

## The WHO Surgical Safety Checklist: A Systematic Literature Review

Sheikh Muhammad Rehman Zia, Rosheen Zahid, Hira Ashraf

**IMPORTANCE** In clinical settings, surgical complications are seen to be responsible for a significant proportion of morbidity and mortality each year. Surgical procedures have become mandatory for fixing uprising complex pathological complications. Advanced technologies are helpful in the diagnoses and treatment of complicated pathological cases but human errors during surgeries cannot be minimized with such technologies. To address such issues WHO has bestowed a checklist at the global level to minimize the possible surgical complications.

**MATERIAL AND METHODS:** This article is written according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Secondary data was selected by three steps; identification of 350 articles, thematic analysis of 38 articles, and selection of 7 articles following detailed review. The article selection process was done according to inclusion and exclusion criteria.

**RESULTS** A detailed review of available data shows a direct relationship between the use of surgical safety checklists and the reduction of surgical complications. Surgical risk factors in the pre-operative, operative, and post-operative phases are minimized following the implementation of the checklist. Implementation of this practice has significantly reduced human errors, thereby, improving surgical outcomes.

**CONCLUSIONS** Available data points towards improved surgical outcomes following the use of a surgical safety checklist. However, further study is required in this area to determine the exact efficacy of this practice.

**KEYWORDS** WHO Checklist, Surgical Complications, Surgical Settings, Surgical Procedures, Health Outcomes

**HOW TO CITE** Rehman Zia SM, Zahid R, Ashraf H. The WHO Surgical Safety Checklist: A Systematic Literature Review. *Archives of Surgical Research*. 2021, 2 (3):27-30. <https://doi.org/10.48111/2021.03.04>.

### A Systematic Literature Review

**Author Affiliations:** Author affiliations are listed at the end of this article.

**Corresponding Author:** Sheikh Muhammad Rehman Zia  
Shalamar Medical & Dental College, Lahore  
[shalamarian.ravian@gmail.com](mailto:shalamarian.ravian@gmail.com)  
092-333-4386553  
<https://doi.org/10.48111/2021.03.04>

Approximately 234 million operations are performed annually in 192 member states of WHO<sup>1</sup>. With the uprising incidence of trauma, congenital anomalies acquired diseases, and cancers surgical care has become the indispensable component of the public health care system<sup>2</sup>. Surgical complications can be real harm to the patients. To increase the accuracy and efficiency of surgical procedures, surgical teams must perform error-proof and safe procedures. Hence, in a modern healthcare system, surgical safety has become a vital component.

In 2008 WHO introduced the implementation of a surgical safety checklist to improve outcomes of surgical interventions. It was proposed to identify human errors and possible surgical complications that compromise the safety and outcomes of surgical interventions<sup>2</sup>. The surgical safety checklist addressed the issues of scrutiny, the efficiency of the procedure, and patient outcome in pre-operative, operative, and post-operative phases. In addition, it addressed the issues faced by patients during their stay in recovery and ward. The mandatory checkpoints are before induction of anesthesia, surgical incision, and patient leaving the operation room<sup>3</sup>.

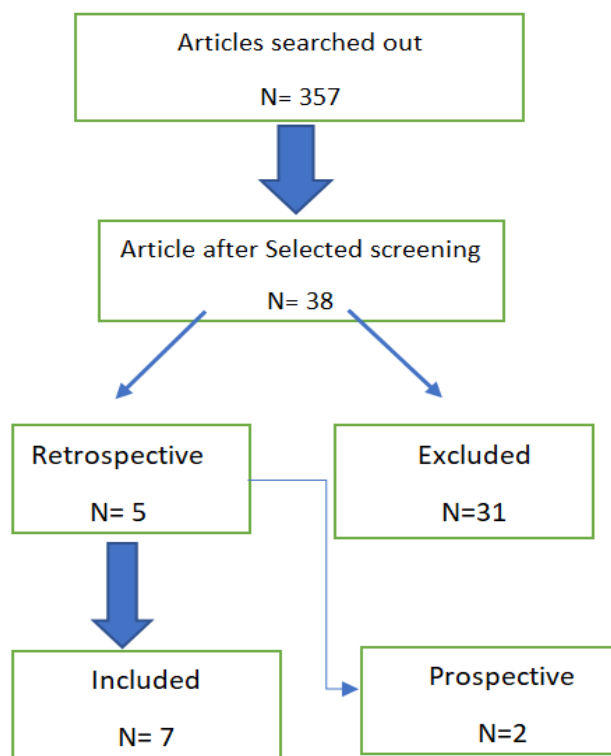
Advancements in anesthesiology, super-specialties in surgical practice, and safe perioperative intensive care have made complicated procedures safe and viable. However, it is important to highlight that advancement in surgical procedures doesn't ensure safe practice. Human errors are attributed to negligence, incorrect attitudes, and overconfidence. Moreover, functioning which has no practical shreds of evidence leads towards complications. So the introduction of a safety checklist in general practice that is recognized beneficial by international health care institutes should be implemented in operation theatres to make the procedures safer<sup>4</sup>.

