JIOM Nepal. Volume 41 Number 3. December 2019, page 1-7.

Implementation of WHO Surgical Safety Checklist and its Outcome in South Asia

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Submitted : December 16, 2019

Accepted : December 22, 2019

ABSTRACT

Introduction

Surgery plays an essential role in any health care system. In 2009, WHO introduced the safe surgery checklist, to improve patient outcome following surgical procedures. The purpose of this trial was to elucidate the effects of the checklist on perioperative complications and checklist implementation at different hospitals in South Asia.

Methods

Online databases were searched to find relevant publications at centres in the South Asian Association for Regional Cooperation (SAARC) area. They were characterised regarding type of study, publication details, study population as well as type of intervention, by the use of the WHO checklist.

Results

Following the search process, seven full text publications were included in the review. They emanated from five medical centres in India and two from Pakistan. All of these reports found a clear improvement in surgical outcomes and the implementation approached 90-96%.

Conclusion

The WHO checklist is a valuable tool to reduce surgical complications, especially in resource-limited settings, where it should be more commonly used.

Keywords: *Checklist, complications, SAARC, safe surgery*

INTRODUCTION

In 2015 the Lancet Commission on Global Surgery was launched as a public health initiative to enhance surgery, obstetric, anaesthesia care worldwide. The Commission´s key findings reveal that human and economic consequences of unmet surgical needs in low- and middle-income countries are substantial and five billion people lack access to safe, affordable and timely surgical and anaesthesia care when needed. Thus, surgery plays an essential role in any health care system and globally an estimated 234 million surgical procedures are performed every year. Of these surgeries around seven million end up with different complications and one million patients die every year.[1-3] A majority of these adverse events occur in the operating room and 43% of these mishaps are preventable by modern standards of care.[4]

Prior to the introduction of the Lancet Commission on Global Surgery the World Health Organisation developed guidelines to identify practices to ensure the safety of surgical procedures worldwide. With experience from the aviation industry, where interventions focus on teamwork and safety climate, WHO introduced a 19-item

surgical safety checklist, in 2009, directed towards these parameters to improve patient outcome following surgical procedures.[5] In an international multicentre study including 8 hospitals from different countries, the implementation of this checklist brought about a significant reduction in postoperative complications and mortality.[5] The checklist is used during three different time-points of any surgical procedure. Before anaesthesia is administered, the patient identity, site, procedure and consent, as well as equipment, medication and allergy are checked (sign in). Immediately before incision, name of patient, team members, procedure and incision, as well as control of antibiotic- and thromboprophylaxis, radiographs and anticipated critical events are controlled (time out). Prior to the patient is leaving the OR, equipment problems are notified as well as any key concerns for the recovery (sign out).[6,7] The checklist is intended to give surgical teams a simple and efficient set of priority checks to ensure patient safety, by effective teamwork and enhanced communication between team members in every operation performed.

Although the awareness of the benefits using the checklist is universal its implementation is lagging behind especially in many low- and mid-income countries (LMICs).[8] From previous studies it is evident that applying the checklist in resource-limited settings is particularly relevant to improve surgical care and outcome.[5,8] In order to elucidate the use of the WHO surgical safety checklist in LMICs, in the Asian context, the present review study was performed. Links were sought between implementation of checklist practice and different outcomes involving centres from countries in the South Asian Association of Regional Cooperation.

AIM

The purpose of this trial was to analyze

- Effects of WHO surgical safety checklist implementation on perioperative mortality and complications
- Checklist compliance rates following implementation in resource-limited settings

METHODS

A search for relevant publications was carried out. The online databases PubMed and SCOPUS were searched using the term "safe surgery checklist". Studies were limited to those written in English language, and including abstracts. Initially all abstracts found were read with the intention to find publications of trials performed in SAARC countries: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

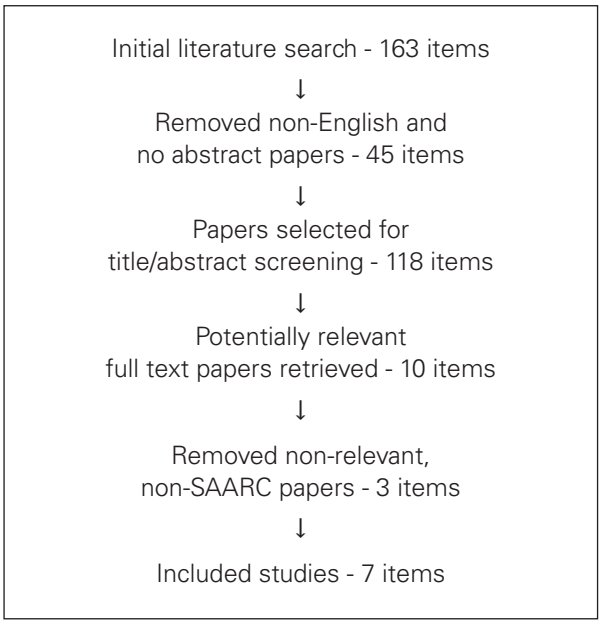

Figure 1. Search strategy of PubMed and Scopus, process and results

The studies were characterised regarding type of study, publication details, study population and hospital setting, as well as intervention (Table 1). The 19-item WHO surgical safety checklist (SSC) is added as an appendix.

