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Developmental care and very preterm infants : neonatal, neurological, growth and developmental outcomes

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Citation

Maguire, C. M. (2008, April 17). *Developmental care and very preterm infants : neonatal, neurological, growth and developmental outcomes*. Retrieved from <https://hdl.handle.net/1887/12703>

Version: Corrected Publisher's Version

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Note: To cite this publication please use the final published version (if applicable).

CHAPTER 2

Reading Preterm Infants' Behavioral Cues:
An Intervention Study with Parents of
Premature Infants Born < 32 weeks

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Abstract

The effect of a short-term intervention with parents in the Neonatal Intensive Care Unit (NICU) on their knowledge of infant behavioral cues and confidence in caregiving was examined. Ten sets of parents with a total of 22 premature infants born < 32 weeks gestational age admitted to a NICU were enrolled in a time-lag control trial over an 8 month period. The intervention group was given 4 sessions of instructions on preterm infant behavior for a period of 2 weeks. The control group did not receive the instructions. All parents completed two subscales of the Mother and Baby Scale (MABS) at weeks 1 and 3 and a short questionnaire concerning nursing support at week 3. Intervention parents completed a pre-and post-test on knowledge of preterm infant behavioral cues at weeks 1 and 3. There was a significant improvement in the post-test scores concerning knowledge of preterm infant behavioral cues and a higher nursing support score for mothers in the intervention group. Intervention mothers showed no significant improvement in confidence in caregiving. Only half of the intervention group fathers participated in the sessions and there were no significant differences in fathers' scores. While the intervention significantly increased maternal knowledge of infant behavioral cues, there was no significant effect on mothers' confidence in caregiving. Very few fathers participated in the entire intervention. A longer, more intensive program with a larger sample size and finding ways of incorporating more participation from fathers is recommended.

Introduction

The advances in recent years in neonatology have resulted in a marked improvement in the mortality of premature infants¹⁻³. As more infants are surviving, the importance of finding ways to improve developmental outcomes and their quality of life becomes paramount. In addition to the increasing concern with the developmental support of the infant, there has been a heightened appreciation of the psychological strain and emotional stresses encountered by the family of the sick neonate⁴.

In addition, many factors in the neonatal intensive care unit (NICU) environment may adversely affect parent-infant attachment and parent involvement essential for long-term development⁵. Family bonding in the NICU is often a very difficult process, due to the separation of parents and child at birth, uncertainty about their child's wellbeing and the continued physical restraints of the complex critical care environment. Cronin et al reported that parents of very low birth weight infants continue to manifest stress even up to 5 years after the birth of the child⁶. In addition, because of their poor motor stability and difficulty maintaining alertness, premature infants do not engage in the social interactions typical of term infants. Preterm infants' cues and interaction signals are often weak and disorganized and too often missed⁷. This in turn may make it more difficult for the parents to form a relationship with their infant.

Involving parents in the care of their infant and instructing them in premature behavior may facilitate bonding, increase parents' confidence in caregiving and possibly decrease the chance of later disturbances in the parent-child relationship⁶. Supporting parents to understand their infant's level of communication through his/her behavior may help them feel more comfortable with their baby and may promote bonding between parents and child.

Various interventions aimed at improving the contact between parents and their infant have been carried out, with some showing promising results⁸⁻¹¹. The studies differed in type and length of intervention as well as study design. Some studies were only carried out with participation from the mothers and continued over a longer period of time with home-based follow-up instructions. A shorter hospital-based intervention may be more relevant to the Dutch situation where infants may be transferred to regional hospitals once they are stabilized.

The present study examined the effects of a short-term, hospital based intervention with parents and their premature infants in the neonatal department of a tertiary Dutch university hospital. The intervention program was based on aspects of developmental supportive care with the goal of positively influencing parental

knowledge and responsiveness to premature infant signals and behavioral cues. It was based on the assumption that once parents understand their infant's behavior, they will be in a better position to respond to and interact with their infant in an appropriate and developmentally supportive way and therefore be more confident and comfortable in their interaction with their infants.

Methods

Design

The study took place in a 17 - bed level III NICU and was a time-lag design. The study was approved by the review board and medical ethics committee of the hospital and written informed consent was obtained from parents. Inclusion criteria were: birth of a preterm infant < 32 weeks with no congenital malformation and requiring no major surgery. The duration of the study was 8 months.

Control group parents were first recruited consecutively over a 4-month period. Parents in the control group received the standard support normally given by the nurses. After questionnaires and data were collected from the control group, the recruitment of the intervention group of parents began and was carried out over a 4-month period.

