Research Article
(Araştırma Makalesi)

How Perceived Parental Stress Levels and Family-Centered Care Change During The First Week of Admission to The Neonatal Intensive Care Unit: A Descriptive Follow-Up Study

Yenidoğan Yoğun Bakım Ünitesine Kabulün İlk Haftasında Algılanan Ebeveyn Stres Düzeyleri ve Aile Merkezli Bakım Nasıl Değişir: Tanımlayıcı Bir Takip Çalışması

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ABSTRACT

Objective: This study aimed to evaluate the evolving dynamics of perceived parental stress levels and family-centered care during the initial week of infant admission to the Neonatal Intensive Care Unit.

Methods:. This descriptive follow-up study, conducted in a level III neonatal intensive care unit from November 2017 to May 2018, included 62 parents whose infants were admitted to the unit immediately after birth and were expected to stay for at least seven days. Data collection at 2nd day of admission and 7th day of admission utilized the Parental Stress Scale: Neonatal Intensive Care Unit, Family-Centered Care Scale-Consistency, and Parent-Infant Information Form. Descriptive statistics and repeated measures t-tests were employed for analysis.

Results: Statistically significant differences were found in the mean scores of parents' Parental Stress Scale: Neonatal Intensive Care Unit and Family-Centered Care Scale-Consistency at 2nd day and 7th day of admission ($p<0.05$). The highest source of stress was "sights and sounds" at 2nd day of admission and shifted to "infant behavior and appearance" at 7th day of admission ($p<0.05$).

Conclusion: This study revealed differences in parental stress levels on the second day of admission to the unit and at the end of the first week. Stress levels decreased and perceived Family-Centered Care Scale-Consistency scores increased at 7th day of admission. The creation of standardized time points and instruments would enhance the comparability of parental stress levels and perceived family-centered care. Organizations can develop checklists and quality indicators to assess the consistency of routine care with the family-centered care model

Öz

Amaç: Bu araştırma, yenidoğan yoğun bakım ünitesine bebeği yatan ebeveynlerin stres düzeyleri ve aile merkezli bakım algılarını değerlendirmeyi amaçlamıştır.

Yöntem: Bu tanımlayıcı takip çalışması, bebekleri doğumdan hemen sonra üniteye kabul edilen ve en az yedi gün kalması beklenen 62 ebeveynin katılımı ile III. düzey yenidoğan yoğun bakım ünitesinde Kasım 2017-Mayıs 2018 tarihlerinde yürütülmüştür. Verilerin toplanmasında; yatışın 2. ve 7. günü Yenidoğan Yoğun Bakım Ünitesi Ebeveyn Stres Ölçeği, Aile Merkezli Bakım Ölçeği-Tutarlılık ve Ebeveyn-Bebek Bilgi Formundan yararlanılmıştır. Analiz için tanımlayıcı istatistikler ve tekrarlanan ölçümler t-testleri kullanılmıştır.

Bulgular: Ebeveynlerin yatışın 2. ve 7. günündeki Yenidoğan Yoğun Bakım Ünitesi Ebeveyn Stres Ölçeği ve Aile Merkezli Bakım Ölçeği-Tutarlılık puan ortalamalarında istatistiksel olarak anlamlı farklılıklar bulunmuştur (p<0.05). Yatışın 2. günündeki en yüksek stres kaynağı "görüntü ve sesler" iken, 7. gününde ise "bebeğin davranışı ve görünümü" olarak değişmiştir (p<0.05).

Sonuç: Bu araştırma, üniteye kabulün ikinci gününde ve ilk haftanın sonunda ebeveynlerin stres düzeylerinde farklılıklar olduğunu ortaya koymuştur. Yatışın 7. gününde ebeveyn stres düzeyleri azalmış ve algılanan bakımın aile merkezli yaklaşımla tutarlı olması artmıştır. Standart ölçüm zamanlarının ve araçların oluşturulması, ebeveyn stres düzeylerinin ve algılanan aile merkezli bakımın karşılaştırılabilirliğini kolaylaştıracaktır. Kurumlar, rutin bakımın aile merkezli bakım modeliyle tutarlılığını değerlendirmek için kontrol listeleri ve kalite göstergeleri geliştirebilirler.

