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# Surgical Safety Checklist: How Far Have We Fared In Africa.

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***Abstract***
***Background:*** *The aim of the World Health Organisation (WHO) surgical safety checklist (SSC) introduction was to improve surgical outcomes by ensuring adherence to standard safety practices throughout the perioperative period. Although its implementation has been successful with minimal hitches in some parts of the world, it is yet to be universal. The use of WHO SSC inthe developing world, such as Africa has been challenging due to several factors. However, it has been shown that with dedication, determination and adequate planning, these challenges are surmountable.*
***Methods:*** *An electronic search was conducted in PUBMED and GOOGLE SCHOLAR based on a series of keywords in different combinations. All forms of studies and articles were accepted except letters to the Editor and unpublished articles.*
***Results:*** *Twenty-three acceptable articles were selected for review. The review identified what a checklist is, its relevance in the healthcare system, how WHO SSC was conceptualised, the barriers to its implementation in Africa and the possible solutions to these barriers.*
***Conclusion:*** *The use of WHO SSC in Africa is still erratic due to barriers that can be overcome with careful planning, dedication and determination by the staffs and hospital leaders.*
***Keywords:*** *WHO, Surgical Safety Checklist, Implementation, Barriers.*

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## I. Introduction

Surgical care is a critical element of health care, with an estimated 234 million surgical procedures performed annually worldwide.[1] Surgery is done in every part of the world; wealthy and poor, rural and urban. Although operations are done to limit or prevent morbidity and mortality in most instances, it is also associated with a considerable risk of complications and death.[2]Studies have shown perioperative death for inpatient surgery to be 0.4 % to 0.8 %, while 3 to 17 percent of patients will have a major complication.[3]Surgical mortality is said to beten times higher in developing countries[1] while anaesthesia related mortality 1000-fold higher.[4,5]

Studies suggest that most of these complications are avoidable if adequate measures are taken to reduce anaesthesia and surgery-related mishaps.[6] Teamwork and effective communication among members of a surgical team have been shown to reduce the rate of adverse events and improves outcome.[7] This is the foundation on to which the concept of the use of a checklist was laid.

## II. Materials And Methods

An electronic search was conducted in PUBMED and GOOGLE SCHOLAR without time restriction for relevant English articles on WHO surgical safety checklist based on a series of keywords in different combinations: "WHO checklist", "surgical safety checklist", "Checklist use in Africa", "Barriers to checklist use in Africa", "checklist implementation in Africa". Both prospective and retrospective studies (observational studies, questionnaire-based studies, case-control studies, cohort studies, case reports,) were considered. The reference lists of original and review articles were also sought. Letters to the Editor and unpublished articles were not considered.

## III. Results

Twenty-three acceptable relevant articles were selected for review. Thereview article was able to identify what a checklist is, how it improves healthcare delivery system, how WHO surgical safety checklist came about, the challenges of WHO surgical safety checklist implementation in sub-Saharan Africa, and possible solutions to these challenges.

## IV. Discussions

**What is a checklist?**

A checklist consistsof a series of (read and do) checks for checking equipment, a challenge/response checks to confirm completed procedures, or an "aide memoirs" to provide series of structured prompts for a team briefing and debriefing or a combination of all three.[8] A standard checklist should be: one page, use simple, familiar language, and each element should contain no more than five items. A checklist should be evidence-based and addresses key safety issues that are often overlooked, and which if omitted, may lead to series adverse outcomes.[9]

There are clear differences between the healthcare sector and ultra-safe industries such as commercial aviation sector. While the checklist has become a universal routine in aircraft operations, its use in the healthcare system is yet to be universal. Clinicians, typically value clinical autonomy and view themselves as individual craftsmen rather than members of a team after standard operating procedures.[10] Hence, the difficulty inthe universalimplementation of a safety checklist in the health sector.

