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# Prototyping to Practice: Validation of the Home Care Guide for Post-caesarean Mothers in Tanzania

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## ABSTRACT

**Background:** The post-caesarean section (CS) home care guide was developed to ensure uniform and contextualised discharge education is provided by nurse midwives, especially in an era where CS rates are high and hospital stays are short. Early discharge limits mothers' access to hospital-based care, increasing dependence on home care, which, without evidence-based guidance, can lead to complications. Currently, post-CS mothers receive insufficient education on post-CS home care, likely due to the absence of a standardised guide. This study aimed to validate the developed post-CS home care guide to ensure its contextual feasibility for use in Tanzania.

**Methods:** This was an iterative multi-stage validation design, involving 13 purposively recruited maternal and child health experts, 20 nurse-midwives, and 50 post-CS mothers in Dodoma and Morogoro regions, from 6th February to 15th May 2023. Participants were requested to evaluate the guide's scope, language, dosage, applicability, clarity, timing, and frequency of use in teaching sessions. Descriptive statistics were used to analyse participants' demographic characteristics and Likert scale responses. The Item-level Content Validity Index (I-CVI) and Item-face Validity Index (I-FVI) were computed for each component using SPSS version 25.

**Results:** The post-CS home care guide with 9 components was validated. The components are nutrition, wound cleaning and dressing, hygiene, maternal exercise and rest, breast care, regaining of sexual activity, adherence to prescribed medications and postnatal visits, use of family planning methods, and maternal mental health care. The 40-item guide demonstrated strong validity, with I-CVI scores between 0.83 and 1.0, and I-FVI scores of 0.76 to 1.0. No items were added or removed; minor edits were done to improve clarity based on participants' recommendations.

**Conclusion:** The post-CS home care guide has been validated, as it offers a reliable, evidence-based tool for nurse-midwives to provide standardised, context-specific post-CS education to mothers and families, promoting safer recovery after CS delivery.

## BACKGROUND

Caesarean section (CS) deliveries have increased globally, in both low and high-income countries.[1,2] The rise exceeds the World Health Organisation's (WHO) recommended rate of 10 to 15%.[3] Between 2000 to 2015, the rate of CS was reported to double from 12.1% to 20.1%.[1,2] The increased rate of CS, however, does not seem to be associated with improved maternal and newborn outcomes.[3] Furthermore, In low and middle-income countries, the increase in CS has contributed to a greater economic burden on health systems and a rise in maternal and neonatal complications.[4,5]

Several factors have been identified as contributors to the rise in CS. These are repeated CS to the mother with prior CS, maternal request of CS, financial incentives to physician or hospital when performing CS compared to vaginal delivery, legal consequence related to adverse outcomes in vaginal births (fear of litigation).[6–8]

Women who give birth by CS have unique recovery compared to those who had normal deliveries.[9] Post-CS care is crucial, WHO recommends that mothers remain in the hospital for 48 to 72 hours for monitoring of both mother and baby.[10] During this period, check-ups at 24, 48, and 72 hours are advised before discharge.[11] However, due to the high volume of CS deliveries and limited postnatal ward capacity, many facilities particularly in low and middle-income countries, discharge mothers as early as 24 hours post-surgery to decongest the wards.[12] Evidence shows that mothers are discharged as early as 24 hours after CS, making post-CS mothers not to benefit from other subsequent check-ups;[10] ultimately affecting the quality of care received.

Different from high-income countries, low-income countries have no practice of home visits and mothers are solely taken care of by their families. Little and

non-uniform health guidance on home care after hospital discharge has been reported to be given to post-CS mothers,[13] which might lead to a lack of confidence in mothers in caring for themselves at home and complications such as surgical site infection (SSI). The guide to instruct care of post-CS mothers at home after hospital discharge is the key to enhancing evidence-based, uniform and contextualised education for safe recovery.

