

OPEN ACCESS

Enhancing Safety of Orthopaedic Surgery: The Role of Surgical Safety Checklist

*Corresponding author :

Tito Sumarwoto

✉ tito.ortho@gmail.comTito Sumarwoto^{1,2*}

Received 10 October 2025

Accepted 31 October 2025

Published 07 February 2026

¹. Master of Hospital Administration, Universitas Muhammadiyah Yogyakarta, Indonesia². Division of Upper Extremity, Hand, and Microsurgery, Department of Orthopaedic and Traumatology, Prof. Dr. R. Soeharso Orthopedic Hospital, Surakarta, Indonesia

CITATION

Sumarwoto T (2026) Enhancing Safety of Orthopaedic Surgery: The Role of Surgical Safety Checklist. *Soeharso Orthopaedic Journal*, 1(1), 25-34.

<https://doi.org/10.65745/soj.v1.i1.1>

COPYRIGHT

© 2026 Sumarwoto. This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY\)](#). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

ABSTRACT

Surgical errors remain a critical threat to patient safety, particularly in orthopaedic procedures involving complex anatomical structures. Despite their preventability, such errors, including wrong-site surgery, retained foreign objects, and equipment failures, persist due to systemic issues like poor communication, insufficient planning, and procedural noncompliance. The World Health Organization introduced the Surgical Safety Checklist (SSC) in 2008 to address these challenges by standardizing perioperative practices through structured protocols. The SSC encompasses three phases: Sign-In, Time-Out, and Sign-Out, aiming to enhance communication, verify critical patient data, and reduce avoidable complications. Evidence suggests significant reductions in mortality and postoperative complications when the SSC is implemented with high fidelity. However, inconsistent application across specialties and institutions, along with mixed results regarding long-term team dynamics and adherence, underscore the need for more robust implementation strategies. In orthopaedics, where surgical errors can severely impact quality of life, the SSC serves as a vital tool to ensure procedural safety and improve clinical outcomes. Promoting rigorous, team-based adherence to the SSC can substantially mitigate risks and reinforce a culture of safety in surgical practice.

KEYWORDS

Surgical Safety Checklist, Orthopaedic Surgery, Patient Safety, Perioperative Errors, Clinical Outcomes

INTRODUCTION

Surgical errors are unintended, preventable injuries during the perioperative period and are not considered a recognized, acceptable risk of surgery. This error is avoidable if the appropriate procedure-specific training guidelines are followed. Medical mistakes, including retained foreign bodies, mislabeled surgical specimens, and errors involving the wrong patient, inappropriate technique, or wrong site, are also included in the category of surgical errors (WSPEs). Research on these errors over the past few decades revealed that they typically have several causes. Inadequate training, physician burnout, unnecessary or rushed therapies, and poor communication are common causes of surgical errors (Santos & Jones, 2023).

A comprehensive analysis found that 43% of hospital adverse events might have been prevented with the current standard of care, with operating rooms accounting for most of these incidents. According to a survey, every year, 234 million people get surgery, of which one million died from complications, at least half of which are avoidable (Aranaz-Ostáriz, 2022; Borchard, 2012). Data from developed nations showed that after inpatient surgical treatments, the risk of complications ranged from 3 to 16 percent, while the rate of mortality was between 0.4 and 0.8 percent (Jain, et al, 2018).

Orthopedic surgeons operate on delicate body parts such as the spine, arteries, nerves, muscles, tendons, and joints. Orthopedic errors can cause serious injury and have a detrimental effect on a patient's quality of life. 483 out of 917 respondents (or 53%) to a survey conducted by the American Academy of Orthopedic Surgeons (AAOS) stated they had committed a medical error within six months prior to the survey. The most common reported medical errors (5.6 percent) were equipment malfunctions (29 percent), communication problems (24.7 percent), prescription errors (9.7 percent), and wrong-site surgery. Surgeons reported doing wrong-side surgery in 59% of cases, wrong-digit surgery in 23%, wrong-patient surgery in 14%, and erroneous surgery in 14% of cases with wrong-site surgery (Santiesteban, et al, 2016).

