



## Research Paper

## Mentoring approaches in a safe surgery program in Tanzania: Lessons learned during COVID-19 and recommendations for the future



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## ABSTRACT

**Background:** COVID-19 has dramatically affected the delivery of health care and technical assistance. This is true in Tanzania, where maternal mortality and surgical infection rates are significantly higher than in high-income countries. This paper describes lessons learned about the optimal application of in-person and virtual mentorship in the Safe Surgery 2020 program to improve the quality of surgical services in Tanzania before and after the COVID-19 pandemic.

**Methods:** From January 2018 through December 2020, Safe Surgery 2020 supported 40 health facilities in Tanzania's Lake Zone to improve the quality of surgical care. A blended surgical mentorship model, employing both onsite and virtual mentorship, was central to the program's capacity development approach. With COVID-19, the program pivoted to full virtual mentorship. Through continuous learning and adaptation processes, including a human-centered design workshop, surveys assessing mentors' confidence with different competencies, and focus group discussions with mentors, mentees and safe surgery program staff, the program distilled the optimal use of mentorship models.

**Results:** Developing complex surgical skills, addressing contextual considerations, problem-solving, and building trusting relationships were best suited to in-person mentorship, whereas virtual mentorship was most effective in supporting mentees' quality improvement projects, data use, case discussions, and reinforcing clinical practices. Leading successful virtual learning required enhanced facilitation skills and active engagement of health facility leadership.

**Conclusions:** In-person and virtual mentorship offer distinct benefits and complement each other when combined. Investing more in-person mentorship at the beginning of programs allows for the establishment of trust that is foundational to effective mentorship.

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## Key message

Both virtual and in-person mentorship approaches complement and reinforce each other. Investing in more intensive, in-person mentorship at the beginning of programs allows mentors and mentees to establish the trust and respect that is foundational to effective mentorship.

## Introduction

The Sustainable Development Goals outline ambitious targets for reducing global maternal and newborn mortality by 2030 [1]. Countries' ability to meet these targets depends, in part, on access to surgical care. Globally, timely access to safe, quality cesarean sections (CS) can avert nearly one-third of all maternal deaths yearly and can reduce newborn deaths by 30 %–70 % [2]. However, in Africa, surgically related mortality is twice the global average, and postsurgical infection rates are 2 to 10 times higher than the global average [3]. In Tanzania, where the maternal mortality ratio is among the highest in the world (556 per 100,000 live births) [4], studies report surgical site infection rates that are 5–18 times higher than rates in high-income countries [5–8]. While long-term strategies to strengthen health systems and increase the health workforce are needed to improve access to high-quality surgical care in lower-income settings, clinical mentorship offers a promising intervention to build the capacity of surgical teams in ways that improve health outcomes in the near term [9–12].

To improve access to safe, quality obstetrical surgical and anesthesia care, thereby improving the surgical, maternal and newborn outcomes in Tanzania, a safe surgery program called Safe Surgery 2020 (SS2020) was developed in collaboration with local health agencies. SS2020 was implemented from January 2018 through December 2020 and funded by the GE Foundation (Boston, United States) and the ELMA Foundation (New York, United States), Tanzania's Lake Zone, with a population of 4.7 million, was selected as the focus for this program because it has been reported to have the highest maternal and perinatal mortality rates [4]. The program design aligns with evidence that a combination of team-based and context-responsive interventions that address technical and non-technical capacities can help improve surgical outcomes [9]. As part of a multicomponent safe surgery program that also included training on complex surgical skills, strengthening of non-technical skills such as teamwork and communication, leadership training, and quality improvement projects including the introduction of safety practices such as the use of WHO's Surgical Safety Checklist, and in-person and virtual surgical mentorship were incorporated to help reinforce best practices, identify context-specific solutions, and promote teamwork. The program hypothesized that the combination of these interrelated program components would contribute to higher quality care during cesarean births, fewer perioperative complications, and improved maternal and newborn outcomes. The safe surgery program was implemented in 2 regional hospitals, 20 district hospitals, and 18 health centers in the Mara and Kagera regions in the Lake Zone.

Current evidence lacks insight into dynamic implementation processes, especially the particular and relative value of a specific intervention component in a program such as this one. For instance, literature suggests that mentorship to improve the quality of surgical care is effective [10], but the optimal use of different mentorship modalities and successful implementation strategies have been largely unexplored. To address this gap, this paper describes lessons learned about the optimal application of in-person and virtual mentorship within this safe surgery program in Tanzania. It discusses the implementation challenges presented by the COVID-19 pandemic and the consequent adaptations to the safe surgery mentorship model emerging from those challenges.

