


Tube Feeding Practices and Transition to Breastfeeding Experiences of Mothers of Preterm Infants at a Kangaroo Mother Care Unit of a Tertiary Hospital in South Africa

Global Pediatric Health
Volume 8: 1–12
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/2333794X211037032
journals.sagepub.com/home/gph


Sphiwe Madiba¹  and Malmsey Sengane¹

Abstract

To receive human milk, most preterm infants initially receive the mothers' expressed milk through a nasogastric tube. However, breast milk feeding the preterm infant and making the transition to direct breast-feeding come with significant challenges. The study explored and described the experiences of mothers of preterm infants regarding initiation and expressing breast milk, tube feeding practices, and transition to breastfeeding during the infants' stay in a kangaroo care unit (KMC) of an academic hospital in South Africa. Using a qualitative design, focus group interviews were conducted with 38 mothers of preterm infants after discharge from the neonatal intensive care unit (NICU). We analyzed transcripts following the 5 steps for qualitative thematic data analysis. Tube feeding and breastfeeding preterm infants was challenging and exhausting for the mothers. Many described their experiences of initiating expression and sustaining milk supply as negative. They had constant concerns about their ability to produce adequate milk volumes to feed their infants. They had immense dislike of expressing, which they described as physically exhausting, stressful, and painful. Those who had initiated breastfeeding were highly motivated to breastfeed their preterm infants. They described breastfeeding as a positive bonding experience that they derived pleasure from. The mothers' dislike of expressing was overshadowed by their emotional obligation toward their preterm infants. Although the KMC unit promotes breastfeeding, mothers encountered problems and struggled to initiate expression and sustain milk production. Mothers of extreme and very preterm infants need support to continue with milk expression during the long NICU and KMC stay.

Keywords

breastfeeding, experiences, expression, preterm infants, kangaroo care, mothers' breast milk, neonatal intensive care unit, South Africa tube feeding

Received June 15, 2021. Accepted for publication July 15, 2021.

Introduction

According to the World Health Organization (WHO), 15 million infants are born preterm every year. Preterm babies are those born before the completion of the 37 weeks' gestation.¹ The WHO further classifies preterm infants based on their gestational age as extremely preterm infants (<28 weeks of gestational age), very preterm infants (born between 28 and 32 weeks of gestational age), and moderate to late preterm infants (born between 32 and 37 weeks of gestational age).¹

The WHO² estimates that 30 million newborns every year require inpatient care as a result of being

born preterm, with low birth weight or with a medical condition. The preterm baby is usually separated from the mother immediately after birth and is hospitalized in a neonatal intensive care unit (NICU) for weeks to months.³ Extremely and very preterm infants do not

¹Sefako Makgatho Health Sciences University, Pretoria, Gauteng Province, South Africa

Corresponding Author:

Sphiwe Madiba, Department of Public Health, School of Health Care Sciences, Sefako Makgatho Health Sciences University, Molotlegi Street, Pretoria, 0001, South Africa.
Email: sphiwe.madiba@smu.ac.za



have the ability to suck from the breast effectively for at least 6 weeks after birth. WHO¹ guidelines state that all infants, including preterm infants, should be fed human milk in the first 6 months of life. Human milk and breast-feeding are very important for extremely and very preterm infants to reduce morbidity and mortality and to support the best possible growth, development, and overall outcome.⁴

The hospitalization of preterm infants and mothers and infant separation after birth have been identified as barriers for adequate breast-milk utilization. Among its recommendations to improve preterm birth outcomes, the WHO recommends kangaroo mother care (KMC) as the preferred standard of care for preterm and low birth-weight infants. The core components of KMC include early, continuous, and prolonged skin-to-skin contact between the mother and the baby, and exclusive breast-feeding or feeding with breastmilk.⁴ Skin-to-skin care improves breastfeeding rates in very preterm infants, improves the volume of mother's milk, assists with bonding and attachment, boosts parental engagement, and improves breastfeeding.⁴ For the infant, skin-to-skin care reduces infant mortality, and morbidity.⁵⁻⁷

In line with WHO recommendations, KMC is an accepted standard of care for preterm infants, and South Africa was among the countries that were early adopters, initiating KMC in 1999/2000.⁸ Since then, major success has been achieved in implementing and rolling out KMC locally. KMC has been widely implemented in health facilities in South Africa and countries such as Nigeria, Madagascar, Malawi, Ghana, and Indonesia⁹ due to its low-cost effective measures and for its empirically evident medical benefits on preterm infants.¹⁰

There is a consensus that preterm infants can receive the benefits of breastmilk immediately, if mothers are taught how to express their milk.¹¹ Therefore, it is standard practice in NICUs that mothers of preterm infants must establish and maintain milk production by expressing milk soon after birth to provide their milk before the infant can be put to the breast. Most NICUs allow rooming in, the practice of facilitating that mothers stay together with their pre-term infants in 1 room without separation, both day and night.⁴ Through allowing mothers to stay with their preterm infants in NICU or KMC units and the promotion of skin-to-skin kangaroo care, the establishment of breastfeeding early and infant sucking at the breast can be achieved.¹² However, depending on several factors such as gestational age at birth, it may take many weeks before the preterm infant can fully breastfeed.^{13,14} Thus most extremely and very preterm infants need to initially receive the mothers' expressed milk through a nasogastric tube, and later transition to direct breastfeeding when the infant is ready.¹³

However, breast milk feeding the preterm infant and making the transition to direct breast-feeding come with significant challenges for most mothers.^{15,16} Many mothers of extremely and very preterm infants experience problems with the initiation of milk expression, the continuing production of breast milk, low milk supply, and sustaining milk supply.¹⁷⁻¹⁹ Thus, maintaining an adequate milk supply of expressed milk is a primary concern for mothers of preterm babies admitted in NICUs.²⁰ This is more significant for mothers of extremely preterm infants, who need to express milk for several months.²¹