Existing data have supported the idea that the most common errors in operating rooms are communication errors which resulted in a reduction of operational accuracy. Coordination and cooperation between surgical team members are essential components for better service delivery. Miscommunication or lack of communication can affect patient safety and is a major factor to cause adverse incidents. In a complex environment of operating rooms, an effective exchange of information is required between team members for incident prevention and incident recovery.

Without effective communication, the interdependent goal of effective and safe surgical intervention is not coordinated. Surgical cases are seen to be affected due to these failures in 90% of cases. Implementation and execution of the surgical safety checklist accurately may reduce the complications and communication errors leading to a reduction in morbidity and mortality. Surgical safety checklist may not necessarily prevent all the possible adverse outcomes but it would provide a safer direction to the team members <sup>4</sup>.

## METHODS

The secondary data was utilized to conduct the research. The search engines which were utilized to obtain the scientific data were; Medline/PubMed, Biomed Central, NIH, open MD, and Web Med. After recruitment, the data was selected based on the inclusion criteria. To further refine the data, qualitative analyses and meta-analyses were performed. Specific keywords were used on the search engine to obtain only related articles.



**Inclusion Criteria:** The guidelines of PRISMA were used for the inclusion of the data in the systematic review. To include the data, the procedure was divided into three steps; identification, primary selection, and final selection. In the first step, 357 articles were identified. Out of 357, 38 articles were selected in the second step. For the systematic scientific review, 7 most relevant and admissible articles were selected for the final studies. The selected articles were

peer-reviewed, based on the randomized trials, containing clear abstracts, and were no older than ten years.

**Exclusion Criteria:** The articles older than ten years, without any abstract and background information were excluded. Articles with fewer references and with a lack of proper author information and affiliation were rejected. Moreover, the articles published in unrecognized journals were also not included.

**Data Extraction and Meta-analyses:** The selected journals and articles were further processed for the data extraction. The only required data was extracted which was organized in a specific tabular form. Physical coding was utilized to locate the data. To make the data more reliable it was cross-checked by three reviewers. Meta-analyses were performed to check the strength of presented pieces of evidence in the selected journals and articles.

## RESULTS:

The findings obtained from the selected studies were promising in favor of the implementation of a checklist in surgical settings intending to reduce surgical complications. A Variety of consequences including barriers to implementation, adverse events, and facilitators were included to analyze the results. It has been observed that the checklist provided a positive role in the safety of perioperative care and the safety of the patient in a wide range of surgical settings. The World Health Organization recommended checklists were associated with significant reduction of surgical complications, detection of safety hazards, and improvement in the communication among operating staff members. Designed strategies for the execution of the checklists included incorporating staff feedback and enlisting the institutional leaders correlated with the local champions.

Most of the existing data ensured the improvement of patient safety after the implementation of the checklist. Communication strategies along with team training based on checklists are significantly associated with a reduction in surgical morbidity and mortality. Moreover, Checklists have a significant positive role in the improvement of critical surgical and health care processes, especially at surgical sites. The checklists have reduced the errors in many different ways; enhancing the communication, encouragement of non-hierarchical team approach, catching all the near misses, managing the unanticipated and anticipated complications by using technology, and through anticipation of potential complications.

## DISCUSSION

Under the recommendations of the WHO, the checklist was widely implemented in a variety of contexts. The efficiency and the performance of the paper tick boxes, posters, and

electronic medical reports are still under consideration. The overall feedback from different surgical teams was positive but the feedback from anesthesiologists and nurses was more supportive than the feedback from surgeons. There are multiple reasons which have been identified for the positive outcomes of WHO checklists which are; staff understanding

and good training, evenly distribution of responsibility among the team members, feeling of ownership by each team member, enhancement of the teamwork and communication, incorporation of real-time feedback, and stepwise implementation of the process<sup>4</sup>.

Year	Author	Country	Research Method	Theme Identified
2018	Thomas G Weiser	USA	Demographic information to calculate the total worldwide volume of surgery.	234.2 (95% CI 187.2-281.2) million major surgical procedures are undertaken every year worldwide
2012	Jonathan R Treadwell	USA	A search of four databases (MEDLINE, CINAHL, EMBASE, and the Cochrane Database of Controlled Trials) was conducted	Surgical checklists represent a relatively simple and promising strategy for addressing surgical patient safety worldwide
2015	Anne E. Pugel	USA		The surgical community should view the checklist as a tool for improving communication and safety
2015	Gordon Hale	UK	Data collected from the first two cycles were circulated to the ward staff and the initial findings from the report were discussed	Following the introduction of a structured clinical review sheet, the overall compliance with the documentation of seven outcome measures improved from 45% to 89%
2012	Shauna M Levy	USA	A prospective study was performed to evaluate the completion of all preincision components of the surgical checklist.	A total of 142 pediatric surgical cases were observed. Hospital-reported data demonstrated 100% compliance with the preincision phase of the checklist for these cases.
2014	Susan J Collins		A narrative review of the literature to determine the effectiveness of the surgical safety checklist in correcting and preventing errors in the OR	Analysis of results indicated the effectiveness of the surgical checklist in reducing the incidence of wrong-site surgeries and other medical errors;