Intervention

The researcher met with the parents in the intervention group four times over a two-week period during the infants' second and third week of life and the sessions lasted between 20 and 30 minutes. The teaching sessions were interactive in nature and were primarily carried out with parents and infant individually at the infant's bedside. Material with photos was used for explaining infant behavior and how to read premature infant's cues^{7,10,12-14}. The goal was to support parents in becoming more knowledgeable in preterm behavior in order to better understand their own infant's behavior. Care was taken to present the information in an interactive manner that was easily understandable and supportive of the parents own observations of their child.

Measures

Demographic variables collected were parental age, educational level and country of birth (Netherlands/other). Infant characteristics at birth were the infant's gender, gestational age, birth weight, Apgar score at 5 minutes and twin (yes/no).

Neonatal behavior and parental confidence

Two subscales of the MABS (Mother and Baby Scales) were given to parents to complete. The MABS is a parent-report measure of neonatal behavior and parental caretaking confidence¹⁵. The subscale "Lack of Confidence in Caregiving" (LCC) assesses parental perception of their own caregiving confidence, contains 13 items and has a reliability of 0.93 as measured by Cronbach's alpha. The subscale "Global Confidence" (GC) is a short impressions measure from the overall impressions and experiences section, contains 3 items and has a reliability of 0.81. A higher score of the LCC scales indicates an increase in the lack of confidence in caregiving, whereas a higher score in the GC scales indicates a higher overall global confidence. The subscales of the MABS were translated from English into Dutch and two of the questions in the subscale "lack of confidence in caregiving" were altered slightly so that they would be more appropriate for the situation in the neonatal intensive care unit. Cronbach's alpha was then computed for each subscale. Alpha was reasonable to good.

Knowledge of premature infant behavior

In addition, parents of the intervention group were given a pre- and post-test on premature infant behavior developed specifically for this study, based on the material that would be presented in the instructions started when their infants were 1 and 3 weeks old. The questionnaire measures knowledge of infant behavior. Total possible score was 30. A high score indicated increased knowledge.

Parents' experience of nursing support in the NICU

Parents from both groups were asked at the end of week 3 to complete a short questionnaire concerning their experience in the neonatal intensive care unit. Four of the items were found via reliability analysis to form a scale concerning nursing support given to the parents in those first three weeks (Cronbach's alpha = .81).

The items were:

1. How did you find the support from the nursing staff the first week?
2. How was it the weeks thereafter?
3. Do you feel that you received sufficient information about your baby?
4. Do you feel that the nursing staff involved you enough in the caring for your baby?

Need for more knowledge

An open-ended question was asked at post-test if parents felt the need for more knowledge concerning premature infant behavior (yes or no).

Procedure

Parents in the control group and intervention group completed subscales from the Mother and Baby Scale (MABS) questionnaire when their infant was one week old and again two weeks later. The intervention group was given 4 sessions of instructions in preterm infant behavior for a period of 2 weeks. The control group did not receive the instructions. All parents received along with the 2 modified subscales of the Mother and Baby scale (MABS) at weeks 1 and 3 a short questionnaire concerning nursing support at week 3. In addition the intervention group completed a pre- and post-test on knowledge of preterm infant behavioral cues at weeks 1 and 3. At the end of the 3 weeks parents were interviewed concerning their experience in the NICU.

Statistics

Data was analyzed using SPSS 11 for Windows (SPSS Inc., Chicago, Illinois, USA). Demographic variables and questions concerning parents' experience in the neonatal department were compared between groups using Pearson's chi-square and t-tests. Differences between groups for the MABS scores were compared using independent group t-tests and differences between pre- and post-tests within each group were compared using the paired sample t-tests.

Results

Participants

Twenty-eight preterm infants of 13 sets of parents admitted to the neonatology department were enrolled after meeting the inclusion criteria. Three couples dropped out, one because their infant died after one week and two because their child was transferred to another hospital. There were five sets of twins; in two sets, one of the twins died and in one set, one twin had anomalies, so these three children were also excluded from the study. In addition the control group and intervention group each had one set of living healthy twins. In total 3 infants died, 2 were transferred and one was born with anomalies, leaving 22 infants with 10 sets of parents in the sample.

Intervention and Control Variables

There were no significant differences in age, educational level or country of birth between mothers and fathers in the control and intervention groups (Table 1). No parents from either group had ever had a premature infant before. There were no significant differences in gender, gestational age at birth, birth weight or Apgar score at 5 minutes between infants in the control and intervention groups (Table 2).

