


Safe Surgery for All: Early Lessons from Implementing a National Government-Driven Surgical Plan in Ethiopia

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Abstract Recognizing the unmet need for surgical care in Ethiopia, the Federal Ministry of Health (FMOH) has pioneered innovative methodologies for surgical system development with Saving Lives through Safe Surgery (SaLTS). SaLTS is a national flagship initiative designed to improve access to safe, essential and emergency surgical and anaesthesia care across all levels of the healthcare system. Sustained commitment from the FMOH and their recruitment of implementing partners has led to notable accomplishments across the breadth of the surgical system, including but not limited to: (1) *Leadership, management and governance*—a nationally scaled surgical leadership and mentorship programme, (2) *Infrastructure*—operating room construction and oxygen delivery plan, (3) *Supplies and logistics*—a national essential surgical procedure and equipment list, (4) *Human resource development*—a Surgical Workforce Expansion Plan and Anaesthesia National Roadmap, (5) *Advocacy and partnership*—strong FMOH partnership with international organizations, including GE Foundation’s SafeSurgery2020 initiative, (6) *Innovation*—facility-driven identification of problems and solutions, (7) *Quality of surgical and anaesthesia care service delivery*—a national peri-operative guideline and WHO Surgical Safety Checklist implementation, and (8) *Monitoring and evaluation*—a comprehensive plan for short-term and long-term assessment of surgical quality and capacity. As Ethiopia progresses with its commitment to prioritize surgery within its Health Sector Transformation Plan, disseminating the process and outcomes of the SaLTS initiative will inform other countries on successful national implementation strategies. The following article describes the process by which the Ethiopian FMOH established surgical system reform and the preliminary results of implementation across these eight pillars.

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Introduction

The 2015 UN Sustainable Development Goals provided the impetus for Universal Health Coverage of essential and quality health services accompanied by financial risk protection [1]. After the inclusion of surgery as part of universal health coverage in the 2015 World Health Assembly Resolution 68.15, access to safe and affordable surgical and anaesthetic care has become increasingly recognized as an essential part of development [2].

Ethiopia has emerged as a leader among low-income countries working to improve access to surgical care for its population of 100 million people. Recognizing Ethiopia's limitations in providing safe and essential surgery, the Federal Ministry of Health (FMOH) launched the Saving Lives through Safe Surgery (SaLTS) initiative in 2015 (Table 1). SaLTS is a 5-year (2015–2020) strategy that aims to improve access to safe surgical and anaesthetic care across all levels of the health system. The initiative is designed to address quality and equitable health system reform, one of four transformation agendas of the FMOH's National Health Sector Transformation Plan (2015–2020). SaLTS is one of the first national surgical plans written and is by far the most expansive implementation of a national surgical reform programme in both Sub-Saharan Africa and any low-income country. SaLTS uses a health systems approach through the Ethiopian Hospitals Alliance for Quality (EHAQ) platform to simultaneously tackle activities across eight “pillars of excellence” and avoid the pitfalls of vertical programming (Fig. 1). The eight pillars are based on the WHO Health System Building Blocks, with two additional pillars added: “Advocacy and Partnership” and “Innovation” [6]. These two supplementary pillars were designed by the FMOH and major stakeholders as necessary components to drive and accelerate the plan's goals. This article expands on the aims and preliminary results of each of these eight pillars (Table 2). Dissemination of the tangible strategies and problem-solving

around SaLTS will serve other countries looking to develop and operationalize national surgical plans.

Pillar 1: leadership, management, and governance

Background

The most crucial element to surgical system reform in Ethiopia has been strong leadership and commitment at all levels, from the Federal Ministry of Health to surgical teams on the ground. To achieve this, clear accountability was established with named personnel assigned at each level of the surgical hierarchy to take responsibility for SaLTS implementation (Fig. 2). Hospitals are organized into clusters, which are co-led by university hospitals and identified lead hospitals. University hospitals deploy physicians, residents, and medical students to lower-level facilities for mentorship and on-site training.

