ISW26-465-01 (0182)

A UGANDAN PRECISION GLOBAL SURGERY EDUCATION PILOT

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Introduction:
Global surgery curricula have traditionally been designed by institutions in high-income countries (HICs), which may limit their relevance for learners in low- and middle-income countries (LMICs). We previously developed a Uganda-specific global surgical curriculum using generative artificial intelligence (AI) informed by relevant survey responses from a global survey. This pilot study sought to validate the AI-generated, country-specific global surgery curriculum for Uganda and assess its alignment with local learner needs and expectations.

Material and Method:
A structured follow-up survey from the original survey was distributed to 60 Ugandan healthcare trainees and professionals, of whom 40 completed the survey and reviewed the AI-generated curriculum. Respondents assessed curriculum relevance, accuracy, structure, and feasibility. Metrics included content relevance, logical flow, alignment with learning objectives, and willingness to engage in similar future educational efforts. Feedback was used to iteratively revise the curriculum.

Results:
Of the 40 completed survey respondents, 31 (78%) affirmed the curriculum's relevance, 32 (80%) found its organization logical and aligned with their educational goals, and 32 (80%) felt the structure supported effective delivery. Additionally, 36 (90%) expressed interest in participating in a course based on the proposed curriculum. Feedback highlighted the need for updated epidemiological data and additional Uganda-specific case examples.

Conclusion:
The Uganda-specific curriculum was positively received by local trainees and professionals, supporting the feasibility of using generative AI for precision education in global surgery. These findings will guide further refinement and piloting of country-specific global surgery curriculum in LMIC clinical training environments, with Uganda as the first use-case.

ISW26-465-02 (0536)

EARLY DETECTION OF POSTOPERATIVE DETERIORATION WITH ENHANCED MONITORING USING SENSORS (EMUS)

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Introduction:
Early Warning Scores are used globally to detect patient deterioration. These are powered by intermittent physiological observations which are subject to user error, instrument failure and staffing availability, which can lead to escalation delays. Novel wearable sensors offer accurate, automated, and continuous patient monitoring. This study aims to perform feasibility testing of a wearable sensor in eight variably-resourced countries.

Material and Method:
This prospective observational cohort study recruited patients undergoing procedures with an incision of 5 cm or greater in the UK, India, Rwanda, Ghana, Nigeria, Benin, Guatemala, and Mexico. Continuous heart rate, respiratory rate, peripheral oxygen saturation, skin temperature, and accelerometery were recorded using a wearable sensor, worn for up to 10 days postoperatively. Sensor data was unavailable to clinical teams. Standard of care clinical data was simultaneously collected. Once uploaded, study data was available to local research teams via a Shiny dashboard for near real-time data quality monitoring. Focus groups with healthcare professionals and 1-1 interviews with patients explored barriers and facilitators to future implementation.

Results:
At interim analysis 786 patients were enrolled from 17 hospitals in eight countries. 232 complications were detected. Device maintenance and data quality monitoring was conducted locally at all sites. Individual case analysis highlighted early detection using wearable sensors compared with intermittent physiological observations, across every world bank income threshold.

Conclusion:
Continuous monitoring with sensors can be successfully deployed across a range of global settings. These technologies may detect physiological deterioration earlier than the standard of care and are feasible to implement globally.

ISW26-465-03 (0832)

ESSENTIAL SURGERY GUIDELINES DURING COVID-19: TYPES OF SOURCES AND IMPLICATIONS FOR FUTURE SURGICAL PRACTICE

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Introduction:
Surgical practice changed drastically during the COVID-19 pandemic as healthcare systems faced increased demand and limited resources. Recommendations for essential surgery varied internationally, influencing practice and patient care. This review aimed to identify the sources countries used to define essential surgery to better understand how information was distributed during the pandemic.

Material and Method:
A web-based search was conducted using "[country name] essential surgery guidelines covid" in PubMed to identify country-specific guidelines from 2020 to present. Primary literature from general surgery and surgical subspecialties was included.