## Materials and methods

### *The safe surgery mentorship model*

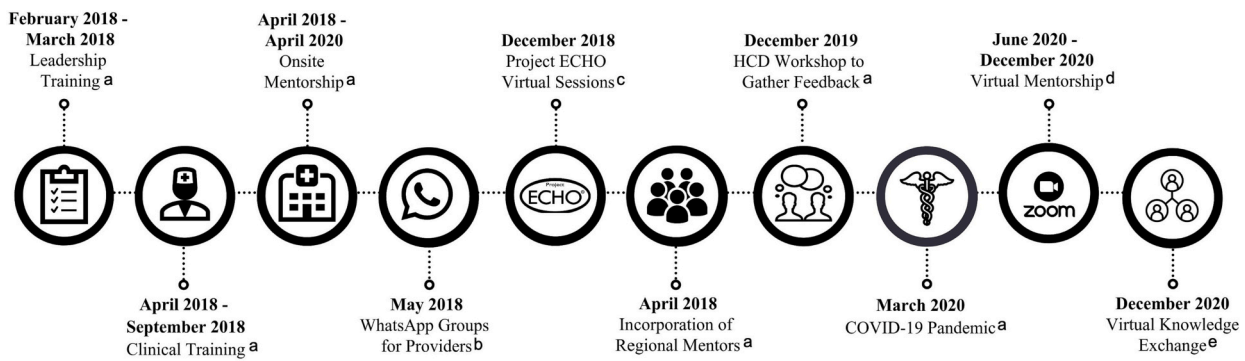
The SS2020 program aimed to create an enabling environment for surgical change and to improve the quality and safety of surgical care. The program was implemented with overall supervision and leadership from the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCGEC), and the President's Office for Regional Authorities and Local Governments (PORALG). Select key components of the safe surgery program included: 1) a 5-day surgical leadership training; 2) a 2-day orientation to mentorship and preparation of surgical mentors; 3) a 5-day surgical/clinical update including surgical techniques, infection prevention bundles of care, and patient safety processes; and 4) regular bimonthly blended (in-person and virtual) mentorship.

Following the initial training activities, ongoing mentorship was introduced to strengthen teamwork, communication, adherence to practices, data collection and use, functional organization of services, and institutionalization of new evidence-based practices. In the first year of the program, mentorship was provided by a four-person mentor team (a surgeon/obstetrician and gynecologist, an anesthesia provider, a theatre nurse and a labor/post-operative ward nurse) from Bugando Medical Center (BMC), a zonal referral and teaching hospital in the Lake Zone. SS2020 mentees were members of surgical teams in the 40 intervention health facilities, and included surgical providers, anesthesia providers including nurse anesthetists, theatre nurses, and nurses in post-surgical and postnatal wards. The mentor to mentee ratio during the in-person mentorship visits was 4:10. Initially, 10 of the 40 health facilities received information technology (IT) equipment to join weekly tele-mentorship sessions through Project ECHO (Extension for Community Healthcare Outcomes), a collaborative model of case-based medical education delivered via Zoom [13]. Additionally, two regional WhatsApp chat groups were created for real-time knowledge exchange, reinforcement of key clinical updates, case consultations, and data sharing. In the second year of the program, the original zonal mentors supported surgical providers at the regional level, and former mentees from varied clinical backgrounds with strong clinical and interpersonal skills undertook responsibilities as safe surgery mentors to promote the long-term sustainability of program interventions.

The perception of the impact of the mentorship intervention was evaluated using mixed methods [10]. Surveys, in-depth semi-structured interviews, and focus group discussions were conducted with mentors and mentees. These tools focused on collecting data regarding satisfaction with mentorship, perceived impact, experience with mentorship, important mentor characteristics, challenges to implementing mentorship, respondent characteristics, and mentor-mentee relationship and challenges.

