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Bonding, Relaxation, Separation, and Connection: Expressing Human Milk While Videoconferencing with the Hospitalized Premature Infant

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Abstract

Background: Breast milk feeding is an essential component of safe and effective care of the hospitalized premature infant. There are numerous barriers that impact breast milk expression during a preterm infant's hospitalization. We aimed to explore the experience of using videoconferencing with one's hospitalized premature infant while expressing breast milk.
Materials and Methods: We conducted a qualitative study using purposive sampling to recruit lactating parents of premature (<34 weeks) hospitalized infants. We conducted semistructured interviews using an interview guide with 14 open-ended questions regarding the breast milk expression experience. Data collection and analysis were performed iteratively and were analyzed using inductive thematic analysis with a constant comparative approach. Data were organized into themes. Interview recruitment was discontinued when thematic saturation was reached.
Results: Seventeen participants completed the interviews and four themes were identified: (1) videoconferencing promotes bonding and connection with the hospitalized infant, (2) videoconferencing provides motivation to pump, (3) videoconferencing reminds participants of the realities of separation from their infant, and (4) videoconferencing connects the whole family to the hospitalized infant.
Conclusions: Users of videoconferencing with their hospitalized neonate reported an improved pumping experience while expressing milk for their premature infant. Videoconferencing is also a tool that can connect the whole family to the infant. This study was registered at clinicaltrials.gov (ClinicalTrials.gov Identifier: NCT03957941) under the title ''FamilyLink and Breastfeeding.''

Keywords: telemedicine, telehealth, videoconferencing, premature infant, NICU, breastfeeding, expressing breast milk, pumping

Background

Feeding mother's own milk (MOM) to the hospitalized premature infant is an essential component of safe and effective care of patients in the neonatal intensive care unit (NICU), as it reduces morbidity and mortality in this special population.[1–4] Because of its benefits, mothers and other birthing parents are often encouraged to express milk for their premature infant. However, providing MOM to the newborn admitted to the NICU is fraught with barriers.

Immediately following an unexpected and often traumatic birth, premature infants and their birthing parent are physically separated, and the birthing parent begins to express milk rather than feeding the infant directly at the breast.

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Expression and provision of human milk can continue after the birthing parent is discharged from the hospital, but challenges with expressing and providing human milk can be exacerbated by low milk supply (common in lactating parents of hospitalized premature infants), stress and anxiety secondary to separation from the newborn, and logistical challenges of visiting infants who may be located in NICUs at a great distance from the parents' home.[5–7] Given the multitude of barriers, it is not surprising that almost all infants are given MOM ever, but the number drops precipitously to 1/3 of infants receiving MOM at NICU hospitalization discharge.[8]

To improve the provision of MOM to the hospitalized premature infant, novel approaches are needed. One approach could be to improve connection with the infant and while pumping milk with the use of videoconferencing technology. Weber et al. demonstrated in an observational pilot study that videoconferencing with one's hospitalized premature infant is associated with positive attitudes toward planning to breastfeed and improved breastfeeding outcomes at NICU discharge.[9] It has not been described if videoconferencing with one's hospitalized newborn improves the pumping experience of lactating parents of hospitalized premature infants. We aimed to explore the experience of lactating parents of hospitalized premature infants using videoconferencing technology to connect with their infant and how that affected their milk pumping experience.

Materials and Methods

We recruited for a qualitative study among those who consented to participate and those who were approached but declined participation in an ongoing randomized controlled trial, *n* of 25 participants/potential participants in the randomized trial (ClinicalTrials.gov identifier: NCT03957941). That ongoing crossover trial is testing the quantitative impact of offering lactating parents of premature infants the opportunity to use videoconferencing with their premature infant while pumping (intervention) versus pumping without videoconferencing (control).

The videoconferencing program was developed by the hospital where the study took place. The platform utilizes videoconferencing software in an HIPAA compliant format to connect families with their hospitalized infants. Cameras are connected to all NICU bedsides and a web-based portal allows families to view their infant 24 hours per day and provided visual contact only, audio connection was disabled due to privacy concerns.

