

**Evaluation of the Five-Year National
Safe Surgical Care Strategy and the
Saving Lives Through Safe Surgery (SaLTS
I) Program in Ethiopia (2016-2020):
A Nationwide Evaluation**

October 2021



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Foreword

In 2008 E.C., Ethiopia responded to the World Health Assembly resolution (WHA68.15) by designing the Saving Life Through Safe Surgery (SaLTS) flagship initiative to make emergency and essential surgical and anesthesia care accessible and affordable as a component of universal health coverage. Moreover, it intends to ensure the delivery of quality, safe, essential, and emergency surgery throughout the country to ease the national burden of diseases, disability, and death that are preventable through Safe surgery.

For successful implementation of the initiative, the Ministry of Health in collaboration with regional health bureaus and partners had designed a five-year strategy. The strategy was executed from 2016-2021 by all actors in the surgical care provision.

In 2013 E.C., with an overall goal of generating evidence to inform subsequent strategic planning and data-driven decision-making and policy formulation on surgical and anesthesia care in public and private health facilities, the evaluation was conducted. Specifically, the assessment had aimed to obtain the outcomes of the national SaLTS strategic plan and lessons learned during the implementation of the strategy in public and private health facilities.

The evaluation was conducted in collaboration with Armauer Hansen Research Institute and Jhpiego Ethiopia. The study was done professionally with the involvement of policymakers, program leaders, researchers, and clinicians. This could be a great lesson for the other program areas in the future. This report has outlined the key successes achieved and gaps identified, challenges faced during the implementation, and recommendations forwarded.

I am very thankful for all involved in this assessment and I am quite sure that the report will help to understand the current status of surgical care in Ethiopia, and the findings of the report will be used to improve the care provided mainly both in private and public facilities.



Hassen Mohammed Beshir (MD, MPH)
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We also would like to thank the key informants, clinicians, and patients for their willingness to share their experience and information on the SaLTS I program.

Last, but not least, we are indebted to the quantitative and qualitative data managers for their relentless efforts in collecting and reporting the required information without which this evaluation wouldn't have been completed successfully.

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Abbreviations

CSR Central Sterilizing Room
DHIS2 District Health Information Software 2 EDHS
Ethiopian Demographic and Health Survey EESC
Emergency and Essential Surgical Care HMIS Health
Management Information System HSTP Health Sector
Transformation Plan IDI In-depth Interviews
IESO Integrated Emergency Surgical Officers KII
Key Informant Interviews
LCoGS Lancet Commission on Global Surgery LMG
Leadership, Management, and Governance LMIC Low-
and Middle-Income Countries MOH Ministry of Health
OR Operating Room
OT Operating Theater
POMR Perioperative Mortality Rate
PGSSC Program in Global Surgery and Social Change QI
Quality Improvement
QMU Quality Management Unit
RHB Regional Health Bureaus
SaLTS Saving Lives Through Safe Surgery SAT
Surgical Assessment Tool
SSC Surgical Safety Checklist
SSI Surgical Site Infection
TOT Turnover Time
WHO World Health Organization

Background: From 2016 to 2020, the Government of Ethiopia implemented a five-year national safe surgery plan that aimed to expand access to safe, affordable, and timely emergency and essential surgical care (EESC) in Ethiopia. Additionally, a national flagship program, the *Saving Lives Through Safe Surgery (SaLTS)* program, was implemented. The Ministry of Health commissioned this program evaluation to assess the outcomes of the strategy and generate evidence on the yield of the program in terms of expanding access to safe, efficient, and equitable surgical care in 10 regions and two city administrations in Ethiopia.

Aim: This program evaluation was designed to review the outcomes of the national safe surgery strategy, the changes brought about through the SaLTS flagship program, and document the lessons learned in public and private health facilities in Ethiopia.

Methods: A cross-sectional study design with quantitative and qualitative methods was used to evaluate the national surgical strategy and the SaLTS I program, which was implemented from 2016 to 2020. A pre-tested data collection tool was used to collect data from health care facilities and individual key informants (policymakers, program managers, clinicians, clients, and patients and partners). For quantitative data, a self-administered quantitative semi-structured questionnaire adapted from the globally validated Surgical Assessment Tool and a medical record abstraction tool was used. Additionally, a qualitative method was used to explore client experience and stakeholder's reflection of the quality of surgical care. Atlas-ti Version 9 software was used to code transcripts of the qualitative data, and STATA Version 15 statistical software was used to analyze quantitative data. The quantitative and qualitative data were summarized using descriptive statistics and thematic analysis, respectively.

Results: Over six months, the surveyed health care facilities had 125,075 surgical admissions (surgical, gynecologic, and obstetric admissions). Of these, 38.9 percent were reported at public specialized hospitals, and 13.2 percent were reported at private hospitals. There were a total of 59,375 surgical admissions during this period, including orthopedic admissions. A total of 145,368 obstetric and gynecologic admissions per annum were reported.

In a quarter, 69,717 surgical procedures were performed in the surveyed health care facilities, of which 40,202 were major surgeries (58 percent) and 29,515 were minor surgeries (42 percent). More than a third (32.2 percent) of both minor and major surgeries were performed at public specialized hospitals. During the period, 2.4 percent and 1 percent of major surgery (elective cesarean section) were performed at health centers' operating room (OR) blocks.

Specialized hospitals also performed nearly half (46.3 percent) of all cesarean sections in a quarter. A larger volume of open fracture management was reported in public specialized hospitals (1,162 or 49.4 percent) and private hospitals (785 or 33.4 percent). Of the total of 8,584 patients referred out for surgical intervention, 3,540 (41.2 percent) surgical patients were referred from public private hospitals to other health care facilities. Multiple reasons are cited for referral of surgical patients to other health care facilities. Lack of diagnostic modalities (78.6 percent), lack of skilled professionals (45 percent), lack of equipment/instrument (50.8 percent), lack of blood (62.5 percent), and lack of supply/medication (56.9 percent) were the most common reasons for surgical referral out from public primary hospitals. Electric power interruption was found to be the leading cause of emergency and essential surgical care interruption (30.5 percent), followed by equipment dysfunction (23 percent) and laundry/central sterilizing room (CSR) dysfunction (14.5 percent). Average pre-admission waiting time recorded in private hospitals was one and half days, whereas

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average pre-admission waiting time in generalized and specialized hospitals was 38 and 36 days, respectively. On average, clients traveled 284.3 (\pm 198.3) km or 28.4 hours to access surgical services at specialized hospitals. Moreover, patients were able to get surgical services at primary hospitals within 49.2 (\pm 39.2) km or 21.3 hours.

Case management guidelines for emergency care were found to be unavailable in nearly a third (48 or 27.91 percent) of the evaluated health care facilities. Comparatively, health center with OR blocks demonstrated higher proportion of availability of case management guidelines for emergency care in which 8 (88.9 percent) of the evaluated 9 health facilities reported its availability. Similarly, lower availability of case management guidelines for surgery, obstetrics, and anesthesia were reported in the health care facilities in which only 99 (57.55 percent) of the 172 evaluated health care facilities reported its availability, of which private and specialized hospitals reported better availability with 23 (71.9 percent) and 11 (68.8 percent), respectively, than health centers with OR blocks, which reported the least number of availability with 4 (44.4 percent).

Surgical safety checklist (SSC) use improved during implementation of surgical care strategy. The clinical audit data disaggregated by level of care showed that the specialized hospitals and health center OR blocks have demonstrated the highest percentage of compliant SSC use, 58.82 percent and 67.10 percent, respectively. The lowest percentage of SSC use was observed in private health facilities; only 22.5 percent of the charts had SSC attached, and only 60.31 percent of the checklists were complete. However, compared with the clinical audit findings, a higher SSC use rate was reported through the national data management system, the HMIS/DHIS2 platform in which the overall average rate of SSC use for major surgeries was higher in public health facilities (81 percent) compared with private health facilities (26 percent).

Of the total 1,603 medical records of post elective surgery patients who were operated on 90 days before an evaluation day, or during chart audit and that were extracted from the 172 evaluated health care facilities, the number of charts that demonstrated evaluation of surgical wounds for presence/absence of surgical site infections (SSI) and that documented the clinicians' wound assessment findings were very low, 827 (51.56 percent).

Most of the evaluated health care facilities (68.71 percent) didn't have an agreed operation timeline as to when to start the first elective surgical procedure of the operation day. Nearly 60 percent of the charts reviewed showed first case incision time starts after 8:30 a.m. The average turn over time (TOI) for the evaluated public hospitals was 40.5 minutes, and the longest average TOT was observed in private health facilities (79.52 minutes). Similarly, the TOT was found to be more than 30 minutes for 51.48 percent of consecutive surgical charts. Cancellation rate was high for public specialized hospitals, in which 14.6 percent of scheduled OR cases were canceled (mainly because of medical reasons [28.5 percent] and shortage of blood and blood products [21 percent]). Public primary hospitals had the lowest cancellation rate (3.7 percent).

The highest proportion of surgical beds allocated of total hospital beds was in public generalized hospitals (23.4 percent) and Addis Ababa health centers with OR blocks (22.04 percent). Health centers with OR blocks allocated 73% of their total hospital beds for gynecology and obstetrics wards. Moreover, an exceedingly low ratio of surgical beds to population served was a common feature across all health care levels (except for private hospitals, as they do not have a clearly defined catchment population).

Health centers had no surgeon and obstetrician, rather they were exclusively staffed with qualified Integrated Emergency Surgical Officers (IESO), qualified anesthesiologists/anesthesia care providers, and nurse anesthetists. Specialized hospitals had a higher number of surgeons (336, 51.1

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percent) compared with other levels. Primary hospitals have considerably lower numbers of obstetricians (16, 4.8 percent) compared with private hospitals (77, 23.1 percent). Public general hospitals and private hospitals have relatively the same proportion (90 percent) of functioning operating theater (OT) tables. Nonfunctioning OT tables contributed to the highest proportions of reasons listed for OT tables not in use in all public hospitals (85 percent). On the other hand, a lack of skilled professionals (80%) and low patient flow (42.8%) contributed for OT tables not in use in Addis Ababa health center OR blocks and private hospitals, respectively.

Most (74 percent) health care facilities did not monitor data of a patient's readmission status, one of the key indicators for assessing quality of surgical care. Exit interview participants reported accessible service, good case management, hospitality, communication, and equitable service were in place. On the other hand, long wait times, re-appointments, inadequate drugs and laboratory services, and lack of food, water supply, pajamas/gowns, and toilet were reported as gaps.

Providers and key informants discussed that the SaLTS initiative was found to be very important and has brought significant changes. SaLTS was reported to be successful in leadership and governance, human resource development, monitoring and evaluation, and quality and safety. However, limited to no change was reported by most participants in infrastructure, supply and logistics, innovation, and advocacy. Lack of a responsible body who owns the program and lack of resources were articulated as challenges and gaps in the program by most of the participants.

Conclusions and recommendations: Overall, the program evaluation results showed inadequate access to surgical services, and noticeable variation was illustrated with the level of health facilities. The majority of surgical admissions and procedures were reported from specialized hospitals, which shows the magnitude of burden in these health facilities. A low volume of surgical procedures was performed at the health centers with OR blocks where SaLTS I is not being implemented in full. Public primary hospitals accounted for more than one-third of the total surgical referrals to other health care facilities. The most common reasons stated were the lack of diagnostic modalities, skilled professionals, equipment/instruments, blood, and supplies/medications. Electrical power interruption, equipment, and laundry/CSR dysfunction were found to be the most common reasons for the interruption of emergency and essential surgical care. This may indicate the weak status of surgical infrastructure in the country and also may be one of the reasons for having long average pre-admission wait times in generalized and specialized hospitals. In contrast to the recommended distance to access EESC, surgical patients in Ethiopia travel long distances, up to 28.4 hours, to access surgical services, which indicates the need for investment and government commitment to expand surgical access to the general public.

Moreover, findings showed underutilization of surgical safety checklists and poor surveillance, documentation and diagnosis practice of SSI, and other surgical adverse events. On the other hand, health care facilities providing surgical services were poorly equipped with case management guidelines for surgery, obstetrics, and anesthesia.

The majority of the health care facilities performing elective surgical procedures reported not having a set/agreed time for the first elective case incision for the day. Chart reviews of consecutive elective surgical procedures also revealed that time between the majorities of the cases was more than 30 minutes. The high rates of surgical case cancellation for booked elective surgeries reported from public specialized hospitals were attributed mainly to medical reasons and lack of blood and blood products.

The deployment of qualified IESO care providers and nurse anesthetists in the health centers was found to be a crucial step to bridge the gap of looking for highly qualified specialists. Nevertheless, a

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significantly low ratio of surgical workforce, less than or equal to 1 per 100,000 population, served in all four levels of health care facilities evaluated. However, the highest ratio of surgical workforce per 100,000 population served at health center OR blocks in Addis Ababa with 4.83 per 100,000 population. There was chronic shortage of surgical beds across all levels of health care, from 1:11,000 population in health centers with OR blocks to 1:61,000 population in public specialized hospitals. More than one third of OT tables in public hospitals were found to be non-functional, which exacerbates the existing chronic shortage of OT tables in those hospitals. On the other hand, the lack of adequate skilled manpower in health centers with OR blocks and low patient flow in private hospitals were found to be the major reasons for not using OT tables.

This evaluation also revealed that there is an absence or shortage of emergency and essential major and minor surgical care kits, OR equipment, and/or supplies across all levels of public health facilities and private hospitals.

In light of the World Health Organization's (WHO) system building blocks framework, it is highly recommended to ensure the capacity of health workforce, infrastructure, and essential major and minor surgical kits and equipment to achieve high quality service delivery and to improve health. In addition, monitoring the functionality status and timely maintenance of essential OR equipment is recommended to enhance the efficiency and delivery of high-quality service.

These results suggest sizable gaps in readiness of health facilities for surgical services and low access and utilization of surgical services and safety procedures. Therefore, it would be most valuable to strengthen surgical services of the health facilities with relevant human resources, medical equipment, and supplies. Results also indicated the importance of enhancing the availability and use of surgical safety checklists and case management guidelines to reduce adverse incidents of surgeries or to improve surgical efficiencies. Finally, increasing access to surgical services and reducing delays in admission and initiation of surgical procedures would help to increase the use of the respective services.

Getting ownership of the program, capacity building, incentives to professionals, provision of supply, improving the infrastructure, engaging stakeholders, strengthening monitoring and evaluation, improving recording and documentation, and budgeting to the program are some of the major areas that demand improvement.

Data use: The study findings aimed to inform the new five-year surgical care strategy and improve interventions for access to safe and affordable Surgical Care in Ethiopia.

Keywords: Emergency and Essential Surgical Care, Access, Safety, Efficiency.

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Introduction

Background on Emergency and Essential Surgical Care

Globally, around 5 billion people of the world's 7.9 billion population lack access to safe, affordable, and timely emergency and essential surgical care (EESC). This problem leads to an increased preventable mortality, morbidity, and avoidable disability and deformity. In 2005, the World Health Organization (WHO) launched an initiative to better access Emergency and Essential Surgical Care (EESC) and published cost-effective surgical care interventions and released a situational analysis tool to assess the availability of EESC and needed inputs health facilities in low- and middle-income countries (LMIC). The initiative galvanized global commitment, successfully advocated for the

inclusion of EESC as an integral component of the Universal Health Coverage packages, and convened member countries to prioritize surgical care in their national health strategy plan. [1,2]

To achieve this in LMICs and improve their capability to deliver emergency and essential surgical care, it is necessary to measure access in terms of capability, capacity, timeliness, safety, and affordability. In line with this, the Lancet Commission on Global Surgery (LCoGS) put forth the following targets to be achieved by 2030. The targets include 80 percent coverage of essential surgical and anesthesia services per country; at least 20 surgical, anesthesia, and obstetric physicians per 100,000 population; 5,000 procedures annually per 100,000 population, and 100 percent protection against catastrophic expenditure from out-of-pocket payments for surgical and anesthesia care.

The Saving Lives Through Safe Surgery (SaLTS) Program

Ethiopia's safe surgery strategic plan was created for five years (2016-2020) to address the huge unmet need for basic surgical care services. The proposed strategies are well aligned with the Health Sector Transformation Plan (HSTP), WHO recommendations, and the Ministry of Health (MOH) health sector transformation plan and quality strategy. In line with the quality and equity transformation agenda and as part of recognizing the key roles that essential and emergency surgical care can play role in achieving universal health coverage, the Federal Ministry of Health (FMOH) had prioritized surgical and anesthesia care as part of the primary health care package and launched Saving Lives Through Safe Surgery (SaLTS) as the national flagship initiative. The Saving Lives Through Safe Surgery (SaLTS) initiative aims to expand access to safe surgical care in Ethiopia. In a nutshell, SaLTS envisioned improving the quality and access to safe, essential, and emergency surgical and anesthesia care across the health care systems. [3,4]

This strategy has been instrumental to define and standardize the minimum care packages needed to expand emergency and essential surgical and anesthesia care. The eight intervention pillars described in the strategic plan include: (1) *Leadership, Management, and Governance*; (2) *Infrastructure Development*; (3) *Supplies and Logistics Management*; (4) *Human Resource Development*; (5) *Advocacy and partnership*; (6) *Innovation in problem-solving*; (7) *Quality and Safety across the perioperative continuum of surgical and anesthesia care*, and (8) *Monitoring and Evaluation*. [5]

The Lancet (LCoGS) in 2015 formulated six metrics that can enable countries to measure their surgical anesthesia care delivery. These indicators have subsequently been accepted by the World Bank to be included in the World Development Indicators. On the other hand, these surgical and anesthesia care delivery outcome measurement indicators also have been included in the WHO 100 Health indicators. As part of the world, those indicators are also crucial for Ethiopia to measure the

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outcomes of surgical and anesthesia care delivery in the nation apart from other indicators, which can be used and tailored to our context.

Now, this study is proposing to evaluate the national surgical care strategic plan and its flagship program, the SaLTS program. The evaluation will be forward-looking and will effectively capture lessons learned and provide information on the nature, extent, and where possible the potential impact and sustainability of the SaLTS initiative. The evaluation will assess the initiative's design, scope, implementation status, and the outcomes the nation gained. The evidence generated will be used to inform the subsequent five-year strategy and surgical care improvement plans.

Problem Statement and Rationale

Since the five-year surgical care strategy was launched in 2016, it has not been evaluated. Thus there is a need to revisit the current strategy, and strong evidence is needed to inform the overall outcomes of the program and inform the development of new strategies and key interventions

described to achieve universal access for safe and affordable emergency and essential surgical care in Ethiopia.

