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Acceptability of telemedicine for early surgical site infection diagnosis after cesarean delivery in rural Rwanda: a qualitative study

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Abstract

Background Telemedicine interventions, while promising for enhancing healthcare access, require an evaluation of feasibility and acceptability to inform field implementation. This qualitative study explored the acceptability of a telemedicine intervention in which surgical incision photos taken by community health workers (CHWs) were sent to hospital-based general practitioners to diagnose surgical site infections (SSIs) following cesarean section in rural Rwanda. As the study timeline coincided with the beginning of the COVID-19 pandemic we additionally asked about their perceptions of telemedicine in this context .

Methods We conducted qualitative, semi-structured in-depth interviews in Kinyarwanda among 26 individuals (14 women and 12 CHWs) who participated in the telemedicine intervention. The interviews were transcribed verbatim and translated into English. Thematic analysis was applied and parallel inductive coding was used to develop English and Kinyarwanda codebooks. These were consolidated into a master codebook for final coding.

Results All women and CHWs found the photo-based telemedicine program acceptable, though some concerns were raised. One woman voiced concerns about the reliability of photos in detecting SSIs compared to in-person visits. Women and CHWs reported perceived faster healing associated with the intervention, enhanced access to postoperative care from home, and cost savings as notable benefits of the telemedicine program. Trust in CHWs emerged as a critical factor for community acceptance. While one CHW expressed reservations about implementing the intervention during COVID-19, the majority of CHWs and patients indicated strong acceptance, with some even preferring it.

Conclusion These findings highlight the acceptance - from both caregivers and patients - of the photo-based telemedicine intervention in a resource-limited context, even amid crises like the COVID-19 pandemic. This acceptance was reinforced with recognized benefits, with trust in CHWs serving as a crucial factor. These insights can inform the development of telemedicine interventions in similar settings.

Keywords Maternal health, Postpartum care, Community health workers, Africa, Mobile health

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Background

Increasing rates of cesarean delivery have been linked to declines in maternal mortality, particularly in low- and middle-income countries (LMICs) [1]. However, cesarean section (CS) deliveries are associated with higher risk of postoperative complications. Surgical site infections (SSIs), one of the most common CS-related complications, increases morbidity [2], risk of mortality [2, 3], and the financial burden on patients and their families [4]. Nevertheless, these risks may be mitigated through early detection and timely treatment of SSIs [5].

In sub-Saharan Africa, the risk of SSI after CS delivery – estimated between 7.9 and 15.6% [6–10] – is notably higher than in other regions. In Rwanda women are required to return to the nearest health center every 2–3 days after being discharged from the hospital for wound monitoring and, if needed, wound dressing changes. The current standard of care for SSI monitoring, requiring travel to return to the health facilities, is both physically challenging and financially burdensome [11, 12].

With the increasing accessibility to digital technologies, there is a growing interest in leveraging telemedicine interventions to address healthcare access challenges in sub-Saharan Africa [13]. Two recent reviews of telemedicine for SSIs highlighted various strategies for postoperative monitoring, including five interventions in LMICs [14, 15]. However, these interventions often require that patients have regular access to phones, which can exacerbate health care inequities. In rural Rwanda, our team has explored the use of telemedicine for remote diagnosis of SSI, in collaboration with community health workers (CHWs). CHWs in Rwanda are required to have a primary education and are elected from within their communities for their trustworthiness. Following election into the role these CHWs are trained by the Rwandan Ministry of Health to be able to carry out their responsibilities; this is either provision of basic care and integrated community case management of childhood illness, or maternal and newborn health care. For our team's telemedicine intervention, CHWs visited women who had delivered by CS in their homes, captured wound images, and transmitted them to general practitioners for real-time SSI diagnosis [16]. This paper explores women's and CHWs' perspectives regarding the acceptability of CHW-led home based telemedicine for post-CS SSI monitoring in rural Rwanda.

Methods

Study setting

This study was conducted at Kirehe District Hospital (KDH), located in the Eastern Province of Rwanda. Kirehe District has over 450,000 residents and 19 health centers. The hospital is managed by the Rwandan Ministry of Health with support from the non-governmental organization Partners In Health/Inshuti Mu Buzima. The study team obtained written informed consent for participation from all study participants at time of enrollment in the parent study and at the time of the qualitative interview. This study received clearance from Partners In Health/Inshuti Mu Buzima and KDH, and had ethical approval from the Rwanda National Ethics Committee (No.326/RNEC/2019 and No.151/RNEC/2020) as well as the Harvard Medical School Institutional Review Board (IRB18-1033). Reporting of the research was guided by the Standards for Reporting Qualitative Research checklist [17].

