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Informational videos to improve maternal knowledge of and comfort with using expressed breast milk in premature infants in rural Burundi

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Abstract*:* In low-income countries, breast milk is the most reliable and most cost-effective nutrition for premature and term neonates. Most premature infants require gastric feedings of expressed breast milk via gastric tube. In many low-resource countries there is a lack of adequate personnel to teach every mother at every healthcare facility how to properly express breast milk. In our rural Burundian premature newborn unit, we sought to evaluate the efficacy of videos by Global Health Media on improving maternal knowledge of and confidence in breast milk expression. We proposed to assess the pre-and post-intervention knowledge of breast milk expression and understating of its use of at least 75 mothers of preterm infants. The intervention was two videos – "A small baby's feeding journey" and "How to express your first milk" - translated into the mother's language, Kirundi. We used fourteen knowledge-based questions with clear answers that were given in the videos and two confidence questions. Between May 1, 2023, and November 30, 2023, we recruited 83 new mothers for the study. The mean pre-video knowledge score was 58.3% correct; the mean post-video score was 94.6% correct ($p < 0.0001$). The mothers' overall confidence (somewhat or very confident) in nipple attachment and giving her milk improved after watching the video from 63.9% to 90.4% and 86.7% to 100% respectively. This study shows that immediately after watching two short educational videos, the mothers gained knowledge on how to feed their premature baby and how to better express their breast milk and feel more confident in doing so.

Résumé: Dans les pays à faible revenu, le lait maternel est l'aliment le plus fiable et le plus rentable pour les prématurés et les nouveau-nés à terme. La plupart des prématurés ont besoin d'être nourris par sonde gastrique avec du lait maternel exprimé. Dans de nombreux pays à faibles ressources, il n'y a pas assez de personnel pour enseigner à chaque mère, dans chaque formation sanitaire, comment exprimer correctement le lait maternel. Dans notre unité rurale burundaise pour nouveau-nés prématurés, nous avons cherché à évaluer l'efficacité des vidéos de Global Health Media sur l'amélioration des connaissances des mères et de la confiance dans l'expression du lait maternel. Nous avons proposé d'évaluer, avant et après l'intervention, les connaissances sur l'expression du lait maternel et la compréhension de son utilisation par au moins 75 mères d'enfants prématurés. L'intervention consistait en deux vidéos - « A small baby's feeding journey » et « How to express your first milk » - traduites dans la langue de la mère, le kirundi. Nous avons utilisé quatorze questions basées sur les connaissances avec des réponses claires qui ont été données dans les vidéos et deux questions de confiance. Entre le 1er mai 2023 et le 30 novembre 2023, nous avons recruté 83 mères pour l'étude. Le score moyen des connaissances avant la vidéo était

de 58,3 % de bonnes réponses ; le score moyen après la vidéo était de 94,6 % de bonnes réponses (p <0,0001). La confiance globale des mères (assez ou très confiante) dans la fixation du mamelon et l'administration du lait s'est améliorée après le visionnage de la vidéo, passant de 63,9 % à 90,4 % et de 86,7 % à 100 % respectivement. Cette étude montre qu'immédiatement après avoir visionné deux courtes vidéos éducatives, les mères ont acquis des connaissances sur la manière de nourrir leur bébé prématuré et de mieux exprimer leur lait maternel, et se sentent plus confiantes pour le faire.

Introduction

Most premature infants require gastric feedings of expressed breast milk via a nasogastric or orogastric tube until they are able to coordinate their suck, swallowing, and breathing, usually 32-34 weeks gestational age (GA).[2] Even after that time most will require supplementation with expressed breast milk.

Expressing breast milk is not an easy task, especially for mothers of premature infants.[3,4]In moderate and high resource nations lactation consultants and breast pumps (with sterilization) are used to aid mothers of premature infants in breast milk milk collection.[5] In resource limited countries, pumps are often not available and there is limited cultural experience with hand expression since until recently medical support for premature infants has been limited. Few mothers have ever seen hand expression. Proper technique is required to maximize production and expression; it has been shown that the more sufficiently the breast is emptied, the more milk the breast will produce.[6] Staff time for educating mothers is also limited.