The study setting was a single large academic hospital with a 49-bed NICU that serves a wide catchment area of more than 33 counties in three U.S. states and has more than 500 admissions per year. The study was approved by the Institutional Review Board at the study site. Purposive sampling was used to recruit participants who had enrolled in the above-referenced randomized trial, aiming to include both those willing to do the experimental portion of the study and those who opted not to. Enrollment occurred from September 2019 through November 2020, when thematic saturation was met.

Inclusion criteria were individuals 18 years and older, who had birthed an infant ≤34-week gestational age who was admitted to the study site NICU. Eligible participants had to have initiated pumping of human milk for the infant, delivered the infant at least 7 days before enrollment, had access to videoconferencing equipment (i.e. smartphone, tablet, or laptop), and were discharged from birth hospitalization at the time of enrollment. Exclusion criteria were incarcerated birthing parents, inability to communicate in English, gestational surrogate, or any medical conditions precluding breastfeeding. We sought informed consent from participants in the qualitative study both from those who consented to participate in the trial and those who were eligible but declined participation or were unable to continue expressing human milk in the trial.

We used a semistructured interview guide with 14 open-ended questions regarding the breast milk expression experience to conduct one-on-one interviews. Participant demographic study data were collected and managed using REDCap electronic data capture tools hosted by the study site institution.[10,11] Interviews were audio recorded, transcribed verbatim by a professional transcription service (Home Row, Inc., and stored in a password-protected cloud storage service through Office365.

Qualitative analysis was completed in Microsoft Word and participant demographic and clinical characteristics were summarized using Excel. Data were analyzed iteratively, through which six researchers independently coded each transcript and then met to discuss codes, adapt the codebook, and identify emerging themes. An inductive thematic analysis with a constant comparative approach was completed. No additional participants were approached once the analysis reached thematic saturation, through which the themes were fully developed and demonstrated conceptual coherence.

Results

Seventeen participants completed qualitative interviews (Table 1), 25 were eligible and were approached (17/25, 68%). Participant age was 30.2 ± 5.8 years at the time of interview with a majority experiencing cesarean delivery (65%) of very preterm infants (average gestational age 29.8 ± 2.4 weeks, average birth weight 1,484.8 ± 440 g). Participant race and ethnicity were 65% white (11/17), 18% Asian (3/17), 6% (1/17)American Indian/Alaska Native, and 4 participants identifying their race as other. Of all the participants, 35% identified as Hispanic ethnicity.

Most participants had private medical insurance (11/17, 65%) and the remainder with either public health insurance (3/17, 17%) or military medical insurance (3/17, 17%). Mean body mass index of participants before pregnancy was 25.3 ± 5.5. Roughly 30% of participants had been diagnosed with diabetes, either gestational or before pregnancy. All participants endorsed that the other parent of the newborn infant was involved. There were no significant differences among participants in the qualitative study and participants in the trial who did not elect to do the qualitative study (Table 1).

Themes

In qualitative analysis, four themes were identified: (1) bonding and connection with the infant; (2) videoconferencing provides motivation to pump; (3) videoconferencing reminds participants of the realities of separation from their

Table 1. Demographic Characteristics of Participants ($N = 17$ Qualitative Study)