Some of the low and middle-income countries have hospital guidelines on home care after CS.[13] In Tanzania, there is no specific post-CS guideline to inform home care after CS deliveries, as a result, mothers receive varied health information from healthcare providers.[14] Due to advanced technology and access to information and culture, most of the recommendations from high-income countries are not applicable in low and middle-income countries.[15] For example, guidelines suggesting the change of wound dress at home;[16,17] it is not suitable in contexts where sterile environments and clean water are not consistently available. Developing a standardised, evidence-based, and contextually appropriate home care guide is essential to improving post-CS outcomes.[15]

The methodologies used to develop the post-CS care guide varied among countries. For example, the post CS guidelines developed in Rwanda involved maternal and child health experts.[13] However, some of these recommendations cannot be applied in Tanzania. For example, the recommendation on bathing, mothers are recommended to remove the gauze and replace it with clean and dry dressings after the bath.[9] In Tanzania, all mothers are not advised to remove wound dress at home, to sponge bath to keep the wound clean and dry. In view of these inconsistencies, it was considered desirable to develop a validated post-CS home care guide with inputs from experts and end-users including mothers and nurse-midwives to enhance its reliability and applicability in the community. This study aimed at validating the developed post-CS home care guide to be used in Tanzania context by maternal and child health experts, nurse-midwives and post-CS mothers.[15]

# METHODS

## Study Design and Setting

This study followed an iterative, multi-stage validation design conducted from 6th February to 15th May 2023 at Dodoma and Morogoro, Tanzania. The first phase of validating the post-CS home care guidelines with maternal and child health experts took place at the University of Dodoma's School of Nursing and Public Health from 6th to 24th February 2025. The university is one of the largest in East and Central Africa and hosts various health-related programs.[18]

The second and third phases of validation, involving nurse-midwives and post-CS mothers, were carried out at Morogoro Regional Referral Hospital (MRRH) from March 6th to May 15th, 2023. This hospital serves as a referral centre for ten districts, reported a maternal mortality rate of 415 per 100,000 live births[19,20] and performed CS in about 24% of hospital deliveries in 2022.[21]

## Study Population and Recruitment

The validation process involved purposively selecting 13 maternal and child health experts; and the end users of the guidelines which were 20 nurse-midwives and 50 post-CS mothers. Maternal and child health experts were people with training in nursing and midwifery, obstetrics and gynaecology; and paediatrics working in- public and private health care facilities, training institutions; and worked in the Ministry of Health foreseeing maternal and child health services. To be included in the study maternal and child health experts had to have working experience in the maternity care or advocate for maternal health for not less than three years. Experts who were not fully available to participate in the study due to difference factors were excluded in the study. The experts were recruited from key institutions including the Ministry of Health, (MoH); The association of gynaecologist and obstetricians in Tanzania (AGOTA), the Tanzania Midwives Association (TAMA), and midwifery faculty from the University of Dodoma (UDOM). Furthermore, nutrition specialists from Food and Nutrition Association of Tanzania (FONATA) were included to provide expert nutritional guidance relevant to post-CS wound healing and maternal recovery of post-CS mothers. All experts were recruited through formal invitation letter sent to their respective institutions, with each letter outlining the predetermined selection criteria.

Nurse midwives were those who worked in maternity unit (i.e. antenatal, labour, post- CS ward and gynaecology ward) at MRRH and provided direct care to the mothers before and after childbirth for at least one year. Nurse midwives who were in their internship period or students were excluded from the study. The mothers who delivered in MRRH by CS were recruited in the study from 24 hours after the operation, contrary to the recommended 48 hours[22] because of the overcrowded of the post-CS ward. Mothers who needed intensive care after operation, those who received general anaesthesia during CS operation, post-CS mothers referred from other health were excluded and those whose newborns were admitted in the neonatal care unit after CS were excluded from the study. The study obtained written informed consent from all participants after explaining the study aims, confidentiality measures and their right to withdraw at any time.

## Designing of Post-CS Home Care Guide

The post-CS home care guide (Prototype I) was developed through a systematic literature review of existing home care recommendations and interviews to explore current home care practices with nurse-midwives and post-CS mothers. This process identified nine essential components maternal and new-born nutrition, wound cleaning and dressing, maternal and newborn hygiene, exercise and rest, breast care, post CS drugs, family planning, regaining of sexual activity and maternal mental health. These components were then validated through a comprehensive evaluation by maternal and child health experts, nurse-midwives and post-CS mothers to ensure their relevance and applicability in the Tanzanian context.