As technology advances, the use of educational videos is emerging as an effective mode of health education.[7-9]The Global Health Media Project is an organization looking to educate healthcare professionals as well as patients and care givers about multiple health issues. Their goal is to produce "clear, practical and trusted videos with step-by-step guidance for health workers and care givers in multiple languages."[10] The videos are freely available for streaming on their website, globalhealthmedia.org, or on YouTube provided permission has been given. "Expressing first milk" is a seven-minute video that informs mothers that since they have given birth to a premature baby, she will need to express colostrum and breast milk until her baby can exclusively feed from the breast. It teaches the mother how to stimulate milk flow with massage, how to properly position her hand on her breast, and how to properly express the milk by pressing back toward the chest wall, compressing the breast, and then releasing. The video mostly is of mothers expressing their milk but also sometimes shows diagrams displaying milk glands and milk ducts to help the mother understand the physiology. From this video, mothers also learn common misconceptions and pitfalls to avoid in order to express the most milk possible.

The second video, "A Small Baby's Feeding Journey", an eight-minute video, again emphasizes the idea that premature babies lack the energy, coordination, and ability to ingest enough milk to grow. It teaches that if the baby can swallow well, the baby can use a cup or spoon to take in milk by mouth until his sucking and ability to extract milk at the breast is mature and sufficient. It states that if the baby chokes or cannot take in milk by mouth, the baby must take in breast milk via a nasogastric tube. The idea that skin to skin contact (kangaroo mother care, KMC) increases the chance of eventual successful breastfeeding is expressed in the video as well as teaches the mother feeding cues, how to do practice feedings, and correct positioning for breastfeeding once the baby is ready. The video also teaches how to attach the baby well to the breast by rubbing nipple on baby's face and dripping some milk into mouth, waiting for the baby to open wide and then placing the nipple and some of the areola into the mouth of the baby. Signs of good attachment and signs that baby is receiving enough milk (good weight gain, baby is content after feeding and producing sufficient stools) are discussed.
The aim of this study was to determine the efficacy of using these videos to educate mothers of premature newborns how to nourish their small babies. The main objective was to determine if showing these two videos could change the knowledge and confidence of mothers of premature neonates recruited at Kibuye Hope Hospital. To reach our patient population, the videos were translated into Kirundi and the mothers were interviewed using a questionnaire before and immediately after watching the videos.

Methods

Study Design and Location

This study was performed in the Neonatology Unit of Kibuye Hope Hospital, a 315-bed rural hospital located in the Burundian province of Gitega, where there are on average 2500 births per year. We are also a district hospital so receive babies from community health centers as well as other surrounding hospitals. In 2023, the neonatal unit averaged 62 admissions per month including 24 infants per month less than 37 weeks' gestation.

Inclusion and Exclusion Criteria

Mothers of preterm infants (less than thirty-seven weeks gestational age at birth) who were admitted to the neonatal unit and who were exclusively breastfeeding or expressing breast milk were included in the study. We

excluded mothers of premature neonates who were < 800 grams at birth, extremely ill (respiratory distress, severe sepsis, needing to be on the radiant warmer) or suffered congenital syndromes or malformations. A mother was also excluded if she did not verbally consent to the study.

Assessment/Intervention

Following a quiz (fig1) administered verbally, the mother was shown two educational videos from Global Health Media: "Expressing first milk" and "A Small Baby's Feeding Journey." Immediately following the two videos the mother was verbally re-administered the same quiz (fig 1). The mothers were also asked two confidence questions before and after the intervention.

The videos were used for educational purposes with permission from Global Health Media according to their "Terms of Use."[11] The videos had Kinyarwanda as the spoken language which is a language native to Rwanda. While there is significant overlap between Kirundi and Kinyarwanda, there were specific details that could have been confusing. For example, the word for breast milk is different in Kinyarwanda and because these movies mostly focused on breast milk, we deemed it superior to have the videos in Kirundi. Therefore, with written permission from Global Health Media, the second author dubbed her voice into the same video delivering the same content in Kirundi.

Data Collection

From May 1, 2023 to November 30, 2023, at the convenience of the investigators, subjects were identified and evaluated. The movies were shown on a smart phone. The demographic data and maternal responses for each patient were recorded on a single form before data entry, compilation and analysis. The patients' names and identification numbers were stored in separate places to ensure anonymity.

Questionnaire responses were imputed into a Google form, transmitted to a Google Sheet then downloaded as a Microsoft Excel spreadsheet. The mean pre-intervention percentage correct score was compared to the mean post-intervention percentage correct using the unpaired t-test. Similarly, the pre and post-intervention mean percentage with somewhat or very confident were compared. The knowledge and confidence of first-time mothers and mothers with experience was also compared.