Results:
Guidelines were identified for 25 countries: 17 high-income (HICs) and 8 low- or middle-income countries (LMICs). Thirty-three guidelines were analyzed: 21 from HICs and 12 from LMICs. Sources included international organizations, non-governmental organizations (NGOs), Ministries of Health (MOHs) or other governmental agencies, hospital departments, and professional medical or surgical associations. Only one LMIC, and no HICs, used World Health Organization guidelines. NGO recommendations were used by two HICs and one LMIC. National MOHs guided 5 LMICs and 5 HICs; hospital departments guided 2 LMICs and 2 HICs. Most countries relied on professional associations; specifically, 11 HICs and 7 LMICs. Among these, 3 HICs and 5 LMICs used American College of Surgeons (ACS) recommendations, and 6 LMICs used guidelines from other HICs.

Conclusion:
Professional associations supplied most essential surgical guidelines for both HICs and LMICs, with many countries adopting ACS recommendations. Ministries of Health also played key roles in standardizing surgical care. Further work will assess recommendations for emergent versus elective surgeries.

ISW26-465-04 (0861)

RESIDENT-LED ADOPTION OF ROUTINE LAPAROSCOPIC APPENDECTOMY IN A NIGERIAN TEACHING HOSPITAL

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Introduction:
Appendectomy is one of the most common emergency procedures and often the first major operation performed by surgical residents. While laparoscopic appendectomy offers several advantages, the open technique remains predominant in resource-limited settings like Nigeria due to infrastructure and training gaps. The study aimed to document a resident-driven shift from open to routine laparoscopic appendectomy at a Nigerian teaching hospital.

Material and Method:
A retrospective review of appendectomies performed at the Ife Hospital Unit, Obafemi Awolowo University Teaching Hospitals Complex between January 2019 and April 2025. Cases were grouped into two periods: pre- and post-October 2023, when resident-led laparoscopic appendectomy was introduced. Data on patient demographics, surgical approach, surgeon cadre, complications, and operative time were analyzed.

Results:
265 patients for appendectomy were reviewed in the study period. Between January 2019 and September 2023, 189 appendectomies were performed, with 76.7% done via open surgery. All 44 laparoscopic cases (23.3%) were performed by consultants. After October 2023, 76 appendectomies were done by residents, 89.4% of which were laparoscopic. Three conversions to open were required. Postoperative complications occurred in 2 (2.9%) patients: one re-operation for localized peritonitis and one pelvic collection managed conservatively. Mean operative time for laparoscopic cases improved significantly, decreasing from 110 to 60 minutes over time.

Conclusion:
This study demonstrates a successful resident-led transition toward routine laparoscopic appendectomy. With continued exposure and skill development, minimally invasive surgery can become routine even in resource-limited settings. Integrating structured laparoscopic training into residency programs is essential for sustaining this progress

ISW26-465-05 (0580)

IMPROVING IMPLEMENTATION OF ENHANCED RECOVERY AFTER CESAREAN SECTION PROTOCOL IN RESOURCE LIMITED SETTING OF KOIDU GOVERNMENT HOSPITAL, SIERRA LEONE 2024. A QUALITY IMPROVEMENT PROJECT FROM EVIDENCE TO REALITY.

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Introduction:
Enhanced recovery after cesarean section (ERAC) is an evidence-based, and standardized peri-operative care program that comprises a multi-disciplinary team with the principal goal of improving quality of surgical care. implementation of ERAC protocol in Koidu Government Hospital was low There was no standardized protocol in place; Utilization of the WHO surgical safety checklist was only 13.3%, and just 15.9% patients received opioid free analgesia, additionally, pain was not recorded as a vital sign. This project aims to improve adherence to protocol and enhance recovery following cesarean.

Material and Method:
We employed standardized QI tools such as fish bone diagram and priority matrix for root cause analysis. Based on findings, we implemented three series of PDSA cycles. The key interventions included, designing evidence based and standardized protocol, and checklist on peri-operative care, providing training, perform regional block, and document pain as a 6th vital sign.

Results:
Post-implementation data from 689 cesarean mothers showed significant improvements under different Key Performance Indicators (KPIs). Utilization of the WHO surgical safety check list found to be 95.6 %, regional analgesia was performed for 79% of cesarean mother, and pain was assessed and documented for 97.3% of surgical patients. Oral feeding, ambulation and catheter removal was protocoled as per the ERAC standard for all patients. Postoperative complications drastically decreased from 12.71% to 5.78%. Furthermore, the duration of hospital stay decreased from 4.64 days to 3.12 days.

Conclusion:
The quality improvement project demonstrated that, successful implementation of ERAC protocol improve the all over recovery, decrease rate of complication and hospital stay.