## Data collection

### Phase I: Content Validity of the post-CS home care guide by Maternal and child health experts

Content validity refers to the degree to which the items in a measurement or intervention tool are relevant

and representative of all aspects of the construct being addressed.[23] In this study, before the physical meeting was conducted for validation of a guide, experts were contacted through online zoom meetings that took two hours in order familiarize them with the development process of the first draft of the guide (prototype I of the home care guide). After three weeks, maternal experts had a physical meeting that was moderated by the first author (MM). The discussion aimed at obtaining opinion of the experts on the component and content of the prototype I after they had reviewed the hard copy of the post-CS guidelines. Thereafter, the experts were requested to respond to the Likert-scale questionnaire that had items of the guidelines. Each item had 5 options; strongly relevant, relevant, neutral, irrelevant or strongly irrelevant. Experts were requested to view each item of the homecare guide individually and provide individual responses with reasons of their choices in each item. Thereafter, the experts were organized into four discussion groups: three groups comprised of three participants each, and one group consisting of two participants, where they had to discuss each response against each item. They had to have a common response in each item and provide reason for choosing each component and content of prototype I of post-CS home care guide. This was followed by a plenary discussion of recommendations where consensus was reached on the items of the post-CS home care guide.[24] During the discussion, experts also reviewed various published papers as references.[9,13] Prototype I was then revised based on experts' agreed recommendations and formed prototype II.

### Phase II: Face Validity of the post-CS home care guide by Nurse Midwives

Face validity is the degree of relevancy of the tool's content and items from the viewpoint of the participants in the intended setting. Prototype II of the post-CS home care guide was presented using a projector to nurse-midwives by the first author (MM). Participants were also given a hardcopy of the guide to reflect on each item of prototype II and provide feedback. The presentation was held in the meeting room at MRRH. The nurse midwives were requested to provide individualised opinion through a self-administered tool adopted and modified from Millanzi et al.[25] Participants were required to rate the guide as strong irrelevant, irrelevant, neutral relevant and strong relevant in terms of scope, flow of idea, significance of recommendations in local context, word usage, clarity of items, frequency and feedback on time required for using the guide during health education (Table 1).

After the rating, plenary discussion was held whereby nurse midwives reflected on each section of the guide and the group recommendations were obtained and written in the space provided after each guide recommendations. In this stage some of the items were edited for clarity. The results from the validation study helped to improve the guide and formed prototype III of the post-CS home care guide.

### Phase III: Face validity of prototype III of the Post-CS home care guide by post-CS mothers

The prototype III of the post-CS home care guide was validated by post-CS mothers after nurse midwives had oriented them on the guide composition before they were discharged home. Nurse midwives used various teaching strategies, such as lecturing methods, demonstrations and discussions in case more than one mother was being discharged on that day. Mothers were allowed to ask questions for clarification to facilitate their understanding. The teaching took 30 to 45 minutes.

After orientation, the post-CS mothers were requested to individually provide comments on the feasibility of using instructions in the guideline, specifically about its clarity of the language used, applicability of the recommendation in the home environment, their proposed frequency of teaching and dosage of the teaching material (Table 1), to avoid influencing opinions from other mothers. Each item had five options of either strong irrelevant, irrelevant, neutral or irrelevant.

### Analysis

The data were analysed by using IBM SPSS Statistics for Windows version 27.0 (IBM Corp, Armonk, NY, USA) following data cleaning procedures by generating frequency distribution tables to ensure completeness and accuracy data. Descriptive statistics were used to analyze participants' characteristics by calculating frequencies and percentages. The same approach was applied to analyze Likert-scale responses and the prevalence of recommendations for each component of the home care guide. Recommendations that achieved a prevalence of ≥ 50% were incorporated into the final version of the guide.[26] For Content validation, both item-level Content Validity Index (I-CVI) and the scale-level average (S-CVI/Ave) were calculated by dividing the number of experts endorsing each item by the total number of experts, with items scoring ≥0.78 (indicating ≥78% expert agreement),[27] being retained as satisfactory.[28,29] Face validity was assessed through the item-face validity index (I-FVI) calculated by dividing the number of affirmative ratings from post-CS mothers and nurse-midwives by the total number of respondents, evaluating aspects such as content relevance, clarity, home applicability, logical flow, and contextual appropriateness.[30] Items achieving I-FVI scores ≥0.75 (≥75% agreement) were considered relevant,[31] with components failing to meet these thresholds being revised or eliminated.

### Ethical Consideration

This study received ethical approval from the Institutional Review Board of Muhimbili University of Health and Allied Sciences (MUHAS-REC-05-2021-647). Permissions to conduct the study were obtained from the Tanzania Ministry of Health, respective associations, the Medical Officer in charge, and the Hospital Matron of Morogoro Regional Referral Hospital. Before data collection, all participants were informed about the purpose of the study, procedures, and the voluntary nature of their participation and that they were free to withdraw their participation at any time. Respondents were required to provide a written consent to participate.

