagulant therapy (e.g., Warfarin)? <input type="checkbox"/> VTE Prophylaxis <ul style="list-style-type: none"> - Anticoagulant - Mechanical <input type="checkbox"/> Difficult Airway / Aspiration Risk <ul style="list-style-type: none"> - Confirm equipment and assistance available <input type="checkbox"/> Monitoring <ul style="list-style-type: none"> - Pulse oximetry, ECG, BP, arterial line, CVP, temperature and urine catheter <input type="checkbox"/> Blood loss <ul style="list-style-type: none"> - Anticipated to be more than 500 ml (adult) or more than 7 ml/kg (child) - Blood products required and available - Patient grouped, screened and cross matched 	<p>BRIEFING (continued)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Surgeon(s) review(s) <ul style="list-style-type: none"> - Specific patient concerns, critical steps, and special instruments or implants <input type="checkbox"/> Anesthesiologist(s) review(s) <ul style="list-style-type: none"> - Specific patient concerns and critical resuscitation plans <input type="checkbox"/> Nurses(s) review(s) <ul style="list-style-type: none"> - Specific patient concerns, sterility indicator results and equipment / implant issues <input type="checkbox"/> Patient positioning and support / Warming devices <input type="checkbox"/> Special precautions <input type="checkbox"/> Expected procedure time / Postoperative destination <p>TIME OUT – Before skin incision</p> <ul style="list-style-type: none"> <input type="checkbox"/> All team members introduce themselves by name and role <input type="checkbox"/> Surgeon, Anesthesiologist, and Nurse verbally confirm <ul style="list-style-type: none"> - Patient - Site, side and level - Procedure - Antibiotic prophylaxis: repeat dose? - Final optimal positioning of patient <input type="checkbox"/> "Does anyone have any other questions or concerns before proceeding?" 	<p>DEBRIEFING – Before patient leaves OR</p> <ul style="list-style-type: none"> <input type="checkbox"/> Surgeon reviews with entire team <ul style="list-style-type: none"> - Procedure - Important intra-operative events - Fluid balance / management <input type="checkbox"/> Anesthesiologist reviews with entire team <ul style="list-style-type: none"> - Important intra-operative events - Recovery plans (including postoperative ventilation, pain management, glucose and temperature) <input type="checkbox"/> Nurse(s) review(s) with entire team <ul style="list-style-type: none"> - Instrument / sponge / needle counts - Specimen labeling and management - Important intraoperative events (including equipment malfunction) <input type="checkbox"/> Changes to post-operative destination? <input type="checkbox"/> What are the KEY concerns for this patient's recovery and management? <input type="checkbox"/> Could anything have been done to make this case safer or more efficient? <p><i>Hand-off to PACU / RR, Nursing Unit or ICU</i></p> <p>CHECKLIST SCORE</p> <p>Add all checkmarks for 3 sections and enter below</p> <p>Briefing _____ /17 = _____ Time Out _____ /3 = _____ Debriefing _____ /6 = _____ TOTAL _____ /26 = _____ x 100 = _____</p> <p>PATIENT INFORMATION</p> <div style="border: 1px solid black; height: 40px; width: 100%;"></div>
<p>Adapted from the WHO Surgical Safety Checklist, © World Health Organization, 2008</p>		<p>Surgical Safety Checklist: Canada Version 1, January 9, 2009</p>

The **Briefing** and **Time Out** phases of the checklist should be viewed as an extended surgical pause during which team members verbally confirm the identity of the patient, the operative site, and the procedure to be performed. Also in these phases, team members should ensure that evidence-based interventions are provided (e.g., prophylaxis against infection).

The Goals of the Surgical Safety Checklist:

- Improve the safety of the perioperative process for patients by improving teamwork and communication.
- Clarify the minimum expected steps.
- Ensure adherence to evidence-based standards of care.
- Elevate surgical teams to a higher standard of performance.

