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Fathers' Stress in the Neonatal Intensive Care Unit

A Systematic Review

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ABSTRACT

Background: Admission to the neonatal intensive care unit (NICU) is stressful for parents. Nurses often focus on maternal well-being and fail to acknowledge the stress of fathers. Research on fathers' psychological stress is limited.

Purpose: A systematic review of the literature was completed to examine the extent of psychological stress and types of stressors in fathers with infants admitted to the NICU.

Methods/Search Strategy: A search of Ovid MEDLINE, Cochrane Library, PsycINFO, CINAHL, and EMBASE was conducted to identify descriptive and observational studies reporting father-specific stress in the NICU. Studies using observational and descriptive designs, published in English, and reporting father-specific stress outcomes during a NICU admission were eligible for inclusion. Strengthening the Reporting of Observational Studies in Epidemiology guidelines were used for quality assessment.

Results: Fifteen studies met inclusion criteria. Fathers find the NICU environment stressful and are more stressed than fathers of full-term, healthy infants. Parental role alteration, infant appearance, NICU environment, and staff communication are stressors.

Implications for Practice/Research: By recognizing the extent and types of psychological stress in fathers, nurses can provide better support for fathers in their new role. Younger fathers and those with very low birth-weight premature infants may need additional support and resources. Future research on fathers' stress should include larger sample sizes, diverse populations, and tool development and evaluation.

Key Words: fathers, neonatal intensive care unit, PROSPERO registration #CRD42016049285, psychological stress, special care nursery, stress

Admission rates in neonatal intensive care units (NICU) in the United States are on the rise. In a study of almost 18 million newborns from January 1, 2007, to December 31, 2012, in 38 states and the District of Columbia, crude admission rates increased from 64.0 to 77.9 per 1000 live births.¹ This represents an overall increase of 13.9% in admission rates, with a relative increase of 22% in the 5-year period. After adjusting for maternal and infant characteristics that may increase the chance for admission to the NICU (birth weight, gestational age, size for gestational age, gender, multiple gestation, method of delivery, Apgar score, maternal race/ethnicity, maternal age, maternal educational level, and parity), admission rates showed a similar relative increase of 23%.¹

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Having an infant admitted to the NICU is stressful and traumatic for parents.² Parents are often overwhelmed, grief stricken, and isolated.² They perceive the sounds of the NICU as very stressful and may be uncomfortable in the environment due to the noise.³ On the contrary, some parents feel the need to continuously stay at the bedside and protect their infant from the environment.³ Fathers, in particular, may feel a lack of control and those with very low birth-weight infants experience negative impacts on their work, health, and relationships with others.^{4,5} While fathers may cope with the stressors of their infant's NICU hospitalization by talking with their partners, many report not wanting to increase their partner's stress by discussing their own fears and worries.⁴ These behaviors may be interpreted by partners as the father appearing emotionally reserved and unsupportive.⁶

A qualitative study of 29 NICU parents found that participating in the care of their infant was a critical coping strategy, and observing their child's progress eased anxiety.⁶ Being encouraged by nurses to participate in care can make fathers feel important, relieve worry, and improve self-esteem and coping, where exclusion from care can contribute to distress.⁷ However, while nursing support may mediate fathers' stress, a Swedish study of child

healthcare nurses found that a vast majority of nurses (89%) reported, “it only occasionally or practically never came to their attention that a father was distressed.”^{8(p399)} Only 27% of the nurses in this study had attempted to identify fathers in distress. Even more alarming, less than 20% of nurses “had offered supportive counseling to any father during the previous year.”^{8(p399)}

Stress is often understood as a biophysical or psychological response to a stimulus. Psychological stress occurs when an individual cannot adequately cope with situational demands or threats to his or her well-being.⁹ Lazarus¹⁰ expands on this definition, viewing stress, emotion, appraisal, and coping as interdependent. Emotions convey how a person appraises and copes with a stressor and can be both positive and negative.¹⁰ Lazarus¹⁰ identifies 15 emotions that can be associated with a stressor: anxiety, anger, envy, jealousy, fright, shame, guilt, sadness, happiness, relief, hope, love, pride, gratitude, and compassion. Appraisal is the evaluation of a stressor or event that influences the stress response. Coping is the way in which an individual manages and regulates emotional responses to stressors. Reactions to stress and how individuals appraise and cope with an event are influenced by both environmental and personal variables. Environmental variables include demands, constraints, opportunities, and culture, while personal variables include goals and their hierarchies, resources, and beliefs about self and the world.¹⁰

Although considerable research has been completed on parental stress in the NICU, most of the research in the literature is focused on mothers. Research on paternal involvement in the NICU is lacking.⁴ Fathers in high-acuity settings have “long been neglected in studies on prematurity research”^{11(p16)} and much of the literature on family-centered care practices excludes the role of fathers.¹² While qualitative reviews have examined fathers’ experiences in the NICU,^{13,14} to date no systematic reviews of quantitative research on father specific psychological stress outcomes in the NICU have been published.

The purpose of this systematic review is to answer 2 questions: (1) what is the extent of psychological stress in fathers with an infant admitted to the NICU? And, (2) what are the types of psychological stressors for fathers with an infant in the NICU? Recommendations for nursing practice and future research will be provided on the basis of key findings of this review.

METHODS

A search of OVID Medline (1946-2016), EMBASE (1947-2016), Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled

Trials, PsycINFO (1800s-2016), and CINAHL (1937-2016) was conducted between September 28, 2016, and December 5, 2016 (L.Y. and P.P.). Using Boolean terms, Medical Subject Headings (MeSH), and truncation, the following search terms were used individually and in combination: fathers, father*, male parent*, dad, dads, daddy, daddies, (intensive care, neonatal), (intensive care units, neonatal), newborn, neonatal, intensive care, ICU, NICU*, (stress, psychological), stress, (psychological stress*), (life stress), (mental stress*), (mental suffering), anguish. Full search strategies for each database can be found in Table 1.