### *Applying adaptive processes in response to COVID-19*

Due to the COVID-19 pandemic, the bimonthly onsite mentoring visits were suspended in April 2020. In response, the project adapted to a strictly virtual mentorship approach. Project ECHO tele-mentoring sessions and WhatsApp groups remained active from April 2020 through December 2020. This was possible once the remaining 30 health facilities were supplied with IT equipment in April 2020. With all 40 program-supported health facilities equipped, the SS2020 team introduced bimonthly 80-minute tele-mentoring sessions via Zoom (Fig. 1). During each virtual session, three mentors simultaneously trained five to ten mentees from three to five health facilities. These virtual sessions leveraged the platform established through Project ECHO tele-mentorship but were structured uniquely. Each virtual mentorship session focused on a particular clinical topic, such as postoperative infections, management of postpartum hemorrhage, and topics related to anesthesia and biomedical support, and began with a review of related



**Fig. 1.** Safe surgery program and mentorship development timeline.

Footnote: <sup>a</sup>Available open source on [venngage.com](https://venngage.com) [14].

<sup>b</sup>Available open source on [vecteezy.com](https://vecteezy.com) [15].

<sup>c</sup>Reproduced from Project ECHO [13].

<sup>d</sup>Available open source on [vecteezy.com](https://vecteezy.com) [16].

<sup>e</sup>Created by Alzam from The Noun Project.

Available open source on [thenounproject.com](https://thenounproject.com) [17].

facility data. The data review was followed by a discussion of facility challenges, quality improvement interventions implemented in response and lessons learned. The sessions often included case study discussions, a didactic lecture and skills-building videos or demonstrations.

Three continuous learning and adaptation processes were leveraged to support necessary adaptations to the mentorship model in response to the COVID-19 pandemic. These integrated continuous learning and adaptation processes helped to refine the mentorship approach considering the rapidly changing implementation context. First, in December 2019, a human-centered design (HCD) workshop was conducted to “reimagine the mentorship model for Safe Surgery.” During this 2-and-a-half-day workshop, 26 program mentors and surgical team members/mentees, and two MOH representatives, identified mentorship successes, challenges, and recommendations. This information helped the program understand how mentors and mentees viewed mentorship and offered suggestions for ways to improve mentorship. These recommendations, captured in [Table 1](#), were taken forward in 2020 with the onset of the pandemic and helped the program team transition to virtual mentorship when in-person visits were suspended for safety reasons.

Next, in April 2020, before the transition to full virtual mentorship in June 2020, the program conducted a survey to better understand mentors' confidence in conducting mentorship activities, both in person and virtually. The findings informed a May 2020 capacity building activity with mentors to prepare them to lead virtual mentorship sessions. The survey, in a slightly adapted form, was repeated in December 2020. Then, a focus group discussion in November 2020 with two members of the Tanzania program team identified contextual enablers and barriers to blended mentorship and the program adaptations needed to rapidly pivot approaches in response to COVID-19. Lastly, in December 2020, a virtual knowledge exchange for strong and vocal mentors and mentees explored mentorship successes and challenges, trade-offs between in-person and virtual mentorship, and recommendations for future safe surgery mentorship efforts. The sequencing of program events, including adaptive learning activities, is outlined above in [Fig. 1](#): SS2020 program and mentorship development timeline.

### Results: lessons learned through program adaptation

While unforeseen and globally devastating, COVID-19 offered a unique opportunity to distill comparative benefits and trade-offs within blended mentorship in the Tanzania safe surgery program and, potentially, other workforce capacity development interventions. These learnings related to the development of interprofessional team capacity in technical and non-technical surgical skills and to the strengthening of

surgical processes. Gathered through the ongoing continuous learning and adaptation processes outlined in the previous section, these findings respond to gaps in the literature about which skills are effectively targeted by blended mentorship approaches, trade-offs between mentorship approaches, and contextual factors that enable/constrict successful virtual mentorship.

#### *The importance of continuous learning and adaptation processes*

Maintaining a practice of collecting and using regular feedback made the program more adaptable, including when faced with the complex operational challenge posed by COVID-19. When adapting the mentorship approach, it was critical to assess the situation and the needs of stakeholders before designing the adaptation. We learned that if adaptation involves delivering similar activities in a different way, it was important to invest in sufficient capacity building before rolling out program revisions. In this case, the safe surgery team invested time in preparing mentors and mentees for the switch to virtual mentorship. Mentors needed the skills to be able to comfortably mentor via the Zoom platform, and to facilitate discussions virtually.

#### *Relative strengths of different mentorship models*

Mentors, mentees, and the program team reported that blended in-person and virtual mentorship can be used to effectively target both clinical skills, such as learning new surgical techniques or clinical approaches, and non-technical skills, such as teamwork and communication. They also suggested that particular types of skills (e.g., complex surgical skills), addressing contextual considerations, problem-solving, and building trusting relationships are best suited to in-person mentorship. The program team, mentors, and mentees felt that virtual mentorship was most effective in supporting mentees' quality improvement plans, data use for decision-making, and case discussions to reinforce recommended clinical practices. Data strengthening was one of the most valuable elements of both in person and virtual mentorship. Grounding all mentorship sessions in site-specific data reviews focused the mentorship process and made learning relevant and valuable for mentees. [Table 2](#) outlines these relative benefits by mentorship modality.