WHO Guidelines for Safe Surgery 2009, World Alliance for Patient Safety, World Health Organization pg 5, Retrieved from <http://www.who.int/patientsafety/safesurgery>

The **Debriefing** section of the checklist is a key opportunity to discuss future ideas for quality improvement and learning. The final question - “Could anything have been done to make this case safer or more efficient?”, will allow every member of the team to provide their thoughts and plans to address these issues. These kinds of conversations may not otherwise occur once the team has left the operating room. Used in this manner, the Surgical Safety Checklist should take no more than one minute per section.

The Surgical Safety Checklist is not intended to be a “to-do” list, but rather a tool designed to:

- Reinforce each step related to preparing for surgery and preparing for postoperative care.
- Identify a list of key items that should be read out loud and verified by all members of the surgical team at each of the three stages in surgery.

For a detailed explanation of all items contained on the CPSI checklist, please see the “How to” Implementation Guide section 4.

The Value of Prompts and Reminders

The premise of the Surgical Safety Checklist is that no single professional can bear full responsibility for remembering the many steps required to reduce every preventable complication possible in a surgery. By helping OR teams take a consistent, standardized approach to every surgery, the Surgical Safety Checklist decreases reliance on memory and reminds team members of all the steps required prior to surgery. This is very similar to an airline checklist that pilots use in the cockpit prior to takeoff.

Using the Surgical Safety Checklist can reduce assumptions that someone else has already done a task (e.g., VTE prophylaxis or antibiotic administration). The structured prompts will benefit all surgical patients by helping to ensure all appropriate vital interventions are delivered consistently. Though there may always be some inconsistency in the delivery of evidence-based standards of care, the Surgical Safety Checklist can make it easier for teams to follow best practices by providing reminders at the right point in time in the surgical process.

The goals of the SET program are to optimize surgical capacity in Ontario and increase access to surgical services, while maintaining safe, quality patient care.

Report of the Surgical Efficiency Targets (SET) Program Advisory Committee – Benchmarking of Surgical Best Practices, March 2009

1.4 The Checklist and Accountability

Ontario hospitals and operating room teams are committed to patient safety. As part of that commitment, they are accountable to patients, to their hospital's board, and to a number of external groups – national and provincial – for providing high quality, efficient, and safe care. Implementation of the Surgical Safety Checklist will help hospitals comply with standards and legislation, and fulfill many of their accountabilities. For example:

1. **Patients** place their trust in surgical care teams and give consent to allow them to participate in their care. Today's patients are more informed about the risks and benefits associated with health care and demand high degrees of transparency and information about their care.
2. The **Government of Ontario** announced on September 30, 2009, that all Ontario hospitals with operating rooms will be required to publicly report their compliance with the use of a three-phase surgical safety checklist for all surgeries on July 30, 2010. Ontario hospitals already publicly report on a variety of patient safety indicators, including compliance with surgical site infection prevention in hip and knee replacement surgeries (i.e., percentage of surgeries receiving “on time” antibiotic prophylaxis). The Surgical Safety Checklist includes many evidence-based interventions to prevent or reduce surgical site infections, including prophylactic antibiotic administration, double dosing of antibiotics, temperature/maintenance of normothermia, and glycemic control for diabetic patients.^{29,30,31,32} These well-studied interventions are also part of the *Safer Healthcare Now!* “surgical site infection bundle,”³³ and will help hospitals comply with that national initiative.
3. Wait-time funded hospitals that participate in the **Surgical Efficiencies Target (SET)** program are required to report to their Local Health Integration Network through the **Operating Room Benchmark Collaborative (ORBC)** on a number of key performance indicators, including start time accuracy, surgical pause/timeout, OR utilization, pre-admission screenings for elective patients, and a perioperative pause/timeout. The Surgical Safety Checklist will replace the current indicator “time out” on April 1, 2010. Use of the Surgical Safety Checklist may help hospitals meet benchmarks for an improved start time, accuracy, and reduced preventable delays (*see appendix 6 - A31*).