Results

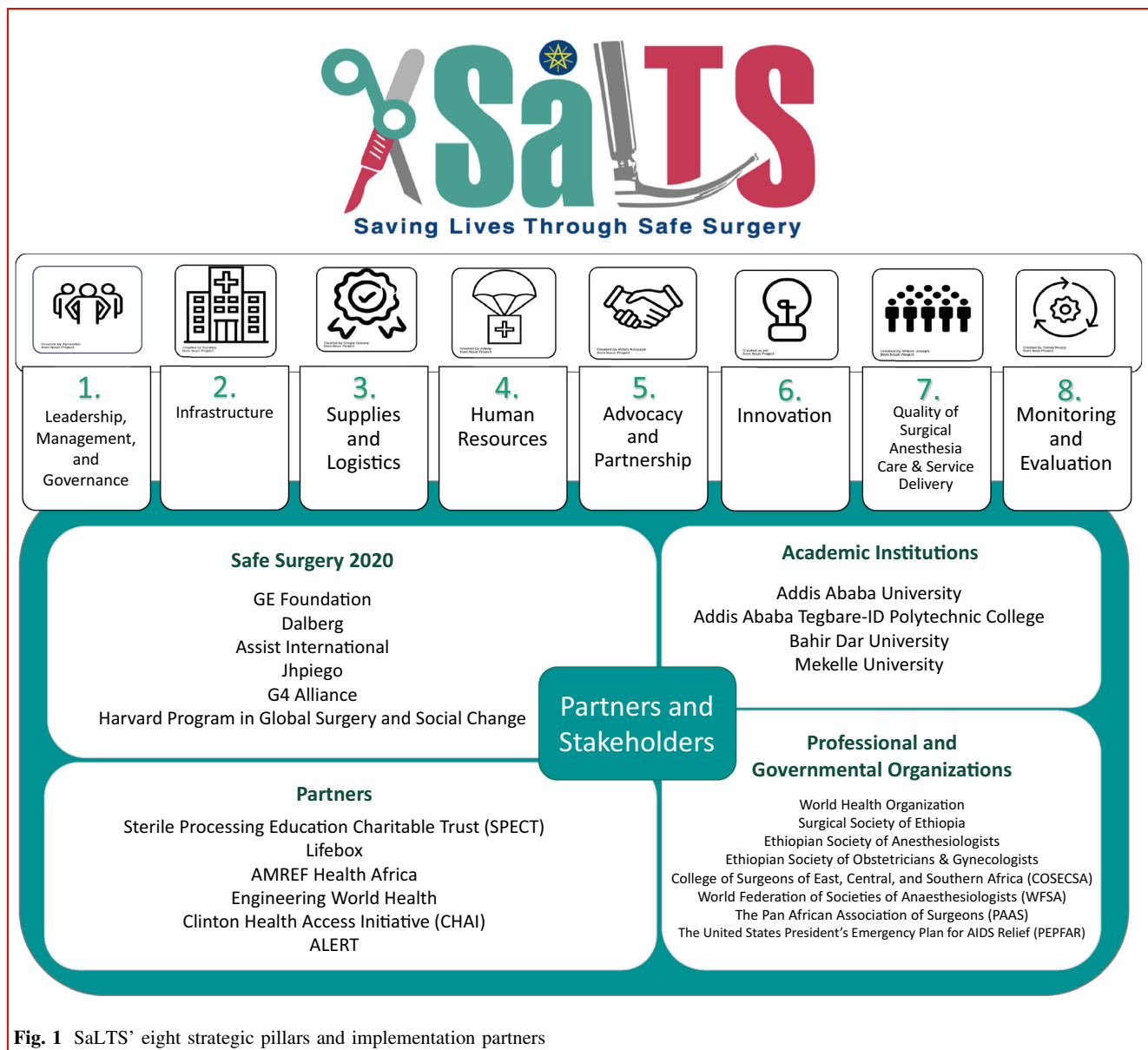
Surgical leadership training was disseminated nationally to ensure multidisciplinary facility teams had the skills to sustain the SaLTS programme. The pilot training was designed by Jhpiego and the Surgical Society of Ethiopia as part of SafeSurgery2020, a multi-partner initiative funded by the GE Foundation. The goal was to train and empower surgical staff to identify facility-level problems and then design and implement effective solutions. The leadership training was followed by 9 months of mentorship visits to ensure lessons were put into practice. Early success of the leadership programme in two regions prompted the FMOH to expand the training to 700 surgical team members across the country. Following this training, one round of mentorship was conducted thus far by the national project team and members of the technical working group at 38 hospitals across all regions.

