Nurse-Led Education Mitigates Maternal Stress and Enhances Knowledge in the NICU

Jo Ann Morey, BSN, RN, and Katherine Gregory, PhD, RN

Abstract

Purpose: Maternal stress common to the neonatal intensive care unit (NICU) experience often impairs bonding, plays a role in postpartum depression and anxiety, and decreases maternal milk production. This study evaluated the effect of a nurse-led intervention pertaining to the experience of having a baby in the NICU on maternal stress in a population of high-risk pregnant women at three different time points.

Study Design and Methods: Using a repeated measures design, 42 pregnant women cared for on the high-risk antenatal unit participated in the educational intervention. Evaluative data pertaining to the intervention included maternal stress and knowledge specific to premature birth and the NICU. Participants answered surveys at three time points: prior to the intervention, immediately following the intervention, and 48 to 72 hours after infant admission to the NICU.

Results: Following the intervention, mothers were significantly more knowledgeable about who would be taking care of their baby (p = .008), their baby's body (p = .002), their baby's physical needs (p = .000), and the equipment used in the NICU (p = .001). In addition, participation in the intervention significantly decreased aspects of maternal stress related to the sights and sounds of the NICU (p = .010) and infant behavior and appearance (p = .035). Participation did not significantly influence feelings related to maternal role attainment (p = .165).

Clinical Implications: Nurse-led patient education is an effective intervention strategy when aiming to reduce maternal stress in the NICU. Family-centered interventions tailored to the care of the high-risk mother and infant can improve patient outcomes.

Keywords: Maternal stress; Neonatal intensive care; Nursing intervention; Premature infant

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s many as 20% of women experience unexpected maternal or fetal complications during pregnancy (Bennett, Kotelchuck, Cox, Tucker, & Nadeau, 1998; Gazmararian et al., 2002). Minor complications are effectively managed at home; more significant complications require hospitalization and often, infant admission to the neonatal intensive care unit (NICU). The majority of infants cared for in the NICU are the result of a premature birth, a leading perinatal health problem in the United States (March of Dimes, 2010). Premature birth is problematic as a result of the significant infant morbidity and mortality associated with immature organ systems and physiological functioning (Eichenwald & Stark, 2008). Furthermore, perinatal hospitalization, premature birth, and the NICU experience result in high levels of stress among pregnant women and new mothers.

Maternal stress associated with having a baby in the NICU has multiple ramifications: it interferes with initial bonding and attachment (Mercer, 1981, 2004); is correlated with postpartum depression, anxiety, and posttraumatic stress disorder (Holditch-Davis, Bartlett, Blickman, & Miles, 2003; Shaw, Bernard, DeBlois, Ikuta, Ginzburg, & Koopman, 2009); and has been shown to influence the production of breast milk (Boucher, Brazal, Graham-Certosini, Carnaghan-Sherrard, & Feeley, 2011). Maternal stress is highest during the acute care stage of the NICU experience. However, stress-related health issues often persist following discharge from the NICU (Pinelli, 2000). In spite of the significant health consequences secondary to maternal stress associated with care of an infant in the NICU, little known about how nurses can effectively intervene to help hospitalized, high-risk pregnant women cope with the anticipation of having a baby who will likely require care in the NICU. We conducted this study to evaluate the effect of a nurse-led educational intervention on maternal knowledge and stress in high-risk pregnant women prior to and soon after infant admission to the NICU.

Background

Stress is a physical and emotional state always present as a result of the human experience (Goldberger & Breznitz, 1993; Magnussen, 1982; Murray & Heulskoetter, 1983). Selve, an endocrinologist and pioneer in studying stress, suggested that humans repeatedly work toward developing successful adaptation patterns in response to the ongoing stresses associated with daily activities and demands (Selye, 1956). Lazarus, a psychologist, focused on the psychological responses to stress, specifically on how an individual copes with a stressful situation. Lazarus's theory encompasses the individual's belief system, both cultural and religious, as well as the social supports available to the person experiencing stress. Lazarus suggested that coping with stress is contingent on the individual's appraisal of the stress, how the stress is perceived by the individual, and whether or not the stress causes specific harm to the individual (Lazarus & Folkman, 1984). A mother's ability to cope with the birth of a premature infant is influenced by her perception of her situation and infant's clinical condition. For this reason, the theoretical principles developed by Selye and Lazarus provided the conceptual basis for our study on maternal stress in the NICU.

