Original Article

How Skilled Birth Attendants Navigate the Complexities of Managing Preterm Premature Rupture of Membranes and Cervical Insufficiency in Rwanda

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Abstract

Background: Preterm birth affects 13.4 million cases globally, presenting significant health and socioeconomic challenges. Addressing preterm birth's underlying risk factors and causes, such as Preterm Premature Rupture of Membranes (PPROM) and Cervical Insufficiency (CI), is important. Although these conditions are manageable, they still contribute to a high rate of preterm birth, especially in developing countries like Rwanda, where limited resources alter effective management. This study sought to explore skilled birth attendants' (SBAs') lived experience in the management of PPROM and CI as risk factors for preterm birth in Rwanda.

Materials and Methods: A qualitative study using a phenomenological approach was conducted in five health facilities in Rwanda. Participants were 24 SBAs working in obstetrics and gynaecology departments and included Nurses, Midwives, General Practitioners, Obstetric/Gynaecology Residents, Obstetrician/Gynaecologists and Fetomaternal Medicine Specialists. After obtaining informed consent, 24 in-depth interviews were conducted using a semi-structured interview guide. The interviews were recorded in the participants' preferred language, either Kinyarwanda or English and transcribed verbatim. Kinyarwanda transcripts were translated into English. The transcripts were coded inductively and thematically analysed using Dedoose. Results of the study underscored the experiences of SBAs during management of PPROM and CI, including the challenges they face and the foundational anchors of the management.

Results: Four themes emerged: Teamwork in action: collaborative care drives success; evidence-based practice: protocols and expertise lead CI and PPROM management; transformative impact: better practices, better outcomes; and overcoming obstacles: resource gaps and patient challenges.

Conclusions/Recommendations: PPROM and CI management in Rwanda includes a blend of emotional experiences for those involved, reference to various guidelines, task-sharing and informal in-service education. Addressing resource limitations, adherence to harmonised evidence-based national protocols, formalising task-sharing, emotional support of SBA, and continuous education can benefit PPROM and CI care.

Keywords: Cervical Insufficiency, Lived experiences, Preterm birth, Preterm Premature Rupture of Membranes, Skilled birth attendants

Background

Preterm births, affecting 8% to 13.2% of pregnancies globally, present significant neonatal health, maternal health, and socioeconomic challenges, particularly in low-income countries where up to 90% of affected neonates may die within the first few days of life.[1,2] Preterm birth is defined as delivery before 37 weeks of gestation and is classified as extremely preterm (before 28 weeks), very preterm (between 28 and 32 weeks), or moderate-to-late preterm birth (from 32 to below 37 weeks of gestation).[3]

In 2023 alone, 13.4 million babies were born preterm, posing a challenge in reducing maternal, neonatal, infant and under-five mortality rates.[2,4] In Rwanda, the preterm birth prevalence is 13.8%, contributing to a neonatal mortality rate of 17.6 deaths per 1,000 live births, with 11% of these deaths linked to preterm birth complications.[3,5,6] Addressing these challenges is crucial to meeting the Sustainable Development Goal (SDG) 3 target of reducing neonatal mortality to 12 deaths per 1,000 live births by 2030.[3,5]

Preterm Premature Rupture of Membranes (PPROM) and cervical insufficiency (CI) are significant causes of preterm birth. While 40-45% of preterm births are

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attributed to spontaneous causes, 25-30% are due to PPROM, and 8-9% are due to CI.[7] PPROM refers to the rupture of membranes occurring before 37 weeks of gestation, and it compromises further growth and development of the foetus. PPROM has been reported to increase the risk of chorioamnionitis, caesarean section, postpartum haemorrhage, endometritis, and to complicate 2-4% of singleton and 7-20% of twin pregnancies.[8] However, PPROM can be easily diagnosed through microscopic examination or pH testing of vaginally-collected amniotic fluid. Yet, these options may not be available in rural or resource-limited contexts. Once diagnosed with PPROM, a woman has 30-40% chances of delivering within 48 hours and a 56-63% chance of delivering within one week.[9] There is a lack of agreement regarding PPROM management and antibiotic regimens due to varying guidelines and resource availability.[10]