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4. **Accreditation Canada** sets national operating room standards, that, for example, include using an interdisciplinary approach, verifying the client's information before beginning the procedure, and ensuring all equipment and supplies are in place before beginning the procedure. The Surgical Safety Checklist covers many of these requirements (*see appendix 6 - A30*). In 2011, Accreditation Canada will add two new Required Organizational Practices (ROP's) as part of their Qmentum Accreditation Program - Surgical Safety Checklist compliance and VTE prevention

Endnotes

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Preparing to Implement the Surgical Safety Checklist

This section discusses the key elements necessary to successfully implement and maintain the Surgical Safety Checklist, including leadership/ownership, organizational commitment, teamwork/communication, and mechanisms to monitor, evaluate, and report on the use of the checklist.

2.1 Leadership and Ownership

The goals of the Surgical Safety Checklist cannot be achieved without the full engagement of each member of the OR team, who must “own” the initiative. Senior leaders play an important role as well. Formal support and endorsement is key at all levels of administration and physician/clinician leadership.

Physician support is critical. Any significant change to the design, process, practice, or delivery of medical or surgical care can be very challenging to implement without strong physician engagement and acceptance.³⁴

Nursing support is also key. Nurses need to be supported as integral members of the OR team. If they are taking on new roles for the checklist program, they need the support and collaboration from senior leadership and physicians.

Support of key leaders is particularly important to help overcome any barriers, such as those identified in an OHA survey from June 2009, including:

- The perception that using a checklist will increase the time required for surgery.
- The challenge of getting the entire team together for the briefing.
- Surgeons’ attitudes towards team discussions.
- Anesthesiologists’ attitudes towards team discussions.

Nurses and other team members also need to be empowered to speak up and stop the running of the checklist if it is not followed in an appropriate manner.

2.2 Organizational Commitment

At the outset, hospitals need to make an organizational commitment to patient safety, and embrace the use of the Surgical Safety Checklist as an important step in improving the reliability of safe surgical care. High reliability theory suggests that many accidents can be prevented through good organizational design and management.³⁵ The characteristics of high reliability organizations include:³⁶

- An organizational commitment to safety.
- High levels of redundancy in personnel and safety measures.
- A strong organizational culture for continuous learning and willingness to change.

Strategies for Building Clinical* Ownership (Adapted from Reinertsen et. al. 2007**)

Work with Administrative, Physician and Nurse Leaders. Clinical staff are more inclined to participate in quality improvements when they see that physician and nurse leaders are also serious about improving the quality of care for patients. Administrative leaders such as Chief Nursing Officers, Chiefs of Staff, Chiefs of Surgery, Surgical Division Chiefs, or those who sit on the Medical Advisory Committee and Perioperative Services Committee have great potential to influence their colleagues through their support of the Surgical Safety Checklist.

Identify Physician and Non-Physician Champions. Champions are usually highly-respected clinicians who are not necessarily administrative leaders in the hospital. If they are not in leadership roles, it is important that they are aligned with senior leadership. These individuals are often early adopters of emerging evidence-based practices. Consider enthusiastic surgeons, OR educators, and Clinical Nurse Specialists.

Involve Clinicians from the Beginning. Clinicians are more receptive to changes in practice if they are involved in the initial stages of planning and play key roles in plan development. Consider involving them on committees, listen to their concerns, and consider the uniqueness of the surgical program and setting.

Choose Messages and Messengers Carefully, and Communicate Often. Although this is a provincially-mandated initiative, clinicians will ascribe credibility in part to those who deliver the messages. Decide who will “invite” participation, report on ongoing progress, listen and deal with issues, and report data to the entire clinician group.

When preparing messages, be sure to concentrate on the evidence by:

- Emphasizing that the use of the Surgical Safety Checklist has been empirically proven to reduce mortality and morbidity in surgery, and that’s why it has been chosen as a patient safety indicator.