To fit the purpose of this systematic review, studies were included if they (1) used observational and descriptive designs; (2) were published in English; (3) reported father-specific stress outcomes; and (4) reported outcomes specific to the NICU or special care nursery during the time of hospitalization. Studies were excluded if they (1) used experimental, quasi-experimental, or qualitative designs; (2) reported only combined parent or mother-specific outcomes; (3) addressed only outcomes of anxiety, depression, acute stress disorder, and/or posttraumatic stress disorder; (4) addressed outcomes outside of the NICU or special care nursery; (5) addressed outcomes after discharge from the unit; and (6) were abstracts, incomplete reports, editorials, case studies, or anecdotal reports. Only published studies were included in this review.

Quality assessment was performed using Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.¹⁵ Two reviewers independently conducted quality assessment of included studies (P.P. and M.G.), with discrepancies resolved either through consensus or a third reviewer (C.R.). Quality scoring of each article can be found in Table 2. Twenty-two items were scored in relation to title, abstract, introduction, methods, results, and discussion.¹⁵ Items were scored as 0 (no information reported), 0.5 (partial information reported), or 1 (complete information reported), for a total possible score of 22.

Initial search of the databases identified 179 articles. An ancestry approach resulted in an additional 21 articles for review. After eliminating duplicates, 136 article titles and abstracts were reviewed to determine whether the study met inclusion or exclusion criteria, further eliminating 106 articles. After a full manuscript review of the remaining 30 articles, 15 articles were eliminated for the following reasons: 4 articles did not report father-specific data; 4 articles reported on acute stress disorder and/or posttraumatic stress disorder; 2 articles were not in English; 1 article did not report any stress outcome data; 1 article reported only on anxiety; 1 article defined stress only as emotional exhaustion; 1 article did not contain research data; and 1 article described

TABLE 1. Search Strategy

Database	Search String
Ovid MEDLINE	(exp Fathers/ OR father*.mp. OR (male parent*).mp. OR (dad OR dads OR daddy OR daddies).mp.) AND (exp Intensive Care Units, Neonatal/OR ((newborn or neonatal) adj2 (intensive care or ICU)).mp. OR NICU.ab,ti.) AND (exp Stress, Psychological/ OR Psychological Stress*.mp. OR life stress*.mp. OR psychologic stress*.mp. OR mental stress*.mp. OR mental suffering.mp. OR anguish.mp.)
EMBASE	('father'/exp OR 'father' OR father* OR male NEAR/2 parent* OR dad OR dads OR daddy OR daddies) AND ('newborn intensive care'/exp OR 'newborn intensive care' OR (newborn OR neonatal) NEAR/2 ('intensive care' OR icu) OR nicu*:ab,ti) AND ('mental stress'/exp OR 'mental stress' OR (mental OR psychological OR life OR psychologic OR nervous OR 'psycho-social' OR psychosocial) NEAR/2 (stress* OR tension) OR 'mental suffering' OR anguish)
Cochrane	(([mh "fathers"] OR father* OR "male parent*" OR dad OR dads OR daddy OR daddies) AND ([mh "intensive care units, neonatal"] OR ((newborn or neonatal) near/2 ("intensive care" OR ICU)) OR NICU*) AND ([mh "stress, psychological"] OR psychological stress* OR life stress* OR psychologic stress* OR mental stress* OR "mental suffering" OR anguish)
PsycINFO	(DE "Fathers" OR father* OR "male parent*" OR dad OR dads OR daddy OR daddies) AND (DE "Neonatal Intensive Care" OR ((newborn or neonatal) N2 ("intensive care" OR ICU)) OR NICU*) AND (DE "Psychological Stress" OR psychological stress* OR life stress* OR psychologic stress* OR mental stress* OR "mental suffering" OR anguish)
CINAHL	(MH "Fathers" OR father* OR "male parent*" OR dad OR dads OR daddy OR daddies) AND (MH "Intensive Care, Neonatal" OR MH "Intensive Care Units, Neonatal" OR ((newborn or neonatal) N2 ("intensive care" OR ICU)) OR NICU*) AND (MH "Stress, Psychological" OR (MH "Stress") OR psychological stress* OR life stress* OR psychologic stress* OR mental stress* OR "mental suffering" OR anguish)

only a conceptual model of stress. The remaining 15 articles meeting inclusion criteria were included in this review (Table 3). Steps of the literature search can be found in the Figure.

Details of the protocol for this systematic review were registered on PROSPERO (registration #CRD42016049285) and can be accessed at https://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42016049285

RESULTS

Of the 15 studies included, study years ranged from 1990¹⁷ to 2016,^{18,19} with 3 studies published between 1990 and 1999,^{17,20,21} 7 from 2000 to 2009,²²⁻²⁸ and 5 from 2010 to 2016.^{18,19,29-31} The studies represented 11 countries: the United States (n = 6),^{21,23-25,27,30} Portugal (n = 1),¹⁸ New Zealand (n = 2),^{22,29} India (n = 2),^{19,28} Japan (n = 1),²⁹ Canada (n = 2),^{17,20}

TABLE 2. STROBE Quality Scoring

	Title and Abstract	Introduction	Methods	Results	Discussion	Funding	Total Score
Baía et al (2016)	1	2	7	4	2.5	1	17.5
Carter et al (2007)	0.5	2	6	5	2.5	1	17
D'Souza et al (2009)	1	2	6.5	3	2.5	0	15
Dudek-Shriber (2004)	0.5	2	6	4	4	0	16.5
Dutta et al (2016)	0.5	1.5	7.5	4	2	1	16.5
Ichijima et al (2011)	1	2	7.5	3.5	3.5	0	17.5
Joseph et al (2007)	0.5	2	5	2	3	0	12.5
Lee et al (2005)	1	2	7	3	3	1	17
Mackley et al (2010)	1	1.5	6.5	3.5	4	0	16.5
Miles et al (1992)	0.5	2	6.5	3	3	1	16
Perehudoff (1990)	0	2	6	3.5	1.5	0	13
Rimmerman and Sheran (2001)	0.5	2	6	5	1.5	0	15
Shields-Poë and Pinelli (1997)	1	2	8.5	3.5	1.5	1	17.5
Spear et al (2002)	0.5	2	6	4.5	2	0	15
Wormald et al (2015)	1	2	7.5	4	3	1	18.5

