Progress and challenges in global surgical and anaesthesia care and safety: proceedings of the SAFE-T Summit 2018

Kerry A Vaughan and Walter D Johnson

Correspondence: johnsonw@who.int

Surgical and anaesthesia care are undeniably critical to strengthening healthcare systems worldwide and they are steadily gaining support from the World Health Organization (WHO). Former Director-General Halfdan Mahler remarked in his address to the World Congress of the International College of Surgeons in 1980 that surgical (and anaesthetic and obstetric) resources should be scrutinised according to social justice principles.[1] His vision of social justice in the realm of surgery and anaesthesia remained in the background of global public health, but began to gain momentum in the 21st century. World Health Assembly (WHA; the decision-making body of WHO) resolution 68.15 on strengthening emergency and essential surgical care and anaesthesia as a component of Universal Health Coverage (UHC), the *Lancet* Commission on Global Surgery (LCoGS)[2] and *Essential Surgery. Disease Control Priorities*,[3] which lay out the health economic case for surgical care and anaesthesia, were all launched in 2015. They serve as key rallying points for advancing surgical, anaesthesia and obstetric (SAO) care.

The scale of the global disease burden of surgical conditions was underestimated prior to the LCoGS, which demonstrated that 5 billion people were lacking timely access to safe and affordable surgery and anaesthesia.[4] This disparity is aggravated by a severe lack of funding: whereas infectious diseases (HIV/AIDS, tuberculosis and malaria) have a US$5 billion annual global budget to address 3 million deaths annually, avertable surgical deaths total 16.9 million annually and have a US$0 global budget.[5] Furthermore, avertable surgical deaths are expected to increase significantly over the next few years with the projected rise in global deaths due to non-communicable diseases (NCDs); demand for surgical care and anaesthesia increases in parallel with increases in NCDs. Cancer, ischaemic heart disease and cerebrovascular disease are the three most common killers globally and will likely remain so in the coming years.[6] Deaths from road traffic accidents, among other injuries, are also projected to increase, of which many may be averted by surgery and anaesthesia.

Safety is intimately linked to strengthening SAO care across numerous linked domains, from anaesthesia risks, surgical disease burden, morbidity and mortality to outcomes, SAO workforce and even pain management. Strict adherence to global safety standards for anaesthesia and surgery is critical, as surgical disease accounts for 30% of the global disease burden.[5] Unsafe perioperative practices in anaesthesia are linked not only to surgical outcomes, but also to maternal mortality worldwide.[7] Risks associated with anaesthesia are significantly disparate across countries and settings, with the vast majority of risk found in low- and middle-income countries (LMICs). The risk of perioperative mortality from anaesthesia in LMICs remains high at around 5–10%; this compares with 0.0005% (1 in 200,000 cases) in high-income countries as a result of improvements in anaesthesia safety and practice.[8] Inadequate anaesthesia workforce density, training and support also hinder operative care in LMICs. Whereas in high-income countries such as the UK or USA there is one trained anaesthesia provider per 4000–5000 persons, in LMICs there are much lower ratios, such as one provider per 3.6 million people in Afghanistan.[8–11] Safety in pain management and administration of pain medications is also critical from an anaesthesia perspective, for acute and chronic pain in all populations.

Safety is inextricably linked to continued global healthcare improvements, as well as strengthening surgical and anaesthesia care. Good health and well-being is one of the pillars of the United Nations (UN) Sustainable Development Goals also launched in 2015 (i.e. SDG3), the successors to the UN Millennium Development Goals.[12] At least nine of the 13 SDG3 targets are directly or indirectly addressed by improving anaesthesia and surgical safety standards and practices worldwide, including SDG3.8 on UHC and a direct link to WHA resolution 68.15.[13] Furthermore, SAO care is also linked to many of the other 17 SDGs. These strengthening efforts are addressed through all levels of healthcare, from access to essential medicines to health systems integration. Stronger SAO care cannot be accomplished without

Kerry A Vaughan MD
Program in Global Surgery and Social Change
Harvard Medical School
Boston, MA
USA
and
Department of Neurosurgery and Penn Global Surgery Group
University of Pennsylvania
Philadelphia, PA
USA

Walter D Johnson MD, MPH, MBA
Lead
Emergency and Essential Surgical Care Programme
World Health Organization
Geneva
Switzerland

simultaneously addressing safety concerns and disparity via advocacy, resource development, service access and delivery, data collection and analysis, and workforce training and competence. Baseline data collection on surgical and anaesthesia care is part of the core of WHA resolution 68.15, which directly mentions safety as a focus of these efforts. Although this initial resolution called for a one-time report on implementation progress in 2017, WHA Decision Point 70.22 was adopted in 2017, mandating continued biennial progress reports on implementation from the WHO Secretariat.[14]

