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EDITORIAL ARTICLE

Perioperative quality improvement programs: A global perioperative network is urgently needed to promote education, collaboration, and contextual innovation

Programas de mejora de la calidad perioperatoria: se necesita urgentemente una red perioperatoria para promover la educación, la colaboración y la innovación contextual

Perioperative quality improvements (QI) programs are transforming surgical care by standardising best practices from preoperative preparation through to postoperative recovery. These programs have demonstrated substantial gains in patient outcomes after surgery and hospital efficiency,¹⁻³ yet, their implementation remains inconsistent across institutions and countries.

One of the earliest and most influential examples emerged from the work of Henrik Kehlet, whose enhanced recovery after surgery philosophy in colorectal surgery aimed to reduce surgical stress, accelerate recovery, and improve both clinical and economic outcomes.^{4,5} Since then, perioperative QI programs have expanded across multiple specialties, including general surgery, orthopaedics, gynaecology, urology, and cardiac surgery.¹⁻³ Central to these programs are principles such as preoperative education, optimal anaesthesia management, multimodal analgesia, early mobilisation, and nutritional optimisation.³ Anaesthesiologists are pivotal to implementing these evidence-based protocols, making them essential leaders in perioperative medicine.¹

These quality improvement programs aim to modulate perioperative pathophysiology through a multimodal approach that prevents postoperative complications and improves surgical outcomes. However, the complexity of individual patient risk profiles, pathophysiological response, and surgical procedures necessitates tailored strategies.⁶ Despite advances, challenges persist, particularly for elderly, frail patients with multiple comorbidities, who continue to experience postoperative complications, delayed recovery, and prolonged hospitalisation.³ Multidisciplinary teamwork, often coordinated by anaesthesiologists, is

required to tailor perioperative care for stress-response modulation.

One of the most significant barriers is inconsistent implementation of standardized, multidisciplinary, evidence-based perioperative protocols.⁷ Implementation calls for a tailored approach. Commercial implementation programs often fail due to insufficient understanding of local health systems. Success requires tailoring approaches to regional infrastructure, resource availability, and clinical workflows. Supporting local adaptation of evidence-based perioperative practices is essential to address regional disparities while respecting care structures.⁷

Patient-centred outcomes in perioperative quality improvement

Traditionally, surgical success has been measured in terms of mortality, complication rates, and length of stay.^{1-3,5,6} Perioperative QI programs broaden this perspective to include patient-centred outcomes: pain relief; quality of recovery (emotional and functional status); standardized tracking of postoperative complications; and disability-free survival (i.e., longer term recovery free of disability).^{8,9} These outcome measures better reflect long-term recovery and patient wellbeing. In critical care settings, meaningful end-points also include duration of ICU stay and ventilator-free days. Importantly, these QI programs aim not merely to reduce pain or hospital length of stay, but to optimise cognitive, emotional, and physical recovery, factors that are particularly relevant as surgical populations age and comorbidities increase.

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Economic benefits and system efficiency

Institutions adopting perioperative QI programs consistently report shorter hospital stays, reduced complication rates, fewer readmissions, and lower overall costs.^{1-3,10,11} Multimodal analgesia reduces opioid consumption, leading to fewer side effects and earlier mobilisation, while goal-directed haemodynamic and fluid therapy and nausea control help to further improve postoperative recovery.³ These outcomes benefit not only patients but also health systems under pressure to increase efficiency and value-based care delivery. Moreover, the return on investment is substantial; for instance, cost savings per patient of \$5815 have been reported.^{10,11} These efficiency gains, improved throughput, decrease use of intensive care facilities, and fewer complications help deliver significant returns on investment from these programs. As healthcare systems shift toward value-based care, perioperative QI programs align well with institutional priorities and benefit society.

Anaesthesiologists as central coordinators

The success of perioperative QI programs often hinges on anaesthesiologist leadership. Their expertise in physiology, pain management, and care coordination positions them uniquely to lead multidisciplinary teams.^{1-3,9} Anaesthesiologists oversee key components of QI programs and enhanced recovery protocols, from risk assessment and prehabilitation to intraoperative management and enhanced post-anaesthesia care. As aging, multimorbidity, and deconditioning due to lifestyle-related factors increases in patients presenting for surgery, preoperative optimisation through prehabilitation becomes essential. At the same time, chronic disease-related pathophysiological changes often require extended haemodynamic support in enhanced care units during the early postoperative period.¹² Anaesthesiologists are also educators and researchers, shaping enhanced recovery pathways, collecting outcome data, and leading implementation science. As champions of quality, anaesthesiologists bridge clinical, operational, and educational domains to drive and lead improved care, aligning surgical teams to focus on patient-centred recovery.