Despite this evidence, surgical safety is rarely considered a major health concern, especially in developing and middle-class countries with inadequate resources. Furthermore, there remains a lack of assurance regarding the efficiency and promptness of standard, fundamental interventions, such as administering antibiotics to lessen infection-related issues. A checklist ensures that teams regularly carry out essential safety steps, lowering the risk of endangering surgical patients' lives (Walker, et al, 2012).

Since 2008, the World Health Organization (WHO) has recommended that operating rooms utilize the Surgical Safety Checklist (SSC). This is done to improve the standard of care provided to surgical patients globally, minimize adverse outcomes, and tighten safety protocols (Van Zyl, et al, 2023).

The three phases of the SSC are the time before the anesthesia induction (sign-in), the time out before the surgical incision, and the immediate postoperative period. Every stage aligns with a specific moment in the standard surgical anesthesia process flow (sign out) with every phase possessing specific elements (M.F.do P. Tostes & C. M. Galvão, 2019).

The World Health Organization (WHO) created the Safe Surgical Checklist (SSC), a surgical safety intervention that is both widely advised and, in certain situations, necessary. Its objectives are to assess specific safety items critically and improve communication between perioperative team members (WHO, 2009). Numerous patient and team outcomes, such as death rates, complication rates, duration of hospital stay, teamwork, and adherence to safety measures, have been positively impacted by studies on the clinical effectiveness of the SSC implementation (N.Lynch and M. Kerin, 2016). Furthermore, it has been shown that improved outcomes can only be attained through high-fidelity use of the SSC or

the proper application of each of its three components. As a result, the data shows that successful SSC implementation is required to get the desired outcomes (Haugen et al, 2019).

Nevertheless contradictory results have been found in studies on applying the SSC. Further research indicates that the SSC is not always implemented uniformly and that different surgical specialties, hospitals, surgical staff, and specific checklist items and sections have various levels of SSC implementation quality (Hul., et al, 2017). Moreover, relatively little long-term impact on staff attitudes and satisfaction, as well as surgical team perspectives, has been found in long-term SSC implementation studies (Haugen., et al, 2013). Some people remain skeptical about the SSC's true potential as a patient safety intervention due to inconsistent results and a lack of data linking it to better outcomes. There have also been requests to evaluate the regulations requiring the SSC as an organizational safety procedure due to concerns about how noncompliance with the SSC can potentially introduce new hazards that did not previously exist (Hul, 2017; C. Rydenfält, Å. Ek & P. A. Larsson, 2014) .

RESULT

Errors in Orthopedic Surgery

Since 2008, the World Health Organization (WHO) has recommended that operating rooms utilize the Surgical Safety Checklist (SSC). This is done to improve the standard of care provided to surgical patients globally, minimize adverse outcomes, and tighten safety protocols (WHO, 2009).

Anybody can experience medical errors, including surgical errors. A study from Johns Hopkins Medicine claims that 10% of US deaths are the result of medical errors. Among the most hazardous and obvious medical mistakes, surgical errors carry the risk of permanent damage or, possibly, death (Cohen., et al, 2021). Furthermore, Science Daily found that more than 4,000 surgical errors that could have been prevented are committed by surgeons annually. Because these surgical mistake incidences are thought never to have happened in the first place, they are referred to as "never events" (Johnson, 2021).

There is no such thing as a "minor" procedure. There is a chance that even simple tasks could become dangerous. However, in certain situations, a patient may be disproportionately at risk of harm or even death as a result of negligence or other factors. These could involve doctors performing surgeries with defective equipment or making preventable mistakes. The yearly \$1.3 billion in malpractice compensation paid by medical facilities and healthcare providers is primarily the result of surgical errors and other medical mishaps (Rodziewicz., et al, 2022). Surgical errors are, by definition, unforeseen issues that arise during a surgical procedure and surpass the common, accepted risk associated with surgery. Observing the proper medical or surgical protocols could have prevented incidences or behaviors that could have been classified as surgical errors (Santos & Jones, 2023; Rodziewicz., et a, 2022).