Stress and Premature Birth

Increasing survival of infants born premature led physicians in psychiatry to become interested in parental response to the birth of a premature baby (Caplan, 1960). Following this early work, Miles and Carter were the first to study parental stress of parents with children in the intensive care unit (ICU). This work defines three sources of stress affecting parents within the ICU personal/family, situational, and environmental (Miles & Brunssen, 2003; Miles & Carter, 1983). Further investigations of major stressors affecting parents, specifically in the NICU, highlighted the role that aspects of the physical environment (i.e., monitors, lights, and presence of tubes attached to the baby) play in this uniquely stressful experience (Miles, Funk, & Carlson, 1993). However, the greatest source of stress identified by mothers with infants in the NICU was the loss of maternal role (Cleveland, 2008; Turan, Basbakkal, & Ozbek, 2008).

A systematic review of the literature confirmed that sources of stress among parents with infants in the NICU were the following: (1) receiving accurate information and being actively included in the infants care, (2) vigilance and watching over the infant, (3) contact with the infant, (4) being positively perceived by the staff, (5) development and implementation of individualized care, and (6) a positive relationship with the nursing staff (Cleveland, 2008). Furthermore, qualitative findings have shown that mothers with infants in the NICU have an overwhelming feeling of "exclusion," which dominates when a new mother is alienated within the hospital system and lacks a sense of belonging to either the maternity unit or the NICU (Wigert, Johansson, Berg, & Hellstrom, 2006).

Literature has documented that the birth of a premature baby, NICU admission, and prolonged hospitalization are traumatic events for mothers. These events can be so traumatic that they are often associated with symptoms of posttraumatic stress disorder (PTSD) (Holditch-Davis et al., 2003). Frequent nightmares, distressing thoughts about the NICU experience, avoidance, and overprotectiveness of their baby are associated with PTSD in this patient population. Research has shown that in women who have given birth to premature infants, at least one symptom of PTSD is reported, and the overwhelming majority (86.6%) of mothers report experiencing increased arousal, avoidance, and reexperiencing. In addition, these mothers report increased levels of anxiety, which can interfere with the development and utilization of healthy parenting skills throughout infancy and into the child's school-aged years (Holditch-Davis et al., 2003; Melnyk, Crean, Feinstein, & Fairbanks, 2008). In sum, more than half of all mothers who have a baby cared

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for in the NICU are at high-risk of experiencing PTSD symptoms (Shaw et al., 2009).

Interventions Aimed at Decreasing Stress Related to Premature Birth

Implementing patient- and family-centered interventions aimed at reducing stress and improving patient care outcomes is an important component of nursing care. As premature birth is an ongoing problem in maternal child health and an especially stressful experience for women, interventions developed for mothers in the NICU have been tested and reported in the literature.

Effective communication and providing appropriate anticipatory guidance about what to expect when their baby is admitted to the NICU are essential aspects of nursing care provided to parents in the NICU. Knowing what to expect enables parents to more effectively cope with the stress of having a premature baby and the fear of uncertainty associated with the health and well-being of their infant. Parental knowledge of the ICU has been attributed to an enhanced understanding of the situation, a sense of predictability of the NICU experience, and a confidence to deal with the overall stress of having a premature baby (Melnyk et al., 2006). One strategy aimed at enhancing parental knowledge employed by nurses caring for high-risk pregnant women was the opportunity for parents to tour the NICU prior to labor and birth. Parents who participated in the tour of the NICU reported it to be beneficial for several reasons: the tour decreased fear of the NICU, inspired a sense of hope for the outcome of the baby, and provided emotional preparation for the actual care provided in the NICU environment (Griffin, Wishba, & Kavanaugh, 1998).