**TABLE 1: Operational Definition of the Rating Teams Used in This Study**

| S/N | Term | Definition |
|---|---|---|
| 1. | The scope of the guide | The inclusiveness of the home care recommendations to post-CS mothers' recovery |
| 2. | Flow of idea | Arrangement of the content and items of the guide from simple to complex |
| 3. | Significant of recommendation | The relevance and importance of recommendations to mother's recovery |
| 4. | Word usage | The selection of words in the guide that are not contradicting and sufficient to send a required message |
| 5. | Clarity of items | The presentation of items in the guide by a commonly used language to be understood by a lay mother |
| 6. | Frequency of teaching of the guide | The regularity of teaching the mother for ensuring adequately exposure to home care recommendations |
| 7. | Timing of teaching the guide meant | The right scheduling for conducting the training to mother to enhance their understanding |
| 8. | Applicability of recommendation in home environment | The feasibility of implementing the recommendations at home by post-CS mothers |
| 9. | Frequency of teaching | How many times should another be educated |
| 10. | Dosage of teaching material | Quantity of home care recommendations presents in the guide |

# RESULTS

## Demographic Characteristics

### Maternal and child health experts

A total of 13 experts were involved in this study. Seven (53.8%) were midwives, of whom three were from the Tanzania Midwives Association (TAMA), two from a training institution (UDOM), and the other two from referral hospitals that are DRRH and Mloganzila Hospital. In addition, the workshop had 4 (30.7%) gynaecologists, whereby two were from AGOTA, one from UDOM and another one from Benjamin Mkapa Hospital; and two (15.4%) nutritionists.

The experts had a mean age of 38 years (SD±3) , with professional experience ranging from 3 to 17 years. Among the 20 nurse-midwives recruited, the mean age was 40.1 (SD±5) years, with most being female (90%, n=18), holding a degree in nursing, and employed as nursing officers (55%, n=11), working in postnatal wards (40%, n=8) (Table 2).

Further, 50 post-CS mothers had a mean age of 27 years (SD±6) with the majority (46%, n=23) aged 25–34 years, married (52%, n=26), had primary-level education (54%, n=27), and were housewives (40%, n=20). Most had undergone two to four deliveries (64%, n=32), with 90% (n=45) of cases, the current caesarean section being an emergency procedure (Table 3).

## Content validity of the guide by Experts

Experts rated and provided comments to all of the 9 components of the guide. All comments were considered and discussed with research team. Some items were revised by experts to improve their clarity and applicability in six components for better maternal outcome. In the component of nutrition, the item of fluid food consumption was edited to include the entire period of breast feeding "fluid food throughout breastfeeding (Six months)". The component of wound care, one item was edited regarding accidental gauze remove at home, "A post-CS mother to visit a nearby health facility as soon as possible in case of bandage removal" instead of covering the wound with a cleaning cloth. Also in the component of hygiene, one item was edited to include the restriction of using perfumed soap and oil to the mother and newborn as may some newborn might be sensitive to them; "the use of medicated, perfumed soap and body oil is highly restricted to the newborn".

**TABLE 2: Demographic Characteristics of Nurse Midwives (N=20)**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| Age (Year) | | |
| Mean age 40.1 Years (SD+5) | | |
| 25-34 | 7 | 35 |
| 35-44 | 8 | 40 |
| ≥45 | 5 | 25 |
| Sex | | |
| Female | 18 | 90 |
| Male | 2 | 10 |
| Education level | | |
| Certificate | 6 | 30 |
| Diploma | 3 | 15 |
| Degree | 11 | 55 |
| Designation | | |
| Enrolled Nurse | 3 | 15 |
| Assistance Nursing Officer | 5 | 25 |
| Nurse Office | 11 | 55 |
| Nurse Specialist | 1 | 1 |
| Ward | | |
| Post-natal Ward | 8 | 40 |
| Labour Ward | 7 | 35 |
| Antenatal Ward | 2 | 10 |
| Gynaecology ward | 3 | 15 |