Surgical procedures are unique from one another; no two are alike. Although no two surgical errors are alike, underlying reasons are frequently shared. Orthopedic surgical errors can be prevented before, during, and after surgical procedures. They may have major adverse effects on patients, including illnesses, injuries, and even death. Orthopedic surgeons frequently make the following surgical errors:

1. Surgical incompetence or lack of skill, whether due to negligence, imprudence, or inexperience, performing this type of medical surgery.
2. Inadequate preoperative planning including not having the necessary instruments to finish the treatment, not thoroughly sterilizing surgical instruments, or expecting complications in advance.
3. Cutting corners to save time by not carrying out standard surgical procedures or the required stages.
4. Incorrect location designation for the surgical site, failure to disclose medical allergies, or inability to comprehend the full scope of the treatment are examples of communication errors.

5. Weariness among surgical personnel, which can arise from activities outside of work or from inadequate sleep brought on by an increased workload.
6. Addiction to drugs or alcohol that affects judgment or one's capacity to carry out bodily tasks.
7. Incompetence or carelessness during the surgical process, such as not paying attention.
8. Medical equipment that is not working properly and need to be replaced before surgery or wasn't available as a backup or alternative.

The Most Typical Mistakes in Orthopedic Surgery.

The seriousness of surgical errors can vary greatly, from extremely treatable wounds to fatalities that severely lower quality of life. Furthermore, surgical errors occur regularly, even though every patient's experience is unique. According to G. L. Johnson (2021), Santiesteban et al. (2016), and Wong et al. (2009), the following are the most common surgical errors in orthopedics (Santiesteban, 2016; Walker, 2012; Wong, 2009) :

1. Eliminating an unfamiliar item

Surgeons and their staff are required to keep account of every surgical instrument used during an operation. Ignoring one instrument within the patient or failing to keep track of all the instruments used can lead to problems. Leaving a foreign object, such as a blade, surgical clamp, or gauze, within a patient results in excruciating pain, discomfort, or infection. This could happen in a busy or disorganized operating room when medical personnel may not do their duties to the best of their abilities. Even though this is still one of the most common surgical errors, it is easily preventable by checking a simple "materials used" checklist following the procedure. If a surgeon makes the surgical error of leaving a foreign object inside the patient, the patient frequently requires another surgery to remove the object.

2. Operating on the wrong patient for the wrong procedure

A surgeon operates on the wrong patient when they do surgery on the wrong person. It could happen if the patient's identity is misplaced. In the event of patient confusion, the wrong patient may be booked for surgery. This can be damaging and caused by scheduling issues, administrative errors, or communication problems. Patients who have the wrong operation run the risk of having healthy organs removed or suffering from major complications as a result of missing necessary care.

3. The improper surgical site

Something happens when a surgeon operates on the wrong part of the body. Despite operating on the patient's erroneous side, surgeons carry out the essential procedure. A patient's quality of life may be gravely harmed by "wrong site" operations resulting from negligence or a communication failure. Patients have had healthy organs removed in place of diseased organs or the incorrect limb severed.

4. Preventable injury during and after the operation

Due to carelessness or a faulty method, surgical staff may puncture or damage otherwise healthy organs or body parts. This could lead to additional avoidable injuries during and after surgery, as well as major injuries.

This incident could be attributed to negligence or badly executed surgery. Serious injuries may result from this, necessitating more surgeries to fix the harm. Surgical staff negligence or carelessness during an operation, as well as avoidable injuries during and after surgery, can also result in surgical site infections, bleeding or hemorrhage, and nerve damage.

Medical professionals run the risk of puncturing or harming otherwise healthy organs or body parts due to negligence or badly executed surgery. Serious injuries may result from this, necessitating more surgeries to fix the harm. Surgical staff negligence or carelessness during an operation can potentially result in surgical site infections, bleeding or hemorrhage, and nerve injury.