Defining and assessing the specific causes of stress for parents in the NICU have resulted in the development of interventions aimed at decreasing stress and promoting effective coping skills. The Creating Opportunities for Parent Empowerment (COPE) Program is an example of this type of intervention. COPE is a behavioral intervention that involves four unique interventions beginning within 1 week of admission and ending up to 6 months following discharge (Melnyk et al., 2006). Participation in the COPE program demonstrated via a randomized control trial decreased infant length of stay, decreased parental stress levels, and development of critical parenting skills. In addition, Melnyk et al. (2006) studied the COPE program in relation to maternal anxiety and depression following infant discharge from the NICU. In this secondary analysis, participants of the COPE program experienced less postdischarge maternal anxiety and depression when compared to a control group. This study showed that educational interventions could effectively decrease the risk of maternal anxiety and depression associated with having a premature infant.

Studies have shown that selected interventions help reduce stress and anxiety related to the environmental stimuli and situational conditions following birth; however, little is known about the effect of providing education to high-risk pregnant women during the antenatal period. Maternal stress associated with having a baby in the NICU interferes with initial bonding and attachment, is correlated with postpartum depression, and has been shown to influence the production of breast milk.

The findings generated by our study address this gap in the literature.

Study Design and Methods

The study design was a single-group interventional comparison, with repeated measures of maternal knowledge and stress obtained at three time points: prior to the intervention, immediately following the intervention, and following birth of the infant and admission to the NICU.

Study Sample and Setting

We obtained our study sample from a population of pregnant women who were cared for on the high-risk antenatal floor of a large academic medical center located in the North Eastern United States. The sample included highrisk women admitted to the hospital during their pregnancy due to incidence of premature labor, premature rupture of membranes, and/or maternal or fetal health concerns that were likely to result in premature labor and birth.

Study inclusion criteria were the following: (1) English literacy that encompassed speaking, writing, and comprehension, and (2) stable clinical status, which allowed attendance and participation in the entire NICU class. All pregnant women cared for in the inpatient setting, regardless of parity, gestation at admission, or rationale for admission, were eligible for the study. Participants who enrolled in the study but did not deliver a premature baby requiring admission to the NICU were not included at the third measurement point. A sample size calculation conducted in G-Power 3.0 (Faul, Erdfelder, Lang, & Buchner, 2007), assuming a medium effect size for one study group measured three times, indicated that 31 participants would be sufficient to detect meaningful statistical results based on the study design and analysis plan.

Study Protocol

Prior to study implementation, institutional review board approval was received from the hospital. The principal investigator (PI) approached potential participants in their hospital rooms prior to the intervention (i.e., NICU Class) and described the study in detail. Following

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Figure 1. Study Intervention

NICU Educational Intervention for High-Risk Pregnant Women

- NICU Class taught weekly on a high-risk antenatal nursing unit by an experienced NICU nurse
- Participants identified by the high-risk antenatal nursing staff
- Participants able to attend class in wheelchairs or on stretchers, per bed rest requirements
 Small class size, ranging from 3 to 8 pregnant women per class
- Small class size, ranging nom 5 to 6 pregnant worn

Viewing NICU Video

- · Provides an overview of the NICU from the Nurse Manager and Medical Director .
- Captures parent interviews with a culturally diverse group of patients in the NICU.
- Presents images of infants in the NICU.

Teaching and Discussion Led by NICU Nurse

- Overview of "Who's Who in the NICU", with discussion pertaining to the multidisciplinary care providers in the NICU
- Discussion of physiological differences of premature babies as compared to full term babies
- Discussion about specific physical needs of infants in the NICU, including specialized technology and equipment, as well as enhanced comfort measures (i.e., pacifiers for non-nutritive sucking, use of pain medications, etc.)
- · Emphasis placed on importance of breast milk for premature babies and introduction to pumping breast milk
- · Focus on infection control measures in the NICU (i.e., importance of hand washing, use of cell phones, healthy visitors)
- Presentation about developmental care measures implemented in the NICU
- · Teaching about the role of parents in caring for their baby while in the NICU
- Introduction to the discharge planning process and procedures