The MOH called for this program evaluation to review the national surgical care strategic plan and its flagship program, SaLTS. The evaluation intended to capture effective lessons learned and provide information on the nature, extent, and where possible the potential impact and sustainability of the SaLTS initiative. The evaluation assessed the initiative's design, scope, implementation status, and the outcomes the nation gained. It will also help to collect and analyze lessons learned, challenges faced, and best practices obtained during implementation of the flagship initiative during the specified period, which will be a springboard for the subsequent planning to improve the surgical and anesthesia care in the nation.

This evaluation assessed the performance of the initiative against planned targets on all strategic pillars. The pillars of evaluation encompassed: access for surgical and anesthesia care; surgical safety; surgical system efficiency; surgical workforce and system; client experience, and program learning. It also assessed the preliminary indications of potential impact and sustainability of results, including the contribution to capacity development. The findings and recommendations of the evaluations aimed to inform the key stakeholders (i.e., FMOH, professional associations, and partners) who had a role in the design and implementation of the initiative. Importantly, the evidence generated will be used to inform the subsequent five-year strategy and surgical care improvement plans.

Goal and Objectives of the Evaluation

The overall goal of the evaluation was to generate evidence to inform subsequent strategic planning and data-driven decision-making and policy formulation on surgical and anesthesia care in public and private health facilities in Ethiopia.

General Objective

To assess the outcomes of Ethiopia's national safe surgical care strategic plan and lessons learned during implementation of the surgical care plan in public and private health facilities in Ethiopia.

Specific Objectives: The specific objectives were organized by thematic area described below:

Specific Objective 1: To evaluate access for surgical and anesthesia care after the implementation of the safe surgery strategic plan in public and private health facilities in Ethiopia.

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This objective will review the changes in terms of surgical access for emergency and essential surgical care. The key access metrics include surgical volume, productivity of the surgical operating room (OR) facility; surgical referral out and reason for referral at Primary Health Care Unit (PHCU), and the number and functionality of existing OR(s) per facility (access equated to per 100,000 populations and clients' physical access). This also includes the surgical procedures or the Bellwether procedures disaggregated by type of procedure, region, and facility levels at all levels (Primary, Secondary, Tertiary levels).

Specific Objective 2: To evaluate the magnitude of surgical safety incidents and the factors associated with the perioperative mortality rate in public and private health facilities in Ethiopia.

This objective will review the overall safety of surgical care, magnitude, and major factors associated with institution based perioperative mortality rate, surgical site infection, and use of surgical safety checklists, anesthesia adverse events, and other complications.

Specific Objective 3: To evaluate the surgical system efficiency in public and private health

facilities in Ethiopia.

This objective will review the surgical system and process efficiency metrics such as productivity of the surgical OR facility, first-case start time (pacemaker case), patient turnover time for the first two cases of the day, and pre-admission waiting time for elective surgery (“backlog”).

Specific Objective 4: To describe the availability and adequacy of the surgical workforce in public and private health facilities in Ethiopia.

This objective will review the availability and adequacy of the surgical and anesthesia workforce in terms of the type/category of the surgical team, the total number of Surgical, Obstetric, and Anesthetic care providers (SOAs), their surgical skills or training provided, awareness on key surgical care monitoring indicators, and workforce density equated to per 100,000 catchment populations. This includes the leadership and system management skills of the surgical service leadership.

Specific Objective 5: To explore **client experience (patient satisfaction)** of surgical care in public and private health facilities in Ethiopia.

This objective will review the clients’ experience or patient satisfaction of surgical care, primarily the physical access, overall quality of care and patient safety, timeliness, and client-centeredness or equity of surgical care.

Specific Objective 6: To document the **program learning**, successes, and challenges of the design, implementation, and monitoring of the SaLTS program.

This objective will review the successes and challenges of the SaLTS program, SaLTS program design, review of the status of 8 strategic pillars (outlined above), implementation structure, surgical leadership and stakeholder coordination, M&E indicators and data use, experience sharing and communication platform at all levels, evidence generation, and lessons learned.

Evaluation Methods and Materials

Context

The MOH has commissioned a nationwide evaluation of the national surgical care program that has been implemented across Ethiopia. The program has been operational in 10 regions and two city administrations. Since the launch of the five-year surgical care strategy in 2016, the program has not been evaluated, and now the evidence generated is needed to inform the overall outcomes of the program and inform the development of new strategies and key interventions described to achieve universal access for safe and affordable emergency and essential surgical care (EESC) in Ethiopia. Under the leadership of the MOH Quality Directorate, and with support from Jhpiego Ethiopia, these evaluations will be carried out by all Regional Health Bureaus (RHB) and professional societies directly concerned with surgical care.

Study design

A cross-sectional study with both quantitative and qualitative research methods was conducted to evaluate the national surgical care program implemented in public and private health facilities. A pre tested data collection tool was used to collect data from sample health care facilities of seven regions and two city administrations in Ethiopia. Key informants, including policymakers, program managers, clinicians, and partners, were interviewed using a semi-structured interview guide focusing on the successes, challenges of the national strategy, and stakeholder's reflection of the overall access and quality of surgical care in Ethiopia for the period 2016 through 2020. For quantitative data, the study participants were asked to complete a self-administered semi-structured questionnaire adapted from the globally validated Surgical Assessment tool and a medical record abstraction tool. Additionally, a qualitative method was used to explore information on client's or patient's experience (satisfaction) of safe surgical care and stakeholder's reflection of the quality of surgical care and the national strategy.

The evaluations of SaLTS were carried out in accordance with Ethiopian MOH Evaluation Norms and Quality Standards of evaluation of the implementation of the strategic plan/program. The Evaluations were led by MOH in collaboration with the Armauer Hansen Research Institute (AHRI), Regional Health Bureaus (RHBs), and Jhpiego Ethiopia.

Study location and period

This program evaluation was conducted in the health care facilities of seven regions and two city administrations in Ethiopia from December 30, 2020, to June 10, 2021. Tigray, Afar, Amhara, Oromia, SNNP (Southern Nation, Nationalities, and People), Sidama, and Harari were regions of Ethiopia included in the evaluation. Addis Ababa and Dire Dawa city administrations also were included.

Sampling procedure and sample size

A multi-stage stratified convenient sampling method was used to choose public health care facilities (primary, general, and referral or teaching hospitals) and private health care facilities from all regions and city administrations for the evaluation process. According to HMIS2, there were 282 government hospitals in the country that were providing emergency and essential surgical care. Among those public hospitals, 26 were referral hospitals, 75 were general hospitals, and 181 were primary hospitals. The sample size was estimated using a single population proportion formula ($n = \frac{z^2pq}{e^2/1 + (z^2pq/e^2)*N}$) for a finite population with a 5 percent margin of error. Accordingly, the

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sample size was determined as 163 public hospitals. As a stratified sampling method was used, the sample size for each stratum of primary hospitals (n_p), general hospitals (n_g), and referral hospitals (n_r) was calculated using the proportional allocation method, resulting in 105, 43, and 15 hospitals, respectively. In addition, to assess the status of surgical care in the private health sector, private health facilities providing surgical care services were included. According to the data we obtained from the MOH, 45 private health facilities were providing safe surgical care. Thus, using the formula $n = \frac{z^2pq}{e^2/1 + (z^2pq/e^2)*N}$, the sample size for private hospitals was estimated at 40.

A mixed-method validated Surgical Assessment Tool (SAT), jointly developed by the Harvard Program in Global Surgery and Social Change (PGSSC) and WHO and adopted and validated in the Ethiopian context, was used at each facility. The assessment consisted of hospital visits and interviews with hospital directors and surgical and anesthesia care providers designed to assess five domains: infrastructure, service delivery (focused on SaLTS M&E key performance indicators [KPIs], catchment population the hospital serving, and proportion of catchment population who can access the facility for emergency and essential surgical and anesthesia care within 2 hours), workforce (focused on specialist surgical, obstetrics, and anesthetics care providers), information management, and financing (budget spent for surgical and anesthesia care provision, which included all amounts spent for consumables and equipment).

For the qualitative method, purposive sampling was used to select public hospitals (primary, general, and referral or teaching hospitals) from the selected study sites in a quantitative study. Accordingly, three public primary hospitals, five public general hospitals, three public teaching or referral hospitals, three health center OR block, and two private hospitals implementing a safe surgical care strategy and SaLTS program were selected purposely based on the client load that the health facilities had.

The study participants comprised clients (patients), surgeons, anesthesiologists, gynecologists, nurses, medical doctors, case team leaders, health facility heads, woreda and regional health office representatives, and programmers and policy makers from FMOH and NGOs. A total of 77 in depth interviews were conducted: 26 (11 from Addis Ababa, 9 from Oromia, and 6 from SNNPR) exit interviews with patients who underwent surgery, 30 in-depth interviews (IDI) with service providers at different levels, and 21 key informant interviews. Participants were included in the study based on eligibility criteria. Surgery patients 18 years and older who at exit were willing to participate in the study were included until sufficient data were reached. Key informants and in-depth interview participants were purposely selected based on the convenience and position they have in consultation with key stakeholders involved in the surgical care program.

Data collection procedures and tools

This evaluation program used both quantitative and qualitative data collection methods: **Quantitative method**

The data were collected using a pre-tested data collection tool, which was adapted from the globally validated Surgical Assessment Tool and a medical record abstraction tool. Routine HMIS surgical care services database, records in liaison offices, and charts from sampled health facilities were reviewed to assess surgical access in Ethiopia after implementing the first five-year SaLTS I strategy. Thirteen experienced and trained data collectors reviewed the data from December 2020 to June 2021. Data collectors reviewed quality control measures such as: completeness, correctness, consistency, and synchronizing and archiving data with RedCap. The data reviewed includes that from September 2020 to May 2021. Specifically for total surgical procedures, the data were intended to capture the volume of procedures done in the 90 days before arrival of the data collector. Regular

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supervision and follow-up were made throughout the data collection period. Supervisors checked daily for completeness, correctness, and consistency of the reviewed data. The principal investigator led the overall activities and the entire process of data collection. Precaution measures including maintaining wearing face mask, using hand sanitizers, and physical distancing were implemented to prevent COVID-19 transmission during data collection.

Qualitative method

The qualitative study was conducted from February 2021 to June 2021. An inductive qualitative approach was used to interpret meaning from the data and make comparisons. Qualitative data were collected through an exit interview, in-depth interviews (IDI), and key informants' interviews (KII) to explore patient satisfaction, the safe surgical care practice, and overall experience in the health facilities. Face-to-face audio-taped interviews (average 40 minutes) with patients, service providers, and key informants were conducted. The interviews were pre-arranged, and all interviews were at the venue of choice of participants. However, some interviews were conducted by phone because a few key informants were unavailable for face-to-face interviews. Qualitative research advisors led the entire process of qualitative data collection. Each interview (exit patient, IDI, and KII) was conducted by experienced and trained qualitative data collectors led by a research advisor. Semi structured interviews with open-ended questions were used to facilitate the interviews and generate the relevant data. The exit interview, IDI, and KII tools were piloted to evaluate the flow of the interview, to identify sensitive areas, and to get further emerging ideas and direction. The participants then conducted an interview to narrate their experience in their own words.

Throughout the interviews, follow-up questions using probes were asked to acquire a deeper understanding of when an explanation was unclear. Each IDI, KII, and patient exit interview was audio recorded with the consent of the participants. The patient exit interviews were conducted in the local language for all participants.

Data Management and Analysis

The evaluation data were collected, cleaned, and entered in a period of six months, and the data collectors archived cleaned data every week. The survey team then exported the data into STATA statistical software Version 15 for further analysis. Additional data cleaning and consistency checks were done using the STATA software to detect outliers and inconsistent variables. Descriptive statistics such as mean, median, percent, frequency, visual graphs, and other descriptive measures were calculated.

The evaluation team also performed subgroup analyses (between regions, health facilities, or interventions) on the outcomes using descriptive statistics. After this preliminary report, the study team will carry out further analysis to evaluate the effectiveness of the project by comparing the end line project performance with the baseline/benchmark values.

Thematic analysis was used to identify and analyze important themes from the qualitative data. The audio-taped data were transcribed verbatim into English. The investigators read transcripts and independently developed themes following the objective of the evaluation. The themes were consolidating. The data were categorized following the themes and codes using Atlas.ti software, Version 9. Findings were interpreted within the frame of their original meaning. Quotes that best show differences or consensus were considered to substantiate the finding. An effort was made to keep the anonymity of participants in the quotes.

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Table 1: Study variables and definition.

Tools	Variable	Method, tools
Objective 1 (surgical access)	Access and other surgical outcomes KPIs (surgical volume, surgical referral out and reason for referral, pre-admission waiting time for elective surgery, number of OR, number of OR per facility, functional OR surgical procedures)	Methods: Quantitative, record review Tool 1: Quantitative, abstraction from records (registration books or patient chart)
Objective 2 (surgical safety)	Safety (institution-based surgical related deaths, magnitude, diagnosis and reporting practices of surgical site infection, the rate of safe surgery checklist utilization, other complications, and anesthesia adverse safety incidents); workforce (the availability and adequacy of surgical and anesthesia)	Records of Quality Management Unit; OR registry, anesthesia register Tool 1: Quantitative, abstraction from records (registration books or patient chart) Tool 3: Data abstraction tool from chart review

Objective 3 (system efficiency)	Pre-admission in hospital wait time for elective surgery, the first case start time (to be determined by reviewing 10 random charts of patients scheduled as first case in the study period), OR productivity (count of the number of major surgeries performed on a specific OR table in 24 hours), and patient turnover time (to be determined by reviewing anesthesia registration book, at least 10 percent of patients scheduled in the study period)	Quantitative data abstraction from chart review, OR registry review, and review of an anesthesia logbook Tool 1: Quantitative, abstraction from records (registration books or patient chart) Tool 3: Data abstraction tool from chart review
Objective 4 (surgical workforce)	Surgical workforce (their surgical skills or training provided, awareness of key surgical care monitoring indicators)	Record review, self-administered questionnaire Tool 1: Self-administered questionnaire and Human Resource Administration Office Records
Objective 5 (client experience)	Patient satisfaction or client experience of the surgical care (primarily the physical access, overall patient safety, timeliness of care, client-centeredness, or equity)	Tool 5: Qualitative, exit interview

Operational definition

Operation: defined as a procedure (the incision, excision, or manipulation of tissue that needs regional or general anesthesia, or profound sedation to control pain) undertaken in an operating room.

Functioning operating room: defined as a room in which there is required equipment for surgical and anesthesia care and operations were taking place actively at the time of evaluation.

OR blocks: health centers that perform emergency and essential surgical care including Bellwether procedures (cesarean section, laparotomy, and open fracture management).

Access for surgical care: defined as the percentage of the population that can access a surgical facility capable of performing Bellwether procedures within two hours of travel.

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Institutional capacity: Proportion of population who can have access to a Bellwether facility can be determined as local clinicians used locations of Bellwether Hospitals and adjacent regions in the catchment area of the hospital within 2 hours distance combined with regional population data to calculate proportion within 2 hours zone for the specific facility. The national average will be calculated thereafter.

First case incision start time: The time of surgical incision for the first elective case scheduled in the OR room for the day, where “start” refers to the incision time (not in the OR time). Used as a proxy indicator for system efficiency because delay in incision time for the first case will also delay subsequent patient schedules.

Turn Over Time (TOT): Measures the time (in minutes) that elapsed between the preceding patient surgery end time and the succeeding patient incision start time.

Perioperative Mortality Rate (POMR): Proportion of all major surgeries leading to in-hospital deaths among patients within 30 days of the index procedure. Numerator: Total number of perioperative deaths (intraoperative and postoperative deaths [regardless of cause]) in the reporting period. Denominator: Total number of major surgeries performed (e.g., cesarean section, laparotomy, open fracture) in the reporting period.

Safety checklist use/completeness: The proportion of surgeries for which the SSC was correctly completed. Numerator: Number of major surgeries where the SSC was correctly completed in the reporting period. Denominator: Total number of major surgeries in the reporting period.

Safety checklist adherence: Adherence to the appropriate use of SSC is evaluated in two ways: (a) prospectively, while the surgery is performed in real-time, or (b) retrospectively, after completion of the surgical procedure. In the first instance, live observation methods will be used to see if the designated staff completes the checklist in real-time each of the steps on the checklist, if the tool has been “correctly completed” in real-time use of the SSC (Sign In, Time Out, and Sign Out), and if all steps have been fully completed, then the use and adherence are labeled optimum. In the second instance, a clinical audit will be conducted to assess the completeness of the checklist attached to the surgical client, and if one or more eligible entries are missed, the use is labeled sub-optimum.

Surgical referrals out: The total number of patients referred out of the hospital for surgical services after an on-site assessment by a medical professional in the reporting period. This may be because of the inability to perform the procedure at the facility (e.g., lack of blood, lack of surgical or anesthetic skill to perform the surgery, lack of staff, lack of equipment, etc.)

The volume of surgery: Total number of major surgeries performed (e.g., cesarean section, laparotomy, open fracture) in the reporting period. For major surgery, the level of anesthesia is general anesthesia.

Quality Assurance Plan

Data collection procedures and tools were pre-tested through an expert peer review by investigators, data collectors, and study collaborators. The study coordinator and investigators continuously monitored participants’ adherence to study procedure and checked for consistency and completeness of self-reported information. The study teams run queries on sample entries (5 percent to 10 percent) to check for the consistency and completeness of select information.

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Data quality review was conducted by the evaluation team on 5 percent sample facilities where data collected was verified for its accuracy, completeness, and consistency against the data found directly from the sample health facilities. Findings from the quality monitoring field activities showed that the collected data was more or less accurate and consistent. Further observations on the overall surgical record keeping, handling, and reporting systems were made on sampled facilities and reported separately.

To minimize information or observer bias, operational terms were defined. For the qualitative study, the researchers were familiar with the research area, issues at hand, and the project itself, which made it easier to conceptualize the problem and approaches. To ensure completeness of data and variations, regular debriefing was made at the end of every day. Coding themes were done by investigators independently to align differences. While interpreting the data, an effort was made to maintain the original meanings.

Ethical considerations

The MOH of Ethiopia secured an ethical clearance letter from the AHRI ethical review board. A

letter of support was obtained from the MOH. Additionally, letters of support and permissions were obtained from the local administrations to conduct evaluations at the selected health facilities. Consent was obtained from each participant who was willing to take part in this evaluation. Participants were informed about their right to decline participation at any stage of the evaluation. Each participant was assured about the confidentiality of the data.

The target health workers were graduates from higher learning institutions and believed to easily read and understand the consent form and data collection tool prepared in English.

Evaluation Results

Part I: Quantitative study results

General Information

This survey included 172 health facilities (84.7 percent response rate) in seven regions and two city administrations of Ethiopia, 44.77 percent of which were primary hospitals and 22.09 percent of which were general hospitals (Table 2). About a quarter of the sampled health facilities were from Amhara (22.1 percent) and Oromia (26.7 percent) regions, the most populous administrative regions in Ethiopia. Approximately 17 percent of health facilities were sampled from the Addis Ababa city administration (Table 3). Most of the specialized hospitals were sampled from Addis Ababa, whereas most of the primary and general hospitals were sampled from Amhara, Oromia and Southern Nation, Nationalities, and People (SNNP) regions (Table 3).