5. Anesthesia mistakes

Anesthesia is an essential part of surgery, and could cause the patient to experience issues and negative outcomes if administered incorrectly, such as inadequate pain management, brain damage, or even death. An overdose of anesthesia can result in death, oxygen starvation, or brain damage. Conversely, a patient who does not receive sufficient anesthesia could feel uncomfortable, wake up during the procedure, and have long-term psychological effects.

Surgical Safety Checklist

The Surgical Safety Checklist was developed by the World Health Organization in 2008. Most hospitals and surgery centers employ this essential checklist, or some variation of it, to improve surgical outcomes and safety. The long list covers three distinct phases of a surgical procedure: before the patient is given anesthesia ("Sign-In"), before the surgeon makes the skin incision ("Time-Out"), and before the patient leaves the operating room ("Sign-Out") (Jain, 2018; WHO, 2009; AAOS, 2017). The surgical team and surgeon use checklists to exchange critical health information before surgery.

1. Sign-In (before anesthesia)

The surgical team will review a sign-in checklist before the patient enters the operating room. As the team reviews each item on the list, the patient should speak out if they think something has been done incorrectly or would like more information.

a) Verifying the identification

During Sign-In, the nurse or anesthesiologist will cross-reference the patient's name with their medical record and the consent form they signed for surgery.

b) Surgeon permission, planned surgical site, and process

The surgical team will ask the patient to confirm every detail of the planned procedure, including the type of surgery and the desired incision location. The patient will be asked to attest that all of the information they provided matches that on the surgical consent form.

c) Correct marking of surgical sites

The patient will verify the incision site that the surgeon had previously marked.

d) Medication Allergies

A medication allergies form will be needed to confirm any pharmaceutical allergies.

e) Checklist for Anesthesia

The anesthesiologist will ask the patient a few important questions to help them get ready for anesthesia. The anesthesiologist will ask if the patient or any family members have had a bad anesthesia reaction from a previous procedure.

f) Getting Ready for a Transfusion of Blood

In the event that a blood transfusion is necessary, the surgical team will confirm that the patient has completed the required blood tests or, in some cases, has donated blood beforehand.

2. Time-out (before making skin incision)

Using the Time-Out checklist, the surgical team will go over important information about the patient and the upcoming surgery as it happens. During this period, the personnel will be incredibly quiet and concentrated to ensure everything is in order.

a) Introductions of team members

To encourage communication among team members throughout the surgery, each surgical team member will introduce themselves to the others by name and role.

b) Verify surgical consent once more

The surgeon, anesthesiologist, and nurse will review the surgical consent one last time to ensure everything is correct.

c) Examining the anesthesia, nursing, and surgical plans

During Time-Out, each surgical team member will discuss their unique approach to the procedure with the others. The surgeon will review the surgery plan with the nurse to ensure everything is ready, including any special needs for implants, equipment, or concerns. The nursing staff will review the nursing plan with the patient to ensure that it includes the intended procedure and any special instruments, supplies, implants, or equipment the patient might need during the surgery. During this time, the anesthesiologist will also review the anesthesia plan to make sure the patient is ready and that any specialized equipment is present.