In the Rwandan healthcare system, expectant mothers initially present to health centers, where the majority of them deliver. Those with more complicated deliveries or who require CS are referred to district hospitals. In rare cases, women are referred to tertiary care hospitals. After CS delivery, women are typically hospitalized for three days and then discharged for recovery at home. Under current standard of care, women who deliver via CS receive home visits from CHWs solely for neonatal assessments of their infants.

Rwanda established its community health program in 1995. The system is aimed at increasing uptake of essential maternal and child clinical services through education of pregnant women, promotion of healthy behaviors, and follow-up and linkages to health services. Each village elects three CHWs including a male-female pair known as binômes, who are in charge of provision of basic care and integrated community case management of childhood illness, and one Agent de Sante Maternelle, who is in-charge of maternal and newborn health care [18]. The current community health program was established to strengthen four areas: (1) the capacity of decentralized structures to allow community health service delivery; (2) the participation of community members in community health activities; (3) CHW motivation through Community Performance Based Financing to improve health service delivery; and (4) coordination of community health services at the central, district, health center, and community levels [18].

The telemedicine intervention

Participants in this qualitative study are a sub-section of those who participated in a parent study of a telemedicine intervention [16]; the overall goal of the parent study was to assess the feasibility and accuracy of CHW-led, home-based telemedicine to monitor for SSIs in women who delivered via CS. The intervention utilized a smartphone app, designed specifically for the study, to aid CHWs in taking standardized photos of a woman's CS incision. For the intervention we recruited study CHWs at the request of the Rwandan government in order to not interfere with regular CHW activities. Study CHWs

are women with similar characteristics to government CHWs and trained to carry out CHW responsibilities in the context of the study. Training included a theoretical session on wound examination and dressing, a corresponding practical session, and familiarization with use of study devices, namely smartphones and applications used in the study. We used a similar selection criteria and procedures as used for government CHWs. In the intervention government CHWs led study CHWs to patients' homes. Women were still instructed to return to the health center every 2–3 days after hospital discharge for standard wound monitoring, then for this intervention study CHWs visited women in their homes approximately ten days after discharge and used the study app to take a photo of the incision. The study CHWs then sent the photo to a Kigali (Rwanda's capital city) -based general practitioner via WhatsApp. The general practitioner sent back a diagnosis of "SSI" or "no SSI" based on the photo. For the purposes of this parent study, all participants then returned the following day to KDH for a general practitioner-led physical examination. Full details of the intervention and study results are available elsewhere [16].

Sample selection

Women who underwent CS and CHWs were purposively selected from those who had participated in the telemedicine study. For the parent study, the inclusion criteria were women who underwent CS delivery at KDH during the study enrollment period (September 2019 – February 2020), who were residents of Kirehe district, and were discharged home before postoperative day (POD) 10. The parent study had no age restrictions for enrollment; however, for this qualitative analysis, we only included participants of adult age in Rwanda (18 years and older). Equal numbers of SSI-positive and SSI-negative women were enrolled in this qualitative evaluation in order to assess acceptability of the intervention from both perspectives. The CHWs enrolled to the qualitative study were the government CHWs who originally worked in the parent study. This is because we sought to learn more about the current service provided to mothers who undergo CS, and what can be improved in the current system. We enrolled women and CHWs into this qualitative study until the thematic saturation (14 women and 12 CHWs) had been reached.

Data collection and analysis

We conducted in-depth, semi-structured individual interviews using two interview guides – one developed for the women who underwent CS delivery and were followed with the telemedicine intervention (see Additional file 1), and one for the CHWs (see Additional file 2). The two interview guides, based on the predefined study objectives, were developed in English by one team member, then translated into the local language, Kinyarwanda, and back-translated by a different study team member to ensure that the meaning of the questions were preserved. The Kinyarwanda interview guides were then piloted among the study team members as well as participants and CHWs. For the patient interview guides, key subjects covered were their experience and feelings regarding the telemedicine intervention. In the CHW interview guides, key subjects included their existing responsibilities to support women postpartum (in general and following CS delivery), their experience conducting the telemedicine intervention, and their perceived acceptability of the intervention. In light of COVID-19, we added questions regarding patients' and CHWs' thoughts on telemedicine in the context of the pandemic.

