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Maternal Perceptions of Infant Exercise in the Neonatal Intensive Care Unit

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Abstract

Objective—To identify important factors that influence mothers' perceptions of engaging in exercise with their preterm infants.

Design—Qualitative, semistructured individual interviews.

Setting—Neonatal Intensive Care Unit.

Participants—Thirteen mothers of preterm infants who were in the Neonatal Intensive Care Unit.

Methods—Two researchers conducted interviews with mothers in English or Spanish. Interviews were recorded, transcribed, and analyzed.

Results—Mothers tended to view infant exercise as beneficial but feared for the safety of their infants. They perceived nurses as experts who could safely exercise their infants but feared that they themselves might harm their infants. Factors that influenced their beliefs included previous experiences with infant exercise and views regarding the fragility or the strength of their own infants. Mothers identified nurses, doctors, family members, and research studies as trusted sources of information on exercise efficacy and safety.

Conclusion—Understanding and addressing mothers' perceptions is a crucial component of a nursing intervention that teaches parents to do assisted exercises at home with their preterm infants.

Keywords

infant exercise; early intervention; maternal perceptions; preterm infants

Preterm health birth impairments is associated including with neurological long-term and cognitive deficiencies, chronic lung disease, and altered growth patterns of lean, fat, and bone tissues (Eliakim & Nemet, 2005; Greenough, 2008; Greer, 2007; Rees & Inder, 2005). For the past few years, a team of nurse and physician scientists has implemented a novel research program designed to mitigate these impairments through augmented physical activity in hospitalized preterm infants, a true paradigm shift in the care of this fragile and vulnerable population. This effort is based on mounting evidence from both animal models and studies done in preterm infants that an increase in physical activity very early in life (primarily through handling and assisted physical activity) leads to beneficial changes in body weight, bone mineralization, and neuromotor development (Cameron, Maehle, & Reid, 2005; Spittle, Orton, Doyle, & Boyd, 2007).

With few exceptions, studies that have examined the therapeutic use of physical activity in preterm infants utilized inpatient regimens in which the exercise activities were performed by trained staff predominately in the Neonatal Intensive Care Unit (NICU); moreover, research in this area is scarce, and no studies were found that reported how commonly such regimens are used in NICUs. Early on the team recognized that any benefits accrued by inpatient assisted exercise would likely be lost if the activities ceased when the baby was discharged. The potential usefulness of any postdischarge, home-based intervention in preterm infants that designates parents as the individuals implementing the intervention will be affected by behavioral factors, such as a parent's consistency or willingness to do the exercises. Thus, it is important to consider psychological and cultural factors that may impact parent implementation of recommended interventions following discharge. Surprisingly, there have been no studies to date, either qualitative or quantitative, that have addressed how parents of preterm infants might perceive infant exercise and how their perceptions might impact utilization of the intervention at home.

Moreover, a historical shift in views toward handling preterm infants has occurred in recent years. Dodd's (2005) review of kangaroo care described this shift:

In early advances in preterm infant care, the emphasis was on keeping small preterm infants warm, isolating them from infection, and handling them as little as possible because they were so tiny and fragile ... In the past three decades, the majority of the research concerning developmental interventions revealed that when preterm infants receive sensorimotor interventions such as rocking, massaging, extra holding, or sleeping on waterbeds, they gain weight faster, advance in feeding abilities more quickly, and show improved interactive behavior (p. 219).

Her review also described how limited the current knowledge is regarding the benefits or risks associated with specific movements and contexts:

These findings imply that various amounts of sensorimotor stimulation, as applied in studies, enhance growth and development. Conversely, over-stimulation may have negative effects on growth and development ... What is not known is what type and amount of stimulation is appropriate and in what context (p. 219).

Thus, it is anticipated that a historical shift in views regarding the handling of infants and the current lack of information on specific risks and benefits for varying types and levels of movement might emerge as themes in the data analysis.

An appropriate first step in conducting research on study participant perceptions involves utilizing qualitative methods to capture a range of perceptions across participants. The purpose of this study was to obtain preliminary data on mothers' perceptions of infant exercise using qualitative, open-ended individual interviews. The approach obtained initial information regarding the perceptions, hopes, and fears that mothers have regarding their ability to perform appropriate assisted exercise interventions in the NICU or at home after discharge.