Table 1 Current state of Ethiopia's surgical system

Indicator	Target	Ethiopia
Procedure volume	5000/100,000*	43/100,000
Caesarean section	10–15%**	3.5%
SAO density	20/100,000*	0.35 Surgeons/100,000
Risk of impoverishing expenditure for surgical care (% of people at risk)	0%*	98%
Risk of catastrophic expenditure for surgical care (% of people at risk)	0%*	85%

* Lancet and WDI surgical indicators [3, 4]

** WHO health indicators [5]



Formation of the SaLTS project management team at the FMOH and the early engagement of a breadth of stakeholders, including clinicians, funders, and implementers, was key to putting policy into action. A SaLTS national technical working group (TWG) of more than 19 stakeholders was established and led by the FMOH, including representatives from the Surgical Society of Ethiopia, the Ethiopian Society of Gynecologists and Obstetricians, the Ethiopian Society of Anesthesiologists, the Ethiopian Association of Anesthetists, African Medical and Research Foundation (AMREF), SafeSurgery2020, World Health Organization, and Clinton Health Access Initiative. The diversity of stakeholder representation ensured SaLTS strategies reflected the needs of surgical providers. The early involvement of implementing and









funding partners, as well as the creation of regional and facility SaLTS teams, ensured increased capacity for implementation beyond the FMOH alone.

Pillar 2: infrastructure development

Background

Defining the scope of SaLTS was at times difficult, but necessary for designing attainable goals and strategies. Hospital baseline assessments highlighted deep-rooted issues with basic infrastructure in Ethiopian surgical facilities. An assessment of 29 facilities in multiple regions of Ethiopia showed that 72% of surgical facilities lacked

Table 2 Early SaLTS implementation activities

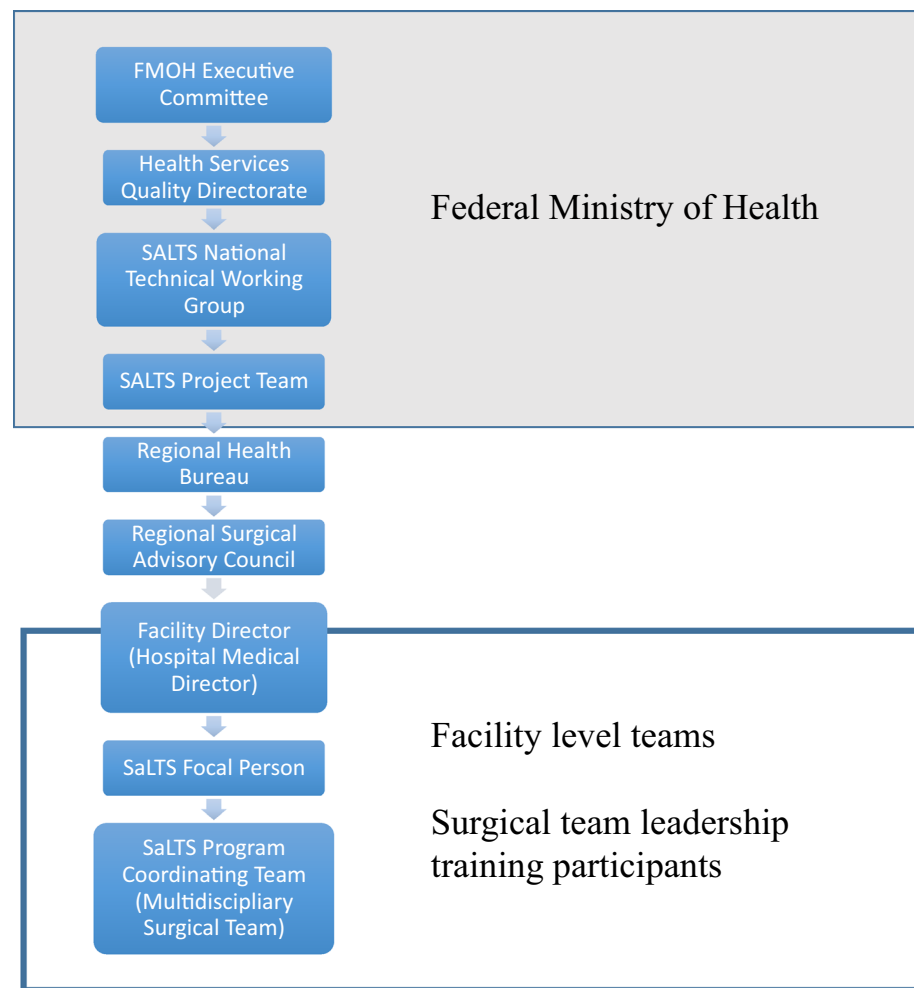
Pillar	Activities
 1. Leadership, management, and governance	<p>Effective SaLTS leadership and management established for national, regional, and facility levels</p> <p>National leadership and mentorship training piloted by Jhpiego and provided to 700 regional leads and surgical team members by FMOH</p> <p>9-Month supportive supervision and mentorship programme conducted by Jhpiego in leadership training hospitals</p>
 2. Infrastructure	<p>National guidelines for operating theatre infrastructure standardized for all facility levels</p> <p>80 Operating room blocks constructed and 290 additional blocks to be newly constructed or renovated during SaLTS implementation</p> <p>Development of oxygen plants underway to be installed at two referral hospitals. Anticipated completion of two plants by March 2018</p>
 3. Supplies and logistics	<p>National list of 56 essential and emergency surgical procedures and corresponding list of essential surgical and anaesthetic equipment, drugs, and consumables established. Stratified by facility level</p> <p>Biomedical technician course completed for 20 trainees at Tegbaried Technical College in partnership with Addis Ababa University</p> <p>Forged partnership between facilities and regional blood banks in two regions to curb blood supply issues</p>
 4. Human resources	<p>National Surgical Workforce Expansion and Anaesthesia Roadmaps designed to determine long-term surgical workforce needs and strategize solutions</p> <p>Short-term anaesthesia training to upskill existing staff due to start Fall 2017</p> <p>Sterilization and surgical site infection training ongoing through Lifebox's CLEAN CUT initiative and SPECT</p>
 5. Advocacy and partnership	<p>National SaLTS interviews radio-broadcasted and published in local Ethiopian newspaper</p> <p>International events organized to share experiences and promote SaLTS early successes, e.g. PAAS 2017, WHA 2017</p> <p>Strong engagement of professional societies established within SaLTS National Technical Working Group</p> <p>Several implementing partners identified, including GE Foundation's SafeSurgery2020, Lifebox, SPECT, WFSA, COSECSA, and AMREF</p>
 6. Innovation	<p>Facility Accelerator Fund grants of up to 10,000 USD awarded to 11 facilities to creatively problem-solve and implement solutions</p>
 7. Quality of surgical and anaesthesia care service delivery	<p>National quality training conducted on evidence-based practices and standard operating procedures</p> <p>WHO Surgical Safety Checklist implemented across all facilities</p> <p>Peri-operative guideline nationally standardized and finalized, and morbidity and mortality audit meetings introduced at selected sites</p>
 8. Monitoring and evaluation	<p>Surgical capacity and infrastructure hospital assessment tool adapted and finalized. National data to be available by the end of June 2017</p> <p>15 Key performance indicators designed and integrated into national data collection and reporting systems. National KPI training and collection to begin Fall 2017. Lancet surgical indicators included within dataset</p>