**Is there a need for a checklist in the healthcare system?**

Complications due to errors during healthcare delivery are well documented and constitute a significant public health problem.[11] Patient safety and healthcare-related complications received more attention from researchers and policymakers after the US institute of medicine published a report, "to err is human: building a safer health system" in 2000.[11] The report claimed that at least 4,000 to 98,000 patients die in hospitals each year as a result of preventable medical errors.[11] The report also identified errors in diagnosis, treatment, prevention, and others such as communication, equipment and other system failures as the root causes of medical errors. In general, it attributed medical errors to the decentralised and fragmented nature of the healthcare system. The report concluded that a majority of medical errors do not result from individual recklessness or action of a particular group. Instead, errors are commonly caused by faulty system processes, and condition that leads people to make mistakes or fail to prevent them.[11]

In the UK, "an organisation with memory" reported that there are around 850,000 adverse events.[12] The cost of these adverse events was estimated to be approximately 2 billion pounds annually. The report also concludes that the NHS has not learned enough from the series of adverse events and that there is a need for further work focusing on how to reduce the impact of these events on patients, their families, and staffs.

Kable et al[13]studied the rate of adverse events in surgical patients in Australia. They found an adverse event rate of 21.9 % of which 83 % resolved within 12 months, 13 % led to permanent disability, and 4% resulted in death.

Similarly, De Vries et al[14] conducted a systemic review of 8 studies on in-hospital adverse events involving 74,485 patients. They found a median incidence of 9.2%, with a median preventability of 43.5%. In the review, they found that 56.3% of the events led to no or minor disability, whereas 7.4% of the events were lethal. Surgical operations (39.6%) and medication-related (15.1%) events constituted the majority of the cause. Therefore, they concluded that a substantial part of adverse events is preventable and that interventions aimed at preventing these events have the potential to make a significant positive impact.[14]

With all the statistics presented above, it is evident that something needs to be done to curb this menace affecting the healthcare system.

**The WHO Surgical Safety Checklist**

In 2007, the WHO patient safety group started work on second global patient safety challenge: safe surgery saves lives.[15] This group of international experts identified four areas of potential improvement in surgical safety viz:- surgical site infection prevention, safe anaesthetic service delivery, safe surgical team interaction and measurement of services (audit). Based on their work in early 2008, the WHO published a guideline for safe surgery.[15]WHO surgical safety checklist was based on this guideline and was launched in June 2008. The checklist was included in a supplementary file in It contains 19 items in three phases with collaborative involvement of surgeon, the anaesthetist, and nursing team:

I. Before induction of anesthesia ("sign-in"), covering areas such as patient identification, anesthesia equipment check, and pulse oximetry check.
II. Before skin incision ("time out"), covering areas such as team introduction, review of critical steps, and antibiotic prophylaxis.
III. Before the patient leaves the operating room ("sign out"), covering areas such as checking counts of instruments, specimen labelling, and concerns for recovery.

Following this, the next step was taken by WHO to see the feasibility of universal implementation of the checklist. Hence, Haynes et al[2] tested the WHO checklist in 2008 using eight sites and published the result in 2009. The sites settings varied greatly in the number of beds (ranging from 371 to 1800), the number of

operating rooms (ranging from 3 to 39), and the income level of the countries from which there were selected (with four low-income countries and four high-income countries). Surgical safety policies also differed prior to implementation of WHO checklist regarding the use of routine intra-operative monitoring with pulse oximetry (6 out of 8 sites), oral confirmation of patient's identity and surgical site in the operating room (only 2 out of 8 sites), and routine administration of prophylactic antibiotics in the operating room (5 out of 8 sites). None of the sites had a "standard plan for intravenous access for cases of high blood loss", or formal team briefings pre and postoperatively. Baseline data were obtained at each site for 3 months prior to checklist introduction (3,733 surgical procedures). Then, another data was collected for the subsequent 3 to 6 months after checklist introduction (3,955 surgical procedures), which showed a decrease in mortality (from 1.5% to 0.8%) and in-patient complications (from 11% to 7%). No single site was driving the findings, as evidenced by the persistence of findings after the removal of any individual site in a sensitivity analysis. The authors also found that the performance rates for six safety indicators also increased after checklist introduction, suggesting that safety indicators may have been responsible for the lower rates. In the discussion, the authors acknowledged that the underlying reasons for the improvements were "most likely multi-factorial" as follows:

- The checklist itself is responsible.
- A Hawthorne effect (rates decreased because operating room personnel knew they were being measured). However, they argued against this based on 2 aspects of their data, that this knowledge was in place both before and after checklist introduction and the subset of procedures for which study personnel were present in the operating room had the same reduction in the complications as procedures where study personnel were absent from the operating room.
- The simple existence of formal pause or pre-operative briefing.
- Increased update in safety technologies.
- A broad change in safety culture and teamwork at that site.

In a subsequent publication, Weiser et al[16] presented a subgroup analysis of the same study focussing on urgent surgery (defined as surgery required to be performed within 24hrs of assessment to be beneficial). The authors found a decrease in complications rate from 18% to 12% and the death rate declined from 3.7% to 1.4% both in pre and post-intervention phases, respectively.

Haynes et al[17] in 2011 reported data on the safety attitude questionnaire (SAQ) in the 8 WHO checklist pilot study sites before and after checklist introduction. A scale of 1-5 to score the SAQ, where 5 represent the most safety-conscious attitude. Scores on the SAQ were only slightly higher in the post-intervention phase than the pre-intervention period (4.01 vs 3.19 representing a 2.5% increase of the scale range only, nevertheless, the difference was statistically significant). However, the change in SAQ scores was associated with reduced complication rates (Pearson r=0.71), meaning that sites with more significant improvements in safety attitude tend to have a greater decline in complications. The publication also reported that 80% 0f respondents considered checklist easy to use, 20% believed it took too long, and when asked if they would want the checklist used if they were undergoing surgery, 93% of the respondents said yes.

Other surgical checklists have also been found to be as effective as that of WHO in reducing perioperative errors and improving team spirit among surgical team members. De Vries and his colleagues,[18] used a 90-item checklist named Surgical Patient Safety System (SURPASS) checklist. The authors used a control group (5 hospitals) to match the studied group (6 hospitals). The 11 participating hospitals were initially measured for their safety performance to minimise the potential Hawthorne effect. They measured the rate of surgical complications in both groups over six months(three months pre-intervention and three months post-intervention). They saw a remarkable improvement after the intervention. There was a decrease in complication rate from 15% to 11%, and in-hospital mortality dropped from 1.5% to 0.8%, temporary disability rate dropped from 9.4% to 6.6%, need for re-operation also declined from 3.7% to 2.5%. However, no such improvement was found in the control group. More interestingly, the extent of improvement was found to be directly related to greater compliance with the checklist. Hence, the 566 patients whose surgeries had greater checklist compliance have 7.1% complication rate, which is significant when compared to the 18.8% seen in 580 patients whose surgeries involved less checklist compliance. These findings provided greater confidence that the checklist itself was the reason for the improvements.

Despite all these positive findings, checklist use is yet to gain global acceptance, and its use has not been routine, especially in the developing countries of sub-Saharan Africa.

**Challenges and way forward**

The implementation of the WHO checklist is yet to be universal. Little work has been done to study these barriers hindering its implementation despite all the positive outcomes shown by the earlier cited researches.

Kariyo and colleagues[19] reported challenges facing the introduction of the WHO surgical safety checklist in African countries in a questionnaire-based study involving 15 countries. They held an orientation workshop on the checklist for the 15 countries in 2011 and surveyed in 2012. The workshop participants were asked to explore their experience with the checklist implementation. Of the 15 hospitals surveyed, 10 (67%) successfully implemented the checklist, 4 out of 10 hospitals (40%) adapted the checklist to suit their local conditions while the other 6 (60%) used the generic WHO version. None of the implementing hospitals completed implementation in all of the institutions operating rooms (OR). The mean compliance rate of use of the checklist was 48.5%, while the mean duration of use was 9.2 months. The main barriers to implementing checklist identified were staff resistance in 70%of hospitals and that the checklist was not a priority.The authors concluded that 10 out of the 15 hospitals oriented on its use, successfully achieved the implementation of the SSCL checklist. Butthe main barriers are related to lack of organisational prioritisation, staff resistance, and cultural reasons. Therefore, there is a need for strong supportive leadership, staff orientation and a precise follow-up mechanism to review the states of implementation regularly for successful implementation.