Interviews were conducted at KDH in August 2020, delayed by three months due to lockdown constraints and safety considerations related to the COVID-19 pandemic. All selected interviewees were contacted by the telephone contact they had provided during parent study enrollment. Both CHWs and mothers who agreed to participate received travel vouchers to cover costs of transportation to the interview location.

All interviews were conducted in Kinyarwanda and were led by two study-trained interviewers who were fluent in both English and Kinyarwanda. The interviews were recorded using a password protected smartphone and transcribed verbatim by a Rwanda-based professional transcription service. The two interviewers then translated these transcripts into English.

All qualitative analysis was completed in MAXQDA Analytics Pro 2020 [19]. The study team conducted thematic analysis [20], first completing inductive parallel coding with one team member developing codes in Kinyarwanda using the original transcripts and a second team member developing codes in English using the translated transcripts. The parallel coding process was adopted to ensure that the interviews were being correctly interpreted and the correct meanings were maintained during the translation process. The study team then compared and reconciled the two codebooks to develop a master codebook. A study team member used this master codebook for deductive coding, facilitating a final review and extraction of overarching concepts, their connections and patterns from the English transcripts. This process ensured coding precision, accurately reflecting the data, and aligning emerging themes with the research objectives.

Results

A total of 26 interviews, of 14 women who delivered via CS and 12 female CHWs, were conducted. Among the participating women, the median age was 25 years (range:

18–42 years). The highest level of education attained for seven women was primary education only, while five women had at least one childbirth experience prior to the CS related study enrollment.

The median travel time from home to the woman's nearest health center was 25 min (range: 5–50 min). By POD 4, twelve women had been discharged from the hospital, and by POD 10 (± 3 days), seven women had been diagnosed with SSIs. Among the CHWs, the median age was 42 years (range: 30–57 years) and the median years of service as CHW were 8 years (range: 4–15 years). All CHWs had completed primary school education, with two having secondary school education.

In the coding process eight codes from the English codebook were omitted in the final codebook due to translation issues, and one code from the English codebook did not appear in the Kinyarwanda codebook. The emerging themes in the final codebook were organized and presented around the four areas of interest: description of current post-cesarean care, acceptability of the telemedicine intervention, necessary changes to post-cesarean care, and telemedicine during the COVID-19 pandemic.

Current CHW-led post-CS care

CHWs described the basic assessment that they perform for women and neonates following CS delivery. Some CHWs underscored that this care is in line with the routine support they offer to women after vaginal delivery, overlooking the specific needs of women who undergo cesarean sections. All CHWs reported performing basic assessments and interviews with the mothers regarding symptoms; while one CHW stated she assessed the incisions of women who underwent CS, the rest reported that they do not routinely do so because they are not trained in evaluation of the incision. All emphasized that they refer women to health centers if there are any issues. Two CHWs reported using an SMS-based platform to report on home visits, indicating their familiarity with mobile health (mHealth) interventions for post-delivery care. Both women and CHWs reported that CHWs provided social support to mothers, as well as providing essentials such as food and money for transport; such support would be provided out of solidarity, as resources are not allocated for this purpose in their program. When asked about the existing support to mothers who underwent CS, CHWs responded:

> *"We used to see [mothers who underwent cesarean section] like everyone else. But now we are left to see them as people who have more trouble than the one with normal delivery. The support we give to them is home follow up, I think I follow her at least twice a day. I asked her, "How are you? Is [your baby] okay?" I encouraged her to respect the medical appointment and if necessary, she would also need someone to carry the child and I can accompany her to the health center." – CHW #01, 4 years of experience as CHW.*
>
> *"We do not support them, no other help except to visit them and give advice to go to see a health provider if they have any concern." – CHW #06, 15 years of experience as CHW.*
>
> *"Because we do not have the ability to help them, other than to give them advice on how to take care of them, when she is poor we give support by providing like one kilogram of flour for porridge, so that she can have a porridge at least every morning. We can also help fetch water, help with other kids as other neighbors. We cannot provide wound care, except by sending her to the health facilities when there is a concern about the wound." – CHW #07, 11 years of experience as CHW.*