Progress in SAO care advocacy has occurred, including on the global stage through the WHO. The six major indicators on safety, accessibility and economic burden of surgical and anaesthesia management of disease published by the LCoGS were successfully incorporated into the 2015 WHO 100 Core Health Indicators:[15] postoperative mortality, surgical volume, 2-hour access to services, SAO workforce density and risk of impoverishing and catastrophic health expenditures related to surgical and anaesthesia care. All but one of these, catastrophic health expenditure, was preserved in the 2018 WHO Indicators.[16]

Recent safety-focused SAO efforts from the WHO include safety checklists, the creation of collaborative safety standards, international safe anaesthesia guidelines, surgical site infection guidelines and promoting safe essential medicines and their use. Checklists for trauma care, surgical safety and safe childbirth have been developed by the WHO and globally disseminated to help all health systems implement and provide safer services, thus ideally improving SAO outcomes.[17–19] The WHO and the World Federation of Societies of Anaesthesiologists (WFSA) published *International Standards for a Safe Practice of Anaesthesia* in May 2018 as minimum safety standards for all anaesthesia providers and settings.[20] Multiple campaigns on safe administration practices for essential medicines, such as ketamine, narcotics and antibiotics, have been launched, in part with the WHO, to promote the safe and judicious usage of these agents without causing patient harm. The current WHO Patient Safety Campaign is on medication safety. Safety must also be considered for surgical and anaesthesia providers, that is, safety from infectious diseases such as Ebola, as well as harm from local natural and man-made events.

Five academic and medical institutions around the world have become official WHO collaborating centres for surgery and anaesthesia. Centres from all WHO regions have joined efforts to strengthen surgical and anaesthesia care, with the goal of creating not only bidirectional relationships with the WHO, but also international collaborative networks. Resolution 68.15 has been advanced at the country level by the WHO and collaborating centre partnerships with Ministries of Health in the form of National Surgical, Obstetric and Anaesthesia Plans (NSOAPs). Such plans are intended to improve national SAO care and safety by an iterative process of planning, a national surgical forum for feedback, and implementation, with the NSOAP fully embedded within the national health policy, strategy or plan.

NSOAP creation is led by the Ministry of Health, with support from local and international stakeholders and technical assistance from the WHO and international partners. The Republic of Zambia has completed its strategic plan and has begun country-wide implementation, as have Senegal and Tanzania. Ethiopia has also developed a pathway for scaling up SAO care through its SaLTS plan, currently undergoing implementation.[21] Smaller scale efforts to improve safety in these domains have been launched in Madagascar, Uganda, Vietnam, Brazil and India, among others.

The NSOAP process has garnered international attention, with requests from many Member States, leading to an NSOAP workshop in March 2018 that was developed by the WHO and the Program in Global Surgery and Social Change (PGSSC) from Harvard University. As multiple Member States begin work on this process, collaboration across multiple Ministries of Health and a consortium of partners will be important in improving national and global SAO care.

The planning phase should include special consideration of the safety of vulnerable populations, including obstetric and paediatric patients and those who are injured. Children are particularly susceptible to unsafe practices, as the same challenges facing the surgical and anaesthesia care of the adult patient are even more pronounced, such as fewer paediatric-trained providers, as well as there being additional paediatric-specific challenges. Children under 15 years make up on average 43% of the total population in sub-Saharan Africa (with this figure being as high as 50% in some countries) and 26% of the total world population, which places additional stress on already limited paediatric surgical and anaesthesia resources in LMICs.[22] Adult surgeons may choose to not operate on these children because of the higher risks, unfamiliarity with unique pathologies and children's inability to pay for services. Strategic alliances, such as the Global Initiative for Children's Surgery, include all paediatric surgical and anaesthesia services to support care for this vulnerable population.

Patients with traumatic injuries represent another vulnerable population and highlight safety disparities, both in healthcare as well as in prevention. These are often treatable and remain most prevalent and most severe in LMICs. Of the disease burden that could be averted by surgical and anaesthesia system scaling up at first-level LMIC hospitals, 68% would be related to injuries.[23] Safety through injury prevention is also critical, as only 7% of the world's population has adequate legal protection from the five major risk factors for road traffic accidents: speed, drink driving, helmets, seatbelts and child restraints.[24]

The incoming leadership at the WHO has developed the 13th General Programme of Work, a 5-year strategic plan outlining WHO priorities.[25] Its main focus includes promoting health, keeping the world safe and serving the vulnerable. These broad priorities are supported by specific 'triple billion goals' to improve access for an additional 1 billion people to UHC, better protection from health

emergencies and better health. Scaling up safe surgical and anaesthesia care are critical to achieving these priorities and goals, as healthcare safety affects everyone's health.