In four of the papers "no conflict of interest" was declared and ethical approval had been granted in the same amount of publications.

RESULTS

The search process identified 163 papers, of which 45 were removed because of non-English texts and lack of abstracts. Remaining 118 items went for title and/or abstract screening. Ten papers were identified for their potential relevance and selected for full text review. Three items were excluded due to irrelevance or researched from centres outside South Asia. Thus, seven publications were included in the review process (Fig 1).

The papers involved in this review were from five centres in India and two institutions in Pakistan. Altogether 9119 patients and 669 healthcare personnel were involved in the different trials. Four of the studies elucidated the WHO safe surgery checklist influence on postoperative mortality and complications. All of these reports found a clear improvement in surgical outcomes after the introduction of the checklist. Three of these studies also researched the checklist implementation and completion; after a period of introduction the completion of implementation approached 90 - 96%. The SSC was found easy to use, and

Table 1. Summary of the main features of the seven papers studied

Type of study	Publication	Population and setting	Intervention
RCT	N Chaudhary, J Gastrointest Surg 2015 [9]	700 consecutive surgical patients, randomized to study groups before and after implementation of WHO SSC. New Delhi, India	Effect of WHO SSC on postoperative mortality and complications (Clavien-Dindo)
Observational Prospective	SN Oak, J Postgrad Med 2015[6]	3000 consecutive pediatric patients followed for 2 yrs. Mumbai, India	Assess the acceptance, application, adherence to the WHO SSC.
Observational Prospective	Anwer M, Pak J Med Sci 2016[19]	3638 elective surgical patients divided into four groups, one for each year, during four years. Karachi, Pakistan	Assess WHO SSC on compliance and effectiveness in reducing complications and final outcome.
Cross-sectional	MS Minhas, J Ayub Med Coll Abottabad 2017 [20]	543 surgical care providers in two tertiary care hospitals, Karachi, Pakistan.	Determine knowledge and attitudes on surgical safety among healthcare personnel and raise its awareness through the implementation of WHO SSC
Observational Prospective	R Shankar, Int J Health Plann Mgmt 2017 [15]	1778 patients undergoing different types surgery followed for 30 days postop. Bangalore, India.	Assess implementation of WHO SSC and its effect on drawing the attention of the OR personnel to patient safety and the reduction in complications.
Cross-sectional Comparative	Y Dabholkar, Indian J Otolaryngol 2018 [16]	ENT operating room personnel responding to questionnaire during one month. Navi Mumbai, India	In 126 ENT procedures, divided into two groups, the OT personnel responded to questions on patient safety, team work, communication, before and after introduction of WHO SSC
Observational Prospective	Chhabra A et al. Niger J Surg 2019 [10]	500 patients divided into two subgroups studied before and after implementation of WHO SSC. Punjab, India	Effect on complications in elective surgery after the introduction of WHO SSC

Table 2. Summary of study results on reduction of complications after introduction of the surgical safety checklist

Study	Outcome	Checklist
N Chaudhary, J Gastrointest Surg 2015	Differences pre/post SSC in 340/280 complications. No differences in preoperative values or hospital stay. Wound complications 8.5% - 4.5%, p= 0.04, abdominal 28% - 19.7%, p=0.01, bleeding 2.8% - 0.5%, p=0.03. Mortality 10% - 5.7%, p=0.04. No differences in terms of respiratory, septic, renal and cardiovascular complications	Checklist compliance 85%
Anwer M, Pak J Med Sci 2016	Surgical site infections occurred in 59 (7.5%), 52 (6.4%), 44 (4.7%), 20 (2.1%) of the cases for 1st, 2nd, 3rd, 4th year. No difference in chest complications or mortality.	In 1st year SSC was properly marked in 172/840 cases (20.4%), 2nd year 303 of 857 cases (35.3%), 3rd year 757 of 935 procedures (80.9%), and 4th year 838 of 932 cases (89.9%). No significant mishaps on site/side.
R Shankar, Int J Health Plann Mgmt 2017	1778 patients were studied during introduction of SSC. Data collection during 30d for each patient in nine weeks study. 73 complications during the period (4.1%) of these 44 were surgical site infections, after 100% prophylactic antibiotics.	43 errors detected and corrected on checklist
Chhabra A et al. Niger J Surg 2019	After an information phase the introduction of the SSC decreased the frequency of surgical site infections from 73 cases (29.2%). to 34 (13.6%) p<0.05, major wound disruptions 27 pts before (10.8%) 13 pts after SSC (5.2%) p<0.05, 5 pts (2%) preSSC developed sepsis but none after introduction of the checklist p<0.05. No significant differences in other complications.	Implementation differences not studied

through the use of SSC errors could be detected and corrected (Table 2).

