International Surgery Journal
Dinesh HN et al. Int Surg J. 2018 Nov;5(11):3640-3643
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20184637

Original Research Article

Surgical safety checklist implementation and its impact on patient safety

H. N. Dinesh, Ravya R. S.*, Sunil Kumar V.

Department of General Surgery, Mysore Medical College and Research Institute, Mysore, Karnataka, India

Received: 02 September 2018
Accepted: 28 September 2018

***Correspondence:**
Dr. Ravya R. S.,
E-mail: ravyaradhakrishnan@gmail.com

ABSTRACT

Background: Surgery has become an integral part of global health care, with an estimated 234 million operations performed yearly. Surgical complications are common and often preventable. Although surgical and anesthetic caregivers seek to deliver optimal quality in peri-operative service, surgery still carries considerable risk for the patient. WHO surgical safety checklist outlines essential standards of surgical care and has been shown to reduce complications and death associated with surgery.
Methods: Pre-intervention and post-intervention study. The effect on patient outcomes and documentation of WHO surgical safety checklist was examined. After an education programme, the checklist implementation and patient safety outcome indicators were studied.
Results: Checklist compliance increased over time. The median number of items documented was 16. After implementation of the checklist, mortality decreased from 3.13% to 2.85%. Most causes of death did not significantly differ between the implementation periods, except for multiorgan failure and major bleeding. Adjustment of the association between implementation period and outcome for all variables revealed a decreased mortality after checklist implementation.
Conclusions: Implementation of the checklist showed improved outcomes. Use of the WHO surgical safety checklist in urgent operations is feasible and should be considered. Implementation proved neither costly nor lengthy. Further research is needed to confirm these findings and reveal additional factors supportive of checklist implementation.

Keywords: Surgical safety checklist, Mortality

INTRODUCTION

Surgery has become an integral part of global health care, with an estimated 234 million operations performed yearly.[1] Surgical complications are common and often preventable. Although surgical and anesthetic caregivers seek to deliver optimal quality in peri-operative service, surgery still carries considerable risk for the patient. WHO surgical safety checklist outlines essential standards of surgical care and has been shown to reduce complications and death associated with surgery.[2] As with the aviation industry, checklist have been developed to enhance teamwork and improve handover, thereby minimizing avoidable errors and complications including mortality. The 19-item surgical safety checklist has been implemented in other surgical settings including ambulatory surgery, endoscopy, labour and delivery. Even routine surgery requires the complex coordination of surgeons, anesthesia providers, nurses, and support staff to provide timely and effective care.[3] Heightened patient acuity and time pressure increase the potential for critical errors and omissions in established standards of

care. In situations requiring urgent intervention, however, there has been worry that use of a checklist will interrupt workflow and delay therapeutic care in ways that increase risk to patients. Nonetheless, these delays are measured in hours rather than minutes and a brief perioperative checklist may avert errors that are common in urgent surgery. Safety Surgery Checklist (SSCL) is a support tool for operating teams, used to carry out safety checks while also encouraging compliance with the implementation of recommended quality and safety standards.[4-6] We hypothesized that implementation of this checklist in urgent surgical cases would improve compliance with basic standards of care and reduce rates of death and complications following surgery. Objectives of the study were to study the impact of implementation of surgical safety checklist on patient safety and to study the compliance of the surgical team to the implementation of surgical safety checklist following education programme.

METHODS

Patients undergoing elective and emergency surgeries in KR hospital Mysore during a 6-month study period extending from January to June 2018. The present study was a pre-intervention and post-intervention study. The effect on patient outcomes and documentation of WHO surgical safety checklist was examined. After an education programme, the checklist implementation and patient safety outcome indicators were studied.