INTRODUCTION

Experiencing the birth of a healthy neonate is a transformative journey for parents, reshaping family dynamics, roles, and responsibilities. However, when an infant is admitted to the neonatal intensive care unit (NICU) immediately after delivery, the stress on parents intensifies (Caporali, Pisoni, Gasparini, Ballante, Zecca, Orcesi & Provenzi, 2020; Govindaswamy, Laing, Waters, Walker, Spence & Badawi, 2019; Lazzerini, do Amaral Gomez, Azzimonti, Bua, Neto, Brasili et al., 2024). NICUs, characterized by advanced technological devices, trained staff, and unfamiliar environments, can induce parental stress levels (Üğücü, Çelebioğlu & İsbir, 2024; Yiğit & Üğücü, 2019).

NICUs, whether designed as single-family room, hybrid, or open-bay layouts, play a crucial role in providing safe, effective, and individualized developmental care for infants and their families. Central to all NICUs is the commitment to family-centered care (FCC) (Gómez-Cantarino, García-Valdivieso, Moncunill-Martínez, Yáñez-Araque & Ugarte Gurrutxaga, 2020; Soni & Tscherning, 2021; Yiğit & Üğücü, 2019). One of the core components of FCC is meeting the needs of the infant and family with dignity and respect. Also, sharing unbiased information and encouraging parents to participate in care and decision-making processes at the level they choose is part of the core components of FCC (Caporali et al., 2020; Gómez-Cantarino et al., 2020; Soni & Tscherning, 2021).

Nurses in NICUs play a pivotal role in identifying parental stress (levels and sources of stress in NICU) and providing support in harmony FCC core components (Adama, Adua, Bayes & Mörelius, 2022; Caporali et al., 2020; Gómez-Cantarino et al., 2020; Üğücü, Çelebioğlu & İsbir, 2024). While certain stressors in NICUs, such as environmental sights and sounds, parental role alterations, and infant behavior and appearance have been identified (Adama et al., 2022; Caporali et al., 2020; Heidarzadeh, Heidari, Ahmadi, Solati & Sadeghi, 2023), not all sources of parental stressors have been explored (Üğücü, 2018).

Reducing parental stress is vital for improving psychological well-being and preventing long-term adverse effects (Adama et al., 2022; Brunson, Thierry, Ligier, Vulliez-Coady, Novo, Rolland, Eutrope, 2021; Caporali et al., 2020; Gómez-Cantarino et al., 2020; Heidarzadeh et al., 2023; Soghier, Kritikos, Carty, Glass, Tuchman, Streisand, Fratantoni, 2020). Addressing parental stress positively impacts both parents and infants, fostering improved breastfeeding, secure parent-infant attachment, and overall well-being (Brunson et al., 2021; Govindaswamy et al., 2019; Soni & Tscherning, 2021; Üğücü, Çelebioğlu & İsbir, 2024). In a review of 24 studies by Adama et al (2022), it was reported that parents with infants in the NICU have support needs including emotional support, adapting to changing roles and developing knowledge and skills. Family-centered care was identified as the best way to achieve this. In addition, it was suggested that parents should evaluate the routine care in the unit in terms of family-centered care and further research is recommended to ensure that appropriate adjustments are made in the unit in this regard. Lazzerini et al (2024) reported that parents of infants in the NICU are very likely to experience high levels of stress, anxiety and symptoms of depression. In the same study, there is a recommendation to assess the compatibility of NICU practices with family-centered care and the appropriate level of parental involvement in care. While past studies have focused on identifying parental needs and stressors (Al Maghaireh, Abdullah, Chong, Chua, Al Kawafha, 2017; Alkozei, McMahon & Lahav, 2014; Bernardo, Rent, Arias-Shah, Hoge, Shaw, 2021; Brunson et al., 2021; Govindaswamy et al., 2019), there is a notable gap in understanding how parents perceive routine care in terms of FCC consistency (Adama et al., 2022; Heidarzadeh et al., 2023; Lazzerini et al., 2024). This follow-up study aimed to fill this gap by indicating how stress levels, sources of stress, and perceived FCC change for parents during the first week of infant admission to the NICU.

