

Examining the Influence of Nurse-Led Discharge Education on Parental Readiness and Anxiety: A Path Analysis in the NICU Setting

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ABSTRACT

This study examined the influence of nurse-led discharge education on parental readiness and anxiety among parents of neonates admitted to the Neonatal Intensive Care Unit. Specifically, it determined the respondents' demographic profile, perceived level of nurse-led discharge education, level of parental readiness, level of parental anxiety prior to discharge, relationships among the major variables, differences in readiness and anxiety when grouped according to demographic profile, and the mediating role of parental readiness in the relationship between nurse-led discharge education and parental anxiety.

The study employed a quantitative, non-experimental, cross-sectional, predictive-correlational design using mediation/path analysis. A total of 133 parents participated in the study through purposive sampling. Data were gathered using the researcher-made Parent Discharge Preparation Questionnaire (NICU) and analyzed using descriptive statistics, Pearson correlation, t-test, ANOVA, and mediation/path analysis. Findings revealed that nurse-led discharge education was perceived as very high, parental readiness was high, and parental anxiety prior to discharge was low. Nurse-led discharge education was significantly and positively related to parental readiness and significantly and negatively related to parental anxiety.

Parental readiness was also significantly and negatively related to parental anxiety. Significant differences in parental readiness and anxiety were found according to previous NICU experience and length of infant's NICU stay. Mediation/path analysis showed that parental readiness significantly mediated the relationship between nurse-led discharge education and parental anxiety, indicating that discharge education may reduce anxiety by strengthening parents' readiness for home caregiving. Based on the findings, the NICU Parent Discharge Readiness and Anxiety Reduction Program was proposed to strengthen structured, continuous, skills-based, and emotionally supportive discharge education for parents.

Keywords: nurse-led discharge education, parental readiness, parental anxiety, NICU discharge, path analysis

INTRODUCTION

The transition of a neonate from the Neonatal Intensive Care Unit (NICU) to home is a critical period for both infants and their families. Admission to the NICU frequently occurs unexpectedly and exposes parents to a highly technical and unfamiliar environment in which uncertainty regarding the infant's condition, separation from the newborn, and fear of adverse outcomes may produce considerable emotional distress. Parents of NICU-admitted infants commonly experience elevated stress, anxiety, helplessness, and uncertainty compared with parents of healthy newborns (Adama et al., 2022; Obeidat et al., 2023). As the infant's condition stabilizes and discharge approaches, these concerns may shift from fear about survival toward apprehension regarding the parents' ability to independently care for a medically vulnerable infant at home.

Successful NICU discharge therefore requires more than completion of medical treatment. Parents must acquire adequate knowledge, practical caregiving skills, confidence, and emotional preparedness before assuming full responsibility for their infant. However, parents may still report inadequate preparedness even after receiving discharge instructions, particularly when their infants require specialized feeding, medications, monitoring, or continuing follow-up care (Franck et al., 2023). Parental anxiety may further complicate this transition because heightened anxiety can interfere with information processing, learning, confidence, decision-making, and the performance of caregiving activities (Wu et al., 2025). Consequently, discharge preparation should address both the informational and emotional needs of parents.

Nurses occupy a central position in this process because they maintain sustained contact with parents throughout the infant's NICU hospitalization. Nurse-led discharge education may include structured teaching, demonstrations, return demonstrations, reinforcement of essential information, opportunities for clarification, and individualized support. When systematically implemented, these interventions can strengthen parental knowledge, caregiving competence, confidence, and overall readiness while potentially reducing anxiety. Evidence suggests that structured and progressively delivered discharge education is more effective than education provided only immediately before discharge, particularly when instruction is individualized according to parental learning needs (Zhang et al., 2025).

Despite increasing recognition of the importance of discharge education, an important gap remains in understanding how nurse-led discharge education, parental readiness, and parental anxiety operate together. Existing studies have frequently examined readiness and anxiety as separate outcomes, providing less evidence regarding their simultaneous and potentially sequential relationships.

Emerging findings suggest that discharge education may directly influence parental readiness and anxiety, while readiness itself may constitute an important pathway through which education influences parental emotional responses (Guttmann et al., 2025). Thus, examining only bivariate relationships may not adequately explain the more complex mechanisms involved in parental transition from NICU to home.

This issue is particularly relevant within contemporary family-centered neonatal care, which recognizes parents as active partners rather than passive recipients of information. Effective communication, parental participation, repeated instruction, and supportive nurse–parent interaction can help families develop the competence and confidence necessary for home care.

Nevertheless, the extent to which the quality of nurse-led discharge education—particularly its content adequacy, clarity of instruction, frequency of teaching, and responsiveness of nurses—contributes to parents' knowledge, caregiving skills, confidence, and anxiety requires further empirical examination within specific sociocultural and healthcare contexts. In the present study, these relationships are investigated among parents of neonates preparing for discharge from a selected NICU in Madinah, Kingdom of Saudi Arabia.

Accordingly, this study aims to determine the influence of nurse-led discharge education on parental readiness and anxiety among parents of neonates in the NICU. Specifically, it examines the levels of discharge education, parental readiness, and parental anxiety; determines the relationships among these variables; assesses differences in readiness and anxiety according to selected demographic characteristics; and tests whether parental readiness mediates the relationship between nurse-led discharge education and parental anxiety.

Using a quantitative descriptive-correlational approach with path analysis, the study seeks to identify both direct and indirect relationships among the variables. The findings may provide an empirical basis for strengthening structured, family-centered NICU discharge education programs that enhance parental preparedness, reduce anxiety, and promote safer transitions from hospital to home.