consistent running water, 59% of facilities had interrupted electricity, and 33% of facilities did not have a continuous oxygen supply. An assessment of 18 surgical facilities in two regions also showed that 61% of facilities had only one or no functional operating rooms.

Results

SaLTS has set to tackle the issues of operating room construction and oxygen supply, the elements of infrastructure unaddressed by other government sectors. The FMOH allocated a budget for the construction and renovation of 370 operating rooms, of which eighty are currently finalized. Additionally, the FMOH has designated

Fig. 2 SaLTS' leadership structure stratified by national, regional, and facility levels



fifty million USD for the procurement of operating theatre equipment, including 650 operating room tables and anaesthesia machines.

To increase access to medical oxygen, Assist International, a SafeSurgery2020 implementation partner, is planning on building oxygen plants at two referral hospitals in Ethiopia as a demonstration project coordinated with Ethiopia's National Medical Oxygen and Pulse Oximetry Scale Up Road Map [7]. The project aims to reliably supply oxygen to 40 hospitals in two regions. The plants will be managed as a public–private partnership based on successful models demonstrated in Kenya and Rwanda, and two plants are due for completion in March 2018. Included in the programme are a comprehensive monitoring and evaluation plan, plant maintenance and troubleshooting training, 2-years of expertise support, and clinical training on oxygen usage.

The SafeSurgery2020 commitment to improving access to oxygen through SaLTS illustrates how investment in surgery can benefit the whole health system, as the oxygen will be used for neonatal, obstetric, medical and surgical

patients alike. Unlike many public health priorities focusing on interventions at the primary health level, surgery is a unique conduit towards elevating care at higher-level facilities.

