PERSPECTIVE

Building capacity for surgery, obstetrics and anesthesia in support of universal health coverage and achievement of the Sustainable Development Goals

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Surgery, the SDGs and Universal Health Coverage

The United Nations' *2030 agenda for sustainable development* lays out an ambitious mission to "leave no one behind." It endorses a set of 17 global development goals to be achieved by 2030 with substantially broader scope, reach, and aspiration than the agenda set forth by its predecessor, the Millennium Development Goals (MDGs). Although the third sustainable development goal (SDG) is the only goal wholly dedicated to health, 29 health-related targets are spread across 11 of the 17 goals, underscoring the vital role of health in realizing all the SDG's. [1,2] Central to the achievement of the health-related SDGs is the call for universal health coverage (UHC) in SDG target 3.8. UHC acknowledges that expanding access to essential health services is insufficient unless patients are also protected from poverty-inducing out-of-pocket payments. There is significant institutional support for UHC through a heightened emphasis on UHC and recent collaborations by key global health multilaterals—including WHO and World Bank.

There is increasing recognition that achieving UHC is impossible without attending to the five billion people who lack access to safe surgery or the 81 million patients pushed into poverty every year due to out-of-pocket payments for surgical care.[3,4] Improved access to surgical care is required for the achievement of specific health-related SDG targets, including reductions in mortality due to maternal causes (SDG 3.1), injuries (SDG 3.6) and non-communicable diseases (SDG 3.4). Prolonged obstructed labor, which remains a significant cause of maternal mortality only in low- and middle-income countries, can only be treated with timely and safe caesarean delivery .[5] Moreover, addressing the rising burden of malignancy, the second leading cause of mortality among non-communicable diseases, is dependent upon access to surgery not only to provide curative treatment, but also for diagnosis and palliation. During the year 2015, 57% (9.5 million) of patients with newly diagnosed cancer were from LMICs, resulting in the loss of 5.7 million lives. Surgery plays a role in the management of about 80% of cancer patients, and current projections indicate the need for cancer surgery will rapidly expand by 2030: of the 17.3 million cancer patients estimated to require surgery, 10 million will be from LMICs.[6] Timely access to surgery also supports efforts to reduce morbidity caused by the rising burden of road traffic injuries, a leading cause of death among young working-age population. Recent estimates suggest that a package of basic surgical interventions could prevent up to 24% of road traffic injury-related deaths in LMICs.[7]