CI, with a prevalence of 6.9 in 1000 deliveries in Sub-Saharan Africa,[11] is the inability of the cervix to maintain a pregnancy in the absence of contractions.[12,13] Risk factors for CI include cervical anatomy, some genetic polymorphisms, and inflammatory processes and congenital conditions such as uterine malformations, collagen abnormalities, Müllerian abnormalities, intrauterine diethylstilbesterol exposure and a history of childbearing or gynaecological surgeries. [12,13] Before cervical changes occur, women with CI are usually asymptomatic but pelvic pressure, lumbopelvic pain, and increased vaginal discharge can be observed in some women for days or weeks.[13] These symptoms are often overlooked as they resemble normal physiological symptoms during pregnancy.[13] Recommendations on diagnosing CI differ and may include clinical presentation, hysterosalpingography, cervical insufficiency dilator, cervical isthmus traction balloon, or Foley catheter, a cervical length below 25mm, or the presence of CI risk factors.[14,15] Similarly, surgical interventions like cervical cerclage and non-surgical treatments are controversial due to varying reported efficacy.[12,16,17] CI is treated surgically through cervical cerclage or conservatively with progesterone and a cervical pessary.[12] Bed rest and activity restrictions are not recommended as there is limited supporting evidence.[13] Specific CI management differs across the American College of Obstetricians and Gynecologists (ACOG),[16] the Royal College of Obstetricians and Gynecologists (RCOG) guidelines,[17] and the Rwanda Ministry of Health guidelines.[18] As a result, there is apparent perplexity in PPROM and CI management as skilled birth attendants (SBAs) manage the conditions from different backgrounds. Moreover, even in the presence of the clinical guidelines, poor maternal and neonatal outcomes persis.[19] Additionally, adherence to existing guidelines is complicated by a lack of relevant infrastructure and technology for diagnosis, management and follow-up.[20,21]

Research has shown that the attitudes, perceptions, and experiences of SBAs significantly influence pregnancy and delivery outcomes.[22] However, there is a notable gap in local data regarding how these professionals navigate the complexities of managing PPROM and CI. Despite the essential role they play, the experiences of skilled birth attendants in managing PPROM and CI have not been explored in Rwanda. This study sought to assess the lived experiences of skilled birth attendants, including challenges in the management of PPROM and CI, to improve maternal and neonatal outcomes.

Materials and Methods

This phenomenological study was conducted in one rural and two urban districts of Rwanda, with high delivery rates, at the University Teaching Hospital of Kigali (CHUK), King Faisal Hospital (KFH), Kirehe District Hospital (DH), Kigina Health Centre (HC), and Remera Health Centre (HC). CHUK and KFH are the largest public and Private referral hospitals in Rwanda. These health facilities were purposively selected to capture responses in public and private centres across primary, secondary and tertiary healthcare levels where PPROM and CI were likely to have been encountered.

Twenty-four purposively sampled SBAs, who included general practitioners, nurses, midwives, obstetrics, and gynaecology residents and specialists committed to the labour and delivery unit, were included in in-depth interviews (IDIs). Thirteen of the participants were drawn from the referral hospitals in Kigali, Table 1. SBAs with less than three months in the current labour and delivery unit or who had managed less than three cases of CI and PPROM were excluded from the study. The sample size was reached through theoretical saturation determined through daily debriefing and code saturation.[23]

The interviews were done in either English or vernacular Kinyarwanda languages using a 10-item semi-structured interview guide with several prompts. The guide was pre-tested on five skilled birth attendants, three in English and two in Kinyarwanda, at a secondary facility in a different district. The interview guide included items on the SBAs' role, exposure to patients with PPROM and CI, the clinical experiences in managing PPROM and CI, available support, challenges, and reflections on how to improve the quality of care. Approval to conduct the study was granted by the institutional review boards at the University of Global Health Equity (UGHE), UGHE-IRB/2024/300; The Rwanda Ministry of Health, 20/2087/DPMEHF/2024, King Faisal Hospital and KFH/2024/180/IRB; CHUK, EC/CHUK/O75/2024. Additionally, informed consent was obtained from all

participants. The interviews were conducted by two investigators, a General practitioner and a Medical Imaging Officer, and two trained interviewers, each possessing a Bachelor's degree in Health Management. The interviews took place in a private room, and each lasted between 40 and 60 minutes. Audio recordings were then de-identified and transcribed verbatim; translated to English where necessary, and kept in confidential, password-encrypted files. Analysis of transcripts was done through thematic analysis,[24] using Dedoose software version 9.2.012. The researchers used bracketing and subjectivity statements for reflexivity.[25]