**TABLE 3: Demographic Characteristics of Post- Caesarean Section (CS) Mothers (N=50**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| Age (years) | | |
| Mean age 27 years (SD± 6) | | |
| 15-24 | 22 | 44 |
| 25-34 | 23 | 46 |
| ≥35 | 5 | 10 |
| Education level | | |
| Informal education | 2 | 4 |
| Primary Education | 27 | 54 |
| Secondary Education | 16 | 32 |
| College/University level | 5 | 10 |
| Occupation | | |
| Peasant | 9 | 18 |
| Pet trader | 18 | 36 |
| Housewife | 20 | 40 |
| Employed | 3 | 6 |
| Marital Status | | |
| Single | 2 | 4 |
| Married | 26 | 52 |
| Cohabiting | 22 | 44 |
| Parity | | |
| 1 | 17 | 34 |
| 2-4 | 32 | 64 |
| ≥5 | 1 | 2 |
| Current type of CS | | |
| Elective | 5 | 10 |
| Emergence | 45 | 90 |

Regarding the component of exercise and rest, one item was edited to specify the distance required a post-CS to work per day, "Mothers are advised to walk at least 100m twice a day"; as the previous item did not specify the minimum required distance. Adequate exercise is important for enhancing post-CS mother recovery. Furthermore, in the component of regaining sexual activities, its name was edited from "regaining sexual activity" to "regaining of sexual intercourse" to be specific because even hugging could mean sexual activities. Experts argued much about this component concerning the specification of the period to resume sex. Given that mothers are not expected to have perineal tear, and in the absence of other complications, their recovery could be within six months. Thus it was agreed to include the specification on the item to read "Post-CS mothers were recommended to resume sexual intercourse when they feel recovered, and have mental readiness, in the absence of lochia and when the perineum is healed from at least six weeks after CS" (Table 4).

In the component of maternal mental health care, one item was edited to specify the recommendations to included example to be assisted by relative's/care givers with home chores "Family members should provide support to the mother, such as washing clothes, cooking, fetching water and cleaning". The specification of the support was important as it would help the mother be involved only in light home chores (Table 5).

The I-CVI was computed for each item, the value was 0.83 to 1, indicating good validity of the component of the guide. The S-CVI /Ave was also computed it was 0.91 and satisfactory value, indicating good validity of the component of the guide (Table 4).

### Face Validity of the guide

#### Nurse Midwives

The guide was evaluated by 20 nurse midwives and provided their comments in written and verbal form. They evaluated the of scope, flow of idea, significance of guide items in the local context, word usage, clarity of items, dosage that included inclusiveness of the components and frequency of using the guide. All items were agreed by the nurse midwives to be included to the guide. General comments were on language/word usage, where nurse midwives advised the use of polite recommendatory language and not a commanding language/words. For example;

*"Breast feed the child six months without giving any food until six months"* to

*"Post CS-mother are advised to breastfeed their babies for six months without giving them anything other food "*

*"Take a sponge bath without wetting the gauge of the wound to avoid contamination "* to

*"Post-CS mothers are advised to practice sponge bath to prevent the gauge of the wound from contamination".*

After the face validity analysis, the I-FVI was calculated. The values for each item were satisfactory, ranging from 0.87 to 1. Thus, no further items were removed. The S-FVI was also calculated and scored 0.95, which was suitable to be included in the guide.

#### Post-CS mothers

The guide was also evaluated by 50 post-CS mothers after they were educated by using it and given the leaflet to review. They evaluated the language usage, applicability of the recommendation to home environment and dosage of material, that is, adequacy of recommendation and frequency of teaching mothers by using the guide After the validation all the items of the guide scored great I-FVI (from 0.76 to 1). One item in the component of nutrition (I-FVI 0.76) was commented on by mothers to edit the frequency of eating from minimum of five meals a day to a minimum of three meals per day due to economic difficulties. The S-FVI was also computed and scored 0.89 suggesting understanding ability and acceptance of the guide items.

Regarding the appropriate way to deliver the education in regard to the guide, both post-CS mothers and nurse midwives agreed the guide to be taught more than twice, during discharge and displayed on the television of the post-CS ward to spread the knowledge to the majority of post-CS mothers and relatives. Table 5 shows the final validated post-CS home care guide.