In South Africa there is the paucity of data on the challenges faced by mothers of preterm babies while their babies are still in admission at the NICU and during their stay in KMC, even though the country has been implementing kangaroo care for more than 2 decades. There is extensive literature on the physical and physiologic benefits of breastfeeding preterm infants in developed and well-resourced settings,²² and the benefits of kangaroo care from meta-analysis, systematic reviews, and randomized controlled trials.^{6,23,24}

Hurst et al²⁰ point out that although research has expanded our understanding of the breastfeeding experience of these mothers, the struggles involved in establishing breastfeeding, the behaviors of mothers related to their expressing routine, and infant feeding concerns are not fully understood, especially in low-income countries. Moreover, in South Africa our understanding of the breastfeeding experience of mothers of preterm infants is informed by studies conducted elsewhere.^{17,19,21,25} This study explored and described the experiences of mothers of preterm infants regarding initiation and expressing breast milk, nasogastric tube feeding practices, and transition to breastfeeding during the infants' stay in the NICU and KMC unit of a South African academic hospital. An understanding of breastfeeding challenges encountered by mothers of preterm babies while in NICU is crucial for developing good support and care for mothers.²¹

Research Design and Setting

This qualitative study was conducted at the KMC unit of a tertiary hospital in Pretoria, South Africa. Participants consisted of mothers whose babies were initially admitted in the NICU immediately after birth due to their premature birth or illness. The NICU unit also provides intensive care to preterm infants referred from a large rural and peri-urban geographical catchment area populated by low-income groups of people.

The hospital promotes breastfeeding, and during the preterm infants' admission in NICU the mothers stay in

the mother lodger wards in the hospital and express breastmilk for their infants' feeds in the NICU. When the preterm infants are medically stable, they are transferred to the KMC unit, where they room-in with their mothers. During rooming-in, the mothers continue tube feeding their infants every 3 hours under the guidance and assistance of the nurses. When the infant is ready, the mother transition to direct breastfeeding. The nurse also monitors the weight of the infants in preparation for discharge. The KMC unit can accommodate up to 30 mothers, who room-in with their preterm infants until they reach a weight of 1700 g to qualify for discharge from the hospital. The period in the KMC unit can range from about 2 weeks to 2 months.

Mothers were selected for participation by purposive sampling. We selected mothers whose preterm infants had been hospitalized in NICU and had been transitioned to the KMC unit at the time of the interviews. Mothers were eligible to participate if they had begun to breastfeed their preterm infants. We purposively sampled women of different ages, socioeconomic backgrounds, parity, and gestational age of their infants to explore and describe the mothers' diverse and unique individual experiences. Mothers were informed about the study by the KMC unit nurse manager, and potential participants who met the inclusion criteria were identified and approached by the nurses working in the KMC unit. Interested mothers were referred to the researcher and the research assistant, who explained the purpose of the study in detail. A focus group interview was scheduled for the following day for mothers who agreed to participate.

Data Collection

Data were collected through focus group interviews, which took place in a quiet, private area in the KMC unit after written consent had been obtained from the mothers. The focus groups were moderated by a researcher and a research assistant who had received training in qualitative research methods and on the objectives of the study from the principal investigators. A focus group guide comprising of semi-structured open-ended questions was used to explore and encourage the participants to provide in-depth data about their personal experiences of breastfeeding preterm babies. The investigators developed the guide from an extensive review of literature on breastfeeding preterm babies.^{20,22} The participants were asked broad questions about their experiences of breastfeeding their preterm infants, initiating breast milk expression, tube feeding, and transitioning from tube feeding to direct breastfeeding. Probes were used as needed to explore the topic in greater depth, to elicit

more information, and to clarify the responses provided by the participants.

The most ideal time at which to conduct the FGDs was the afternoon as the unit was at its quietest then, owing to the completion of doctors and nurses rounds. The focus groups were conducted in Setswana, a commonly spoken local language in the setting. All of the participant responses were audio recorded, and each session lasted approximately 1 hour. Data saturation was reached after 5 focus groups had been conducted with about 7 to 8 mothers in each group. Data saturation was achieved when subsequent discussions no longer generated new information to contribute to the understanding of the participants' experiences of breastfeeding their preterm infants.²⁶

A demographic tool collected the participants' demographic information such as their age, marital status, employment, educational attainment, and support system. In addition, the tool captured the participants' parity, number of pregnancies, mode of delivery of the current baby, gestational age, birth weight, current weight, gender, length of stay in ICU, and length of stay in the KMC unit.

Data Analysis

Qualitative thematic analysis was the approach used to analyze the data, using NVivo 10.²⁷ The audiotaped data were transcribed verbatim and translated into English by the researchers who conducted the interviews. We analyzed transcripts following the 5 steps for qualitative data analysis procedures described by Braun and Clarke,²⁸ which allow both deductive and inductive analysis. First the transcripts were read several times so that we could familiarize ourselves with the data and identify initial emergent codes. Second, we searched for themes, reviewed, defined, and named emerging themes. We met several times during the analysis process to group the codes generated from the transcribed interviews into themes and sub-themes, and we developed a coding frame. We continued to reconcile the emerging codes and themes until deep and rich themes and sub-themes that described the breastfeeding experiences of the mothers had been achieved. Direct quotations from the participants were used to support the themes.

Rigor in this study was obtained through several techniques and trustworthiness was ensured through the principles of credibility, confirmability, dependability, and transferability.²⁹ We used an audit trail, conducted the FGDs in the local language, and transcribed verbatim to enhance the credibility and dependability of the data. All the authors analyzed the data to ensure that the interpretations were free from investigator bias. We also

Table 1. Summary of themes and sub-themes.