Results

Sociodemographic Characteristics

The 24 SBAs had a mean age of 36 (SD=8.6 years) and included five nurses, nine midwives, two general practitioners, four obstetrics and gynaecology (GYN/OBS) residents, two Obstetricians/ Gynaecologists, and two Maternal-Foetal-Medicine specialists (MFM). There were mostly midwives and obstetricians, as they are primarily involved in PPROM and CI management and had prior experience managing the two conditions. Eleven (45.8%) were female while 54.2% were male, Table 1.

The analysis yielded four themes: teamwork in action: collaborative care drives success, evidence-based practice: protocols and expertise lead CI and PPROM management, transformative impact: better practices and better outcomes, overcoming obstacles: resource gaps and patient challenges, Table 2.

Table 1: Sociodemographic Characteristics of the Interviewed Skilled Birth Attendants

Variables Participants	Age	Sex	Level of education	Profession	Level of care
P001	44	Female	Bachelor's degree	Nurse	Health center
P002	40	Female	Bachelor's degree	Midwife	Health center
P003	32	Female	Advanced diploma	Nurse	Health center
P004	28	Female	Advanced diploma	Midwife	Referral Hospital
P005	27	Female	Advanced diploma	Midwife	Referral Hospital
P006	30	Male	Master's degree	Obstetric/Gynaecology Resident	Referral Hospital
P007	47	Female	Bachelor's degree	Midwife	Referral Hospital
P008	28	Male	Master's degree	Obstetric/Gynaecology Resident	Referral Hospital
P009	44	Female	Bachelor's degree	Midwife	Referral Hospital
P010	39	Male	Master's degree	Obstetric/Gynaecology Resident	Referral Hospital
P011	31	Male	Master's degree	Obstetric/Gynaecology Resident	Referral Hospital
P012	53	Male	Master's degree	Maternal-foetal-medicine specialist	Referral Hospital
P013	42	Male	Master's degree	Obstetrician/gynaecologist	Referral Hospital
P014	40	Female	Bachelor's degree	Midwife	Referral Hospital
P015	33	Male	Bachelor's degree	General Practitioner	District Hospital
P016	24	Female	Bachelor's degree	Midwife	District Hospital
P017	27	Male	Bachelor's degree	General Practitioner	District Hospital
P018	36	Male	Advanced diploma	Nurse	Health center
P019	44	Female	Advanced diploma	Nurse	Health center
P020	36	Female	Advanced diploma	Nurse	Health center
P021	29	Male	Advanced diploma	Midwife	District Hospital
P022	56	Male	Master's degree	Obstetrician/gynaecologist	District Hospital
P023	42	Male	Master's degree	Maternal-foetal-medicine specialist	Referral Hospital
P024	32	Male	Bachelor's degree	Midwife	Referral Hospital

Table 2: Themes and subthemes of lived experiences of skilled birth attendants in the management of preterm premature rupture of membranes and cervical insufficiency

	Themes	Subthemes
1	Teamwork in action: collaborative care drives success	Multidisciplinary collaboration is key The role of patient-provider relationship
2	Evidence-based practice: protocols and expertise lead CI and PPROM management.	Clinical criteria influence decision-making Knowledge and experience play a significant role
3	Transformative impact: better practices, better outcomes	Improvements in PPROM and CI management SBA emotion in PPROM and CI management
4	Overcoming obstacles: resource gaps and patient challenges	Inadequate resources hinder effective care Patient factors impact management strategies

Theme 1: Teamwork in Action: Collaborative Care Drives Success

Multidisciplinary collaboration is key

Participants expressed that the scope of practice restrictions for each discipline necessitates interprofessional collaboration, where professionals must *"work as a multidisciplinary team," (P005, Midwife at referral hospital)*. For instance, nurses and midwives were restricted from diagnosing while general practitioners were restricted from performing cervical cerclage. Collaboration also helped to expedite patient referral. As one nurse mentioned,

"I call a gynaecologist, who is readily available. ... If I... find something concerning, I can quickly consult the gynaecologist and receive immediate feedback." P018, Nurse at HC.