Global disparities and the access gap

While perioperative QI programs are increasingly standardized in high-income settings, a stark global disparity remains.¹³⁻¹⁵ As highlighted by the Lancet Commission on Global Surgery, low- and middle-income countries (LMICs) face immense surgical needs but limited access to safe anaesthesia and surgical care.¹³ According to the Commission, nearly five billion people lack access to safe, affordable surgical and anaesthetic care. It is estimated that 143 million additional surgical procedures are needed in LMICs each year to prevent disability and save lives.¹³ In LMICs, common conditions such as appendicitis, hernia, obstructed labour, and cancer often go untreated, leading to avoidable mortality and disability. Surgical volumes are lowest and case-fatality rates highest in poorest regions.¹³ Universal health coverage and health aspirations will be impossible to achieve without ensuring that surgical and anaesthesia

care is available, accessible, safe, timely, and affordable. The Lancet Commission recommends urgent investment in surgical capacity, both personnel and infrastructure. The Commission estimates that scaling surgical capacity in LMICs could prevent \$12.3 trillion in lost productivity by 2030. Surgical care, including perioperative services, is foundational to public health and health system resilience.¹³

Adapting perioperative quality improvement programs for global equity

While initially developed in high-resource contexts, the principles of perioperative QI programs are adaptable for LMICs.¹³⁻¹⁵ Many of the core components—patient education, patient preparation, early mobilisation, multimodal analgesia - do not depend on expensive technology. With workforce training, access to essential medications, and system-level coordination, high-impact and meaningful improvements are feasible, even in resource-constrained settings. However, successful implementation must be locally led, flexible, and cognisant of regional constraints. Future research should also reflect global needs.¹³⁻¹⁵ Many perioperative trials and QI programs often fail to capture diverse, real-world populations and patient-centred outcomes. Future research should integrate standardized, generalizable endpoints that are reproducible and meaningful to both high- and low-resource settings.¹⁵

The need for a global scientific and educational network

Despite their effectiveness, perioperative QI programs are inadequately disseminated.¹⁻³ Fragmented efforts, limited knowledge sharing, and insufficient access to implementation science hinders progress and widespread adoption, particularly in LMICs.¹³⁻¹⁵ A global perioperative network is urgently needed. To bridge these disparities and accelerate meaningful progress, the creation of an overarching multidisciplinary global perioperative network is urgently needed to promote education, collaboration, and contextual innovation. Such a network could link high- and low-resource settings, enable adaptation of evidence-based protocols, and foster local champions. By supporting training, digital learning platforms, data sharing, and regional mentorship, this network would build perioperative capacity while enabling equitable care.

This global network would serve as a collaborative platform for knowledge exchange, education, implementation science, and innovation, fostering connections between high-resource centres and under-served health systems. By pooling global multidisciplinary expertise in perioperative care, from academic anaesthesiologists, surgeons, allied healthcare professionals, implementation scientists, and health policy leaders, the network could support the contextual adaptation of evidence-based protocols for diverse settings. It would also promote standardized, globally relevant research frameworks, helping ensure that perioperative clinical trials capture meaningful, patient-centred outcomes across varied populations.

Moreover, the global network could address one of the most persistent barriers to implementation: the lack of regional customization. Some commercially available programs fail due to poor alignment with local infrastructure, workforce capacity, clinical priorities, supply chains, and cultural context. A global network, rooted in multidisciplinary expertise—including anaesthesiologists, surgeons, implementation scientists, and policymakers—could help deliver tailored scalable solutions by connecting local clinicians with global experts and educational resources tailored to their settings.

Moreover, such a network could support capacity-building efforts by offering tailor-made training for perioperative clinicians worldwide, including structured pathways for anaesthesia providers in LMICs to develop leadership roles in perioperative medicine. Education could be delivered through digital learning platforms, simulation-based training, mentorship programs, and shared standardized databases of clinical pathways and outcome metrics.

From a policy perspective, a global perioperative network could also act as an advocacy vehicle, emphasizing the economic and societal returns of safe surgical care and helping to elevate perioperative services in national and international health agendas.

Crucially, this network would not only foster high income — to low resource settings knowledge transfer, but it would also amplify innovations from LMICs, many of which have pioneered low-cost, high-impact perioperative strategies out of necessity. Bidirectional knowledge sharing is essential to accelerate global perioperative advancement, ensuring inclusive, equitable, and sustainable improvements.

In an era where surgical and anaesthetic care is increasingly recognized as a cornerstone of public health, the formation of a coordinated, interdisciplinary, and globally inclusive scientific and educational infrastructure is no longer optional, it is a strategic imperative.

Conclusion

Perioperative QI programs represent a paradigm shift in surgical care, from a narrow focus on procedural success to comprehensive, functional recovery. These programs offer measurable improvements in clinical outcomes, economic efficiency, and patient experience. Anaesthesiologists are uniquely positioned to lead this transformation, bridging clinical, operational, and educational domains. However, inequities in implementation persist globally. Global health priorities must embrace surgical and anaesthetic care. Delivering timely, safe, affordable surgical care is essential for reducing preventable deaths and disabilities worldwide. Expanding perioperative QI programs globally will require sustained leadership, tailored strategies, and a collaborative, multidisciplinary approach. A global scientific and educational network, led by perioperative champions, is now a strategic imperative. The time to act is now, to reduce disparities and ensure equitable high quality surgical care for all.