Themes	Sub-themes
Difficulties of breastfeeding pre-term babies	Maintaining their milk supply is a constant worry
Milk expressing challenges	Inadequate sucking ability
Lack of confidence and skill to tube feed	Expressing breast milk is difficult
Transitioning from tube feeding to breastfeeding	The process of expressing milk is stressful and painful
Establishing breastfeeding is a daunting experience	Tube feeding is stressful
Establishing breastfeeding is a pleasurable experience	Tube feeding is a necessity
	Tube feeding delays baby's suckling reflex
	Latching is difficult
	Concerns that the baby will lose weight
	Establishing breastfeeding is a pleasurable experience
	Bonding with the baby
	Improved suckling reflexes

performed bracketing throughout the data analysis to reduce inherent biases as much as possible, given that the second author is a specialist midwife. In addition, we used NVivo qualitative software to analyze the data.³⁰

Ethical Considerations

Ethical approval was obtained from Sefako Makgatho Health Sciences University Research Ethics Committee (MREC/H/81/2014: PG). The relevant hospital authorities granted permission to conduct the study. All the mothers provided individual written informed consent prior to the interviews. All the participants were informed that their participation was voluntary and were told about the confidentiality of the data.

Results

The sample included mothers of preterm infants who had been discharged from NICU to the KMC unit. At the time of interviews, the mothers' length of stay in the hospital ranged from 5 days to 12 weeks. Maternal age ranged from 18 to 40 years, with a median age of 27 years. Only 4 mothers had obtained tertiary education, 16 had completed high school, 15 had obtained a secondary education, and 6 had primary education.

As to parity, 10 of the mothers were primiparas and 28 were multiparas, but none had a previous history of a preterm birth.

The gestational age of the infants ranged between 24 and 36 weeks and the mean gestational age was 29 weeks. The infants' birth weight was between 660 and 1800 g, and the mean birth weight was 1303 g. The sample included extremely, very, and moderate to late preterm infants. The infants had been in the NICU from 3 days to

6 weeks and the mean length of stay in the NICU was 14 days.

With respect to tube feeding, 33 infants had received expressed milk via the nasogastric tube from 1 day to 7 weeks; the mean duration on tube feeding was 3 weeks.

At the time of the interviews, the infants had been in the KMC unit from 1 day to 8 weeks, and the mean stay in KMC unit was 12 days. The infants' current weight was between 840 and 1800 g, with a mean weight of 1556 g.

Themes

Six main themes and subthemes contribute to an understanding of the experiences of mothers of preterm infants regarding the expression of breast milk and feeding their infants in the NICU and KMC unit (Table 1).

Difficulties of Breastfeeding Preterm Babies

Following a preterm birth, mothers learn to understand that providing breast milk is an important part of the infant's care. However, the mothers said that they were not able to breastfeed their babies immediately after delivery because breastfeeding was delayed until their preterm babies had been transferred to the KMC unit. Breastfeeding preterm infants is not possible because they are too weak to suck by themselves. During the time when breastfeeding was delayed, the mothers had to express milk for feeding their infants in the NICU. The mothers described their experiences of breastfeeding their preterm infants in terms of maintaining milk production, the initiation of milk expression, and their babies' inability to suck well.

Maintaining Their Milk Supply a Constant Worry

Maintaining their milk supply was a common worry for most mothers. They described how in the beginning they were not able to produce enough milk for their infants in the NICU. They also said that their inability to sustain milk production to supply the needs of their infants during their stay in NICU was stressful. The small amounts of milk that they initially produced evoked feelings of frustration among the mothers, and the long stay of their infants in the NICU made it difficult to sustain milk production.

The milk was problematic and it did not want to come out because of stress. A lot of us were stressed by the small babies that we had, and once you start being stressed, the milk does not come out. So it was difficult for all of us. (39-year-old mother)

When you start expressing milk, it is difficult sometimes. When you see your baby being admitted in the NICU you get stressed, and when you have stress the milk doesn't come out easily. (19-year-old mother)

Expressing gives me stress sometimes because sometimes my milk does not come out at all and sometimes it comes out a little. (40-year-old mother)

Inadequate Sucking Ability

In their narratives the mothers shared their experiences of struggling with feeding their preterm infants directly from their breasts because of their sleepiness and their small mouths, which could not accommodate their mothers' big nipples. However, the inadequate sucking ability did not prevent them - from breastfeeding their infants because they saw breastfeeding as an important milestone in their infant's journey to development and time to have contact with the baby.

It was stressful to breastfeed him because his mouth is small and the nipple is big. You have to keep forcing things so that he can at least suck a bit. He is not like a full-term baby. (23-year-old mother)

I still have a problem with her being able to suck on my breast. The milk is there, but she is struggling to latch onto the breast. She sleeps a lot and also my nipple is big. . . It is a bit challenging. (28-year-old mother)

When I was going to breastfeed her, sometimes she would sleep. Breastfeeding is problematic. The babies sleep. (35-year-old mother)

Milk-Expressing Challenges

This theme highlights the difficulties faced by mothers of preterm infants when they initiate milk expression. Although the mothers appreciated that they had to express breast milk to contribute to the care of their infants, expressing did not come easily to most of them. They described expressing breast milk as difficult, challenging, stressful, and frustrating because it had to be done regularly. The 3-hourly feeding schedule was rigid and mothers had to produce milk for each feed. For some of them, expressing breast milk was done for up to several weeks until their infants were discharged from the NICU.