Acceptability of the telemedicine intervention

Table 1 summarizes the main themes that emerged surrounding the acceptability of the telemedicine intervention for SSI screening. All interviewed CHWs reported the intervention as acceptable and beneficial (Table 1, CHW Q1). Moreover, they believed that women and the communities would similarly accept the intervention (Table 1, CHW Q3). Additionally, when asked about the possibility of including such a telemedicine program in their current roles and responsibilities, all CHWs reported that it would be feasible (Table 1, CHW Q4). This included their perceived ability to conduct home visits, acquire proficiency in using associated technology (smartphones, image capture, messaging, etc.), and undergo training to examine and dress surgical wounds.

No differences in themes were seen between women who were diagnosed with SSIs and women who were not. Establishing trust in CHWs emerged as a strong theme during interviews with both women and CHWs. The importance of women placing trust in CHWs was underscored by both groups, emphasizing that the success and adoption of the program hinged upon this crucial element (Table 1, CHW Q2 and Patient Q2). All women reported finding the intervention acceptable and beneficial (Table 1, Patient Q1), and the overwhelming majority expressed having no issues with the image capture and sharing process (Table 1, Patient Q4). However, one woman commented that she felt that in-person wound assessments would be more reliable than image-based assessments used in the telemedicine intervention (Table 1, Patient Q5). One woman did voice a concern regarding the privacy of sharing photos via text messaging, such as if a phone were misplaced or accessed by someone who shouldn't have handled the CHW's device.

Table 1 Main themes on the acceptability of the telemedicine SSI screening program

Community Health Workers			Women delivering via cesarean
Quote	**Theme**		**Quote**
CHW Q1: "It would be very beneficial to [women], to be followed at home would be very easy… I wish it would be a countrywide program and be communicated to everyone in the village." – CHW #05, 6 years of experience as CHW.	Perceived benefits		*Patient Q1: "What [the CHW] did made me happy, it should continue like that…I would accept it as it was planned to be done." – Patient #04, completed primary education.*
CHW Q2: "Aah, the secret is to get close to people and build the trust in them. There would be no problem if they have trust in us as community health workers." – CHW #05, 6 years of experience as CHW.	Trust in CHWs		*Patient Q2: "I would prefer the CHW at home…because she lives close to me, she knows how I am doing, we see each other every time…With the person you are familiar with, you feel free to tell her everything, tell her your problem." – Patient #03, completed primary education.*
CHW Q3: "[The community] would accept it. I think when it will be implemented they will accept it and will be happy, especially those who are concerned." – CHW #05, 6 years of experience as CHW.	Patients and community acceptability		*Patient Q3: "When they saw a CHW comes to visit me at my home, my family didn't see it as a problem thinking that if they see I have a problem, I will be readmitted and get cared for. So they took it very well." – Patient #02, completed primary education.*
CHW Q4: "If they provide me with a smartphone and train me how to do that, I can do it without any problem…It sounds like implementing this program will not take more time." – CHW #01, 4 years of experience as CHW.	Feasibility	Concerns	*Patient Q4: "I like [the photographing] …I would trust because the photos are being shared between health providers, no one else will show them to others." – Patient #09, completed secondary education.*
			Patient Q5: "…I feel that the best way would be to ask the patient to come to the hospital as it normally happens- so the doctor can see how the wound is in-person. Sometimes, the photo may show things that are real but on the other hand, there might be wrong indications of the photo." Patient #1, completed secondary education.
CHW Q5: "If I was trained, I would do things according to how I was trained. I feel that no negative consequences would arise." – CHW #04, 13 years of experience as CHW.	Perceived safety	Improved patient engagement and recovery	*Patient Q6: "Because the CHW showed me the photo, I saw how my wound was since I was not able to see it myself." – Patient #09, completed secondary education.*