Pillar 3: supplies and logistics management

Background

Although each of the eight SaLTS pillars relies and builds upon the next, the two most interdependent are infrastructure and supplies (pillars 2 and 3). Despite new operating room construction in progress, erratic supply of materials or unreliable equipment can lead to interruptions in surgical service delivery, which in turn contributes to breakdowns in the referral pathway. For example, baseline audits of 28 facilities in multiple regions of Ethiopia showed that only 29% of hospitals had a reliably functional X-ray machine and 25% a functional ultrasound. This broken or unreliable equipment frequently contributes to

service interruptions. In order to keep up with the investment into infrastructure mentioned in pillar 2, simultaneous financing of correct equipment and consumables is required.

Results

A central activity of the SaLTS team was the establishment of the minimum requirements of a functional operating room and standardization of equipment, supplies, and purchasing. The FMOH established a national list of 56 essential surgical procedures stratified by facility level (primary, general, or specialized) and a corresponding list of essential medical equipment, drugs, and consumables required for comprehensive service provision. Previously, those responsible for procurement were often not trained in recognizing what elements from an exhaustive list were essential to surgical services. Now, there is a mandate to supply these basic items and record stock-outs. The remaining challenge will be to establish robust supply chains and effectively and sustainably procure essential items.

To address the issue of equipment breakdown, SaLTS partnered with Tegbaried Technical College, Addis Ababa University, GE Foundation, PEPFAR, and others to deliver an accelerated 1-year training programme for biomedical technicians (BMETs) on medical equipment repair and maintenance. Twenty BMETs were trained across multiple regions and will work with Regional Health Bureaus to provide essential equipment services to hospitals. Additionally, new annual equipment audits will assess adherence to minimum equipment guidelines.

Pillar 4: human resources

Background

Human resource changes are difficult to enact as governments and external partners are discouraged by the long lag time between investment and return for specialist training, as well as the undefined duration of financial commitment when creating new posts. To define more tangible steps, the FMOH SaLTS TWG designed a human resources development strategy, including a national Surgical Workforce Expansion Plan and Anaesthesia Roadmap identifying nearly 40 key interventions. Proposed initiatives include: increased training numbers and posts, close partnership with the College of Surgeons of East, Central and Southern Africa (COSECSA), expanded skills training programmes for new graduates, task-sharing and task-shifting programs, and private sector engagement for advanced skills training. All relevant stakeholders in the surgical workforce

development process were included such as training institutions, professional societies, and the Ministries of Health and Education. However, sustainable steps to implement these plans have yet to be realized.

Results

While large-scale increases in specialist human resources are not yet imminent, SaLTS has worked to upskill current providers in the interim. Short courses have proven easier to attract partnerships. For example, Sterile Processing Education Charitable Trust (SPECT), in collaboration with SafeSurgery2020 partner Assist International (AI), is working to improve sterilization practices by providing training in a low-cost sterilization method for medical instruments. Training was provided to 55 surgical instrument cleaning staff members across multiple facilities in Ethiopia, followed by on-site mentoring sessions on workflow, cross-contamination, and surgical site infection (SSI) reduction. In Fall 2017, a short course on anaesthesia and newborn resuscitation will be led by the World Federation of Societies of Anaesthesiologists and the Ethiopian Society of Anaesthesiologists in partnership with AI [8].

Pillar 5: partnership and advocacy

Background

Partnerships have proven to be one of the greatest successes of SaLTS to date. This pillar was designed by the SaLTS TWG, realizing the need for both in-country and external collaboration to accelerate the plan into action. The SaLTS strategy aligned FMOH goals and those of implementing and donor partners by explicitly defining priority areas for surgery.

Results

The SaLTS team successfully attracted financial support from the GE Foundation, which has invested millions of dollars in strategic implementation through a collaborative network of partners. GE Foundation's SafeSurgery2020 programme acts across all eight SaLTS pillars through five organizations: Assist International, Jhpiego, Harvard's Program in Global Surgery and Social Change (PGSSC), the G4 Alliance, and Dalberg. The FMOH and GE Foundation have also partnered with Lifebox on the CLEAN CUT project designed to reduce SSIs and surgical morbidity by adhering to recognized SSI reaction steps. SaLTS also established a successful partnership with local professional societies working in surgical, obstetric, and anaesthetic care.

One difficulty associated with partnerships is balancing governmental, external partner, and donor responsibility. Partners often lack the resources to implement solutions at scale. Rather, they provide direct support and feedback around smaller interventions for the FMOH to scale across regions. Expansion of current programmes to all regions of Ethiopia is a future challenge for SaLTS.