Table 1. Comparison of parent characteristics

	Control (n=10)	Intervention (n=10)	<i>p</i> value
Maternal age at infant's birth			
< 30 years	8	6	0.33
≥ 30 years	2	4	
Paternal age at infant's birth			
< 30 years	3	2	0.61
≥ 30 years	7	8	
Maternal education level (low/intermediate/high)*	4/5/1	1/9/0	0.14
Paternal education level (low/intermediate/high)*	9/1	9/1	1.00
Country of birth mother (Netherlands/other)	9/2	9/2	1.00
Country of birth father (Netherlands/other)	9/1	8/2	0.53

Comparisons were done using chi-square; *p* value significance = <.05

* Low = vocational training, intermediate = high school, high = college/university

Table 2. Comparison of infant characteristics

	Control (n=11) Mean (sd)	Intervention (n=11) Mean (sd)	<i>p</i> value
Gender (female/male)	5/6	6/5	0.67
Gestational age at birth (weeks)	29.0 (1.8)	28.5 (1.2)	0.47
Birth weight (grams)	1075.1 (208.7)	1215.4 (402.8)	0.32
Apgar score at 5 minutes	7.8 (1.3)	7.6 (1.9)	0.79
One of a twin (no/yes)	6/5	8/3	0.38

Comparisons were done using t-test or chi-square test as appropriate.

Outcome variables

Knowledge of preterm infant behavior

There was a significant improvement in the post-test scores concerning knowledge of preterm infant behavioral cues for mothers who underwent the training (pre-test score 15.5; post-test score 24.1 from a possible total score of 30, $p < 0.001$). Since only 5 fathers in the intervention group participated in the teaching sessions and 2 of them did not complete the post-test on infant behavior they were not included in this analysis.

Confidence in caregiving (CCG) and global confidence (GC)

There was no significant difference in the baseline MABS scores of the control group and intervention group of mothers and fathers, indicating that both groups had comparable initial levels of confidence in caregiving at the start of the study (mothers: mean CCG score: $C=20.9$, $I=18.3$, $p=0.54$; mean GC score: $C=9.6$, $I=9.6$, $p=0.95$; fathers: mean CCG score: $C=16.7$, $I=18.6$, $p=0.64$; mean GC score: $C=10.7$, $I=11.1$, $p=0.76$).

Scores were analyzed separately for mothers and fathers, since only 5 fathers in the intervention group actually participated completely in the training. Two fathers from the control group and three fathers from the intervention group did not complete all of the questionnaires.

The difference between the MABS scores pre- and post-test was calculated for each person and the mean difference scores of both groups were then compared. A negative mean score showed an improvement in confidence in caregiving, whereas a positive mean score showed a decrease in confidence in caregiving. There was no significant difference in the scores between mothers, although the intervention group mothers showed more improvement. When comparing the fathers, we found no significant differences in the mean scores; however the scores of the intervention fathers showed an improved confidence in caregiving, while the scores of the control fathers showed a decreased confidence in caregiving. There was no significant difference in the mean difference in global confidence between mothers or fathers (Table 3).

Experience of nursing support in the NICU

The mothers in the intervention group showed a significantly higher support score than the control group, meaning that they felt they received more support from the nursing staff. There was however no significant difference in the fathers' scores (Table 4).

Table 3. Mean score differences in pre- and posttest MABS

Variables	Group	N	Mean	Std. Dev.	p value
Mean score differences confidence in caregiving mothers*	control	11	- 0.82	10.59	0.74
	intervention	11	- 2.27	9.53	
Mean score differences global confidence mothers	control	11	1.91	2.39	0.15
	intervention	11	0.36	2.42	
Mean score differences confidence in caregiving fathers*	control	9	3.33	8.4	0.12
	intervention	8	- 3.50	8.6	
Mean score differences global confidence fathers	control	9	0.22	1.9	0.23
	intervention	8	1.38	1.8	

Paired samples t-test; *p* value significance = <.05

*Negative score indicates improvement

Table 4. Parents' experience of nursing support in the NICU

Variables	Group	N	Mean	Std. Dev.	p value
Support parents*	control	17	16.88	2.2	.049*
	intervention	17	18.29	1.8	
Support/mothers*	control	10	16.10	2.3	.017*
	intervention	10	18.40	1.6	
Support/fathers*	control	7	18.00	1.7	ns
	intervention	7	18.14	2.1	

Independent samples t-test; * *p* value significance = < .05

*Higher score indicates more support.

