

# Impact of Maternity Support Program on the Stress of Mothers in the First Encounter with the Preterm Infants

## Abstract

**Background:** Mothers of premature infants experience a high level of stress. The current study was conducted aiming at investigating the impact of maternity support program on the stress of mothers in the first encounter with infants. **Methods:** This experimental study began in neonatal intensive care units (NICUs) of two hospitals of Tehran; that is, Mahdiah (intervention) and Shahid Akbar-Abadi (control), from Feb 14, 2016, to May 14, 2016. Both are educational and referral centers including three levels of NICU that were randomly allocated to intervention and control sites. In the span of study period all 75 infants and mothers with inclusion/exclusion criteria in the Mahdiah hospital were included in the intervention group and vis-à-vis all 68 infants and mothers in Shahid-Akbar-Abadi were enrolled in the control group. The designed intervention was conducted based on the support system pattern of mothers with premature infants in the interventional group. In the first stage of intervention, in the intervention group, mothers were provided informational, emotional, and spiritual support before and during the first exposure and were empowered for comfortable interactions. The control group received routine care. After the first exposure, the mothers' stress was measured by the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU). The data were analyzed by STATA software as well as *t*-test, Chi-square, and average treatment effects (ATEs) were estimated using inverse probability treatment weights (IPTW). **Results:** After adjusting pre-treatment variables by IPTW, the adjusted average difference in the stress score over the NICU environment, infant's behavior and appearance, the special treatments on him/her, and the change in the parental role and total stress were 1.47 (1.19–1.75), 1.06 (0.73–1.14), 1.21 (0.93–1.49), and 1.18 (0.93–1.44), which were lower than the control group ( $P < 0.001$ ). **Conclusions:** The intervention reduced significantly the stress of mothers. The policy-makers are suggested to conduct this method.

**Keywords:** Health planning support, infant, mothers, premature, psychological, stress

## Introduction

Preterm delivery includes many psychosocial complications because it comes with “preterm parental” in which the women's expectation from the “normal” pregnancy and giving birth to a healthy infant are not met. The pregnancy term duration allows one to achieve the emotional adjustment with changes during the pregnancy and to obtain the parenting preparation. Preterm birth followed by hospitalizing the infant in a neonatal intensive care unit (NICU) not only causes such adjustment to occur but also is indicated as a stressful experience.<sup>[1-3]</sup>

It has been documented that preterm birth is usually related to conditions such as posttraumatic stress disorder, parental depression, anxiety, and other stress-related disorders.<sup>[4-6]</sup> These problems later affect

mother-infant bonding and interactions, such as insensitivity during interactions that can affect infant development.<sup>[4]</sup>

In the first encounter with the preterm infant, the technological and unfamiliar environment, infant's appearance, sense of losing the parental role,<sup>[7]</sup> and uncertainty in neonatal prognosis<sup>[8]</sup> affect significantly the formation of maternal stress and accompany contradictory feelings of fear and excitement.<sup>[9]</sup> Hence, the health team is required to provide a welcoming and supportive environment to help the parents to deal with the initial feeling of stress in coming to the NICU.<sup>[3,10]</sup> Addressing the specific causes of stress for mothers in the NICU has resulted in the development of supportive programs aimed at enhancing knowledge, empowerment, and sensitivity, alleviating stress and promoting effective adaptation skills.<sup>[3]</sup>

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**How to cite this article:** Mousavi SS, Keramat A, Chaman R, Mohagheghi P, Mousavi SA, Khosravi A. Impact of maternity support program on the stress of mothers in the first encounter with the preterm infants. *Int J Prev Med* 2021;12:68.

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**DOI:**  
10.4103/ijpvm.IJPVM\_314\_19

## Quick Response Code:



There are different programs such as creating opportunities for parent empowerment (COPE),<sup>[11]</sup> mother-infant transaction program (MITP),<sup>[12]</sup> neonatal individualized developmental care (NIDCAP),<sup>[13]</sup> kangaroo care,<sup>[14]</sup> NICU tours,<sup>[15]</sup> music therapy,<sup>[16]</sup> buddy system,<sup>[17]</sup> expressive writing,<sup>[4]</sup> joint observation method, and infant massage.<sup>[18]</sup>

COPE is a combination of educational support and psychological conformity with maternal feelings.<sup>[11]</sup> It is conducted within 1 week after admission up to 6 months after discharge.

Just like COPE, other support programs<sup>[4,5,14,19-26]</sup> are planned for the duration of the baby's stay in the NICU, at discharge or beyond when the negative consequences of mental health have changed the mother's perception of infant and inefficient patterns of mother-infant interactions are established.<sup>[6]</sup> In these programs, the first exposure with a preterm infant has been neglected while it is very stressful.<sup>[27]</sup>

It is shown that the highest stress level is attributed to the beginning of infant admission in the NICU that is an emphasis on starting the supportive programs as soon as possible the infant is transferred to the NICU. The failure to pay attention to this critical stage may be one of the reasons that some of the interventions wouldn't help reduce the stress of parental role alteration.<sup>[11,15]</sup>

The current study is designed and conducted aiming at addressing this gap in the literature and determining the influence of early supportive interventions on the stress of mothers in the first encounter with the preterm infants.