- Confirming that the initiative is being adopted as a standard around the world, and is not a “cookbook medicine” standardization project.
- Informing staff of plans to collect and share evidence relevant to their practice and to the safety of their patients (e.g., VTE rates, Surgical Site Infection rates, Return to Surgery (RTS) rates, “good catches” from use of the checklist, etc.).
- Reinforcing that the checklist is a **patient safety initiative**, and that much of the value in this tool pertains to common sense (i.e., every patient case is discussed by the team, and all necessary preparations are made to ensure patients receive any and all interventions that will lead to the best possible outcome).
- Reminding teams that compliance with the Surgical Safety Checklist is going to be publicly reported.

Link Champion(s) to the Pilot Testing Teams. Ensure that administrative colleagues (e.g., director of perioperative services, OR managers) are included. Start practice trials on a small scale, perhaps with one department, one type of patient population, or one OR suite. Work with teams that are high functioning (e.g., already have high compliance with “Time Out”) and give them a week or two to get comfortable. Success in one area gives a solid foundation to build upon.

Decide on the Process for Surgical Safety Checklist Modification. Hospitals must consider potential modifications to the surgical safety checklist carefully and weigh them in terms of importance to patient safety; establish a process for testing them for practicality and feasibility; and, having them approved by the Perioperative Services Committee.

Plan How to Engage the “Majority” and “Late Adopters.” Spread will occur more quickly if the early adopters are able to influence their peers. Clinical champions should be encouraged to mentor their peers, share success stories, and be formally recognized for their efforts. Keep all staff updated with progress, and repeatedly congratulate and celebrate successes.

**The term “clinician” includes physicians, nurses, and surgical assistant professionals; however, some steps are more reflective of the physician clinical role.*

***Reinertsen JL, Gosfield AG, Rupp W, Whittington JW. Engaging Physicians in a Shared Quality Agenda. IHI Innovation Series white paper. Cambridge, Massachusetts: Institute for Healthcare Improvement; 2007. (Available at www.IHI.org)*

2.3 Communication and Teamwork

The Operating Room Team

The most critical resource of operating teams is the team itself - the surgeons, anesthesia professionals, nurses, and others. A team that works effectively together to use its knowledge and abilities on behalf of the surgical patient can avert a considerable proportion of life-threatening complications. Unfortunately, operating room personnel have had little guidance or structure for fostering effective teamwork and thus minimizing the risk for surgical safety.

World Alliance for Patient Safety; Who Guidelines for Safe Surgery 2009, World Health Organization pg 1 Retrieved from www.who.int/patientsafety/safesurgery

According to the WHO Guidelines for Safe Surgery, “safety in surgery requires the reliable execution of multiple necessary steps in care, not just by the surgeon, but by a team of health care professionals working in concert for the benefit of the patient”.³⁷

OR teams are groups of highly skilled multidisciplinary providers who may or may not be familiar with each other. Each member has a set of discipline-specific priorities and constraints that may conflict with other members of the team. They must adapt to highly variable patients, complicated procedures, time pressures, and often acute events that demand coordinated interventions. Teams routinely manage these complex circumstances with varying degrees of knowledge about the patient, the procedure, and other team members. Coupled with an intense hierarchy in the OR, these teams often fail to work effectively, which often contributes to adverse events.³⁸

According to a Joint Commission report, 70% of adverse events reported by hospitals in the United States could be traced back to poor communication.³⁹

The potential for communication failures in the operating room is high, and the outcomes of such failures are significant.^{40, 41} The following diagram lists the types of communication errors that occur and their potential consequences.^{42,43,44,45}

Types of Communication Failures

- Information is not transmitted
- Information delivered in an ad hoc manner
- Misinterpretation of information received
- Communication is too late to be effective
- Content is not consistently complete or accurate
- Key individuals are excluded
- Issues are left unresolved until the point of urgency

Consequences of Communication Failures:

- Procedural errors
- Delays
- Inefficiency
- Team tension
- Resource waste
- Workaround **
- Patient inconvenience
- Ambiguity about roles, responsibilities and leadership

**Workaround is defined as “Communication failure that provokes a culturally accepted violation of an institutional regulation in order to maintain efficient workflow.”⁴⁶

“Improved team culture in the operating room will be noticeable to all healthcare providers”.