Method

Participants

The Institutional Review Board at the University of California, Irvine (UC Irvine), approved this study. To identify potential participants, the research personnel screened the medical records of infants in the NICU at the UC Irvine Medical Center and recruited mothers (18 years and older) of preterm infants with a gestational age at birth of between 23 and 34 weeks who had reached 30 weeks post-conceptual age at the time of recruitment for this study. Mothers were excluded if their infants had a tracheostomy, bone diseases (such as osteogenesis imperfecta, hip or knee joint anomalies, arthrogryposis, and fractures), skin disorders (such as erythematous bullosis), and symptomatic congestive heart disease. The exclusion criteria restricted the study to mothers who had infants who were healthy despite being preterm. The mothers had no prior experience with an exercise intervention for their preterm infants. Mothers who met these criteria were contacted either by phone or at the bedside in the NICU by a researcher who provided study information and invited them to participate.

Thirteen mothers, ranging in age from 19 to 47 years, with infants of mean gestational age of 30 weeks provided written informed consent and completed a demographic questionnaire as well as an interview with a study researcher. Two interviews were conducted in Spanish, and 11 were conducted in English. Analysis of interview data was performed following each interview, and, thus, recruitment and interviews continued until theoretical saturation was reached, in which less and less new information was generated and themes were repeated across interviews (Glaser & Strauss, 1967).

Procedure

Conducted over a 4 month period, interviews lasted approximately 45 minutes and were conducted in the mother's primary language (English or Spanish). Two researchers completed training to be interviewers for the study, one to conduct the English interviews and the other the Spanish interviews. One interviewer was a medical student and the other interviewer had a doctoral degree. All but one of the interviews occurred at the UC Irvine Medical Center in a private room in close proximity to the NICU. One interview was conducted in the NICU at the bedside.

The interviews were semistructured and contained open-ended questions related to mothers' perceptions of infant exercise. Standard questions addressed participants' perceptions about what they could do, as mothers, to improve the health of their baby, and their perceptions of infant exercise, such as whether they believed it was possible for an infant to exercise. The interviewer showed participants photographs of infant exercise as it is defined in research studies at UC Irvine. After the mothers reviewed the photographs, the interviewer asked them to explain what they would consider to be the risks and/or benefits of the exercises

depicted in the photographs. She also asked them to consider how they would feel if asked to do these exercises with their infants or to participate in an infant exercise program at home.

The interview method was based on a multistage process, where, as interviews progressed, questions were added to clarify concepts from previous interviews and became more focused in response to ongoing data analysis (Glaser & Strauss, 1967; Strauss & Corbin, 1998). For example, questions added in later interviews more directly assessed mothers' perceived fragility of their preterm infants and previous experiences that shaped the mothers' perspectives about the health of their infants.

The interviews were audio-recorded and transcribed verbatim. The scripts for interviews that occurred in Spanish were translated into English by a professional, certified translator. Researchers read the transcripts and developed key codes. These codes were compared across all interviews and were categorized according to concepts that subsumed several individual codes. Eventually a core category was identified that reflected the mothers' perceptions of conducting exercises with their infants. The methods used were consistent with classic grounded theory (Glaser & Strauss, 1967).

Results

Demographic data (see Table 1) characterized the study sample in a way that allowed the study of specific factors influencing the mothers' perceptions. The 13 participants averaged 28.6 years of age, 61% were married and 76% were primiparous.

There was a remarkable and core paradox in these data. The mothers were clearly interested in the exercise program because they believed the intervention would strengthen their infants. However, their enthusiasm was tempered by fears that the exercises might be unsafe for their fragile infants.

Several themes influenced these paradoxical views:

- Previous experiences with infant exercise.
- Current views of infant exercise and movement.
- Beliefs regarding the safety of infant exercise and fears of harming infants.
- Expertise of those training and conducting the assisted infant exercise.