**TABLE 4: Proposed Changes in the Post-Caesarean Section (CS) Home Care Guide**

| S/N | Component of Home Care Guide/ Old Version | Component of Home Care Guide/Agreed Version | Reason for a Change | Average Scale Component Validity Index (I-CVI/Ave) |
|---|---|---|---|---|
| 1. | **Nutrition**<br>**Maternal Nutrition**<br>Consumption of fluid food is encouraged for the first four days to two weeks to enhance milk production, such as porridge, soup, etc. | **Proposed Version**<br>Maternal consumption of fluid food throughout the period of breastfeeding (Six months) enhances milk production, such as porridge, soup, etc. | Fluid food is needed for the entire period of breastfeeding not only the first two weeks | **0.89** |
| 2.<br>a. | **Wound Care**<br>**Wound Dressing**<br>In case of dressing removal, the wound should be covered with a clean and ironed cloth, and the mother should visit the nearby health facility as soon as possible | A post-CS mother to visit a nearby health facility as soon as possible in case of bandage removal | Not every post-CS mother will have iron at home, and allowing them to cover their wound with home clothes might lead to the introduction of infection in the wound | **0.87** |
| 3.<br>a. | **Newborn Hygiene**<br>Bathing of the newborn (nature of water, timing of first bathing after delivery, etc.) | | | **0.84** |
| | Apply none non-perfumed body oil immediately after drying the baby | The use of medicated, perfumed soap and body oil is highly restricted. | Not only perfumed soap but also perfumed oil may lead to respiratory irritation to the baby | |
| | Change the diapers after every two hours and immediately after defecation | Mothers should change the baby's diaper, nap or piece of cloth frequently; at least after every two hours & immediately after defecation to avoid diaper rashes and infection. | Not every mother use diapers other used piece of clothes (Khanga) and the reason to do so to facilitate compliance | |
| 4. | **Exercise and Rest**<br>A mother should walk a bearable distance at least twice a day | Mothers are advised to walk at least 100m twice a day | It is important to specify since some will work only a few steps, claiming they are bearable to them | **0.83** |
| 5. | **Sexual Activities**<br>Sexual activities can be resumed when a mother feels recovered to do so; this includes being mentally ready, no lochia and the perineum is healed | Regarding sexual intercourse, post-CS mothers were recommended to resume sexual intercourse after they feel recovered, including mental readiness, in the absence of lochia and the perineum is healed from at least six weeks after CS | It is important to put an estimate of the duration so that mothers will not claim to prolong the abstinence from sexual activities to their partners | **0.89** |
| 6. | **Mental Health Care**<br>Family members should provide support & comfort to the mother, ensuring the mother is getting the necessary needs to for her parenting | Family members should provide support to the mother, such as washing clothes, cooking, fetching water and cleaning; ensuring she receives all necessary needs in supporting parenting. This will help a mother to have adequate time to rest and care for the baby and prevent postpartum depression | Identifying activities to be supported by the family members will help to clarify the recommendation & facilitate its implementation. | **0.9** |