*Dr. Bryce Taylor
Surgeon-in-Chief & Director
of Surgical Services
University Health Network*

Checklists help team members exchange information, improve team communication, and reduce the incidence of communication failures. For example, in a study by Lingard and Espin et al., the use of a checklist reduced the number of observed communication failures from a mean of 3.95 per surgical procedure to a mean of 1.31 per procedure, and directly benefited the patient by revealing knowledge gaps and provoking a change in the care plan.⁴⁷

Positive Team Behaviours

In highly-complex environments, such as an OR during surgery, teamwork is critically important to patient safety. Compared to individuals working independently, teams make fewer mistakes and have better resilience in responding to and mitigating errors, especially when each team member knows his/her own responsibilities as well as those of other team members.⁴⁸ Good teamwork depends on good team communication, which includes the following behaviours.⁴⁹

- Briefing (activities such as sharing situation and relevant background about a patient).
- Information sharing (intentions stated).
- Inquiry (asking for input).
- Vigilance and awareness (red flags identified, attention is focused).
- Assertion (team members speak up during critical times).
- Contingency management (relevant risks identified, back up plans made and executed).

In one study, teams that exhibited fewer positive team behaviours, (therefore, less teamwork) had significantly higher rates of complications and patient deaths. Since positive teamwork behaviours can produce better outcomes, the use of the Surgical Safety Checklist – which reinforces these behaviours - may translate into safer care and improved outcomes for patients.

2.4 The Importance of Monitoring, Evaluation, and Reporting

The Surgical Safety Checklist is more than a checklist. It is a commitment to best practice and ongoing quality improvement. Implementing the checklist involves assessing current practices against those informed by evidence, identifying gaps, and developing quality improvement plans to close those gaps.

It will take time for the consistent use of the checklist to take hold and spread within Ontario's hospitals, and it will take ongoing effort to sustain the momentum. Over time, teams may lose some of the initial enthusiasm of running the checklist. As time pressures take over, they may start rushing through in a "tick and flick" manner. Oftentimes, organizations make improvements only to discover later that performance reverts back to the old way of practice.⁵⁰

Therefore, ongoing monitoring and support of this process – including occasional direct audits – is essential to ensuring proper adherence. Monthly or quarterly compliance reports are useful to monitor sustainability (*see appendix 10 - A39* for details on ensuring quality data and audits). Ontario hospitals will also be required to report on their use of the Surgical Safety Checklist to the Ontario government, and so it is essential to check the quality of data reported. Hospital leadership should show a demonstrated commitment to the data collection, analysis, and reporting process.

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Understanding Risk and Evidence-Based Practices to Reduce Risk

This section of the Surgical Safety Checklist Implementation Toolkit describes the risks associated with five common surgical complications and errors that could have been prevented through the use of a surgical safety checklist: retained foreign objects, wrong site surgery, medication errors, surgical site infections, and venous thromboembolism (VTE). Introductory evidence is provided to support some of the interventions included in the checklist.

3.1 Surgical Statistics

Every surgery carries an element of risk. The risk associated with surgery is reflected in statistics obtained from the Healthcare Insurance Reciprocal of Canada (HIROC):

- Since HIROC's inception over 20 years ago, they have recorded over 1700 surgical claims.
- 1500 of these related to operating room and same day surgery events.
- 600 of these claims could be classified as "never events" that might have been prevented by the use of the Surgical Safety Checklist.
- The claims included 210 retained foreign bodies, 94 wrong site surgeries, and nine wrong patient surgeries.
- The total cost of the 1500 claims has been estimated at more than \$27 million. Actuarial estimates expect these costs to increase on an annual basis.
- These costs do not reflect the psychological and human costs to the patients, their families, and staff involved in these incidents.

In concert with their vision of *Partnering to create the safety healthcare system*, HIROC has incorporated the Surgical Safety Checklist into the 2009 revised version of the *Risk Management Self-Appraisal Modules (RMSAM™)*. The surgical module has now incorporated a section devoted to questions addressed in the checklist.