Table 2: Level and number of surveyed health care facilities, Ethiopia.

Health care facility level	Number	Percentage
Primary hospital	77	44.77
General hospital	38	22.09
Specialized hospital	16	9.3
Health center OR block	9	5.23
Private hospital	32	18.6
Total	172	100

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Table 3: Number of evaluated health care facilities disaggregated by health care facility level and Region/City administration, December 30, 2020, to May 14, 2021, Ethiopia.

Regions/City administrations	Level of health care facilities					
	Primary hospital	General hospital	Specialized hospital	Health center OR block	Private hospital	Total

Tigray region	1	2	1	0	0	4 (2.32%)
Afar region	1	2	0	0	0	3 (1.74%)
Amhara region	25	4	4	0	5	38 (22.09%)
Oromia region	21	17	4	0	4	46 (26.74%)
SNNP region	21	5	1	0	3	30 (17.44%)
Sidama region	8	2	1	0	3	14 (8.13%)
Harari region	0	1	1	0	1	3 (1.74%)
Dire Dawa city administration	0	2	0	0	2	4 (2.32%)
Addis Ababa city administration	0	3	4	9	14	30 (17.44%)
Total	77 (44.77%)	38 (22.09%)	16 (9.3%)	9 (5.23%)	32 (18.60%)	172 (100%)

Catchment populations served

Among the evaluated public health care facilities, public specialized hospitals are serving a higher population (Table 4).

Table 4: Number of Populations served by the evaluated public health care facilities, Ethiopia.

Health care facility level	Number of health facilities evaluated	Total population served by each health care facility level	The average number of patients served by each health facility
Public primary ¹ hospital	72	26,272,830	364,900
Public general hospital	36	66,741,268	1,853,924
Public specialized ² hospital	13	83,762,329	6,443,256
Health center OR block	9	393,056	43,673

Private ³	---	---	---
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¹ Five public primary hospitals didn't report the catchment population served.

² Three public specialized hospitals didn't report their total catchment population.

³ Private hospitals don't have a clearly defined catchment population.

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Access for Surgical and Anesthesia care

Surgical Volume

Surgical Admission

During six months (Dec 14, 2019, to June 12, 2020), the surveyed health care facilities had a total of 125,075 surgical admissions, which included surgical, gynecologic, and obstetric admissions. More than a third (38.9 percent) of these admissions were reported at specialized hospitals and 13.2 percent at private hospitals. During this period there were a total of 59,375 surgical admissions (orthopedics included), and from the reported surgical admissions, 35.6 percent were from specialized hospitals and a comparable percentage of surgical admissions were reported from public primary hospitals (18.8 percent) and private hospitals (19.2 percent). The surveyed health facilities reported 145,368 obstetric and gynecologic admissions per annum. The number of surgical admissions (surgical, gynecologic, and obstetric admissions) increased across the level of health care facilities, where the lowest and highest admission rates were at health centers OR blocks and specialized hospitals, respectively. Furthermore, private hospitals had a sizable contribution to management of surgical cases, thereby reducing surgical admission burdens or backlogs at government facilities (Table 5).

Table 5: Total number of surgical admissions (surgical and ob-gyn) over 180 days (from Dec. 14, 2019, to June 12, 2020) disaggregated by level of health care facilities, Ethiopia.

Surgical admissions N (%)	Level of health care facilities					
	Primary hospital N (%)	General hospital N (%)	Specialized hospital N (%)	Health center OR block N (%)	Private hospital N (%)	Total N (%)
Admissions (surgical and ob-gyn) in 180 days	23,263 (18.6)	35,850 (28.7)	48,679 (38.9)	762 (0.6)	16,521 (13.2)	125,075 (100)
Surgical admissions (orthopedics included) in 180 days	11,137 (18.8)	15,373 (25.9)	21,153 (35.6)	285 (0.5)	11,427 (19.2)	59,375 (100)
Obstetric and gynecologic admissions in one year	33,673 (23.2)	41,432 (28.5)	52,645 (36.2)	1,602 (1.1)	16,016 (11.0)	145,368 (100)

Surgical procedures

Within a 90-day interval of the study period starting from September 2020 to May 2021, 69,717 surgical procedures were performed in the surveyed health care facilities, of which 29,515 were

minor surgeries and 40,202 were major surgeries (Table 6). Major surgeries accounted for 58 percent of total surgeries (Figure 1). The quarterly pediatric surgeries (minor and major) totaled 6,133, and Bellwether surgical procedures (cesarean section) were 27,384. About 11,084 (37.6 percent) minor surgeries and 5,341 (13.3 percent) major surgeries were performed at primary hospitals. Private hospitals reported 18.0 percent (7,239) major surgeries. A total of 1,036 (31.3 percent) and 1,128 (34 percent) Bellwether surgical procedures (laparotomies of both adult and pediatric age groups) were performed at general and specialized hospitals, respectively, whereas private hospitals represented a fifth (21.3 percent) of total Bellwether surgical procedures (laparotomies). Furthermore, specialized hospitals were leading institutions for Bellwether surgical procedures (cesarean section) at 12,673 (46.3 percent). A larger volume of Bellwether surgical procedures (open fracture management) was reported in public specialized hospitals (1,162, 49.4 percent) and private hospitals (785, 33.4

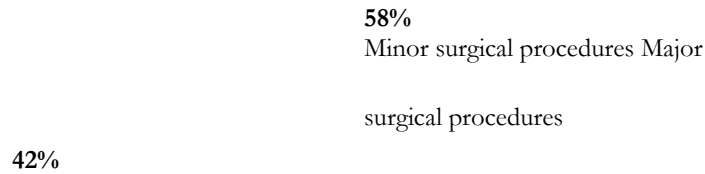
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percent). Nevertheless, the least and sizably low volume of all types of surgical procedures were performed at health center OR blocks (Table 6).

Table 6: Total number of surgical procedures done in a 90-day interval of the study period starting from September 2020 to May 2021 disaggregated by level of health care facilities in Ethiopia.

Number of surgical procedures	Level of health care facilities					
	Primary hospital N (%)	General hospital N (%)	Specialized hospital N (%)	Health center OR block N (%)	Private hospital N (%)	Total N (%)
Minor surgical procedures	11,084 (37.6)	6,810 (23.1)	16,245	17781718 (2.4)	4,847 (16.4)	29,515 (100)
Major surgical procedures	5,341 (13.3)	10,855 (27)	16,364 16,245 (40.7)	17781 22606403 1)	1121 7,239 (18.0)	40,202 (100)
Minor and major surgical procedures	16,425 (23.6)	17,665 (25.3)	22,420 16,245 (32.2)	17781226061,12 (1.6)	1121 12,086 (17.3)	69,717 (100)
Pediatric (aged less than 15 years) surgeries, minor and major	1,602 (26.1)	1,142 (18.6)	2,090 (34.1)	264 (4.3)	1,035 (16.9)	6,133 (100)
Bellwether surgical procedures						
Laparotomies (adult and pediatric)	444 (13.4)	1,036 (31.3)	1,128 (34)	1 (0.03)	706 (21.3)	3,315 (100)
Cesarean section	3,770 (13.8)	7,706 (28.1)	12,673 (46.3)	1,037 (3.8)	2,198 (8.0)	27,384 (100)
Open fracture management	14 (0.6)	392 (16.7)	1,162 (49.4)	0 (0)	785 (33.4)	2,353 (100)

Figure 1: Percentage of major and minor surgical procedures done in a 90-day interval of the study period from September 2020 to May 2021, Ethiopia

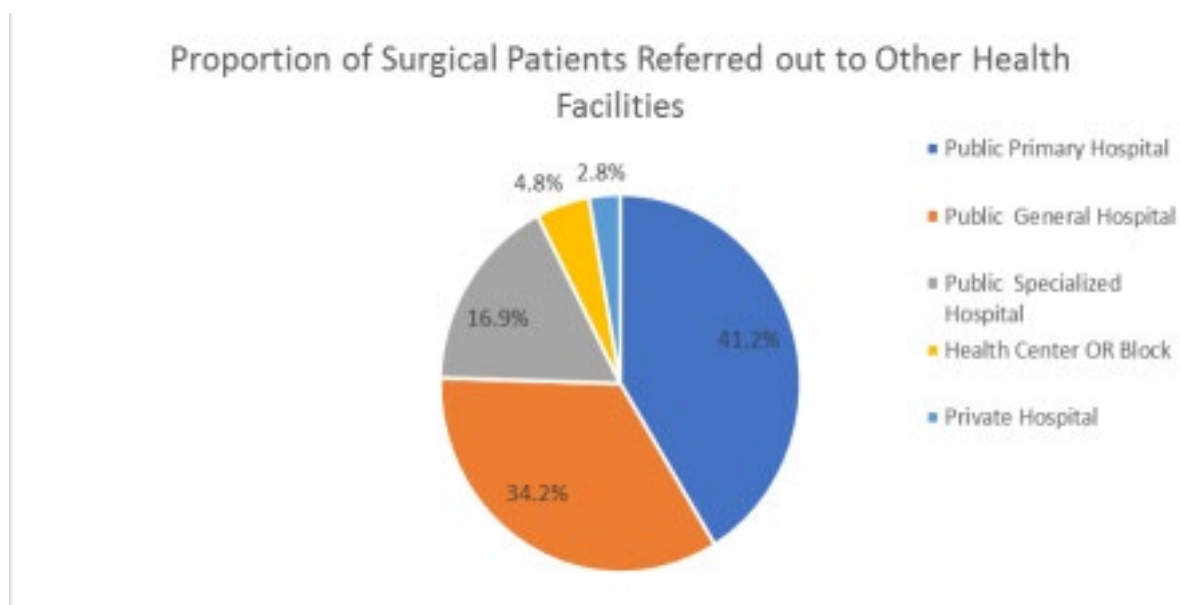


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Surgical referral out to other health care facilities

This program evaluation showed that 8,584 patients were referred for surgical services. A higher proportion of surgical patient referral to other health care facilities was observed in public primary hospitals (3,540, 41.2 percent), followed by public generalized hospitals (2,936, 34.2 percent) and public specialized hospitals (1,449, 16.9 percent). The lowest proportion of surgical patient referrals was from private hospitals (243, 2.8 percent). Health center OR block referrals were 416 (4.8 percent) (Figure 2).

Figure 2: Proportion of surgical patients referred to other health care facilities in a 90-day interval of the study period from September 2020 to May 2021, disaggregated by level of health care, Ethiopia.



Reasons for surgical referral out to other health care facility

Compared with other health care facilities, lack of diagnostic modalities (78.6 percent), lack of skilled professionals (45 percent), lack of equipment/instrument (50.8 percent), lack of blood (62.5

percent), and lack of supply/medication (56.9 percent) were the most common reasons for surgical referral out from public primary hospitals. In general, hospitals' lack of skilled professionals also accounts for 31 percent of reasons for surgical referral. (Table 7)

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Table 7. Proportion of reasons for referral patients for surgical intervention to other health facility in a 90-day interval of the study period from September 2020 to May 2021 disaggregated by level of care, Ethiopia

Levels of health facilities	Reasons for surgical referral out								
	Lack of bed N (%)	Lack of equipment/instrument N (%)	Lack of supply/medication N (%)	Lack of skilled professional N (%)	Lack of blood N (%)	Patient preference N (%)	Lack of investigation modalities N (%)	Lack of ICU care N (%)	Financial reason N (%)
Primary hospital	8 (40)	48 (50.5)	29 (56.9)	58 (45)	35 (62.5)	9 (30)	22 (78.6)	2 (25)	1 (7.14)
General hospital	4 (20)	29 (30.5)	14 (27.5)	40 (31)	11 (19.6)	10 (33.3)	5 (17.9)	3 (37.5)	1 (7.14)
Specialized hospital	7 (35)	7 (7.4)	4 (7.8)	11 (8.5)	2 (3.6)	2 (6.7)	0	0	0
Health center with OR block	0	6 (6.3)	1 (2)	9 (6.9)	4 (7.1)	0	0	0	0
Private hospital	1 (5)	5 (5.3)	3 (5.9)	11 (8.5)	4 (7.1)	9 (30)	1 (3.6)	3 (37.5)	12 (85.7)
Total	20 (100)	95 (100)	51 (100)	129 (100)	56 (100)	30 (100)	28 (100)	8 (100)	14 (100)

Of data gathered from lesion offices from the surveyed health facilities, the most common reason for referral out is lack of skilled professionals, which accounts for more than a quarter of the

proportion of common reasons (30 percent). Similarly, the second most common reason for referral out was lack of equipment/instrument (22 percent). Reasons such as lack of supply medication, lack of bed, lack of blood, patient preference, lack of investigation modalities, financial reasons, and lack of ICU collectively account for nearly 50 percent of the reasons for referral out from the surveyed hospitals (Figure 3).

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Figure 3: Common reasons for referral of patients for surgical intervention to other health care facilities in a 90-day interval of the study period from September 2020 to May 2021, Ethiopia.

Emergency and essential surgical care interruption

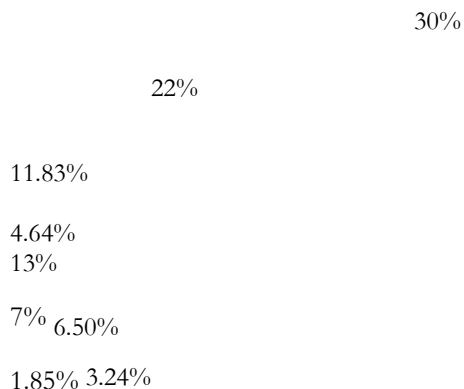
Of the surveyed 172 hospitals, 136 (79.06 percent) reported interruption of emergency and essential surgical care. At primary hospitals, CSR/laundry dysfunction (11, 14.67 percent) and electric power interruption (28, 37.33 percent) were the leading causes of emergency and essential surgical care interruption. A majority of the emergency and essential surgical care interruption at health center OR blocks were related to electric power interruption (4, 50 percent) and equipment dysfunction (3, 37.5 percent). Equipment dysfunction alone contributed to 35.13 percent of the emergency and essential surgical care interruptions at generalized hospitals (Table 8).

Table 8: Proportion of reason for emergency and essential surgical care interruption in a 90-day interval of the study period from September 2020 to May 2021, disaggregated by health care facility level, Ethiopia.

Reason for emergency and essential surgical care interruption	Level of health care				
	Primary hospital N (%)	Generalized hospital N (%)	Specialized hospital N (%)	Health center OR block N (%)	Private hospital N (%)
Equipment dysfunction	12(16%)	13 (35.13%)	2 (16.66%)	3 (37.5%)	3 (25%)
CSR/Laundry dysfunction	11 (14.67%)	6 (16.21%)	3 (25%)	1 (12.5%)	0

Electric power interruption	28 (37.33%)	6 (16.21%)	3 (25%)	4 (50%)	3 (25%)
Water supply interruption	9 (12%)	5 (13.5%)	2 (16.66%)	0	2 (16.66%)
O2 supply interruption	8 (10.67%)	3 (8.1%)	1 (8.33%)	0	1 (8.33%)
Shortage of blood	5 (6.66%)	2 (5.4%)	0	0	3 (25%)
Lack of medication and anesthesia drugs	1 (1.33%)	2 (5.4%)	1 (8.33%)	0	
Shortage of laboratory services	1 (1.33%)	0	0	0	

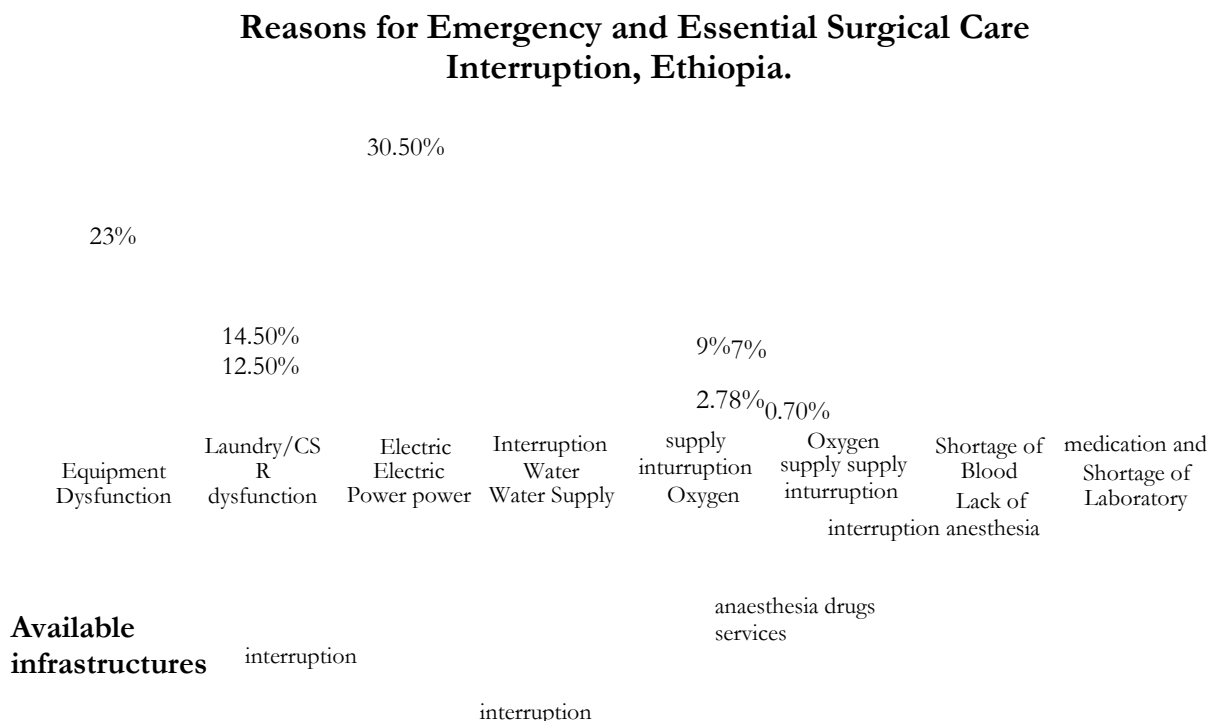
**Reasons for Surgical Referral out to other Health Care Facilities,
Ethiopia.**



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Electric power interruption was found to be the leading cause of emergency and essential surgical care interruption (30.5 percent), followed by equipment dysfunction (23 percent) and laundry/CSR dysfunction (14.5 percent). Other reasons, such as shortage of blood (7 percent), shortage of medications and anesthesia drugs (2.78 percent), and shortage in laboratory services (0.7 percent), were less common (Figure 4).