TABLE 3. Characteristics of Selected Studies

Author (Year)	Purpose	Theory/Design/Tools	Setting/Sample	Findings
Baia et al (2016)	To identify sources of stress in mothers and fathers of very preterm infants hospitalized in the NICU, and their association with sociodemographic, obstetric, and infants' characteristics	Theory: None stated Design: Cross-sectional Tool: PSS:NICU (Portuguese version)	Setting: Seven Level III NICUs in Northern Health Region of Portugal Sample: 211 parents (fathers, n = 91) of very preterm infants born between July 1, 2013, and June 30, 2014 Age: ≥ 30 y (75.8%) Married: 87.9% Education: ≤ 12 y (70.3%)	Fathers perceived the overall experience of hospitalization in the NICU as stressful (median = 3.0); parental role alteration was classified as the most stressful dimension (median = 3.2); fathers < 30 y had higher levels of stress on all subscales and overall stress; fathers of extremely preterm or extremely low birth-weight infants had higher levels of overall stress (median = 4.0); fathers of extremely low birth-weight infants had higher stress levels attributed to how the baby looks and behaves (median = 3.8); educational level, previous pregnancies, previous children, pregnancy complications, mode of delivery, extremely preterm delivery had no significant associations with stress.
Carter et al (2007)	To examine and compare sources of stress for mothers and fathers who had an infant admitted to a NICU; to explore the contribution of individual, family, and pregnancy factors to mothers' and fathers' stress levels	Theory: None stated Design: Cross-sectional Tool: PSS:NICU	Setting: Christchurch Women's Hospital level III NICU in New Zealand Sample: 172 cohabitating couples recruited from a larger study of randomly recruited parents with an infant admitted to the NICU between February 2001 and February 2002 Age: mean = 33.1 Married: 118 (68.6%) Years of secondary education: None: 28 (16.3%) One: 47 (27.3%) Two: 43 (25%) Three: 54 (31.4%)	Parental role alteration was the most stressful dimension for fathers; mean total stress score for fathers was 1.7 (± 0.06) irrespective of income or whether they were married or cohabitating; fathers with a history of alcohol/drug dependence had high parental role stress (mean = 2.7, SD = 0.06); fathers whose partners were transferred during pregnancy due to complications reported more total NICU stress and stress related to staff communications/behaviors; fathers' stress levels were not affected by a previous NICU admission

(continues)

TABLE 3. Characteristics of Selected Studies (Continued)

Author (Year)	Purpose	Theory/Design/Tools	Setting/Sample	Findings
D'Souza et al (2009)	To examine the relationship between stress, coping, and nursing support perceived by parents of preterm infants; identify the difference in levels of stress among parents of preterm infants	Theory: Parental stress conceptual model (Miles, 1989); Ways of Coping model (WOC); Nursing Mutual Participation model of care (NMPMC) Design: Cross-sectional Tool: PSS:NICU (Kannada version)	Setting: Six tertiary-level NICUs in hospitals of Karnataka, India Sample: Convenience sample of 100 parents (fathers, n = 38) Age: mean = 36.39 Married: Father-specific NR Education: Father-specific NR	The mean total stress score for fathers was 131.32 (SD = 22.51), indicating a moderate stress level
Dudek-Shriber (2004)	To determine the occurrence of stress, the overall stress level, and the frequency of stress experienced by parents of infants in the NICU; to determine which infant and parent characteristics result in significantly different stress scores; to determine the influence of both infant and parent characteristics in predicting stress for parents who have an infant in the NICU	Theory: The Parental Stress Intensive Care Unit Model Design: Cross-sectional Tool: PSS: NICU	Setting: Level II and level III nurseries in a large urban hospital in the United States Sample: Convenience sample of 181 parents (fathers, n = 32); father-specific demographics not reported; however, "most of the parents were white (80.9%) and married (61%)" with "various educational levels" represented	Fathers experienced a high level of stress on the sights and sounds subscale (frequency mean = 5.0, SD = 0.00); fathers were moderately stressed in the relationship/parental role subscale (mean = 2.84, SD = 0.87)
Dutta et al (2016)	To study stress in fathers of preterm infants admitted in a neonatal intensive care unit	Theory: None stated Design: Longitudinal Tool: Author developed Paternal Stress Questionnaire derived from the PSS:NICU; Raw scores of each domain were expressed as Domain-specific Percent Stress Scores (DPSS) of the maximum possible domain score. The Mean Percent Stress Score (MPSS) was the arithmetic mean of the 6 DPSS.	Setting: Level III public sector neonatal unit; Northern India Sample: Convenience sample of fathers (n = 80); 80 fathers interviewed on day 7, 59 fathers interviewed on day 17, 28 fathers interviewed on day 27 Age: Median = 29 Married, y: Median = 3 Education: >10th grade: 45 (56.2%) 6th to 10th: 30 (38.4%) <6th: 7 (9.6%)	Total stress scores showed a declining trend between the first and second interviews, with raw stress scores of staff behavior and parental role decreasing significantly; raw stress scores of finances and home affairs showed an increasing trend between the first and second interviews; father's age, family income, birth weight, and educational and occupational status of father were either associated with or had a trend toward association with the MPSS in the first interview; father's age, birth weight, father educated to 11-12 grade, and father employed as either daily wage or skilled laborer were independent predictors of the MPSS

(continues)

TABLE 3. Characteristics of Selected Studies (Continued)