Patient Tour of the NICU

- Mothers view:
 - An admission bed in the NICU
 - The physical layout of the NICU
 - All equipment common to the NICU and infant care (ventilators, isolette, IV pump, etc.)
- · Mothers visit the bedside and see a baby at the current gestational age of their pregnancy

informed consent, the study staff obtained baseline measures, including demographic data and maternal stress data. The participant then participated in the NICU class, offered in a common area on the high-risk antenatal unit. The study staff offered the NICU class on the unit so that women who required bed rest could participate from their hospital bed. The intervention consisted of three major components and several teaching strategies: (1) an educational video developed by the hospital NICU team, (2) a detailed description of the clinical aspects of prematurity, the care requirements of premature infants, and the family involvement in the NICU, and (3) a tour of the NICU, offered at the conclusion of the intervention. During the tour of the NICU, the participant was able to visit the NICU environment, as well as a baby of similar gestation. Figure 1 provides details on the three components of the educational intervention.

To ensure intervention fidelity, the PI trained her study team, which consisted of two other NICU nurses. The training consisted of the following: (1) study nurses observing the NICU class as taught by the PI, (2) a review of training materials (including a detailed outline of the class curriculum and specific procedures for the class), (3) a discussion pertaining to the significance of maternal stress and the need to intervene should any of the participants be overwhelmed by the content of the class, and (4) the PI observing and evaluating the study nurse teaching the class. The training was ongoing, and the PI maintained supervision of the study nurses over the course of the project. In sum, prior to implementing the study, all members of the research team responsible for teaching the antenatal class agreed to implement the intervention consistently and without variation, ensuring standardization of study procedures and generalizability of findings.

Following the intervention, the participant completed the maternal stress measurements for the second time. On birth of the infant and admission to the NICU, the PI contacted the participant to complete the maternal stress measurements for the third time. This measurement occurred within 72 hours of infant admission to the NICU. Study staff collected selected clinical variables pertaining to both the mother and the infant from the medical record upon discharge from the NICU.

Measures

The primary study outcomes were maternal stress, as measured by the *Parental Stressor Scale: NICU* (PSS: NICU) (Miles et al., 1993), and maternal knowledge, as

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measured by assessment questions asked of the study participants. The PSS: NICU measures parental perception of stressors arising from the physical and psychosocial environment of the NICU. The instrument includes three dimensions: sights and sounds of the NICU, infant behavior and appearance, and parental role alteration. The Cronbach alpha coefficients for the overall score (0.89) and for each subscale (0.73, 0.83, and 0.83, respectively) indicated validity and reliability of this instrument (Miles et al., 1993). The questions included on the PSS: NICU rate stressfulness on a scale of 1 (not at all stressful) to 5 (extremely stressful). Six questions are included on the sights and sounds subscale with a range of scores between 6 and 30. Thirteen questions are included on the infant behavior and appearance subscales, with a range of scores between 13 and 65. Seven questions are included on the parental role subscale, with a range of scores between 7 and 35.

Participants completed a pre-/postassessment questionnaire on aspects of the intervention as part of this study. The pre-/postassessment questionnaire of the antenatal class included demographic questions and five questions on the participant's knowledge of premature babies and the NICU. Four additional questions concerning participant's impressions of the class were included. These questions were developed and pilot tested in collaboration with the Parent Advisory Council (PAC) at our hospital. The PAC comprises former NICU parents, the majority of whom participated in the intervention while hospitalized. Thus, these parents were able to confirm that our study questions accurately measured parental knowledge of the NICU and premature infants, as well as parental perceptions of the NICU class. These evaluative data served as feedback on the class and guided the PI' ongoing quality improvement of the class.

Data Collection and Analysis

Study staff developed a database designed for the purposes of this study using SPSS 18.0 and entered the data. Statistical calculations included descriptive statistics to determine mean and standard deviation of demographic data and parametric techniques, including repeated measure-ANOVA (RM-ANOVA) to evaluate changes in the dependent variables over time. For the purposes of the study, statistical significance was set at p < .05.