Expressing Breast Milk is Difficult

Most of the mothers reported that the process of expressing breast milk for their pre-term infants was difficult. They struggled to produce the required quantity of milk for their infants in the NICU. They reported that frequent expressing caused physical pain to their breasts in their effort to produce milk. Moreover, all the mothers had to do hand expressing since the hospital did not provide breast pumps. They described how they became discouraged and disappointed when after all the efforts they would still produce scant amounts of milk. They further described feeling frustrated when they produced small amounts of milk.

Initially, it is not a nice experience, especially if you are not used to expressing. When you went to ward 24 it was just problems. The nurses would say: "Press hard, express, you have milk". Then only a little drop would come out. . . As time went on, the milk started coming out. (21-year-old mother)

I struggled a lot. I would express and nothing would come out. I would get red. Even now I have black marks. The doctor ended up prescribing pills for me. They helped me a lot. Now this cup gets full. (29-year-old mother)

In the beginning, expressing breast milk was not nice because nothing would come out. It was such a shame. I would express about 2 ml, but now, I can express. (26-year-old mother)

The Process of Expressing Milk was Stressful and Painful

The mothers stated that the process of expressing breast milk was tiring and time-consuming, especially in the beginning before they got used to it. They felt that expressing was also stressful, overwhelming, and

painful, and they described the time it took to express milk as adding to the stress of having a preterm infant. The frequent and continuous expression led to bruises, skin abrasions, or pain and exhaustion for the mothers.

Expressing breast milk was very painful. (40-year-old mother)

Expressing is not good. . . You hurt yourself when expressing. My breast gets painful. I would rather breastfeed. Expressing is not good. I honestly don't like it. . . I am not interested in expressing. (22-year-old mother)

Expressing is painful. When I am expressing a little bit of milk comes out and it comes out very slowly. Even my nipples are painful, the inside of my breasts are painful and some areas of my breast become hard. (37-year-old mother)

It was painful at the start and there wasn't a lot of milk coming out, only a little. (22-year-old mother)

Some mothers described an overwhelming dislike of the expressing process, but said that they had continued expressing to provide milk for their infants.

It was difficult the first time. The nurses would tell us that we have to express so the babies could get enough milk and grow, but it didn't want to come out. I would express and express, but nothing came out. I would look at my baby knowing that she needs this milk. (27-year-old mother)

It was painful at the start, but I told myself that I am doing it for my baby. And it wasn't a lot, it was a little, but I told myself that as long as my baby eats and gets full. So I became ok and now the milk is coming out and it is no longer painful. (22-year-old mother)

Lack of Confidence and Skill to Tube Feed

Although the mothers understood the need to express breast milk to feed their infants at the NICU and KMCU, they described the concept of tube feeding as foreign to them, new and terrifying. They described how they felt overwhelmed by the lack of knowledge concerning tube feeding. Their greatest cause of concern was the conviction that the tube and the feeding caused a lot of discomfort for their infants.

Yho! Feeding a baby with a tube is scary because you sometimes wonder if it doesn't hurt her when they put it inside of her. (25-year-old mother)

I was scared. I didn't even want to feed. I told the nurse that I wouldn't be able to feed her with the tube because I was scared. I didn't know where to start and where I was going

to finish. The sister initially fed her for me while I watched how she did it. (19-year-old mother)

I was scared. They initially put the tube in the mouth and then they took it out and put it in the nose. I was scared and wondered how this baby was going to eat. (20-year-old mother)

Tube Feeding is Stressful

Besides the mothers' aversion to tube feeding, some of them described the process of feeding their infants via the tube as stressful and something that they did not get accustomed to throughout the time that their infants were being tube fed.

Tube feeding was a shocking thing. . . These premature babies are naughty. Sometimes they pull the tubes out and sometimes it comes out covered with blood, and that is stressful. It's something that you don't get used to. You don't ever get used to feeding your baby with a tube. (28-year-old mother)

Tube feeding stressed me because I thought the doctors and nurses were the ones who were supposed to do it. So, when I realised that I had to tube feed my baby myself, I was stressed. The thing is there were too many things to deal with and to add to that, I had to tube feed my baby. It was depressing, seriously. (22-year-old mother)

I am happy that he is breastfeeding now, that tube stressed me, it was as though it was hurting my baby, I didn't like it. (32-year-old mother)

Tube Feeding is a Necessity

In contrast, some of the mothers particularly those with extreme preterm babies, described tube feeding as an effortless and convenient feeding method that ensured that their babies were fed the correct amount of breast milk to help them grow.

I think that tube feeding is good, especially for small babies, like mine was born with a weight of 1070g. Even now my nipple is big and it's struggling to go into her mouth. So if I was not tube feeding her then how would she get milk? So, tube feeding benefits babies; they get all the nutrients their bodies need so they can grow to such a stage at which they can suck the breast on their own. (29-year-old mother)

Tube feeding does not make your child to weigh less on the scale. . . So, the tube is ok. Even if the baby is sleeping, you can feed her because you just pour the milk and then it moves on its own into the stomach. Your baby gets full and she gains weight. (35-year-old mother)

The narratives of the mothers indicated that with time some of them became comfortable with tube feeding and acknowledged that it benefited their infants and contributed to their gaining weight.

As time goes on you get used to feeding your baby with a tube. You are not even stressed anymore, and you are enjoying it. (25-year-old mother)

They put the tube in and after some time I saw that he is actually eating nicely. I was happy. Now that they have taken it out, I am happy that he has grown. He grew up because of the tube. (20-year-old mother)

Tube Feeding Delays Baby's Suckling Reflex

One of the mothers felt that tube feeding delayed the baby's learning how to suck on the breast.