Author (Year)	Purpose	Theory/Design/Tools	Setting/Sample	Findings
Ichijima et al (2011)	Examine sources of parental stress in 2 neonatal intensive care units (NICUs) located in New Zealand and Japan; explore how cultural norms of NICU care environments influence parental stress-related experiences and nursing support	Theory: Relational approach to family nursing Design: Comparative Tool: PSS: NICU	Setting: Two NICUs in Christchurch (New Zealand) and Tokyo (Japan); November 2007 to June 2008 Sample: 121 parents (Christchurch fathers, n = 30; Tokyo fathers, n = 30) Christchurch fathers: Age: mean = 35 Married: NR Education: Secondary: 31% ≥ Tertiary University degree: 31% Trade/Professional: 38% Ethnicity: New Zealand Europeans (>70%) Tokyo fathers: Age: mean = 33 Married: NR Education: Secondary: 31% ≥ Tertiary University degree: 69% Trade/Professional: 0% Ethnicity: Japanese (100%)	For Christchurch fathers, the infants' post-menstrual age was positively correlated with stress levels in baby's appearance and behavior ($P < .001$) and parental role alteration subscales ($P = .004$); the younger the father, the higher the stress level in the parental role alteration subscale. Tokyo fathers experienced a greater degree of stress in the baby's appearance and behavior when no other people visited their infants and when their infants required tube feeding for a longer period; duration of tube feeding and traveling hours from home to hospital was positively related to the level of stress in parental role alteration ($P = .003$ and $P = .04$, respectively)
Joseph et al. (2007)	To identify and measure components of perceived stress in fathers of infants in a surgical neonatal intensive care unit	Theory: None stated Design: Cross-sectional Tool: PSS:IH	Setting: The NICU at a pediatric teaching hospital in the mid-Atlantic region Sample: 22 fathers of infants admitted to the NICU for a minimum of 7 days Age: > 18 Married: NR Education: "varying" Ethnicity: NR	The PSS:IH total stress score for individual fathers ranged from 46 to 96 (maximum possible score = 110); mean total stress score was 73 (SD = 16); all fathers had total stress scores greater than 45 regardless of infant diagnosis or duration of stay; parental role alteration and infant appearance factors overall were associated with elevated stress levels; sight and sounds were not scored as very or extremely stressful; unable to protect from pain, separation from baby, seeing the baby in pain, unable to comfort and help, and breathing problems in the baby were the most significant stress factors for most fathers

(continues)

TABLE 3. Characteristics of Selected Studies (Continued)

Author (Year)	Purpose	Theory/Design/Tools	Setting/Sample	Findings
Lee et al (2005)	To describe the stressful experiences that Chinese American parents had while their infant was in the ICU and assess the influence that acculturation, personal/family characteristics, and uncertainty regarding the infant's illness had on the degree of stress experienced by both mothers and fathers	Theory: Stress-Coping Model for Chinese American Parents with a Critically Ill Child Design: Cross-sectional Tool: PSS:IH	Setting: Three teaching hospitals in San Francisco, California Sample: Convenience sample of 30 families (fathers, n = 25); of the 30 families, 26 were recruited from a tertiary neonatal ICU and the other 4 families were from a tertiary pediatric ICU or cardiac ICU Age: Mean = 33.4 (24-42) Married: 23 Education: Middle school: 2 High school: 6 College: 13 Graduate school: 4 Ethnicity (country of origin): Mainland China: 13 Hong Kong: 3 United States: 4 Other Asian area: 5	Fathers found their experiences moderately stressful (mean = 2.9, SD = 0.94); infant appearance and behavior was the most stressful (mean = 3.5; SD = 1.03), followed by an alteration in parental role function (mean = 3.1, SD = 1.06 for fathers) and healthcare provider (HCP) communication (mean = 2.4, SD = 1.47); HCP behavior and ICU environment were the stressors with the least impact
Mackley et al. (2010)	To evaluate and compare the presence of perceived paternal stress and depressive symptomatology in fathers of preterm infants over time.	Theory: None stated Design: Longitudinal Tool: PSS:IH	Setting: Level III NICU in a mid-Atlantic academic center. Sample: Convenience sample of 35 fathers; 35 fathers completed the questionnaire at time 1; 30 fathers completed the questionnaire at time 2; 24 at time 3. Age: Mean = 29 Married: 49% Education: >High school: 35% Ethnicity: White: 54% African American: 40%	PSS:IH total scores and subscale scores did not change over time ($P < .05$); unmarried status and presence of private insurance were significantly associated with higher total scores at the initial baseline measurement but not at subsequent time points; there was no interaction between PSS:IH scores over time and married status or use of Medicaid; infant illness severity and education level did not have an effect on stress

(continues)

TABLE 3. Characteristics of Selected Studies (Continued)

Author (Year)	Purpose	Theory/Design/Tools	Setting/Sample	Findings
Miles et al (1992)	To explore differences in the responses of mothers and fathers with a premature infant in a NICU	Theory: Stress theory Design: Longitudinal Tool: PSS:NICU	Setting: 14-bed level III NICU and a 14-bed intermediary care nursery in a southeastern university medical center; 26-bed level III NICU in a midwestern university medical center, and a 24-bed level II NICU in a midwestern community hospital Sample: 23 couples who participated in a larger study that explored parental responses to the hospitalization of a premature infant in the NICU; interviewed within a week of admission (time 1) and again 1 wk later (time 2) Age: Mean = 29 (20-41) Married: 91% Education: Average of 14 y of education Ethnicity: White (87%)	Fathers perceived the NICU environment to be more stressful at time 1 than at time 2; fathers found parental role alteration the most stressful (mean = 2.7 time 1; mean = 2.48 time 2)
Perehudoff (1990)	To determine the degree of stress related to the NICU environment as perceived by mothers and fathers during the first week of their infant's admission; to investigate the relationship of gestational age, birth weight, and paternal attitude toward caregiving to the perceived degree of environmental stress.	Theory: Miles and Carter's (1983) conceptual framework: Understanding Parental Stress in the Intensive Care Unit Design: Comparative Tool: PSS:NICU	Setting: Tertiary-level NICU in a large urban children's hospital in western Canada Sample: Convenience sample of 31 parents (fathers, n = unknown) Age: Mean = 31.2 Married: NR Education: 83.9% ≥High school Ethnicity: NR	Fathers' total environmental stress scores ranged from 27 to 105 (maximum possible score of 230), with a mean of 59.7 (SD = 21.1); fathers' responses to the final item of the stress scale (how stressful the total NICU experience has been for them) resulted in a mean score of 2.03 (SD = 1.24); fathers' scores indicated that sights and sounds caused the highest stress, followed by parental role alteration, infant's appearance and behavior, and staff communications and relations

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TABLE 3. Characteristics of Selected Studies (Continued)