Ethical Review

This study was reviewed and approved by the Dean's Committee of Hope Africa University the Ethics Committee of Kibuye Hope Hospital, and the Medical Director of Kibuye Hope Hospital. Before asking questions and showing the videos, the mothers were asked if they would be willing to participate in an educational study and written consent was obtained.

Results

The characteristics of the 83 enrolled mothers are shown in Table 1. Table 2 shows the pre and post knowledge scores of the mothers and Figure 2 shows the change in individual questions. The average pre-video knowledge score was 58% (SD +/-12.5, SEM 1.37) correct and the average post-video score was 94% (SD +/- 6.2, SEM 0.68) correct. Each mother's individual percentage scored was analysed using paired t-test. ($p<0.0001$.

Tables 3 shows the change in confidence levels for the two confidence questions that were asked pre and post intervention showing that confidence significantly increased. A Mc Nemar's test was used finding p values of <0.001 for both questions.

When first time mothers were compared to mothers with other children there was no significant difference in pre and post knowledge scores or in pre and post confidence scores for either feeding question suggesting that previous experience did not give mothers knowledge and confidence with premature infants.

Fig 1: Individual questions

	Question and [desired response]
1	When should you start expressing your milk? [within one hour after birth]
2	Are there any measures you should do before feeding your baby? [wash your hands]
3	Is it important to correctly position your hands when expressing breast milk? [yes]
4	Is it good to slide your hands down your breast then pinch the nipple to express milk? [no]
5	If you are expressing milk out of your right breast, which hand should you use? [right]
6	Do you have to worry if you do not have a lot of milk on the first day? [no]
7	If you are expressing milk correctly, will you have pain in your breasts? [no]
8	Is your very small premature baby able to breastfeed immediately after birth? [no]
9	If the baby is too premature or too small to breastfeed, what should you do? [NG, syringe, spoon or cup]
10	Is it ok to continue to breastfeed your baby if the baby turns blue or chokes while you are trying to breastfeed? [no]
11	The baby must open his mouth very wide to create a proper attachment [yes or true]
12	What is an appropriate amount of time for each breastfeeding session? [accept a time 15-20 min]
13	When you start to breastfeed the baby, is it important to continue giving the baby milk by syringe? [yes]
14	Is it normal for your baby to lose weight during the first few days of life? [yes]

Table 1: Demographic Data

	n = 83	(%)
Maternal Age (years)		
18-20	12	14%
21-25	24	29%
26-30	19	23%
31-35	15	18%
>35	13	16%
Education Level		
None	9	11%
Began Primary School	36	43%
Began Secondary School	38	46%
Parity		
	1	32
	2	15
	3	11
	4	10
	5	4
	>5	11
Gestational Age at Birth	*n=82**	
Very Preterm	25	31%
Moderate Preterm	28	34%
Late Preterm	29	35%
Age of baby on day of Study	*n=81***	*%*
≤7 days	45	56%
>7 days	36	44%
Birth weight (g)	*N=82**	
< 1500	31	38%
≥1500	51	62%

*Original data entry showed an incorrect input for one patient.
**Gestational age was accidently used instead of days of life for two patients

Table 2: Knowledge score of mothers pre- and post- video intervention

83 mothers	Pre-video intervention	Post-video intervention
Mean % correct of 14 questions (±SD)	58.3% (+/-12.5)	94.6% (+/- 6.2)

Paired t-test p <0.0001

Fig 2: Individual Questions Percent Correct

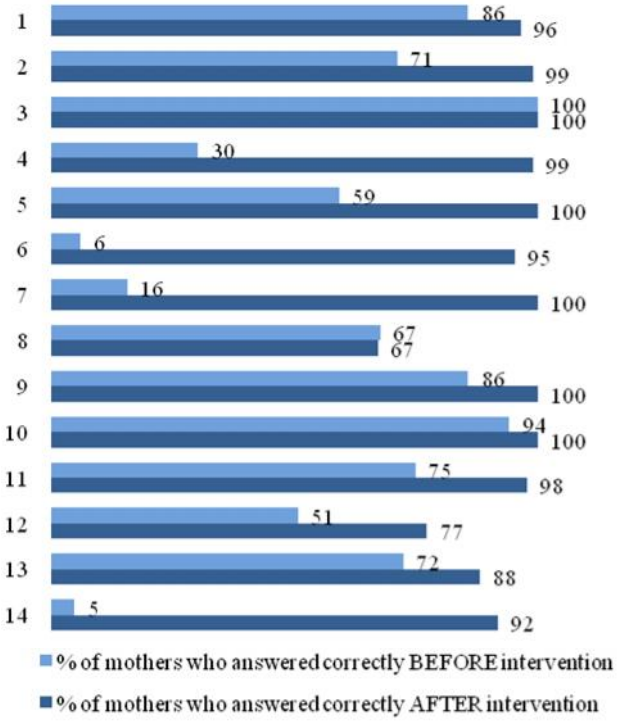

Table 3: Confidence of the mother in feeding baby (N-83)