Participant characteristics	*Qualitative participants (*N = *17),* n *(%*[a]*) or mean ± SD*	*Nonqualitative participants (*N = *8*[b]*),* n *(%) or mean ± SD*	p[c]
Age of participants	30.2 ± 5.8	29.6 ± 4	0.9
Gestational age at delivery	29.8 ± 2.4	28.9 ± 3.5	
Birth weight at delivery (g)	1,484.7 ± 440	1,253.8 ± 478	
Mode of delivery			0.2
Vaginal	6 (35)	3 (50)	
Cesarean	11 (65)	3 (50)	
Ethnicity			0.2
Hispanic	6 (35)	2 (33)	
Non-Hispanic	11 (65)	4 (67)	
Race[d]			0.3
White	11 (65)	4 (50)	
Black/African American	0 (0)	1 (12)	
Asian	3 (18)	1 (12)	
Pacific Islander	0 (0)	0 (0)	
American Indian/Alaska Native	1 (6)	0 (0)	
Other	4 (24)	1 (12)	
Health of participant			0.9
Prepregnancy BMI	25.3 ± 5.5	30.6 ± 12.1	
Endorses cigarette smoking	0 (0)	1 (17)	
Smoke exposure in the home	2 (12)	1 (20)	
Diagnosed with diabetes	5 (29)	1 (17)	
Medical insurance			0.2
Public insurance	3 (17)	3 (60)	
Military insurance	3 (17)	1 (20)	
Private insurance	11 (65)	1 (20)	
Highest educational degree of participant			0.1
Graduate	2 (12)	0 (0)	
College graduate	8 (47)	1 (20)	
Some college or associate degree	3 (17)	3 (60)	
Vocational or trade school	1 (6)	0 (0)	
High school graduate or GED	3 (17)	1 (20)	
Relationship status			0.2
Married/live-in partner	14 (82)	4 (80)	
Single/never married	3 (17)	0 (0)	
Divorced/separated	0 (0)	1 (20)	
Infant of other parent involved	17 (100)	5 (100)	
Other parent highest level education			0.07
Graduate	2 (12)	0 (0)	
College graduate	2 (12)	1 (20)	
Some college or associate degree	7 (41)	1 (20)	
High school graduate or GED	3 (17)	3 (60)	
Some high school	2 (12)	0 (0)	
8th Grade or less	1 (6)	0 (0)	

[a]Percentages may not sum to 100% due to rounding error.
[b]Not all add to 8 as not all participants completed demographic information.
[c]*p*-Value calculated using Student's *t* test.
[d]Percentages may not sum to 100% as multiple categories of race could be selected by each participant.
BMI, body mass index; SD, standard deviation.

infant; and (4) videoconferencing connects the whole family to the hospitalized infant (example quotations in text and Table 2).

Theme 1: videoconferencing promotes bonding and connection with the infant. Most participants noted that videoconferencing promoted bonding and connection with their hospitalized premature infant, ''It was really nice getting to be able to watch him and feel like you're right beside him even though physically you're not right beside him'' (Participant 16).

When using videoconferencing to see their hospitalized infant, participants felt, ''more of a connection'' and ''more of a bond'' (Participant 3 and 8, respectively).

One participant noted that she was concerned there would be a difference in bonding with her hospitalized premature

Table 2. Qualitative Themes

Theme	*Selected quotations*
Bonding and connection	I found that using Family Link it was definitely more … of a connection versus not being near my baby. (Participant 3)
	I like being near him. I like watching him … I think it [use of video conferencing] really does help just to connect to what I'm doing and why I'm doing it. (Participant 4)
	I definitely liked watching him on the Family Link … just because it felt like you had a little bit more of a bond instead of just sitting in a room staring at nothing or looking at your phone or doing something like that. It was kind of nice to watch him. It did make me feel a little bit more comfortable. And then it made you feel like you were doing this for a purpose, because you were watching your baby. (Participant 8)
Videoconferencing relaxes and motivates	I felt like I had better milk production first of all, and I was definitely more relaxed [while videoconferencing], and it was more enjoyable than sitting in a room by myself. (Participant 3)
	When I see her more … I produce a little bit more … When I don't see her, 'cause I didn't come yesterday the whole day also, and I did the other sample, I didn't produce not even half of the bottle. And when I'm with her or seeing her on the camera, I just—just comes out. (Participant 5)
	That [videoconferencing] gave me motivation … to say that okay, that's my baby there for me to pump. Gave me the desire. (Participant 11)
Separation from the infant	I think watching baby makes me feel closer than just pumping … for no reason and not feeling connected. But then it also makes me feel further, and it's kind of sad to see baby like in the NICU and you're not there to be able to like be with baby. (Participant 6)
	I'm kind of a little bit anxious … and I see the baby … There's just a lot of stuff coming to my mind. How they're feeling, what they're doing. I wish I could be there … I wish I could be there. I wish I could be with them directly. (Participant 11)
Connection to the extended family	No, actually me and my husband enjoy it … since we can't come all the time … since we live far … we do enjoy when we're looking at her. (Participant 5)
	We had our Family Link on almost like—almost the whole day every day. Because we have a daughter that liked to watch her baby on the monitor. (Participant 6)

NICU, neonatal intensive care unit.

infant versus older healthy infants who were able to be at home, ''I think it was just more of, you know, I've always nursed my children, so not being able to do so I was nervous about whether or not there would be that bond, but just being able to see them and be in front of them while pumping I felt like I was—I was still engaging where I was able to have that bond while I—I pumped'' (Participant 15).

