

Research

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Stress beyond the Neonatal Intensive Care Unit (NICU) Discharge: Implications to Outcome

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ABSTRACT

Purpose: The high-risk parental experience in the neonatal intensive care environment is a major stress event that is not necessarily resolved with discharge. Many parents report “walking on eggshells” with worry and stress for up to a year beyond the birth of their infant. Because stressors can induce behavioral, physiological, and biochemical changes to such a degree that family adaptation is challenged, attempting to resolve stressors before the discharge should be a goal. The ethical concept of beneficence (doing good) provides the Neonatal Intensive Care Unit (NICU) nurse with a framework for wanting to lower stressors as much as possible prior to discharge. The purpose of this study was to examine the relationship between high-risk experiences including high-risk pregnancies, deliveries, and NICU admissions and unresolved parental stress up to a year after delivery.

Method: Women in a day care center with infants under a year old were tested for their emotional status and pregnancy related demographics.

Principal Results: Findings show a positive correlation between two factors, both NICU admission of a newborn and parental stress ($r=.88$) and a high risk primiparous births without NICU admissions and parental stress ($r=.72$).

Major Conclusion: While this is a pilot study, the findings illustrate unresolved parental stress well beyond the birth of the baby, providing ethical support for early identification of stressed parents and interventions to normalize that stress before discharge. When parents report significant stress after their deliveries or infants' NICU admissions, and there is no specific intervention to identify and reduce this stress, high levels of stress may last and be measurable even a year later.

KEYWORDS: Parental emotion; Stress; Neonatal intensive care unit (NICU); High-risk pregnancy; High-risk birth.

ABBREVIATIONS: NICU: Neonatal Intensive Care Unit; FEE: Family Emotional Expressiveness; IRB: Institutional Review Board.

INTRODUCTION

Parental stress experiences related to pregnancy, childbirth, and upto a year beyond the postpartum period are examined across disciplines in research of term, preterm, and high-risk deliveries to identify causative factors for early intervention. In a large study of women (N=783) and 671 of their male partners, the prenatal attitudes and feelings of these subjects provided some explanation for the differences in parental stress in the first year.¹ Although women in this study reported higher levels of parental stress than men, negative feelings or attitudes by either parent towards the pregnancy, birth, and first weeks at home with the infant were strongly correlated with high parental stress for both parents. This suggests that all parents are at risk for a significant stress experience following the birth of a baby, yet the incidence and intensity of the stress experience for parents of extreme premature infants and high-risk deliveries may have lasting effects as well as long-term consequences.

There is a growing body of research evidence that examines the postpartum stress experience of mothers of the extremely premature infants. According to findings, mothers of premature infants are at increased risk for postpartum depression and post-traumatic stress, yet screening factors for early identification are not standardized practice. In a recent study of mothers of premature infants (N=135), investigators found that maternal sociodemographic factors as well as the infant's physiologic stability did not contribute to early identification of postpartum traumatic stress in the Neonatal Intensive Care Unit (NICU).² These findings differ slightly from another study of parental stress (N=100) in the NICU, in that older parents and interruption of breast feeding plans were associated with higher stress levels but not necessarily postpartum traumatic stress.³ Studies agree that the postpartum transition to parenthood is a major life stress, yet the incidence of postpartum traumatic stress in full-term births is 6%.⁴ This is a much different statistic in the premature population. In a study of mothers of extremely premature infants (N=78), 25.6% showed symptoms of postpartum traumatic stress related to their perceived severity of the infants' developmental outcome later in life.⁵ These findings provide the ethical foundation to question the current practices to mitigate stress experiences.

Any parental stress experience arising from NICU admissions is not a surprise. The hectic, technological intensive care environment of the NICU presents a challenge for nurses to integrate care that supports the development of premature infants while facilitating mother-infant attachment and supporting parents as collaborators in the care of their infant. Parents face barriers imposed by the challenging environment of the NICU that shift the parents' focus from their baby and the "normal" attachment process to equipment and technology that supports their infant's life.