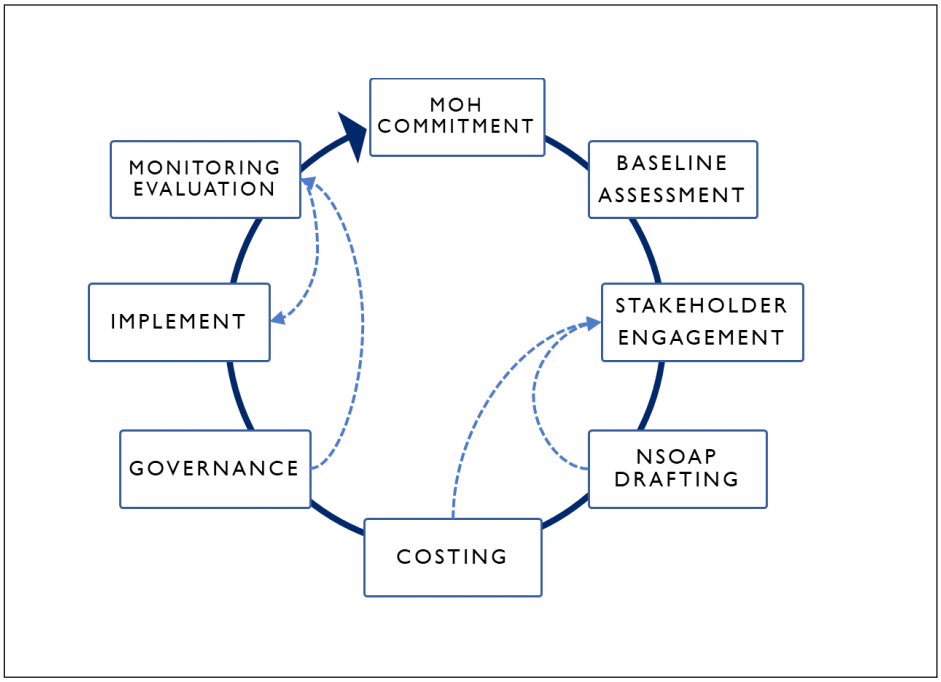

Figure 1. Principle Planning Components of a National Surgical, Obstetric, and Anesthesia Plan
The conceptual framework for the NSOAP process is built upon eight principles that are tantamount to defined objectives. Although achieving ministry of health support usually occurs first given the pivotal role it plays in determining the long-term success of an NSOAP, other NSOAP processes often occur in parallel. Ongoing engagement throughout the process with all relevant stakeholders—including government, academia, providers, civil society, and patients—is crucial for NSOAP adoption, implementation, and sustainability.

The economic consequences of surgical disease are also staggering: LMICs risk losing up to $12.3 trillion in GDP from 2015-2030 if surgical capacity is not improved.[16] Improvements in surgical anesthesia and obstetric care are therefore required to attain the economically focused SDGs 1 (no poverty), 9 (economic growth) and 10 (reduction in inequity).

Unfortunately, the current unmet need for safe surgical, obstetric and anesthesia care remains critically high: five out of every seven people globally—and more than 90% of the population in sub-Saharan Africa, South Asia, and Southeast Asia—cannot receive safe, affordable surgery and anesthesia care when needed.[3] Due to the absence of even the most basic surgical and anesthesia infrastructure in many low resource settings, more than 1.4 million patients die needlessly every year.[11] When surgical capacity is available, the provision of safe high-quality care remains a concern; the African Surgical Outcome Study showed that patients in Africa, who are relatively younger, were twice as likely to die after surgery when compared with the global average for postoperative death.[12] The high perioperative mortality rate after surgery, suggestive of the failure to identify and treat life-threatening complications in the perioperative period, emphasizes the need to focus simultaneously on improving access but also quality of emergency and essential surgery, anesthesia and obstetric care. To close the gap, more than 140 million procedures are required annually, and the workforce must grow by at least 1 million surgeons and anesthesiologists, to say nothing of nurses, ancillary staff, biomedical technicians or mid-level providers.[17,18]

Expanding access to surgical, obstetric, and anesthesia care is not only necessary for realizing the SDGs, but also essential to addressing a significant portion of the global burden of disease and the attendant human suffering. More than 30% of the global burden of disease is due to surgical conditions, and surgery is required for management of conditions within every major disease category tracked by the global burden of disease project.[8,9] Dr. Jim Kim, the former World Bank president, recognized the ubiquity and cross-cutting nature of surgical conditions with the statement "surgery is an indivisible, indispensable part of healthcare."[10] Implicit in this statement is the notion that investing in surgical capacity is not a zero-sum gain at the expense of other medical interventions or disease platforms; instead, a strong surgical system benefits patients across the disease spectrum by supporting, rather than competing with, primary care, maternal and neonatal health, infectious disease, injuries, and non-communicable diseases. Simply put, surgical systems strengthening is a model horizontal approach to improve health systems, as it necessitates that resources be dedicated to each of a health system's building blocks.