METHODS

Study design

The present study had a prospective, descriptive, follow-up design. The researchers chose this because it was the most appropriate method to perform easily and to measure stress levels, stressors in NICU, and perceived FCC at different points in time (Mariani & Pego-Fernandes, 2014).

The convenience sampling method was used for selection. Follow-up was planned at two different points in time based on settings and the literature review (Bernardo et al., 2021; Brunson et al., 2021). Time 1 (T1) was on the 2nd day of admission, while Time 2 (T2) was on the 7th day of admission.

Population and sample

A priori power analysis was used to estimate the sample size based on data from Turan, Başbakkal & Özbek's (2008) study. The effect size in that study was d=0.362, which was considered medium. The minimum sample size was calculated as 62 parents, with an effect size of d=0.362, type I error of .05, and a power of 80% for a two-tailed hypothesis. This single-center study was conducted in a Level III NICU at a university hospital between November 2017 and May 2018. The data collection process was finished when 62 parents were reached. Post hoc power analysis showed that the achieved power of the present study was more than 97%.

Eligibility criteria: Study eligibility criteria included the following: a) being literate, b) being over 18 years old, c) able to speak Turkish, d) not having a cognitive or physical disability, e) not diagnosed with a mental health problem/disease before, by a psychiatrist, f) whose infant was admitted to the unit directly after birth, and g) whose infant was predicted to stay in the unit at least for seven days according to neonatal risk category of Turkish Neonatal Society Guideline (Acunaş, Uslu & Yağmur Baş, 2018). Even if there were multiple pregnancies/births and both parents were willing to participate, only one parent and one infant were included for each family using the toss of a coin to decide.

Settings: The hospital provides education in the field of neonatal nursing (certification) and neonatology (subspeciality) as a training hospital. The 25-bed unit is one of the tertiary care referral centers in southern Türkiye. The admission rate is nearly 214 infants per year on average. Generally, infants come from peripheral (40%), and central (40%) districts, or another city (20%). Scheduled nursing shifts are daytime (for 8 h - 8 am to 4 pm) and night (for 16 h - 4 pm to 8 am). The nurse/infant ratio is 1:1 or 1:2 for each shift to abide by government regulations. The unit design is a traditional open-bay type. The Turkish health care system provides free services for all infants while staying in the unit.

Routine care in the NICU: Parental presence is encouraged with 24-hour access, but there are some restrictions during some procedures like endotracheal intubation, resuscitation, percutaneous/central venous catheterization, etc. Following admission, parents are ensured to meet their infants at the earliest opportunity. When they come to the unit for the first time, staff always welcome them and introduce the health care team, environment, basic procedures, etc. During that time, the staff was always aware of each parent's individuality and stress. Efforts are made to maintain continuity in care by matching the same nurses with infants from admission to discharge across different shifts. Collaborative planning involves deciding how parents participate in caregiving during each presence. Notably, no structured parent information sessions or support groups are currently available. *The information procedure* provides explanations to parents about the environment, tools, machines, unit policies, routines, resources, and facilities. They obtain information about the infant's condition/treatment from nurses and doctors face to face or via phone calls frequently. Nurses support parents in how they care for infants at the bedside, but no structured parent information sessions are available. *The parental involvement procedure* aims to build up infant-parent attachment, to reduce infant and parent stress, and to empower parental efficacy. Parental readiness and what they do in the caring process are noted in nursing records. Skin-to-skin care is encouraged unless contraindicated, often initiated once the infant stabilizes. The level of parental involvement depends on readiness and willingness, with constant bedside support from nurses. The discharge/transfer process involves preparing parents for home care, including training in the Mom-Infant Adaptation Room. Discharge criteria include staff and parent agreement on caregiving capability, awareness of follow-up appointments, immunizations, examinations, and home readiness.