World Health Organization		
SURGICAL SAFETY CHECKLIST (FIRST EDITION)		
Before induction of anaesthesia	Before skin incision	Before patient leaves operating room
SIGN IN ☐ PATIENT HAS CONFIRMED • IDENTITY • SITE • PROCEDURE • CONSENT ☐ SITE MARKED/NOT APPLICABLE ☐ ANAESTHESIA SAFETY CHECK COMPLETED ☐ PULSE OXIMETER ON PATIENT AND FUNCTIONING - DOES PATIENT HAVE A: - KNOWN ALLERGY? ☐ NO ☐ YES - DIFFICULT AIRWAY/ASPIRATION RISK? ☐ NO ☐ YES, AND EQUIPMENT/ASSISTANCE AVAILABLE - RISK OF >500ML BLOOD LOSS (7ML/KG IN CHILDREN)? ☐ NO ☐ YES, AND ADEQUATE INTRAVENOUS ACCESS AND FLUIDS PLANNED	TIME OUT ☐ CONFIRM ALL TEAM MEMBERS HAVE INTRODUCED THEMSELVES BY NAME AND ROLE ☐ SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE VERBALLY CONFIRM • PATIENT • SITE • PROCEDURE - ANTICIPATED CRITICAL EVENTS ☐ SURGEON REVIEWS: WHAT ARE THE CRITICAL OR UNEXPECTED STEPS, OPERATIVE DURATION, ANTICIPATED BLOOD LOSS? ☐ ANAESTHESIA TEAM REVIEWS: ARE THERE ANY PATIENT-SPECIFIC CONCERNS? ☐ NURSING TEAM REVIEWS: HAS STERILITY (INCLUDING INDICATOR RESULTS) BEEN CONFIRMED? ARE THERE EQUIPMENT ISSUES OR ANY CONCERNS? - HAS ANTIBIOTIC PROPHYLAXIS BEEN GIVEN WITHIN THE LAST 60 MINUTES? ☐ YES ☐ NOT APPLICABLE - IS ESSENTIAL IMAGING DISPLAYED? ☐ YES ☐ NOT APPLICABLE	SIGN OUT - NURSE VERBALLY CONFIRMS WITH THE TEAM: ☐ THE NAME OF THE PROCEDURE RECORDED ☐ THAT INSTRUMENT, SPONGE AND NEEDLE COUNTS ARE CORRECT (OR NOT APPLICABLE) ☐ HOW THE SPECIMEN IS LABELLED (INCLUDING PATIENT NAME) ☐ WHETHER THERE ARE ANY EQUIPMENT PROBLEMS TO BE ADDRESSED ☐ SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE REVIEW THE KEY CONCERNS FOR RECOVERY AND MANAGEMENT OF THIS PATIENT

Figure 2. WHO Surgical Safety Checklist (WHO, 2009)

- d) Dispensing antibiotics

Antibiotics are often given before surgery to reduce the possibility of infection. If the team determines that antibiotics are required in this specific case, they will confirm that the drugs have been given before starting surgery.
3. Sign out (before leaving the operating room)

Exit the operating room by signing out. The surgical team will utilize the Sign-Out checklist to complete documentation in the patient's medical record and address any concerns that should be addressed for future procedures comparable to the one the patient had before the patient exits the operating room.

 - a) Documenting the process

The nurse will consult with the surgeon to guarantee that the procedure's specifics are appropriately documented in the patient's medical file. This documentation may include details about the procedure performed, the anesthetic used, the types of implants, blood loss, and any complications.
 - b) Counting the sponges, needles, and tools

To lessen the chance of leaving surgical materials in the incision, the team will ensure that every instrument is present and that the counts of needles and sponges are precise.

c) Specimens labelling

The team will ensure that tissue or fluid samples are properly labeled with the patient's name and the test needed before sending them to the lab for additional testing.

d) Equipment inspection

After the procedure, the surgical team will inspect the equipment to ensure it is handled properly and stored for use in other cases.

e) Discussing a plan for postoperative recovery

Finally, the team will review the patient's needs to guarantee a smooth recovery. While they still have clear memories of the procedure, they will discuss and record regular or special directives to identify and minimize any possible problems. This aims to give the patient the best chance possible for a full recovery.

DISCUSSION

Surgical Safety Checklist: Patient Safety Practices

It is possible to prevent surgical complications, including mortality. One preventive measure would be to implement a surgical safety checklist. Adopting a surgical safety checklist guarantees that patients undergo well-managed, safe surgery. Surgical safety checklists are a communication tool used by skilled teams in the operating room to assure patient safety. Professionals such as nurses, physicians, anesthesiologists, and others comprise the team. To minimize unnecessary risks, the surgical team must continuously finish every process stage, starting with the briefing, time-out, and debriefing stages (Arimbi & Dhamanti, 2023; Johnson, 2017).