The burden of disease among children, which form up to half of the population in LMICs, is also substantial: it has been estimated that a third of childhood deaths are the result of a surgical condition.[13] More recently, congenital anomalies have risen to become the 6th leading global cause of death in

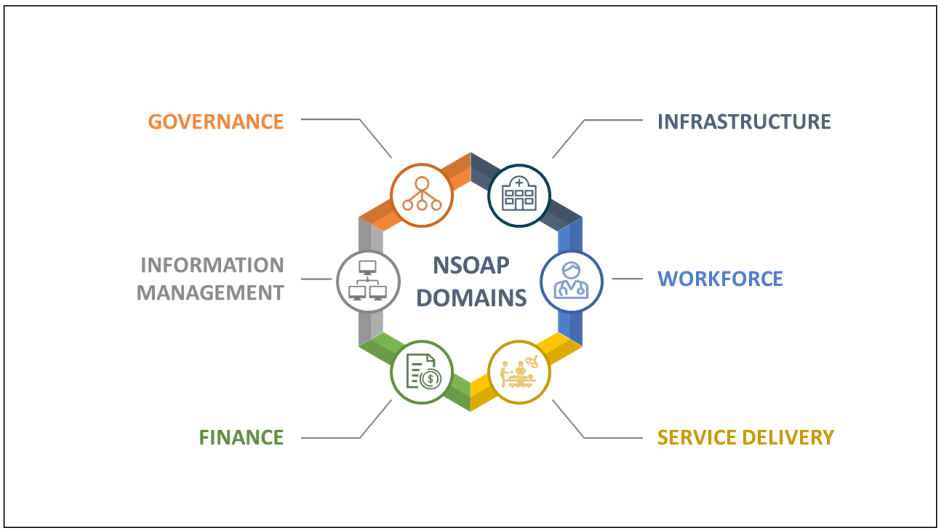

Figure 2. Six Domains of an NSOAP

the under-5 age group. Further, 97% of deaths from congenital anomalies occur in LMICs,[14] where an estimated two-thirds of the deaths and disability from congenital anomalies could be prevented through the provision of surgical care. [15]

Global Surgery and Global Health: Historical Context

The above statistics beg the question: why has surgical and anesthesia care for patients been for so long underrepresented on the global health agenda?[19] The world cannot claim ignorance: as early as 1980, WHO Director-General Mahler acknowledged that "… the vast majority of the world's population has no access whatsoever to skilled surgical care and little is being done to find a solution."[20] Mahler's broader vision of an integrated, primary-care-based approach unfortunately had to contend with a global health landscape dominated by vertical programs aimed largely at communicable diseases; this disease-specific approach left little room for developing health systems capable of delivering surgical care.

The tension between vertical programing and systems-based approaches is well demonstrated by the emerging maternal and child health programs in the mid-1980s. When Mahler introduced the Safe Motherhood Initiative in 1987 in response to the maternal mortality epidemic, he implored the global health community to consider an integrated approach by proposing a four part framework that placed building surgical capacity to support emergency obstetric and newborn care on equal footing with prenatal and primary healthcare.[21] The subsequent failure to support surgical systems strengthening within primary care models has borne witness to the perpetuation of unnecessary mortality and disability for mothers and children who are subjected to prolonged obstructed labor. More than 30 years after the Safe Motherhood initiative was launched, new cases of preventable disabilities occur on a daily basis. These cases would be unheard of in the presence of robust emergency obstetric systems—these disabilities include, but are not limited to, sequelae of hypoxic encephalopathy for children, and fistula, genital fibrosis, infertility, foot-drop, sepsis, renal failure, osteomyelitis and mental health impacts for mothers, among other conditions.[22]

The lack of urgency by multilaterals and ministries of health has additionally been rooted in an unsubstantiated belief that building surgical capacity in LMICs is too expensive (i.e. not cost-effective). Over the past 15 years, a proliferation of surgical cost-effectiveness data has complemented the urgent humanitarian case for global surgery by strongly challenging this dogma. There is a robust evidence-base that conveys a clear message: surgical care can be as cost-effective as widely accepted interventions, including some vaccinations and antiretroviral medications for HIV.[23]