Data collection

Data were collected using the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU) (Miles, Funk & Carlson, 1993), Family-Centered Care Scale (FCC-Consistency) (Curley, Hunsberger & Harris, 2013), and Parent-Infant Information Form (PIIF) based on literature review (Al Maghaireh et al., 2017; Baía, Amorim, Silva, Kelly-Irving, de Freitas, Alves, 2016; Gustafson, LaBrecque, Graham, Tella, Curley, 2016; Raiskila, Lehtonen, Tandberg, Normann, Ewald, Caballero, Axelin, 2016). All data in PIIF were saved from nursing records. FCCS- Consistency and PSS: NICU for T1 and T2 were filled out by parents (n=62).

Data collection tools

Parent-Infant Information Form (PIIF): The PIIF contained clinical and descriptive characteristics of both parents and infants created by researchers based on literature reviews to determine the sample profiles. The PIIF

was finalized after consulting with five experts in the field of child health nursing and incorporating their recommendations through necessary revisions. Descriptive characteristics of parents were gender, age, family structure, previous NICU experience. The characteristics of parental presence included participation in the infant's care (such as skin-to-skin care, holding, feeding, etc.), frequency (times/week), and duration (minutes/day) of presence in the unit (Baía et al., 2016; Gustafson et al., 2016; Raiskila et al., 2016).

The descriptive and clinical characteristics of infants were their sex, gestational age at birth, birth weight, risk category, and whether they were firstborns. The obstetric characteristics of infants were whether the pregnancy was planned, if any assisted reproductive techniques were used, whether there were multiple pregnancies, and whether there was a follow-up during pregnancy (Al Maghaireh et al., 2017; Baía et al., 2016; Gustafson et al., 2016; Raiskila et al., 2016). As a standard procedure, nurses documented the presence of parents, including the time and duration in the NICU, as well as details of parents' involvement in the care process such as touching, holding, cuddling, changing the diaper, bathing, skin-to-skin care, and measuring body temperature etc. These records helped nurses follow what parents had done and could do for their infants.

Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU): Parental stress levels and stressors in the NICU were assessed by PSS: NICU; response categories were rated from "1 = not stressful" to "5 = extremely stressful" or "0= not experienced" (Miles et al., 1993). The 34-item self-reported scale has illustrated admirable validity and reliability for the Turkish version (Turan & Başbakkal, 2006). It has three subscales: "Sights and Sounds (6-item, stress related to the NICU environment), Infant Behavior and Appearance (17-item, stress related to the neonates' appearance, and reaction), Parental Role Alteration (11-item, stress related to the alteration of expected parenting roles)". Higher subscales and total scores reflect higher parental perceived stress. Cronbach's alpha values of the scale ranged between 0.89 and 0.90 (Turan & Başbakkal, 2006), and they ranged between 0.88 and 0.91 in the present study.

Family-Centered Care Scale (FCCS): Consistency of care with a family-centered approach was measured by FCCS; response categories were rated from "1 = not at all important/consistent" to "5 = very important/consistent" (Curley, Hunsberger & Harris, 2016). The 7-item self-reported scale has revealed excellent validity and reliability for the Turkish version (Altıparmak & Taş-Arslan, 2016). It consists of two parts: "Importance" and "Consistency". The consistency part can be used alone (Altıparmak & Taş-Arslan, 2016; Curley et al., 2016). For saving time and resources, the consistency subscale was preferred to use alone because it measures both the perceptions of parents as relevant and important and the extent to which care practices are consistent with the family-centered approach. The range for minimum-maximum scores in this scale is 7-35. Higher scores indicate greater consistency with which nurses provide the type of care identified as important to parents during hospitalization. Cronbach's alpha value of FCCS- Consistency was 0.89 (Altıparmak & Taş-Arslan, 2016), while it ranged between 0.91 and 0.92 in the current study.