Figure 4: Reasons for emergency and essential surgical care interruption in a 90-day interval of the study period from September 2020 to May 2021, Ethiopia.



Public generalized hospitals and health centers with OR blocks have the highest proportion of allocated surgical beds of the total hospital beds with 23.41 percent and 22.64 percent, respectively. Although public specialized hospitals did have the highest total number of hospital beds, they were found to have the lowest proportion of surgical bed allocation with 18.75 percent. Moreover, health centers with OR blocks (72.95 percent of their total hospital beds) were allocated for ob-gyn (Table 9 and Table 10).

Table 9: Number of available infrastructures in a 90-day interval of the study period from September 2020 to May 2021, disaggregated by health care facility level, Ethiopia.

Infrastructure	Number of available infrastructures by health care facility level				
	Primary hospital	Generalized hospital	Specialized hospital	Health center OR block	Private hospital
Hospital beds	3,699	4,864	7,330	159	2,366
Surgical beds (trauma, GS, and orthopedics)	726	1,139	1,375	36	674
Obstetric and gynecologic beds	843	937	1,089	116	380
Functioning operating rooms (Minor)	77	42	71	8	34

Functioning operating rooms (Major)	99	90	110	10	89
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Table 10: Proportional allocation of surgical and ob-gyn beds from the total hospital beds in a 90-day interval of the study period from September 2020 to May 2021, disaggregated by health care facility level, Ethiopia.

Level of evaluated health care facilities	Number of evaluated facilities	Total number of hospital beds	Proportion of surgical beds allocated	Proportion of ob-gyn beds allocated
Public primary hospitals	77	3,699	19.62%	22.78%
Public generalized hospitals	38	4,864	23.41%	19.26%
Public specialized hospitals	16	7,330	18.75%	14.85%
Health centers with OR blocks	9	159	22.64%	72.95%
Private hospitals	32	2,366	28.4%	16.06%

Ratio of surgical beds to the population served

Comparatively, health centers with OR blocks have the lowest surgical bed to total population served ratio of 1 to 10,918. The ratio is significantly low in all four levels of health care, but more so in public specialized hospitals where it is 1 to 60,918 (Table 11).

Table 11: Ratio of surgical beds to total population served disaggregated by level of health care, Ethiopia.

Health care facility level	Number of evaluated health care facilities	Total number of surgical beds	Surgical beds to population ratio
Public primary hospital	77	726	1:36,188
Public general hospital	38	1,139	1:58,596
Public specialized hospital	16	1,375	1:60,918
Health center OR block	9	36	1:10,918

Number and functionality of Operating Room tables

Comparatively, public general hospitals have the highest proportion of functioning OR tables (90.4 percent). Public specialized hospitals have the highest number of OR tables (158), of which 86

percent were observed to be functioning. Primary hospitals have 174 OR tables, of which 75.28 percent were found to be functioning (Table 12).

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Table 12: Proportion of functional operating theater tables in a 90-day interval of the study period from September 2020 to May 2021, disaggregated by level of health care, Ethiopia.

Health care facility level	Number of health facilities evaluated	Total number of functioning ORs	Total number of OT tables	Number of functioning OT tables	Proportion of functioning OT tables (Denominator is total number of OR tables)	Average number of OT tables (Denominator is number of evaluated facilities)
Public primary hospital	77	176	174	131	75.28%	2.26
Public general hospital	38	132	125	113	90.4%	3.28
Public specialized hospital	16	181	158	134	84.8%	9.9
Health center OR block	9	18	15	12	80%	1.6
Private hospital	32	123	116	104	89.65%	3.6
Total	172	630	588	494		

Reasons for OR tables not in use

Non-functioning operating tables accounted for more than one third of the reasons for the tables not being used in public hospitals in Ethiopia during the study period (Table 13).

There is variation in the reasons and their frequencies across the different levels of health care

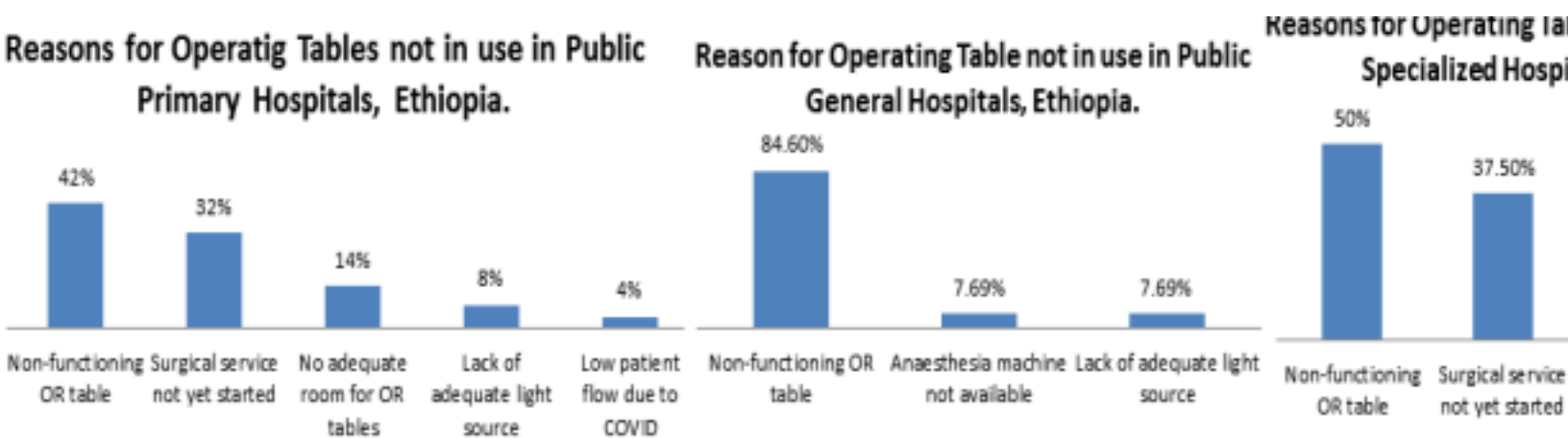
facilities. In public primary hospitals, non-functioning operating tables (42 percent) were the most common reason, followed by elective surgical service not yet started, which accounted for 32 percent. Lack of skilled professionals accounted for 80 percent of the reasons for operating tables not in use in health center OR blocks (Figures 5 and 6).

Table 13: Reasons for operating table not in use in public hospitals in a 90-day interval of the study period from September 2020 to May 2021, Ethiopia.

Reasons for operating table not in use	N (%)
Non-functioning operating table	19 (34.5%)
Elective surgical services not yet started	12 (21.8%)
Lack of adequate room for operating table	9 (16.36%)
Lack of adequate light source	5 (9.1%)
Operating room repurposed for COVID-19 treatment	2 (3.63%)
Low patient flow	3 (5.45%)
Lack of skilled professional	2 (3.63%)
Other	3 (5.45%)
Total	55 (100%)

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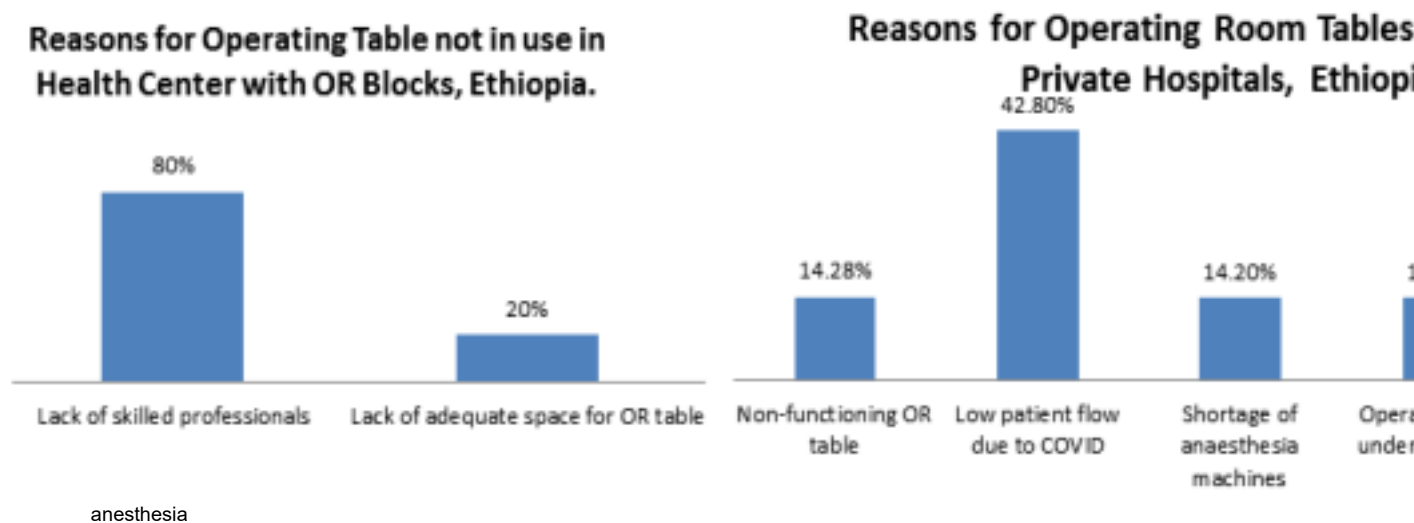
Figure 5: Reasons for Operating Room tables not in use in public primary hospitals, public general hospitals, and public specialized hospitals in a 90-day interval of the study period from



September 2020 to May 2021, Ethiopia.

Operating

Figure 6: Reasons for Operating Room tables not in use in health center with OR blocks and private hospitals, general hospitals, and public specialized hospitals in a 90-day interval of the study period from September 2020 to May 2021, Ethiopia.



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Pre-admission waiting time

The shortest average pre-admission wait time recorded in private hospitals stood at 1.42 days. Public primary hospitals reported 9.68 days pre-admission wait time. Longer average pre-admission wait time is recorded for both generalized and specialized hospitals, averaging 37.6 days to 35.9 days, respectively (Table 14).

Table 14: Average pre-admission wait time for patients who need essential surgical care disaggregated by health facility, Ethiopia.

Health care facility level	Average pre-admission wait time for patients who need essential surgical care (in Days)
Public primary hospital	9.68
Public generalized hospital	37.6
Public specialized hospital	35.9
Health center OR block	----
Private hospital	1.42

Physical access to health facility

On average, clients need to travel 284.3 km (± 198.3) or 28.4 hours to access surgical services at

specialized hospitals. Moreover, patients were able to get surgical services at primary hospitals within 49.2 km (± 39.2), whereas patients were able to access the health centers with OR blocks, which are all in Addis Ababa, within a 9.3 km (± 6.9) radius (Table 15).

Table 15: Average physical access to health facility for surgical care in a 90-day interval of the study period from September 2020 to May 2021, disaggregated by health care facility level, Ethiopia.

Health care facility level	Kilometers (Hours) that most patients travel to access surgical services
Public primary hospital	49.2 \pm 39.2 (4.92Hrs)
Public generalized hospital	106.8 \pm 88.7 (10.6Hrs)
Public specialized hospital	284.3 \pm 198.3 (28.4Hrs)
Health center OR block	9.3 \pm 6.9 (0.933Hrs)
Private hospital	214.9 \pm 208.8 (21.49Hrs)

Surgical Care Safety

Availability of case management guidelines

Case management guidelines for emergency surgical, obstetrics, and anesthesia care were observed in nearly three-fourths (72.0 percent) of the study health facilities evaluated, and guidelines for elective surgical care was observed in only 56.7 percent of the study health facilities in Ethiopia (Figure 7).

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Figure 7: Availability of case management guidelines for surgical, obstetrics, and anesthesia care emergencies in the evaluated health facilities in a 90-day interval of the study period from September 2020 to May 2021, Ethiopia.

Availability of Case Management Guidelines, Ethiopia.

72%

56.70%

Relatively, private hospitals had improved (78.1 percent) availability of case management guidelines for emergency care, surgery, and obstetrics, and the lowest availability of the same guideline was observed at health centers with OR blocks (44 percent). Although the case management guidelines in emergency surgical care settings were observed in the majority of specialized hospitals (80.3 percent) and the health centers with OR blocks (88.9 percent), the availability of guidelines in general hospitals was lower (57.9 percent) compared with other facilities (Table 16).

Table 16: Availability of case management guidelines for emergency care, surgery, obstetrics, and anesthesia, disaggregated by health care facility level, Ethiopia.

Health care facility level	Number of evaluated health care facilities	Case management guidelines available for emergency care		Case management guidelines available for surgery, obstetrics, and anesthesia	
		Frequency	Percentage	Frequency	Percentage
Primary hospitals	77	56	72.7	40	51.9
Generalized hospital	38	22	57.9	21	55.3
Specialized hospital	16	13	81.3	11	68.8
Health centers with OR block	9	8	88.9	4	44.4
Private hospital	32	25	78.1	23	71.9
Total	172	124	72.09	99	57.55

Surgical Safety Checklist utilization: HMIS/DHIS2

Of data abstracted from the national data management system installed in the study facilities, the HMIS, the overall average rate of SSC use for major surgeries was higher in public health facilities (81 percent) compared with private health facilities (26 percent). The highest rates were in

specialized and general hospitals (81 percent and 79 percent, respectively). The SSC use rates in primary hospitals and health centers with OR blocks were 71 percent and 59 percent, respectively (Figure 8).

Figure 8: Mean percentage of surgical safety checklist utilization in a 90-day interval of the study period from September 2020 to May 2021, disaggregated by health care facility level, Ethiopia.

Mean Percentage of Surgical Safety Checklist Utilization, Ethiopia.

					26
		Hospital Specialized			
		Hospital			
		Health Center With OR			
		Blocks			
		Private Hospital			
Primary Hospital	General				

Surgical Safety Checklist utilization: Direct Observation of Charts

Analysis of data gathered through direct observation of 10 random records of surgical patients operated in the 90 days before an evaluation day or during chart audit for each of the evaluated health care facilities showed that 67.56 percent of the patient charts had an SSC attached, and only 42.15 percent of the SSC complied with WHO's SSC usage guide.

The data disaggregated by level of care showed that specialized hospitals (85 percent) and health center OR blocks (84.44 percent) demonstrated the highest SSC use with their charts, but that specialized hospitals (58.82 percent) and health center OR blocks (67.10 percent) had their SSCs properly filled. On the other hand, primary hospitals showed that 75 percent of the patient charts had SSC attached, but that only 62.15 percent of the SSC complied with WHO's SSC usage guide. The lowest percentage of SSC use was observed in private health facilities; only 22.5 percent of the charts had SSC attached, and only 60.31 percent of those were complete (Table 17).

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Table 17: Rate of surgical safety checklist (SSC) use in 10 randomly selected charts of surgical patients (per facility) whose operations occurred during a 90-day interval of the reporting period from September 2020 to May 2021, disaggregated by level of health care, Ethiopia.

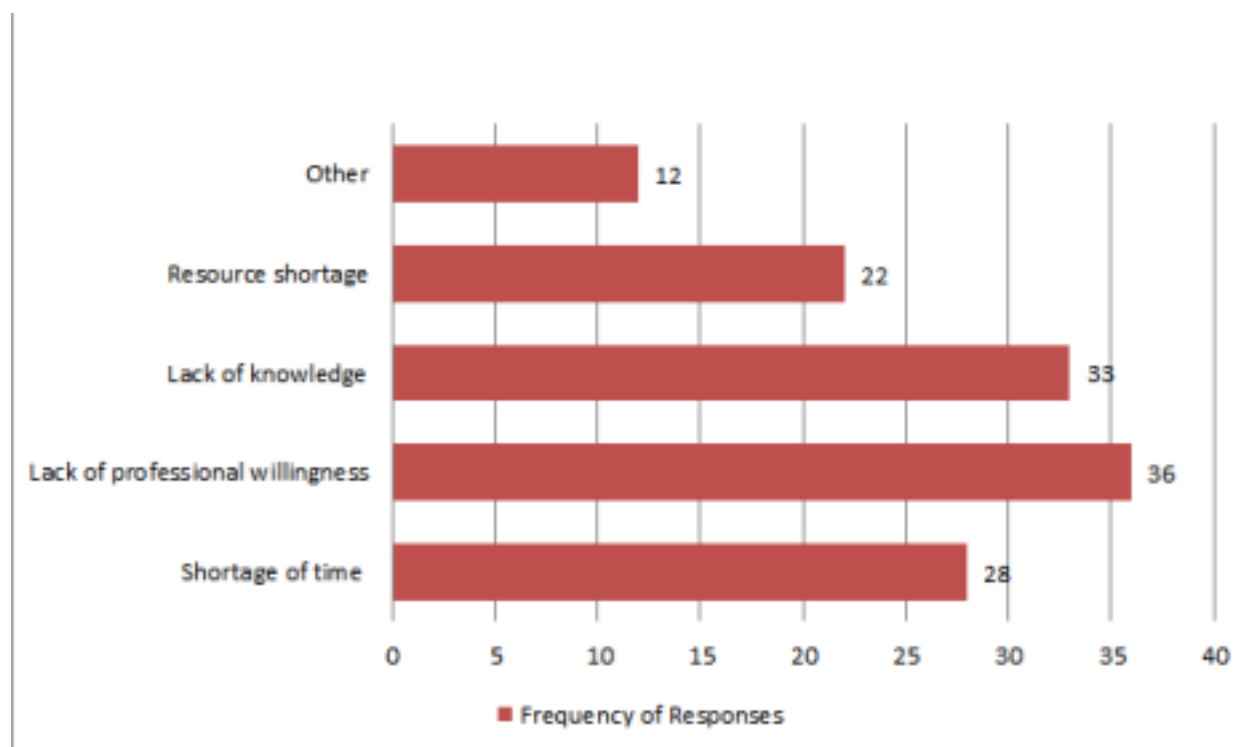
Level of health care	Number of health facilities evaluated	Number of charts eligible for review	Number of charts reviewed	Number of charts with SSC attached N (%)	Number of charts with SSC completed N (%)
Public primary hospital	77	770	710	533 (75%)	331 (62.1%)

Public general hospital	38	380	370	275 (74.32%)	159 (57.81%)
Public specialized hospital	16	160	160	136 (85%)	80 (58.82%)
Health center OR blocks	9	90	90	76 (84.44%)	51 (67.1%)
Private hospital	32	320	273	63 (23%)	38 (60.31%)
Total	172	1,720	1,603	1,083 (67.56%)	659 (60.84%)

Reasons for noncompliance of Surgical Safety Checklist utilization

Of information gathered from operating room coordinators (OR head nurses, anesthesiologists, and surgeons) and/or surgical department heads, lack of willingness and knowledge were the most frequently mentioned reasons for low use of SSC and noncompliance with surgical safety standards (Figure 9). Shortage of time was the main reason for non-adherence in private (14, 36.8 percent) and specialized (6, 50 percent) hospitals (Table 18).