**TABLE 5: The Final Validated Post-Caesarean Section (CS) Home Care Guide**

| Components | Recommendations |
|---|---|
| **I. Nutrition** | |
| Maternal | Fluid food is encouraged for the first six months to enhance milk production, such as porridge, soup, etc.<br>A balanced diet to ensure all food groups are consumed using local available food, with an emphasis of vegetables, fruits, Protein, and vitamin C to enhance wound healing.<br>Post-CS mother should eat at least three meals per day and two additional small meals/ snacks in between |
| Newborn | Post CS-mother are advised to breastfeed their babies for six months without giving them anything other food (Exclusive breastfeeding)<br>Breastfeeding a child is advised by using all breast to minimize the risk of breast problems |
| **II. Wound care** | |
| Wound dressing | All dressing should be done at the health facility after discharge; no wound dressing at home is advised.<br>The dressing should be protected from water, breast milk and lochia to minimize the risk of wound contamination and infection<br>In case of dressing removal, a mother is recommended to visit the nearby health facility as soon as possible<br>Regular wound assessment should be performed with clean hands to identify any signs of infection, without removing the dressing<br>A mother is advised not to put anything in a wound in order to prevent wound infection (herbs or any traditional medicine) |
| Wound cleaning | All wounds are recommended to be cleaned at the health facility<br>No wound cleaning with soap and water, or any traditional medicine, is advised at home |
| **III. Hygiene** | |
| Maternal | Post-CS mothers are advised to practice sponge bath (at least twice a day), to prevent the gauge of the wound from contamination; until the sutures are removed, and advised to bathe the whole body<br>Clean the perineum to ensure water does not reach the wound<br>Change the pads/piece of cloth at least three times a day<br>Warm water can be used or cold, depending on the mother's preferences.<br>Nature of clothes to wear: Wear clean and comfortable clothes, change clothes after every bath<br>Avoid to ware very tight clothes, especially in the wound area |
| Newborn | A mother is advised to bathe the newborn with warm water, 24 hours after birth.<br>Keep windows and doors closed to help keep the baby warm<br>For the first six months, use unscented soap and oil to help protect the baby from respiratory tract sensitivity.<br>Wear a baby clean clothes, and should be changed after every<br>Change the baby diaper/ piece of cloth frequently to avoid diaper rashes, and immediately after defecation<br>The cord should neither be cleaned nor anything applied to reduce the risk of cord infection. The cord will fall within 10 to 14 days |
| Clean environment | A mother is advised to stay in a clean environment, with clean surroundings, bed sheets, and room<br>Adequate light and ventilation in the room is encouraged |
| **IV. Exercise and rest** | A mother is advised to perform Pelvic floor muscles exercise (Kegel's exercise) to reduce the risk of urine incontinence<br>Also a mother is advised to walk At least 100m meters (length of the football ground) at least twice a day to facilitate blood circulation and enhancing healing<br>Other exercise includes basic foot and leg exercises, breathing and coughing exercises, abdominal breathing exercises, hip hitching and pelvic tilt exercises, and knee rolling exercises<br>Do not lift heavy weights, run or swim for the first 6 weeks in order to facilitate recovery<br>A mother is further advised to have adequate time to rest |
| **V. Breast Care** | A mother is advised to wear a comfortable brassiere to support the breast and minimize the risk of breast engorgement.<br>In case of breast problems such as breast engorgement, mastitis, and breast abscess, visit the health facility for immediate intervention. |
| **VI. Post-operative drugs & visit** | Adherence to the drug prescribed and post-natal visits as advised |
| **VII. FP use** | The post CS mother should wait at least two years before becoming pregnant again<br>The use of family planning after being counselled in the hospital methods can help in achieving this goal |
| **VIII. Regaining Sexual Intercourse** | Sexual activities can be resumed when a woman feels recovered to do so when she is mentally ready, no lochia and perineum is healed. |
| **IX. Mental health care** | Family members are advised to support the mother by helping with tasks such as washing clothes, cooking, fetching water, and cleaning, as well as ensuring she receives the necessary support for parenting<br>Family member has to report to the facility in case a mother behaves abnormally at home (signs of depression, violence to the newborn or family member)<br>Mothers and community members are advised to report any cases of gender-based violence, whether physical, psychological or economic mistreatment, or harassment by a family member or anyone in the community to a health care worker for immediate support and intervention |

## DISCUSSION

Comprehensive and quality care after CS is important for the recovery of the mother. After validation, a contextualized post CS home care guide was developed covering nine crucial components: nutrition, wound care, hygiene, maternal exercise and rest, breast care, regaining of sexual intercourse, adherence to prescribed drugs and postnatal visits, the use of family planning methods and maternal mental health care. The guide's item-level content validity index (I-CVI) ranged from 0.83 to 1.0, and item-face validity index (I-FVI) ranged from 0.76 to 1.0, demonstrating strong expert agreement and clarity. No items were removed; however, several were refined for clarity based on participant feedback.

The multi-stage involvement of different stakeholders in validation of the guideline guarantee its comprehensiveness in addressing home care after CS. The components of this guide slightly similar with the items in guide developed in Rwanda but differ is some item recommendations.[9] For example, in this guide, there is a component of hygiene that recommended a woman body and surrounding cleanness while in Rwanda's guideline there is no item of environmental cleanliness. Environmental cleanness is stipulated by Nightingale's Environmental Theory[32] and the Triad Model of Disease Causation.[33] Nightingale's theory emphasizes the role of the environment as an external factor influencing healing, emphasizing that cleanliness, ventilation, and hygiene can impact recovery.[32] The Triad Model of Disease Causation identifies three essential components for the occurrence of illness: a susceptible host; an external agent that are microorganisms responsible for infection; and environmental factors that facilitate transmission of these microorganisms to the host,[33] which in this study refers to the home environment. Although a study done by Peter et al,[34], shows indirect influence of unconducive home environment that favours pathogens colonization with CS wound healing; this validation study endorses environmental cleanness to be among the components of post-CS home care guide that would enhance recovery of the post-SC mother.