CONCEPTUAL FRAMEWORK

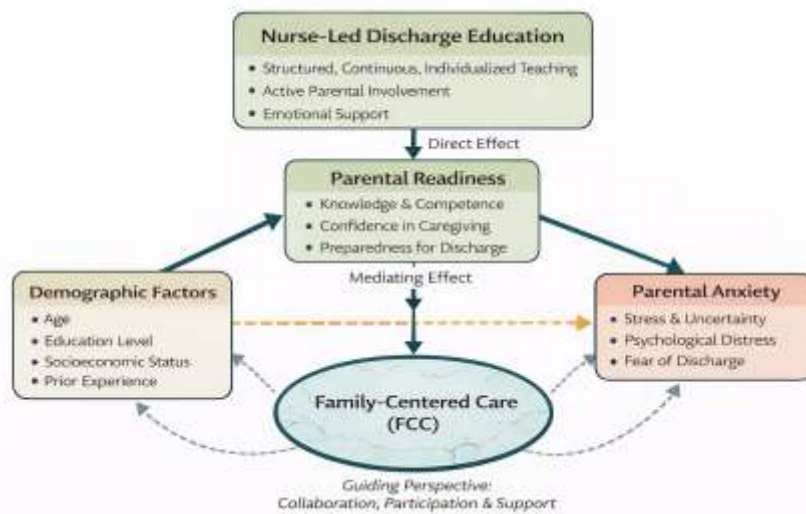


Figure 1: Self-developed Conceptual Framework

The conceptual framework of this study is anchored in the Family-Centered Care (FCC) Model, which views patients and families as active partners in the planning, delivery, and evaluation of healthcare. Family-centered care is founded on four core principles: respect and dignity, information sharing, participation, and collaboration. These principles emphasize that healthcare professionals should recognize families' values and preferences, provide complete and understandable information, encourage meaningful participation in care, and establish collaborative relationships with families throughout the healthcare experience. In the Neonatal Intensive Care Unit (NICU), these principles are particularly relevant because parents gradually assume the role of primary caregivers as their infants transition from intensive hospital care to home.

Within this framework, nurse-led discharge education serves as the principal independent variable and represents the practical application of Family-Centered Care during discharge preparation. It includes the adequacy of educational content, the clarity of instruction, the frequency of teaching, and the responsiveness of nurses to parents' questions and learning needs. Rather than limiting discharge preparation to information provided immediately before discharge, the framework considers education a continuous, participatory, and individualized process throughout hospitalization. This reflects FCC principles because parents are engaged as partners in caregiving and decision-making rather than merely as recipients of instructions. Evidence from neonatal care supports structured parent education, psychosocial support, and interdisciplinary collaboration as important elements of effective family-centered interventions.

The first principal outcome of nurse-led discharge education is parental readiness for discharge. In this study, readiness is reflected in parents' knowledge, caregiving skills, and confidence in independently caring for their neonate after discharge. Effective information sharing is expected to improve parents' understanding of their infant's health condition and continuing care requirements. Active participation, demonstrations, return demonstrations, and collaborative interactions with nurses provide opportunities for parents to acquire and strengthen caregiving skills. Respectful communication and supportive feedback may further enhance parental confidence. Thus, the FCC model provides the theoretical rationale for proposing that higher-quality nurse-led discharge education will be associated with greater parental readiness. Family-centered approaches in neonatal care have been shown to improve parental knowledge, caregiving skills, participation, and satisfaction.

The second principal outcome is parental anxiety prior to discharge. Discharge from the NICU may generate worry and uncertainty because parents become responsible for monitoring and caring for a medically vulnerable infant without the continuous presence of neonatal healthcare professionals. Within the proposed framework, nurse-led discharge education is expected to influence parental anxiety directly. Clear

information, opportunities to ask questions, emotional support, and collaborative decision-making may reduce uncertainty and help parents develop a greater sense of control over the transition. The FCC perspective therefore suggests that effective discharge preparation should address not only the parents' informational needs but also their psychological and emotional needs.

More importantly, the framework posits that parental readiness serves as a mediator between nurse-led discharge education and parental anxiety. This means that discharge education may influence anxiety both directly and indirectly through its effect on readiness. Structured education is expected to increase parental knowledge, caregiving competence, and confidence; greater readiness may, in turn, reduce uncertainty, fear, and apprehension associated with independently caring for the infant. Accordingly, parents who perceive themselves as more competent and prepared are expected to experience lower anxiety prior to discharge. This proposed mediation pathway allows the study to move beyond examining simple relationships and determine the mechanism through which nurse-led discharge education may contribute to parents' psychological preparedness.

The framework further recognizes that selected demographic and NICU-related characteristics, including age, sex, educational attainment, employment status, monthly income, number of children, previous NICU experience, and length of the infant's NICU stay, may contribute to variations in parental readiness and anxiety. These characteristics are treated as influencing or contextual factors because they may shape parents' previous experiences, available resources, learning needs, and perceptions of caregiving demands. Unless interaction or moderation analyses are specifically conducted, these characteristics are not presumed to be statistical moderators but may instead be examined as grouping variables or covariates.

Overall, the framework proposes a pathway in which Family-Centered Care provides the overarching theoretical foundation, nurse-led discharge education represents the primary nursing intervention, parental readiness serves both as an outcome and mediating mechanism, and parental anxiety represents the principal psychological outcome. The model assumes that discharge preparation that embodies respect, information sharing, participation, and collaboration will strengthen parents' knowledge, caregiving skills, and confidence and, consequently, lessen anxiety during the transition from the NICU to home. This is consistent with contemporary neonatal FCC approaches that regard parents as healthcare team members, primary caregivers, and shared decision-makers throughout hospitalization, discharge, and continuing care at home.