The screenshot displays the RMSAM Online interface. The top navigation bar includes the HIROC logo, the title "RMSAM™ Online", and user options like "Modify User Information", "Home", "Help", and "Logout". A sidebar on the left contains navigation links: "Introduction", "Setup", "Answer Module Questions", and "Review the Reports". The main content area is titled "Patient Identification" and contains a form for question 2.1: "Does the Surgical Program require that a pre-operative checklist be completed for every patient?". The form includes fields for "Action Plan" (with a dropdown menu), "Due Date" (set to Feb 01, 2010), "Person Responsible" (James Smith, Director Sv), and "Explanation". Below the form are three sub-questions (2.1.1, 2.1.2, 2.1.3) with associated progress indicators. At the bottom, there are navigation buttons: "Incomplete", "Unanswered", "Page", "Main Page", "Page", "Unanswered", and "Incomplete", along with a "Go To: Question Number" field set to 1.1. The footer contains contact information for HIROC, a confidentiality notice, and a copyright notice for HIROC Management Limited 2009.

3.2 Using Evidence to Reduce Risk

“Patients and the public at large have appropriate expectations that their hospitals make every effort to prevent complications of care, including venous thromboembolism and hospital-acquired infections.”

Dr. William Geerts, National Lead, VTE Intervention, Safer Healthcare Now!

The consistent and standardized use of evidence-based practices proven to reduce the incidence of harm to patients is an integral part of the Surgical Safety Checklist. Many items in the CPSI Surgical Safety Checklist have been carefully chosen because they are evidence-based practice interventions that improve the quality or safety of care for surgical patients – and can help reduce preventable complications and errors.

If the evidence-based interventions in the checklist are not routinely delivered, hospitals face a higher risk of patient complications from surgery and, therefore, potentially increased costs associated with longer lengths of stay, medications, possible unplanned surgical interventions, and potential legal claims.

Some practices, such as screening patients for allergies, are done very consistently in this province. Other items, such as surgical site infection prophylaxis or prevention and venous thromboembolism (VTE) prevention measures may not be as consistent.

OHA June 2009 survey reveals variability in VTE prevention for three high risk surgical groups: *(see appendix 5 - A29)*

Do all surgeons routinely prescribe VTE prophylaxis treatment to all patients requiring major general surgery, hip fracture surgery, and THA/TKA surgery?

Checklist item/phase	Never	Rarely	Sometimes	Most of the time	Always
Major general surgery	2%	2%	20%	43%	33%
Hip fracture surgery	7%	2%	9%	15%	47%
THA/TKA surgery	7%	4%	6%	10%	50%

3.3 Common Complications and Adverse Events

OR briefings can significantly reduce the risk for wrong site surgery*. Using the Surgical Safety Checklist consistently for every procedure will ensure that the independent verification process for patient identity and marking of the site (for procedures with bilaterality of limb or organ) are completed in both the Briefing and the Time Out phase. By extending the surgical pause in this manner, wrong patient/wrong site/wrong side procedures should become “never events” in hospitals.

* Makary M, Mukherjee A, Sexton B: *Operating Room Briefings and Wrong Site Surgery*. *J Am Coll Surg*. 2007; 204:236-43. Retrieved from <http://www.surgicalpatientsafety.facs.org/research/makary.pdf>

