

# Educational Intervention to Increase Parental Care of Preterm Neonates at District Hospital in Kigali

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## Abstract

### Background

A preterm neonate usually requires specialised care in the neonatal intensive care unit (NICU). Nurses in the NICU are the primary source of parental education particularly for preterm neonates.

### Objective

To assess the effectiveness of a preterm infant care educational program on parental knowledge acquisition in the NICU.

### Methods

A quasi-experimental pre-test post-test design was used. A convenience sample of 53 parents with preterm infants was recruited at a district hospital NICU in 2017 in Kigali. The two-hour evidenced-based intervention in the local language of Kinyarwanda included five Global Health Media Project videos and a power-point presentation on the knowledge and skills to improve maternal and neonatal health. Data analysis included descriptive and inferential statistics.

### Results

The mean correct pre-test knowledge score was 54%, and the mean correct post-test score was 92%, indicating a significant increase (38%) of correct responses after the intervention.

### Conclusion

An educational intervention was found to be effective in improving parental knowledge in caring for preterm infants in a district hospital NICU in Kigali. This evidenced-based intervention could become routine for neonatal nurses in NICUs throughout Rwanda.

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**Keywords:** NICU, educational program, parents, preterm birth, prematurity

## Background

Every year about 15 million infants are born preterm, making prematurity the leading cause of neonatal mortality worldwide.[1] Prematurity is defined as a birth occurring before 37 weeks gestational age, or very preterm if born before 32 weeks.[2] One million infant deaths are due to immediate complications of prematurity and long-term sequelae.[3] The sub-Saharan African (SSA) region has the highest mortality, and the leading causes are prematurity, birth asphyxia, and infection.[4] In Rwanda in 2016, prematurity accounted for 16.5 per 1000 live births,[5] and 32% of neonatal deaths.[6] The majority of these deaths are preventable and protecting newborns means providing evidenced-based care to mothers during and after pregnancy when they access the healthcare system.[7]

Becoming a parent is a life-changing event even under normal circumstances, but more so with premature birth, which can be distressing to parents expecting a healthy child.[8] This unexpectedly stressful event can render a feeling of loss of parental control when their infant is quickly taken away for urgent care. Fear and anticipatory grief take hold of not knowing if their vulnerable infant will live or die.[9] Preterm infants have special physical needs and more at risk of complications, so hospitalisation in a Neonatal Intensive Care Unit (NICU) is usually required.

Parents already in shock from an unexpected early birth, frequently find the NICU environment overwhelming, due to seeing their infant connected to wires, electrodes and intravenous lines, and the unfamiliar equipment such as an incubator, cardiac monitor, and ventilator. [10] Hence, most parents are not prepared for the challenges of parenting a preterm infant.[11]

Though parents have a vital role in caring for their infant beginning in the NICU, they have specific information and communication needs, and they seek ways to reduce the emotional impact of their infant's admission to the NICU.[12,13] Parents often have feelings of helplessness and lack adequate knowledge of how to connect with their hospitalized infant.[14] Information needs are not always met by the NICU staff, due to staff shortages and other high demands placed on nurses and physicians.[15] Parents may find information from sources other than the NICU staff, which may not be evidence-based practice (EBP) for a preterm infant. It is important to know that information and communication needs change during the hospital stay and continue after discharge.[16] An approach to including families in the preterm infant's care is known as family-centered care (FCC), whereby families are integrated into the infant's care, becoming decision-makers and collaborators with the NICU team,[17] while learning about the infant's basic needs, such as keeping the infant warm and preventing infections.

Parents with infants in the NICU for several weeks may appear to have plenty of time to learn how to care for their infant, but there is a delay in the neonatal parental attachment when the infant is very ill or preterm. Parents may have other commitments that prevent them from being in the NICU, such as caring for other children at home, having work responsibilities, or living far from the NICU.[18] The Poppy Project in Wales emphasised the need for NICU parents to have a good rapport and active support with the NICU nursing staff. [19] Individual support from staff has been shown to decrease parental stress, anxiety and depression,[20] which gives parents more opportunities to learn about their new infant and provide care.