**Health Outcomes:** Concerning the health outcomes, more than half of the implemented studies reported relevant results. In these relevant studies, the reductions of surgical complications were impressive. For instance, the occurrence of surgical complications was reduced from 22.9% to the level of 10%. Besides the surgical complications, the infections at the surgical sites were also reduced at a significant rate after the application of Surgical checklists. Moreover, studies of Royal Bolton revealed that about nine potential incidents were avoided just in one month of implementation of the checklist. Haynes et al performed a large multicenter prospective comparative study across 8 major cities in the world (Toronto; New Delhi; Amman; Auckland; Manila; Ifakara; London and Seattle), comparing 30-day outcomes in patients managed without a checklist (n= 3733) to those with checklist implementation (n=3955). In this study, the death rate was found to have declined from 1.5% to 0.8% (P=0.003), and inpatient complications reduced from 11.0% to 7.0% (P<0.001) in favor of WHOSSC use<sup>5</sup>.

**Possible Harms:** Since WHO presented the checklist the direct harm in the surgical settings has not appeared. Both anesthesiologists and surgeons felt it caused a detrimental delay, particularly during time-critical stages of emergency procedures<sup>6</sup>.

According to Sewell, the infection rate of lower respiratory tract infection increased from 2.1% to 2.5% after the implementation of the WHO checklist. But the real cause of this increase is still unclear and it is just an assumption without any solid proof. Despite no such reported potential harm, there is concern over potential harm by some checklist users<sup>7</sup>. For instance, some users are worried that about the patient anxiety after the use of the checklist. The studies of Kearns which were conducted in 2011, disclosed that more than 30% of users believed that such checklists created inconvenience, especially during emergencies. But it is important to mention that the percentage was lower when compared to prior studies (53%) conducted to find out the concern over the implementation of the checklist. There are concerns over its efficiency after the overlapping of checklist safety procedure on already practiced procedure<sup>8</sup>.

#### CONCLUSION:

WHO surgical checklist is a simple and favorable strategy to address surgical patient safety worldwide. Most of the studies concluded that there are positive clinical outcomes of using the checklist. There is the utmost need for studies to evaluate the efficiency and the extent of the degree to which the checklist can improve surgical/clinical outcomes.

**ARTICLE INFORMATION** Accepted for Publication: June 6, 2021, Published Online: September 29, 2021. <https://doi.org/10.48111/2021.03.04>  
Open Access: This is an open-access article distributed under the terms of the CC-BY License. © 2021 Rehman Zia et al ASR.

Author Affiliations: Shalamar Medical & Dental College, Lahore, Pakistan

**Financial Support and Sponsorship:** Nil.

**Conflicts of Interest:** There are no conflicts of interest

#### REFERENCES

1. Weiser TG, Regenbogen SE, Thompson KD, Haynes AB, Lipsitz SR, Berry WR, et al. An estimation of the global volume of surgery: a modeling strategy based on available data. *Lancet*. 2008;372(9633):139-44.10.1016/S0140-6736(08)60878-8
2. Treadwell, Jonathan & Lucas, Scott & Tsou, Amy. (2013). Surgical checklists: A systematic review of impacts and implementation. *BMJ quality & safety*. 23. 10.1136/bmjqs-2012-001797.doi:10.1136/bmjqs-2012-001797
3. Organization WH. World Health Organisation Surgical Safety Checklist 2015
4. Pugel A, Simianu V, Flum D, Patchen Dellinger E. Use of the surgical safety checklist to improve communication and reduce complications 2021.doi: 10.1016/j.jiph.2015.01.001
5. Hale G, McNab D. Developing a ward round checklist to improve patient safety. *BMJ Qual Improv Rep*. 2015.doi: 10.1136/bmjquality.u204775.w2440.
6. Levy SM, Senter CE, Hawkins RB, Zhao JY, Doody K, Kao LS, et al. Implementing a surgical checklist: more than checking a box. *Surgery*. 2012;152(3):331-6.10.1016/j.surg.2012.05.034
7. Haugen A, Sevdalis N, Søfteland E. Impact of the World Health Organization Surgical Safety Checklist on Patient Safety. 2021.doi:10.1093/bja/aet005
8. Collins SJ, Newhouse R, Porter J, Talsma A. Effectiveness of the surgical safety checklist in correcting errors: a literature review applying Reason's Swiss cheese model. *AORN J*. 2014 Jul;100(1):65-79.e5. doi: 10.1016/j.aorn.2013.07.024. PMID: 24973186.