ISW26-465-06 (0488)

BRIDGING HEALTHCARE GAPS: MIXED REALITY APPLICATIONS IN REMOTE MEDICAL OUTREACH

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Introduction:
Access to advanced medical care in lesser-developed regions remain a persistent challenge. Emerging technologies such as Mixed Reality (MR) offer potential solutions by enabling hands-free operation and real-time image sharing. We present our initial experience using MR to enable remote specialist medical assistance in Ghana.

Material and Method:
In July 2025, the National University Hospital, University Surgical Cluster (NUH, USC, Singapore), in collaboration with HopeXchange Medical Centre (HMC, Ghana), conducted a medical outreach mission to a rural village in Kantinkyiren (Ghana) with the team using Microsoft HoloLens 2 MR devices. These devices feature an optical-passthrough holographic display that overlays virtual content onto the user's field of vision. The combined outreach team comprised of 23 members, including doctors, nurses and pharmacists. The MR devices were worn by two doctors and connected to the internet via a dedicated 4G router, enabling real-time communication and video streaming with specialists in NUH and HMC.

Results:
A total of 152 patients, aged 2 to 85 years, were evaluated. Apart from common ailments, the team encountered complex pathologies, including hernias, possible tumors and obstetric conditions. Live videos of patient consult and point-of-care imaging tests were streamed to remote specialists from NUH and HMC via the MR devices.

Conclusion:
The outreach team were able to utilize MR to conduct real-time remote consultations, with initial results suggesting that this approach helps support clinical decision-making for complex cases and enhance communication in rural outreach settings. Its integration into outreach workflows has the potential to increase specialized healthcare accessibility for remote rural communities.

ISW26-465-07 (0423)

SURGICAL ACCESS IN ETHIOPIA: A GEOSPATIAL MODELING STUDY

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Introduction:

Access to essential surgical care varies significantly worldwide, particularly in low- and middle-income countries (LMICs). Prior studies estimate that patients in Ethiopia travel between 5 and 28.4 hours to reach surgical services. Our study determined the geographic accessibility of surgical facilities in Ethiopia using nationally available data to determine the proportion of the population within a two-hour travel time.

Material and Method:

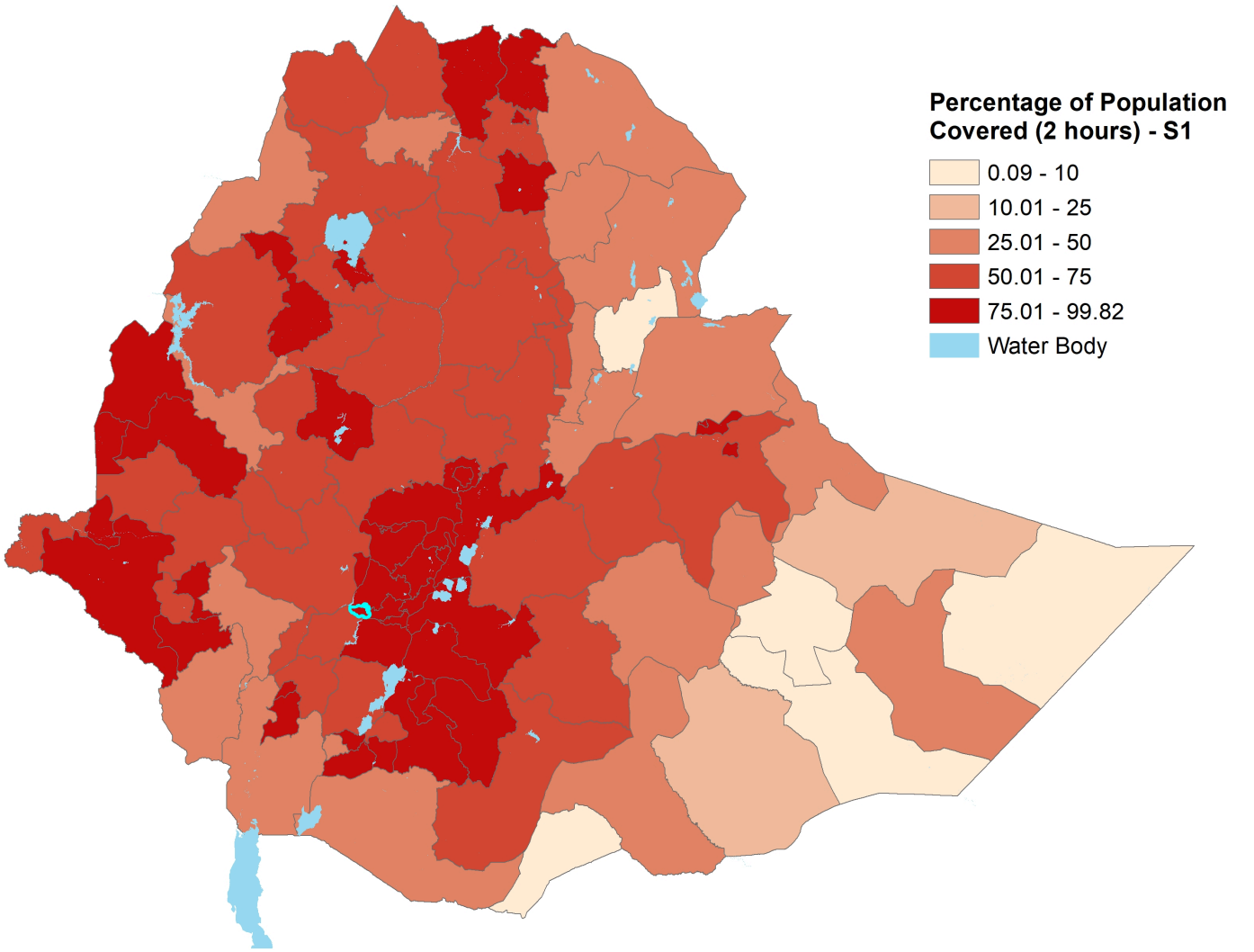
The coordinates of 839 hospitals reporting surgical volumes from the Ethiopian Federal Ministry of Health (FMOH) were geocoded and combined with geospatial data on road networks, elevation, land cover, population density, and travel barriers. Three travel scenarios were modeled: (1) driving+walking, (2) bicycling/horse + walking, and (3) walking only. Population coverage was analyzed at 30-minute, 1-hour, and 2-hour travel time thresholds.