Figure 9: Reasons for surgical safety checklist noncompliance or use in a 90-day interval of the study period from September 2020 to May 2021, Ethiopia.



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Table 18: Reasons for surgical safety checklist non-compliance or use in a 90-day interval of the study period from September 2020 to May 2021 disaggregated by health care facility level, Ethiopia.

	Level of health care facilities
--	--

Reasons for SSC non-compliance	Primary hospital	Generalized hospital	Specialized hospital	Health centers with OR block	Private hospital
Shortage of time	7 (13.20%)	9 (31.03%)	6 (50%)	2 (25%)	4 (14.29%)
Lack of professional willingness	19 (35.84%)	2 (6.89%)	2 (15.38%)	6 (75%)	7 (25%)
Lack of knowledge	13 (24.52%)	5 (17.24%)	3 (23.08%)	0	12 (42.86%)
Resource shortage	9 (16.98%)	10 (34.48%)	0	0	3 (10.71%)
Other	5 (9.43%)	3 (10.34%)	2 (15.38%)	0	2 (7.14%)

Surgical site infection rate

The magnitude of surgical site infection reported through monthly HMIS/DHIS2 reports for the evaluated health care facilities showed a very low rate across all levels of health facilities ranging from 0 percent to 4 percent (Table 19).

Table 19: Health care facilities reporting surgical site infection (SSI) rate in a 90-day interval of the study period from September 2020 to May 2021, disaggregated by health care facility level, Ethiopia.

Health facility type	Number of evaluated health care facilities	Number of health care facilities reporting SSI rate	Rate range
Primary hospital	77	70 (90.9%)	0%-0.55%
General hospital	38	33 (86.8%)	0%-0.29%
Specialized hospital	16	13 (81.3%)	0%-4%
Health center OR bloc	9	6 (66.7%)	0%-0.0111%
Private hospital	32	17 (53.2%)	0%-0.00083%
Total	172	139 (80.8%)	0%-4%

SSI surveillance and diagnosis practice: chart review

Of the 1,720 medical records of patients who had undergone surgical procedure in the 90-day reporting period and who were eligible for chart review, 1,604 (93.3 percent) charts were reviewed by taking 10 randomly selected charts from each study facility. The number of charts that demonstrated evaluation of surgical wounds for presence/absence of SSI and that documented the clinicians' wound assessment findings was very low (827, 51.56 percent).

In general, SSI surveillance, surgical wound assessment, and documentation were unsatisfactory in all study facilities. For instance, the practice of surgical wound assessment and its documentation was lowest in private health facilities (34.93 percent) and best in specialized hospitals (66.87 percent) (Table 20).

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Table 20: Rate of appropriate SSI tracking and diagnosis on randomly selected 10 charts per health facility of surgical patients who were operated in a 90-day interval of the reporting period from September 2020 to May 2021, disaggregated by level of health care, Ethiopia.

Level of health care	Number of health facilities evaluated	Number of charts eligible for review	Number of charts reviewed	Number of charts with documented evidence for wound assessment N (%)
Public primary hospital	77	770	696	411 (59%)
Public general hospital	38	380	366	148 (40.3%)
Public specialized hospital	16	160	160	107 (66.87%)
Health centers with OR blocks	9	90	90	59 (60.55%)
Private hospital	32	320	292	102 (34.93%)
Total	172	1,720	1,604	827 (51.56%)

Anesthesia adverse outcomes

Alarming, no major or life-threatening anesthesia adverse outcomes were reported by surgical care centers in health centers and private hospitals. Significantly low average anesthesia adverse outcomes were illustrated at primary, generalized, and specialized hospitals ranging from 0 to 0.62 (Table 21).

Table 21: Average rate of anesthesia adverse outcome in a 30-day interval of the study period from September 2020 to May 2021, disaggregated by health care facility level, Ethiopia.

Health facility type	Number of evaluated health care facilities	Number of facilities reporting anesthesia adverse event N (%)	Rate of anesthesia adverse event
Primary hospital	77	70 (90.9%)	0-0.01
General hospital	38	35 (92.1%)	0-1
Specialized hospital	16	14 (87.5%)	0-0.62

Health centers with OR block	9	9 (100%)	0
Private hospital	32	22 (68.75%)	0
Total	172	150 (87.2%)	0-4

Perioperative mortality rate

The monthly report showed that relatively specialized hospitals had the highest rate of perioperative mortality (0 percent to 2.8 percent) (Table 22).

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Table 22: Perioperative mortality rate in a 30-day interval of the study period from September 2020 to May 2021, disaggregated by health care facility level, Ethiopia.

Health facility type	Number of evaluated health care facilities	Number of facilities reporting perioperative mortality	Rate perioperative mortality
Primary hospital	77	71 (92.2%)	0-0.012
General hospital	38	33 (86.8%)	0-0.181
Specialized hospital	16	13 (81.25%)	0-2.8
Health centers with OR block	9	9 (100%)	0
Private hospital	32	20 (84.88%)	0
Total	172	150 (87.2%)	0-2.8

Surgical system efficiency

A total of 163 (94.76 percent) health facilities were evaluated for perioperative system efficiency using select metrics (first case incision time, turn over time, elective surgical case cancellation rate, operating room table outputs). Health centers with OR blocks were excluded from the analysis because these facilities operate in emergency cases only.

Perioperative efficiency: First case incision time (pacemaker case)

Of 163 hospitals evaluated for surgical system efficiency, only 51 (31.29 percent) were reported to

have an agreed first case incision time for the first elective surgical procedure, meaning the majority (112, 68.71 percent) of hospitals didn't have an agreed time for the first surgical case incision time. Through direct chart observation conducted on first of the day elective surgical cases it was observed that adherence to agreed incision start time for the pacemaker case was observed in one quarter to one third of cases, ranging from 26.25 percent to 34.66 percent in public specialized and public generalized health care facilities, respectively (Table 23).

Table 23: Proportion of health facilities having an agreed incision time for elective surgeries disaggregated by level of health care, Ethiopia.

Level of health care facility	Number of evaluated health care facilities	Number of facilities having agreed time	Number of charts assessed	Number of cases that start on agreed time
Public primary hospital	77	18 (23.37%)	146	48 (32.87%)
Public general hospital	38	16 (42.11%)	150	55 (36.66%)
Public specialized hospital	16	9 (56.25%)	90	24 (26.66%)
Private hospital	32	8 (25%)	80	24 (30%)
Total	163	51 (31.29%)	466	151 (32.4%)

As shown by data abstracted from chart audits to determine first case incision time, most cases (40.16 percent) had first case incision time on/before 8:30 a.m. On the other hand, for a quarter of the cases (24.85 percent) the first case incision time is after 10:00 a.m. On further analysis, 37

Evaluation of 5-Year National Safe Surgical Care Strategy and SaLTS I Program in Ethiopia 27

percent of first case incision time is after 10:00 a.m. for primary hospitals and 39.88 percent for private hospitals (Table 24).

Table 24: Surgical/incision start time for 10 first cases (per health facility) in a 90-day interval of the reporting period from September 2020 to May 2021, Ethiopia.

	Number of health facilities evaluated	Number of charts assessed	Surgical/incision start time			
			Before 8:30 a.m. N (%)	8:31 – 9:00 a.m. N (%)	9:00 – 9:30 a.m. N (%)	9:31 – 10:00 a.m. N (%)
Public primary hospital	77	273	58 (21.24%)	14 (5.12%)	48 (17.58%)	57 (20.88%)
Public generalized	38	298	167 (56.04%)	40 (13.42%)	39 (13.08%)	52 (17.45%)
Public specialized	16	110	53 (48.18%)	21 (19.09%)	21 (19.09%)	15 (13.64%)
Private hospital	32	168	63 (37.5%)	14 (8.33%)	15 (8.93%)	76 (45.24%)
Total	163	849	341 (40.16%)	89 (10.48%)	123 (14.48%)	307 (36.18%)

Evaluation of 5-Year National Safe Surgical Care Strategy and SaLTS I Program in Ethiopia 29**Perioperative efficiency: turn over time (TOT)**

On average the longest average time difference between consecutive major elective surgeries was 79.52 minutes, and the shortest turn over time (TOT) was 40.24 minutes. The TOT for private hospitals was longer (79.52 minutes) compared with the TOT in public hospitals (40.24 minutes to 40.76 minutes). Chart review analysis also indicated that of the 610 consecutive major elective surgeries reviewed, 46.98 percent of consecutive surgical procedures had TOT of less than 30 minutes, 28.88 percent of surgeries had TOT of 30 minutes to 60 minutes, and 11.47 percent had TOTs of more than 90 minutes. Analysis was calculated using 30 minutes as reference for the time range (Table 25).

Table 25: Patient turn over time, by reviewing anesthesia sheets of 10 consecutive surgical charts of patients in a 90-day interval of the reporting period from September 2020 to May 2021, Ethiopia.

Level of health care	Number of health facilities evaluated	Number of charts expected to be assessed	Number of charts assessed	Patient Turn Over Time (TOT)				
				<30 minutes N (%)	31 – 60 minutes N (%)	61 – 90 minutes N (%)	>91 minutes N (%)	Average TOT
Public primary hospital	77	770	158	68 (43.03%)	44 (27.84%)	26 (16.45%)	20 (12.65%)	40.5
Public generalized	38	380	214	106 (49.53%)	76 (35.51%)	20 (9.34%)	12 (5.6%)	40.76

Public specialized	16	160	104	54 (51.9%)	32 (30.76%)	14 (13.46%)	4 (3.84%)	40.24
Private hospital	32	320	134	68 (50.76%)	30 (22.38%)	2 (1.49%)	34 (25.37%)	79.52
Total	163	1,630	610 (18.7%)	296 (48.52%)	182 (29.83%)	62 (10.16%)	70 (11.47%)	50.25

Number of and reasons for surgical case cancellation

Cancellation of scheduled elective surgical procedures is not uncommon. Public specialized hospitals had a relatively higher average cancellation rate (14.6 percent), and public primary hospitals reported the lowest (3.7 percent) (Table 26).

Medical reasons (35 percent) and lack of blood and blood products (25 percent) were the most common reasons nationally for cancellation of surgical procedures, followed by lack of instrument/equipment (14.74 percent). Interrupted electric power (1.65 percent), interrupted oxygen supply (2.28 percent), and interrupted water supply were among the less common reasons for such cancellations (Figure 10).

In public generalized hospitals, lack of instruments or equipment accounted for more than one fifth (21.9 percent) of the reasons for cancellation of scheduled surgical procedures (Table 27).

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Table 26: Average cancellation rate in a 30-day interval of the study period from September 2020 to May 2021, disaggregated by health care facility level, Ethiopia.

Health care facility level	Average cancellation rate in a 30-day interval of the study period from September 2020 to May 2021
Public primary hospital	3.7%
Public generalized hospital	7.3%
Public specialized hospital	14.6%
Private hospital	2.5%

Figure 10: Reasons for cancellation of scheduled surgical cases in a 90-day interval of the reporting period from September 2020 to May 2021, Ethiopia.

Reasons for Cancellation of Scheduled Elective Surgical Procedures, Ethiopia.

3%	2%	Interrupted water supply
		Interrupted oxygen supply
4%		Interrupted electricity
		Delayed COVID 19 test result
8%		Other
	35%	25%
15%	4%	Medical reasons
3%		Lack of blood
		Lack of instrument/equipment
		Lack of surgical drape
		Lack of supplies/medication

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Table 27: Reasons for cancellation of scheduled surgical cases in a 90-day interval of the reporting period from September 2020 to May 2021, disaggregated by health care facility level, Ethiopia.

Reasons for	Health care facility level
-------------	----------------------------

cancellation of surgical cases	Primary hospital	Generalized hospital	Specialized hospital	Health centers with OR block	Private hospital	Total
Medical reason	16 (29.6%)	13 (24%)	8 (14.8%)	0	17 (31.5%)	54 (34.6%)
Lack of blood or blood products	20 (51.28%)	8 (20.51%)	6 (15.38%)	1 (2.56%)	4 (10.25%)	39 (25%)
Lack of instrument or equipment	8 (34.78%)	11 (47.82%)	3 (13.04%)	0	1 (4.35%)	23 (14.7%)
Lack of supplies or medications	4 (57.14%)	3 (42.85%)	--	--	--	7 (4.5%)
Lack of surgical drape	4 (33.3%)	3 (25%)	4 (33.3%)	1 (8.33%)		12 (7.7%)
Interrupted oxygen supply	2 (66.66%)	1 (33.33%)	0			3 (1.9%)
Interrupted water supply	3 (60%)	2 (40%)	0			5 (3.21%)
Interrupted electric	1 (50%)	0	1 (50%)			2 (1.28%)
Delayed COVID-19 test/investigation result	1 (14.28%)	2 (28.5%)	4 (57.14%)	--	--	7 (4.48%)
Other		2 (50%)	2 (50%)			4 (2.56%)
Total						156 (100%)

Operating table output (performance)

Major surgical procedures performed per operating table per day in 10 consecutive days revealed that performance of the operating table is low. For instance, the average number of major surgical procedures performed per table during a 10-day period was 14.2 (range of 9.7 procedures to 24.8 procedures per day), which is equivalent to one surgical procedure per table per day (Table 28). Note that this analysis did not factor in the complexity of the surgical procedure and conditions of the patient.

Table 28: OR table output (table performance) by surgeries performed on a given OR table in a day (24 hours) in a 90-day interval of the reporting period from September 2020 to May 2021, Ethiopia.

Level of health care	Number of health facilities evaluated	OR table output (table performance)	
		Average number of operations per table in 10 days	Average number of operations per table per day
Public primary hospitals	77	10	1

Public generalized	38	18	2
Public specialized	16	25	3
Health center OR blocks	9	10	1
Private hospitals	32	16	2
Total	172	14	1

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Surgical workforce

Health centers had no surgeon or obstetrician. Rather, health centers were exclusively staffed with qualified Integrated Emergency Surgical Officers (IESO), qualified anesthesiologists/anesthesia care providers, and nurse anesthetists. Specialized hospitals had the most surgeons (336, 51.1 percent) of all health facilities in the study. Primary hospitals have considerably fewer obstetricians (16, 4.8 percent) than private hospitals (77, 23.1 percent) and were staffed mostly with qualified IESO. Comparatively, general hospitals were more evenly staffed with qualified IESO (100) and surgeons (123) (Table 29).

Table 29: Number of surgical workforce available in the evaluated health care facilities in a 90-day interval of the reporting period from September 2020 to May 2021, disaggregated by level of health care, Ethiopia.

Hospital staff	Number of available human resource					
	Primary hospital n=77	Generalized hospital n=38	Specialized hospital n=16	Health centers with OR blocks n=9	Private hospital n=32	Total
Surgeons (general, neurosurgeons, and orthopedic surgeons)	47 (7.2%)	123 (18.7%)	336 (51.14%)	0	151 (22.98%)	657 (100%)
Anesthesiologists or anesthesia care providers	126 (16.7%)	157 (20.82%)	364 (48.27%)	19 (25.12%)	88 (11.67%)	754 (100%)
Obstetrician	16 (4.79%)	76 (22.75%)	165 (49.4%)	0	77 (23.05%)	334 (100%)
IESO	194 (58.6%)	100 (30.2%)	10 (3.02%)	18 (5.44%)	9 (2.7%)	331 (100%)
Nurse anesthetists	79 (33.47%)	94 (39.8%)	14 (5.93%)	2 (0.85%)	47 (19.9%)	236 (100%)

Ratio of surgical workforce to population served

Overall analysis showed a significantly low ratio of surgical workforce, including surgeons, anesthesiologists or anesthesia care providers, and obstetricians per 100,000 population served in all four levels of health care facilities evaluated. Health center OR blocks, with the lowest average catchment population (43,672.89), had the highest ratio of 4.8 surgical workers per 100,000 population served, followed by public specialized hospitals, with the largest workforce of 856 qualified surgeons, anesthesiologists or anesthesia care providers, and obstetricians, had a ratio of 1.03 professionals per 100,000 population served. The lowest ratio is observed in public generalized hospitals in which the evaluated 38 hospitals had 356 qualified surgical workforce for a ratio per 100,000 population served to be 0.53 (Table 30).

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Table 30: Ratio of surgical workforce (surgeons, anesthesiologists/anesthesia care providers, obstetricians) per 100,000 population served in a 90-day interval of the reporting period from September 2020 to May 2021, disaggregated by level of care, Ethiopia.

Health care facility level	Number of evaluated health facilities	Number of surgical workforce [(surgeons, anesthesiologists/anesthesia care providers, obstetricians)]	Ratio per 100,000 population served
Public primary Hospital	77	189	0.718043
Public general Hospital	38	356	0.533493
Public specialized Hospital	16	865	1.032684
Health center OR block	9	19	4.831471

Health insurance coverage

On average less than 30 percent of patients had health insurance in the evaluated four levels of health care and private hospitals. Accordingly, public primary hospitals had the highest average percentage of patients with health insurance (28.8 percent), compared with health centers, which had the lowest rate (7.62 percent) (Table 31).

Table 31: Average percentage of patients having health insurance in a 90-day interval of the reporting period from September 2020 to May 2021, disaggregated by level of health facility, Ethiopia.

Health care facility level	Average percentage of patients having health insurance
Public primary hospital	28.80%
Public generalized hospital	14.51%
Public specialized hospital	18.86%
Health centers with OR block	7.62%
Private hospital	11.69%

Overall, fewer than 40 percent of patients had health insurance coverage in all seven regions and city administrations shown in Table 32. The lowest percentage of health insurance coverage was in Addis Ababa city with 5.4 percent. The highest percentage of health insurance coverage was found in the Amhara (37.65 percent) and Sidama (37.49 percent) regions (Table 32).

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Table 32: Average percentage of patients having health insurance coverage in a 90-day interval of the reporting period from September 2020 to May 2021, disaggregated by level of Region/City administration, Ethiopia.

Region/City administration	Average percentage of patients having health insurance
Tigray region	22.5%
Afar region	13.33%
Amhara region	37.65%
Oromia region	14.99%
SNNP region	19.2%
Sidama region	37.49%
Harari region	--

Dire Dawa city administration	---
Addis Ababa city administration	5.39%

Patient's readmission monitoring

Of the surveyed facilities, only a quarter of health care facilities monitored patient's readmission within 30 days after any surgery (Figure 11).

Figure 11: Monitoring of patient's readmission within 30 days after any surgery in a 90-day interval of the reporting period from September 2020 to May 2021, Ethiopia.

Monitored re-admission
re-admission

Did not monitored re-admission Did not monitor

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Emergency and essential surgical care equipment and supplies

National figures showed that blood pressure measuring equipment and retractors were the two emergency and essential surgical care equipment items that were found to be available in all health care facilities evaluated. Data from the 172 health care facilities evaluated show the availability of this equipment and supplies to varying extents (Table 33 and Table 34).