Statement of the Problem

The transition from the Neonatal Intensive Care Unit (NICU) to home is a critical period in which parents assume full responsibility for caring for medically vulnerable infants. Despite receiving discharge education, many parents continue to experience uncertainty, low confidence, and anxiety, which may affect safe and effective caregiving. Nurse-led discharge education aims to strengthen parental knowledge, caregiving skills, and confidence through structured teaching and support. However, limited evidence explains how discharge education simultaneously influences parental readiness and anxiety. This study therefore examines these relationships and determines whether parental readiness mediates the effect of nurse-led discharge education on parental anxiety.

This study aims to examine the influence of nurse-led discharge education on parental readiness and anxiety among parents of neonates in the Neonatal Intensive Care Unit (NICU). Specifically, it seeks to answer the following questions:

What is the demographic profile of the respondents in terms of:

- age,
- sex,
- educational attainment,
- employment status,
- monthly income,

- number of children,
- previous NICU experience
- length of infant's NICU stay

What is the level of nurse-led discharge education as perceived by parents in terms of:

- Content adequacy
- Clarity of instruction
- Frequency of teaching
- Responsiveness of nurses

What is the level of parental readiness for discharge in terms of:

- knowledge
- caregiving skills
- confidence

1. What is the level of parental anxiety prior to discharge?
2. Is there a significant relationship between nurse-led discharge education and parental readiness?
3. Is there a significant relationship between nurse-led discharge education and parental anxiety?
4. Is there a significant relationship between parental readiness and parental anxiety?
5. Is there a significant difference in parental readiness and anxiety when grouped by demographic profile?
6. Does parental readiness significantly mediate the relationship between nurse-led discharge education and parental anxiety?
7. Based on the results of the study, what program output can be developed?

Significance of the Study

This study is significant because it may contribute to improvements in neonatal nursing education, clinical practice, hospital administration, and future research by providing evidence on how nurse-led discharge education influences parental readiness and anxiety during the transition from the NICU to home. For nursing students, the findings may deepen their understanding of the importance of communication, patient education, empathy, and family-centered care in preparing parents for discharge. Nursing educators may use the results to strengthen teaching strategies and integrate practical learning experiences related to discharge planning and parental support. For nursing professionals, particularly NICU nurses, the study may provide insights into improving educational approaches, communication techniques, and support systems that enhance parental knowledge, caregiving skills, confidence, and emotional preparedness. Nursing and hospital administrators may use the findings to review and improve discharge protocols, educational programs, and policies that promote safe transitions and continuity of care. The academic community may benefit from additional evidence on the interrelationships among discharge education, readiness, and anxiety. Finally, future researchers may use the study as a reference for examining similar variables, testing related interventions, or exploring other factors that may influence parental readiness and anxiety in different populations and healthcare settings.

METHODOLOGY

The study employed a quantitative, non-experimental, cross-sectional, predictive-correlational design with mediation/path analysis. This design was appropriate because the major variables—nurse-led discharge education, parental readiness, and parental anxiety—were measured numerically using a structured, self-constructed questionnaire and analyzed statistically (Creswell & Creswell, 2018; Polit & Beck, 2021). No intervention or manipulation of variables was introduced; instead, the variables were examined as they naturally occurred within the NICU discharge setting. Data were collected at a single point in time, after parents had received nurse-led discharge education and before their infant's discharge. Mediation/path

analysis was applied to examine the direct and indirect relationships among nurse-led discharge education, parental readiness, and parental anxiety, with parental readiness serving as the mediating variable (Hayes, 2022; Kline, 2023). Because the study was cross-sectional and non-experimental, findings were interpreted as statistical relationships and predictive associations rather than definitive causal effects.

The study was conducted in the NICU of a selected tertiary hospital in Madinah, Kingdom of Saudi Arabia. The setting provided specialized care to preterm, critically ill, and medically vulnerable neonates and regularly involved parents in discharge education, demonstrations, caregiving guidance, and preparation for home care. Nurses maintained direct, continuous contact with parents and played a central role in providing discharge instructions and emotional support. This setting was consistent with patient- and family-centered care principles emphasizing communication, participation, collaboration, and respect for family needs (American Academy of Pediatrics Committee on Fetus and Newborn, 2008; Institute for Patient- and Family-Centered Care, n.d.; World Health Organization, 2020).

The population consisted of mothers, fathers, or legal guardians of neonates admitted to the NICU who were directly involved in infant care and had received nurse-led discharge education. Purposive sampling was used because the study required respondents with direct experience of NICU discharge preparation (Etikan et al., 2016; Polit & Beck, 2021). Participants were at least 18 years old, identified as primary caregivers after discharge, able to understand and complete the questionnaire, and willing to participate. A total of 133 parents participated. This sample was considered appropriate for regression-based mediation or observed-variable path analysis involving the three major variables (Fritz & MacKinnon, 2007; Hayes, 2022).

