Outcomes of a multicomponent safe surgery intervention in Tanzania’s Lake Zone

December 6 2019
DISCLOSURES

- Safe Surgery 2020 is funded by the GE Foundation
SAFE SURGERY 2020 PARTNERS

Lead partners…

Country partners…

Implementation partners…

Funded by…
SURGICAL QUALITY IN GLOBAL CONTEXT

Patients in Africa 2x as likely to die after surgery compared to global average.

Maternal mortality rate after C-section 50x higher in Africa than HICs.

1 in 5 patients in Africa has post-surgical complications; infections are most common and 2-10X higher than HICs.
SAFE SURGERY 2020 APPROACH

- Partnership with the Tanzanian government
- Focus on local surgical priorities
- Multicomponent intervention
- Build local capacity and empower surgical teams
- Evaluate to promote learning about how best to strengthen surgical services in LMICs
RESEARCH AIMS

To assess the impact of the Safe Surgery 2020 multicomponent intervention on the quality of surgical care

- **Short-term outcomes: surgical quality processes**
  - Safety and team work & communication

- **Medium-term outcomes: surgical complications**
  - Maternal sepsis, post-operative sepsis and surgical site infections (SSI)
Reduced complications and deaths from surgery

Improved surgical quality

Reduced post-operative infections
- Maternal sepsis
- Post-operative sepsis
- Surgical site infections

Improved surgical quality processes
- Safety practice
- Teamwork and communication

**Intervention Components**
- Leadership and teamwork training for surgical safety
- Sterilization training
- Infrastructure support (up to $10,000 USD) and BMET training
- Data quality training
- Clinical training in safe surgery and anesthesia

Mentorship (on-site, virtual via Project ECHO, and peer mentoring)
STUDY SETTING

POPULATION
10 million people
2/3 live in rural areas
1/3 live below poverty line

KAGERA
1 Health Centre
3 District Hospitals
1 Referral Hospital

MARA
1 Health Centre
3 District Hospitals
1 Referral Hospital

GEITA
2 Health Centres
1 District Hospital
1 Referral Hospital

SHINYANGA/SIMIYU
3 District Hospitals
2 Referral Hospitals

TARGET GROUP
Post-surgical patients
Post-natal patients
STUDY DESIGN

- High quality evidence
  - Longitudinal, multi-site, quasi-experimental design
- Knowledge for scale up
  - Mixed quantitative and qualitative methods
- High quality primary data
  - Prospective; direct observation; weekly data quality checks
DATA COLLECTION TEAM

Tanzanian medical doctors trained

40
QUANTITATIVE DATA COLLECTION

SSC
Observation tool

Maternal sepsis/
Sepsis/SSI
Screening tool
STUDY TIMELINE

2017
Oct – Dec

2018
Jan - Mar
Apr - Jun
Jul - Sep
Oct - Dec

2019
Jan - Mar
Apr - Jun
Jul - Sep

Study Preparation

Pre-Intervention Data Collection (Feb – Apr 18)

Post-Intervention I Data Collection (Mar – May 19)

SS2020 Intervention
DATA ANALYSIS

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed trend in intervention group</td>
<td>Intervention Effect</td>
</tr>
<tr>
<td>Observed trend in control group</td>
<td>Pre-intervention</td>
</tr>
</tbody>
</table>
SUMMARY

- 20 study facilities
- 40 Tanzanian medical doctors trained
- 200+ days of on-site data collection
- 2,712 surgeries observed
- 18,864 study participants enrolled
SAFETY, TEAMWORK & COMMUNICATION

Safety Indicators
1) Pulse oximeter used
2) Prophylactic antibiotic administration within 60 minutes before incision
3) Confirmation by team of patient’s identity, site, and procedure
4) Instrument, sponge, and needle count completed
5) Operative site cleaned
6) Appropriate vaginal cleansing (C/S)

Teamwork & Communication Indicators
1) Risk of airway difficulty or aspiration
2) Risk of blood loss
3) Patient specific concerns — anesthesia provider
4) Patient specific concerns — surgical provider
5) Sterility of instruments and equipment
6) Equipment problems during surgery
7) Post-operative recovery concerns
8) Duration and difficulty of procedure
ADHERENCE TO SAFETY DOMAIN