Table 33: Availability of emergency and essential surgical care equipment and supplies in 172 health care facilities evaluated, reporting period from September 2020 to May 2021, Ethiopia.

Emergency and essential surgical care equipment and supplies	Absent	Available with shortages or difficulties	Fully available for all patients all the time
Suction pump (manual or electric) with catheter	2 (1.16%)	50 (29.07%)	120 (69.77%)
Blood pressure measuring equipment	0	41 (23.84%)	131 (76.16%)
Scalpel with blades	2 (1.18%)	23 (13.53%)	145 (85.29%)
Retractors	0	18 (10.59%)	152 (89.41%)
Scissors	1 (0.59%)	30 (17.65%)	139 (81.76%)
Tissue forceps	1 (0.59%)	27 (15.88%)	142 (83.53%)
Gloves (sterile)	3 (1.79%)	36 (21.43%)	129 (76.79%)
Gloves (examination)	48 (28.4%)	54 (31.95%)	67 (39.64%)
Needle holder	1 (0.59%)	28 (16.47%)	141 (82.94%)
Sterilizing skin prep	3 (1.76%)	40 (23.53%)	127 (74.71%)
Nasogastric tubes	4 (2.37%)	46 (27.22%)	119 (70.41%)
Light source (lamp & flashlight)	5 (2.94%)	62 (36.47%)	103 (60.59%)
Intravenous fluid infusion set	3 (1.76%)	25 (14.71%)	142 (83.53%)
Intravenous cannulas/scalp vein infusion set	2 (1.18%)	17 (10%)	151 (88.82%)
Syringes with needles (disposable)	1 (0.59%)	14 (8.24%)	155 (91.18%)
Sharps disposal container	8 (4.71%)	30 (17.65%)	132 (77.65%)
Renewable items			
Tourniquet	23 (13.53%)	39 (22.94%)	108 (63.53%)
Needles & sutures	1 (0.59%)	33 (19.41%)	136 (80%)
Splints for arm, leg	41 (24.12%)	36 (21.18%)	93 (54.71%)
Waste disposal container	2 (1.18%)	30 (17.75%)	137 (81.07%)

Scalpel with blades	1 (1.30%)	17 (22.08%)	59 (76.62%)	0	2 (5.41%)	35 (94.59%)	1 (6.25%)	1 (6.25%)	14 (87.50%)	0	2 (22.22%)
Retractors	0	15 (19.48%)	62 (80.52%)	0	1 (2.7%)	36 (97.3%)	0	1 (6.25%)	15 (93.75%)	0	0
Scissors	0	18 (23.38%)	59 (76.62%)	0	7 (18.92%)	30 (81.08%)	1 (6.25%)	3 (18.75%)	12 (75%)	0	1 (11.11%)
Tissue forceps	0	16 (20.78%)	61 (79.22%)	0	7 (18.92%)	30 (81.08%)	1 (6.25%)	2 (12.50%)	13 (81.25%)	0	1 (11.11%)
Needle holder	0	19 (24.68%)	58 (75.32%)	0	6 (16.22%)	31 (83.78%)	1 (6.25%)	2 (12.50%)	13 (81.25%)	0	0
Adult McGill forceps	24 (32%)	17 (22.67%)	34 (45.33%)	2 (5.41%)	5 (13.51%)	30 (81.08%)	0	4 (26.67%)	11 (73.33%)	5 (55.56%)	2 (22.22%)
Pediatric McGill forceps	38 (49.35%)	15 (19.48%)	24 (31.17%)	13 (36.11%)	4 (11.11%)	19 (52.78%)	1 (6.67%)	5 (33.33%)	9 (60%)	8 (88.89%)	1 (11.11%)
Needles & sutures	0	20 (25.97%)	57 (74.03%)	0	7 (18.92%)	30 (81.08%)	1 (6.25%)	2 (12.50%)	13 (81.25%)	0	1 (11.11%)

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Suction pump	1 (1.3%)	30 (38.96%)	46 (59.74%)	0	11 (28.95%)	27 (71.05%)	1 (6.25%)	5 (31.25%)	10 (62.50%)	0	1 (11.11%)
Light source (lamp & flashlight)	3 (3.90%)	38 (49.35%)	36 (46.75%)	1 (2.70%)	14 (37.84%)	22 (59.46%)	1 (6.25%)	6 (37.50%)	9 (56.25%)	0	2 (22.22%)
Tourniquet	15 (19.48%)	23 (29.87%)	39 (50.65%)	3 (8.11%)	6 (16.22%)	28 (75.68%)	3 (18.75%)	5 (31.25%)	8 (50%)	2 (2.22%)	2 (22.22%)
Splints for arm, leg	19 (24.68%)	23 (29.87%)	35 (45.45%)	12 (32.43%)	3 (8.11%)	22 (59.46%)	3 (18.75%)	5 (31.25%)	8 (50%)	5 (55.56%)	3 (33.33%)
Electrocautery	9 (11.69%)	22 (28.57%)	46 (59.74%)	0	11 (30.56%)	25 (69.44%)	0	8 (50%)	8 (50%)	6 (66.67%)	2 (22.22%)

Chest tubes insertion equipment	21 (27.27%)	28 (36.36%)	28 (36.36%)	5 (13.51%)	8 (21.62%)	24 (64.86%)	3 (18.75%)	3 (18.75%)	10 (62.50%)	9 (100%)	0
Tracheostomy set	27 (35.06%)	20 (25.97%)	30 (38.96%)	8 (21.62%)	8 (21.62%)	21 (56.76%)	1 (6.25%)	2 (12.50%)	13 (81.25%)	9 (100%)	0

Part II: Qualitative study results

Sociodemographic characteristics of study participants

A total of 77 in-depth interviews (26 with patients, 30 with service providers at different levels of health care, and 21 with key informants) were conducted.

A total of 26 patients participated in the study. Eighteen of the patients were females, almost half were 23 to 30 years of age, and 23 were married. Nearly half of the participants attended elementary school from grade 2 to grade 8 level, and 5 had no formal education. Seven were housewives, 4 were farmers, and 5 ran private businesses. Eleven were from Addis Ababa, 9 from Oromia (3 from Bishoftu, 3 from Adama, 2 from Tulu Bolo, and 1 from Sendafa hospitals), and 6 from SNNP (3 from Butajira, 2 from Buee, and 1 from Worabe hospitals) (Table 35).

Table 35: Sociodemographic characteristics of exit interview participants

Sociodemographic characteristic	Frequency
Sex	
Male	8
Female	18
Age group	
18-20	1
21-30	12
31-40	5
41-50	2
≥ 50	6
Educational status	
No formal education	5
Grade 1-4	4
Grade 5-8	8

Grade 9-12 6
Higher level education ----
Not documented 3
Marital status
Not married -----
Married 23
Widowed 3
Divorced -----
Job
Teacher 1
Housewife 10
Farmers 4
Retired 2
Day laborers 2
Jobless 2
Private business 5

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A total of 51 health professionals from different institutions participated. Of these professionals, 30 participated in in-depth interviews, and 21 participated in key informant interviews. Of these participants, 44 were males, and 35 were 31 to 40 years of age. Thirty-nine study participants had a second degree and above educational level, and 23 of them had 10 years and above of work experience in surgery and related areas. The professional participants included nurses, health officers, surgeons, anesthesia professionals, and general practitioners. Most were surgeons who have direct contact with patients, and others included directors, consultants, advisors, and heads of departments. Thirty-one participants were from Addis Ababa (from public hospitals and health centers, FMOH, and NGOs), 6 from Tigray, 6 from Amhara, 5 from SNNPR, 1 from Oromia, and 1 from Afar regions (Table 36).

Table 36: Sociodemographic characteristics of service provider participants.

Sociodemographic characteristic	Frequency
Sex	

Male 44
Female 7
Age group
18-20 -----
21-30 7
31-40 31
41-50 8
51-59 2
≥ 60 1
Not documented 2
Professional background
Specialist 19
General practitioner 5
BSc nurse 8
Public health specialists 16
IESO 1
PhD candidates 2
Not documented 3

Thematic analysis

We identified the following themes in the semi-structured interview transcripts: client experience, what's known about SaLTS program, pillars of the program, benefits of the program, and area of improvement.

Client experience

Accessibility

The distance of the health facility from beneficiaries including access to basic services in the target facility was discussed, and almost all clients from Addis Ababa who participated in this study explained that the facilities are found at short distances with taxi travel or were within walking distance of their residence.

“My workplace is around ‘Lukanda’. I heard from others that the service at this health center is very good. So, I came here for delivery. It is about a 10-minute walking distance from my home to this health center. It is very near.” (28-year-old female patient, Addis Ababa)

Nonetheless, patients from Oromia and SNNP regions reported that the facilities were somewhat at a distance and used private transport, such as a minibus, and others used ambulances to reach the health facility. All those who used private transport reported fair cost.

“We travel on foot until Mercy Hospital, then we get transportation for Butajira (20 Ethiopian Birr transport). Then we came to Worabe from Butajira.” (20-year-old female patient, SNNPR)

“Bussa is a rural village about 16 km or 10 Ethiopian Birr transport fee (tariffs) from Tulu Bollo along the road of Dawo. The road is not an asphalt road, and the health center is somewhat far from my village.” (23-year-old female patient, Oromia region)

Communication with providers

Clients reported that they got adequate information regarding the reason for their operation and the follow-up conditions after surgery.

“They gave me a chance to express my feeling! They politely accept my feeling and provide me care as I want. So, the interaction we had was best. They did tell me enough information; I did get enough information about the type and severity of my condition. So, their information is adequate.” (27-year-old female patient, Addis Ababa)

“More than five doctors communicated with me. They told me that it has risks, even the anesthesia may have side effects. They told me all information and after informed consent they operate the procedure.” (63-year-old male patient, Oromia region)

Fewer than 10 patients who participated in this study complained of not getting adequate information, and there was no opinion difference across regions.

“They didn’t tell me enough information; I didn’t get enough information about the type and severity of my condition, they simply told me the type of my illness. So, there is lack of information.” (70-year-old female patient, Addis Ababa)

Service equity

Whether the service was equitable to all clients was discussed, and almost all exit interview participants reflected that the service provision is not discriminating based on the patient's personal condition such as gender, economics, or other factors. It was also reported that service was not delayed, and most have got surgical service within a short period from diagnosis through operation.

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“I felt they serve equally all patients irrespective of gender or any other social or economic status.” (28-year-old female patient, Oromia region)

But participating patients also indicated that shortage of drugs and laboratory investigations in the public institutions affected getting timely service. Inadequate service provision at weekend and night were part of the limitations reported by a few participants.

“There is not enough service during the weekend, especially on Sunday. They didn’t make regular visits on these days; you know that pain is aggravated at night, so regular visit is important at this time, but they didn’t. So I am not happy with the weekend service; the hospital management should correct such problems, enough professionals should be available at all times.” (30-year-old male patient, Oromia region)

“I didn’t face any challenge because of my gender or age, but I can say their service was provided during the weekend and the pharmacy was closed at night.” (31-year-old female patient, Addis Ababa)

Hospitality and follow up

Clients find that they received acceptable care as they passed through the different steps such as the initial diagnosis, laboratory investigation preoperation waiting and postoperation follow ups. Almost all clients reported that they are happy and even prefer to return to the facility for another time as needed and even recommend others to visit the facility where they got the service.

“I am very happy and confident in the service I have received here. I will definitely come back again. I already started telling people about the hospital’s service.” (64-year-old male patient, Oromia region)

“Their care and hospitality are excellent, especially, there was good care in OR. I got out without suffering from pain, this may be due to good care from them. Their follow up was interesting, the doctors followed me regularly. They came to me and asked me my status, they were giving me what I complained on the spot. Their service is also good and adequate. Their care during this is very interesting.” (29-year-old female patient, Addis Ababa)

Only one woman from the Oromia region reported that male professionals have more patience and better understanding of patients than female professionals. Otherwise, most of them have mentioned repeatedly that the care they got from the provider side was appreciable.

“I delivered all of my children here, and I noticed that males are more kind, patient, and give respect for us than female ones. ... I don’t know the reason, but I realize this.” (38-year-old female patient, Oromia region)

Pain management

Pain management, as a major aspect of surgical post operative experience, was discussed with the clients and patients from Addis Ababa and Oromia reported that physicians were caring and supportive during surgical procedures and much pain was not experienced.

“There was no pain, I didn’t feel pain. I would like to thank the surgeons for their good care and best hospitality. They were doing the procedure by entertaining me during the procedure. Their management is more than enough, and I am happy with their management.” (28-year-old female patient, Addis Ababa)

“They used partial anesthesia during surgery, and they have made me happy and played with me. I have finished the surgery without any pain. They did their tasks freely and all are in the best mood and had attractive manners. They have made me happy while performing the surgery at the operation room and I should give them recognition for their duties.” (23-year-old female, Oromia region)

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Yet one patient from the Oromia region and two patients from SNNP argued that though the follow up was good, there is a gap in pain management. One of the participants said: *“They gave me different medications on time and asked me if I got relieved. But, with all the care they gave me, I didn’t get relieved. The pain was so intense that I couldn’t sit or lie down, but the follow up was very good.”* (49-year old male patient, SNNP region)

Accommodation

Questions about food and water supply, linen, pajamas, and related supply issues generated various responses among participating patients, and less than one-third reported they got food, water, and pajamas, while the rest reported lack of food, water, linen, pajamas, gown supply, and latrine problems, including its hygiene.

“The food service was very good; they were giving us breakfast, lunch, and dinner on time. So, it was satisfactory. They gave me one linen after surgery. They didn’t give me additional linen. So, the linen was not being changed regularly. I think there is not enough gown.” (70-year-old female patient, Addis Ababa)

“There is no food service in the hospital. ... There is tap water outside the ward for sanitation purposes. There is no toilet near the ward. Patients must have to go outside for toilet use. I haven’t seen any bathrooms around. We purchase purified bottled water for drinking purposes. ... The hospital is not providing bed sheets for the patients; we use ours. The hospital does not deliver pajamas, gowns, and bed sheets. Patients use their own things. We were only provided with the bare bed.” (39-year-old male patient, Oromia region).

What is known about SaLTS

Provider's impression

What the providers knew about the program in terms of objective and structure are explained in the next sections. More than two thirds of care providers who participated in this study explained SaLTS as a special program that targeted the provision of safe surgery service to change the routine practice.

“The main reason for the initiation came after many people have become victims of surgical morbidity following surgical service and interventions. As a result, we needed to minimize it. Therefore, saving lives through safe surgery was initiated to change the practice of the surgery... .” (38-year-old female IDI participant, Addis Ababa).

“SaLTS is a strategy that has been developed using different strictures, it focuses on primary health care related with emergency surgeries and anesthesia care, it is a strategic plan.” (34-year-old- female IDI participant, Amhara region)

The finding revealed that almost all key informants reflected the following points: as surgery has been one of neglected public health issues globally and as Lancet’s global commission galvanized the issue of safe surgery, especially at low- and middle-income countries, by stating that the surgical need is immense in these countries and that addressing the immense surgical needs would increase productivity of citizens, decrease morbidity, mortality, and increase healthy life, therefore SaLTS was designed to achieve the stated needs.

“The main reason was getting recognition. Surgery is perceived as a luxury, our country’s policy is based on prevention, curative medicine didn’t get the needed attention especially they don’t include surgery. But later on, studies show surgery is important and also as studied by the Lancet Commission, SaLTS will save lives, and it is not actually expensive as it is presumed compared to

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other programs. WHO approves the program after due consideration and comparison. ...” (50-year old male KII participant, Addis Ababa)

“SaLTS mean saving life through safe surgery. These strategies were developed because of two reasons; the first was, in Ethiopia only 4% of the population is getting surgical service in 2015/16 when we launch the program and the second one is that in May 2015 the WHO’s World Health Assembly (WHA) resolutions stated that countries need to integrate safe surgery into their health system; therefore as a part of WHA and the access for the safe surgery was low, so we launched the

safe surgery initiative.” (40-year-old male KII participant, Addis Ababa)

However, one in 10 key informants said that SaLTS is not well understood by all respective service providers. They have conveyed that there is confusion and misunderstanding among service providers starting from its meaning to how it would be implemented. This was noted by informants as:

“To be honest it is difficult to say everyone in the surgical area (surgeon, anesthetists, and nurses) knows SaLTS strategy. I can assure you that there is only one person that knows about the SaLTS program or strategy. The rest of the team works based on the old trend. It is difficult to tell you everyone knows about the SaLTS strategy” (40-year-old male KII participant)

“... I was working closely with health facilities, and I can say most of the providers didn’t know about SaLTS in detail. They might be aware of the pillars or know the checklist, but it is hard to say providers fully understood what the program entails.” (36-year-old male, KII participant, SNNP)

Pillars of SaLTS program

Of 30 IDI participants, more than three-fourths and almost all the key informants mentioned that safe surgery has eight pillars, which includes leadership and governance, infrastructure development, human resource component, advocacy and partnership, quality and safety, monitoring and evaluation, innovation and quality, and safety. They also discussed each pillar and what is expected from all perspectives; however, in most of the cases the participants were not aware about the details of the pillars. It was also reported that although having these pillars in the document is good, there are many limitations in changing it to practice.

Leadership, Management, and Governance

The study participants had different opinions about the contribution of SaLTS strategy in leadership and governance; half of the participants agreed that it has brought better change. These ideas were attested by participants as follows:

“In SaLTS initiative, leadership has got a role. When we say leadership, it is taking the initiatives and trying to implement important things. It needs a person who is a solution creator or can bring a solution idea. I think the training was given with Jhpiego in a SaLTS initiative on the surgical field specifically on leadership to representatives. It has tried to do so much. Again, on selected facilities in the northern part, Tigray, and Amhara region, we had field visits. It was good because those who took the training were serving as a mentor for the catchment area small institutions. This was a good initiative. If we strengthen it, we could address lots of things. At least the human resource gap can be filled and build your colleague’s capacity by giving management and leadership training.” (39-year-old female KII participant, Addis Ababa)

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Nonetheless the remaining half reported minimal impact to no contribution. Participants from different regions have pointed out the following responses on the issue:

“The leadership extends from the woreda zone up to the region. It is not limited to the facilities. As leadership it is also involved because to solve some problems that you ask and discuss the zonal or may be the city administer. In achieving the leadership concept there were budget limitations or political and other several factors. It’s difficult to say we attain the intended achievement by giving attention for it” (41-year-old male KII participant, SNNP)

Another respondent said:

“It has been two years since I became department head. I didn’t witness any activity or initiation

from the management or leadership side regarding the implementation of SaLTS strategy in the department surgical service. I am not sure if they have done any leadership movement on the implementation of SaLTS strategy. I know that the SaLTS program focal person has been participating in different SaLTS meetings and gave and took part in different SaLTS training, but nothing has been done up to now in integration of the strategy to the surgical service in the department.” (43-year-old male IDI participant, Addis Ababa)

Infrastructure Development

Findings from this study show that SaLTS has contributed to the development of infrastructure, especially on the emergency and expansion of comprehensive emergency obstructive care centers at hospitals, establishment of building block and oxygen plants at health centers, and renovation of some health facilities.