Data were gathered using the researcher-developed Parent Discharge Preparation Questionnaire (NICU), which was constructed based on the study objectives, research questions, reviewed literature, and family-centered care principles (Boateng et al., 2018; DeVellis & Thorpe, 2021). The instrument consisted of four sections: demographic characteristics; nurse-led discharge education, including content adequacy, clarity of instruction, frequency of teaching, and nurses' responsiveness; parental readiness, including knowledge, caregiving skills, and confidence; and parental anxiety related to discharge. Parts II to IV used a four-point Likert-type scale ranging from 1, Strongly Disagree, to 4, Strongly Agree (Likert, 1932). Higher scores indicated more favorable discharge education, greater readiness, or greater discharge-related anxiety, depending on the subscale.

The instrument underwent expert content validation and pilot testing before final administration. Thirty parents with characteristics similar to those of the target population participated in the pilot test but were excluded from the final sample. Content validation assessed relevance, clarity, appropriateness, and alignment of the items with the NICU discharge context (Lynn, 1986; Polit & Beck, 2021). Internal consistency was evaluated using Cronbach's alpha (Cronbach, 1951; Tavakol & Dennick, 2011). The coefficients were .91 for nurse-led discharge education, .89 for parental readiness, .86 for parental anxiety, and .94 for the overall instrument, indicating acceptable to excellent internal consistency.

Data collection commenced after ethical and institutional approvals were obtained. Eligible parents were identified in coordination with NICU staff and approached after discharge education had been provided but before actual discharge. The purpose, procedures, voluntary nature of participation, confidentiality measures, and right to withdraw were explained, and written informed consent was obtained before questionnaire administration. Participants required approximately 10 to 15 minutes to complete the questionnaire. Completed forms were checked for completeness, coded without personally identifying information, and prepared for statistical analysis (Polit & Beck, 2021; World Medical Association, 2013).

For data analysis, frequencies and percentages were used to describe demographic variables, while the mean and standard deviation were used to summarize nurse-led discharge education, parental readiness, and parental anxiety. Statistical assumptions of normality, linearity, homoscedasticity, and the absence of outliers were examined prior to inferential analysis (Field, 2018; Pallant, 2020). Pearson product-moment correlation was used to assess relationships among the three major variables. Independent-samples t-tests and one-way ANOVA were used to examine differences in parental readiness and anxiety across demographic groups.

Mediation/path analysis, using bootstrapped confidence intervals, determined whether parental readiness significantly mediated the relationship between nurse-led discharge education and parental anxiety (Hayes, 2022; Preacher & Hayes, 2008). Statistical significance was set at $p < .05$.

Ethical safeguards included voluntary participation, informed consent, confidentiality, anonymity, non-maleficence, beneficence, respect for persons, and justice. Ethical clearance was secured from the university's Ethics Review Committee, and permission was obtained from the selected hospital and NICU authorities. Participants were allowed to decline or withdraw without consequences to their infant's care, and provisions were made for emotional support when necessary (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979; Polit & Beck, 2021; World Medical Association, 2013).

RESULTS, ANALYSIS, AND DISCUSSION

Profile of the Respondents

A total of 133 parents participated in the study. Most of the respondents were aged 26 to 35 years old. By sex, the majority were female. Most had attained a bachelor's degree and were employed. A greater proportion had no prior NICU experience, while most infants had stayed in the NICU for 8 to 14 days.

Table 1: Profile of the Respondents

Profile Variable	Category	Frequency	Percentage
Age	18–25 years old	38	28.6
	26–35 years old	65	48.9
	36 years old and above	30	22.6
Sex	Male	43	32.3
	Female	90	67.7
Educational Attainment	High school level/graduate	25	18.8
	Diploma/Vocational	31	23.3
	Bachelor's degree	62	46.6
	Graduate studies	15	11.3
Employment Status	Employed	72	54.1
	Not employed	61	45.9
Monthly Income	Below SAR 5,000	45	33.8
	SAR 5,000–9,999	58	43.6
	SAR 10,000 and above	30	22.6
Number of Children	One child	54	40.6
	Two to three children	59	44.4
	Four or more children	20	15.0
Previous NICU Experience	Yes	35	26.3
	No	98	73.7
Length of Infant's NICU Stay	7 days or less	37	27.8
	8–14 days	54	40.6
	15 days or more	42	31.6

Table 1 presents the demographic profile of the 133 respondents included in the study. Most of the respondents were 26–35 years old (48.9%), followed by those aged 18–25 years old (28.6%) and 36 years old and above (22.6%). By sex, the majority were female (67.7%), while 32.3% were male. This distribution suggests that mothers were overrepresented among respondents, as expected, because mothers are often more directly involved in infant care during hospitalization and discharge preparation. However, the participation of fathers is also important because family readiness for NICU discharge involves preparing the infant's primary

caregivers, not just one parent. The American Academy of Pediatrics emphasized that discharge of high-risk neonates is not based only on infant stability but also on family readiness and the availability of appropriate care after discharge (Committee on Fetus and Newborn, 2008).

With respect to educational attainment, the largest group of respondents were bachelor's degree holders (46.6%), followed by those with diploma or vocational education (23.3%), high school level or graduate education (18.8%), and graduate studies (11.3%). More than half of the respondents were employed (54.1%), while 45.9% were not employed. In terms of monthly income, most respondents belonged to the SAR 5,000–9,999 category (43.6%). These characteristics are relevant because educational background, employment status, and income may influence parents' access to information, confidence in asking questions, ability to understand health instructions, and perceived capacity to manage infant care needs at home. Discharge preparation in the NICU requires that parents acquire knowledge, technical caregiving skills, emotional comfort, and confidence before assuming care at home (Smith et al., 2013; Smith et al., 2022).