- Documenting whether each phase of the checklist was compatible or not.
- Evaluating whether each phase occurred as a formal practice at the appropriate time.
- Verifying whether all relevant items were addressed or whether some items were neglected.
- Documenting whether all surgical staff were there during checklist completion. Recording cases where there was a good catch during checklist completion. Direct observation was identified as the preferred inspection method. With the use of special report sheets, guided observation of behaviour in the operating room was done, recording any inconsistencies. Operative data included patient age and gender, diagnosis, procedure, wound classification, urgency of the operation, anesthetic modality, and safety processes. Patients were followed up prospectively until discharge , for deaths and complications. Outcomes were identified through chart monitoring and communication with clinical staff. Baseline characteristics of patients operated before and after implementation of checklist were compared with Pearson's χ^2 test.
- A p value below 0.5 was considered statistically significant.
- To determine compliance with the particular parts of the total checklist, the percentages of completed sign-in, time-out and sign-out forms were calculated separately.
- Differences in causes of deaths between the intervention periods were compared with univariable logistic regression analysis.
- Multivariable logistic regression analysis was used to adjust the association between intervention and outcome for confounding factors.
- Moreover, to compare the different levels of compliance after implementation, and to further eliminate any possible "time" effect, the analysis was repeated separately for the post implementation period.

RESULTS

Compliance since initiation was greater than 93%. Perioperative staff was initially resistant to implementation of the checklist. However, with education and follow up, acceptance and implementation levels were over 90%. Patient safety outcomes showed drastic improvement and no surgical mishaps were recorded. Table 1 demonstrates the demographics of the respondents.

Table 1: Demographics of the respondents.

	Pre -intervention	(n=281)	Post -Intervention	(n=257)	P value
	N	%	N	%	
Gender					
Male	141	50.2	149	58	0.2049
Female	140	49.8	108	42	
Professional background					
Surgeon	45	16.0	47	18.3	0.0817
Surgical trainee	59	21.0	35	13.6	
Anaesthesia professional	53	18.9	41	16.0	
Anaesthesia trainee	17	6.0	22	8.6	
Nurse	81	28.8	84	32.7	

Sign-in was completed in 58.6%, Time-out: 59.2 and Sign-out: 44.6%.

Checklist compliance increased over time. The median number of items documented was 16. In the post intervention period, the checklist was fully completed in 39.0% cases. Most of the time, the lag occurred in the sign out phase of the checklist. Post procedure the surgical team was either exhausted or missed to sign out the checklist. However, this improved significantly over time with education. Since, the implementation requires multi-disciplinary approach, the staff nurse in charge for the procedure was entrusted to coordinate the data collection. A p value less than 0.5 is considered statistically significant for this study. Taking this parameter into consideration, few other conclusions are derived from this study. Compliance and adherence to the checklist did not picturise any gender difference. Among the respondents, surgeons attitude showed the most welcoming response in the post intervention period. In the post intervention period 58% of the male population and 42% of females adhered to the checklist.

Table 2: Compliance to checklist.

	Agree		Disagree/ no answer	
	N	%	N	%
The checklist was easy to use	206	80.2	51	19.8
The checklist took a long time to complete	51	19.8	206	80.2
The checklist improved operating room safety	206	80.2	51	19.8
Communication improved through the use of checklist	218	84.8	39	15.2
The checklist helped to prevent errors in the OT	202	78.6	55	21.4
I would prefer it to be implemented for me	240	93.4	17	6.6

Table 2 illustrates the compliance to check list. Eighty percent of the study population were of the opinion that checklist was easy to use. 19.8 % of them believed that checklist took a long time to complete and hence such time-consuming procedure is not feasible during an emergency surgery. 80.2% of the study population opined that implementation of checklist improved operating room safety especially in case of an emergency procedure. When asked about prevention of errors in the operating room by implementation of checklist, 78.6% responded positively whereas 21.4 % disagreed.

Most interestingly, when asked whether they would like to implement the checklist in the scenario of themselves undergoing a procedure, 93% agreed to it. This highlights the significance and the credibility of surgical safety checklist implementation among the hospital community. Furthermore, will be the positive response if such a survey is conducted among the general population.

After implementation of the checklist, mortality decreased from 3.13% to 2.85%. Most causes of death did not significantly differ between the implementation periods, except for multiorgan failure and major bleeding. Adjustment of the association between implementation period and outcome for all variables revealed a decreased mortality after checklist implementation.