Table 2 Perceived benefits of telemedicine SSI screening intervention

Cost-effective	Q1: "There are times when the woman doesn't even have any money, which requires you to look for a loan from your neighbors, or sell your possessions. But when the CHW follows you at home, the problem is solved."– Patient #02, completed primary education.
Convenience	*Q2: "It would better if the CHW would follow us at home…You may not have strengths to go to the health center. So, if they can see you at home, it would be much better"– Patient #04, completed primary education.*
Improved access to postoperative care	*Q3: "You receive basic health care nearby without hassling. Again, what you would go look for at the health facility, it's what you get at home."– Patient #12, completed primary education.*
Proximity of care	*Q4: "The benefits are there because if she visits you in the morning and sees how the wound is, and gives medicines if any, then she would come back in the evening to see how you are." – Patient #10, completed primary education.*
Faster healing	*Q5: "We [CHWs] observed that it made things easier for them. It is not like how they used to wait and take transport to the healthcare facility. But at that time we observed that it sped up the recovery process for the patients." – CHW #03, 3 years of experience as CHW.*
Preserves productivity	*Q6: The benefit is that - you see, when a husband and wife are both at home, when a wife has to go to the health facility, sometimes, they both go together. Since I am nearby, I can go home to see the patient, which would also facilitate the husband in his work." – CHW #08, 10 years of experience as CHW.*

Another woman stated that the image capture process was time consuming and suggested that additional training for CHWs might address this issue. Moreover, several women also expressed appreciation for this intervention, noting that it enabled them to actively engage in and gain more insights into their recovery process (Table 1, Patient Q6).

The acceptability of the telemedicine intervention is strongly associated with the perceived benefits as expressed by both women and CHWs and highlighted in Table 2. Notably, two key advantages identified by women were cost savings and the elimination of the need to travel (Table 2, Q1 and Q2). By having CHWs follow-up with women at home, women could recover without the strain of returning to the health center for care, thus averting costs related to transportation and potential loss of income. The associated improvement in access to postoperative care was also underscored (Table 2, Q3). Home visits by CHWs offered a closer and more frequent evaluation of the well-being of women (Table 2, Q4), and some CHWs attributed this to faster healing (Table 2, Q5). Another perceived benefit to women and their families was the ability to avoid disruptions in home activities resulting from reduced caregiving responsibilities, since women would not need to be escorted to health centers (Table 2, Q6). Ultimately, having CHWs follow women at home rather than having them return to health centers for follow-up was acknowledged as a valuable opportunity that could improve access to postoperative care.

Necessary changes to post-CS care

All CHWs and a large majority of the women reported the necessity for enhancing CHWs' capabilities through increased access to materials and resources, as well as training for the care of women post-CS. Proposed resources included hygiene materials such as soap, wound dressing supplies, and a dedicated office for the CHWs for convenient accessibility by women. All CHWs emphasized the need for them to receive financial compensation for the services that they provide, as well as financial support for women after surgery to cover expenses related to recovery and follow up visits. Several women voiced concerns over the long wait times at health centers and suggested potential solutions, such as increasing health center staff. Lastly, while acknowledging the value of home-based CHW-led care, many women emphasized the importance of post-discharge evaluations by a trained general practitioner or nurse. When asked about the changes needed to improve the current state of post-CS care in the community, participants responded:

> *"…they should prepare trainings for us so that we could gain better understandings, so that we can help mothers well without any problem. They should continue to take care of us and train us even after the program implementation. Then they should give us tools to use and for hygiene, so that we can take good care of the patents. But also if we [CHWs] take care of them [the mothers], it would be better if we were given compensation because some of us are farmers, and when we decide to go take care of the mother instead, we wish that we could get some money and pay another person to cultivate while we are gone." – CHW #03, 3 years of experience as CHW.*
>
> *"We will mainly need the related equipment, training and other hygienic materials so that we can be clean as we encourage the mother to be" – CHW #10, 6 years of experience as CHW.*
>
> *"We live far from the health center and to go there requires transportation fees, but community health workers are our neighbors. Anytime we are together they can come for a follow up at our home." – Patient #10, completed primary education.*

Telemedicine and COVID-19

Several women and CHWs reported how the COVID-19 pandemic had significantly increased difficulty in

accessing postoperative care, particularly because of limited means of transportation during lockdowns. The overwhelming majority of women and CHWs reported that they still believed the telemedicine intervention to be feasible during a pandemic such as COVID-19. While one CHW raised concerns about the impracticality due to the challenges in maintaining social distancing, despite having the necessary personal protective equipment, the remaining CHWs conveyed confidence in the program's execution with the provision of required equipment. Furthermore, both women and CHWs highlighted that the telemedicine intervention could be even more advantageous during a pandemic, such as COVID-19, as it would circumvent the need to find transportation to health centers, curb gathering at health centers, and reduce contact between the women, babies, and other people. Some of the responses when asked about their thoughts about telemedicine in the context of the pandemic were:

"During COVID-19, finding a motorcycle or a car was not easy, the means of reaching the health center was not easy, so you understand that it could be much better if they come to us at home." – Patient #05, completed secondary education.