The Way Forward

While the current unmet need of surgical care and attendant consequences are immense, the neglected surgical patient has reason for cautious optimism. In 2015, an explosion in the global surgery evidence base produced by the Lancet Commission on Global Surgery (LCoGS)[10] and a dedicated surgical volume in the third edition of Disease Control Priorities (DCP3)[24] accompanied an elevated awareness of global surgery by high-level policymakers, culminating in the unanimous adoption of World Health Assembly Resolution 68.15 (WHA68.15).[25] WHA68.15 identified five key surgical areas of focus—surgical and anesthesia workforce, information management, service delivery, essential medicines, advocacy, and resource development—and recognized the central role of surgery and anesthesia care in achieving universal health coverage; importantly, countries unanimously committed to improving their capacity to deliver surgical care at the district hospital level as a means to attaining UHC. The resolution was subsequently bolstered by decision WHA70.22, which called for the WHO and its 194

Table 1. Lancet Commission on Global Surgery Indicators

Indicator Name	Target
Access to timely essential surgery	A minimum of 80% coverage of essential surgical anesthesia services per country by 2030
Specialist surgical workforce density	100% of countries with at least 20 surgical, anesthesia and obstetric physicians per 100,000 population by 2030
Surgical volume	80% of countries by 2020 and 100% of countries by 2030 tracking surgical volume; A minimum of 5000 procedures per 100 000 population by 2030
Perioperative mortality rate (POMR)	80% of countries by 2020 and 100% of countries by 2030 tracking POMR; In 2020, evaluate global data and set national targets for 2030
Protection against impoverishing expenditure	100% protection against impoverishment from out of pocket payments for surgical and anesthesia care by 2030
Protection against catastrophic expenditure	100% protection against catastrophic expenditure from out of pocket payments for surgical and anesthesia care by 2030

member countries to bi-annually report on the progress being made in improving surgical capacity as part of the work on UHC and the SDGs.

NSOAPs and Indicators

In addition to illuminating the current burden of surgical disease and associated downstream consequences, DCP3 and LCoGS also provided practical suggestions for a way forward to improve quality and access of surgical and anesthesia care. DCP3 underscored the cost-effectiveness of surgery and identified a basket of essential cost-effective procedures that should be performed at the district hospital. LCoGS provided a framework, adaptable to each country, to systematically strengthen each surgical health system building block, beginning with the development of national surgical, obstetric and anesthesia plans (NSOAP). The NSOAP process, which must be led and owned by the ministry of health to ensure success and sustainability, is central to ensuring the development and strengthening of surgical systems. Broadly, an NSOAP calls for assessing baseline surgical capacity and access, followed by convening stakeholders from a wide variety of backgrounds to create a costed implementation plan with measurable indicators. Inclusion of the NSOAP in the formal budgeting process, such as the national health sector plan or strategy, is essential given the key role domestic financing plays in supporting sustainable health systems. The gaps filled by the NSOAP platform are acutely illustrated, for instance, within MCH services, where the lack of access to safe Cesarean delivery in LMICs has resulted in a preventable epidemic of iatrogenic fistula where Cesarean capacity has increased without concurrent quality-of-care governance.[26]

The LCoGS also emphasized that to build surgical and anesthesia care capacity, there must be routine measurement to evaluate and advocate for the scale of the unmet need and track to progress and success of any Investment. As such, the LCoGS recommended six indicators to track surgical care capacity, quality of surgical care, and financial risk protection (Table 1).

While the primary role of health indicators is to allow for evaluation and management of public health interventions, they can also incentivize stakeholders to realign resources, especially if endorsed by high-level policymakers. Soon after publication of LCoGS, the World Bank accepted four of the six recommended indicators into the World Development Indicators, implicitly signaling the importance of addressing surgical conditions to the global health community. The Bank additionally highlighted surgical indicators in its recently published 2018 SDG atlas,[27] while WHO has included surgical workforce density in its UHC index metric. In the long-term, the catalyzing effect of metric collection requires that reliable, primary data be collected, and stakeholders engaged on a routine basis. In addition to new data, consensus standards have also been introduced to guide clinicians. Underscoring the essential role of assuring quality anesthesia care, The World Federation of Societies of Anesthesiologists (WFSA) recently published international standards for the safe practice of anesthesia in partnership with WHO.[28]