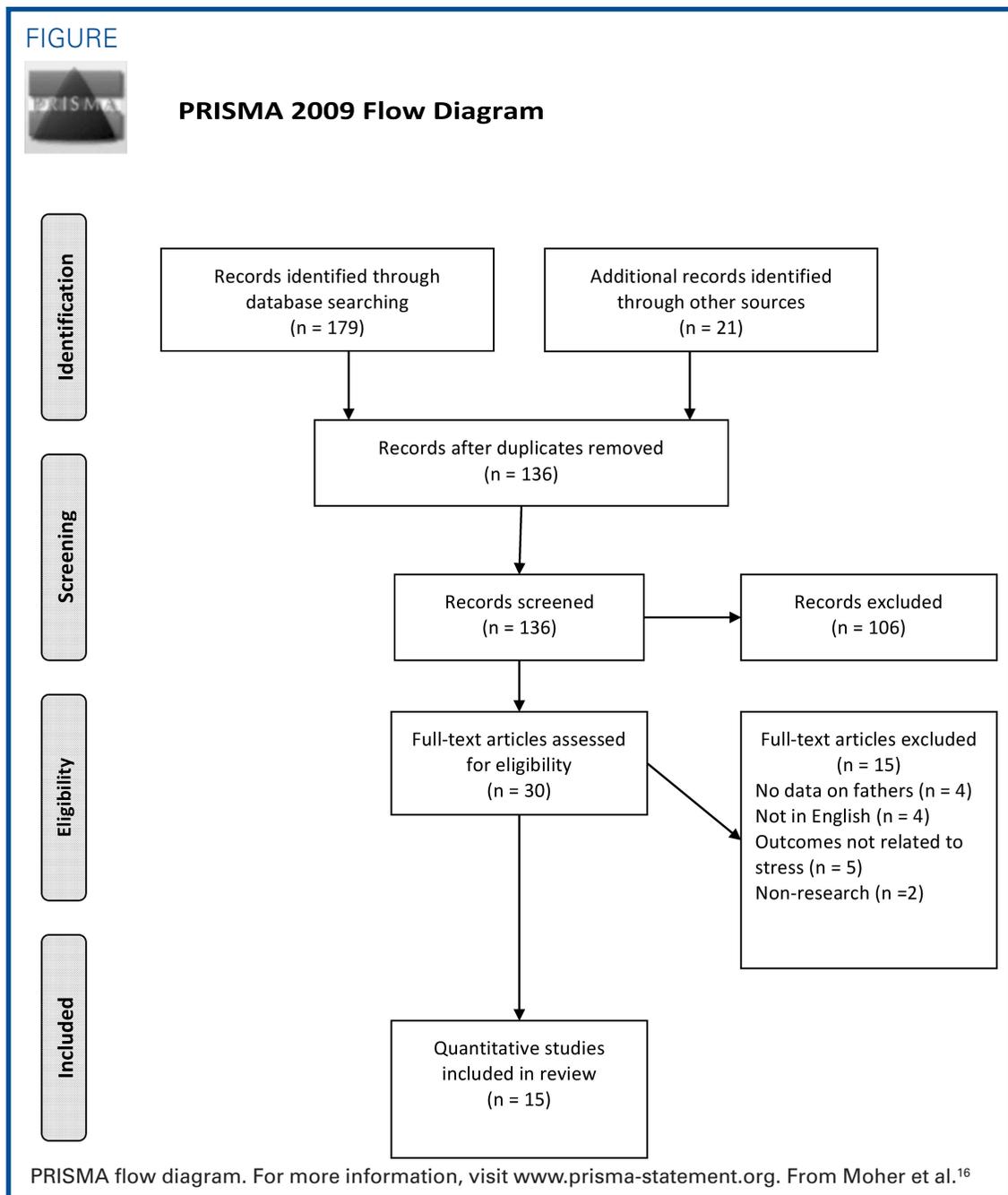
Author (Year)	Purpose	Theory/Design/Tools	Setting/Sample	Findings
Rimmerman and Sheran (2001)	Compares new fathers of preterm/full-term babies with respect to the following variables: parental stress, mastery, self-esteem, involvement with the child, and depression	Theory: None stated Design: Comparative Tool: Five subscales concerning parental stress, depression, mastery, self-esteem, and involvement with the child; PSI	Setting: Rabin Medical Center, Petah Tiqwa, Israel; May 1994 to April 1995 Sample: 120 fathers to first-born children born (62 new fathers to preterm infants; 58 new fathers to full-term babies born in the same period) Preterm fathers: Age: mean = 29.1 Married, y: Mean = 2.4 Education, y: Mean = 13.4 Ethnicity (country of origin): Israel: n = 46 Europe/America: n = 11 Asia/Africa: n = 5 Full-term fathers: Age: Mean = 29.5 Married, y: Mean = 2.6 Education, y: Mean = 13.3 Ethnicity (country of origin): Israel: n = 50 Europe/America: n = 7 Asia/Africa: n = 1	Fathers of preterm infants had significantly higher parental stress level scores than fathers of full-term infants (mean = 201.26 vs mean = 159.77, respectively)
Shields-Poë and Pinelli (1997)	To identify sources of stress in the NICU for parents and any parental or situational characteristics or behaviors that appeared to aggravate or alleviate the stress	Theory: None stated Design: Cross-sectional Tool: PSS:NICU	Setting: Two NICUs in a large metropolitan Canadian city Sample: Stratified sample of 212 parents (fathers, n = 90) Age: Mean = 30.03 Married: 90% Education: 46% college or higher education Ethnicity: 81% Canadian born	PSS:NICU total scores ranged from 14 to 209 for fathers; perceived infant morbidity, and the gap between fathers' perceived infant morbidity and the neonatal morbidity score contributed to greater stress ($P = .005$); attendance at religious services was significant, with those never attending reporting lowest stress scores and occasional attendees reporting the highest stress scores; unwanted pregnancy, fathers' trait anxiety, and seeing the infant in the NICU within the first 24 h was associated with high stress scores; interacting with a social worker was associated with lower scores for fathers

(continues)

TABLE 3. Characteristics of Selected Studies (Continued)