"You see that we are living the time of a COVID-19 pandemic where people are not allowed to travel freely. In this intervention a CHW would visit you, see how the wound is doing, take a photo, send it to a clinician who would in turn diagnose whether your wound has an infection or not, and share the diagnosis with a CHW – all without the patient having to go to the health facility. This is the value of this home-based follow up during the current emergency of COVID-19." – Patient #02, completed primary education.

"There are benefits if you factor in COVID-19, you see that a patient who has to go to the health facility will meet with many different people on her way. But if follow up is in the village, it is just me whom she will meet, who will be having the COVID-19 screening materials and others related to hygiene. You understand that it is not the same as if she has to walk a longer distance. I think that the benefit is that if follow up happens nearby it will prevent COVID because we would be having the materials and I will be the one taking care of her." – CHW #03, 3 years of experience as CHW.

"In these days of staying at home, now you see that most of us are not allowed to leave our homes. It can be complicated if it is implemented in this period. When you are doing this, you get very close. It would be better and easy if this program is implemented after Covid-19 is over. It would be easy to be implemented." – CHW #07, 11 years of experience as a CHW.

Discussion

Our study revealed a high rate of acceptability of the telemedicine intervention among women who delivered by CS as well as CHWs in rural Rwanda. This widespread acceptance may be due to the perceived benefits acknowledged by women, such as enhanced postoperative healing, the elimination of the need for transportation to health facilities, and the ability to save money on postoperative care.

The demonstrated acceptability shows promising potential for the telemedicine intervention. Yet, the current intervention lacks sufficient sensitivity to scale this model of care; in the parent study the telemedicine sensitivity was 36.8% [16]. However, we are still pursuing this intervention. We believe the encouraging feasibility results [16] coupled with this demonstrated acceptability, and the intervention's potential to alleviate the physical and financial burdens of facility-based follow-up, warrant further exploration of telemedicine for post-cesarean SSI monitoring in rural Rwanda.

While prior studies have reported the benefits of financial savings and reduced transportation burdens linked to telemedicine interventions [21], our study uniquely identified other perceived benefits to the intervention, including perceived improvement in healing and preserved productivity. Another distinct finding of our study was that most women expressed no reservation about the photo-taking process or transmitting health information to doctors via text, particularly when assured of privacy protocols taught and maintained among all health workers involved in the process. One woman did express some concern with the privacy of the image transmission. The importance of privacy and safety in telemedicine aligns with findings from other studies [22, 23] and is particularly evident in the context of image capture storage and management [24–26]. Having clear protocols regarding maintenance of privacy and best practices for telemedicine features (i.e., image capture) will be vital to addressing concerns and increasing trust in telemedicine [24–26]. This may include specific trainings about procedures for handling devices, or how to guide patients through each telemedicine mediated step of an intervention.

The CHWs participating in this study universally believed that incorporating this intervention into their daily duties would be feasible. Consistent with findings from other studies examining telemedicine interventions in surgical, gynecological, and general medical care for various patient populations [27–29], our study aligns with these prior evaluations, now specifically focusing on an obstetric population. However, it's crucial to note that

despite the overall positive outlook, all CHWs expressed a need for additional training and resources to make such intervention truly feasible. Addressing this requirement should be a priority for enhancing postoperative care for women, even beyond the scope of telemedicine interventions. Research conducted in Rwanda and other LMICs underscore the need for more resources, including reliable access to safe water and consistent supply of medical consumables (e.g., latex gloves, sanitizer), to ensure the success of follow-up care for women who have undergone CSs [30, 31]. Furthermore, other studies have established the connection between low resources in SSI prevention with a higher risk for postoperative SSIs [8, 30].