The Importance of a Positive Patient-Provider Relationship

Participants recognised the importance of building trusting relationships with patients through genuine communication, patient education, and counselling since *"if the patient is not involved, we can't achieve a lot." (P013, OB/GYN at referral hospital).*

Theme 2: Evidence-based practice: protocols and expertise lead CI and PPROM management.

Clinical Criteria Influence Decision Making.

The SBAs described, *"all we do we have to follow the protocol" (P009 Midwife at a Referral Hospital)* for them to ensure that they take patient history, perform a physical examination, and document a diagnosis. The SBAs commonly diagnose PPROM through history, and occasionally through a pooling test or ultrasonography.

Knowledge and experience play a significant role.

Apart from using protocols, the participants drew their practices from the knowledge that they acquired from formal education, personal experiences or peer knowledge sharing.

"I have never had the opportunity to gain additional knowledge except through the experience gained from my work. This job serves as a school too, ... we share knowledge gained from training within our team. When someone attends a training session, they return to share their newly acquired skills ... regarding protocols, news, and changes." P001 nurse at a HC.

Theme 3: Transformative impact: better practices, better outcomes

Improvements in PPROM and CI Management

The participants expressed being happy with recently improved clinical guidelines for the management of PPROM and CI. They reported changes that included a policy update to raise community awareness as it helps pregnant women to seek early assistance; "*when they see the watery fluid, they come to the hospital immediately." P020, Nurse at HC.* Additionally, the SBAs explained a policy shift towards availing more technology in lower levels of care. For instance, the decentralisation and task-shifting of obstetric ultrasonography to nurses in health centres has helped: "*you can decide to refer the patients or to deliver the baby." P020, Nurse at HC.* Lastly, with improved antenatal care and attendance, SBAs shared that women seemed more empowered to independently make decisions regarding their healthcare.

PPROM and CI Management cases evoke emotional responses in SBAs

The participants were profoundly affected by negative patient outcomes and usually lived with guilt when poor outcomes arose. For instance, *"the hardest part is the pre-viable, those who have PPROM before like 26 weeks, for sure it is a very painful experience, and for both of us doctors to tell that nothing can be done for this baby." P023, MFM at Referral Hospital.*

"She got PPROM at 23 weeks, we provided antibiotics, bed rest, we were washing her in bed, ..., we continued

pushing, but at 27 weeks she developed chorioamnionitis. We did not have anything else to do. We sent her to the operating room for the caesarean section. Unfortunately, ... the newborn passed away a few days later. We were disappointed because the mother really wanted this baby." P024, Midwife at a referral hospital

SBAs reported that these experiences sometimes motivated them to become more vigilant with subsequent cases. "*That is painful even for us, we keep telling ourselves 'I wish', 'I wish'. It is very traumatising and even now, when I go away, I must call every time to remind those on duty to monitor the patients more closely." P022, OB/GYN at DH.*

Theme 4: Overcoming obstacles: resource gaps and patient challenges of PPROM and CI

Inadequate resources and staffing hinder effective care. Commonly encountered setbacks in the management of PPROM and CI included inadequate infrastructure, health workers, equipment, and medical or surgical consumables. For instance, small neonatal intensive care units, a shortage of ambulances, centralised PPROM and CI management expertise, and a shortage of resuscitation equipment such as incubators, cerclage stitches or speculum, all of which compromise the management of the conditions and can result in poor patient outcomes. *"Sometimes the materials we use for cervical cerclage are not available in many hospitals." P011 Resident at Referral Hospital.* Even when available, "*not every physician is capable of doing that procedure [cerclage]and sometimes the cerclage fails, and we have to do transabdominal cerclage, while even many obstetricians don't know how to do it." P011 Resident at Referral Hospital.*

Discussion

This study has shown that the management of PPROM and CI relies on teamwork involving patients and various specialists to allow for expanded roles such as rescue cervical cerclage. Additionally, the experience is laden with emotions from poor outcomes. While local guidelines for PPROM and CI are available, SBAs often refer to NICE and ACOG guidelines, adapting the protocols due to resource constraints such as unavailability of specialists who can perform rescue cerclage, limited neonatal intensive care capacity, ultrasonography and resuscitation equipment. As a result, PPROM and CI are typically diagnosed through the patient's history. Due to concerns for poor maternal and foetal outcomes, the SBAs tend to work with active management as opposed to expectant management. For instance, early Caesarean section for chorioamnionitis at 27 weeks when vaginal delivery could have been possible.