Interventions have been tried to relieve the stress of parents during the NICU experience. A study of high-risk pregnant women (N=42) tested a nurse-led educational intervention on maternal stress prior to delivery and 48 to 72 hours after admission to the NICU.⁶ Although the intervention significantly decreased maternal stress related to the NICU environment ($p=.01$), it did not influence the stress related to later attachment. What this suggests is that ongoing education is important for adaptation to the environment, but other interventions are needed to facilitate attachment and support parents beyond discharge. In a review of literature, the facilitator role of the NICU nurse to promote parental attachment by encouraging active participation in care, skin-to-skin holding, breastfeeding, and communication while assessing parental stress and offering mitigating interventions across the NICU experience is key.⁷ While this may not alter the stress experience beyond discharge, it offers interventions to improve attachment in the NICU that could have a lasting effect as the parent's transition home.

Stress Beyond Discharge

If the goals of neonatal nursing care are to support physiologic

and developmental growth of the infant while managing family and infant stressors, then assessing stressors and intervening to minimize stressors should become essential components of neonatal nursing practice. A study examining the relationship between postnatal depression and first year parenting stress of mothers of premature infants born at <32 weeks gestation (N=123) found that women with postnatal depression at 6 weeks after birth had a higher incidence and intensity of parenting stress the first postpartum year.⁸ This relationship of postnatal depression to prolonged parenting stress experiences lasting up to a year gives insight to the needs of screening and intervention for all new parents. A second study examining postpartum stress and depression of Taiwanese mothers of premature infants born at 32+ weeks gestation (N=203) had similar findings with an important addition to the understanding of predictors of long-term parenting stress.⁹ Taiwanese mothers with general health issues such as sleep disturbances, anxiety, and interpersonal difficulties experienced higher levels of stress beyond discharge ($p<.001$). These findings give practitioners insight on factors that contribute to the stress experiences of all new parents.

In order to build an educational and counseling program, researchers studies mothers of young infants who were free of all signs of depression (N=322). They attempted to identify factors that caused parental stress and to identify mitigating coping styles.¹⁰ Identified sources of highest stress for mothers were sleep problems (81.4%), body image problems (93.9%), and breast problems (94.9%). Highest baby related stressors were feeding problems (93.5%), dressing and baby care (98.6%), and recognizing health issues (95.5%). Although 84.2% reported stress related to returning to work, only 10.6% of the women had returned to work at the time of the study. The "Ways of Coping with Stress" inventory used in this study measured two main coping styles: a problem-oriented active problem solving approach or an emotional, passive approach that has dimensions of helpless and submissive coping. The findings are concerning as these were married mothers of term infants free of birth experiences that are perceived traumatic and without postpartum depression. Many of these women reported stressors and reported being unable to cope, using emotional-passive coping styles on the helpless approach dimension ($p<.05$). These findings demonstrate that prolonged stress following the birth is not discerning of family demographics.

Problems with Unresolved Stress can also Impact Relationships with the Infant

What is known is that unresolved stressors can induce behavioral, physiological, and biochemical changes in all people, regardless of age and circumstances; the resulting problems are not limited to immune system compromise, cardiovascular changes, depression, and negatively impact long-term health outcome.^{3,8,9} New parents experience extra stressors of adaptation to caring for an infant, family responsibilities, self care issues, and lack of regular sleep. In a large study examining attachment-sleep relationships and attachment security and emotionality of mother-infant dyads (N=776), negative emotionality significantly influ-

enced attachment security and later behavior problems ($p < .05$) as the infant becomes a toddler.¹¹ Because these parental relationships are integral for attachment security and are associated with self-regulation behaviors of toddlers and children, research correlates high quality early social and emotional experience of infants to improved cognitive development. That is not to say that parental stress experiences should be non-existent in the infant's environment, but, instead, should be one of a wide range of emotions the infant experiences since they are sensitive to their parent's moods and emotions.¹² This range of emotions helps infants develop self-regulation and self-soothing behaviors that are later correlated better to cognitive development. The problems that arise with unresolved stress are associated with highly emotional environment, which becomes a part of the psychological development of the infant very early in life.¹² Findings suggest that infants nurtured in highly emotional environments may lack emotional nurturance themselves, becoming toddlers with delayed language acquisition and cognitive development.

