

Ten years of the Surgical Safety Checklist

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Checklists were not new to medicine when, in January 2009, the results of the first large systematic evaluation in surgery were published¹. With surgical care becoming increasingly complex over the past 50 years, it was inevitable that systems interventions would be needed. In retrospect, it was somewhat amazing that it had not happened sooner; adoption of the checklist has been rapid since. Yet the checklist is still a difficult safety tool to implement, with problems in application, fidelity and execution. Hospitals and surgical systems to this day struggle to use it correctly and maintain enthusiasm in a sustainable way.

The checklist was developed within the patient safety movement of the World Health Organization (WHO) as part of its Global Patient Safety Challenge. This *Safe Surgery Saves Lives* programme brought together surgeons, gynaecologists, anaesthetists, ward and theatre nurses, infection control experts, public health personnel, patient advocates, and biomedical engineers to identify opportunities to improve the safety of surgical care. The groups were tasked with exploring four pillars of safe surgical care: infection prevention, anaesthesia safety, teamwork and communication, and measurement of surgical capacity and outcomes. Notably, the programme did not attempt to address funding and infrastructure constraints faced in many resource-poor settings, as it was determined that such barriers were beyond the ability of a small, budget-constrained programme. Surgery was

recognized to be taking place regardless of resources, and improvements could be made by facilitating communication and teamwork, ensuring that simple tasks were completed on time and in sequence, regardless of resource limitations. The intervention developed from this work was the WHO Surgical Safety Checklist, introduced in June 2008 at the PanAmerican Health Organization headquarters in Washington, D.C., USA. The launch was symbolic, as multiple professional societies of surgery and anaesthesia signed up to the concept of using a checklist to improve surgical safety but without a full understanding of the effort it would take to change behaviour and incorporate its use into daily practice.

The results of subsequent pilot testing provided some insight: use of, and compliance with, the checklist resulted in dramatic improvements in outcomes, with a 47 per cent reduction in mortality and a 36 per cent reduction in complications in a cohort of nearly 8000 patients from eight countries. This was followed 20 months later by a persuasive study from the Netherlands demonstrating remarkable improvements in surgical outcomes following the introduction of a checklist-based safety system². The combined power of these two publications from different surgical teams boosted checklist use as a routine part of surgical practice³.

Over the past decade there has been an explosion of studies evaluating both the impact of the checklist and challenges in its implementation.

The checklist was adopted rapidly by thousands of hospitals in numerous countries and is a standard of care in many health systems. Yet implementation of the checklist is not as simple as passing it along to the surgeon or nurse in an operating theatre and demanding its use. Studies have demonstrated that the checklist concept may encourage box-ticking without true fidelity to the communications and process assurance aspects of the checklist⁴. Furthermore, mandated use by regulatory agencies has, on occasion, failed to result in meaningful improvements in surgical outcomes⁵. Yet implementation, when done thoughtfully and with an understanding of the local context, results in improvements, even in high-performing hospitals. A stepwise approach to implementation that focuses on harnessing the checklist's ability to foster team dynamics that are supportive of surgical safety can leverage change and produce ongoing reductions in harm. An example is the Safe Surgery 2015 South Carolina initiative, a partnership between Ariadne Labs and the South Carolina Hospital Association, which demonstrated a reduction in mortality by 20 per cent in hospitals that were able to improve adherence to the checklist⁶. An important mechanism of action of the checklist is encouraging behaviour change in the operating theatre to create an atmosphere of effective communication and a culture of safety; hospitals that effectively implemented the checklist have seen an improvement in safety culture and

practices that parallels changes in surgical outcomes⁷.

Despite the early evidence, widespread adoption of the checklist has been erratic. The European Surgical Outcomes study reported wide variation in checklist use based on data collected in 2011 (2 years after the WHO publication)⁸. Reported checklist use approached 100 per cent in Denmark, France, Ireland, the Netherlands and the UK, while it was 30 per cent or lower in Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Poland and Slovakia. In adjusted analysis, use of the checklist was associated with a 30 per cent decrease in mortality. Until further studies and audits are conducted, it is impossible to know what, if any, improvements have been made in countries slower to adopt the checklist.

While the checklist is a well recognized tool in high Human Development Index (HDI) countries, its use and implementation are also growing in low and middle HDI countries. In 2016, data were obtained on checklist use by the GlobalSurg Consortium⁹. Middle and low HDI countries reported use of the checklist over 50 per cent of the time, while it was reportedly not available in just over 25 per cent of procedures. The remaining 20 per cent of procedures were reported in hospitals that had the checklist but did not use it during the surgery being evaluated. This roughly mirrored the recent African Surgical Outcomes Study, with checklist use reported in 57 per cent of surgical procedures¹⁰. Thus, in low and middle HDI countries, the checklist is known and often available, but its use is still not universally promoted or implemented, indicating a substantial opportunity for advocacy and education in the use of this critical safety tool.

There are unique challenges in many of these settings due to lack of infrastructure, equipment and trained personnel that add additional challenges to implementation of this team-based tool. Innovative strategies have been developed to counter some of these barriers. Lifebox, a non-profit organization devoted to improving surgical safety worldwide, has committed to supporting systems for safe surgery, including checklist introduction paired with training and provision of pulse oximetry, an essential monitoring device and a standard incorporated into the WHO Surgical Safety Checklist. Over 18 000 oximeters have been distributed in over 100 countries, accompanied by training in use of the checklist¹¹. Furthermore, Clean Cut, a checklist-based surgical infection prevention programme led by Lifebox, identifies specific barriers to checklist compliance using process mapping and team-based improvement strategies; it is currently being implemented in a number of hospitals in Ethiopia, with plans for further expansion^{12,13}.

In the ten years since the launch of the checklist, surgical teamwork and communication have improved. In the next decade, more young surgeons will have used the checklist throughout their training. Yet ongoing efforts need to ensure the effective uptake of team-based systems of care. Research underway seeks to better understand and describe the tools that are needed to ensure that system-level interventions, such as surgical safety checklists, are effectively integrated into clinical practice in all environments, not just the best resourced. The future leaders of surgery must support the checklist and ensure the tools to prevent surgical infections and optimize anaesthetic monitoring are accessible everywhere. The checklist elevates teamwork to a central role in surgery and provides an improved sense of value to all theatre

personnel. The global surgical community must guarantee that the checklist is used effectively as part of safe surgical systems, not as a simple tick box exercise to be completed by rote.

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