Author (Year)	Purpose	Theory/Design/Tools	Setting/Sample	Findings
Spear et al (2002)	To assess family stress, coping, perceptions of their infant, and alterations in mood that may result from the hospitalization of a critically ill newborn infant	Theory: None stated Design: Longitudinal Tool: PSS:NICU	Setting: Special Care Nursery at Christiana Care Health Services Sample: 27 families (mothers and/or fathers) completed 4 questionnaires at 2-wk intervals from July 24, 1998, through June 4, 1999; with no significant differences between time period 1 and time period 2, data analysis reflects only time period 1 Time 1 (fathers, n = 15) Age: NR Married: NR Education: NR Ethnicity: White: 9 African American: 4 Latino: 1 Asian: 1	There was no effect of parent gender on any of the questionnaire results; analysis of cofactors and confounding variables did not produce significant results
Wormald et al (2015)	To determine early stress in parents of VLBWIs hospitalized in the NICUs participating in the Neocosur South American Neonatal Network, to identify associated factors, and to compare the level of parental stress between public and private sites	Theory: None stated Design: Cross-sectional Tool: PSS:NICU	Setting: Twelve neonatology units in the Neocosur Network from 4 countries (Argentina, Chile, Paraguay, and Peru) Sample: 273 fathers and mothers of VLBW preterm infants (fathers, n = 27.5%) No father-specific demographics reported	Fathers found parental role alteration the most stressful (mean = 3.10) and sights and sounds least stressful (mean = 2.49); mean total stress score for fathers = 2.82

Abbreviations: NICU, neonatal intensive care unit; NR, Not Reported; PSI, Parenting Stress Index; PSS:IH, Parental Stressor Scale: Infant Hospitalization; PSS:NICU, Parental Stressor Scale: Neonatal Intensive Care Unit; VLBWIs, very low birth-weight infants.



Israel (n = 1),²⁶ Argentina (n = 1),³¹ Chile (n = 1),³¹ Paraguay (n = 1),³¹ and Peru (n = 1).³¹ Of the 13 articles (86.7%) reporting separate father sample sizes, a total of 863 fathers were included, with a range of 22 to 172.^{18–26,28–31} For those studies reporting father-specific demographics, the majority of fathers were around 30 years of age, married, well educated, and employed.^{17–20,22,25,26,29,30} The majority of participants from the United States were white.^{21,23,30}

Several research designs were used in the studies. Eight of 15 studies (53.3%) used a cross-sectional design.^{18,20,22–25,28,31} Four studies (26.7%) used a

longitudinal approach.^{19,21,27,30} The remaining 3 studies (20%) used a comparative design.^{17,26,29}

Of the 15 studies, 10 (66.7%) used the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS:NICU),^{17,18,20–23,27–29,31} 3 (20%) used the Parental Stressor Scale: Infant Hospitalization (PSS:IH),^{24,25,30} 1 used the Parenting Stress Index,²⁶ and 1 developed a Paternal Stress Questionnaire derived from the PSS:NICU.¹⁹

The PSS:NICU is based in stress theory and focuses on environmental stressors within the NICU.³² Adapted from the Parental Stressor Scale: Pediatric Intensive Care Unit, an early version of the PSS:NICU

included 4 dimensions: infant behavior and appearance, parental role alteration, sights and sounds, and staff behavior and communication. A more recent, revised version keeps 3 dimensions (parental role alteration, infant's appearance, and sights and sounds) but drops the fourth dimension of staff communication as it was rarely experienced by parents.³² Of the 10 studies using the PSS:NICU, 5 studies used the 4 subscale version,^{17,20,22,23,27} while 5 studies used the PSS:NICU with 3 subscales.^{18,21,28,29,31} On either version, participants rate stressfulness on each item from 1 (not at all stressful) to 5 (extremely stressful). The PSS:NICU can be scored by Stress Occurrence Level (metric 1), Overall Stress Level (metric 2), or by calculating frequencies on each subscale. Mean scores are calculated for both metrics and frequencies. Metric 1 measures stress related to a particular situation in the NICU, with parents not having experienced an item receiving a zero. Metric 2 measures the level of stress experienced, with parents not experiencing stress on an item receiving a score of 1. Frequency scores indicate the total number of items parents have experienced.

The PSS:IH was adapted from the PSS:NICU to provide a scale for parents with a hospitalized infant in any inpatient pediatric unit.³³ The 3 subscales of parental role alteration, infant appearance and behavior, and sights and sounds remain the same, with individual items dropped for low means, redundancy, low coefficients, and nonapplicability. Scaling and scoring remains the same as the PSS:NICU.³³

The Parenting Stress Index, developed by Richard R. Abidin, measures stress in the parent-child dyad due to characteristics of the child, parent, and situation.³⁴ The 120-item self-report questionnaire includes items in 2 domains, child and parent. The child domain consists of 6 subscales: distractibility/hyperactivity, adaptability, reinforces parent, demandingness, mood, and acceptability. The parent domain has 7 subscales: competence, isolation, attachment, health, role restriction, depression, and spouse.

Six of the 15 studies (40%) reported theoretical frameworks. D'Souza et al²⁸ used the Parental Stress conceptual model, Ways of Coping model, and the Nursing Mutual Participation Model of Care. Dudek-Shriber²³ used the Parental Stress Intensive Care Unit model. Ichijima et al²⁹ applied the Relational Approach to Family Nursing. Lee et al²⁵ used the Stress-Coping Model for Chinese-American Parents with a Critically Ill child, which was adapted from the ICU Parental Stress Framework and the Asian-American Assimilation Model. Miles et al²¹ applied stress theory and Pehredoff¹⁷ used Understanding Parental Stress in the Intensive Care Unit.

Extent of Stress

Fathers found the overall NICU experience to be moderately stressful.^{17,18,20–28,30,31} Fathers of preterm infants

were found to have significantly higher parental stress-level scores (Parenting Stress Index; mean = 201.26, SD = 13.47, $P < .001$) than fathers of full-term infants (mean = 59.77, SD = 17.04).²⁶ Fathers younger than 30 years had higher levels of overall stress (PSS:NICU; median = 4.0), along with fathers of an extremely preterm infant (median = 4.0) or an extremely low birth-weight infant (median = 4.0).¹⁸ While Mackley et al³⁰ found that the PSS:IH total and subscale scores did not change over time ($P < .05$), Miles et al²¹ reported a decrease in NICU environmental stress between the first week of admission and 1 week later.

