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Surgical safety checklist implementation in a post-armed conflict country with limited resources: the Somali experience

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Abstract

Surgical safety remains a critical yet often overlooked priority in low-resource countries, particularly in post-armed conflict settings like Somalia. Decades of instability have left the Somali healthcare system fragmented and severely under-resourced, contributing to a high burden of avoidable surgical complications and perioperative mortality. In response to these challenges, the World Health Organization (WHO) developed the Surgical Safety Checklist (SSC), a globally recognized tool designed to reduce surgical harm, enhance communication, and foster teamwork in operating theatres. Although widely adopted in many health systems, evidence on its implementation and effectiveness in Somalia has been notably absent. The country's unique constraints, including inadequate infrastructure, variable clinical training, and fluid surgical team structures, raise important considerations about the adaptability and sustainability of global safety initiatives in such environments. To address this gap, we implemented the WHO SSC in 15 hospitals across Mogadishu, aiming to evaluate its feasibility, measure improvements in adherence, and examine its influence on promoting a culture of surgical safety within resource-limited settings. Beyond improving procedural compliance, the intervention sought to determine whether structured training and frontline engagement could mitigate systemic barriers to safe surgical care. This study contributes valuable insights for global health stakeholders and policy-makers seeking to contextualize and scale evidence-based safety practices in settings characterized by conflict, institutional fragility, or chronic underinvestment in health systems.

Keywords WHO surgical safety checklist, Patient morbidity, Safe surgery saves lives, Resource-constrained settings

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Somalia has endured decades of civil war and political instability since the collapse of its central government in 1991, this prolonged armed conflict has severely damaged the nation's health infrastructure, leading to chronic shortages of trained personnel, medical supplies, and functioning surgical units [1]. In many public hospitals, electricity and sterilization services remain unreliable, while surgical teams often operate under extreme constraints with minimal oversight. These challenges exemplify the post-armed conflict deprivation of economic and healthcare resources [1].

Surgical safety remains a critical concern in global health, particularly in low-resource countries where perioperative systems are often underdeveloped [2]. In Somalia, a country contending with prolonged conflict and a severely fragmented healthcare infrastructure, preventable surgical errors and complications are major contributors to patient morbidity and mortality [2, 3]. In response to this pressing challenge, our team implemented the World Health Organization (WHO) Surgical Safety Checklist (SSC) across 15 hospitals in Mogadishu, aiming to assess its feasibility and impact within such a fragile health system [4].

The SSC, a 19-item tool introduced under WHO's "Safe Surgery Saves Lives" initiative, has consistently demonstrated effectiveness in improving surgical outcomes globally [5–7]. However, its use in Somalia had not been systematically studied. In our pre- and post-intervention study, only 37% of surgical cases initially met the benchmark for good adherence (>60%). Following a structured training program that engaged surgical teams, including surgeons, scrub nurses, anesthetists, and hospital managers, compliance rose dramatically to 98.8%, with mean adherence improving from 51.6 to 94.1% ($p < 0.001$) [4].

Significant gains were observed across core components of the checklist. Verification of patient identity increased from 44.6 to 97.9%; surgical site marking improved from 62.9 to 93.8%; and checks of anesthesia equipment rose from 66.2 to 94.7%. Post-training, over 95% of teams consistently performed introductions and procedure briefings, these findings align with international experiences that underscore the importance of structured training, frontline engagement, and leadership support in driving successful SSC implementation [1, 4, 8, 9].

Our results echo outcomes reported in other LMIC contexts. For instance, an educational intervention in Uganda increased SSC utilization from 7 to 92%, with adherence sustained through routine audits and supervision [10]. Similarly, evidence from Thailand, Brazil, Germany, Switzerland and Madagascar highlights that regular checklist use, especially during the "sign-in" and "time-out" phases, can significantly enhance safety

practices and promote effective teamwork, even in resource-constrained settings [11–13].

Interestingly, our study found that checklist compliance varied by hospital type and team composition. General hospitals demonstrated higher adherence than teaching or specialty institutions, and small to medium-sized facilities outperformed larger ones. Emergency procedures and surgical teams comprising more than five members were also associated with better adherence. These trends suggest that institutional culture, team dynamics, and workload distribution play important roles in shaping safety behavior, consistent with findings from multicenter studies across Africa, Latin America, and Asia [12, 14].

Although we did not directly assess clinical outcomes such as morbidity or mortality, the broader evidence base supports the clinical significance of SSC adherence. A landmark multicenter trial published in the *New England Journal of Medicine* found that checklist implementation reduced inpatient complications from 11 to 7% and mortality from 1.5–0.8%.⁶ Given Somalia's high baseline risk for perioperative complications, similar reductions could yield substantial health benefits.

Beyond its clinical utility, the SSC also fosters communication, coordination, and accountability among surgical teams. In our context, where surgical teams are often temporary and under-resourced, team introductions and coordinated briefings improved notably after training. This experience resonates with reports from other fragile health systems, where SSC implementation not only improves patient outcomes but also strengthens perceptions of safety culture and teamwork [1, 9, 14].

Our findings suggest that even in post-conflict settings with constrained resources, high adherence to global safety protocols is attainable. Key success factors include context-specific training, engaged leadership, and integration of the checklist into routine surgical practices. We strongly advocate for Somalia's health authorities to adopt the WHO SSC as a national standard formally. Structured implementation strategies, ongoing monitoring, and incorporation into professional surgical education should support this.

In conclusion, Somalia's experience provides a promising model for other LMICs and fragile states aiming to improve surgical safety. Embedding evidence-based tools such as the SSC into national surgical systems can accelerate progress toward universal health coverage and reduce avoidable surgical harm. International partners and stakeholders must support these efforts through appropriate policies, funding mechanisms, and technical collaboration to ensure that safe surgery becomes a global standard, not a privilege.

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Author contributions

All authors contributed substantially to this work, including its conception, study design, execution, data acquisition, analysis, and interpretation. They actively participated in drafting, revising, or reviewing the manuscript, provided final approval for publication, agreed on the selected journal, and accepted responsibility for all aspects of the study.

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Competing interests

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