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Review

Surgical safety checklists in developing countries



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ABSTRACT

The World Health Organization Surgical Safety Checklist (WHO SSC) has demonstrated efficacy in developed and developing countries alike. Recent increases in awareness of surgical morbidity in developing countries has placed greater emphasis on strategies to improve surgical safety in resource-limited settings. The implementation of surgical safety checklists in low-income countries has specific barriers related to resources and culture. Adapting and amending existing surgical safety checklists, as well as considering factors unique to developing countries, may allow the potential of this simple intervention to be fully harnessed in a wider setting.

This review will address the benefits and challenges of implementation of surgical safety checklists in developing countries. Moreover, inspiration for the original checklist is revisited to identify areas that will be of particular benefit in a resource-poor setting. Potential future strategies to encourage the implementation of checklists in these countries are also discussed.

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1. Introduction

The surgical mortality in developing countries is 10 times higher than developed nations¹ and deaths attributed to anesthesia are 1000-fold higher,^{2,3} clearly demonstrating the need to improve safety in this setting. By simply implementing checklists and protocols from developed countries to developing countries we may not be harnessing their complete benefits. This review will consider the role of surgery in addressing the overall burden of disease in the developing world and discuss the impact of the World Health Organization Surgical Safety Checklist (WHO SSC) in this setting. Suggestions for appropriately adapting and expanding the WHO SSC for developing countries to improve the safety of surgery globally are also discussed.⁴

2. Importance of surgery in developing countries

The recent WHO report 'Safe Surgery Saves Lives' has helped prioritize surgical care throughout the world.⁵ Surgery has previously been perceived to be a cost-ineffective intervention relative

to GDP in low-income countries.⁶ However, Gosselin et al. have measured the cost per Disability-Adjusted-Life-Year (DALY) in Sierra Leone, which highlighted that the price per DALY averted was \$32.78 through surgery, which compares favorably with non-surgical interventions.⁷ Another study in Cambodia evaluated the cost of trauma surgery and this was also deemed to be cost-effective relative to other medical interventions.⁸

Aside from cost being a barrier to the expansion of surgery in developing countries, it was also thought that surgery only benefited a small percentage of the population. This implied that resources would be more effectively utilized on alternative management strategies. Jamison et al. have countered this position; they have estimated that 11% of the global burden of disease can be treated by surgery, particularly by operating on those suffering trauma or cancer.⁹

These findings underpin the acknowledgment of the increased benefit surgery can provide in developing countries. It is vital that as increased surgical interventions are employed in these settings, safety standards are initiated and improved in parallel.

3. Importance of the WHO SSC in the developing world

Vast differences between developed and developing countries, for example in healthcare budgets, reflect differences in measures needed to ensure surgical safety.⁹ In light of this, we believe the WHO SSC is even more critical in developing countries compared to

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developed countries. For example, surgeons in rural areas may have to perform a higher number of operations and operate in situations where they may not be specialists.¹⁰ This may lead to simple checks being omitted because of the pressure of the workload, as well as unfamiliarity with the procedure performed. Checklists would be particularly useful in such settings.

The WHO SSC was developed with the aim of routinely checking information at three critical stages of surgery (Fig. 1). Use of this initiative has been associated with reduced operative error and improved outcomes.⁴ In particular patient mortality fell from 1.5% to 0.8% following the implementation of this checklist. Importantly, this data was acquired from four high-income and four low-income or middle-income countries, as classified by the World Bank,¹¹ thereby demonstrating its applicability throughout the world.⁴

Numerous other studies have looked into the implementation of the WHO SSC globally.^{12–14} In 2012, Borchard et al. performed a systematic review of the effectiveness of safety checklists in surgery and encouragingly found that the relative risk of mortality fell to 0.57 (95% CI: 0.42–0.76) when checklists were used.¹⁴ Furthermore,

the relative risk of complications also fell after the implementation of the checklists (0.63 [95% CI: 0.58–0.67]).¹⁴

Whilst the WHO SSC was trialed worldwide, evidence suggests it is particularly effective in a resource-poor setting. Following the implementation of the WHO SSC, the largest decrease in complications (74.3%) was in low-income or middle-income countries.⁴ Furthermore, in the same study, two of the four hospital sites in the low-income and middle-income countries group had a decrease in surgical site infections and total complication rates, compared to only one of the four hospital sites in high-income countries.⁴ These findings highlight that the WHO SSC has the potential for significant impact specifically in the context of developing countries.

A possible explanation for these observations could be that a number of safety measures outlined in the WHO SSC were already used in developed countries prior to the formal introduction of the checklist. For example, observations from high-income countries from the initial WHO SSC study showed pulse oximetry was used for intra-operative monitoring in 99.0% of cases before the checklist

Sign in

Before induction of anesthesia, members of the team (at least the nurse and an anesthesia professional) orally confirm that:

The patient has verified his or her identity, the surgical site and procedure, and consent

The surgical site is marked or site marking is not applicable

The pulse oximeter is on the patient and functioning

All members of the team are aware of whether the patient has a known allergy

The patient's airway and risk of aspiration have been evaluated and appropriate equipment and assistance are available

If there is a risk of blood loss of at least 500 ml (or 7 ml/kg of body weight, in children), appropriate access and fluids are available

Time out

Before skin incision, the entire team (nurses, surgeons, anesthesia professionals, and any others participating in the care of the patient) orally:

Confirms that all team members have been introduced by name and role

Confirms the patient's identity, surgical site, and procedure

Reviews the anticipated critical events

Surgeon reviews critical and unexpected steps, operative duration, and anticipated blood loss

Anesthesia staff review concerns specific to the patient

Nursing staff review confirmation of sterility, equipment availability, and other concerns

Confirms that prophylactic antibiotics have been administered ≤ 60 min before incision is made or that antibiotics are not indicated

Confirms that all essential imaging results for the correct patient are displayed in the operating room

Sign out

Before the patient leaves the operating room:

Nurse reviews items aloud with the team

Name of the procedure as recorded

That the needle, sponge, and instrument counts are complete (or not applicable)

That the specimen (if any) is correctly labeled, including with the patient's name

Whether there are any issues with equipment to be addressed

The surgeon, nurse, and anesthesia professional review aloud the key concerns for the recovery and care of the patient

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