#### *Mentorship design and planning considerations*

Feedback also stressed the importance of structured processes to prepare for mentorship. After the shift to strictly virtual mentorship, the

**Table 1**  
Mentorship successes, challenges, and recommendations from the December 2019 HCD workshop that informed COVID-19 program adaptations.

Successes following 18 months of blended mentorship	Challenges following 18 months of blended mentorship	Recommendations for continued safe surgery mentorship
<ul style="list-style-type: none"> <li>Valuable professional relationships built between mentees and mentors</li> <li>Increased acceptance and practice of new surgical approaches and best practices, including use of Surgical Safety Checklist</li> <li>Better understanding by mentors of mentees' contextual challenges with in-person mentorship</li> <li>Improved interprofessional teamwork among surgical teams</li> <li>Developed new surgical, management, and quality improvement skills</li> <li>Improved data collection practices; shifting from documentation to data use for decision-making</li> </ul>	<ul style="list-style-type: none"> <li>Some facility administrators were unengaged or unsupportive</li> <li>Sometimes mentors were not well prepared for mentorship visits</li> <li>Mentees struggled to balance mentorship visit activities with clinical responsibilities</li> <li>Some individual mentees resisted use of the Surgical Safety Checklist and other recommended best practices</li> <li>Some team members who were not part of initial Safe Surgery training did not feel part of program/team</li> <li>Only 10 of the 40 health facilities had virtual mentorship equipment</li> </ul>	<ul style="list-style-type: none"> <li>Emphasize the need for, and closely monitor, the utilization of Surgical Safety Checklist and other recommended best practices</li> <li>Translate the Surgical Safety Checklist to local language</li> <li>Develop formal structured safe surgery champion program with recognition mechanism</li> <li>Increase peer-to-peer learning and institute on-the-job training for new staff</li> <li>Extend tele-mentoring to all program-supported health facilities by providing required IT equipment</li> <li>Provide more ongoing support for mentors</li> <li>Institute more structured pre-visit preparation for mentors</li> <li>Test methods for better engagement of facility administration and leadership</li> <li>Create local videos to demonstrate best practices (such as use of the Surgical Safety Checklist and B-lynch compression sutures)</li> <li>Promote cross-site learning/visits to facilities and teams that have strong data use practices</li> <li>Empower surgical teams (mentees) to become mentors and serve as role models in their own facilities</li> </ul>

**Table 2**  
Relative strengths of in person versus virtual mentorship for safe surgery.

In person mentorship is well suited for:	Virtual mentorship is well suited for:
<ul style="list-style-type: none"> <li>Building relationships at the start of mentorship</li> <li>Developing complex surgical skills</li> <li>Addressing contextual considerations/barriers</li> <li>Ongoing peer support</li> <li>Supporting mentees' quality improvement plans</li> <li>Facilitating data use for decision-making</li> <li>Case discussions</li> <li>Reinforcing recommended clinical practices</li> <li>Data strengthening</li> </ul>	<ul style="list-style-type: none"> <li>Supporting mentees' quality improvement plans</li> <li>Facilitating data use for decision-making</li> <li>Case discussions</li> <li>Reinforcing recommended clinical practices</li> <li>Data strengthening</li> <li>Expanded learning for additional clinical and support staff</li> </ul>

program team sent information to health facilities one week before the scheduled mentorship session and included facility management and council health management teams to ensure active participation and engagement. The program team also prepared all session materials beforehand. A preparatory meeting between mentors and the program team took place one day before the mentorship session to assign roles and review the session materials. Table 3 describes key barriers and enablers to successful virtual mentorship.

Our experience suggests that investing in more frequent or more intensive in-person mentorship at the beginning of programs allows mentors and mentees to establish the trust and respect that is foundational to effective mentorship. Incorporating virtual mentorship once these relationships have developed can potentially help contain program costs, increase the number of mentorship touchpoints with more frequent meetings for shorter periods of time, and extend the mentorship reach since more than one facility can be engaged in the same virtual session.