Types of Stressors

Parental Role Alteration

Many fathers reported the alteration in parental role as highly stressful.^{18,24} Fathers in the study by Baía et al¹⁸ found parental role alteration as the most stressful subcategory on the PSS:NICU (median = 3.2). Joseph et al²⁴ also found this category highly stressful for fathers, which included the most stressful item of being unable to protect the infant from pain (PSS:IH; mean = 4.4, SD = 0.7). Fathers with a history of alcohol or drug dependence experienced increased parental role stress (mean = 2.7, SD = 0.06).²² Fathers in Tokyo experienced role alteration stress with extended commutes from hospital to home ($P = .04$) and if their infant required prolonged tube feedings ($P = .003$); fathers in Christchurch, New Zealand, had positive correlations in stress levels due to fathers' age ($P = .037$) and infants' postmenstrual age ($P = .004$).²⁹ Younger fathers experienced more stress in the parental role.²⁹ Miles et al²¹ reported a decrease in parental role alteration stress over time.

Infant's Appearance and Behavior

The infants' appearance was significantly associated with elevated stress levels for fathers (mean = 3.7),²⁴ and fathers of extremely low birth-weight infants had higher stress levels in this subscale (median = 3.4).¹⁸ Lee et al²⁵ found that the infants' appearance and behavior had the greatest impact on fathers' stress when compared with other subscales (mean = 3.5, SD = 1.03). Shields-Poë and Pinelli²⁰ found an increase in a father's stress related to infant appearance when a gap existed between the neonatal morbidity scale score and his perceived morbidity of the infant ($P = .005$). Unwanted pregnancy,²⁰ infants' postmenstrual age, lack of other visitors, and prolonged tube feedings²⁹ also contributed to elevated stress for fathers in this subscale. Stress related to the appearance and behavior of the infant may decrease significantly over time.²¹

Sights and Sounds

Studies reported conflicting findings for fathers in the sights and sounds subscale. Pehredoff¹⁷ found

that sights and sounds of the NICU caused the highest stress in fathers. Dudek-Shriber²³ also reported that fathers were highly stressed in this subscale (frequency mean = 5.00, SD = 0.00). However, Joseph et al²⁴ found this to be the lowest of all subscales for fathers. The level of fathers' stress from sights and sounds did not appear to be affected by whether or not the father had experienced a previous NICU admission.²²

Staff Behavior and Communication

Shields-Poë and Pinelli²⁰ found that a father's perceived illness of his infant contributed most to his staff behavior and communication stress scores ($P = .009$), along with length of stay ($P = .01$). An interaction effect between the perceived illness of the infant and whether the pregnancy was wanted also impacted scores in this subscale.²⁰ Fathers whose partners were transferred for complications before birth had higher stress scores with staff (mean = 1.9, SD = 0.20 vs mean = 1.6, SD = 0.04).²² This subscale was ranked as the lowest source of stress for fathers in the studies by both Lee et al²⁵ and Perehudoff.¹⁷ When examining the impact of acculturation on stress in Chinese Americans, Lee et al²⁵ found that those fathers with higher acculturation scores reported lower stress in healthcare provider communication.

Other Stressors

Baía et al¹⁸ found no significant associations between education level, previous pregnancies, previous children, mode of delivery, pregnancy complications, or extremely preterm birth with parental stress. While Carter et al²² found that total stress scores were not associated with income, Dutta et al¹⁹ discovered that financial burden was the biggest source of stress for fathers, and concerns over finances and home affairs increased over time. The authors also found associations between mother's age, father's age, income, infant's birth weight, and father's education and employment and Mean Percent Stress Score (MPSS) scores during the first interview.¹⁹

Joseph et al²⁴ found that the most significant stress factors for fathers were seeing the infant in pain (mean = 4.2), being unable to comfort and help (mean = 4.1), separation from the infant (mean = 4.0), and breathing problems in the infant (mean = 4.3). Shields-Poë and Pinelli²⁰ reported trait anxiety, timing of seeing the infant for the first time, communication with a social worker, and the time of the interview as significant variables for a fathers' stress. Frequency of attendance at religious services also impacted stress scores, with those never attending having the lowest scores and occasional attenders having the highest.²⁰ While Shields-Poë and Pinelli²⁰ saw no impact in total stress scores due to marital status, Mackley et al³⁰ found that unmarried status

was significantly associated with higher initial PSS:IH scores, though not at later time points. Infant illness severity, use of Medicaid, and education level did not have an effect on paternal stress.³⁰ Worrying about the future impact of their infants' illness, strong belief in Asian values, and perceived lack of support contributed to stress in Chinese American fathers.²⁵ The infants' gender was not found to cause stress.²⁵

Quality Scoring

Total STROBE quality scores for the included studies ranged from 12.5²⁴ to 18.5,³¹ with a mean score of 16. Sixty percent ($n = 9$) of studies lacked a theoretical basis.^{18–20,22,24,26,27,30,31} Research design was described in only 7 of the 15 articles (46.7%).^{17–20,25,28,31} Four studies (26.7%) used a power analysis to determine sample size.^{19,20,23,31} Convenience sampling was used by 13 studies (86.7%) and 8 studies (53.3%) were conducted in a single-center setting. All but one study reported significant findings related to the influence of parents' gender on stress, regardless of STROBE score. Spear et al²⁷ found no effect of parent gender on any of the questionnaire items (PSS:NICU) (STROBE score of 15). Results in this study were presented as combined scores of mothers and fathers. The sample size for this study was small (fathers, $n = 15$).

DISCUSSION

The purpose of this systematic review was to answer 2 questions: (1) what is the extent of psychological stress in fathers with an infant admitted to the NICU? (2) What are the types of psychological stressors for fathers with an infant in the NICU?