In reviewing the literature, it is clear that the high-risk parental experience in the neonatal intensive care environment is a major stress event that is not necessarily resolved with discharge. Many parents report "walking on eggshells" with worry and stress for up to a year beyond the birth of their infant. Because stressors can induce behavioral, physiological, and biochemical changes to such a degree that family adaptation is challenged, resolving stress before the discharge should be a goal. The purpose of this study was to examine the relationship between high-risk experiences including high-risk pregnancies, deliveries, and NICU admissions and maternal emotions that could lead to unresolved parental stressors.

MATERIALS AND METHODS

This study was a cross-sectional, correlational design to examine the relationship of high emotionality to stress and pregnancy and birth risk factors. After obtaining University Institutional Review Board (IRB) approval to conduct the study, data was collected over a 3-month period at a single child care center located in a South Atlantic State of the Mid-Atlantic region. The center provides infant, toddler, pre-school and kindergarten care to a diverse population of approximately 180 children, specifically targeting children with risk factors including poverty (40%), foster care (10%) and disabilities (20%).

A convenience sample of 54 mothers of infants 6-months of age or older enrolled at the center participated in this study after signing an informed consent. The mothers completed the self-reporting demographic data and the Family Emotional Expressiveness (FEE) tool at home and returned it to the

center for analysis. Of the 54 women, 77.7% were employed 20 hours or more per week, 92.5% were married, 81.5% of the women were first-time mothers, and more than 70% of the women had attended some college.

Instrument

The family emotional expressiveness (FEE) is a 12 item self-report scale that measures a family's range of positive and negative emotions and the frequency of them. Answers range from 0 (Never) to 4 (Always). Cronbach's Alpha of the instrument was =.77.¹³ Validity of the instrument was not reported in recent literature however, this scale it is consistently used to predict child behavior patterns in a larger body of research. According to the literature, it is considered a good fit to measure emotional climates of family and information on corresponding infant behaviors.¹⁴

Data Analysis

Data analysis was conducted to describe the sample and to determine the relationship between stress measured as emotionality and high-risk family experiences including high-risk pregnancies, deliveries, and NICU admissions. The level of significance was set at $\alpha = .05$.

RESULTS

The sample of mothers (N=54) each completed the family emotional expressiveness (FEE), a 12 item self-report scale that measures a family's range of positive and negative emotions, In addition, the mothers completed a 10-question demographic tool on the pregnancy and birth of the infant. Data was coded and Pearson correlation coefficients were used to determine relationships related to stress, family emotions, and demographics.

The demographic data was examined for the stressors identified in the review of literature such as returning to work or first baby. The majority of the mothers were working at least 20 hours per week (77.7%) and were married (92.5%). Many had problems during pregnancy, such as health issues of hypertension (N=6), gestational diabetes (N=17), asthma (N=4), preeclampsia (N=2), and thyroid problems (N=2). The high-risk pregnancy and birth without a NICU admission was significantly correlated to the lasting family stress experience ($r = .72$). In most instances, the infant at the child care center was the first baby (81.5%). The infant sample has a mean gestational age at birth of 39.3 weeks. At the time of the study, infant ages ranged from six to eleven months with a mean of 8 months, 7 days. Table 1 summarizes the key stressor results from the demographic data.

	1 st Baby	High-risk pregnancy	NICU Admission	NICU 7 days or longer
Number	44	31	13	3
Percentage	81.5%	57.4%	24.1%	5.5%

Table 1: Demographic summary of stressors.

The family emotional expressiveness (FEE) results described family emotions to twelve situations that would induce responses for most people. The mothers rated how they would express themselves in situations that may evoke a positive or negative emotional response. Negative situations such as showing unhappiness, going to pieces when pressure builds up, and arguing with a family member were countered by positive situations such as expressing excitement, spontaneously hugging a family member, and expressing happiness. The questionnaires were scored for each mother, yielding a FEE score described as high or low emotions. The total scores ranged from 1.34 to 3.64 where 0-1 is low emotions and 3-4 are high emotions. Although the mean score of 2.79 further describes a higher emotional expressiveness score, the breakdown of these scores gives insight to the maternal experience.