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References

1. Cline KM, Clement V, Rock-Klotz J, Kash BA, Steel C, Miller TR. Improving the cost, quality, and safety of perioperative care: a systematic review of the literature on implementation of the perioperative surgical home. *J Clin Anesth.* 2020;63:109760, <http://dx.doi.org/10.1016/j.jclinane.2020.109760>.
2. Pesce A, Ramírez JM, Fabbri N, Ubieta JM, Bellosta AP, Arroyo A, et al. The EUROpean PERioperative MEDical Networking (EUPEMEN) project and recommendations for perioperative care in colorectal surgery: a quality improvement study. *Int J Surg.* 2024;110:4796–803, <http://dx.doi.org/10.1097/JS9.0000000000001601>.
3. Stephens TJ, Beckingham IJ, Bamber JR, Peden CJ. What influences the effectiveness of quality improvement in perioperative care: learning from large multicenter studies in emergency general surgery? *Anesth Analg.* 2022;134:559–63, <http://dx.doi.org/10.1213/ANE.0000000000005879>.

4. Kehlet H. Multimodal approach to control postoperative pathophysiology and rehabilitation. *Br J Anaesth*. 1997;78:606–17, <http://dx.doi.org/10.1093/bja/78.5.606>.
5. Kehlet H, Wilmore DW. Evidence-based surgical care and the evolution of fast-track surgery. *Ann Surg*. 2008;248:189–98, <http://dx.doi.org/10.1097/SLA.0b013e31817f2c1a>.
6. Lobo DN, Joshi GP, Kehlet H. Challenges in Enhanced Recovery After Surgery (ERAS) research. *Br J Anaesth*. 2024;133:717–21, <http://dx.doi.org/10.1016/j.bja.2024.06.031>.
7. Yuan CT, Wu J, Cardell CP, Liu TM, Eidman B, Hobson D, et al. Implementing enhanced recovery pathways: a qualitative study of factors that distinguished higher performing hospitals. *Ann Surg*. 2024;279:789–95, <http://dx.doi.org/10.1097/SLA.0000000000006165>.
8. Fleisher LA. Quality anesthesia: medicine measures, patients decide. *Anesthesiology*. 2018;129:1063–9, <http://dx.doi.org/10.1097/ALN.0000000000002455>.
9. Boney O, Moonesinghe SR, Paul S, Myles PM, Grocott MPW. Core Outcome Measures for Perioperative and Anaesthetic Care (COMPAC): a modified Delphi process to develop a core outcome set for trials in perioperative care and anaesthesia. *Br J Anaesth*. 2022;128:174–85, <http://dx.doi.org/10.1016/j.bja.2021.09.027>.
10. Ladant FX, Parc Y, Roupert ME, Ristovska L, Retbi A, Kastler EC, et al. Hidden costs of surgical complications: a retrospective cohort study. *BMJ Surg Interv Health Technol*. 2025;7:e000323, <http://dx.doi.org/10.1136/bmjst-2024-000323>.
11. Davis MJ, Bryan C, Luu BC, Abu-Ghname A, Buchanan EP. Multidisciplinary care in surgery: are team-based interventions cost-effective? *Surgeon*. 2021;19:49–60, <http://dx.doi.org/10.1016/j.surge.2020.02.005>.
12. Ludbrook G, Riedel B, Martin D, Williams H. Improving outcomes after surgery: a roadmap for delivering the value proposition in perioperative care. *ANZ J Surg*. 2021;91:225–8, <http://dx.doi.org/10.1111/ans.16571>.
13. Meara JG, Leather AJM, Hagander L, Alkire BC, Alonso N, Ameh EA, et al. Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development. *Lancet*. 2015;386:569–624, [http://dx.doi.org/10.1016/S0140-6736\(15\)60160-X](http://dx.doi.org/10.1016/S0140-6736(15)60160-X).
14. Latin American Surgical Outcomes Study (LASOS) group. Patient outcomes after surgery in 17 Latin American countries (LASOS): a 7 day prospective cohort study. *Lancet Glob Health*. 2025;13:e635–45, [http://dx.doi.org/10.1016/S2214-109X\(24\)00558-8](http://dx.doi.org/10.1016/S2214-109X(24)00558-8).
15. Collier L, Hohlfeld ASJ, Biccard BM. Mapping perioperative care randomized controlled trials in Sub-Saharan Africa: a scoping review. *Anesth Analg*. 2025, <http://dx.doi.org/10.1213/ANE.0000000000007460>.

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