The neonatal nurse in the NICU is the primary source of information and is in a strategic position at the bedside, all hours of the day and night, to help meet the emotional and educational needs of parents.[21,22] There are no known formal parental orientation classes or group educational trainings for infant care while in the NICU, or preparation for discharge at any of the local healthcare facilities in Kigali. Parental education on the care of the preterm or high-risk newborn in the NICU study site was found to be limited to a simple one-page checklist or many times non-existent.

Numerous studies have identified the challenges for parents with a preterm infant in the NICU, [23,24] and others included educational interventions by nurses to increase parental knowledge and decrease stress.[7,18,25–27] There have been no studies conducted in Rwanda evaluating the effectiveness of a parental education intervention in the NICU. Therefore, this study aimed to assess the effectiveness of a preterm infant care educational intervention on parental knowledge acquisition in the NICU.

## Methods

### Design

This study was a quasi-experimental pre-test and post-test design using one-group, and educational intervention to assess parental knowledge of preterm infant care. The study was conducted at one site, the NICU at Muhima District Hospital in the capital city of Kigali between 13 February and 12 April 2017. There was no control group.

### Participants' recruitment

The sampling strategy was a non-probability convenience sampling of parents with newborns in the NICU during the two-month data collection period. In 2016, the number of preterm infants admitted to the NICU was 364; therefore using Slovin's formula, a confidence interval of 95% and margin error of 5%, the sample size is 53 participants. The study population included 52 mothers and one father who were available as their preterm infant was hospitalized in the NICU. Parents with infants other than preterm infants, health professionals and other caregivers were not included.

### Measures

The tools used in the research were five Global Health Media videos for teaching health care best practices, with simple and easy to follow visual steps to improve health outcomes. The Global Health Media videos were checked for content validity by comparing the content to the current evidenced-based care that neonates receive by the neonatal specialists. The instrument had three sections.

Section A consisted of the participant's demographic characteristics.

Section B identified their obstetrical history.

Section C consisted of a 12-item questionnaire used before and after the training session that addressed parental knowledge of caring for the preterm newborn in the NICU. The test items were developed from WHO evidence-based practice literature,[7] and input from several neonatal experts. The knowledge questions were multiple-choice and were the same for the pre-test and post-test. Only participants who completed both the pre-test and post-test were included in the analysis ( $n=53$ ).

Since many of the mothers were recovering from birth, concern was given to the number of questions. The content validity index (CVI) of the instrument was calculated and had the appropriate number of items, using the following equation: The total number of items was 42 (included pre-test and post-test), and with a sample size of 53, the CVI was  $42/53 = 0.79$ . Also, a pilot test was conducted on six parents at a health facility other than the study site to assess the feasibility of the questionnaire.

## Intervention

The investigator provided the two-hour educational session, beginning with a brief power point presentation and concluding with five different videos. The videos lasted 20 minutes each and were provided in Kinyarwanda by the Global Health Media Project. The clinical videos were designed to provide clear, step-by-step instruction with the knowledge and basic skills that improve maternal and neonatal health, and save people's lives.[28] The videos provide the sights and sounds in the local language of Kinyarwanda making it easier for the parents to learn and remember how to care for their baby.

The content of education videos addressed all 12 questions related to the pre-test and post-test items, so parents did not need to glean information from other sources to answer questions. The investigator presented five videos in the following sequence:

1. How to Express Breast Milk
2. Feeding with a Nasogastric Tube
3. Keeping Baby Warm
4. Protecting a Small Baby from Infection
5. Discharge the Small Baby and Danger Signs after Discharge

The education training and multiple-choice questions were translated from English to Kinyarwanda to facilitate understanding and response in using the local language. The investigator assisted participants who were not able to read by reading the questionnaire and possible answers to the participant.