One other thing is that the baby will forget how to suck. Every baby that comes into the world initially sucks on the breast automatically. So, when the baby does not start off breastfeeding and is tube fed for a long time, they struggle to learn how to suck and when she has to suck on the breast for the first time, she becomes slow. So because of this, we stay in the hospital for even a longer time, while I teach her how to suck. You see, that wastes time. Tube feeding is not ok. (22-year-old mother)

Transitioning From Tube Feeding to Breastfeeding

Preterm infants are tube fed until they are both developmentally and physiologically ready to begin the process of learning to suck. As the sucking reflexes develop and when the infants were clinically stable, they are transitioned from tube feeding to breastfeeding. While this was an indication of the wellbeing of their infants, the mothers described the transition of the infants from tube feeding to direct breastfeeding as daunting and fulfilling at the same time.

Establishing Breastfeeding is a Daunting Experience

Some mother said that they found the process of transitioning from tube feeding to breastfeeding daunting. They were fearful about breastfeeding their infants that were still so small and were doubtful about their infants' ability to breastfeed without the assistance of a tube.

It is a bit heavy because you wouldn't be used to carrying the baby in a certain way when breastfeeding her. . . So now when you start to teach her how to feed on the breast, it will be difficult because the baby is going to sleep and

she won't feed on the breast for as long as you would like her to and you won't be able to measure the exact amount of milk she will be getting from the breast. She won't gain enough weight. (35-year-old mother)

I was scared when they told me that they were going to take out the tube from my baby. I was saying that she can't suck properly yet and I wasn't sure if she would suck properly on the breast because had sucking difficulties. I was worried that she was going to lose a lot of weight. (30-year-old mother)

The tube scared me, but when I was supposed to start breastfeeding her, my breast was flat. I didn't have nipples. It had to take a syringe first and pull them out before she could suck. When I wanted to put it in her mouth, she also didn't want to suck. (20-year-old mother)

Latching is Difficult

Some of the mothers described their challenges with direct breastfeeding after the transition from tube feeding. They struggled with trying to get their babies to latch because of a weak suck, while some infants did not want to breastfeed.

From my side, it's a bit difficult because I started giving her the breast today. When I gave her the breast this morning, she didn't want to latch on it. So, that's why they put the tube back in. (36-year-old mother)

I was happy to express. . . When I was expressing for her, I was just relaxed. I didn't have any stress, and I didn't have any problems. I was just concerned about my baby being calm, her eating and getting full. Now that she is breastfeeding directly, it is very painful. (22-year-old mother)

Concerns That the Baby will Lose Weight

As the need for expressing milk decreased because the infant's suction ability had developed, the mothers had concern about the weight gain of their small infants. They were anxious about the inability of their infants to suck, which might lead them to would lose weight. They indicated that it was hard for them to estimate the amount of breastmilk the baby had sucked during feeding.

It is heavy because I started yesterday. . . it pains me when the baby sucks a little and let's go of the breast. Yesterday she weighed 1560; today it is still 1560. So I became a bit worried that she is not getting enough milk. (22-year-old mother)

My baby is lazy. She sleeps a lot. So she would worry me when she didn't suck on the breast. I asked for the tube myself, so she could at least gain weight. . . It's just a

matter of getting scared about her weight dropping again because she is used to the tube. (28-year-old mother)

I was worried that she couldn't suck properly or that she wouldn't suck at all. I thought that it meant that my baby was going to lose weight. (30-year-old mother)

In contrast, other mothers said that their infants had gained weight since they started breastfeeding.

Since my baby has been sucking on the breast she is growing. Her weight has gone up by 60 grams. So that also shows that by next week we won't be here (22-year-old mother)

I felt good when my baby stopped tube feeding and I started with breastfeeding him. . . I feel comforted when I see him sucking on my breast, unlike when I was tube feeding him, so when I started to breast feed him I was very happy, I could see that now he had grown up and could suck. (22-year-old mother)

Establishing Breastfeeding is a Pleasurable Experience

The KMC unit promotes the mother-infant contact that is necessary for the success of breastfeeding. Indeed, the narratives of the mothers revealed that with time they overcame the difficulties and the stressful negative feelings of breastfeeding their small infants after the transition from tube feeding to breastfeeding. Their expressions showed that breastfeeding became easy and pleasurable. Most experienced positive maternal feelings when they were allowed to breastfeed their pre-term babies.

I was not pleased when my baby was tube feeding, but when I gave him mommy's breast, I felt so happy, I could bond with my baby properly. I was happy when the tube was out because I did not like it. (22-year-old mother)

Well, from tube feeding to breastfeeding, I was happy because I could bond with him in the best way possible. Honestly speaking, the tube is not nice. . . So when you breastfeed him, you find him opening his eyes, looking at you. (24-year-old mother)

I experienced love for the baby. . . , because when you put her like this and breastfeed her, she can look at you in the face, she can know her mother, and she can even know her mother's smell when you put her like this. (35-year-old mother)

The mothers also reported that their infants adjusted well to the transition from tube feeding to breastfeeding. This was a pleasure for them to witness, and they

experienced feelings of pride while breastfeeding their infants.

My baby adjusted well to sucking on the breast. He couldn't feed properly with the tube anyway. . . I also felt good when he was feeding on the breast. . . He sucks well on the breast. (37-year-old mother)

My baby started breastfeeding just like that, I just saw his mouth opening, like he was ready to breastfeed. He managed to hold on to the nipple by himself. (24-year-old mother)

I wasn't even sure if he would suck because I had small nipples, but I saw him opening his mouth, going toward the breast and when I put it in his mouth, he started sucking and sucking. When I wanted to take it out, he refused with it. (28-year-old mother)

Bonding With the Baby

Most of the mothers appreciated the transitioning from tube feeding to breastfeeding. They described breastfeeding as an opportunity to become close, to connect, and to bond better with their infants. The mothers felt that the process of breastfeeding was precious to them because it enabled skin-to-skin interaction with their infants, which was a way for their infants to recognize them.