Results:

Nationwide, 70.9% Ethiopia's population had access to a surgical facility within 2 h under Scenario 1, compared to 55.4% and 25.1% for Scenarios 2 and 3, respectively. Regional disparities were significant: under Scenario 1, 99.6% of Harari's population had access within 2 h, while only 25.9% did in Somali. For walking only (Scenario 3), access ranged from 10.0% in Somali to 95.2% in Addis Ababa.

Conclusion:

Following the launch of Ethiopia's Saving Lives through the Safe Surgery (SaLTS) initiative in 2015, access to surgical care, improved from (39.6%) to (70.9%), by 2025. However, rural access to surgery remains a challenge, necessitating targeted interventions and regional implementation strategies to enhance surgical accessibility across sub-Saharan African countries.


Percentage of Population Covered (2 hours) - S1
0.09 - 10
10.01 - 25
25.01 - 50
50.01 - 75
75.01 - 99.82
Water Body

ISW26-465-08 (0602)

EXAMINING THE CARBON FOOTPRINT OF VASCULAR SURGERY: A 12-MONTH SINGLE INSTITUTION REVIEW

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Introduction:
The modern Operating Room (OR) is responsible for creating an overwhelming amount of Greenhouse Gas (GHG) emissions, the main driver of global warming. There is a dearth of information regarding the true impact from vascular procedures on climate change.

Material and Method:
A retrospective review was performed of all vascular procedures from a single institutional OR during a twelve-month period. OR waste was divided into disposable, biohazard, and recycling. GHG emissions were calculated based on established historical measurements.

Results:
A total of 776 procedures were performed. Of these, 686 procedures met criteria for analysis: 285 (42%) endovascular procedures (EPs), 311 (45%) open procedures (OPs) and 90 (13%) hybrid procedures (HPs). A total of 6104.3 kg of waste was produced over the 12-month study period. Of this, 4,449.3 kg was disposable waste, 1,011 kg was biohazard waste and 643.3 was recyclables. An average of 8.2 kg of waste was produced per procedure. HPs created more mean waste (11.2 kg) than EPs (8.0 kg) or OPs (7.5 kg). HPs also produced more biohazard waste (2.6 kg) than EPs (1.3 kg) or OPs (1.0 kg).