Theme 2: videoconferencing provides motivation for and helps with expressing milk. Participants responded that use of videoconferencing while pumping human milk was very helpful to the pumping process. Participants noted that seeing the infant was a visual cue for the importance of pumping, ''That [visualizing baby] feels a lot better because then it's that visual reminder that this [expressing milk] is what I'm doing this for'' (Participant 1). ''It was like a self-motivation … because I am pumping for him because he does need it, and it just motivates me to want to pump for him and provide him with food'' (Participant 13).

Other users of videoconferencing were able to see their hospitalized premature infant while expressing milk and they perceived improved production and output of pumped milk, ''I felt like I had better milk production first of all, and I was definitely more relaxed [while videoconferencing], and it was more enjoyable than sitting in a room by myself'' (Participant 3).

Watching the infant was self-reported to help with relaxation, improve stress, comfort, and enjoyment during the process of pumping, ''I just like watching my baby when I pump … It makes me feel comfortable'' (Participant 13). Another participant commented, ''If I'm pumping, I usually do [breast] massage at the same time, hand expression, so sometimes I get busy with hand expression and I watch her … I think it just helps with—because pumping for me is a little stressful, so it makes me a little—feel a little better'' (Participant 17).

Pumping and videoconferencing also served as a motivating reminder that the infant needed the parent and would be able to be connected to the parent at home soon:

> It just made me feel like I was pumping for a reason … I mean, obviously I know why I'm pumping, but, like, it just—being able to, like, look at him and be, like, okay, like, for this little guy … It's just nice to, like, see him while I'm pumping and kind of realize that at some point soon I'll be able to just have him at home. And, like, you know, if I'm still pumping or feeding him, it's, like, a reason for doing those is, like, this little—this little boy. (Participant 14)

Theme 3: videoconferencing reminds of the emotional challenges of separation from the infant. Connecting with the hospitalized premature infant through videoconferencing reminded some participants of the sad reality of separation from their infant and added an additional level of guilt that they were able to detach from when not seeing their infant on video:

> So, for me, I am just like a guilt-ridden person to begin with. I think that's my natural go-to. So, viewing my child while pumping really just gave me overwhelming emotions of sadness, some guilt, like, ''Why aren't I there trying to breastfeed them?'' You know, normally, even though logically it wasn't the best thing for them at the time. They couldn't even latch at the time just due to their gestational age.

> But the overwhelming emotional feelings don't necessarily listen to logic. So, for me on a personal level, I just became very sad. I became just kind of guilty watching, feeling like I should be there instead of away. (Participant 9)

Videoconferencing with the infant along with expressing milk for storage reminded this participant of how hard it is to be physically separated from the infant without a clear date for discharge to home, ''It's very difficult when you don't have your baby at home, and I don't really—all I see is just stockpiling and stockpiling [of expressed milk], and it just builds up in the freezer. I don't see any end in sight'' (Participant 1).

Theme 4: videoconferencing connects the extended family to the infant. Participants noted that they used videoconferencing as a way to connect the newborn hospitalized infant to the rest of the family:

> We have an older child at home and that's how we introduced the new babies to him. Because it was flu season, he couldn't go in and see them. So, we did use that a couple of times to show him his babies. But he was a little confused because he goes, ''What's all that on them? You know, those aren't my babies.'' So, we had like the whole other explaining situation to deal with that. But other than that, we absolutely appreciated Family Link [videoconferencing platform] that it gave us those days that I couldn't be up there, or that my husband couldn't be up there, he could kind of feel like he was still a part. (Participant 9)

Videoconferencing for that family was used to introduce new family members as well as explain the complicated issue of neonatal hospitalization. As noted, the family's young child voiced concern about ''all that on them'' and the family used that moment to teach the older child about the complicated medical aspects of the new babies. Another participant remarked that they used videoconferencing to connect the new infant to the extended family that lived outside of the state, ''We actually used it every single day. Not just me but my family as well. It was nice because we have a lot of family out of—out of state, so every night we had it on actually'' (Participant 16).