Results

The study sample of pregnant women (n = 42) was representative of the patient population admitted to this large academic medical center located in the northeastern United States. Women in the sample were on average 34 years of age and completed about 15.5 years of education. The majority of women were married (80.9%), and nearly all identified a support person (95.2%). Approximately one-third of the sample was primiparious, had experienced assisted reproductive therapy, and was pregnant with a multiple gestation. The mean gestation of pregnancy at the time of admission was 30 weeks for reasons including premature labor (40.4%), premature

rupture of membranes (19%), cervical changes (11.9%), and maternal (42.8%) and/or fetal complications (2.3%). Examples of maternal complications included gestational diabetes, hypertension, and hyperemesis. Examples of fetal complications included decreased fetal movement, discordant twin growth, and fetal growth restriction. Admissions to the high-risk antenatal unit occur for many reasons. Although 42 women enrolled in the study, only 32 of the women gave birth to infants admitted to the NICU. Therefore, the final sample size was 32.

The gestational age of infants included in the sample (n = 33) ranged from 27 to 35 3/7 weeks of gestation (M = 32.4, SD = 2.01), with birth weights ranging from 1,050 to 3,060 g (M = 1901.9, SD = 469.63). Within this sample, the majority (n = 31) were singleton births, with one set of twins. Eleven (33.3%) of the infants were oxygenated via endotracheal tube, 16 (48.5%) via nasal continuous positive airway pressure (CPAP), and 6 (18.2%) required no assisted ventilation in the first 3 postnatal days. One (2.2%) infant was treated for sepsis. Two (4.3%) infants were diagnosed with an IVH; none of the infants were diagnosed with NEC. Seventeen (51.5%) received breast milk exclusively during the hospitalization, 6 (18.2%) received only infant formula, and 10 (30.3%) received both breast milk and infant formula.

The total length of stay in the NICU averaged 24 days (SD = 19.32) and ranged from 2 to 78 days. The average gestational age at discharge was 35.7 weeks (SD = 1.6). The majority of the infants were discharged home (78.8%); the remainder (22.2%) were transferred to another hospital prior to discharge to home. At the time of discharge, none of the infants required assisted ventilation or supplemental oxygen. Fifteen infants (45.4%) were discharged receiving only breast milk, 5 (15.2%) receiving infant formula, and 13 (39.4%) receiving breast milk and infant formula. Table 1 includes descriptive data pertaining to mothers and infants included in the study.

All 42 participants who enrolled in the study completed the study questionnaire at time 1, (before the NICU class) and time 2 (immediately after the NICU class). The mothers who had given birth to infants admitted to the NICU (n = 32) completed the questionnaire at all three study time points.

Survey questions addressed participants' general knowledge about premature infants and the NICU at all three time points. These questions assessed a sense of knowledge about who would be taking care of the baby in the NICU, the premature infant's body, the physical needs of the baby while in the NICU, the equipment used in the NIUC, and the importance of breast milk. Participants rated their knowledge using a 5-point Likert scale. Following the NICU class, mothers were significantly more knowledgeable about who would be taking care of their baby (F = 5.385 [2, 40], p = .008), their baby's body (F = 6.970 [2, 42], p = .002), their baby's physical needs (F = 9.776 [2, 44], p = .000), and the equipment used in the NICU (F = 8.806 [2, 42], p = .001) than they were

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Table 1. Maternal and NeonatalDescriptive Data

Maternal Data (<i>n</i> = 42)	n (%) or <i>M</i> (SD)
Maternal age	34.3 (<i>SD</i> = 6.33)
Marital status Single Married Not reported	7 (16.6%) 34 (80.9%) 1 (2.3%)
Support person identified by patient	40 (95.2%)
Education (years)	15.51 (<i>SD</i> = 2.15)
Primiparious	16 (38.1%)
Assisted reproductive therapy (IVF)	17 (40.4%)
Number of gestation Singleton gestation Multiple gestation	27 (64.3%) 15 (35.7%)
Reason for antenatal admission ^a Premature labor PPROM Cervical changes Maternal complications Fetal complications	17 (40.4%) 8 (19%) 5 (11.9%) 18 (42.8%) 1 (2.3%)
Gestation at admission (weeks of pregnancy)	30.2 (<i>SD</i> = 3.20)
History of a preterm birth	2 (4.3%)

Neonatal Data (<i>n</i> = 33)	
Gestational age	32.4 (<i>SD</i> = 2.01)
Birth weight (g)	1901.9 (<i>SD</i> = 469.63)
Gender (male)	15 (45.5%)
Singleton birth	31 (93.9%)
Clinical status at day 3	
Respiratory status at day 3: Intubated CPAP No assisted ventilation needs	11 (33.3%) 16 (48.5%) 6 (18.2%)
Sepsis	1 (3.0%)
IVH	2 (6.1%)
NEC	0 (0%)
Type of feeding Breast milk Infant formula Breast milk and infant formula	17 (51.5%) 6 (18.2%) 10 (30.3%)
	Continued

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Table 1. Maternal and NeonatalDescriptive Data (Continued...)