Previous Experience With Infant Exercise

Mothers verbalized having had previous experience with infant exercise and many of these experiences were viewed as positive. One mother described her perceptions of how early exercise—such as early walking—had positive long-term effects on her older daughters:

I always, with my other girls, walked early ... I think that gave her strength in her legs ... They get stronger muscles, I don't have any medical problems with my girls. They hardly ever go to the doctor, they haven't broken a leg. They do a lot of physical activity. It helps their muscles and helps anything they want to do physically.

Another mother described her mother's experience exercising a preterm nephew:

When my mom came to see her the other day, my nephew was a preemie as well, she was like doing these things with her legs, like moving them back and forth, moving her arms. She says it helps them to exercise. I'm thinking they might have

done that with my nephew I think it's just because my mom wants her to be able to move her joints, instead of being stiff.

The experiences with other children in the family provided a context for positive perceptions of exercise with infants:

It's something I done ... with my sisters' children, and she did it with her children, and now her children are big ... They teach that it's the best thing for the babies, to have time to relax, sometime he cannot sleep nicely, if they do for him something like that, then he will sleep good.

A mother described how she plans to exercise her newborn, especially because of the beneficial experience with her older child:

Starting when he was a newborn we massaged his little legs with oil, we did that for him ... exercising him by putting his legs together and stretching them, and his hands ... and that's what we also plan to do when we take (the baby) home.

Despite these positive previous experiences with infant exercise, mothers also voiced having had negative experiences, with a particular concern about the fragility of the preterm infant. Their negative experiences influenced how they currently felt about engaging in assisted exercise with their newborns. For example, one mother described her concern about movement adversely impacting IVs:

In the NICU your kids have IVs. Mine hit theirs (IVs) out (of their veins) and they can't have (another IV) because they don't have the veins to handle it ... so you don't wanna move your kids like that. You wanna keep them as still as you can.

Current Views of Infant Exercise/Movement

Mothers also described their current views of movement in general and exercise specifically for infants. Mothers had differing beliefs related to whether exercise and/or movement was beneficial or detrimental to their infants. These views influenced how they felt about engaging in assisted exercise with their preterm infants. Several statements indicating positive views of infant exercise included:

I mean we find that we are always moving their arms, shaking their legs within reason ... I think it will affect the coordination ... It's fun to look at, it helps to bond with us. I think it's good, especially when I am feeding her ... I put her on a pillow and I stretch her legs and her arms.

I think it's good. Anything that is gonna help her get better, use her body, joints and stuff is good.

Well, you know, since the old days, our moms, they do it, the doctors do it.

In contrast, some mothers indicated that they felt that infant movement could be detrimental. For example:

I think they get strained. Like when they do things, it helps them to burn calories. I know not all types of calorie loss is good, but I know it takes a lot of exercise to breastfeed ... In his case, he is preterm so he needs to gain weight. Exercise is good, but I don't know if in his case it would be too good right now.

For right now, now ... He is very tiny, so you don't want to stress him out, you want him to get better.

I think they probably need more rest now than exercise ... because, you know, they are still not mature enough to, um, because they have to breathe on their own, and

sustain their temperature and that. I wanna say that energy that they would use for exercise, maybe they can use in gaining weight or maturing ...

Beliefs Regarding Safety of Infant Exercise

Mothers frequently referred to safety when asked about engaging in assisted exercise with their pre-term infants. In this category, three subthemes emerged in the data analysis: concerns about safety were often tied to a mother's lack of knowledge of and experience with infant exercise, resulting in a lack of self-confidence that she could do the intervention safely; perceptions of the fragility of the infants; and trusted sources mothers would turn to for advice on whether or not the exercises are helpful and safe.

Personal Knowledge of and Experience With Infant Exercise—Several mothers indicated that they were concerned about the safety of their infants, particularly because they were unsure about how to conduct the exercises and lacked training in doing the exercises. One mother asked:

I would be concerned that as a lay person, how far can you go to stretch them or to move them without hurting them?

If we don't know how, then we might hurt him ... some part of his body.

Two mothers voiced similar concerns, but indicated a willingness to do the exercise if someone, particularly a nurse, taught them safe ways to do so:

If someone showed me how to not do it wrong ... I don't wanna hurt her.