Of the 54 mothers participating, 36(66.7%) reported often feeling negative emotions by expressing disappointments, arguing with family members, blaming others for problems, and falling apart under pressure. Less than 19% of the mothers rarely experienced negative emotions. More than half of the mothers (53.7%) reported rarely expressed their happiness to family members or expressed excitement over future plans. Only 13 of the mothers (24.1%) reported experiencing positive emotions with most scoring high on expressing deep love to their partner. Although the expressiveness items can be difficult to interpret as an absolute, the scores yield trends of emotional expressiveness. The statistical analysis was completed using Pearson correlation coefficients to examine the relationship of the reported family emotionality scales of the FEE to the stressors. Results revealed a significant relationship for all NICU admissions, regardless of severity of condition or length of stay, to family stress ($r=.88$). These mothers reported much higher family stress than all other mothers of this sample. The relationship of family stress to high-risk primiparous pregnancies without NICU admissions was the second significant finding. Family stress increased significantly when it was the first pregnancy and that pregnancy was considered high-risk due to maternal complications and/or illness ($r=.72$). First pregnancies and first infants in general were not significantly correlated to higher family stress.

DISCUSSION

The infants of this sample of mothers were all term or near-term births with a mean gestational age of 39.3 weeks. The fact that 24.1% of the infants were admitted to the NICU with only three NICU stays 7 days or longer suggests that this sample does not represent the very low birth weight infants described in research that associates post-traumatic stress experiences with families that take up to a year to mend.^{2,5} Because the results of this study illustrate a lasting, unresolved stress for all families with infants admitted to the NICU ($r=.88$), one must question how even the short stays in the NICU result in similar emotions. The longitudinal Swedish study of Hildingsson and Thomas may offer some answers; these researchers found that even if a woman *perceived* her pregnancy, birth or transition home as stressful, regardless of actual circumstances, which this stress lasted up to one year.

The mothers who identified their experience as a high-risk pregnancy reported many health issues. These high risk health issues, even without the infant admission to the NICU, was significantly correlated to the lasting family stress experience ($r=.72$). These findings are consistent with the NICU admission experiences and supported by the findings of other researchers.¹

LIMITATIONS

The primary limitation of this study is the sample size. This sample is representative of the child care center and geographic location and, although these findings may not be generalizable to other child care populations without additional research, the data adds to the literature on the long-term family stress experience after high-risk births.

IMPLICATIONS FOR NICU AND MATERNAL CHILD NURSES

Implications for NICU and maternal-child nurses as well as childbirth educators focus on education, communication, and early intervention to support families before, during, and after the birth of their infants. If how parents perceive their birth experiences clearly contribute to the family emotions over the first year, then early intervention to decrease stress should be offered. Mindfulness-based interventions with parents have been shown to help reduce stress and anxiety associated with birth experiences while giving parents tools for coping beyond discharge.¹⁵ This technique helps individuals alter their perspective of events to reduce the stress response, which, over time, will make that person more cognizant of emotions. Moreover, at-risk families should have focused discharge education and information of stress and coping as well as follow-up care for the first year after the birth of their baby.

IMPLICATIONS TO FURTHER RESEARCH

Because this study illustrates the unresolved family stress from high risk pregnancies and deliveries to admissions to the NICU, identification of at-risk families early in pregnancy and research with interventions is necessary. Studies that include a counseling component to resolve family stress across the pregnancy and first year following birth, as well as research examining the family stress response over time would open doors to better early family interventions. Suggestions for specific research study should be included here. Counseling has a two-fold benefit of (1) intervention during stress crisis and (2) educational interventions that promote family coping across the lifespan.

CONCLUSION

NICU nurses support families while in the NICU. This study shows the importance of doing so, and the ethical need for referral and intervention to lower stress levels. The findings illustrate unresolved family stress can last well beyond the birth of the baby, and provides support for early identification of stressed families and interventions to normalize that stress before discharge. Although that source of stress differs for each family,

understanding the relationship of high emotions to cognitive and psychological development of the infant is a considerable basis for screening and intervention.

CONFLICTS OF INTEREST

There are no declared conflicts of interest in the manuscript including financial, consultant, institutional, and other relationships that might lead to bias.

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