The foundation for the trials is the surgical safety checklist. The research results showed a decrease in complications and mortality associated with surgery. A total of 1750 individuals needed emergency surgery; these patients were divided into two groups: 842 patients before and 908 patients after the surgical safety checklist was introduced. Surgical complications occurred in 18.4% (N=151) of the 842 patients who had not received the surgical safety checklist; which was higher compared to the 11.7% (N=102) complications observed in the group introduced to the checklist. The death rate varied from 3.7% to 1.4% before the surgical safety checklist was put into place (Weiser., et al, 2010). The overall risk of surgical complications decreased from 11% to 7%, and the fatality rate declined from 1.5% to 0.7% after using the surgical safety checklist (Kisacik & Cigerci, 2019).

The outcomes of numerous studies on the use of the Surgical Safety Checklist revealed the following:

1. Surgical safety checklists can reduce mortality and complications. Research conducted in the US showed that surgical wound infections (SWI) were reduced by 33% to 88% (Maksimović., et al, 2008), the complication rate dropped from 11% to 7% (Kisacik & Cigerci, 2019), and the use of prophylactic antibiotics increased from 56% to 83% (Lamont., et al, 2011).
2. Reduces the possibility of surgical site infections and blood loss exceeding 500 milliliters. Weiser's research indicates SSCL has decreased surgical wound infections (SWI). According to studies by M. R. Weiser et al. (2018) and Suarez-Easton et al. (2017), the probability of losing more than 500 milliliters of blood dropped from 20.2% to 13.2%, and the SSI rate fell from 11.2 percent to 6.6% (Weiser, 2018; Suarez-Easton, 2017).
3. Reduces the proportion of individuals who postpone receiving antibiotics until after undergoing a skin incision. In "A Surgical Patient Safety System," Vries' study found that preoperative SSCL application increased the duration from 23.9–29.9 to 32.9 minutes. Nevertheless, 6% fewer patients did not receive antibiotics before the skin incision (Vries., et al, 2010).

4. The most common tasks include providing in-depth information on the problem being worked on, confirming data, summarizing the main ideas discussed, and putting together a team (Lingard, 2017; Lingard, 2005).
5. Using paper checklists is one approach to deal with the aforementioned hurdle as they are affordable and produced quickly. Furthermore, paper checklists are simple to adapt to particular requirements and do not require sophisticated technology expertise (Verdaasdonk, 2009).

CONCLUSION

Implementing Surgical Safety Checklists (SSC) is a pivotal intervention in enhancing the safety and efficacy of orthopaedic surgery. Though often preventable, surgical errors persist as a significant concern in the medical field, with adverse outcomes impacting global patient well-being. The SSC, recommended by the World Health Organization since 2008, offers a structured approach to mitigate such errors through systematic checks and communication protocols across the perioperative period. Despite contradictory findings regarding its uniform implementation and long-term impact, studies overwhelmingly support the SSC's role in reducing complications and mortality rates and improving teamwork. Its adoption facilitates meticulous preoperative planning, verification of critical information, and postoperative documentation, fostering a culture of safety in surgical practices. As evidenced, the SSC is a cornerstone in safeguarding patients undergoing orthopaedic procedures, underscoring its indispensable value in contemporary surgical settings.

CONFLICT OF INTEREST

The author(s) declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

ACKNOWLEDGMENTS

None

PATIENT CONSENT STATEMENT

None

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request

GENERATIVE AI STATEMENT

The author(s) declare that no Generative AI was used in the creation of this manuscript

LIST OF ABBREVIATIONS

SSC : Surgical Safety Checklist
SSCL : Surgical Safety Checklist
SWI : Surgical Wound Infections

WSPEs : Wrong-side/ wrong-site, wrong procedure, and wrong-patient adverse events
WHO : World Health Organization

PUBLISHER'S NOTE

All claims expressed in this article are solely those of the author(s) and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