Data analyses

All data analysis was conducted using the SPSS 21.0 (Statistical Package for Social Sciences) package program. For assessing the data normality of subscales and total scores, the Shapiro-Wilk test was used ($p > 0.05$), In this study, the statistical significance level was set as $p < 0.05$. While categorical variables are expressed as frequencies and percentages, quantitative variables are presented as the mean, standard deviation, minimum/maximum values, and quartiles. Repeated measures *t*-tests were applied to compare the mean PSS: NICU and FCCS- Consistency scores at T1 and T2. Additionally, Cronbach's alpha coefficients of scales were assessed by reliability analysis. A priori power analysis to estimate the sample size, post hoc power analysis to check the achieved power, and effect sizes (Cohen's *d*) were performed using the G*Power 3.1 program.

Ethical consideration

Before collecting data, an approval from the noninvasive clinical trials ethics committee (Mersin University, 19/10/2017-2017/299) and a written permission from the university hospital were obtained. Written consent was acquired from each parent. Parents were informed about the research procedure and that they could withdraw from the study at any time without explanation. Parents provided written consent before the study.

RESULTS

Analysis of parents' and infants' profiles

Parents' profile: **Table 1** outlines the descriptive and presence characteristics of the 62 parents. Among them, 35 (56.5%) were female. A majority, 54 (93.5%) had no prior experience with the NICU. Approximately, 26 (41.9%) visited the unit at least once a day, and 38 (61.3%) participated in their infant's care. The mean age of

the parents was 30.72±5.22 years, ranging between 20 and 39 years old. The mean duration of parental presence was 44.67±20.24 minutes/day (IQR=30-60 min).

Table 1. The Descriptive and Presence Characteristics of Parents (n=62)

Variables	n	%
Gender		
Female	35	**56.5**
Male	27	43.5
Age		
Under 25 years	10	16.1
25-29 years	13	21.0
30-34 years	23	**37.1**
35-39 years	16	25.8
Family structure		
Nuclear	58	**93.5**
Extended	4	6.5
Previous NICU experience		
Yes	8	12.9
No	54	**87.1**
First parental presence after infant's admission		
1st day	54	**87.1**
2nd day	8	12.9
Frequency of parental presence (times/week)		
3-6 times a week	36	**58.1**
7-9 times a week	26	41.9
Participation of infant's care (holding, touching, feeding etc.)		
Yes	38	**61.3**
No	24	38.7
Participation of the skin-to-skin care		
Yes	34	**54.8**
No	28	45.2

n=frequency, %=percent, NICU: Neonatal Intensive Care Unit

Infant profile: **Table 2** shows the descriptive, clinical, and obstetric characteristics of the 62 infants. Among them, 32 (51.6%) were male. A significant proportion, 50 (80.6%) were born prematurely, 36 (58.1%) had a birth weight below 2500 grams. The majority, 35 (56.5%) were classified as high-risk neonates, and 16 (25.8%) were the firstborn. Of these infants, 43 (69.4%) were born from planned pregnancies, 60 (96.8%) had regular prenatal follow-up. In 10 cases (16.1%), assisted reproductive techniques were used. The infants' mean gestational age was 33.35±4.30 weeks (ranging from 26 to 40 weeks), and their mean birth weight was 2,209±944.3 grams (ranging from 670 to 3,645 grams).