It also helps with bonding with the baby because the baby is premature, it is not her time to come into the world yet. Then when you breastfeed her you will be communicating with her. When she is sleeping, you will be chatting to her as the sisters told us. So she bonds. That baby gets used to you. Even when you start talking, even when you get home, she will hear that this voice is my mother's voice. When you are talking she will know that this one that is coming is my mother. (28-year-old mother)

I wasn't feeling good when my baby was feeding with that tube. It's like he couldn't feel that mommy was there, that mommy loved him. When I started to kangaroo mother care him, he would sometimes just cry even though he was full and not hungry. He would just want mommy's love and warmth only. (29-year-old mother)

Improved Suckling Reflexes

I saw that when she stopped with tube feeding and started breastfeeding, she was indeed growing and that she could suck on the breast by herself. This proved to me that she would be able to do anything by herself. (36-year-old mother)

I was happy because I knew that with the breast she would have to suck by herself with the mouth and that I would not

be giving her the tube because she sleeps during tube feeding. At least with breastfeeding she knows that she has to wake up and suck. (28-year-old mother)

I was also happy because it showed that there was progress. It meant that his sucking reflexes were now strong and that we were not far from going home. It is obvious, at home you are not going to go on with the tube. (23-year-old mother)

Other mothers felt that the baby was getting enough milk from breastfeeding.

I also felt good when my baby was feeding on the breast, you see. I could not tell if my baby was getting enough milk with the measurements from the tube, but with the breast, I am satisfied, my baby sucks well, and the milk comes out a lot. (37-year-old mother)

I am happy to be breastfeeding, even though it is painful. I can see when she is full at the breast. When she was feeding from the tube, I could not see when she was full. (22-year-old mother)

Discussion

The study explored and described the experiences of mothers of preterm infants regarding the initiation of expressing breast milk, nasogastric tube feeding practices, and the transition to breastfeeding during the infants' stay in the NICU and KMC units of an academic hospital. The sample consisted of mothers of extremely, very, and moderately preterm infants with gestational ages of 24 to 36 weeks and birth weights of 660 to 1800 g. We found that breastfeeding a very small preterm infant is a challenging and exhausting experience for the mothers. In line with prior research,^{12,17,22,31,32} establishing and maintaining milk expression was a constant worry for most of these participating mothers of preterm infants during admission in NICU.

We noted that to achieve adequate volumes of expressed milk feeds for their infants was a challenge for many mothers. The challenges the mothers experienced in maintaining milk production were particularly frustrating for those who recognized the importance of providing adequate breast milk for their hospitalized infants. Similar observations have been noted in prior studies.^{12,17-19} Several studies have found that mothers who struggle with low milk supply or those who find it too hard to maintain a supply feel disappointed and feel like failures because they cannot feed their infants.^{19,21,33}

During the period when breastfeeding is delayed because their infants were admitted in the NICU, the mothers have to express breast milk to feed their infants. Most of the mothers expressed a deep dislike of expressing breast milk, despite their understanding of the role their expressed breastmilk plays in the development

of their preterm infants. Prior studies have reported similar findings.^{20,34} The mothers in this study described expressing milk as emotionally and physically challenging. This was particularly so for those who had to do so for up to several weeks until their infants were discharged from the NICU and ready to breastfeed. Thus, most of them experienced physical exhaustion, stress, and breast pain due to their frequent and continuous expression of breast milk.^{12,32} We found that expressing was a frustrating process when the mothers produced scant amounts of milk. Moreover, they had to do hand expressing, which exacerbated the problem.

Studies describe how stress and tiredness are associated with lower success in producing adequate volumes of milk by mothers of preterm infants.^{3,32} Nevertheless, mothers continue to express milk, knowing that their infants are receiving their own mother's milk through tube feeding. Mörelius et al²¹ emphasize that for most mothers the difficulties surrounding milk expression are overshadowed by the emotional obligation they feel toward their preterm infants. We observed similar motive for continuous expression of breast milk. Previous research has shown that expressed breast milk also helps the establishment of emotional connections between mothers and their infants.¹⁹

During their admission to the NICU, preterm infants receive the mother's expressed milk through a nasogastric tube for weeks to months, until their discharge from the NICU.^{11,13} In this study, 33 infants received expressed milk via tube feeding for between 1 day and 7 weeks. We found that one of the feeding issues that generated the most fear, stress, and uncertainty among the mothers was the lack of knowledge concerning the tube feeding of infants during admission in NICU. This was their first experience with tube feeding for all the mothers who had not known about tube feeding prior to the study. Many mothers described how the concept of tube feeding their infants made them feel anxious and confused. Their greatest cause of concern about tube feeding was their conviction that it caused their infants discomfort, and delayed the development of their sucking reflexes.

However, as noted by Mörelius et al²¹ mothers' emotional obligation toward their infants motivated them to continue with tube feeding. In time, the mothers recognized the necessity of the tube feeding method and the role it played to ensure that their infants were fed the correct amount of breast milk to sustain weight gain. It should be noted that most of them expressed a sigh of relief when their infants were discharged from the NICU, when their sucking reflexes developed, and when they were clinically sufficiently stable to transition to breastfeeding. In the study setting, direct breastfeeding

and a weight of 1700 g were the criteria permitting for discharge.⁴

Preterm infants are tube fed until they are developmentally and physiologically ready to suck on their own. We noted with interest that mothers received the news of their infants' transition from tube feeding to the initiation of breastfeeding as both daunting and fulfilling at the same time. The mothers in this study, like those in prior studies, encountered problems and challenges during the transition from tube feeding to direct breastfeeding. Transferring the preterm babies to the breast is a challenging task for most mothers of extremely preterm infants. The main problems that mothers encountered during the transition from tube feeding to breastfeeding included the inadequate sucking ability of the preterm infant, a sleepy infant who was difficult to arouse for feeding, and the slow progression of breastfeeding.^{13,18,22,31,35} The mothers in the current study were anxious that their infants might lose weight due to their inability to suck well. Weight gain is very important for mothers of preterm infants, since it is often used as a criterion to determine the discharge from the hospital. Fernández Medina et al¹⁸ describe the transition as a complex and multifaceted process that generates stress, anxiety, and discontent among mothers of preterm infants. Most of the mothers in our study and in other studies as well were afraid of breastfeeding their babies, that were so small, delicate, and helpless.²⁵