## Data collection

The participants were invited to be in the study because their preterm infant was in the NICU on a day of data collection. The investigator invited the parents to be in the study, and groups were arranged based on those parents available on a given day that they were present. There were six groups, and the size ranged from 7-10 participants in each group. A room adjoining the NICU was available to conduct the training. Participants were seated and made comfortable, and some had their infants at their chest in Kangaroo Mother Care (KMC), while other infants were in the incubator in the adjacent room.

After the study details were explained to parents, those willing to participate signed a consent form, knowing that their information would be kept confidential and reported in aggregate form. The pre-test was completed first. The educational training intervention followed with a presentation of the five videos in the order mentioned above,[28] and viewed consecutively at one time, as one video finished the next one began. Once the presentation was completed, the post-test was given. Participants were able to breastfeed or move about in the training room while watching the videos. The testing and training occurred every two weeks until

the recruitment of the 53 parents.

## Data analysis

Descriptive statistics were used to analyse the data. Sociodemographic characteristics and obstetrical history were analysed using frequencies. The pre-test and post-test responses were analysed using frequencies and means. Analyses were conducted using SPSS, version 21.0.

## Ethical considerations

The Institutional Review Board (IRB) of the University of Rwanda, College of Medicine and Health Sciences, and the Muhima District Hospital granted ethical approval for the study. All participants signed consent prior to data collection.

## Results

Fifty-three parents with infants in the NICU participated in the pre-test and post-test study in Kigali. There mean correct scores went from 54% on the pre-test to 92% on the post-test, indicating a gain of 38% correct answers with the intervention of five Global Health Media Project videos and power point presentation.

The socio-demographic characteristics of the study participants were presented in table 1. The majority was female (98.1%), aged between 14-24 years (54.0%), educated at primary level (71.7%), primigravida (56.6%), and with a singleton pregnancy (92.5%). At birth, the majority of neonates (90.6%) were 33-37 weeks gestation, born during April (43.4%), at a district hospital in Kigali (92.5%).

**Table 1. Sociodemographic Characteristics and Obstetrical History**

Sociodemographics	n (%)
<b>Gender</b>	
Female	52(98.1)
Male	1(1.9)
<b>Age (years)</b>	
<14-24	29(54.0)
24-34	17(32.1)
34-44	7(13.2)
<b>Education level attained</b>	
None	5(9.4)
Primary	38(71.7)
Ordinal (3 years in HS)	8(15.1)
Secondary (4 years in HS)	2(3.8)
<b>Gestation at birth (weeks)</b>	
22-32	5(9.4)
33-37	48(90.6)
<b>Gravidity</b>	
Primigravida	30(56.6)
Multigravida	23(43.4)
<b>Pregnancy</b>	
Singleton	49(92.5)
Multiple	4(7.5)
<b>Birth month</b>	
February	11(20.8)
March	15(28.3)
April	23(43.4)
May	4(7.5)
<b>Birth area</b>	
Kigali City	49(92.5)
Transfer from another facility	4(7.5)

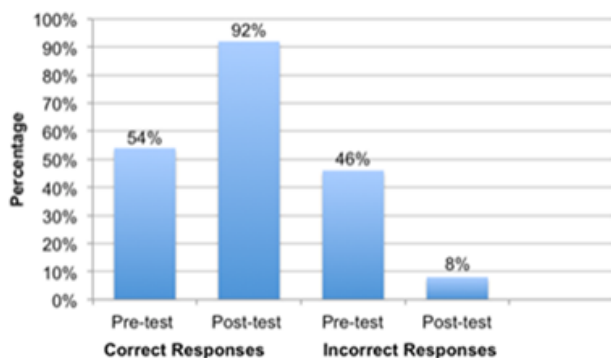
The majority of those who received the educational intervention were able to answer more questions correctly on the post-test (table 2). Many participants answered the following questions incorrectly on the pre-test: What is the special care unit for preterm babies (71.7%); Some common problems of babies born too soon (67.9%); The best way to prevent infection in a baby born too soon (58.5%); and Best ways to keep baby warm (66.0%). The correct post-test scores were all above 90%, except for two questions: What does it mean to say a baby is born too soon (88.7%); and A common mistake in tube feeding (84.5%).