Table 2. The Descriptive, Clinical, and Obstetric Characteristics of Infants (n=62)

Variables	n	%
Sex		
Female	30	48.4
Male	32	**51.6**
Gestational age		
Very preterm (<32 weeks)	18	29.0
Moderate preterm (32 to <34 weeks)	22	**35.5**
Late preterm (34 to <37weeks)	10	16.1
Full-Term	12	19.4
Birth weight		
Extremely Low (< 1,000 grams)	7	11.3
Very Low (1,000– < 1,500 grams)	9	14.5
Low (1,500–2,500 grams)	20	32.3
Average (above 2,500 grams)	26	**41.9**
Risk category of the neonate (mortality & morbidity)		
High risk	35	**56.5**
Intermediate risk	27	43.5
Planned pregnancy		
Yes	43	**69.4**

No	19	30.6
Follow up during pregnancy		
Yes	60	**96.8**
No	2	3.2
First baby		
Yes	16	25.8
No	46	**74.2**
Used one of the assisted reproductive techniques for pregnancies		
Yes	10	16.1
No	52	**83.9**
Multiple pregnancy		
Yes	12	19.4
No	50	**80.6**

n=frequency, %=percen

Comparison of the mean PSS: NICU and FCCS-Consistency scores of parents at T1 and T2: **Table 3** illustrates the comparison of the mean PSS: NICU and FCCS-Consistency scores of parents with corresponding effect sizes at T1 and T2. A repeated measures *t*-test analysis revealed a significant difference between T1 and T2 measurements for each pair (p<0.001). In these analyses, effect sizes exceeding 1.00 were considered large. Notably, stress scores exhibited a significant decrease, while perceived FCC-Consistency scores demonstrated a significant increase from T1 to T2.

Table 3. Comparison of the Mean PSS: NICU And FCCS-Consistency Scores of Parents at T1 and T2 (n=62)

Scales & Subscales	T1 $\bar{x}\pm SD$ (Min-Max)	T2 $\bar{x}\pm SD$ (Min-Max)	Differences $(\bar{x}_D\pm SD_{D)}$	*t* p	Effect Size *d*
PSS: NICU-Sights and Sounds	4.23±0.69 (2-5)	3.13±0.67 (1-5)	1.09±0.48	17.890 **<0.001**	2.27
PSS: NICU-Infant Behavior and Appearance	4.12±0.50 (2-5)	3.22±0.45 (2-5)	0.90±0.25	27.553 **<0.001**	3.60
PSS: NICU-Parental Role Alteration	4.06±0.90 (3-5)	2.78±0.69 (1-4)	1.26±0.60	16.282 **<0.001**	2.10
Total PSS: NICU	4.12±0.65 (2-5)	3.06±0.51 (1-5)	1.14±0.31	26.651 **<0.001**	3.67
FCCS- Consistency	27.02±4.67 (20-35)	31.27±3.64 (21-35)	-4.25±3.48	11.067 **<0.001**	1.22

* T1: 2nd day of admission, T2: 7th day of admission, PSS: NICU: Parental Stressor Scale: Neonatal Intensive Care Unit, FCCS: Family-Centered Care Scale, $\bar{x}$: mean, SD: Standard Deviation, min: lowest value, max: highest value, $\bar{x}_D$: mean differences, SD_D: Standard Deviation for differences, *d*: Cohen's *d*. Repeated measures *t*-test, p<0.05

DISCUSSION

This study represent is the first prospective descriptive follow-up study conducted at Level III NICU aiming to investigate how perceived parental stress levels and FCC changed during the first week of infant admission.