Regarding family and NICU-related characteristics, most respondents had two to three children (44.4%), while 40.6% had only one child. A large proportion had no previous NICU experience (73.7%), indicating that many respondents were encountering the NICU environment and discharge process for the first time. This is an important finding because parents who are unfamiliar with the NICU may require more structured teaching, repeated explanations, and emotional support. The length of NICU stay also varied, with the highest percentage of infants staying for 8–14 days (40.6%), followed by 15 days or more (31.6%) and 7 days or less (27.8%). A longer NICU stay may provide more opportunities for parent-nurse interaction and gradual preparation, while a shorter stay may require more focused and efficient discharge teaching. Previous research has shown that parents' discharge readiness is shaped by the support and preparation they receive before going home, and that discharge preparation should be family-centered, individualized, and responsive to parents' needs (Larsson et al., 2017; World Health Organization, 2020).

Level of Nurse-Led Discharge Education

The level of nurse-led discharge education was assessed for content adequacy, instructional clarity, teaching frequency, and nurse responsiveness.

Table 2: Level of Nurse-Led Discharge Education

No.	Item	Mean	SD	Verbal Interpretation
1	The nurses provided enough information about my infant's condition.	3.39	0.54	Very High
2	The nurses explained home care procedures clearly.	3.45	0.50	Very High
3	I was taught about warning signs to watch for.	3.31	0.57	Very High
4	The discharge instructions were relevant to my infant.	3.34	0.52	Very High
5	The nurses used understandable language.	3.48	0.49	Very High
6	The instructions were well organized.	3.42	0.51	Very High
7	I received repeated teaching sessions.	3.18	0.61	High
8	Discharge teaching started early.	3.14	0.63	High
9	The nurses reviewed instructions multiple times.	3.23	0.58	High
10	I received enough teaching sessions.	3.20	0.60	High
11	The nurses answered my questions clearly.	3.50	0.47	Very High
12	The nurses listened to my concerns.	3.46	0.50	Very High
13	The nurses encouraged me to ask questions.	3.52	0.46	Very High

14	The nurses adjusted teaching to my needs.	3.35	0.55	Very High
15	The nurses provided emotional support during teaching.	3.41	0.53	Very High
	Overall Mean	3.36	0.42	Very High

Legend: 3.26–4.00 = Very High; 2.51–3.25 = High; 1.76–2.50 = Low; 1.00–1.75 = Very Low

As shown in Table 2, the respondents perceived the level of nurse-led discharge education to be very high, as reflected in the overall mean of 3.36. This indicates that parents generally agreed that nurses provided adequate, clear, relevant, and supportive discharge teaching before their infant's transition from the NICU to home. The highest-rated item was “The nurses encouraged me to ask questions” with a mean of 3.52, followed by “The nurses answered my questions clearly” with a mean of 3.50. These findings suggest that the nurses were perceived not only as providers of discharge information but also as approachable sources of clarification and reassurance. This is important because discharge preparation for high-risk neonates requires both infant stability and family readiness for safe home care (Committee on Fetus and Newborn, 2008).

The high ratings given to items related to communication and responsiveness further suggest that nurse-led discharge education was delivered in a manner that was understandable, supportive, and family-centered. Parents appeared to value nurses who used clear language, listened to their concerns, adjusted instruction to parents' needs, and provided emotional support during instruction. This finding is consistent with current recommendations that NICU discharge preparation should include assessing family understanding, developing caregiving skills, and actively involving parents in the discharge process (Smith et al., 2022).

However, the relatively lower-rated items were those related to the timing and repetition of teaching, particularly “Discharge teaching started early” (mean 3.14), “I received repeated teaching sessions” (mean 3.18), and “I received enough teaching sessions” (mean 3.20). Although these items were still interpreted as high, they suggest that discharge education may be further improved by beginning discharge preparation earlier and reinforcing instructions more frequently throughout the infant's hospitalization. Previous studies have emphasized that parents' readiness for NICU discharge improves when education is continuous, individualized, and supported by repeated opportunities for clarification and practice (Larsson et al., 2017; Smith et al., 2013).

Level of Parental Readiness

Parental readiness was measured in terms of knowledge, caregiving skills, and confidence.

Table 3: Level of Parental Readiness as Perceived by the Respondents

No.	Item	Mean	SD	Verbal Interpretation
1	I understand my infant's condition.	3.34	0.50	Very High
2	I know what to monitor at home.	3.25	0.57	High
3	I understand medication instructions.	3.22	0.59	High
4	I know when to seek help.	3.37	0.52	Very High
5	I understand follow-up care.	3.31	0.53	Very High
6	I can feed my infant properly.	3.29	0.55	Very High
7	I can perform basic care tasks.	3.27	0.54	Very High
8	I can safely handle my infant.	3.30	0.51	Very High
9	I can follow care instructions.	3.33	0.49	Very High
10	I can manage daily care needs.	3.21	0.58	High
11	I feel ready to take care of my infant.	3.24	0.56	High
12	I feel confident in my decisions.	3.18	0.61	High
13	I believe I can manage at home.	3.20	0.60	High

14	I feel emotionally prepared.	3.12	0.64	High
15	I feel secure in my caregiving ability.	3.19	0.59	High
	Overall Mean	3.25	0.42	High

As shown in Table 3, the respondents had a high level of parental readiness, as reflected by the overall mean of 3.25. This indicates that parents generally perceived themselves as prepared to assume caregiving responsibilities after their infant's discharge from the NICU. The highest-rated item was "I know when to seek help" with a mean of 3.37, followed by "I understand my infant's condition" with a mean of 3.34 and "I can follow care instructions" with a mean of 3.33. These findings suggest that parents felt relatively prepared in terms of recognizing situations that require medical attention, understanding the infant's condition, and following instructions given by healthcare providers. This is important because discharge of high-risk neonates requires not only infant stability but also adequate family readiness for continuing care at home (Committee on Fetus and Newborn, 2008).