“This one is also very good. For example, one is infrastructures building. The building by itself should be accommodating for an OR. If we say this place is not to work on as per the guideline, it will be built as per the standard. Electric power, water, and the like The OR has its own water reservoir and generator. So, it helped to fulfil these things.” (25-year-old male IDI participant, SNNP)

One of the anesthesiologist critical care physicians also said:

“Infrastructure, in safe surgery, safe anesthesia, and OR starts from the building, some facilities there are already built buildings, what should the set up look like, how can the patient get out from OR by maintaining the sterility, how should water be available. We inspect when we visit the facility. I remember there is an initiative of oxygen implantation in the Amhara region Bahir Dar. It can be considered as infrastructure. Electricity is the issue of most facilities. I remember some facilities work using fuel where they face frequent interruption. When we compare the cost of working like this versus bringing electricity from the supply there is a difference. It is always very expensive to work with fuel. There were initiatives in installing the electricity in the facilities discussing with the stakes. Also, we assess their basic needs and infrastructure problems, and electricity and water supply were identified as a problem” (34-year-old male KII participant, Addis Ababa)

However, one in 10 IDI participants and about one-third of key informants have said infrastructure development is minimal and no new input was observed as a result of SaLTS. It was revealed that developing infrastructure is a highly demanding issue. Below are some of responses from participants that support this description:

“SaLTS strategy is important, but it gives more focus to the human resource development, which cannot bring desired change alone. Human resource development or mentorship doesn't bring change without the infrastructure. The strategy would have been better if it included infrastructure development alongside human resource development. As to me, there is no infrastructure development that followed by the SaLTS strategy. I am not sure that there is any infrastructure development related to the SaLTS. I don't think there has been any material support during the outreach and

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mentorship programs. As to my knowledge and specific to my department, no infrastructure development has been done by the SaLTS program. Strengthening of OR infrastructure is vital for every surgical safety or quality related issue.” (36-year-old male IDI participant, Tigray)

“I don't think SaLTS has a contribution to this because everything is as it was before. I didn't see any big change” (29-year-old male IDI participant, Addis Ababa)

Supplies and Logistics Management

Almost all study participants reported that so far limited contributions on supplies and logistics issues were gained through SaLTS program. Participants illustrated that shortage of supplies has significantly affected access and quality of safe surgery, and all have urged for fulfilling basic

supplies.

“There is an issue regarding supplies and management at the country level. And SaLTS has not pushed much. Perhaps, campaigns are conducted at various times. Those campaigns have contributed to simplifying the waiting list. There are materials procured due to the campaign especially on burn surgery and the likes. Taking that as it is, the supply chain requires a lot of work. Since there is an issue as a country, I do not believe SaLTS contribution has that much of an influence. I think activities should be done next time in this area.” (41-year-old male IDI participant, Addis Ababa)

“Regarding logistics, I can’t say this is going smoothly, because sometimes elective surgeries get canceled, and they only do emergency surgeries because of shortage of supplies. There are lots of challenges, for example autoclave might be out of service and it is hard to maintain them so surgery might be canceled because of that. OR light might stop working, and no one knows how to fix it. Even the biotechnology technicians don’t know how to fix it.” (33-year-old male KII participant, Amhara region)

Human Resource Development

As evidence from this study shows human resource development is one of the pillars that has gained emphasis by SaLTS when compared with other pillars. Although there are no shared feelings among the participants, study participants have reported as it has brought a change even if it is not enough. Participants said:

“The strategy has different pillars, and one of them was development of human resources, and I can say much has been done so far. Based on this pillar it was able to reach remote hospitals and were able to be strengthened on the supply.” (38-year-old female KII participant, Addis Ababa)

“Training has been provided and as a result of the TOT, different health professionals' capability was built. We anticipate that this will result in a change on students and facilities.” (33-year-old male KII participant, Amhara region)

On the other hand, few have reflected that no clear impact was seen as a result of SaLTS program.

“There is no human resource development plan that we have done in line with SaLTS strategy. By default, most of our work aligned with the strategy. So it is not done purposely to accomplish the SaLTS strategy, so it is difficult for me to understand the SaLTS program contribution to human resource development.” (43-year-old male IDI participant, Addis Ababa)

Advocacy and Partnership

To this effect it was reported that different partners were engaged in the SaLTS program and efforts have been exerted to advocate the program.

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“I think the strategy contributed a lot on the advocacy and partnership since the strategy engaged different stakeholders since beginning like surgical society, obstetrics society, and emergency and critical care society and anesthesia society.” (38-year-old female KII participant, Addis Ababa)

“After the introduction of SaLTS’s initiative, we have been working in a partnership with a private NGO named Lifebox. We were working for one or two years after designing the safety improvement of the surgical system. So, I think there are good starts on advocacy and partnership.” (30-year-old male KII participant, Jhpiego)

Nevertheless, a key informant from Afar region argued that much has not been done in terms of grass root advocacy and partnership:

“Advocacy was done at the level of leadership, but not at the level of the community. These are the parts that haven’t been touched. The community’s knowledge of surgery has remained unchanged. To my knowledge nothing is done

regarding partnership.” (33-year-old male KII participant, Afar region)

Innovation in Problem Solving

The study participants mentioned among the common innovations use of surgical safety checklists in facilitating safe surgery service, having mentorship in person, though rare, or by telephone, fostering the role of biomedical engineers, and use of an alternative electric power source.

“... For instance, mentorship has been an innovation like telephone mentorship program, this enables the professionals at lower levels to get the support they need at any time from their mentors. The other could be the surgical safety checklist, a checklist which refers to the actions which needs to be taken before a surgery, so when you translate this checklist to the local language which will be used, it’s beneficial for the end user. Other innovative action is regarding biomedical engineering, which used to be given at Addis Ababa only, but one school at Debre Markos started to give the training with partner.” (53-year-old male KII participant, Addis Ababa)

“In places where surgical service was not available/working because of power issues, solar energy was used; in hospitals, quality improvement projects were initiated with an innovative idea.” (29-year-old female KII participant, FMOH)

Quality and safety across the perioperative continuum of surgical and anesthesia care

It was reported that quality and safety across surgical services is the major target. It was observed that use of the surgical checklist is improved, and that has directly contributed to having quality of the surgical care, decreased hospital stay of clients, reduced mistakes on OR, created conducive work environment, and increased smooth relationship between OR nurses, surgeons, and anesthetist.

“I can confidently tell you that SaLTS strategy contributed highly to the quality and safety of surgical care. When we compare the quality of surgical care before and after the implementation of SaLTS surgical checklist, the difference is enormous.” (40-year-old male IDI participant, Addis Ababa)

“We designed a program called OR efficiency, and we worked to decrease unnecessary long waiting time through OR efficiency, surgical safety, decreasing cancellation rate, and backlog clearance. These all are quality works; currently we are working on all quality improvement works.” (34-year-old male IDI participant, FMOH)

Monitoring and Evaluation

More than half of service providers who participated in this study have illustrated that M&E has improved through applying strategies and standards. It was reported that about 26 key performance indicators targeted to measure surgical services were developed with Harvard at the national level

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and were integrated with the DHIS system. These indicators help to report surgical volume, surgical site infection rate, cancellation rate, safety culture, and pre-operative outcome in some places, and the data obtained from these areas help to design implementation plans at national level.

“M&E brings three things. The first one is to make the surgical registry standardized because previously the surgical registry was not standardized. Secondly, there is no performance auditing, but now we start to audit the surgical team skill so there is an auditing tool to check their performance. Thirdly, there were no indicators at national level; currently there are indicators developed at national level. We also developed indicators at facility level so there is significant change from the beginning. Hospitals start to address their work using the indicators [...] brought through SaLTS.” (43-year-old male KII participant, FMOH)

“The SaLTS has contributed a lot under this pillar as a quality team we monitor and evaluate the overall surgical care in the hospital, monitor the adherence of surgical checklist utilization, give feedback and flows [for] the improvement based on the feedback, we do performance monitoring meeting twice in a month, recording and reporting of surgical site infection. Before the introduction of SaLTS, we didn’t have a record of surgical site infection. It has been reporting zero.” (38-year-old male KII participant, Tigray region)

Benefit of the program/program learning

Among participants, the most common mentioned benefits since SaLTS was launched were fostering teamwork, motivating service providers to discharge their responsibilities at maximum level, opening of lots of primary hospitals, and promotion of those that were already found at the regional hospital level.

“I believe that SaLTS strategy initiation created big motivation in the surgical area and helped surgical practice to gain attention from different concerned bodies.” (32-year-old male IDI participant, Oromia region)

About half of the participants reported that the program has helped to change the traditional based service to the standard based and scientifically accepted one. As a result, there are lessons that can be captured from the program including: having key performance indicators, development of surgical logbook although still not well utilized, use of standard checklist, engagement of different specialties and departments in teamwork, recording and documentation, and use of limited resources with facilitation of service delivery.

“If you visit Harvard website you will find that Ethiopia is the only country which has many and completed surgical related documents at national level compared to other African countries. In that SaLTS has its own contribution by engaging different professionals to teamwork.” (34-year-old male IDI participant, FMOH)

Nearly one-third of participants from different regions articulate the benefit of SaLTS in terms of increment in the number of health care facilities that provide surgery service, increment in OR buildings, development of human resource, reduction in cancellation of surgery appointments, decrease in preoperative mortality, improvement in patient safety because of improving patient operation site mark, timeout practice, use of preoperative checklist, and proper take of consent.

“... Previously we had manpower shortage. I can say SaLTS contribute to having more manpower.” (37-year-old male KII participant, Tigray)

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As a case, Zewditu Memorial Hospital achievement regarding SaLTS was articulated. Service expansion and quality improvement have been indicated at Zewditu, showing that the number of patients who get surgical service has increased from 40 to 60 per week. The following is representative of responses: *“Following the SaLTS access to safe surgery and infrastructure has been improved. About 420 OR blocks have been built throughout the country, and medical equipment has been purchased and imported. Human resource development (capacity building through trainings) has been done to anesthesia professionals, though it does not match the existing need.”* (29-year-old male IDI participant, Addis Ababa)

It was reported that SaLTS has contributed to the improvement of surgical data management, but there are still limitations to having good documentation and data management.

“We were able to collect, document, and report surgical related data from the health facility and make them included in the EDHS. Surgical site infection, preoperative mortality, surgical volume, and anesthesia adverse events have been incorporated in the EDHS. We were also able to generate KPI [key performance indicators]. This also helped to make data analysis and to identify gaps for further intervention.” (43-year-old male KII participant, FMOH)

Areas of improvement

Despite opinion and experience differences among participants, commonly mentioned gaps include areas corresponding to poor capacity building, low quality service because of less trained manpower,

lack of emphasis on anesthesia service, poor leadership and management (frequent changes of leaders on higher position [ministers] and staffs who engaged on the SaLTS program position also affected the success of SaLTS strategy implementation), lack of inclusiveness and partnership (failing to engage stakeholders, such as ministries of education, transport, finance, and others, is an important but missed part in the program), inadequate budget and resources, lack of implementation plan, and weak M&E.

“After the initiation of SaLTS program, there was no follow up on the implementation. The SaLTS program should be revised, and then after revision there should be strong communication with stakeholders who engage in the surgical care (surgical society including gynecologist, oncologists, orthopedics, etc.). The big problem of SaLTS strategy is that the strategy was individual oriented. It wasn’t integrated into the department and institutions. There should be responsible body which closely follows the implementation of the strategy at each level.” (37-year-old male IDI participant, Tigray region)

“The first gap is commitment at a different level; the second is a budget constraint; the third is lack of medical equipment after we build many infrastructures equipment was a problem; the fourth is fewer number of surgeons, anesthetists, OR nurses in general HR deficiency, the other is oxygen availability is very low, fewer anesthetic drugs and supplies ... all these are the challenges.” (37-year-old male KII participant, Addis Ababa)

It was reported that SaLTS program has faced different challenges including conflict of interest at different levels among professionals, lack of commitment among concerned bodies, lack of clear hierarchical structural and responsible body, lack of clear and uniform SaLTS positional structure of surgical service in the health system, lack of budget and supplies. Frequent interchange of ministers at the Federal Ministry of Health was also mentioned to be a factor, which affected the implementation of the strategy because there was reluctance to give attention to the program and that directly affects budget allocation, implementation, and follow up of the program.

“I observed high level of donor’s influence, which leads the SaLTS strategy leaders to do everything in a thoughtless way than in a critical problem-solving way by involving all concerned stakeholders.” (38-year-old male IDI participant, Addis Ababa)

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“There is a gap in the implementation plan. The implementation plan is not clear, it is lately developed and not introduced or advocated properly. Most workforces in the surgical area say, ‘SaLTS strategy has no implementation plan.’ The development of the implementation plan was not engaging, and the assessment done was not deep-rooted. It was done like a desk review; they do not know the implementation. This created a huge gap in the implementation of the strategy.” (43-year-old male KII participant, FMOH)

Accordingly, participants explained various areas for improvement that may contribute to addressing the current encounters in the area and improved sustainability of SaLTS. One of the major issues was ownership of the program and was recommended to have a responsible body at federal and regional level preferably at federal ministry of health, stressing that the strategy should be acknowledged by higher officials or ministers. Fostering inter-sectoral cooperation and supporting the program with research is also another improvement area suggested by study participants. Furthermore, capacity building training to service providers, strengthening follow up of the program, availing necessary supplies, and improving the infrastructure were articulated. Development of realistic plans, advocacy, regular evaluation of the program, human resource development, empowering local manufacturers on the manufacturing and supply of surgical medical equipment, merging of the vague strategic pillars into small groups, research and incorporating community engagement were also suggested.

“It should promote lots of research; it doesn’t include a research component, rather it includes an improvement plan. If it includes, we can work more with the academicians. The other surgery needs multi-sectoral collaboration. when building one OR block, it needs water supply, electricity even if you bring medical equipment and human resources it

needs. ... I think it will do better if it is part of the strategy.” (33-year-old male KII participant, FMOH)

“Regular training should be given for the OR team. Management team should be alert regarding the program to give focus. The other thing is technical training should be given for surgeons and anesthetics. Finally, it is better to improve infrastructures like water and the like.” (32-year-old male IDI participant, Oromia region)

It was also indicated that the objective of the program should be achievable considering the actual condition, and actors should stick to the plan, the objective, and work at maximum level to meet what is expected. One of the key informants from Addis Ababa discussed this issue in detail and pointed out the following concerns:

“By now SaLTS shouldn’t talk about Bellwether surgery; rather it has to start talking about complicated surgery. It’s like universal health coverage; its speed is not the same as we talk even if it starts again. At the beginning, it was said that everyone should have access in 2020, but we haven’t reached it by now. It was planned again for 2030. Sometimes setting unachievable goals is creating a headache for yourself. At that time, at least if we set minimum but achievable goals by now for the next strategy, we could take experience from that and develop another new document. We aren’t ready to move to another, we have to strengthen this one first. We have to strengthen and build up this one in the new document because we are not at the right time to develop a new thing.” (39-year-old female KII participant, Addis Ababa)

Clients have also shared their suggestions on what needs improvement and although many of them appreciate the service they have received to date. Suggested improvement areas include appointment for service shall be shortened, drug availability, fulfilling laboratory services, improving food, water, and other accommodations.

“They always give us extra appointments; you know that coming several times is difficult for pregnant women. They should give optimal appointment and should serve them by giving priority.” (27-year-old female patient, Addis Ababa)

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“What I recommend is, the service of pharmacy, laboratory, and card room should be improved. It is better to add additional laboratory rooms to manage patients’ time and give better care. (36-year-old female patient, Oromia region)

Conclusions

This program evaluation showed inadequate access to surgical services, and noticeable variation was illustrated with the level of health facilities. The majority of surgical admissions and procedures were reported from specialized hospitals, which shows the magnitude of burden in these health facilities. Low volume of surgical procedures was performed at health center OR blocks where SaLTS I is not being implemented in full. Public primary hospitals represented more than one-third of the total referral outs. Lack of diagnostic modalities, lack of skilled professionals, lack of equipment/instrument, lack of blood, and lack of supply/medication were the most common reasons for surgical referral out from public primary hospitals.

Electrical power interruption, equipment, and laundry/CSR dysfunction were found to be the most common reasons for the interruption of emergency and essential surgical care. This may indicate the weak status of surgical infrastructure in the country and could also be one of the reasons for having long average pre-admission wait times in generalized and specialized hospitals. In contrast to the recommended distance to access EESC, surgical patients in Ethiopia travel distances up to 28.4 hours to access surgical services, which indicates the need for big investment and government commitment in expanding surgical access to the general public.

Health facilities, especially, had shortage of management guidelines for emergency care and surgery,

obstetrics, and anesthesia care. Inadequate use of surgical safety checklists was shown in most of the facilities. Health facilities didn't adequately track surgical site infection as evidenced that only 57.56 percent of charts were found with documented evidence for wound assessment. The cases worsen in private hospitals with only 34.9 percent of charts audited showed evidence of wound assessment. This indicates the surgical site infection tracking system was very poor.

The majority of the surgical site infections and longest pre-admission wait time were reported at specialized hospitals, and the lowest infection rate and shortest pre-admission wait time was shown at private hospitals. Private hospitals had a relatively higher cancellation rate for scheduled surgical cases.

The majority of the surveyed health care facilities do not have agreed/set time for first case incision time, and those having a set/agreed time rarely adhere to it. There is a long lapse between consecutive elective surgical procedures as observed in the majority of health care facilities. The high rate of surgical case cancellation was observed in public specialized hospitals and mainly attributed to medical reasons and lack of blood and blood products. Moreover, exceedingly low operating table outputs are a common feature across the different health care facility levels.

Health care facilities providing surgical services were poorly staffed and equipped with relevant human resources and equipment/supplies. Sizable variations in readiness of facilities were also revealed among levels of facilities. Government hospitals had lower numbers of surgeons, especially primary hospitals, which had considerably lower numbers of obstetricians, compared with private hospitals.