The findings of this study are that the mothers were highly motivated to breastfeed their infants,²¹ despite the challenges they experienced while their infants were admitted in the NICU. They described the initiation of breastfeeding after the transition from tube feeding as both a positive bonding experience and a challenging experience. These challenges did not prevent them from breastfeeding their babies. Consistent with prior research, the mothers saw breastfeeding as a positive bonding experience and as enhancing the joy of motherhood. Most of the mothers derived fulfillment from their first experience of breastfeeding in the KMC unit after their infants' transition from tube feeding.^{21,25} They described the benefits of breastfeeding as including that it would ensure that their infants would recognize them as their mothers and would be able to identify their voices and smells.^{22,33,35} Boucher et al²² reported that some of the participants in her study feared that their infants would not recognize them due to the separation during the admission in the NICU. The mothers in this study had similar fears. Some of them thought that tube feeding their infants could lead to their infants not recognizing them. The KMC unit provided the opportunity for the mothers to room-in with their very small infants,

which contributed to the mother-infant bonding that the mothers desired. Maternal recognition by a preterm infant is vital to a woman's sense of self as a mother.²²

Limitations

We conducted the study with mothers of preterm infants from low-resourced communities. Therefore, we cannot generalize the findings of our study to women in affluent societies and in other settings. The strength of the study is that we have described and documented the feedings and experiences of the mothers from their own perspectives while they were breastfeeding their infants in the KMC. They were able to share their actual experiences, which reduced recall bias. We conducted focus group discussions instead of individual interviews due to the nature of the schedule of mothers in the KMC unit; there was only a small window of time in which to access the mothers, as the 3-hourly feeding and expression session leave very little time for them to have lunch. We do not know how the mothers would have responded in one-on-one interviews. Nevertheless, focus groups as a method of data collection have the advantage of producing rich, in-depth data, as observed in the current study.

Conclusion

We found that tube feeding and breastfeeding very small preterm infants was challenging and exhausting for mothers. Prior to transitioning from tube feeding to direct breastfeeding, many mothers described their experiences of initiating the expression of breast milk and sustaining milk supply as being negative. They had constant concerns about their ability to produce adequate volumes of milk to feed their infants and had immense dislike of the process of expressing and the time it took them to express. They described expressing as physically exhausting, stressful, and painful. Although they described a deep dislike of expressing breast milk, this was overshadowed by their emotional obligation toward their preterm infants and the need to provide milk for their infants until they transitioned to direct breastfeeding.

The mothers who had initiated direct breastfeeding were highly motivated to breastfeed their preterm infants. They described the initiation of breastfeeding after the transition from tube feeding as a positive bonding experience. They derived fulfillment from their first experience of breastfeeding.

Although the KMC unit promotes breastfeeding for preterm infants, mothers encounter problems, and struggle to initiate the expression of breast milk and sustain

production for long periods. The related stress and worry lead to a low production of breast milk, thereby exacerbating the problem. It is imperative that health professionals provide appropriate support for the mothers of preterm infants under their care. The mothers of extreme preterm and very preterm infants need support to continue with the expression of milk during the long NICU stay of their infants.

Author Contributions

SM conceptualized the study, SM supervised data collection, MS and SM analyzed and interpreted data, MS drafted the manuscript, SM critically revised the manuscript, and MS and SM gave final approval of the manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical Consideration

Ethical approval was obtained from Sefako Makgatho Health Sciences University Research Ethics Committee (MREC/H/81/2014: PG). The relevant hospital authorities granted permission to conduct the study. All the mothers provided individual written informed consent prior to the interviews. All the participants were informed that their participation was voluntary and were told about the confidentiality of the data.

ORCID iD

Sphiwe Madiba  <https://orcid.org/0000-0002-3735-1248>

Availability of Data and Resources

All data used in the study are available from the lead author on request.