Fathers of infants in the NICU experience stress, particularly those with extremely low birth-weight or preterm infants.^{18,26} Young fathers tend to have higher levels of stress due to the NICU environment.¹⁸ The studies that included both parents in the sample reported either similar levels of stress between parent genders, or fathers experiencing less stress than mothers.^{17,18,20–23,25,27–29,31}

Alteration in the parental role was stressful for fathers, although this decreased over time.^{18,24} The infant's appearance and behavior was a stressor, especially for those fathers of extremely low birth-weight infants.^{18,24} Stress due to infant appearance also decreased over time.²¹ Reports of stress due to the sights and sounds of the NICU were conflicted, with studies reporting this being the stressor with either the most impact or the least impact on fathers.^{23,24} Staff communication and behavior were the lowest stressors for fathers and were found to correlate with the fathers' perceived severity of illness of their infant and whether the pregnancy was wanted.^{17,20,25}

Other stressors impacting fathers' psychological stress included parents' age, fathers' employment status, inability to help and comfort the infant in times of pain, separation from the infant, and lack of support.^{19,24,25} Previous pregnancies and children, mode of delivery, pregnancy complications, and infants' gender did not appear to affect stress in fathers.^{18,25} Contradictory findings were reported as to whether education level, income, or marital status had an influence on stress levels.^{18–20,22,24,30}

It is important to note that the focus of the PSS:NICU and the PSS:IH is the impact of the NICU environment on parental stress. These instruments may not fully capture what fathers consider to be stressors. Hugill et al³⁵ found that fathers of preterm infants have a difficult time balancing emotional and physical demands. Fathers often fall back onto stereotypical male roles to cope by withdrawing, hiding and controlling emotions, and becoming disconnected.^{35,36} Fathers are concerned with job responsibilities and providing financially for the family, and may feel inadequate in their role as family provider.³⁸ They can feel alienated,^{36,38} pressured to perform their role perfectly, and are often more concerned with their partner's well-being than the infant.³⁶ Speaking up to healthcare workers and others about their concerns is difficult.³⁶

In a metaethnographic synthesis of fathers' experiences in the NICU, Sisson et al¹³ discovered several challenges men face. Proximity to their infant, paternal autonomy, vulnerability, communication with staff, and perceived exclusion and isolation played a significant role in whether a father had positive or negative experiences during the NICU stay. Similarly, Provenzi and Santoro's¹⁴ systematic review on qualitative studies revealed fathers' emotional states, describing the birth of a preterm infant as a "roller-coaster". Fathers often hid their own feelings and concentrated on their work. Staff communication and participating in infant care were important in promoting a positive experience.

Strengths and Limitations

A strength of the reviewed studies was the use of well validated and reliable instruments.^{32–34} However, as with previous research, father-specific data and findings were limited in the reviewed studies. Participants were generally white (US), employed, well educated, and married. Only 4 of the 15 (26.7%) studies focused on just fathers, with the majority of studies reporting findings on both parents combined. Most studies did not include a theoretical basis or explanation for research design. Sample sizes lacked sufficient power and had limited generalizability.

Five of the 15 studies (33%) reported steps taken to address bias.^{20,25–27,29} Ichijima et al²⁹ compared baseline demographics between New Zealand and Japanese participants to assess selection bias. Lee

et al²⁵ performed χ^2 analysis and analysis of variance to determine that there were no significant differences between participants among the 3 hospital settings. Rimmerman and Sheran²⁶ matched fathers of preterm infants to fathers of full-term infants and compared baseline demographic data. Shields-Poë and Pinelli²⁰ addressed both volunteer and selection bias by assessing differences between nonparticipants and participants and performing χ^2 analysis and analysis of variance on parent groups between the 2 settings. Finally, Spear et al²⁷ found no significant differences in demographic variables between families that were dropped out after completing only 2 questionnaires.

Implications for Research and Practice

Results from this systematic review emphasize the need for continuing research of fathers' emotional needs in the NICU. Much of the reviewed literature on parental stress in the NICU is focused on comparing differences in stress between mothers and fathers. According to the studies included in this review, fathers are often found to experience similar or lower levels of stress than mothers. However, regardless of gender differences, we know that fathers experience stress. Future research should be dedicated specifically to fathers and testing interventions to decrease their stress and encourage father-infant bonding. Based on Lazarus'¹⁰ definition of stress, future studies would also benefit from examining the relationship between emotions, stress, and coping.

While the reviewed studies measured variables outside of the NICU, the main instruments used to measure sources of stress focused on the NICU environment. Although considered valid and reliable instruments, additional evaluation of whether the PSS:NICU and the PSS:IH specifically measure fathers' perceived stressors is needed. The frequent use of convenience sampling may have led to bias related to voluntary participants, and studies often excluded parents with critically ill infants. Cross-sectional designs with repeated measures are warranted to capture possible changes in fathers' stress over time. With small sample sizes and limited sample diversity, more research is needed on personal, social, and cultural factors impacting stress in NICU fathers.

Theoretical clarity is needed in this area. Miles and Carter's³⁹ conceptual framework of parental stress in the intensive care unit can assist nurses in understanding, describing, and assessing potential sources of stress in parents with a child admitted to an intensive care unit. This framework is based in 4 theories of stress and illness: Hans Selye's theory on stress, Richard Lazarus' cognitive-phenomenological theory on stress and coping, Sr Callista Roy's model of nursing, and Rudolph Moos' theory on coping with illness. Sources of stress come from personal and family

Summary of Recommendations for Practice and Research

What we know:	<ul style="list-style-type: none"> • Admissions to the NICU are increasing • Having an infant in the NICU is stressful for parents • Fathers are often neglected in NICU research, and psychological stress in fathers is not well understood
What needs to be studied:	<ul style="list-style-type: none"> • Fathers' perceived stressors both in and out of the NICU environment • Stressors of diverse populations of fathers • Changes in stressors and levels of stress over time
What we can do today:	<ul style="list-style-type: none"> • Improve nursing assessments of fathers' emotional state • Recognize that fathers' stressors are often different than mothers' stressors • Include fathers in family-centered care interventions, such as hands-on care of their infant • Encourage frequent, open communication with fathers, who are often reluctant to share their feelings

background factors, situational conditions, and environmental stimuli. Responses to stress are a “complex set of interactions between stressors from these three sources as mediated by the parents’ cognitive appraisal of the situation and coping responses and the resources available to help the parents cope.”³⁹

Improvements are needed in acknowledging fathers’ sources of stress in the NICU. It is essential that nurses assess fathers’ perceptions of environmental stress, along with personal background factors, situational conditions, coping strategies, and available resources. Interventions should begin as early as possible and include educating fathers about the NICU environment, the infant’s appearance and behavior, and potential emotional reactions. Younger fathers and those with very preterm or very low birth-weight infants may benefit from extra support. Ongoing communication and sharing information about the infant’s condition, treatment, and response are critical, along with involving fathers in daily infant care.³⁹ Nurses can further assist fathers by identifying potential resources for coping, such as parent support groups.

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