Deployment of qualified IESO care providers and nurse anesthetists in the health centers was found to be a crucial step to bridge the gap to find highly qualified specialists. Nevertheless, a significantly

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low ratio of surgical workforce less than or equal to 1 per 100,000 population served in all four levels of health care facilities evaluated. However, the highest relative ratio of surgical workforce per 100,000 populations served at health center OR blocks in Addis Ababa. There was chronic shortage of surgical beds across all levels of health care, from 1:11,000 population in health centers with OR blocks to 1:61,000 population in public specialized hospitals. More than one third of OR tables in public hospitals were found to be non-functioning, which exacerbates the existing chronic shortage of OT tables in those hospitals. On the other hand, lack of adequate skilled manpower in the health centers with OR blocks and low patient flow in private hospitals were found to be the major reasons for not using OT tables.

This evaluation also revealed that there is total absence or shortage of emergency and essential major and minor surgical care kits, OR equipment and/or supplies across all levels of public health facilities and private hospitals.

Most of the health care facilities did not monitor patient's readmission. A substantial proportion of health facilities, specifically of specialized hospitals and health centers, did not have consistent/regular availability of emergency and essential surgical care equipment and supplies.

This evaluation explored the experiences of surgery service beneficiaries and service providers through exit, in-depth, and key informant interviews. Based on the result, it was reported that accessible service, good case management, hospitality, communication, and equitable service were in place. On the other hand, long wait times, re-appointments, inadequate drugs and laboratory services, lack of food, water supply, pajamas/gowns, and toilet problems were reported as gaps.

Recommendations

- Evaluation results suggest sizable gaps in readiness of health facilities for surgical services and low access and use of surgical services and safety procedures. Findings also indicated the importance of enhancing availability and use of surgical safety supplies to reduce adverse incidents of surgeries/anesthesia or to enhance surgical efficiency at large.
- Therefore, it is highly valuable to strengthen surgical services of the health facilities with relevant inputs, particularly equipping facilities with adequate and skilled human resources and medical technologies.
- In light of WHO's system building blocks framework, it is highly recommended to ensure the capacity of health workforce, infrastructure, and essential major and minor surgical kits and equipment to achieve high quality service delivery and thus to improve health. In addition, monitoring the functionality status and timely maintenance of essential OR equipment is recommended to enhance the efficiency and high quality of service delivery.
- It is highly consequential to strengthen the medical recording practices and documenting skills of health care professionals to ensure optimum quality of facilities capacity of record keeping, handling, and reporting to create a sound system of yielding quality and reliable data that reflects the performance of the health sector.
- As surgical system efficiency is a relatively new concept it is important to identify indicators that help to continually monitor operating room performance and overall surgical system efficiency along with a set standard to say whether an OR is efficient. It is therefore important to ensure the familiarity of the surgical workforce with the concept of surgical/OR efficiency for improved resource use.

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- Even though health providers and key informants commended the benefits of the national SaLTS program in expanding access to safe surgical and anesthesia care, private health facilities lacked the needed knowledge on the national strategy and SaLTS program pillars. This calls for designing a more proactive engagement and capacity building approach that maximizes engagement of all actors, public and private alike, in a nationwide effort that aims to expand access to safe surgical and anesthesia care.
- Surgical leadership and governance need to be strengthened at all levels, and data-driven decision-making and advocacy is warranted to mobilize more resources for developing surgical work force, monitoring and evaluation, and quality and safety. However, limited to null change was reported by most participants in infrastructure, supply and logistics, innovation, and advocacy.
- Standardizing surgical care processes and safety practices across the continuum of surgical care is highly recommended. Using the standard checklist and making the surgery service more accessible, reducing surgical site infection, serving many patients, reduction in cancellation of surgery appointments, decrease in mortality, and patient safety were found to be major benefits and lessons of the SaLTS program.
- Lack of a responsible body who owns the program and lack of resources were articulated as challenges and gaps in the program by most of the participants. Getting ownership of the program at subnational levels is key for building surgical capacity at PHCU levels, particularly the newly constructed HC operation room blocks.
- A functional platform is key for mobilizing local professional associations, patient support groups, and global actors to strengthen capacity building activities, upgrade service infrastructure, monitoring and evaluation, and quantify the unmet needs for surgical care intervention of communities in Ethiopia.
- A concerted effort is needed to promote use of data for decision-making and generate research evidence to inform national strategies and program pillars.

Limitations of the evaluation

Although this evaluation study applied representative sample facilities and used health facility level performance data to generate local evidence on strengths and limitations of the national surgical care strategy and its SaLTS program, it has some limitations. First, because of unpredictable security situations, the quantitative data were not collected from all sampled health facilities. However, as we could collect data from 84.7 percent of sampled health facilities, the results will be generalizable at the national level. Similarly, because of limited time and security issues, qualitative data were not collected from all regions and city administrations of Ethiopia. Qualitative data was collected only from selected health facilities of Addis Ababa city administration, Oromia and SNNP regions. Otherwise, this descriptive qualitative study provides valuable insights regarding the strengths and limitations of the national surgical care strategy and its SaLTS program from a range of participants' perspectives. Thus we believe that the result and conclusions may be transferable and contribute to the improvement of the SaLTS program in other contexts of Ethiopia.

Another area of limitation for the evaluation was that, as shown by the findings of the data quality review work conducted by the evaluation team, health facilities lack the proper documentation skills, record keeping, handling, and reporting ability required to produce quality and reliable data that reflects the performance of the health sector. This gap is mainly observed on the reporting of indicator values by the HMIS/DHIS-2 case teams, although data appear to be readily available gaps

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and inconsistencies were observed between data obtained by direct count from registry and data reported by the HMIS.

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Annexes

Annex 1: Capacity Assessment Tool (CAT) for surgical and anesthesia care

Tool 1: Capacity Assessment Tool (CAT) for Surgical and Anesthesia Care

Assessment Themes and Tools

1 Tool and Instruction 2 2 General Information 3 3 Surgical and Anesthesia Services 4 4 Infrastructure 5 5 Human Resources (workforce) 8 6 Medicines, Equipment, and Supplies 9 7 Financing 10 8 Health Information Management 11 9 Learning and KM 12 10 Others 13

Tool and Instruction

Instruction: This Capacity Assessment Tool (CAT) is used to collect information on the facility capacity for accessing quality surgical care. Meet/Interview the following facility leaders and care providers to complete the assessment: medical director, head of the surgical department, and head of the quality management unit, the HMIS/DHIS2 focal person, and others, as needed. Please complete all questions and check for consistency of data. Thank you for your time.

DATE OF DATA COLLECTION* (dd/mm/yyyy)	
NAME of person(s) filling out form*	
PHONE NUMBER of person(s) filling out form*	
EMAIL*	

General Information

Facility Information Fields marked with an asterisk (*) are mandatory	
REGION*	
NAME and ADDRESS of health care facility* (Include city, woreda or zone, and region)	
Phone number of health care facility*	

Type of health care facility being evaluated	Primary hospital	General hospital	Specialized hospital
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		Health center OR Block	Other	
	Total population served by this health care facility	_____ people (verify source/data)		

Surgical and Anesthesia Services

	1. Total number of admissions (surgical and ob-gyn) within the past 180 days (90 days before COVID and 90 days after COVID)	#
	2. Total number of surgical admissions in 180 days to be separately documented 90 days before first corona case announced and 90 days after first corona case reported. (orthopedics included)	#
	3. Total number of obstetric and gynecologic admissions in one year	#
	4. Total number of surgical procedures in the past 90 days? For minor or major surgery: see definition.	Minor # _____ Major# _____ Total # _____
	5. Total number of Bellwether procedures: laparotomies (adult and pediatric) performed in the past 90 days?	# _____
	6. Total number of Bellwether procedures: Cesarean Section Bellwether procedures done in the past 90 days?	Major # _____
	7. Total number of Bellwether procedures: open fracture management done in the past 90 days?	
	8. Total number of pediatric (aged less than 15 years) surgeries, minor and major combined in the past 90 days?	# _____
	9. Total number of surgical patients referred out to another higher-level facility in the past 90 days?	# _____
	10. What are the three most common reasons for referral out from your facility? Mark a maximum of 3 responses.	a. Lack of bed b. Lack of equipment, instrument c. Lack of supply/medication d. Lack of skilled professional e. Lack of blood f. Patient preference g. Other (Please specify)

	11. Do you have management guidelines available for emergency care?	a. Yes b. No
	12. Do you have management guidelines available for surgery, obstetrics, and anesthesia?	a. Yes b. No
	13. What is the most common reason for emergency and essential surgical care interruption (if there is) in your hospital?	a. Equipment dysfunction b. CSR/Laundry dysfunction c. Electric power interruption d. Water supply interruption e. O ₂ supply interruption

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		f. Other (Please specify)
	14. Percentage of FIRST CASE incision time that starts on-time in reference to the hospital's agreed time? Note: Use tool to abstract data during chart review.	
	15. What is the average pre-admission waiting time for patients who need essential surgical care? Note: Alternately, it can be collected from quality and clinical governance offices of facilities.	
	16. Patient turnover time (time difference between two patients, first end time and the next start time). This can be collected from anesthesia registry book.	
	17. Average Preoperative in hospital waiting time for patients to be admitted for essential surgical treatment. It can be collected from liaison or quality and clinical governance offices of facilities.	
	18. Average decision to incision time for Bellwether procedures (for patients who need C/S and emergency laparotomy or open fracture debridement and fixation).	
	19. Total number of patients waiting for elective admission	
	20. Average cancellation rate (Can be collected from OR managers or quality and clinical governance offices).	

	<p>21. What are the three most common reasons for cancellation of surgical cases after being scheduled</p> <p>Mark a maximum of 3 responses.</p>	<p>a. Medical reason b. Lack of blood or blood products c. Lack of instrument or equipment d. Lack of supplies or medications e. Lack of surgical drape f. Interrupted O2 supply g. Interrupted water supply h. Interrupted electric power i. Other (Please specify)</p>
	<p>22. Percentage of surgical safety checks list (SSC) utilization/completeness. It can be collected from OR manager or quality and clinical governance office of the facility (see chart review guide)</p>	<p>Use the chart review form for the ten charts, annexed. _____ %</p>
	<p>23. For anesthetist/nurse to answer:</p> <p>How often is the WHO surgical safety checklist used in the operating rooms?</p>	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)
	<p>24. For data collector:</p> <p>Calculate the # of times the checklist is used in a random selection of 10% of charts:</p> <p>25. # of charts with completed checklist ÷ 10% charts in number</p>	<p>Use the chart review form for the ten charts, annexed. _____ %</p>
	<p>26. What are the three most common reasons for SSC noncompliance or SSC use</p>	<p>a. Shortage of time b. Lack of professional willingness</p>

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	<p>Mark a maximum of 3 responses.</p>	<p>c. Lack of knowledge d. Resource shortage e. Other (Please specify)</p>
	<p>27. Rate of surgical site infection rate. It can be collected from quality and clinical governance office of the facility.</p>	<p>Use the chart review form for the ten charts, annexed. _____ %</p>
	<p>28. Rate of anesthesia adverse outcome. It can be collected from quality and clinical governance office of the facility.</p>	
	<p>29. Rate of perioperative mortality. It can be collected from quality and clinical governance office of the facility.</p>	

Infrastructure

Items	
1. Total number of hospital beds	#
2. Total number of surgical beds (trauma, GS, and orthopedics)	#
3. Total number of obstetric and gynecologic beds	#
4. Total number of functioning operating rooms?	Minor #
	Major #
5. How far or how long do most patients travel to get to your health facility for surgical services? If estimation is not possible, which woreda do a majority of patients come from?	km/hrs
6. When referred from your hospital, how far/how long does the average patient travel to access surgical services?	km/hrs
7. How many OT tables do you have?	#
8. How many of those tables are regularly used?	#
9. If not in use, why? (e.g., non-functional, surgical services not yet started)	
10. How often do you keep surgery-related records?	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)
11. How many CSRs do you have?	#
12. How many of those are regularly used?	#
13. If not in use, what are the three most common reasons why? Mark a maximum of 3 reasons.	<ul style="list-style-type: none"> a. Non-functional autoclave machine b. No trained human power c. Problem of electric power d. Surgical service not started e. Other (Please specify)

	14. How many equipment/machines do you have in CSRs that are not functional	
	15. How many autoclaves do you have? 16. How many of those machines are regularly used? 17. If not in use, why? (e.g., non-functional, surgical services not yet started)	# # a. Non-functional autoclave machine b. No trained human power c. Problem of electric power d. Surgical service not started e. Other (Please specify)
	18. How often is emergency surgical, obstetric, and anesthesia care available after hours/available 24 hours a day (on average in the past month)?	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)
	19. How many anesthesia machines do you have available for the operating theaters? 20. How many of those machines are regularly used? 21. If not in use, what are the three most common reasons for not being used? Mark a maximum of 3 responses.	# a. Non-functional machine b. No trained human power c. Surgical service not started d. Other (Please specify)
	22. How often do you have an oxygen cylinder or concentrator supply with mask and tubing?	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)
	23. How often is a pulse oximetry used in the operating theater?	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)
	24. How often do you keep anesthesia-related records?	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)

	25. During the past 180 days, how often have you had a generator/back-up electricity source?	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)
	26. During the past 180 days, how often have you had the internet?	<ul style="list-style-type: none"> • 0 (Never) • 1-25%

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		<ul style="list-style-type: none"> • 26-50% • 51-75% • 76-99% • 100% (Always)
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Human Resources (workforce)

Hospital Staff		
	1. Qualified surgeons (General, neurosurgeons, and orthopedic surgeons)?	#
	2. Qualified anesthesiologists or anesthesia care providers?	#
	3. Qualified obstetrician?	#
	4. Qualified IESO?	#
	5. Nurse anesthetists	

Medicines, Equipment, and Supplies

Emergency and Essential Surgical Care Equipment and Supplies

Please ask questions in point in time context, i.e., what is able to be done at time of assessment.

Capital Outlays					
		Absent	Available with shortages or difficulties	Fully available for all patients all the time	Remarks
	1. Suction pump (manual or electric) with catheter				

	2. Blood pressure measuring equipment				
	3. Scalpel with blades				
	4. Retractors				
	5. Scissors				
	6. Tissue forceps				
	7. Gloves (sterile)				
	8. Gloves (examination)				
	9. Needle holder				
	10. Sterilizing skin prep				

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Renewable Items					
	1. Nasogastric tubes				
	2. Light source (lamp & flashlight)				
	3. Intravenous fluid infusion set				
	4. Intravenous cannulas/scalp vein infusion set				
	5. Syringes with needles (disposable)				

		Absent	Available with shortages or difficulties	Fully available for all patients all the time	Remarks
	1. Sharps disposal container				
	2. Tourniquet				

	3. Needles & sutures				
	4. Splints for arm, leg				
	5. Waste disposal container				
	6. Face masks				
	7. Eye protection				
	8. Protective gowns/aprons				
	9. Soap				
	10. Electrocautery				

Supplementary Equipment for Use by Skilled Health Professionals					
	1. Adult McGill forceps				
	2. Pediatric McGill forceps				
	3. Chest tubes insertion equipment				
	4. Tracheostomy set				

Financing

Health Financing and Accounting	
	1. What percentage of your patients have health insurance?

Budget Allocation	
	1. What is your total annual hospital budget? _____Birr
	2. How much of your annual hospital operating budget is allotted to surgery and anesthesia? Including medications, consumables (gloves, etc.), and equipment bought for surgery.

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Health Information Management

Information Systems		
	1. What is the method of record keeping in your hospital?	Paper Electronic Both
	2. Are there personnel in charge of maintaining medical records?	a. Yes b. No
	3. How often are charts accessible across multiple visits for the same patient?	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)
	4. How often is data prospectively collected for monthly perioperative adverse events, such as unexpected return to OT or surgical site infection?	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)
	5. How often is data prospectively collected for monthly postoperative mortality rate?	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)
	6. Do you use telemedicine for surgical services?	a. Yes b. No

Learning and KM

Research Agenda		
	7. How many quality improvement projects were done in the hospital in the past year?	#
	8. How many ongoing research projects are being done in the hospital? Exclude resident, intern, and student research projects.	#
	9. How many papers related to surgical systems, funded by MOH/facility have been published by hospital staff in the last year? Exclude resident, intern, and student research papers.	#

	10. Do you have a data management team in the surgical disciplines (general surgery, orthopedics, and ob-gyn) of your hospital?	a. Yes b. No
	11. Is there a regular data discussion and reporting platform (e.g., monthly mortality and morbidity sessions) among surgical care providers in the hospital?	a. Yes b. No
	12. How often do you use your hospital data for decision making (annual plan, human resource development, ...)?	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)

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Others

	1. Does the hospital monitor patient readmission within 30 days after any surgery?	<ul style="list-style-type: none"> • No • Yes
	<p>2. Rate of patient readmission within 30 days after any surgery? 2a. The denominator, the total number of surgeries performed in the past 30 days, minor and major emergencies, and elective.</p> <p>2b. The numerator, the total number of re-admissions of surgical cases 30 days after any surgery.</p>	<p>2a</p> <p># _____</p> <p>2b</p> <p># _____</p>
	3. How often do you check the quality of processed surgical (sterility tape indicator, dryness of surgical drapes) instruments, drips, and cloths before incision?	<ul style="list-style-type: none"> • 0 (Never) • 1-25% • 26-50% • 51-75% • 76-99% • 100% (Always)

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Annex 2: Abstraction tool for surgical care KPI

Tool 2: Abstraction tool of Surgical Care KPIs, Monitoring and Evaluation Indicators

Instruction: This tool will be used to extract information on Surgical Care KPIs, Monitoring and Evaluation Indicators from chart reviews, and quality offices of facilities proving surgical care.

DATE OF DATA COLLECTION* (dd/mm/yyyy)	
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NAME of person(s) filling out form*	
PHONE NUMBER of person(s) filling out form*	
EMAIL*	

General Information

Facility Information Fields marked with an asterisk (*) are mandatory	
REGION*	
NAME and ADDRESS of health care facility* (Include city, woreda or zone, and region)	
Phone number of health care facility*	

	Type of health care facility being evaluated	Primary hospital	General hospital	Specialized hospital
		Health center OR block	Other	
	Total population served by this health care facility	_____people (verify source/data)		

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No	Indicator	Timeline for data collection						Remark
		June	July	August	September	October	November	
1	Surgical work force density, care provider to client ratio							
2	Major surgery volume (at supported facilities)							

3	Cesarean section rate							
4	Major surgery referrals out (from supported facilities)							
5	WHO Surgical Safety Checklist use rate							
6	Perioperative Mortality Rate (POMR)							
7	Institutional maternal mortality ration (iMMR)							
8	Institutional neonatal mortality rate (iNMR)							
9	Surgical Site Infection rate							
10	Pre-admission wait time							
11	Pre-operative wait time							
12	Total hospital stays, bed occupancy							
13	Rate of new onset pressure/decubitus ulcer							
14	Anesthesia adverse event							
15	Surgical cancellation rate							
16	First OR case on-time rate							
17	Others							