He is very tiny and I'm not quite sure how to do this. But I'm going to learn ... just want to make sure I do everything right ... watching the nurses you know, taking their advice ... seeing how they do things ... it helps me to learn.

Corroborating the notion that lack of experience on the part of the mothers leads to concerns about safety, another mother responded to a question about whether there was a difference between the mothers and the nurses in conducting the exercises, "Yes. They (the nurses) have experience more than us (the moms)."

Perception of Infant as Fragile—A mother's assessment of the safety of infant exercises was also related to the degree to which she viewed her infant as fragile. Mothers who viewed their infants as less fragile were more confident in the safety of infant exercise. One mother stated, "Even so, the fact that they're small doesn't mean they can't be strong, does it?"

Another mother did view her infant as fragile and, consequently, was reticent about engaging in an exercise program. She said, "It's scary cuz you don't wanna pull anything ... My husband was too scared. We really don't let a lot of people hold her now."

Trusted Sources of Information on Safety—One identified reason for concerns about implementing the exercises was evidence, or proof, of safety. Mothers' responses in this area mentioned several trusted sources of information that would impact their confidence in the safety of the exercises.

First, mothers' trust in the NICU nurses was evident in statements indicating that this evidence could be as simple as a nurse telling mothers that exercise was safe for their infants. According to one participant:

If someone told me it wasn't going to hurt them, I would be willing to do it. I mean right now we are kinda in this cautious stage. I don't have a problem, I just want to know at level what a baby could do, or what is safe for them.

Second, evidence of safety also could come in the form of results of a research study, as indicated by this mother: "If there was a study done like this one, and exercise helps them in general to go home quicker and just be healthy in general, yeah, I would promote it." Third, a mother described checking with her doctor as another way of gaining confidence that exercise was proven safe. This mother said, "I would definitely run it by my doctor first. If my doctor OK'd it, yeah, that's fine. But if not, no."

Other mothers were not as specific as to the source of trusted information indicating safety and efficacy, but similarly wanted some form of evidence, "If it was something that was proven to help them, then yeah."

Views of the Expertise Level of Those Conducting Infant Exercises and Adequacy of Information Received

The last factor that influenced mothers' perceptions of engaging in an exercise program with their preterm infants is how they viewed the level of expertise of those who were encouraging them and teaching them and how they viewed the adequacy of the information they received. They specifically mentioned nurses, doctors, and family members, among some of those they considered to be experts. For example, when asked whom she considered to be experts she might turn to, one mother stated:

... nurses, family, his family you know they have gone through this too, my family, church, a lot of people trying to help me out and tell me different things. A lot of the hospital helped a lot. A lot of the nurses too.

Another participant described additional resources she would use:

Well I read a lot, sometimes I go to the books, sometimes I call the nurses, I call the hospital or the pharmacy or I ask things. My mom, my grandma, family. Most of the time, I go to the books or the nurses.

Another mom differentiated those whom she considers experts from those who give advice that could be characterized as "wives' tales." She said:

Well, everyone tries to make suggestions, but I typically try and listen to the doctor or the nurse practitioners or the nurses or the medical field. I'm not into the wives' tales ... I have been reading books throughout the whole pregnancy.

Discussion

This qualitative study revealed important factors that contribute to mothers' perceptions of engaging in exercise with their preterm infants. The mothers were positive about wanting to do what is best for their infants, and they tended to view exercise as beneficial. However, they also feared for the safety of their infants. They perceived the nurses as experts who could safely exercise their infants, but they feared that they themselves could harm their infants. Factors that influenced these beliefs included their previous experiences with infant exercise and their views regarding the fragility or the strength of their own infant. Understanding the complexity of the mothers' perceptions will be crucial as we develop a systematic intervention in which nurses teach mothers how to conduct the assisted exercises at home with their preterm infants.