Retained Foreign Objects

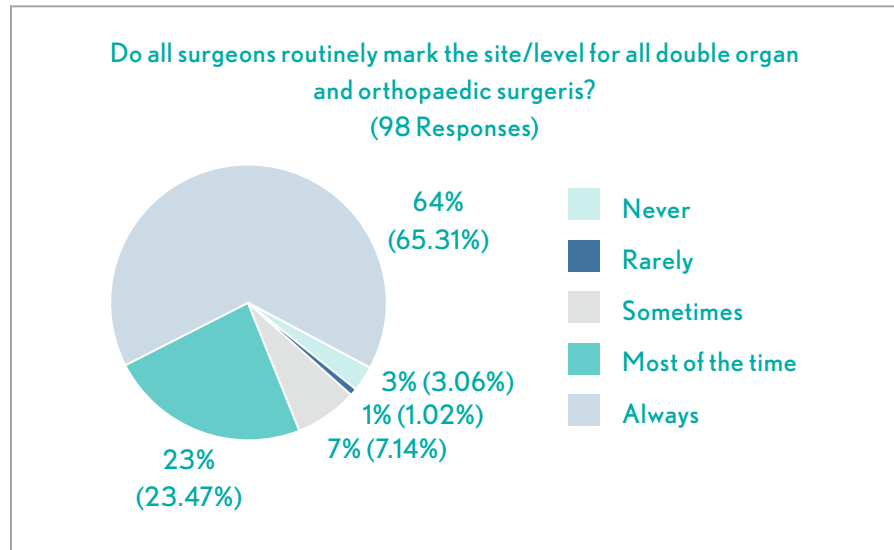
Retained foreign objects following surgery are relatively uncommon but still a serious threat to patient safety. Factors cited as contributing to retained foreign objects include: emergent surgery, unexpected changes in operating procedure, high body mass index, and breakdowns in communication, including failure to indicate when an item was placed in a body cavity.⁵¹ Counting procedures and guidelines have been in place at all hospitals as a risk reduction strategy for some time. The Debriefing stage of the Surgical Safety Checklist reinforces count accuracy before the patient leaves the OR.

Wrong Site Surgery

In an analysis of sentinel events in the USA from 1995 to September of 2009, the Joint Commission reported that 13% of these adverse events were due to wrong site surgery.⁵² Wrong site surgery is more common in specialties, such as orthopaedic surgery, where there is limb bilaterality and multiple spinal levels.⁵³ In 1994, awareness of wrong site surgery led the Canadian Orthopaedic Association to “recommend routinely marking the incision site with a permanent marker”.⁵⁴

In 2003, the Joint Commission mandated the Universal Protocol for Preventing Wrong Site, Wrong Procedure, and Wrong Person Surgery, with stringent guidelines on the marking of surgical sites.⁵⁵ However, the Joint Commission reports that the problem of wrong site, wrong procedure, and wrong person surgery persists at the rate of eight to 10 cases a month in reporting hospitals⁵⁶, and has identified several contributing factors including breakdowns in communication and lack of patient engagement.⁵⁷

The practice of site marking is included on the Surgical Safety Checklist (as a sub-item of “patient information confirmed”). Clearly marking the surgical site gives all team members clarity about the location of the procedure, leaving little room for ambiguity. Actively including the patient in the site marking process may also improve the reliability of site verification.⁵⁸



In any invasive procedure, using multiple steps to verbally confirm patient identity, consent, procedure, and surgical site are good measures to prevent wrong site/wrong person surgery. Most teams already regularly review these items with patients; however, according to the June 2009 OHA survey (*see appendix 5 - A29*), the practice of site marking for surgical procedures varies greatly among hospitals

Medication Errors

According to the Canadian Adverse Events Study, medication and fluid-related events are the second leading cause of harm in hospitalized patients.⁵⁹ Other publications and safety organizations have also highlighted medication incidents in the OR setting.^{60, 61}

Potential for medication error in the OR exists for several reasons, such as:

- Medications may be prescribed, selected, prepared, and administered by only one practitioner.
- Medications may be removed from their original packaging and left unlabelled in the sterile field.

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- Medications may be administered in response to verbal orders, which can be error-prone.
 - There is greater risk for medication incidents (i.e., errors) at transfer points. The OR is a point of continuous patient transfer (i.e., the OR team assumes the care of a patient for short time period), with frequent hand-offs between the OR team and others.

Medication safety is integral to overall patient safety. The Surgical Safety Checklist includes seven items that can improve medication safety:

- An anesthesia safety check.
- Patient identification.
- An allergy check.
- The administration of antibiotics within the specified time frame.
- Anticoagulant status and plan to prevent VTE.
- The need for glycemic control.
- The status of beta blocker therapy.