Feedback also stressed that facilitating learning through virtual modalities requires a different skill set than facilitating learning in person. Mentors accustomed to in-person mentorship will need additional orientation and support to develop the skill set needed to facilitate virtual mentorship sessions. Mentor preparation can cover how to prepare virtual sessions, how to structure session activities, and tips on effective facilitation and evaluating the sessions. Programs should recognize that virtual mentorship sessions, like in-person visits, require ample preparation. Structured preparation, which may include a set facilitators' meeting in advance of the virtual mentorship session, is needed to clarify the session plan and facilitation roles and to make sure key content and materials are ready in time.

A 2021 study reported that the safe surgery intervention was associated with increase in WHO SSC utilization rates and decrease in SSIs and CS-related POMR [9]. Though a direct causal relationship between safe surgery mentorship and the observed improved health outcomes cannot be established due to the multicomponent nature of the intervention, feedback from mentees suggest that mentorship contributed towards positive outcomes. The success of this mentorship model was reported in another 2021 study [10]. The survey results suggested that a high percentage of mentees were satisfied with the intervention (88 %), found it to be a positive (96 %) experience, and all supported continuation of the intervention in the future.

**Conclusion**

As Katz et al. wrote of the importance of mentorship in global health, “complex problems require multidisciplinary approaches and team science” [18]. Clinical mentorship, as part of a multicomponent, team-based intervention, is an evidence-based approach to building health worker capacity and improving the quality of care in diverse settings

**Table 3**  
Enablers and barriers to successful virtual mentorship.

<p>Virtual mentorship is MORE successful when...</p> <p>It follows in-person mentorship, so that a foundation around expectations and best practices is already established, and trust has been built between mentor and mentee teams.</p> <p>It acknowledges and incorporates the realities of mentees work place environments. It engages and includes facility management, regional health management teams, district health management teams, and ministry of health representatives.</p> <p>It is used to complement in-person mentorship, rather than as a stand-alone intervention.</p> <p>Select feedback is collected, and evaluated, frequently for program improvement.</p> <p>It is timed during a natural break during the daily facility routine (such as shift change or after working hours).</p> <p>Virtual mentorship is LESS successful when...</p> <p>Mentors rely too heavily on the language preference (English) of international program teams.</p> <p>Teams experience internet connectivity challenges.</p> <p>There is a lack of structured incentives for participating in virtual mentorship.</p>
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[11,19]. This study contributes to a growing body of literature in support of mentorship in low- and middle-income countries. It offers implementers, policymakers, and funders unique reflections on utilizing ongoing continuous learning and adaptation processes to thoughtfully design and improve mentorship interventions, while strategically incorporating in-person and virtual mentorship approaches [20].

Through necessary programmatic changes made to safeguard healthcare workers during COVID-19, the safe surgery program in Tanzania learned unexpected, but valuable and transferable, lessons. As a result of continuous learning processes, the program was able to nimbly adapt to a changed operational landscape and test a fully virtual mentorship approach. The comparison offered by the pre- and post-COVID-19 mentorship models yielded insights about the benefits and drawbacks of in-person versus virtual mentorship approaches, which are often difficult to tease out when implemented in combination [20]. This experience bolsters emerging evidence that there are distinct benefits to both in-person and virtual mentorship, and that these approaches can complement and reinforce each other when integrated and implemented in a blended mentorship model [10].

Future programs should consider the best ways to tailor the blended mentorship model, including the duration and frequency of mentorship, and the combination of in-person/virtual/WhatsApp groups, to particular contexts. A considered costing analysis is also needed to inform the trade-offs of blended mentorship programs. Continued refinement and adaptation could sharpen the insights gleaned here to target investments in mentorship programming in ways that optimize the benefits for stronger inter-disciplinary teams with the communication, teamwork, and technical skills to make lasting improvements in the quality of surgical care.

#### Credit authorship contribution statement

LF led the interpretation of the work and drafted the manuscript. LT and JV contributed to the interpretation and substantively revised the manuscript. EE interpreted the project data, provided critical references, and revised the manuscript. MMB revised the manuscript and helped design the tables and fig. SA and AP substantively revised the manuscript. SM, AK, DS, KC, VS, and MC all critically reviewed the manuscript and approved the final version. AH led the project on which this manuscript is based, contributed to the interpretation, and critically reviewed the manuscript.

#### Declaration of competing interest

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#### Ethics and consent

This study was reviewed by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board Office, who reverted that “the proposed activity does not qualify as human subjects research as defined by DHHS regulations 45 CFR 46.102, and does not require IRB oversight.”

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