DISCUSSION

A study done by Weiser TG and team in 8 diverse hospitals around the world, implementation of checklist was associated with greater than one third reduction in complications among adult patients undergoing urgent non-cardiac surgery.[7] This is in concordance with this study results. However, this study reinforces the relevance of safety checklist even in emergency surgeries.

Another study which considered the effects of checklist implementation on in-hospital mortality done by Van Klei WA and team found that there was a reduction in 30 days in-hospital mortality.[8]

However, the impact on outcome was smaller than previously reported and effect depended crucially upon checklist compliance. This fact is again established in the present study. Irrespective of the nature of surgery, compliance to the adherence of surgical safety checklist plays a crucial role in the results.

A study conducted in 5 Washington hospitals by Dante M Conley and team in 2009 found that the impact of surgical safety checklists on patient outcomes is likely to vary with effectiveness of each hospital's implementation process.[9] Thus the need for implementation of surgical safety checklist is to be considered by every hospital's governing authority. The items included in the checklist can be tailored to suit the setup of the healthcare. This is one of the suggestions put forward by the present study.

Another study in 2010 which assessed the changes in clinician attitude and changes in postoperative outcomes found that clinicians held the checklist in high regard and postoperative outcomes showed improvements which might be due to checklist implementation. One of the promising results of the present study is that, the surgical team especially the clinicians consider the checklist as a

necessity and implements it with great enthusiasm. Irrespective of the domain of surgery, checklist maintains its relevance among surgeons.

A study done by Anna R and team concluded that multiple processes and factors influenced SSC adherence. This may explain why, in studies evaluating SSC impact, outcomes were variable. Recommendations included continuing education, time for pilot-testing, and engaging all staff in SSC review. Others may use the implementation fidelity framework to plan SSC implementation or evaluate SSC adherence.[10]

CONCLUSION

Implementation of the checklist showed improved outcomes. Use of the WHO surgical safety checklist in urgent operations is feasible and should be considered. Implementation proved neither costly nor lengthy. Further research is needed to confirm these findings and reveal additional factors supportive of checklist implementation.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Haynes AB, Weiser TG, Berry WR, et al. A surgical safety checklist to reduce morbidity and mortality in a global population. N Engl J Med. 2009;360:491-9.
2. World Health Organization. World Alliance for Patient Safety. WHO Guidelines for Safe Surgery. 1st ed. Geneva, Switzerland: WHO; 2008.
3. Khuri SF, Daley J, Henderson W. The national veterans administration surgical risk study: risk adjustment for the comparative assessment of the quality of surgical care. J Am Coll Surg. 1995;180:519-31.
4. Lingard L, Regehr G, Orser B. Evaluation of a preoperative checklist and team briefing among surgeons, nurses, and anesthesiologists to reduce failures in communication. Arch Surg. 2008;143:12-7.
5. Mazzocco K, Petitti DB, Fong KT. Surgical team behaviors and patient outcomes. Am J Surg. 2009;197:678-85.
6. Institute for Healthcare Improvement. Surgical Safety Checklist Sprint Map. 2009. Available at http://www.ihi.org/ihi/gmaps/Surgical_Sprint_Map.aspx. Accessed 7 April 2009.
7. Weiser TG, Bhaynes A, Dzeikan G. Effect of a 19-item surgical safety checklist during urgent operations in a global patient population. Ann Surg. 2010;251:976-80.
8. Van Klei WA, Hoff RG, van Aarnhem EEHL. Effects of the introduction of the WHO surgical safety checklist on In-hospital mortality: a cohort study. Ann Surg. 2012;255:44-9.
9. Conley DM, Singer SJ, Edmondson L. Effective Surgical Safety Checklist Implementation. Elsevier. 2011;212(5)873-9.
10. Gagliardi AR, Straus SE, Courvoisier DS. Multiple interacting factors influence adherence, and outcomes associated with surgical safety checklists: a qualitative study PLoS One. 2014;9(9):e108585.

Cite this article as: Dinesh HN, Ravya RS, Kumar SV. Surgical safety checklist implementation and its impact on patient safety. Int Surg J 2018;5:3640-3.