Vivekanantham et al[20] identified inadequate staffing, lack of prudent leadership, cultural and economic factors to be among the reasons why WHO checklist implementationhas been weak in developing countries. Therefore, they suggested that revisiting the founding principles that initially inspired the creation of the checklist will help to adapt the WHO SSC to improve surgical safety in developing countries. They also suggested that learning how other sectors like aviation and Formula 1 (F1) racing succeeded in implementing a checklist will help in achieving it in the operating theatre.

Kristin et al[21] used a checklist training course to facilitate the implementation process in Madagascar by trying to overcome the already known challenges from previous studies. These challenges are a poor perception of the checklist objectives, problems inherent to the generic WHO SSC, the need for workflow adjustment and local issues. After evaluating the impact of the training, three major issues emerged as the main challenges hindering the implementation process. These problems are non-usage of the checklist during emergency surgeries because it is believed to take so much time, shortage of personnel, making it difficult to assign the responsibility of leading the checklist on any of the team members and unwillingness of some of the staffs especially the more experienced ones to change their old ways of doing things.[21] They suggested that when the use of the checklist becomes habitual, the time taken to conduct the checklist will be less and therefore, makes it feasible even in emergencies. They suggested that checklist use becomes more critical in emergencies where mistakes are more likely to be made due to inadequate preparation.[21] As for the lack of personnel, They suggested that a large-sized checklist should be posted on the wall so that everybody can read it without having to contaminate the sterility already achieved.[21] Staffs unwilling to change should be consulted to identify their reasons, developing protocols and followed up to encourage the use of the checklist.

Dangyang and Afonne[22] carried out a questionnaire-based study to find the level of awareness, knowledge, perception, and implementation of WHO SSC among theatre staffs in a teaching hospital in Northern Nigeria. They found that the majority (92.7%) of the participants wanted the checklist used for all surgical procedures. Challenges identified are lack of team spirit,inadequate supply of consumables, shortage of workforce and lack of commitment from both the staffs and the management. A worrisome finding, more than half (54.4%) felt that the checklist does not add any benefit to the existing safety procedures already in place. Therefore, they concluded that despite the high level of awareness among surgical team members on WHO SSC, there is lack in-depth knowledge on its use and components, they recommended there is a need for more awareness creation, training of staffs and collaboration of all unit heads for proper understanding and implementation of the WHO SSC.

In a similar study in a tertiary hospital in Southern Nigeria, Ogunlusi et al[23] analysed 66 questionnaires filled by 40 surgeons, 12 anaethetists and 14 perioperative nurses. They found that 83.3% of the respondents are aware of the existence of the surgical checklist. However, only 21.8% were able to state the right objectives (improving the patient's safety and safe surgical practice) for the checklist. Three major barriers identified were lack of training (58.2%), lack of assertiveness of staff (58.2%) and perception of checklist causing a delay in operation list (47.2%). They concluded that though, there is a high level of awareness among staffs, it was on a wrong notion,as most of them don't know the actual objective of the surgical checklist. However,the majority of responders are willing to undergo training.

## V. Conclusion

Surgical safety checklist has brought remarkable improvement to surgical safety practices and reduced rate of perioperative complications. However, its implementation in Africa has been erratic due to barriers such as lack of knowledge, cultural practices, lack of prudent leadership and misconceptions, among other things. Training, follow up, the motivation of staffs, strong supportive leadership and local adaptation of the checklist are among the ways to overcome these barriers.

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