Discussion

Mothers of hospitalized premature infants in our study who utilized videoconferencing to connect with their infant from home perceived better expression of milk while pumping and described more motivation to express milk. They also perceived improvements in bonding and connection and an increased connection of the entire family to the premature infant and were reminded of the emotional challenges of separation from their infant.

Visualizing one's infant (via videoconferencing) while expressing breast milk is a novel method to support lactating persons with hospitalized premature newborns. Participants noted that they had more motivation to pump when they saw their infant and they also perceived increased output of breast milk while seeing their infant. A quantitative study regarding this perceived increase in breast milk output is still needed. Videoconferencing has been introduced in many NICUs across the United States; however, to our knowledge, there is little prior description of using videoconferencing to support lactating persons as they express breast milk.

In our own institution, Weber et al. demonstrated that mothers who used videoconferencing during their baby's NICU hospitalization had higher rates of breast milk provision at NICU discharge and were more likely to endorse that they planned to breastfeed at NICU discharge.[9] Prior and ongoing work to support lactating parents of hospitalized premature infants has demonstrated the importance of supporting the breastfeeding person through educational breastfeeding support groups within the NICU, ongoing emotional support from hospital staff and the patient's extended family, practical and specialized lactation evaluation and advice, and breastfeeding education for NICU staff.[12–14] In fact, breastfeeding promotion strategies for low-birth weight, premature infants in the NICU are associated with lower overall costs and better health outcomes.[15]

Participants self-reported a sense of increased bonding and connection with the hospitalized infant along with use of videoconferencing to introduce the baby to the family. Bonding and connection with the use of videoconferencing have been described in prior work, but unrelated to breastfeeding or pumping.[16] Promotion of bonding with the hospitalized premature infant is highly important as prior work has demonstrated that parents of hospitalized infants in the NICU have challenges with bonding. In a cross-sectional study performed at 3 months postpartum, mothers of infants with a history of NICU hospitalization were much less likely to feel that their baby ''belonged'' to them, and their infants were perceived as being more difficult than the average baby and were less likely to be described by the mother using positive adjectives, when compared with mothers of healthy term infants.[17]

Lack of bonding or connection with the hospitalized premature infant can translate into a sense of parental role alteration, as described by Caporali et al. The lack of bonding and connection transforms the parental role and results in high levels of stress in parents of hospitalized premature infants.[18] Participants in our study suggest that bonding and connection can be facilitated by videoconferencing, although it is not described if videoconferencing prevents poor outcomes from lack of parental bonding.

Videoconferencing also reminded participants of the reality of being separated from the infant. Seeing one's critically ill infant on video was noted as a source of anxiety for some participants. We do not have information on clinical psychiatric diagnoses in our cohort or exacerbation (or relief) of clinical psychiatric symptoms, so it is unknown how videoconferencing affected the outcomes of our cohort.

Rhoads and colleagues demonstrated that increased time of videoconferencing with hospitalized infants was associated with increased stress in parents. Bonding, quantified by the Mother-Infant Bonding Scale in their cohort, was improved with increased time observing the infant on video, similar to our qualitative results.[19] Of note, parents of infants hospitalized in the NICU are well described to have increased rates of post-traumatic stress, depression, and anxiety.[18,20,21] Mothers, compared with fathers, of NICU infants experience greater levels of stress overall.[22]

Those studies did not note differences by use of videoconferencing. There is need for further research in the use of

videoconferencing and its relationship with parental mood disorders to help identify how best to help as well as mitigate any potential harm of videoconferencing with their hospitalized infant or child in the NICU as well as other areas such as the pediatric intensive care unit, cardiac intensive care unit, and inpatient wards.

Conclusions

In our study, participants perceived that videoconferencing with their hospitalized neonate improved their pumping experience when expressing milk for their premature infant. Further research is needed to identify factors that influence families with hospitalized newborns to use videoconferencing with their infants, barriers to use, and the other benefits it provides to promotion of breastfeeding in this population at risk for both breastfeeding difficulties and early cessation of breastfeeding. We hope that the use of videoconferencing for NICU parents will become a widespread continued support for lactating parents on their breastfeeding journey.

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