Another three studies focused on the implementation of the WHO surgical safety checklist and its role on postoperative outcome improvement. One study found that although operation room personnel largely reject established protocols, the implementation of the WHO SSC was accepted for use. Also in these reports the checklist completion rate was, more than 90%; errors were detected and corrected. The checklist implementation also scored high on improved OR team communication and thus patient safety (Table 3).

DISCUSSION

In this review study on the implementation of the WHO surgical safety checklist (SSC) in some resource-limited centres in the South Asian region seven papers from India and Pakistan were included. The four studies focusing on postoperative patient outcomes, propose a reduction in complications after the implementation of the checklist. The implementation of the checklist was also successful in the settings were this was studied.

The reduction in advert events following the implementation of the WHO checklist was mainly seen in surgical complications, like less surgical site infections (SSI), wound disruption, bleeding. Decline in mortality was seen in one reviewed paper,[9] but elsewise the death rate was not obvious. One study found less sepsis events post checklist implementation,[10] otherwise no differences in other medical complications, like renal failure, myocardial infarction, etc. after the introduction of the SSC. These are probably

Table 3. Summary of studies on surgical safety checklist (SSC) after implementation

Study	Outcome	Checklist
SN Oak, J Postgrad Med 2105	Out of 3000 paediatric procedures, the SSC detected: 54 pts with same name and procedure, 4 pts´ ID tag missing, 108 pts no side/site marked, 78 pts consent form not signed,4 pts antibiotics not given, 12pts not properly immobilised.	In 54 cases checklist not used, 76 incompletely filled out
MS Minhas, J Ayub Med Coll Abottabad 2017	543 health care providers (surgeons, anaesthetists, trainees, nurses) took part in the study. 69% were men with mean age of 40.5 years. Briefing OR personnel for patient safety was regarded important by 98%, team communication by 89% of responders. OR personnel frequently disregarded protocols in 69% and 193, (35.5%) thought it was difficult to speak up in the OR.	80% of the responders agreed that the WHO SSC would be easy to use, improve team communication (89%), prevent errors (93.5%), improve OR safety (91.5%).
Y Dabholkar, Indian J Otolaryngol 2018	-	After introduction of SSC team members increased the awareness of patient identity from 17 to 86%, each others identity and roles from 46 to 94%, radiographs displayed from 19 to 98%, equipment issues addressed from 41 to 81% and improved effective team communication from 73 to 92%.

more due to the patient´s general condition and comorbidities. de Vries et al in a multi-centre study of 3820 cases in the Netherlands, found following implementation of the WHO checklist a moderate reduction in surgical complications and mortality compared to the control setting.[11] However, as seen in the GlobalSurg Collaborative study reduction in complications in this high-income setting was less pronounced than in resource limited countries.[8]

The mechanisms behind the improved surgical outcome following implementation of the checklist are not well understood, but is probably due multiple factors. Strict adherence to protocols of antibiotic prophylaxis could contribute to less SSI, but also improved hygiene, and atraumatic surgery.[12,13] A decrease in number of wound dehiscence's could also be explained by greater adherence to the principle of suture and incision length ratio not scoring less than 4, as advocated by Israelsson et al.[14]

Adherence to the WHO SSC protocol was in general high after proper introduction and training in the practice of the checklist. Implementation and completion of the checklist changed the working climate in the operating rooms studied. The checklist was regarded easy to use among the centres involved in the review. Team work and communication improved considerably between surgeons, anaesthetists, nurses and technicians, changing attitudes, preventing errors and strengthen safety in the OR.[15,16]

However, in a resource-limited area of 1.8 billion people only seven publications were found studying the use and impact of the WHO safe surgery checklist. There may be many more hospitals using the checklist without publishing its implementation and their experiences of the outcome. Barriers to implementation of the SSC in South Asia could possibly be explained by different sociocultural and organisational patterns. Hospitals in this area are still affected by hierarchical structures among OR personnel.[17] This is the more remarkable since hospitals in LMIC seem to benefit the most from using the WHO safe surgery checklist. In