**Table 2. Responses to the Pre-test and Post-test questions (n=53)**

Questions	Correct Responses	
	Pre-test n (%)	Post-test n (%)
What is the special care unit for preterm babies	15(28.3)	49(92.5)
What does it mean to say a baby is born too soon	41(77.4)	47(88.7)
Related factors of babies born too soon	36(67.9)	49(92.5)
Some common problems of babies born too soon	17(32.1)	48(90.6)
Possible long-term complications of a baby born too soon	37(69.7)	49(92.5)
Importance of colostrum to give to a baby born too soon	35(66.0)	50(90.3)
Important to do before manual expressing breast milk	31(58.5)	49(92.5)
Best ways to keep baby warm	18(34.0)	50(90.3)
Best way to prevent infection in a baby born too soon	22(41.5)	48(90.6)
A common mistake in tube feeding	28(52.8)	45(84.5)
When baby born too soon can discharge from hospital	30(56.6)	52(98.1)
Main danger signs to report after hospital discharge	33(62.3)	51(96.2)



The total pre-test and post-test responses are presented as means (figure 1). The pre-test score indicates that the mean correct response was 54%, whereas the incorrect score was 46%. After the educational intervention, the post-test score indicates that the mean correct score was 92%, where the incorrect score was 8%.



**Figure 1. Mean Knowledge of Parental Pre-test versus Post-test Scores**

## Discussion

The study results demonstrated that an educational training program increased parental knowledge acquisition on the care of their preterm infant in the NICU in the study population in Kigali. The pre-test scores indicated a low level of knowledge. Participants were keen to learn how to take better care of their infant and were therefore agreeable to the two-hour intervention.

The demographics showed that the majority of participants were female (98.1%), in the 14-24-year range (54.0%), and with their first infant (56.6%). In addition, most were educated at the primary level (71.1%). Nearly all parents (92.5%) had given birth in the district hospital catchment area, and therefore had not transferred from a distant health facility. This factor likely improved access to their neonate in the NICU. In a descriptive study in Iran, parents also showed limited knowledge related to preterm infant needs and care, but older parents had significantly more knowledge than younger parents.[26] This current study had a relatively young population with limited education (primary level), which supports the choice of simple presentation terminology in the local language, and basic format using the Global Health Media video resources.

The educational intervention was designed specifically for parents of preterm neonates; therefore, the questions related to the NICU or a baby born too soon. The pre-test scores indicated a low level of knowledge, such as only 28.3% knew that the purpose of a special care unit was for preterm babies, 32.1% were aware of common problems of babies born too soon, and only 34% knew the best way to keep a baby warm. These scores are not surprising given parental lack of general knowledge about prematurity, and the

care of the preterm infant is well documented.[26] It is worth noting that Beheshtipour and colleagues [16] demonstrated that parents with a reduced stress level are better able to support and care for their preterm infant in the NICU.[22]

Over half of the participants were able to correctly answer the three questions related to infant feeding, a critical part of neonatal care. The three questions included, the Importance of colostrum (66.0%), Important things to do before manual expressing breast milk (58.5%), and Common mistakes in tube feeding (52.8%). The post-test scores of 90.3%, 92.5%, and 84.5%, respectively, indicated increased knowledge acquisition after the educational session. The study results indicated that there was less improvement in the post-test results of the breastfeeding questions, most likely because the pre-test results were reasonably high. It is culturally accepted and expected in Rwandan society, that women will breastfeed their infants, and according to UNICEF, the exclusive breastfeeding rate is 86.9%.[28]

An integrative review on preterm mother's experiences with milk expression and breastfeeding explored the emotional and practical experiences of breastfeeding and breast expression.[28] The thematic analysis revealed that breastfeeding or expressing milk was an essential infant care activity that helped rebuild the interrupted connection with motherhood.[28] These are pertinent findings given the cultural value placed on breastfeeding in Rwanda as well as the emotional connection important for maternal-infant bonding.