	Pre	Post	P value
Q1 confident in nipple attachment	63.9% (53/83)	90.4% (75/83)	<0.001
Q2 confident in ability to give milk well	86.7% (72/83)	100.0% (83/83)	<0.001

Discussion

From this study, we found that using pre-recorded videos with Kirundi audio were beneficial in relaying a large amount of information in a short amount of time with minimal staff involvement. With current personnel, there is not adequate time to spend one-on-one time counseling mothers on how to express breastmilk and how to feed her small baby. Feeding a preterm baby requires not only the ability to express breast milk, but to express enough to provide for the increasing needs of the growing neonate as well as knowing how to properly give the milk. Breastmilk is regarded as the best option for nutrition for preterm neonates[12], and in our context, it is usually the only option due to availability and affordability.

The Global Health Media Project is an organization looking to educate healthcare professionals as well as patients and care givers about multiple health issues. According to their website, their goal is to produce "clear, practical and trusted videos with step-by-step guidance for health workers and care givers in multiple languages."[10]

This project was started to create complimentary educational tools covering multiple health topics to teach healthcare professionals at all levels of training. The videos have accurate information which is transmitted in a way that patient and caregivers can also understand and learn the material. The videos we chose are part of a twenty-seven-video series "Care of Small Babies." The organization also has video series on childbirth, diabetes, family planning, nutrition, newborn care, and others.

Videos from Global Health Media Project have been previously studied and published, including one which took place in two hospitals in Kigali, Rwanda.[7] They used the video entitled "Increasing your milk supply," gave pre- and post-intervention questionnaires, and showed statistically significant increase in maternal knowledge of facts presented in the video as well as increase in confidence on how to increase milk supply and using these techniques learned to increase the supply.[7]

In Uganda[8], Global Health Media Project video, "Danger Signs in Newborns," was narrated in Lusoga and used as part of research to determine if locally made videos (including parts of GHMP videos) improved the knowledge and practices on maternal and child health. They conclude "Locally made mobile community videos are effective in communicating maternal, newborn and child health messages and increasing knowledge, changing attitudes, and improving practices such as the use of maternal newborn and child health messages among women living in rural communities for better health outcomes in Eastern Uganda. The need to scale up the local community videos, make them as available as possible across rural communities cannot be emphasized further."[8]

In Kuala Lumpur, Malaysia in 2015, Monoto et al.[9] showed the suitability and feasibility of using GHMP videos as a training tool for Malaysian Breastfeeding Peer Counselors.

From what we have learned and what other studies have shown, these videos are an excellent teaching tool for mothers to improve knowledge and confidence in a setting where there is otherwise no one to routinely available teach these mothers. We found that the visual demonstration on a lactating breast was particularly effective. We also observed that prior maternal experience is not sufficient when facing a premature birth. We plan to implement these videos into our orientations of mothers whose babies are admitted to our unit within the first 3 days. We believe that these videos could be used with equal success in other low-resource premature infant units.

Generally, immediately pre and post intervention comparisons are not very useful. However, in our situation where the learned skills would be applied immediately, used repetitively, reinforced by success and are not necessary to be sustained beyond this particular infant, we believe this simple smartphone-based intervention could be of significant benefit in allowing mothers to help their infant.

Because the mothers represented a convenience sample dependent on the investigator's availability, 44% of the mothers had been present on the unit for at least seven days prior to enrollment in the study. These mothers were not analyzed separately but it is possible that they had learned from others on the unit so already had increased comfort and greater knowledge before viewing the videos. If that were the case the videos would be even more powerful to those newly arrived on the unit.

Conclusion

This study shows that immediately after watching two short educational videos, mothers of premature infants at our rural Burundi hospital gained knowledge on how to feed their premature baby and how to better express their breastmilk and felt more confident in doing so

Author Contributions
JH provided oversight to the research and was responsible for the conceptualization, methodology, formal analysis, and the writing. NH helped with the conceptualization and methodology and helped with the first draft of the paper.

Conflict of interest: None
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