For more information on medication errors and ways to prevent them, see the “How-To” Implementation Guide, section 11, and *appendix 8* which contains the *ISMP Canada Operating Room Medication Safety Checklist*[®].

Surgical Site Infections (SSIs)

SSIs are a serious concern for patients, their caregivers, and hospitals. According to the *WHO Guidelines for Safe Surgery 2009*:⁶²

- SSIs account for about 15% of all hospital-acquired infections and about 37% of hospital-acquired infections in surgical patients.
- Patients with SSIs have a longer average length of stay (from four to seven days), are twice as likely to die, and twice as likely to spend time in an intensive care unit.

By implementing evidence-based interventions, it is possible to prevent 40-60% of surgical site infections.⁶³ A comprehensive proactive SSI prevention strategy uses evidence-based guidelines to assess patients and/or patient groups at risk of SSI and consistently deliver appropriate type, dose, mode of delivery, and timing of antibiotic to achieve optimal antimicrobial prophylaxis. Additional perioperative SSI prevention strategies such as monitoring for normothermia and glycemic control are important adjuncts to antimicrobial prophylaxis that should be included for appropriate patient groups.

The CPSI Surgical Safety Checklist includes a number of interventions to prevent SSI:

- The Briefing section contains antibiotic prophylaxis-double dose, glycemic control, temperature and warming device prompts.
- The Time Out section contains the prompt “antibiotic prophylaxis: repeat dose”.

Refer to *appendix 7 - A33* and the “How-To” Implementation Guide for more information on how to prevent SSIs and optimize timing for antibiotic administration.

Venous Thromboembolism (VTE)

VTE is one of the most common complications of surgical care and one of the most common preventable causes of hospital death.^{64,65}

- Surgical patients are at much greater risk than the general population for developing VTE.
- Approximately 60% of all VTE originates in the hospital, either during the hospitalization itself or within 6 weeks of hospital discharge.
- Several hundred clinical trials demonstrate that VTE can be safely and inexpensively prevented by the use of thromboprophylaxis.

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- More than 25 evidence-based clinical practice guidelines since 1986 recommend the routine use of thromboprophylaxis for most hospitalized surgical patients.⁶⁶
 - The US Agency for Healthcare Research and Quality (AHRQ) considers VTE prevention as the number one ranked patient safety practice for hospitals.⁶⁷

Despite compelling evidence that thromboprophylaxis reduces the morbidity and mortality from VTE after surgery, consistent adherence to optimal practice remains low.^{68,69,70} In a national survey sent to all Canadian hospitals, 94% of hospitals reported that they routinely provided thromboprophylaxis to hip replacement patients but only 33% reported routinely providing thromboprophylaxis to patients undergoing major general surgery.⁷¹ A June, 2009, OHA survey found that thromboprophylaxis was used routinely for major general surgery in only 33% of Ontario hospitals; for hip fracture surgery in only 47% of hospitals; and for hip/knee arthroplasty in only 50% of hospitals. Despite relatively low current rates of thromboprophylaxis, only 4% of Ontario hospitals reported that the inclusion of thromboprophylaxis might be a barrier to implementing the Surgical Safety Checklist in their operating rooms (*see appendix 5 - A29*).

A proactive VTE prevention strategy means using evidence-based guidelines to assess patients and/or patient groups for risk of VTE and consistently delivering an appropriate anticoagulant and/or mechanical method of thromboprophylaxis to all patients with sufficient risk. The inclusion of VTE prophylaxis on the Surgical Safety Checklist emphasizes the importance of this intervention for most surgical patients.⁷² This item involves selecting an appropriate prophylaxis option, at the optimal dose, starting at the optimal time, and continuing for an appropriate duration of time. Although the risk of VTE also affects medical and some other nonsurgical patients, for the purposes of this toolkit, emphasis is on the surgical population.

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