The participants demonstrated an increased understanding of the discharge-related questions, such as "when can a preterm baby be discharged from the hospital?" (56.6% to 98.1%), and "what danger signs need to be reported immediately after hospital discharge?" (62.3% to 96.2%). Since many parents frequently report feeling unprepared for discharge, it is helpful to involve parents right from admission and through until discharge from the NICU.[29]

The parental role in the NICU is essential as parents can be taught basic infant care skills and become their infants' primary caregivers with the support of the NICU professionals.[30] Many mothers feel supported by NICU staff, especially when they are providing breast milk for the infant. A study in Iran showed that mothers had significantly higher awareness and knowledge than fathers, though mothers represented most of the sample (86.9%),[26] similar to our study (98.1%).

A study in Mexico, found that fathers perceived the NICU staff to favour mothers, as they allowed them more easy access to breastfeed or deliver expressed milk. [20] The fathers perceived they had little importance and were considered a source of infection, though they did have an essential role in communicating with NICU staff and transmitting that information to the mother.[20] Rwandan fathers could benefit from more

intentional respect and inclusion in the NICU, and participate in the infant care when they are able to be present in the hospital.

A researcher in Rwanda,[24] studied the parental perception of stress in the NICU and found that what constituted a stressful event, was the appearance and behaviour of the baby. When an infant is born in Rwanda, the whole community is excited to support the family and offer the mother help in caring for the baby in her home. Families want to engage in traditional customs, such as, the naming ceremony that occurs about a week after birth. However, traditions are cast aside when a newborn is admitted to the NICU, and the welcoming ceremony is delayed. Family members' basic routine of connecting and caring for the newborn does not happen, and there is a concern for the newborn's health. A recent Danish study reported that NICUs have become grandparent-friendly, allowing visitation 24 hours a day seven days a week.[31] Furthermore, parents and grandparents should be able to participate in their infant's care in the NICU, so they become competent care-givers of their infant prior to discharge from the hospital.[32]

### Limitations

The study was a convenience sample and conducted in only one hospital. Therefore the findings represent the population that had newborns in a specific NICU at a particular time of the year and cannot be generalised to other NICUs in Rwanda. Other limitations included the small sample size, and the fact that we only had one father, may affect our results. We only used one group for the educational intervention and therefore did not have a control group. There was also a limitation of materials for the educational sessions.

### Recommendations

This educational training program is a method that can be used by neonatal nurses and other health care providers to educate parents with infants in the NICU and through discharge. Neonatal nurses are also in an optimal position to initiate and sustain a teaching program through the development of a standardised national teaching program for parents of preterm and high-risk newborns in the hospitals and universities throughout Rwanda. Neonatal nurses could also develop Continuing Professional Development (CPDs) for nurses and midwives through the Rwandan Association of Nurses and Midwives. This teaching program, along with the family-centered care, could easily be replicated in other settings in Rwanda, so more parents of newborns in the NICU could benefit from the intervention.

The faculty of the University of Rwanda Master of Science in Nursing Neonatal track could initiative this educational training program in their clinical sites in Kigali. In addition, Global Health Media offers 12 other videos in Kinyarwanda that address the small baby, newborn and breastfeeding. There are many other videos, such as nutrition, childbirth, cholera and Ebola, in other

languages that could also be used to educate parents and NICU staff. A future study could be conducted using a larger sample in rural and urban areas, such as a randomisation control trial involving the educational intervention and a control group with usual NICU care.

## Conclusion

An educational training intervention was found to be effective at increasing parental knowledge in caring for the preterm infant at a district hospital NICU in Kigali. Premature infants are at high risk of morbidity and mortality, and therefore have special needs usually requiring NICU admission. Parents can be shocked and overwhelmed, but the neonatal nurse at the bedside in the NICU is in a strategic position to help meet their emotional and educational needs. Nurses could quickly develop, implement, and research educational interventions to assist new parents. This evidenced-based intervention could become routine for neonatal nurses in NICUs throughout Rwanda.

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