Conclusion:
The estimated annual CO2 emissions produced from one vascular division was equivalent to driving 500 gasoline powered automobiles across the country twice. This should be a call to action for the surgical community to take the lead on addressing the Healthcare sector’s contributions to the climate crisis.

ISW26-465-09 (0980)

NATIONAL TRENDS IN CHOLECYSTECTOMY IN MEXICO FROM 2008-2023: A NATIONWIDE RETROSPECTIVE ANALYSIS

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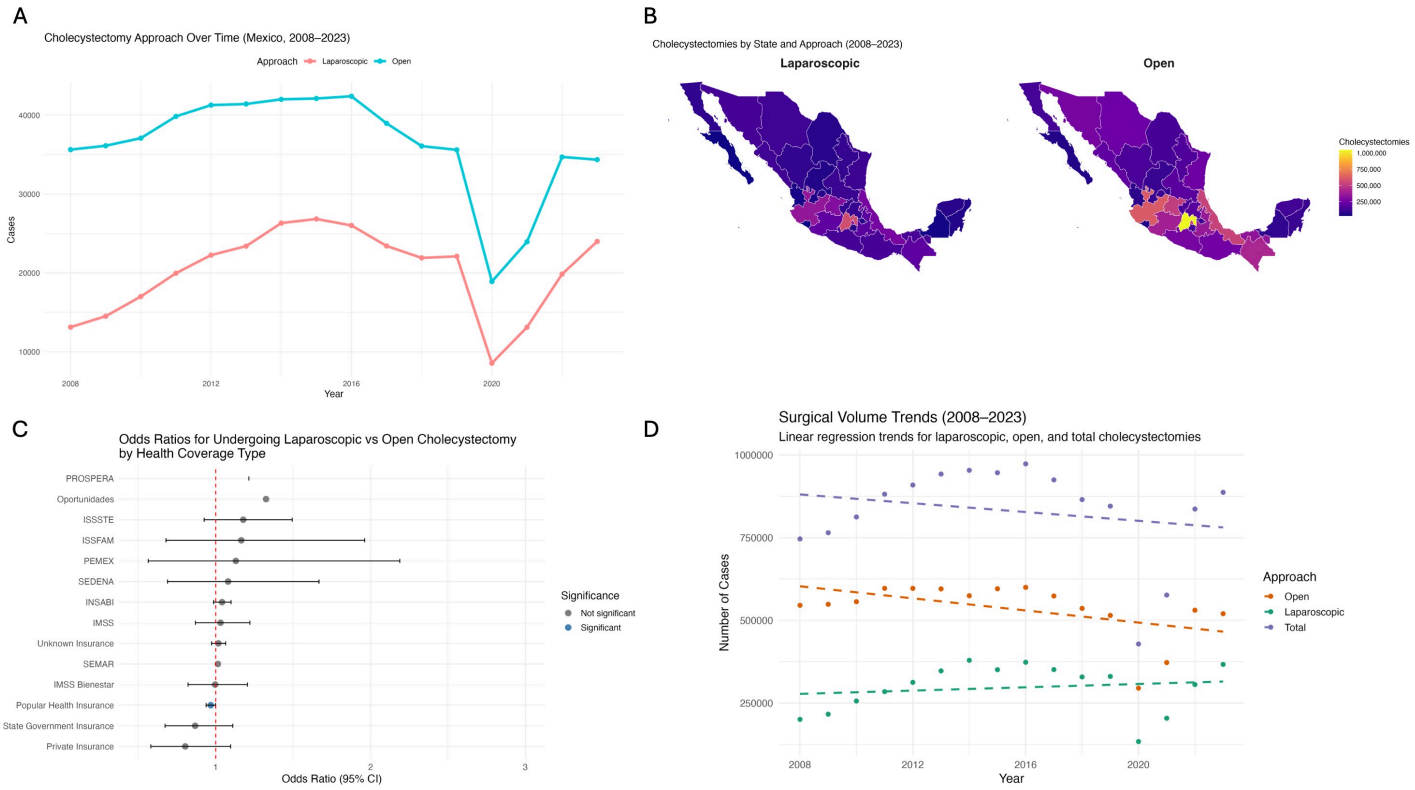
Introduction:
Cholecystectomy is among the most frequently performed planned essential surgeries (PES) worldwide, yet access to PES remains limited in low- and middle-income countries. This study examines national trends in PES provision, using cholecystectomy as a proxy, within Mexico's public healthcare system.