As highlighted in this study, PPROM and CI management require collaborative efforts among patients, caregivers, midwifery, obstetric, and psychiatric professionals for better patient outcomes.[22] The collaboration can improve the quality of obstetric care, patient safety or outcomes by expanding the scope of practice, as needed in the management of high-risk pregnancies.[18] Rwanda's healthcare system is decentralised, with 85% of disease burden managed at Community-Health Worker, Health Post and Health Centre Levels, where there are nurses and midwives; with the remainder of conditions managed at district and tertiary levels of care. As a result, midwives at lower levels of care should be able to screen for PPROM and CI for early referral. For instance, the expansion of task-shared obstetric ultrasonography and cerclage. Given that cerclage has prolonged singleton pregnancy by 52.4 days and twin pregnancy by 36.5 days,[26] the service can be expanded by task-sharing with General Practitioners in District Hospitals, in the absence of Obstetricians. SBAs in District and tertiary hospitals may require continual formalised didactic, simulation-based and precepted training in the management of PPROM and CI, in line with national requirements for Continuous Professional Development. Higher level simulation zones,[27] strengthen collaborative activities such as respectful communication, coordination, conflict, emotional support, clarity of roles and participation in decision making, which enrich collaboration.[28] The need for psychological support for both patients and SBAs needs consideration to address immediate and long-term emotional distress.

In this study, SBAs interchangeably used international, national and hospital protocols for decision support. Similarly, a study in Kigali[21] showed that the management of PPROM was not based on the national antenatal care, and Gynaecology and Obstetrics Clinical protocols and Treatment guidelines due to a lack of both updated guidelines and materials to provide standardised care. Hence, the need to update national PPROM and CI management guidelines whenever internationally recognised guidelines change, and display the protocols in obstetric units in Health Centres and District Hospitals. Another barrier to the use of national protocols was the unavailability of cerclage equipment, ultrasonography, competent personnel, and NICUs. In Rwanda, the use of drones to deliver medical supplies supports PPROM and CI management, as the supplies can be delivered within 30 to 60 minutes from the drone central supply centre, reducing the need for patient referral.

The care for CI and PPROM, by virtue of specialist diagnostic and curative services, transport and hospitalisation, necessitates out-of-pocket expenditure

(OOP).[29,30] While 83% of the Rwandan population is ensured through the compulsory Community-based Health Insurance scheme, the home delivery or use of faith-based therapy reported in this study may be attributed to more OOP expenditure for PPROM and CI. This may indicate a need for comprehensive Community-Based Health Insurance coverage for pregnancy and related in Rwanda.

Conclusion

The management of PPROM and CI is a complex process requiring collaborative care models involving SBAs, patients and their caregivers. The emotional nature of PPROM and CI management underscores the importance of mental health considerations for patients and SBAs. Due to resource constraints, patients and caregivers may not follow management protocols, raising issues with expanding the scope of obstetric insurance coverage. While SBAs rely on their knowledge, experience, and clinical guidelines, ongoing professional development are essential to support the quality of PPROM and CI care in line with emerging best practices.

Limitations of the Study

This study documented the perspectives of SBAs, their experiences, decision-making, challenges and proposed improvement strategies in the management of PPROM and CI, at different levels of care in both the private and public sectors. However, the absence of focus group discussions in this study might have missed richer data, interaction among nursing, midwifery and medical professionals and enhanced idea generation among the participants. Other non-SBA professionals, such as psychiatrists or Psychologists, who might be involved in PPROM and CI management, were not included in the study. Lastly, the use of vernacular language during interview might have missed some situations that are better elaborated through obstetric language.

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Competing interest

The authors declared they have no conflicts of interest.

Data availability

The data collected for this study are available at http://doi.org/10.17605/OSF.OI/J7KGS .

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