A senior CHW suggested the intervention would be more easily implemented after pandemic related restrictions were raised since the CHW would need to be close to the patient. The other CHWs, however, pointed out that the telemedicine approach would reduce the potential points of exposure as compared to the standard of care. Overall, despite the challenges posed by COVID-19 pandemic, the use of telemedicine was deemed feasible, with indications suggesting its increased benefits in this context. Previous studies have demonstrated the effectiveness of telemedicine for postoperative care, and in some cases enhanced patient satisfaction [32]. It is important to acknowledge, however, that barriers to telemedicine accessibility in Africa exist. These include low internet connectivity, unstable electricity supply, inadequate training and knowledge for telemedicine usage, and varied support from stakeholders such as clinicians or the government [13]. Nevertheless, our study uncovered that using telemedicine for home-based follow-up is an acceptable means to facilitate access to postoperative care in this setting.

In our analysis, trust in CHWs emerged as a key determinant of women's acceptance of the telemedicine intervention. The proximity of CHWs to women offering enhanced accessibility compared to health centers played a pivotal role in fostering this trust. Moreover, women felt comfortable in confiding problems with CHWs, revealing their incisions, and even allowing them to capture and transmit the images of the incisions via messages. Earlier studies have indicated a preference for face-to-face consultations in some cases [33, 34], and our analysis identified women who also preferred in-person follow-up (Table 1, Patient Q5). It is noteworthy that women of similar demographics had differing perspectives on their preference, observable in the differences between Table 1 Patient Q4 and Patient Q5; thus, we did not find a connection between demographic characteristics and opinions on telemedicine. Nevertheless, those expressing a preference for health center follow-up over home-based CHW follow-up clarified that, given proper training of CHWs, they would be receptive to home-based follow-up. The CHW system is effective because of their level of integration and acceptance in communities [35], which in turn affects the success of interventions they're engaged in. Although many women already trust CHWs for their service to the community, increasing technical support and training of CHWs would further build the acceptance and confidence of this intervention among women.

A noteworthy aspect of our analysis process was the involvement of interviewers, maintaining the validity of the coding process. This was particularly important given that interviews were conducted in Kinyarwanda, while part of the analysis was performed in English. Discrepancies between Kinyarwanda and English codebooks revealed potential meanings lost or altered during translation of the interview transcripts. This process underscores the importance of being cognizant of such discrepancies when performing qualitative studies across different languages.

This study has several limitations. Firstly, interviews were conducted during the COVID-19 pandemic, which imposed a limited timeframe to data collection, potentially impacting thematic saturation. However, we believe that the concurrent organization, transcription and translation of interviews allowed the study team to sense when thematic saturation was reached, with no new themes emerging from the subsequent interviews. Secondly, the extend time lapse between the intervention and the interviews introduces the possibility of recall bias among women and CHWs. Finally, our findings may not be able to be applied to other regions or countries where the model of CHWs is different. Further investigations should be done to explore the acceptability of telemedicine interventions in settings with different CHW models.

Conclusion

Our findings show high rates of acceptance for the photo-based telemedicine intervention in a resource-limited setting, even amidst crises such as the COVID-19 pandemic. Central to this acceptance is the crucial role of trust in community health workers. While the current telemedicine intervention lacks sufficient sensitivity to scale this model of care, the promising feasibility [16] coupled with the demonstrated acceptability, and the potential to alleviate barriers to facility based follow-up, warrant further exploration of telemedicine for post-cesarean SSI monitoring in rural Rwanda. Findings from this study point to a high likelihood of acceptance of telemedicine interventions for home-based care and support for mothers who delivered by CS. Further investigation should be done in other settings and how integrating this intervention into routine postnatal care might increase early identification and timely follow-up of mothers at

risk of SSIs. Knowledge from this work can inform the development of similar interventions in rural Rwanda and similar settings.

Abbreviations

CHW	Community Health Worker
SSI	Surgical site infection
LMICs	Low- and middle-income countries
CS	Cesarean section
KDH	Kirehe District Hospital
POD	Post-operative day

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40748-024-00200-9.

Supplementary Material 1

Supplementary Material 2

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Author contributions

LB led all aspects of the study, VC, BHG were principal investigators. LB, EHE, AN, FK, VC and BHG provided input on the study design, questions, and interpretation. LB, AN supported data collection. All authors read and approved the final draft of the manuscript.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study team obtained written informed consent for participation from all study participants at time of enrollment in the parent study and at the time of the qualitative interview. This study received clearance from Partners In Health/Inshuti Mu Buzima and KDH. The study had ethical approval from the Rwanda National Ethics Committee (No.326/RNEC/2019 and No.151/RNEC/2020) as well as the Harvard Medical School Institutional Review Board (IRB18-1033).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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