Neonatal Data (<i>n</i> = 33)	
Medical Status at Discharge	
Gestational age at discharge	35.7 (<i>SD</i> = 1.60)
Final disposition Home Level 2 NICU Level 3 NICU	26 (78.8%) 5 (15.2%) 2 (6.1%)
Respiratory status at discharge: Intubated CPAP	0 (0%) 0 (0%)
ROP	0 (0%)
IVH	2 (6.1%)
NEC	0 (0%)
Type of feeding Breast milk Infant formula Breast milk and infant formula	15 (45.4%) 5 (15.2%) 13 (39.4%)

Note. CPAP = continuous positive airway pressure; IVF = in vitro fertilization; IVH = intraventricular hemorrhage; NEC = necrotizing enterocolitis; NICU = neonatal intensive care unit; PROM: premature rupture of membranes; ROP: retinopathy of prematurity.

^aMore than one reason for hospital admission often reported.

prior to the NICU class. Mothers felt highly knowledgeable about the importance of breast milk before the NICU class and at the two measurement points after the NICU class (Table 2 and Figure 2).

It is noteworthy that the knowledge reported by the mothers at time two was higher than at time three. This may be related to the increased anxiety associated with premature birth and NICU admission, which was reported between time two and three. Another explanatory factor may be associated with the time period between when the mother initially participated in the NICU class and ultimately gave birth. The time between the intervention and the final outcome measure following birth may be an important factor in the knowledge mothers retain from educational interventions that occur during the antenatal period.

Aspects of maternal stress, specifically attributes pertaining to the NICU environment of care, the physical attributes of the baby, and feelings related to maternal role attainment were important outcome measurements in this study. As reported in Table 3 and shown in Figure 3, the study intervention had a significant impact on the participants as measured by

Table 2. Maternal Knowledge of Premature Infants and the NICU

	Time 1	Time 2	Time 3	р
Who will be taking care of baby in the NICU	3.51 (<i>SD</i> = 1.142)	4.55 (<i>SD</i> = .765)	4.38 (<i>SD</i> = .983)	.008
The baby's body	3.39 (<i>SD</i> = 1.083)	4.39 (<i>SD</i> = .820)	4.31 (<i>SD</i> = .928)	.002
The baby's physical needs in the NICU	3.22 (<i>SD</i> = 1.126)	4.47 (<i>SD</i> = .773)	4.46 (<i>SD</i> = .989)	.000
The equipment used in the NICU	3.07 (<i>SD</i> = 1.321)	4.47 (<i>SD</i> = .773)	4.19 (<i>SD</i> = 1.020)	.001
The importance of breast milk for NICU baby	4.47 (<i>SD</i> = .842)	4.84 (<i>SD</i> = .652)	4.69 (<i>SD</i> = .1.087)	.494

Note. NICU = neonatal intensive care unit.

Items scored on a 5-point Likert scale: 1 = least knowledge, 5 = most knowledge.

Time 1: Prior to NICU class.

Time 2: Immediately following NICU class.

Time 3: Within 72 hours of infant admission to NICU.

Figure 2. R-ANOVA of Maternal Knowledge of NICU



Time 1: Prior to NICU class.

Time 2: Immediately following NICU class.

Time 3: Within 72 hours of infant admission to NICU.