The items with very high ratings were mostly related to knowledge and basic caregiving skills, such as understanding the infant's condition, knowing when to seek help, understanding follow-up care, feeding the infant properly, performing basic care tasks, safely handling the infant, and following care instructions. These results imply that the parents perceived themselves as knowledgeable and capable of carrying out essential infant care activities after discharge. This supports the idea that NICU discharge readiness is built through parent education, repeated instruction, skills preparation, and family participation in care. Smith et al. (2022) emphasized that NICU discharge preparation should include structured education, assessment of family understanding, caregiving skill development, and transition planning to support safe movement from hospital to home.

However, the relatively lower-rated items were related to confidence and emotional preparedness, particularly "I feel emotionally prepared" with a mean of 3.12, "I feel confident in my decisions" with a mean of 3.18, and "I feel secure in my caregiving ability" with a mean of 3.19. Although these were still interpreted as high, they suggest that parents may have felt more prepared in terms of knowledge and skills than in emotional confidence. This finding is meaningful because readiness for NICU discharge is not limited to knowing what to do; it also involves confidence, emotional adjustment, and reassurance before independently caring for a medically vulnerable infant at home. Previous studies have similarly emphasized that parents benefit from continuous preparation, clear communication, and supportive nurse-parent interaction during the transition from NICU to home (Larsson et al., 2017; Smith et al., 2013).

Level of Parental Anxiety Prior to Discharge

Parental anxiety was measured as discharge-related anxiety, including worry, fear, uncertainty, nervousness, and emotional uneasiness before bringing the infant home.

Table 4: Level of Parental Anxiety Prior to Discharge as Perceived by the Respondents

No.	Item	Mean	SD	Verbal Interpretation
1	I feel worried about caring for my infant at home.	2.45	0.66	Low Anxiety
2	I feel anxious about discharge.	2.38	0.70	Low Anxiety
3	I am afraid I may not care properly.	2.32	0.68	Low Anxiety
4	I feel stressed about my infant's condition.	2.52	0.73	High Anxiety
5	I feel uncertain about what may happen.	2.49	0.69	Low Anxiety
6	I feel nervous without hospital support.	2.40	0.71	Low Anxiety
7	I worry about missing warning signs.	2.54	0.72	High Anxiety
8	I feel emotionally overwhelmed.	2.35	0.67	Low Anxiety

9	I am afraid of making mistakes.	2.30	0.65	Low Anxiety
10	I feel tense about the discharge process.	2.36	0.66	Low Anxiety
	Overall Mean	2.41	0.52	Low Anxiety

As shown in Table 4, the respondents had a low level of parental anxiety prior to discharge, as indicated by the overall mean of 2.41. This suggests that although parents still experienced some degree of worry and uneasiness, their overall anxiety was not high. The relatively low anxiety level may be associated with the previously reported very high level of nurse-led discharge education and high level of parental readiness. This finding is important because discharge from the NICU requires not only the infant's clinical stability but also the parents' readiness and confidence to continue care at home (Committee on Fetus and Newborn, 2008; Smith et al., 2022).

Among the items, the highest mean was obtained by "I worry about missing warning signs" with a mean of 2.54, followed by "I feel stressed about my infant's condition" with a mean of 2.52. Both were interpreted as high anxiety. This indicates that even when parents generally felt prepared, they still had specific concerns about recognizing changes in their infant's condition and responding appropriately after discharge. This is understandable in the NICU context because parents of preterm or medically vulnerable infants often experience uncertainty, fear, and emotional distress during the transition from hospital to home (Wu et al., 2025; Ouwendijk-Andréa et al., 2020).

The lower-rated items were related to fear of improper care, fear of making mistakes, and emotional overwhelm. These findings suggest that the parents may have gained a reasonable level of confidence in performing basic caregiving tasks, but continued to need reassurance about possible complications and warning signs. This supports the need for discharge education that goes beyond routine instructions and includes emotional support, repeated clarification, return demonstration, and clear guidance on when and how to seek help. Previous studies have emphasized that parents benefit from structured, continuous, and family-centered discharge preparation that addresses both informational and emotional needs before leaving the NICU (Larsson et al., 2017; Smith et al., 2013).

Relationship among Nurse-Led Discharge Education, Parental Readiness, and Parental Anxiety

Pearson correlation was used to determine the relationship among the major variables.

Table 5: Correlation Matrix among the Major Variables

Variables	Nurse-Led Discharge Education	Parental Readiness	Parental Anxiety
Nurse-Led Discharge Education	1.00		
Parental Readiness	.62**	1.00	
Parental Anxiety	-.43**	-.56**	1.00

As shown in Table 5, there was a significant positive relationship between nurse-led discharge education and parental readiness, $r = .62$, $p < .01$. This indicates that parents who perceived nurse-led discharge education more favorably also tended to report higher readiness for discharge. This finding suggests that clear instructions, organized teaching, nurse responsiveness, and repeated explanations may help parents develop the knowledge, skills, and confidence needed for home caregiving. This is supported by Weiss et al. (2008), who found that the quality of discharge teaching, particularly how nurses delivered parent education, was associated with higher parental readiness for discharge and better post-discharge coping.