It's important to note that the well-being of infants may have a significant impact on the stress levels of their parents. Even minor changes in their clinical condition may cause a fluctuation in stress levels that vary from day to day and week to week. Understanding and addressing these fluctuations can be crucial (Bernardo et al., 2021; Brunson et al., 2021; Heidarzadeh, Heidari, Ahmadi, Solati, Sadeghi, 2023; Govindaswamy et al., 2019). This study showed that parental perceived stress levels were significantly decreased from high to medium during the first week of infant admission to the NICU. Compared with previous studies in the literature (Matricardi, Agostino, Fedeli & Montirosso, 2012; Montirosso, Fedeli, Del Prete, Calciolari & Borgatti, 2013; O'Brien, Robson, Bracht, Cruz, Lui, Alvaro, et al., 2018; Palma, Von Wussow, Morales, Cifuentes & Ambiado, 2017; Turner, Chur-Hansen, Winefield & Stanners, 2015), the levels of parental stress were high in our study. This difference may be linked to the inclusion criterion of infants with an expected hospital stay of more than seven

days, indicating higher infant mortality and morbidity risks (Matricardi et al., 2012; Montirosso et al., 2013; O'Brien et al., 2018; Palma et al., 2017). Theoretically, as in this research, high levels of parental stress may be associated with having critically ill neonates (Heidarzadeh et al., 2023). In the meta-analysis by Caporali et al. (2020), it was noted that parental stress may differ according to low and high risk of neonatal mortality and morbidity. However, this was not taken into account in the studies reviewed. In addition, the explanation for parents' reports of high levels of stress may also be due to the fact that stress can be contagious (Dimitroff, Kardan, Necka, Decety, Berman, Norman, 2017). In the present study, parents might interact with and affect each other because of the unit, which has a traditional open-bay design (Yiğit & Üğücü, 2019). On the other hand, O'Brien et al. (2018) reported that parents who stayed at their infant's bedside at least 6 h per day and had environmental facilities such as sites for resting space, sleep rooms, support groups, structured parental training, free parking, and transportation- had lower stress on the 21st day (2.79±0.75). Matricardi et al. (2012) stated that parents -who were supported to increase parental ability to recognize infants' signs of stress and well-being in a planned way- reported decreasing stress levels from admission to discharge. Parents who integrate into their infants' care through organizational and environmental facilities can cope easily with stress and stressors. Additionally, the more that parents integrate into their infants' care, the greater ability more they have to sense FCC in the NICU (Brunson et al., 2021; Gómez-Cantarino et al., 2020; Üğücü, Çelebioğlu & İsbir, 2024). Contrary to these studies (Matricardi et al., 2012; O'Brien et al., 2018), which highlight the stress-reducing effects of prolonged parental presence and supportive environmental facilities, our study faces limitations in these aspects. The environmental resources in our NICU are limited to a breast pumping room, a food preparation area, and comfortable chairs at the bedside. Also, in our NICU has no lounge or break room for prolonged parental presence, and no lockers for personal belongings. In addition to limited environmental resources in our NICU, the duration of parental presence was also very limited in this study (IQR=30-60 min). In our clinical observations, parents were asked to leave the unit during invasive interventions such as endotracheal intubation, resuscitation etc. That procedure was observed to disrupt the interaction between parents and infants and leading to notable reduce the parental presence in the unit. When all these components are taken into consideration, it is possible that the high stress levels experienced by the parents in our study may be related to both the clinical characteristics of their infants and the very limited time they were present in the unit. This can be attributed to the limited environmental resources and certain procedural barriers present in the unit. The World Health Organization (2022) recommends that the skin-to-skin (SSC) contact for premature newborns starts as soon as they are born. The SSC lasts for at least 8 hours a day, preferably 24 hours a day if possible. Therefore, it is necessary to revise this procedure which limited parental presence 1 hour or less. This study underscores the need for environmental and organizational adjustments in the NICU setting, such as revisiting the limited duration of parental presence, to enhance the overall well-being of parents and infants. The limitations of this study, including the absence of certain environmental resources, should be considered in interpreting the results.