Maternal knowledge mean for R-ANOVA on knowledge measurement question by study time point:

1. Care for baby [F=5.385, p=.008].

2. Baby body [F=6.970, p=.002].

3. Baby physical needs [F=9.776, p=.000].

4. Equipment in the NICU [F= 8.806, p=.001].

5. Importance of breast milk for baby [F=.717, p=.494].

specific maternal stress questions. The most significant changes in maternal stress were observed between time one, prior to the intervention, and time three, after birth of the infant and admission to the NICU. Participation in the intervention significantly decreased aspects of maternal stress related to the sights and sounds of the NICU (p = .01) and infant behavior and appearance (p = .035). Participation did not significantly influence feelings related to maternal role attainment (p = .165). Our study hypothesis that the NICU Class would decrease maternal stress is supported by these findings. However, we acknowledge that we are unable to determine whether or not our intervention is solely responsible for the decrease in

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Table 3. Maternal Stress Measures and Outcomes

	Time 1	Time 2	Time 3	р
Sights and sounds of the NICU	17.94	14.05	11.00	.010
Infant behavior and appearance	28.58	24.66	16.50	.035
Parental role alteration	25.93	20.37	21.56	.165

Note, NICU = neonatal intensive care unit.

Figure 3. R-ANOVA of Maternal stress in the NICU



Maternal Stress in the NICU

Time 1: Prior to NICU class.

Time 2: Immediately following NICU class.

Time 3: Within 72 hours of infant admission to NICU.

Maternal stress mean for R-ANOVA on maternal stress scales:

1. Sights and sounds in the NICU [F=9.370, p=.010]. Baby appearance, behavior, and treatments [F=7.898, p=.035].

3. Parental role: [F=1.716, p=.165].

maternal stress observed. Other explanations for the decrease in anxiety that mothers reported may be associated with outstanding antenatal care, prolonged pregnancy, and attaining greater gestational age.

Participants rated the parts of the intervention that were most helpful at two time periods: immediately following the NICU class and at a later point, after the baby was born and admitted to the NICU. The data showed that all components of the intervention were helpful at both time points. Specifically, the NICU tour (M = 4.614,SD = .803), seeing a baby of the same gestational age (M =4.55, SD = .828), and the presentation by the NICU nurse (M = 4.57, SD = .770) were rated the most helpful immediately following the class. After the baby was admitted to the NICU, the NICU tour remained very helpful to mothers (M = 4.58, SD = 1.139), as did the presentation by the NICU nurse (M = 4.46, SD = 1.104). Table 4 reports these evaluative data.

Limitations of this study pertain to the attributes of the sample population as well as the lack of a control group. The sample was from one hospital setting and was limited to English-speaking women. As a result, the sample is not representative of a broader population of antenatal women that may have been recruited from multiple sites by a bilingual study team. We were unable to include an appropriate control group in this study because our intervention had been established as part of high-risk antenatal care. The intervention is offered to all hospitalized antenatal patients, and as a result, excluding patients from the intervention for the purposes of research was not appropriate. This limitation may be overcome through future research designed to include a control group either by measuring subjects prior to the implementation of an educational intervention within an institution, or through a multisite study design.

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Table 4. Evaluative Data on NICU Class

	Time 2	Time 3
Experiencing a tour of the NICU	4.61 (<i>SD</i> = .803)	4.58 (<i>SD</i> = 1.139)
Seeing a baby of the same gestational age	4.55 (<i>SD</i> = .828)	4.37 (<i>SD</i> = 1.209)
Watching a video about the NICU	4.24 (<i>SD</i> = .955)	4.08 (<i>SD</i> = 1.083)
The presentation by the NICU nurse	4.57 (<i>SD</i> = .770)	4.46 (<i>SD</i> = 1.104)

Note. NICU = neonatal intensive care unit.

Scored on a 5-point Likert scale: 1 = least helpful, 5 = most helpful.

Time 2: Immediately following NICU class.

Time 3: Within 72 hours of infant admission to NICU.

Clinical Nursing Implications

Published research suggests that education increases knowledge and decreases stress for patients and families in the NICU (Melnyk et al., 2006). The educational intervention tested in this study effectively decreased the stress and anxiety associated with premature birth and the NICU for high-risk pregnant women immediately following participation in the educational intervention. This was an important finding as many of these women remained pregnant, anticipating premature birth and NICU care for several weeks following the initial intervention. One of the important clinical nursing implications of this study is support for providing interventions that effectively decrease a pregnant woman's stress about the NICU during antenatal hospitalization such as the intervention used in this study.