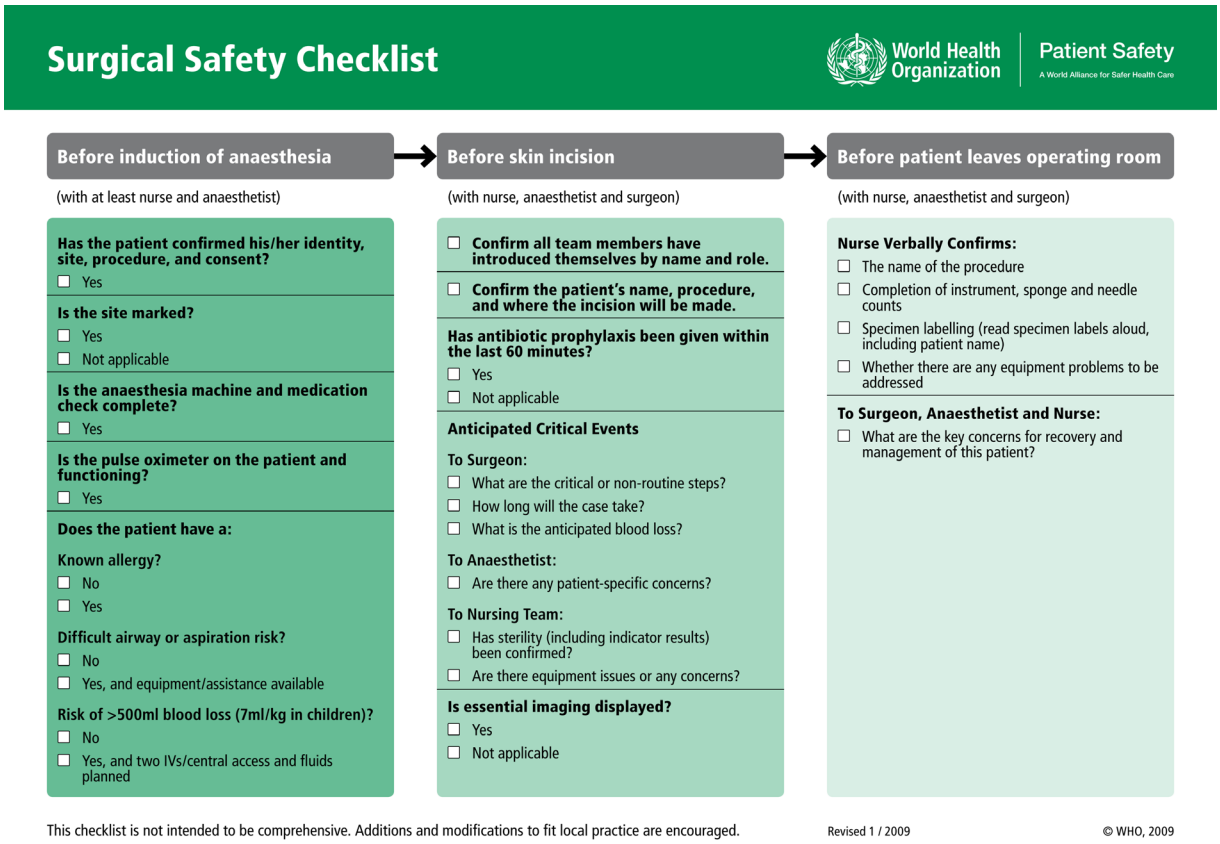

Figure 2. WHO surgical safety checklist, 2009

two multinational trials the checklist use in HIC was double that of low-income countries, but the greatest benefits from checklist use were found in emergency surgery in low- and middle-income countries.[8] Ethiopia could stand out as a model for low-income countries. The Federal Ministry of Health recognizing the unmet need for surgery and pioneered the Saving Lives Safe Surgery initiative. In eight different areas also including the implementation of the WHO safe surgery checklist has seen transformation in health care including improved surgical outcomes.[18] Ethiopia seems to be an example for other resource limited countries, in overcoming the barriers towards implementation of SSC use by enthusiastic leadership, development of appropriate strategies and training programs in implementing the WHO safe surgery checklist.

CONCLUSION

The World Health Organisation surgical safety checklist was in this review study from seven medical centres in the SAARC area noticed to be a promising protocol, easy to implement and use in any operation theatre given an enthusiastic leadership. The checklist was found to reduce surgical complications, but not to the same extent the postoperative mortality. Given the vast South Asian area reviewed the limited number of hospitals reporting their experiences of the checklist is highly remarkable. There is certainly room for expansion in use of this valuable tool to fight surgical complications, especially in low-resource settings.

CONFLICT OF INTEREST

None declared.

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