Other items that differ in the recommendations were in the component of wound care. In this guidel wound care restricts mother from wetting the wound, while in Rwanda's guideline the mother can remove the gauze and replace it with a clean and dry dressings after bath at home.[9] In low-income countries, specifically Tanzania, access to reliable sources of clean water and sterile home environments remain a significant challenge. Given the common practice of early discharge for post-CS mothers, it is difficult to ensure that wounds are cleaned and dressed properly at home, as it may increase the risk of SSI. Therefore, tailored post-discharge support and education are essential to mitigate infection risks and promote safe recovery in these settings.

The monitoring of the guide recommendations' implementation at home is vital in order to predict safe recovery. Community health workers are a significant bridge between post-natal mothers and the health facilities.[9] Home visits to post-natal mothers have been found to improve postnatal recovery and neonatal outcomes and increase the uptake of health promotion behaviours.[35] The country like Rwanda, has managed to integrate maternal and newborn services to community-based interventions of healthcare delivery through CHW which provides a wide range of services and counselling, including conducting home-based visits for women before and after birth and providing referrals.[9] Home visit by CHW is not a practice in Tanzania hence health education on the post-CS mothers and follow-up in the postnatal visit remains a great base for monitoring the implementation of the home care practice and their recovery.[15]

The modality of implementing the guide, include the timing of education and the choice between group-based or individual counselling. This is essential to ensure that mothers receive adequate and appropriate information to support effective recovery at home. In this study post-CS mothers have proposed the guide to be taught more than twice and it should be during discharge or any time on the hospital television. This aims at improving the accessibility of educational content to post-CS mothers through multiple sources. A study done by Logsdon et al,[36] in the United States of America, found that the education on self-care and infant care at home were more feasible by using videos on YouTube or iPad than in printed pamphlets. Also, another study done by Raines and Robson in United States of America reported the preferences of new mothers to obtain information through video on the internet or television.[37] There is a need to include all available suitable communication channels to educate the patients in the Tanzanian context.

Regarding timing of providing education, most mothers reported receiving education about their home care during discharge by health care providers.[36,37] eEducation of mother regarding child birth and parenting is advised to begin even during antenatal period, this would help in spreading of awareness on home care after delivery even if the mode of delivery is not confirmatory.

In a study done in Georgia, nurse were reported to provide discharge education to postpartum mothers using individual counselling.[38] In another study done in U.S.A by the same authors on improving postpartum education, women were given education in groups and then given a leaflet to read at home.[39] Modality of providing education should be based on the mothers needs to ensure appropriate education is delivered. Individual counselling is more preferable than group because each mother has unique needs in recovery depending on the reason of operation, and their condition during discharge. However, individual counselling can be hindered by the limited number of staff available, number of clients and infrastructure of the health facility. Nurse midwives need to strive and ensure that mothers receive adequate information on how to take care of themselves at home for appropriate recovery.[9,34] Comprehensive education should be provided to relatives during discharge and written information should be provided to the mothers for their review at home.[9] The home care guide after CS will help both healthcare workers and post-CS mothers have a reliable and scientifically sound source information for post-CS mothers home care.

The multi-level involvement of stakeholders in the formation and validation of the guide is one of the

strengths of this study. This was necessary to ensure two things, first to capture the opinions of all important stakeholders to formulate the comprehensive home care guide; and second to enhance adaptability of the guide to from facility level to national level. We recommend future research to evaluate the impact of the guide on nurse midwives, the recovery of post-CS mothers and the newborn.

## CONCLUSION

The developed post-CS home care guide has been validated by maternal and child health experts, nurse midwives and post-CS mothers, with no items of the guide being removed or added. This validation process resulted in minor modifications to align with the Tanzanian context. The guide was rated as feasible, valid, reliable, and applicable by maternal and child health experts, nurse-midwives, and post-CS mothers. Further, the guide offers an evidence-based, standardized tool that enables nurse-midwives to deliver uniform, context-specific education to mothers after CS.

The guide also provides a harmonized education framework to facilitate uniform delivery of discharge information that will enable the mother and family members to collaborate in recovery after CS actively. The implementation of the guide is expected to enhance continuity of care beyond the hospital setting, hence ensuring improved maternal and newborn outcomes.

Given the increasing rates of CS and the limited options for extended hospital care, it is highly recommended that nurse-midwives and other healthcare providers use a validated post-CS home care guide to teach women safe home care practices and promote smooth recovery. Additionally, the approach used in its development can serve as a model for creating other evidence-based protocols and guidelines that address community health needs.

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