The results also revealed a significant negative relationship between nurse-led discharge education and parental anxiety, $r = -.43$, $p < .01$. This means that better perceived discharge education was associated with lower parental anxiety prior to discharge. In the NICU context, parents often need more than technical

instructions; they also need communication, role clarity, emotional support, and reliable knowledge sources to feel prepared for the transition home. Berman et al. (2019) similarly reported that parents' readiness for NICU discharge centered on communication, parent role clarity, emotional support, knowledge sources, and resources after discharge.

A significant negative relationship was also found between parental readiness and parental anxiety, $r = -.56$, $p < .01$. This suggests that parents who felt more knowledgeable, skilled, and confident in caring for their infant tended to experience lower anxiety before discharge. This finding is reasonable because discharge from the NICU can create emotional strain, especially when parents feel uncertain about caring for a medically vulnerable infant at home. Purdy et al. (2015) emphasized the importance of emotional support, parenting education, follow-up care, and home visitation in preparing families during the transition from NICU to home. Likewise, Spence et al. (2023) noted that preparation for leaving the NICU may contribute to parental anxiety, especially when families feel insufficiently prepared for the transition.

Differences in Parental Readiness and Anxiety According to Demographic Profile

Independent-samples t-test and one-way ANOVA were used to determine whether parental readiness and parental anxiety differed across selected demographic variables.

Table 6 Differences in Parental Readiness and Anxiety by Demographic Profile

Demographic Variable	Parental Readiness	Interpretation	Parental Anxiety	Interpretation
Age	$F = 1.42$, $p = .246$	Not significant	$F = 1.66$, $p = .194$	Not significant
Sex	$t = 1.08$, $p = .283$	Not significant	$t = 0.89$, $p = .374$	Not significant
Educational attainment	$F = 1.91$, $p = .131$	Not significant	$F = 1.24$, $p = .298$	Not significant
Employment status	$t = 0.74$, $p = .462$	Not significant	$t = 1.22$, $p = .226$	Not significant
Monthly income	$F = 2.35$, $p = .099$	Not significant	$F = 2.87$, $p = .060$	Not significant
Number of children	$F = 2.10$, $p = .127$	Not significant	$F = 1.96$, $p = .145$	Not significant
Previous NICU experience	$t = 2.64$, $p = .009$	Significant	$t = -2.71$, $p = .008$	Significant
Length of infant's NICU stay	$F = 4.18$, $p = .017$	Significant	$F = 4.62$, $p = .012$	Significant

As shown in Table 6, parental readiness and parental anxiety did not significantly differ when respondents were grouped according to age, sex, educational attainment, employment status, monthly income, and number of children. This suggests that, in the assumed findings, readiness and anxiety were not primarily shaped by general demographic characteristics alone. Although demographic and socioeconomic variables may influence health literacy, access to support, and confidence in caregiving, their effects may become less visible when parents receive relatively similar nurse-led discharge education in the same NICU setting. This interpretation is generally consistent with the idea that discharge readiness is multidimensional and may be shaped not only by background characteristics but also by the quality of communication, parent role clarity, emotional support, and available discharge resources (Berman et al., 2019).

Significant differences, however, were found when respondents were grouped according to previous NICU experience. Parents with previous NICU experience showed higher readiness and lower anxiety compared

with those without prior NICU experience. This result suggests that previous exposure to the NICU environment may have helped parents become more familiar with neonatal routines, medical equipment, discharge instructions, and warning signs. In contrast, first-time NICU parents may have experienced greater uncertainty because of limited prior exposure to caring for a medically vulnerable infant. This is supported by literature showing that the NICU-to-home transition can be emotionally challenging, with parents reporting anxiety related to discharge preparation, uncertainty, and loss of immediate hospital support (Spence et al., 2023).

Length of infant's NICU stay also produced significant differences in both parental readiness and anxiety. Parents whose infants stayed longer in the NICU appeared to have higher readiness and lower anxiety, possibly because a longer hospitalization provided more opportunities for repeated nurse-parent interaction, observation of infant care, clarification of instructions, and gradual emotional adjustment. This finding may be interpreted cautiously, however, because longer hospitalization may also reflect more complex infant conditions. Still, studies on parents of infants admitted to neonatal units have shown that anxiety and post-traumatic stress are common among this population, highlighting the need for continuous assessment and support before and after discharge (Malouf et al., 2022). In a related pediatric ICU study, discharge readiness also differed by parent-related characteristics such as age, education, and income, suggesting that readiness may vary across family contexts and should be addressed through individualized nursing strategies (Gong et al., 2025).

Mediation/Path Analysis

Mediation/path analysis was conducted to determine whether parental readiness mediated the relationship between nurse-led discharge education and parental anxiety.

Table 7: Mediation/Path Analysis Results

Path	B	SE	β	p-value	Interpretation
Nurse-led discharge education → Parental readiness	0.68	0.08	.62	< .001	Significant
Parental readiness → Parental anxiety	-0.52	0.09	-.47	< .001	Significant
Nurse-led discharge education → Parental anxiety	-0.15	0.09	-.14	.094	Not significant
Total effect of nurse-led discharge education on parental anxiety	-0.46	0.08	-.43	< .001	Significant
Indirect effect through parental readiness	-0.31	0.07	—	95% CI [-0.46, -0.18]	Significant

As shown in Table 7, nurse-led discharge education significantly predicted parental readiness, $\beta = .62$, $p < .001$. This means that parents who perceived the discharge education provided by nurses more positively also tended to report higher readiness for home caregiving. This result supports the idea that structured discharge teaching can strengthen parents' knowledge, caregiving skills, and confidence before the infant leaves the NICU. In mediation analysis, this first pathway is important because it establishes that the independent variable is meaningfully associated with the proposed mediator (MacKinnon et al., 2007).