REFERENCES

- A. Borchard, D. L. B. Schwappach, A. Barbir, and P. Bezzola. (2012) “*A systematic review of the effectiveness, compliance, and critical factors for implementation of safety checklists in surgery*”. *Ann Surg.* vol. 256 (6). pp. 925–933. doi:10.1097/SLA.0b013e3182682f27.
- A.J.Cohen et al. (2021). “*Rates of Serious Surgical Errors in California and Plans to Prevent Recurrence*”. *JAMA Netw Open.* vol. 4(5). pp. 1–11. doi:10.1001/jamanetworkopen.2021.7058.
- A.S.Haugen et al. (2013). “*Impact of the World Health Organization's Surgical Safety Checklist on safety culture in the operating theatre: A controlled intervention study*”. *Br J Anaesth.* vol. 110(5). pp. 807–815. doi: 10.1093/bja/aet005.
- A.S.Haugen et al. (2019). “*Causal Analysis of World Health Organization's Surgical Safety Checklist Implementation Quality and Impact on Care Processes and Patient Outcomes: Secondary Analysis From a Large Stepped Wedge Cluster Randomized Controlled Trial in Norway*”. *Ann Surg.* vol. 269(2). pp. 283–290. doi:10.1097/SLA.0000000000002584.
- C. Rydenfält, Å. Ek, and P. A. Larsson. (2014). “*Safety checklist compliance and a false sense of safety: New directions for research*”. *BMJ Qual Saf.* vol. 23(3). pp. 183–186. doi: 10.1136/bmjqs-2013-002168.
- D. Jain, S. Ridhima, and S. Reddy. (2018). “*WHO safe surgery checklist: Barriers to universal acceptance*”. *J Anaesthesiol Clin Pharmacol.* vol. 34(3). pp. 7–10. doi:10.4103/joacp.JOACP_307_16.
- D.A.Wong et al. (2009). “*Medical errors in orthopaedics results of an AAOS member survey*”. *Journal of Bone and Joint Surgery.* vol. 91(3). pp. 547–557. doi:10.2106/JBJS.G.01439.
- D.O.Johnson et al. (2017). “*Awareness and Use of Surgical Checklist among Theatre Users at Ekiti State University Teaching Hospital, Ado Ekiti, Nigeria*”. *Nigerian Journal of Surgery.* vol. 23(2) pp. 134–137. doi: 10.4103/njs.NJS.
- E. N. de Vries, L. Dijkstra, S. M. Smorenburg, R. P. Meijer, and M. A. Boermeester. (2010). “*The SURgical PATient Safety System (SURPASS) checklist optimizes timing of antibiotic prophylaxis*”. *Patient Saf Surg.* vol. 4(1). pp. 2–7. doi: 10.1186/1754-9493-4-6.
- E.G. G. Verdaasdonk, L. P. S. Stassen, P. P. Widhiasmara, and J. Dankelman. (2009). “*Requirements for the design and implementation of checklists for surgical processes*”. *Surgical Endoscopy and Other Interventional Techniques.* vol. 23(4). pp. 715–726. doi: 10.1007/s00464-008-0044-4.
- E.G.R. Arimbi and I. Dhamant. (2023) “*Impact Of Implementing A Surgical Safety Checklist In Hospital: Literature Review*” *Journal of Public Health Research and Community Health Development.* vol. 6(2). pp. 153–160. doi:dx.doi.org/10.20473/jphrecode.v6i2.34769.
- G. Santos and M. W. Jones. (2023). “*Prevention of Surgical Errors - StatPearls - NCBI Bookshelf*”. pp. 1–6.
- G.L.Johnson. (2021). “*5 Most Common Surgical Errors*”. pp. 1–7, 2021.