This study identified "sights and sounds" as the primary stressor on the second day of admission, shifting to "infant behavior and appearance" by the end of the first week. Similar to our study, comparable findings by Al Maghaireh et al. (2017) and Raiskila et al. (2016) support this evolution of stressors over time. Conversely, some studies in the literature indicated that "parental role alteration" was the highest source of stress (Bernardo et al., 2021; Caporali et al., 2020; Palma et al., 2017). These differences in results can be attributed to measurement time points. In other words, selected time points were on the 12th day (Palma et al., 2017), on the 3rd-5th days (Montirosso et al., 2014), on the 1st-5th days (Alkozei, McMahon & Lahav, 2014), at admission, and at discharge (Matricardi et al., 2012)[23] in the literature. Our study highlights the need for interventions that consider the evolving nature of parental stressors and the varied needs of infants over time.

Parental stress, especially for those with critically ill neonates, is a deeply individualized experience, as underscored by the findings of this study. Nurses emerge as crucial actors in recognizing and navigating the evolving landscape of stress levels and stressors throughout the NICU admission process. A key responsibility is the assessment of parental needs, stresses, and stressors (Brunson et al., 2021; Govindaswamy et al., 2019; Heidarzadeh et al., 2023; Soni & Tscherning, 2021).

Future research in this domain could focus on developing effective interventions tailored to alleviate parental stress. Applying established stress and coping theories may provide a valuable framework for design and evaluation of these interventions. In future research, incorporating biological measures such as cortisol levels could offer objective insights into parental stress in this population. Furthermore, investigating the impact of stress contagion, encompassing both physiological and psychological dynamics, on parental stress in different NICU designs (open-bay and hybrid) could provide valuable insights.

Adopting the FCC model as the golden standard for NICUs demands a comprehensive approach (Adama et al., 2022; Brunson et al., 2021; Gómez-Cantarino et al., 2020; Soni & Tscherning, 2021). This involves assessing parental needs and ensuring their fulfillment at all stages. Organizations should consider creating checklists and quality indicators to evaluate routine care, irrespective of the consistency with the FCC model. The active integration of parents into decision-making processes, including planning environmental facilities and shaping FCC quality indicators, is imperative in this evaluation process.

Limitations

Several limitations should be considered in interpreting the results of this study. Firstly, the modest sample size may constrain the generalizability of findings. A more extensive participant pool would enhance the robustness and broader applicability of the study's conclusions. Additionally, the sample included parents and neonates with diverse profiles, reflecting a spectrum of clinical and demographic characteristics. Thus, caution is advisable when extending the study's outcomes to encompass all parents of at-risk neonates in a Level III NICU. Future investigations, employing more homogeneous samples, could provide a clearer understanding of specific parental stressors and FCC dynamics. Secondly, the measurement of parental stress levels relied solely on self-reporting. In this research, parental self-reports were used to investigate FCCS- Consistency in the NICU. Hospitalization of their infants to the unit was one of the potentials for bias in reporting FCCS-Consistency outcomes. To minimize self-reporting bias, information was given to each parent that "their responses would not be shared with anyone" and "researchers did not work in NICU". While self-report measures are valuable in capturing subjective experiences, supplementing them with additional objective measures or biological markers could offer a more comprehensive and nuanced understanding of parental stress in the NICU setting. This avenue could be explored in future research to enrich the validity of stress assessments.

CONCLUSION

This study provides valuable insights into the nuanced dynamics of perceived parental stress levels and FCC during the initial week of infant admission to NICU. The findings highlight the fluidity in sources of parental stress from the first day to the end of the first week in the NICU. Initially, the paramount source of stress for parents was related to "sights and sounds". However, by the end of the first week, the focus of stress had shifted to "infant behavior and appearance". Notably, perceived parental stress exhibited a significant decrease within the first week of admission. Simultaneously, the reported consistency of care with FCC significantly increased.

These findings underscore the importance for NICU staff to recognize the dynamic nature of parental stress levels and stressors, acknowledging that these factors can undergo daily fluctuations. Regular assessment of parental stress levels, identification of stressors, and addressing parental needs emerge as crucial for providing effective support. Proactive and routine measures to assess and address parental stress are, therefore, integral components of comprehensive neonatal care.

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