Material and Method:
We conducted a retrospective cross-sectional analysis of all cholecystectomies performed in public hospitals from 2008–2023, using the Ministry of Health's national hospital discharge and procedure registries. Cases were identified by ICD-9-PCS codes 51.23, 51.24, 51.22, and 51.21; Surgical volumes were analyzed by year, state, and sociodemographic characteristics. Trends were assessed using Chi-square tests, Poisson or negative binomial regression, and multivariable logistic regression to estimate adjusted odds of laparoscopic surgery by demographic and health coverage variables.

Results:
A total of 902,976 cholecystectomies were performed: 64.3% open and 35.7% laparoscopic. Both approaches declined sharply in 2020 during the COVID-19 pandemic but exceeded pre-pandemic levels by 2023. Open surgery significantly decreased over time ($\beta = –9{,}145$; $p = 0.04$), while laparoscopic volumes showed a non-significant increase. Geographic disparities were marked, with southeastern states showing the lowest laparoscopic adoption. Patients in more recent years had higher odds of undergoing laparoscopic surgery; those insured through Seguro Popular had lower odds compared with other coverage types. Clinical outcomes were generally similar, although in-hospital mortality was higher for open surgery (9.0 vs 6.0 per 1,000 discharges).

Conclusion:
While access to laparoscopic cholecystectomy in Mexico has expanded, open surgery remains predominant. Geographic and socioeconomic disparities underscore the need for policies that enhance equitable access to minimally invasive surgery nationwide.


A
Cholecystectomy Approach Over Time (Mexico, 2008–2023)
Approach
Laparoscopic
Open
Cases
Year
B
Cholecystectomies by State and Approach (2008–2023)
Laparoscopic
Open
Cholecystectomies
C
Odds Ratios for Undergoing Laparoscopic vs Open Cholecystectomy by Health Coverage Type
PROSPERA
Oportunidades
ISSSTE
ISSFAM
PEMEX
SEDENA
INSABI
IMSS
Unknown Insurance
SEMAR
IMSS Bienestar
Popular Health Insurance
State Government Insurance
Private Insurance
Odds Ratio (95% CI)
Significance
Not significant
Significant
D
Surgical Volume Trends (2008–2023)
Linear regression trends for laparoscopic, open, and total cholecystectomies
Number of Cases
Year
Approach
Open
Laparoscopic
Total

ISW26-465-10 (0223)

SHARING INNOVATIONS IN NON-TECHNICAL SKILLS TRAINING ACROSS AFRICAN CONTEXTS: PILOT IMPLEMENTATION OF RWANDA TRAINING TOOLS IN NIGERIA

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Introduction:
Up to 50% of intraoperative errors are traceable to deficiencies in non-technical skills including leadership. Deficits have been identified in non-technical skills training for surgical teams in the West African sub region. We trained multidisciplinary surgical teams Nigeria using the Non-Technical Skills for Surgery in Variable Resource Contexts (NOTSS-VRC) curriculum, initially implemented in Rwanda and assessed trainings on the first two Kirkpatrick levels.

Material and Method:
We conducted in-person training for multiple surgical teams at 5 facilities (including a public and a private teaching hospital, a non-teaching tertiary federal medical center, a private tertiary hospital, and a not-for-profit secondary facility) across 3 North-Central Nigerian states assessing perception and knowledge gain via surveys and focus groups. Knowledge gain was assessed using Wilcoxon rank test and qualitative data underwent thematic analysis.

Results:
162 multidisciplinary participants including surgical trainees, perioperative and anesthetist nurses, non-specialists, interns, anesthetists and surgeons (median 39 years, M:F=1.7:1) were assessed. There was significant knowledge gain following training; average percentage test scores increased from 47% to 57% (W 2336.500, $p<0.05$), with clarity on NOTSS domains. 95% recommended the training for all operating room staff, 87% were motivated to attend further training and use it to improve patient outcomes. Group discussions and simulation videos were the most helpful curriculum components. Participants suggested contextualized videos, real-time operating room sessions, low-dose high frequency training and NOTSS-VRC Continuing Medical Education.

Conclusion:
Cross-fertilizing NOTSS-VRC Training from Rwanda to Nigeria was feasible, relevant, and well received, with significant knowledge gain. Further contextualization is needed prior to assessment on higher Kirkpatrick levels