Pillar 6: innovation

Background

Innovation, while not a WHO health system building block, was added to SaLTS in recognition that open-mindedness around new and untested interventions would be required to tackle such a broad issue. Innovation is not exclusive to new gadgets or equipment; it also encompasses new and disruptive processes or ways of thinking.

Results

The leadership training implemented by the FMOH and SafeSurgery2020 was designed to lead to facility-driven quality improvement. Surgical teams were subsequently given the opportunity to apply for grants (facility accelerator funds) of up to 10,000 USD to implement their proposed change. This innovative funding mechanism provided by SafeSurgery2020 promoted creativity among surgical teams. Eleven facilities received grants and identified the following as their priority innovations: patient monitors for OR and recovery rooms, ultrasounds, anaesthesia machines and corresponding training, OR sewer and water line construction, surgery unit recovery room construction, and trainings in advanced clinical skills.

Pillars 7 and 8: quality of surgical and anaesthesia care service delivery and monitoring and evaluation

Background

The first step to implementing quality improvement is measurement of quality. However, the desire for data must be balanced with the additional burden and difficulties of proper collection, interpretation, and transformation into meaningful change. Challenges arose with attaining stakeholder consensus on measurement indicators to ensure the breadth of the surgical system, from nursing to surgery and anaesthesia, was captured. To incentivize data collection at the facility level, indicators were selected to provide

not only nationally useful information, but also hospital-relevant outcomes. High-level indicators reflecting long-term change in surgical capacity were combined with short-term indicators affected by surgical team performance. For example, although national density of surgical, anaesthetic, and obstetric professionals is useful to the FMOH, affecting change in this indicator is beyond facility-level control and will not motivate a surgical team as much as, for example, delayed start times.

Results

Two tools were designed to measure SaLTS' impact. The first tool is a comprehensive surgical capacity assessment tool combining an existing tool of the WHO with those of the Ethiopian FMOH and Harvard PGSSC. The second tool consists of 15 key performance indicators (KPIs) to be collected at the facility level and reported nationally. The long-term KPIs will be reported annually to influence national-level planning and implementation, while the short-term KPIs will be reported monthly or quarterly to inform and inspire facility-level change.

The hospital assessment tool was successfully used to baseline 45 sites across the nation, and KPI collection is due to launch nationally by the end of 2017. The feasibility of collecting these indicators and the resultant quality will need to be evaluated, and data elements modified accordingly. Consistent data quality requires developing widespread, systematic methodology for collection and reporting, which is a challenge ahead to reliably judge the early effects of implementation efforts.

The push for data has been accompanied with training for how to use this new information. From January to February 2017, a large-scale quality improvement training was rolled out to 2700 selected participants from RHBs and hospitals across all regions. This platform gave facility teams the opportunity to plan and implement quality improvement projects, including those aimed at surgical services.

Conclusion

Ethiopia has emerged as a leader in Sub-Saharan Africa in prioritizing surgery as part of a national healthcare strategy through the SaLTS initiative. The FMOH has successfully begun to implement the largest surgical health system reform in a low-income country. The key factors to their success have been: (1) establishing strong leadership and ownership in government, (2) utilization of existing learning systems (EHAQ) for implementation, (3) recognizing the importance of partnerships and collaboration, locally among the surgical professionals, government

teams, and local NGOs, as well as globally among the private sector, investment partners, and external NGOs, (4) engaging all stakeholders from planning to execution, (5) defining locally relevant and evidence-based essential surgical, obstetric, and anaesthetic care packages, and (6) using early learning experiences in two regions for national scale-up.

The main challenges now facing SaLTS include: (1) uniformity in implementing the plan's pillars throughout all regions in Ethiopia, (2) attracting new partners and investors to continue putting the plan into action, (3) ensuring robust evaluation of early results, and (4) maintaining the momentum of the movement.

Moving forward, early results on the impact of SaLTS interventions will be illustrative in informing the future direction of national scale-up. Ethiopia's comprehensive SaLTS monitoring and evaluation strategy will build a body of implementation science knowledge that will allow for scaled evidence-based interventions in other countries in the region.

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Compliance with ethical standards

Conflicts of interest The Ethiopian Government is responsible for the national SaLTS-related activities funding. GE Foundation has provided financial support for the SafeSurgery2020 project and associated partners. Grand Challenges Canada is in the final negotiations to provide funding to Assist International for building oxygen plants.

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