Limitations

This study had several limitations. Following the interviews, there was no return to the participants to confirm the analytical findings, as the mothers had been discharged and the protocol did not include home-based visits. However, in keeping with qualitative research, an iterative approach was used to collect and analyze the data. This iterative approach allowed continued verification and, if needed, modification of the analysis based on subsequent interviews, albeit with subsequent women. Saturation of data was eventually achieved, whereby less and less new information was found, but similar information continued to be apparent. In addition, there was not an equal number of Latina and European American participants as the sample was constrained by the population in the NICU at the time of the study. Finally, in this preliminary study, the focus was on mothers' perceptions of infant exercise because these perceptions would affect implementation of the intervention at home. Additional barriers to implementation, not addressed in this study, may impact participation in a home-based intervention study, and in future research the plan is to address a wider range of potential barriers.

Implications

The study findings reveal key factors that could be facilitators of or barriers to a mother's implementation of assisted exercise with her preterm infant. When introducing this home intervention, nurses should conduct a brief assessment addressing the areas revealed as crucial in this study. First, nurses should ask about a mother's past experiences with infant exercise that could influence her views of infant exercise and thus her choices regarding implementation at home. Second, nurses need to assess mothers' current perceptions of exercise and movement in preterm infants. Third, safety is an important concern for mothers, and nurses should be aware of and prepared to address potential safety concerns. Finally, nurses should assess what the trusted sources of information are for mothers and provide information that involves a wider variety of sources. For example, rather than a singular focus on the nurse's opinion that an intervention is safe, additional evidence (such as a research study, doctor's opinions, or summary of traditions endorsing infant exercise) could be included in an information flyer. Understanding these factors will better prepare health care providers to facilitate implementation by providing the needed training and information when the intervention is first introduced.

The most significant finding is the struggle the mothers experience due to two simultaneously held, but conflicting, beliefs. One belief is that engaging in assisted exercise with their infants will be beneficial for their infants, making them stronger and healthier. The other belief is that they may be exposing their fragile infants to potential harm by engaging in assisted exercise. Mothers experience these conflicting views simultaneously, leading to a seeming paradox that reflects the complexity involved in a nursing intervention that involves teaching mothers or parents. While on the surface it appears that an exercise intervention would be simple and straightforward, in reality for this intervention to be effective, nurses will need to understand this paradoxical struggle in participating mothers or parents. As this study revealed, most mothers consider nurses and other health care providers as experts and trusted sources of information. Therefore, nurses have the potential to help mothers resolve this internal conflict by teaching them to exercise their infants in a safe manner and providing information that addresses mothers' needs and concerns.

These findings support the need to develop an intervention where nurses teach mothers of preterm infants how to engage in assisted exercise with their infants, while highlighting the critical components needed for such an intervention to be successful. Specifically, nurses must attend to the mothers' paradoxical desire to exercise their infants while simultaneously fearing for their infants' safety. An intervention to teach infant exercises to parents must

include sensitivity to intervening variables (i.e., parent perceptions of infant exercise and safety) on the part of the nurses. The development and testing of this intervention will occur in a subsequent study. In addition, the results of this study can be used to form hypotheses about parental attitudes toward physical activity in preterm infants that will become the basis of future, quantitative research.

Results also have implications for other home-based implementation of recommendations given at discharge. For example, nurses should routinely assess potential barriers to following through on recommendations due to concerns regarding efficacy and safety, as well as parents' concerns that they might not be able to provide the recommended care as well as the nurses do. When nurses understand that these variables will impact follow through at home, they will be better prepared to address these issues before discharge when they have the opportunity to provide both more information (such as information on efficacy and safety from trusted sources) as well as to provide more training, ensuring that parents feel confident in their abilities to perform the interventions as recommended.

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Table 1

Participant Demographics

	Number	% (or Range)
Average maternal age (years)	28.6	19–47
Marital status		
Single	3 mothers	23
Married	8 mothers	61.5
No answer	1 mother	7.5
Significant other	1 mother	7.5
Education		
Some high school	1	7.6
Completed high school	3	23
Some college/university	5	38
Completed college/university	3	23
Graduate school	0	0
No answer	1	7.6
Number of children at home before this delivery		
None	10	76.9
One	1	7.5
Two	1	7.5
Three	1	7.5
Live births at this delivery		
One	9	69.2
Two	4	30
Three	1	7.5