References

1. WHO. *Guideline: Protecting, Promoting and Supporting Breastfeeding in Facilities Providing Maternity and Newborn Services*. World Health Organization; 2017.
2. WHO. *Survive and Thrive Transforming Care for Every Small and Sick Newborn Report*. World Health Organization; 2019.
3. Fernández Medina IM, Granero-Molina J, Fernández-Sola C, Hernández-Padilla JM, Camacho Ávila M, López Rodríguez MDM. Bonding in neonatal intensive care units: experiences of extremely preterm infants' mothers. *Women Birth*. 2018;31:325-330.
4. WHO. *Protecting, Promoting and Supporting Breastfeeding: The Baby-Friendly Hospital Initiative for Small, Sick and Preterm Newborns*. World Health Organization; 2020.
5. Casper C, Sarapuk I, Pavlyshyn H. Regular and prolonged skin-to-skin contact improves short-term outcomes for very preterm infants: a dose-dependent intervention. *Arch Pediatr*. 2018;25:469-475.
6. Conde-Agudelo A, Diaz-Rossello JL. Kangaroo mother care to reduce morbidity and mortality in low birth-weight infants. *Cochrane Database Syst Rev*. 2016;8:CD002771.
7. Smith ER, Hurt L, Chowdhury R, Sinha B, Fawzi W, Edmond KM. Delayed breastfeeding initiation and infant survival: a systematic review and meta-analysis. *PLoS One*. 2017;12:e0180722.
8. Bergh AM, Arsalio I, Malan AF, Patrick M, Pattinson RC, Phillips N. Measuring implementation progress in kangaroo mother care. *Acta Paediatr*. 2005;94:1102-1108.
9. Bergh A-M, Kerber K, Abwao S, et al. Implementing facility-based kangaroo mother care services: lessons from a multi-country study in Africa. *BMC Health Serv Res*. 2014;14:293.
10. Mathias CT, Mianda S, Ginindza TG. Facilitating factors and barriers to accessibility and utilization of kangaroo mother care service among parents of low birth weight infants in Mangochi District, Malawi: a qualitative study. *BMC Pediatr*. 2020;20:355.
11. Theurich MA, McCool-Myers M, Koletzko B. Supporting breastfeeding of small, sick and preterm neonates. *Semin Perinatol*. 2021;45:151387.
12. Yang Y, Brandon D, Lu H, Cong X. Breastfeeding experiences and perspectives on support among Chinese mothers separated from their hospitalized preterm infants: a qualitative study. *Int Breastfeed J*. 2019;14:45.
13. Bonet M, Forcella E, Blondel B, et al. Approaches to supporting lactation and breastfeeding for very preterm infants in the NICU: a qualitative study in three European regions. *BMJ Open*. 2015;5:e006973.
14. Maastrup R, Hansen BM, Kronborg H, et al. Factors associated with exclusive breastfeeding of preterm infants: results from a prospective national cohort study. *PLoS One*. 2014;9:e89077.
15. Pineda RG. Predictors of breastfeeding and breastmilk feeding among very low birth weight infants. *Breastfeed Med*. 2011;6:15-19.
16. Gianni ML, Bezze EN, Sannino P, et al. Maternal views on facilitators of and barriers to breastfeeding preterm infants. *BMC Pediatr*. 2018;18:283-287.
17. Bower K, Burnette T, Lewis D, Wright C, Kavanagh K. "I had one job and that was to make milk" mothers' experiences expressing milk for their very-low-birth-weight infants. *J Hum Lact*. 2017;33:188-194.
18. Fernández Medina IM, Fernández-Sola C, López-Rodríguez MM, Hernández-Padilla JM, Jiménez Lasserrotte MDM, Granero-Molina J. Barriers to providing mother's own milk to extremely preterm infants in the NICU. *Adv Neonatal Care*. 2019;19:349-360.

19. Ikonen R, Paavilainen E, Kaunonen M. Preterm infants' mothers' experiences with milk expression and breastfeeding: an integrative review. *Adv Neonatal Care*. 2015; 15:394-406.
20. Hurst N, Engebretson J, Mahoney JS. Providing mother's own milk in the context of the NICU: a paradoxical experience. *J Hum Lact*. 2013;29:366-373.
21. Mörelius E, Kling K, Haraldsson E, Alehagen S. You can't flight, you need to fight—a qualitative study of mothers' experiences of feeding extremely preterm infants. *J Clin Nurs*. 2020;29:2420-2428.
22. Boucher CA, Brazal PM, Graham-Certosini C, Carnaghan-Sherrard K, Feeley N. Mothers' breastfeeding experiences in the NICU. *Neonatal Netw*. 2011;30:21-28.
23. Boundy EO, Dastjerdi R, Spiegelman D, et al. Kangaroo mother care and neonatal outcomes: a meta-analysis. *Pediatrics*. 2016;137:2015-2238.
24. Chavula K, Guenther T, Valsangkar B, et al. Improving skin-to-skin practice for babies in kangaroo mother care in Malawi through the use of a customized baby wrap: a randomized control trial. *PLoS One*. 2020;15:e0229720.
25. Davim RMB, Enders BC, Silva RAR. Mothers' feelings about breastfeeding their premature babies in a rooming-in facility. *Rev Esc Enferm USP*. 2010;44:713-718.
26. Fusch P, Ness L. Are we there yet? Data saturation in qualitative research. *Qual Rep*. 2015;20:1408.
27. QSR. *Nvivo Qualitative Data Analysis Software. Version 10*. QSR International Pty Ltd; 2016.
28. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3:77-101.
29. Lincoln YS, Guba EG. *Naturalistic Inquiry*. SAGE; 1985.
30. Shenton AK. Strategies for ensuring trustworthiness in qualitative research projects. *Educ Inform*. 2004;22:63-75.
31. Abeasi D, Emelife B. What mothers go through when the unexpected happens: a look at challenges of mothers with preterm babies during hospitalization in a tertiary institution in Nigeria. *J Nurs Midwifery Sci*. 2020;7:22.
32. Abu Bakar SA, Muda SM, Mohd Arifin SR, Ishak S. Breast milk expression for premature infant in the neonatal intensive care unit: a review of mothers' perceptions. *Enferm Clin*. 2019;29(Suppl 2):725-732.
33. Kair LR, Flaherman VJ, Newby KA, Colaizy TT. The experience of breastfeeding the late preterm infant: a qualitative study. *Breastfeed Med*. 2015;10:102-106.
34. Sweet L. Expressed breast milk as 'connection' and its influence on the construction of 'motherhood' for mothers of preterm infants: a qualitative study. *Int Breastfeed J*. 2008;3(1):30.
35. Lomotey AY, Bam V, Diji AK, Asante E, Asante HB, Osei J. Experiences of mothers with preterm babies at a mother and baby unit of a tertiary hospital: a descriptive phenomenological study. *Nurs Open*. 2020;7:150-159.