In total 14 of the control group parents felt the need for more knowledge as opposed to only 8 parents in the intervention group, which is a significant difference ($p = .022$). When the data was tested to see if there was a difference between the fathers and mothers, a higher number of mothers and fathers in the control group wanted more information; however the differences were not significant.

Discussion

The goal of this study was to investigate if a short-term intervention explaining infant behavioral cues with parents would increase parental knowledge of premature infant behavior and enhance parents' confidence in caregiving in interacting with their infant. The significant improvement in the parental knowledge of premature infant behavior suggests that the training was in itself effective. Also the fact that 14 of the control parents felt the need for more knowledge concerning premature infants as opposed to only 8 parents in the intervention group suggests that the training fulfilled a need that parents have during this period.

In addition, parents in the intervention group did feel that they had received more support. However, their feelings of confidence in caregiving did not improve significantly. The evaluation of the training during the interviews showed that parents enjoyed the instructions, felt it had been helpful in their interactions with their premature infant and recommended it be offered to all parents.

An issue to consider is whether the revised version of the MABS subscales is an appropriate tool sensitive enough to measure parents' feelings of confidence in dealing with their infants in the intensive care unit. This scale was originally developed for interventions with mothers of newborns and was used for the first time with parents of premature infants. The global confidence scores were reasonably high in the pre-test which made it difficult to show a difference after an intervention. Only more studies with larger samples using this instrument will tell us if it is an appropriate one. Since this study had a small sample size and large standard deviations in the scores, replication with a larger sample could give more insight in the effects of the intervention and for whom the intervention is most beneficial.

Finally, while fathers initially expressed interest in the intervention, less than half of them actually participated in the teaching sessions. As fathers in general are becoming more involved in the caregiving of their children it is important to find ways to include them in the care of their premature infants as well. This could in turn help support mothers through having their partner also understand the ways in which their infant may respond to interactions. Further studies are needed to find a way to incorporate more fathers, perhaps with less individual instruction and more written information that could be read at their leisure. Fathers often returned to work and did not visit as frequently as mothers and when they did come to the unit wanted to spend that time alone with their baby. Most of the mothers who received the training stated that they shared much of the information with the fathers; however this "transferring" of knowledge was not measurable.

Recommendations for future research include a study with a larger population, implementing the program within the first few days after the birth, creating a program with a longer period of instruction with follow-up if infants are transferred and finding ways of incorporating more participation from fathers.

Key guidelines

Based on the feedback from parents in the study, the following guidelines and recommendations have been made.

In order to have a developmental care program succeed, the entire team should be involved:

- Educate and train the nursing and medical team in infant behavioral cues so that they can support the parents and infants. A formalized training program such as NIDCAP (Newborn Individualized Developmental Care and Assessment Program) can provide training and guidance in the implementation of a developmental care program.
- Continuing in-service training and lessons for nursing and medical team.
- Have trained developmental specialists on staff who can implement and maintain the developmental care program. Parents often commented that they appreciated having someone to discuss their infant's behavior with instead of just the medical aspects.
- A developmental specialist should participate in the rounds to give feedback about the infant's behavior.

Parents felt the need for more information concerning premature infant behavior and how they could support their infant:

- Try not to overwhelm parents with information, instead begin the first week with basic information about the program and getting to know their infant and gradually increase this as parents are able to incorporate it. Be sensitive to where parents are in the process.
- Make booklets with photos and explanation of infant behavioral cues available for parents whose infant is admitted to the NICU. Create literature for parents that they can read at their leisure about development of premature infants from birth until term age.
- Make a library for parents of existing developmental care books and books with information of premature infants that they can read at their leisure.
- Make contact with mothers who are already admitted to the hospital if possible

to introduce the program. This gives parents time to get acquainted with the developmental specialist and what support is available.

- Regular infant observations with write-ups with key recommendations at the bedside for team and parents.

Increase parental participation and input and offer support to the fathers as well:

- To make the program more accessible to fathers, have developmental specialists available in the evening when fathers usually come to see their infant so that they also can be supported and included in the program. Fathers indicated that they would like to take part in understanding their infant's behavior more, but could not take time off from work during the day to do this.
- Encourage parents to participate together in the infant's care, for example, when one parent is doing caregiving, the other parent could support and comfort the infant.
- Create a multidisciplinary developmental team that also includes parents of ex-premature babies. It is important to get the input of parents because they are the experts and have an understanding of what parents go through. Fathers could also help to create a program that would be more accessible to other fathers.

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Ref Type: Serial (Book, Monograph)