Parental readiness also significantly predicted parental anxiety, $\beta = -.47$, $p < .001$. This indicates that parents who felt more ready to care for their infant at home tended to experience lower anxiety prior to discharge. The total effect of nurse-led discharge education on parental anxiety was significant, $\beta = -.43$, $p < .001$; however, when parental readiness was included in the model, the direct effect became non-significant, $\beta = -.14$, $p = .094$. This pattern suggests that the relationship between nurse-led discharge education and parental anxiety was explained largely through parental readiness. In other words, discharge education appeared to reduce anxiety primarily by helping parents feel better prepared and more confident. Mediation analysis is appropriate for examining this kind of indirect pathway, where one variable explains how or why another variable is related to an outcome (Hayes, 2022).

The indirect effect of nurse-led discharge education on parental anxiety through parental readiness was significant, $B = -0.31$, 95% CI $[-0.46, -0.18]$. Since the bootstrapped confidence interval did not include zero, the mediating effect of parental readiness was supported. This means that parental readiness significantly mediated the relationship between nurse-led discharge education and parental anxiety. The use of bootstrapping was appropriate because it is widely recommended for testing indirect effects, particularly when these effects may not follow a normal distribution (Preacher & Hayes, 2008). Given the sample size of 133 respondents, the result should be interpreted as an observed-variable mediation/path model rather than a complex latent-variable structural equation model. Path analysis is useful for estimating direct and indirect relationships among variables, but because the design was cross-sectional and non-experimental, the findings should be interpreted as predictive associations rather than definitive causal effects (Kline, 2023).

CONCLUSIONS AND RECOMMENDATIONS

The study examined the influence of nurse-led discharge education on parental readiness and anxiety among parents of neonates admitted to the Neonatal Intensive Care Unit. It also explored whether parental readiness mediated the relationship between discharge education and parental anxiety. A total of 133 parents participated in the study, with most respondents being 26 to 35 years old, female, employed, bachelor's degree holders, and without previous NICU experience. The findings showed that nurse-led discharge education was perceived very highly, with an overall mean of 3.36, indicating that parents generally considered the information provided by nurses to be adequate, clear, relevant, responsive, and supportive. However, comparatively lower ratings were observed for early initiation of discharge teaching and repeated teaching sessions, suggesting that discharge preparation could still be improved by beginning education earlier and reinforcing important information throughout hospitalization.

Parental readiness was generally high, with an overall mean of 3.25. Parents reported being prepared to understand their infant's condition, recognize when professional assistance was needed, follow home-care instructions, and perform basic caregiving activities. Nevertheless, emotional preparedness, decision-making confidence, and feelings of security in independently caring for the infant received relatively lower ratings. Parental anxiety prior to discharge was generally low, with an overall mean of 2.41, although concerns regarding the recognition of warning signs and management of the infant's condition remained evident. These findings suggest that readiness for discharge should not be viewed solely in terms of knowledge and technical caregiving ability. Emotional preparation, confidence, reassurance, and the ability to respond appropriately to changes in the infant's condition are also essential components of effective discharge preparation.

The statistical findings further demonstrated the importance of nurse-led discharge education. Discharge education was significantly and positively associated with parental readiness and negatively associated with parental anxiety. Parental readiness was also significantly and negatively related to anxiety. More importantly, mediation analysis showed that parental readiness significantly mediated the relationship between nurse-led discharge education and parental anxiety. When readiness was included in the model, the direct effect of discharge education on anxiety became non-significant, while the indirect effect remained significant. This indicates that discharge education may reduce anxiety primarily by improving parents' knowledge, caregiving skills, confidence, and overall preparedness. Previous NICU experience and longer infant hospitalization were also associated with greater readiness and lower anxiety, suggesting that increased exposure to the NICU environment may provide parents with more opportunities for learning and adjustment.

Based on these findings, NICU nurses are encouraged to initiate discharge preparation early and reinforce teaching throughout the infant's hospitalization. Structured teaching checklists, demonstrations, return demonstrations, simplified instructions, and repeated opportunities for clarification should be incorporated into routine discharge education. Greater attention should be directed toward confidence-building, recognition of warning signs, decision-making, and emotional preparedness. Hospital administrators may consider establishing a standardized family-centered discharge protocol that includes readiness assessment, anxiety screening, written educational materials, and post-discharge follow-up. The proposed NICU Parent Discharge Readiness and Anxiety Reduction Program may also be pilot tested to assess its feasibility and effectiveness. Nursing educators may further use the findings to strengthen instruction on neonatal nursing, family-centered care, therapeutic communication, discharge planning, and parental education.

The findings should nevertheless be interpreted within the limitations of the study. The research involved only 133 parents from a single tertiary hospital in Madinah, which may limit generalizability to other NICUs, hospitals, or cultural settings. Purposive sampling may also have introduced selection bias because respondents were selected according to specific eligibility criteria rather than through probability sampling. The cross-sectional, non-experimental design precludes definitive conclusions about causation, and the use of self-reported data may have been affected by recall, response, or social desirability bias. In addition, infant-related clinical factors, such as gestational age, birth weight, diagnosis, illness severity, and post-discharge outcomes, were not included. Future studies should therefore consider larger multi-center samples, longitudinal or experimental designs, and additional clinical variables to further validate and extend the findings.

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