- I. A. Walker, S. Reshamwalla, and I. H. Wilson. (2012). “*Surgical safety checklists: Do they improve outcomes?*” Br J Anaesth. vol. 109(1). pp. 47–54. doi:10.1093/bja/aes175.
- J.Maksimović, L. Marković-Denić, M. Bumbaširević, J. Marinković, and H. Vlajinac. (2008). “*Surgical site infections in orthopedic patients: Prospective cohort study*”. Croat Med J. vol. 49(1). pp. 58–65. doi:10.3325/cmj.2008.1.58.
- L. Lingard et al. (2017). “*Pulling together and pulling apart: influences of convergence and divergence on distributed healthcare teams*”. Advances in Health Sciences Education. vol. 22(5). pp. 1085–1099. doi: 10.1007/s10459-016-9741-2.
- L. Santiesteban, L. Hutzler, J. A. Bosco, and W. Robb. (2016). “*Wrong-site surgery in orthopaedics: Prevalence, risk factors, and strategies for prevention*”. JBJS Rev. vol. 4(1). pp. 1–7. doi:10.2106/JBJS.RVW.O.00030.
- L.Hull, T. Athanasiou, and S. Russ. (2017). “*Implementation science: A neglected opportunity to accelerate improvements in the safety and quality of surgical care*”. Ann Surg. vol. 265(6). pp. 1104–1112. doi:10.1097/SLA.0000000000002013.
- L.Lingard et al. (2005). “*Getting teams to talk: Development and pilot implementation of a checklist to promote interprofessional communication in the OR*”. Qual Saf Health Care. vol. 14(5). pp. 340–346. doi: 10.1136/qshc.2004.012377.
- M. R. Weiser et al. (2018). “*Effectiveness of a multidisciplinary patient care bundle for reducing surgical-site infections*”. British Journal of Surgery. vol. 105(12). pp. 1680–1687. doi: 10.1002/bjs.10896.
- M. van Zyl, N. C. van Wyk, and R. Leech. (2023). “*The use of the World Health Organization Surgical Safety Checklist in operating theatres*”. Health SA Gesondheid. vol. 28, pp. 1–9. doi:10.4102/hsag.v28i0.2246.
- M.F.do P. Tostes and C. M. Galvão. (2019). “*Implementation process of the surgical safety checklist: Integrative review*”. Rev Lat Am Enfermagem. vol. 27. doi:10.1590/1518-8345.2921.3104.
- N.Lynch and M. Kerin. (2016). “*Effect of the world health organization checklist on patient outcomes: A stepped wedge cluster randomized controlled trial*”. Ann Surg. vol. 263(2). p. e24 doi:10.1097/SLA.0000000000001012.
- O. AAOS. (2017). “*Surgical Safety Checklist : Steps Your Healthcare Team Takes*” pp. 3–5.
- O. G. Kisacik and Y. Cigerci. (2019). “*Use of the surgical safety checklist in the operating room: Operating room nurses’ perspectives*”. Pak J Med Sci, vol. 35(3). pp. 614–619. doi: https://doi.org/10.12669/pjms.35.3.29.
- R. F. Lamont et al. (2011). “*Current debate on the use of antibiotic prophylaxis for caesarean section*”. BJOG. vol. 118(2). pp. 193–201. doi: 10.1111/j.1471-0528.2010.02729.x.
- S.Zuarez-Easton, N. Zafran, G. Garimi, and R. Salim. (2017). “*Postcesarean wound infection: Prevalence, impact, prevention, and management challenges*”. Int J Womens Health. vol. 9. pp. 81–88. doi: 10.2147/IJWH.S98876.
- T. G. Weiser, A. B. Haynes, G. Dziekan, W. R. Berry, S. R. Lipsitz, and A. A. Gawande. (2010). “*Effect of A 19-item surgical safety checklist during urgent operations in a global patient population*”. Ann Surg. vol. 251(5). pp. 976–980. doi:10.1097/SLA.0b013e3181d970e3.
- T.L.Rodziewicz, B. Houseman, and J. E. Hipkind. (2022). “*Medical Error Reduction and Prevention - StatPearls - NCBI Bookshelf*” StatPearls. no. Cdc. pp. 1–6.
- V. Aranaz-Ostáriz et al. (2022). “*Surgery Is in Itself a Risk Factor for the Patient*”. Int J Environ Res Public Health. vol. 19(8). pp. 1–13. doi:10.3390/ijerph19084761.
- WHO. (2009). *WHO Guidelines for Safe Surgery 2009 - Safe Surgery Saves Lives*. WHO/IER/PSP/2008.08-1E. 2009.