REFERENCES

1. Mahler H. *Address to the XXII Biennial World Congress of the International College of Surgeons*. World Health Organization L/81.7a, 29 June 1980. Available at http://www.who.int/surgery/strategies/Mahler1980speech.pdf (accessed 10 May 2018).
2. 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.
3. Debas HT, Donkor P, Gawande A, Jamison DT, Kruk ME, Mock CN (editors). *Essential Surgery. Disease Control Priorities. Volume 1*, 3rd edn. World Bank, Washington, DC; 2015.
4. Alkire BC, Raykar NP, Shrime MG, Weiser TG, Bickler SW, Rose JA *et al.* Global access to surgical care: a modelling study. *Lancet Glob Health* 2015; **3**: e316–23.
5. Shrime MG, Bickler SW, Alkire BC, Mock A. Global burden of surgical disease: an estimation from the provider perspective. *Lancet Glob Health* 2015; **3**: S8–9.
6. World Health Organization. *The Global Burden Of Disease: 2004 Update*. WHO, Geneva; 2008.
7. Sobhy S, Zamora J, Dharmarajah K, Arroyo-Manzano D, Wilson M, Navaratnarajah R *et al.* Anaesthesia-related maternal mortality in low-income and middle-income countries: a systematic review and meta-analysis. *Lancet Glob Health* 2016; **4**: e320–7.
8. Boggs SD, Chee NW. Anesthesia disparities between high-income countries and low- and middle-income countries: providers, training, equipment, and techniques. In Roth R, Frost EAM, Gevirtz C, Atcheson CLH (editors). *The Role of Anesthesiology in Global Health: A Comprehensive Guide*. Springer, Cham; 2015.
9. Dubowitz G, Detlefs S, McQueen KAK. Global anesthesia workforce crisis: a preliminary survey revealing shortages contributing to undesirable outcomes and unsafe practices. *World J Surg* 2010; **34**: 438–44.
10. World Federation of Societies of Anaesthesiologists. *World Anaesthesiology Workforce Map.* Available at https://www.wfsahq.org/workforce-map (accessed 10 May 2018).
11. Kempthorne P, Morriss W, Mellin-Olsen J, Gore-Booth J. WFSA Global Anesthesia Workforce Survey. *Anesth Analg* 2017; **125**: 981–90.
12. United Nations General Assembly. *Resolution 70/1. Transforming our World: The 2030 Agenda for Sustainable Development*. United Nations, New York; 2015.
13. World Health Organization, Sixty-eighth World Health Assembly. *WHA68.15. Strengthening Emergency and Essential Surgical Care and Anaesthesia as a Component of Universal Health Coverage*. WHO, Geneva; 2015.
14. World Health Organization, Seventieth World Health Assembly. *WHA70(22). Progress in the Implementation of the 2030 Agenda for Sustainable Development*. WHO, Geneva; 2017.
15. World Health Organization. *Global Reference List of 100 Core Health Indicators, 2015*. WHO, Geneva; 2015.
16. World Health Organization. *Global Reference List of 100 Core Health Indicators (Plus Health-related SDGs), 2018*. WHO, Geneva; 2018.
17. World Health Organization. *The WHO Trauma Care Checklist.* Available at http://www.who.int/emergencycare/publications/trauma-care-checklist.pdf (accessed 10 May 2018).
18. World Health Organization, World Alliance for Patient Safety. *The WHO Surgical Safety Checklist*, 1st edn. WHO, Geneva; 2008.
19. World Health Organization. *The WHO Safe Childbirth Checklist*, 1st edn. WHO, Geneva; 2015.
20. Gelb AW, Morriss WW, Johnson W, Merry AF, Abayadeera A, Belil N *et al.* World Health Organization–World Federation of Societies of Anaesthesiologists. (WHO-WFSA) International Standards for a Safe Practice of Anaesthesia [published online ahead of print 7 May 2018]. *Can J Anesth* 2018. doi: 10.1007/s12630-018-1111-5.
21. World Health Organization, Program in Global Surgery and Social Change, Harvard Medical School. *Surgical Care Systems Strengthening: Developing National Surgical, Obstetric, and Anaesthesia Plans*. WHO, Geneva; 2017.
22. The World Bank. *World Development Indicators: Population Dynamics.* Available at http://wdi.worldbank.org/table/2.1 (accessed 10 May 2018).
23. Bickler SW, Weiser TG, Kassebaum N *et al.* Global burden of surgical conditions. In Debas HT, Donkor P, Gawande A *et al.* (editors). *Disease Control Priorities*, 3rd edn, Volume 1, Essential Surgery. World Bank, Washington, DC; 2015.
24. World Health Organization. *Global Status Report on Road Safety 2015*. WHO, Geneva; 2015.
25. World Health Organization, Seventy-first World Health Assembly. *Draft Thirteenth General Programme of Work, 2019–2023*. WHO, Geneva; 2018.