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Improving Sterilisation Safety in Low-Resource Settings Through Structured Monitoring and Practical System Improvements

(TORG-NZ Global CSSD Best Practice Essay Competition 2026 - Second Place Winner)

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ABSTRACT

Sterilisation safety is a critical component of infection prevention and surgical patient safety. In many low-resource healthcare settings, challenges arise not solely from limited infrastructure but from inconsistent monitoring, inadequate staff training, and weak process control. This article explores practical approaches to strengthening sterilisation safety through structured monitoring systems, standard operating procedures, competency-based training, and continuous quality improvement initiatives. Evidence from the literature demonstrates that interventions such as routine use of sterilisation indicators, standardised load-release procedures, and regular audits can significantly improve sterility assurance without substantial financial investment. While digital monitoring tools may enhance performance, practical paper-based systems remain effective where technological resources are limited. Strengthening process control and accountability can improve sterilisation reliability, reduce preventable infections, and support safer surgical care in resource-constrained environments.

Keywords: *Sterilisation Safety; Central Sterile Services Department (CSSD); Sterility Assurance; Process Monitoring; Surgical Patient Safety.*

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MAIN TEXT

Safe sterilization is fundamental to patient safety and the prevention of surgical site infections. In many low-resource healthcare settings, however, deficiencies in sterilization safety arise not primarily from inadequate equipment but from inconsistent monitoring, insufficient staff training, and weak process control. Strengthening these operational elements can substantially improve sterility assurance without requiring significant financial investment [1,2].

Reliable sterilization extends beyond completing an autoclave cycle; it requires systematic verification that critical parameters have been achieved before instruments are released for clinical use [3]. Physical parameters, chemical indicators, and biological indicators each play complementary roles in confirming process effectiveness, with biological indicators providing the highest level of routine sterility assurance when used according to established standards. Nevertheless, their implementation remains inconsistent in many resource-constrained facilities because of financial limitations and the absence of structured policies [4].

An illustrative example highlights the importance of process oversight. Recurrent wet packs following steam sterilization may indicate inadequate drying times or inappropriate loading practices [5]. Rather than requiring new equipment, corrective actions such as restoring recommended drying parameters, retraining personnel, and introducing standardized load-release checklists can effectively eliminate these events while reinforcing accountability and compliance [6].

Equally important is the adoption of practical standard operating procedures that govern every stage of instrument reprocessing, from cleaning and inspection to packaging, sterilization, and release [7]. Regular competency assessments and internal audits ensure that staff understand not only how procedures are performed but also why adherence is essential for patient safety [8].

Digital logbooks and performance dashboards offer additional opportunities to strengthen quality monitoring by tracking sterilization cycles, indicator compliance, and equipment performance [9]. However, their implementation may be constrained by unreliable electricity, limited information technology infrastructure, financial barriers, or insufficient staff training. In such circumstances, well-maintained paper-based records and manually updated audit systems remain practical and effective alternatives until digital solutions become sustainable [10].

Ultimately, improving sterilization safety in low-resource settings depends less on sophisticated technology than on disciplined monitoring, standardized procedures, and a culture of accountability [7]. By emphasizing consistent process control and continuous quality improvement, healthcare facilities can enhance sterility assurance, reduce preventable infections, and strengthen confidence across the entire surgical pathway [10].

CONCLUSION

Improving sterilisation safety in low-resource settings depends on consistent monitoring, standardised procedures, staff competency, and a culture of accountability. These improvements do not necessarily require sophisticated technology or major financial investment; rather, they rely on disciplined process control and continuous quality improvement. By strengthening sterilisation systems and adherence to established standards, healthcare facilities can enhance sterility assurance, reduce preventable infections, and improve patient outcomes. CSSD professionals play a central role in sustaining these improvements through ongoing monitoring, adherence to best practices, and commitment to quality and patient safety.

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CONFLICT OF INTEREST
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