Over the past three years, progress at the policy level suggests an opportunity to realize meaningful, sustainable reductions in the burden of surgical conditions. While initial recognition of surgery's role in UHC by multilateral organizations is promising, true change will only come about with country-led support for surgical systems strengthening. Early progress is encouraging, as five countries—Zambia, Tanzania, Senegal, Rwanda and Ethiopia—have completed the development of a National Surgical, Obstetric, and Anesthesia Plan (NSOAP), and an ever growing list of countries, including Pakistan and member states of the Southern African Development Community, are in the process of NSOAP development. Interest in NSOAPs has also expanded: more than 20 countries have expressed the desire to engage, necessitating a recent WHO-sponsored regional workshop in

Dubai - with a published policy brief – which is to be repeated in 2019. The NSOAP process also allows for creation (and buy-in from governmental stakeholders) of data collection systems specific to the regional context, allowing for sustainable data collection that would ideally be shared with WHO and World Bank.

The Surgical, Anesthesia, and Obstetric Workforce

To build capacity for safe surgery and anesthesia as a foundation for UHC, over a million specialist surgeons and anesthesiologists are required by 2030, in addition to many more nurses, physiotherapists, ancillary staff, biomedical technicians, to name but a few. As such, workforce training and development must be carried out strategically, commensurate with regional needs. Even with adequate funding, sustainable human resources for health must be intentionally planned by the relevant stakeholder using up to date information on current workforce quantity, skill and geographic distribution. Workforce training can require considerable upfront expenditure and a prolonged time table, but is an investment that results in a significant positive return on investment and economic growth.[29] Establishment of an adequate surgical and anesthesia workforce requires not only an increase in the absolute workforce, but also assuring the quality of existing training programs, promoting acceptance of credentialing bodies, and possibly support by mid-level providers. Historically, the essential role of anesthesia in providing surgical care was poorly understood by decision makers and stakeholders; consequently, the development of anesthesia has not been prioritized within the context of expanding access to surgery.[30,31] It is important that anesthesia training not lag behind other key surgical services because the output and performance of the surgical workforce is wholly contingent upon the availability and quality of the anesthesia workforce. Finally, workforce development must include consideration for training operating theatre nurses and biomedical engineers, both of which are at critically low levels in many countries, given the indispensable role both professions play in ensuring safe, high-quality care.

Funding

Funding for growing surgery and anesthesia capacity, especially in low-income settings, remains a concern. For many countries, external financial support—whether from bilateral aid, public-private partnerships such as the global financing facility, industry, or multilaterals, including the World Bank—will be necessary to strengthen surgical systems. Some countries may struggle to prioritize the resources to even perform an initial planning and costing process, let alone allocate funding the actual national level intervention. Given the cost-effectiveness of surgical interventions and the need for substantial upfront expenditures, the NSOAP could serve an additional role as an investment case for surgery. The framework of the global financing facility, which aligns and "crowds in" various funding sources to achieve the goals of a country-led investment case can serve as a useful model. Additionally, innovative financing can play a role for example, taxation of goods harmful to health, such as alcohol and tobacco, is a proven model that provides a revenue source while also decreasing unhealthy consumption.[32]

Conclusions

In his inaugural address as Director-General of the WHO, Dr. Tedros Adhanom Ghebreyesus elucidated the priorities that comprise his vision for WHO; above all, he affirmed that achieving UHC, previously a centerpiece of his campaign for Director-General, was now WHO's top priority. The evidence presented above illuminates the role of surgery and anesthesia as a cornerstone of UHC, and as such the need to address the enormous unmet global need for surgery, obstetric, and anesthesia care, along with the staggering financial burden from catastrophic expenditure to pay for surgery. The manuscript highlights the current unprecedented opportunity to build surgical and anesthesia capacity to support the mother who needs a c-section for obstructed labor, the trauma patient in need of open reduction and internal fixation of a femur fracture, or the cancer patient who can be cured with surgical resection. The tools to strengthen surgical systems are in place and ready, but require the necessary capital, human resources, and political strategies to put them to work so that our patients are not left behind, but rather afforded their right to a productive life, good health, and overall well-being.

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