Change in Intervention: +34.4%
Change in Control: +7.3%

Adherence to Safety Domain

Pre

Post 1

Control
Intervention

35
44.4
69.4
37.1
ADHERENCE TO TEAMWORK AND COMMUNICATION DOMAIN

Change in Intervention: +48.1%
Change in Control: +8.6%
## DIFFERENCE – IN-DIFFERENCE RESULTS

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Change in Adherence from pre to post intervention in Intervention sites</th>
<th>Change in Adherence from pre to post intervention in control sites</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Adherence</td>
<td>34.4%</td>
<td>7.3%</td>
<td>&lt;0.0001***</td>
</tr>
<tr>
<td>Teamwork and Communication Adherence</td>
<td>48.1%</td>
<td>8.6%</td>
<td>&lt;0.0001***</td>
</tr>
</tbody>
</table>
“The SSC implementation has become an obligatory practice for all my surgeries... everyone in the theatre understands their roles prior to surgery. The SSC is an imperative tool that I can no longer leave behind for my surgeries.”

Dr. Tubeti Chacha, Surgical Team Leader
SEPSIS RATE

Change in Intervention: -4.3%
Change in Control: -3.8%
SSI RATE

Change in Intervention: -2.9%
Change in Control: -3.4%

Pre

Post 1

SSI Rate

0.0%
3.0%
6.0%
9.0%
12.0%

Control
Intervention
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Change in rates from pre to post intervention in Intervention sites</th>
<th>Change in rates from pre to post intervention in Control sites</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Sepsis</td>
<td>-1.7</td>
<td>-0.4</td>
<td>0.023*</td>
</tr>
<tr>
<td>Sepsis</td>
<td>-4.3</td>
<td>-3.8</td>
<td>0.61</td>
</tr>
<tr>
<td>SSI</td>
<td>-2.9</td>
<td>-3.4</td>
<td>0.69</td>
</tr>
</tbody>
</table>
“Thanks to the training, the clinician knew he was dealing with an SSI and septic shock…

**Her relatives did not expect her to survive…**

Without losing a single minute, he organized a team… and we are always prepared.”

- Bukoba Regional Referral
Maternal Sepsis Rates in each SSC Category

- Low-Moderate Adherence: 5.10%
- High Adherence: 1.90%

P = 0.004*
“The mother would not stop bleeding… The mentors trained us on management of PPH intra-operatively by using a B-Lynch suture. This knowledge helped the doctor save the life of a new mother with twins.”

Dr. Ladislaus Buberwa
LIMITATIONS

- Intervention and control sites were not randomized
- No post-discharge follow-up of patients
- Potential for Hawthorne Effect
- Potential cross-contamination
- QI interventions often need time for changes; intervention time might not have been long enough
CONCLUSION

- One of the largest global surgery studies in a LMIC
- Safe Surgery 2020 was associated with meaningful improvements in surgical quality
  - Safety practices improved
  - Teamwork and communication improved
  - Maternal sepsis declined
- Post-operative sepsis and SSI improved but the change was not statistically significant
  - Control sites improved also: Hawthorne effect? Contamination?
  - QI interventions require time
- Safe Surgery 2020 is a promising approach to improving surgical quality in LMICs in contexts that are similar to the Lake Zone region
A multicomponent intervention may be a promising approach to improving surgical quality in LMICs.

Safe Surgery 2020 is a journey. It takes time to build a ‘quality infrastructure’ (e.g. use of teams, data, training), transform culture and change existing routines.

Interventions should be tailored to meet the needs of individual facilities.

It is important to build a receptive implementation climate by facilitating leadership support, buy-in & a multi-step implementation process.

To scale surgical quality, there is a need for research to guide successful implementation of interventions.
AUTHORS

- Shehnaz Alidina, SD; Gopal Menon, MD; Lauren Kelly; Sakshie Alreja, BDS; David Barash, MD; Erin Barringer, MBA; Hiba Ghandour, MD; Augustino Hellar, MD, MBA; Erastus Maina, MPH; Adelina Mazhiqi; John G. Meara, MD, DMD, MBA; Cheri Reynolds, JD; Steven J. Staffa, MS; Christopher Strader, MD; Meaghan Sydlowski, MPH; Taylor Wurdeman, MD; David Zurakowski, MS, PhD; Ntuli Kapologwe, MD, MPH, MBA-IHMd**; Sarah Maongezi, MD, MPH**

** Joint senior authors


ASANTE SANA