In addition to reporting decreased stress following the initial application of the intervention in the prenatal period, women reported lower levels of stress pertaining to the NICU environment and baby appearance after giving birth and admission of their infants to the NICU. Participants in the study did not report decreased stress regarding the perception of their parental role following birth of the infant. One explanation is that mother and infant separation that routinely occurs during the NICU care experience, regardless of participation in the intervention, is a known factor to affect the experience of mothering (Mercer, 1981). Whenever possible, a mother should be encouraged to spend as much time with her baby as a mechanism to help promote bonding and attachment while in the NICU. Nurses can help facilitate this by encouraging participation in infant care during diaper changes, kangaroo care, and breastfeeding. Providing ongoing information about the infant's well-being and plan of care are other components of nursing care and communication that aid in decreasing stress and allowing mothers to be involved in the day-to-day decisions for their infant. Nurses who actively engage with parents develop enhanced relationships that have been reported to be the most significant factor affecting the parent's NICU experience (Fegran, Fageroen, &

Helseth, 2008; Reis, Rempel, Scott, Brady-Fryer, & Van Aerde, 2010).

It is important that postpartum and NICU nurses understand that interventions administered during pregnancy with the intent of influencing maternal outcomes during the postpartuim period may have a limited effect at that time. This is especially relevant when aiming to decrease maternal stress and anxiety associated with parental role in the NICU, as the stress that these mothers experience can interfere with their own recovery and their ability to participate in the care of the baby. Interventions provided during pregnancy may help facilitate coping during the antepartum period; however, postpartum identification of mothers at risk should be ongoing. Collaboration with multidisciplinary colleagues to provide the necessary support services to care for these mothers should be coordinated when necessary.

The appearance of a premature infant can be overwhelming for a new mother. Nurse-led education about prematurity aids in a mother's preparation for the potential birth of a premature infant and care in the NICU. Visualization of a premature infant, as part of a NICU tour, decreases stress because it allows the mother an opportunity to visualize the environment, equipment, and care needs required of the premature infant. Knowing what to expect enables parents to cope more effectively through a better understanding, predictability, and confidence to deal with the stress of having a premature baby (Melnyk et al., 2008). Nurses play a pivotal role in providing mothers and families with effective educational interventions that serve to reduce stress by providing knowledge of the unique care and developmental differences of premature infants.

Conclusion

When a pregnancy is threatened and infant survival is uncertain, feelings of joy are substituted by fear, grief, loss, and ultimately, heightened maternal stress and anxiety. Providing an educational intervention during the antenatal period for high-risk pregnant women that includes an overview of the NICU, teaching and discussion

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Suggested Clinical Nursing Implications

- Multifaceted educational interventions about prematurity led by NICU nurses that are tailored to enhance knowledge and reduce stress for high-risk pregnant women are an important component of evidence-based nursing care.
- Providing the opportunity to visualize a premature infant during a tour of the NICU is an effective stress management strategy for hospitalized pregnant women anticipating birth of a premature infant and NICU care.
- Educational interventions provided during the antepartum period effectively decrease stress related to the NICU environment and infant appearance; however, following birth of a premature infant, stress associated with parental role persists.
- Interventions provided during pregnancy may help facilitate coping during the high-risk antepartum period; however, identification postpartum of mothers at risk must be ongoing.

led by a NICU nurse, and a tour of the NICU environment enhances knowledge and decreases the stressful nature of hospitalization during pregnancy, premature birth, and infant care in the NICU. Family-centered nursing interventions tailored to the unique needs of vulnerable pregnant women enhance the ability to cope with uncertainty and provide mothers an opportunity to prepare for the birth of a premature infant and ultimately, infant admission to the NICU.

Jo Ann Morey is a Nurse in Charge at Neonatal Intensive Care Unit, Brigham and Women's Hospital, and a Research Nurse for Newborn Medicine at Children's Hospital Boston, Boston, MA.

Katherine Gregory is an Assistant Professor at Boston College, Chestnut Hill, MA, and Haley Nurse Scientist, Brigham and Women's Hospital, Boston, MA. She can be reached via e-mail at katherine.gregory.2@bc.edu

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