Early supportive interventions provided that informational, emotional, and spiritual support before and during the first exposure and nurturing comfortable interactions.

## Methods

This experimental study was conducted in NICUs of two hospitals of Tehran; that is, Mahdih and Shahid Akbar-Abadi, from Feb 14, 2016, to May 14, 2016. Both are educational and referral centers including three levels of NICU. The unit of random allocation was hospitals. Avoiding the contamination between parents is the reason for this type of randomization. In the long run, Mahdih assigned to the intervention site and Shahid Akbar-Abadi assigned as a control site.

The study population of this study was the parents of premature newborns. All premature newborns and their parents with inclusion/exclusion criteria were recruited in the study during 3 months period.<sup>[17]</sup> The inclusion criteria were having a newborn with the age of fewer than 37 weeks, birth weight under 2500 g, high possibility of survival, expressing the satisfaction to take part in the study, Iranian nationality, and the ability to establish verbal communication. Exclusion criteria were as follows newborns with any abnormality or any serious disabling

conditions like intraventricular hemorrhage (IVH) grade 3 or 4.

In the intervention group, 75 infants and mothers were included and 68 infants and mothers were included in the control group during the study period.

## Intervention

The designed intervention was conducted based on the support system pattern of mothers with premature infants in the experimental group. In this pattern, parents and babies are at the center of the supportive model that need to be supported at critical transitional periods and consisted of preconception, prenatal, neonatal unit, the transition to home, and at home.

Different interventions in support of mothers in the NICU were planned for the program, which was gradually implemented within 3 months of the intervention. The present study focuses on the first phase, preparing for the first encounter with the infant, which was designed based on the pattern of the support system of mothers with preterm infants.<sup>[28]</sup>

After welcoming and introducing the researcher and explaining the research and obtaining a written informed consent from the mother to participate in the research and filling out the maternal Trait anxiety inventory, the first encounter of the mother with the infant was established based on the mother's placement, intervention, or control group.

In the intervention group, two albums were shown to the mother. One of the albums, filled with the photos of a premature baby was included from birth to the age of about 2 years, and in the other album the images of previous premature infants and the healthy present kids, all born in different weight and age, were born prematurely, was included. By showing these photos, we prepared mothers to see their baby with the characteristics of premature infant (informational support). During the presentation of the photographs to her, it was tried besides the recognition of the mother's values, was emphasized about trust in God, supplication, recourse to Ma'sumun (The 14 Infallibles), and surrendered to divine fate appreciation (spiritual support). The mother was trained how to express breast milk, work with a breast pump, store, and transport the breast milk, also we tried with creating hope around breastfeeding, gave emotional support. was given, too. At this point, the mother was advised to enter the neonatal intensive care unit, she was taken to the infant's bedside and was encouraged and empowered to have a comfortable interaction with the infant through the exchange of smell (encouraging the mother to put the milk pad under the infant's head and removing the previous pad to make the infant closer to her while milking and when the infant is away), continuous gentle touch, whispering in the infant's ear and eye contacts, and KMC as soon as possible.

In addition to the baby, the conditions and characteristics of premature infants and equipment around the baby were explained simply and were answered to any more questions the mother had about the baby, the environment, and the unit routine.

In the end, DVD and pictorial training booklets on infant's characteristics, premature infant, and infant massage were given to the mother, and the researcher's telephone number was given to the mother to ask any possible question, considering no time limitation then Parent Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU) questionnaire was filled.

In the control group, once the state-trait anxiety inventory (STAI) was filled by mother, the mother's first encounter with the infant occurred in accordance with routines in the unit, and the nurse responded to any question, then after filling the PSS: NICU questionnaire, DVD, and pictorial training booklets on infant's characteristics, premature infant, and infant massage were given to the mother and the researcher's telephone number was given to mother to ask any possible question.

### Measurements

The STAI was designed by Spielberg in 1970 and revised in 1983. The concurrent validity of this scale with other anxiety inventories was assessed using the correlation coefficient ( $r = 0.73$  to  $0.85$ ), and the reliability was substantial using Cronbach's alpha coefficient equal to  $0.97$ . The validity of the Persian version was approved in 2007.<sup>[29]</sup>

The stress on the entrance of mothers was measured by the PSS-NICU after the mother's first encounter with an infant. Parental stress sources were evaluated in three fields of the NICU environment, infant's appearance, behavior, and special treatment made on him/her, parents' communication with infant and parental roles.

Margaret inventory (2002) is a self-reporting tool with 34 items which evaluates the parental stress sources in three fields of NICU environment (six items), infant's appearance, behavior and special treatment made on him/her (17 items), parents' communication with infant and parental roles (11 items). Mothers were demanded to specify the stress intensity of the aforementioned sources by choosing one option among these: "Never, A little, Medium, High, extremely stressful, No experience." In the end, there is an open-ended question in the field of other stressful issues from the mother's point of view. The scores' interval is between 0 and 170 where the high scores indicate the high stress of parents, and the validity and reliability of the Persian version of inventory are already determined.<sup>[30-32]</sup>

### Statistical analysis

The obtained data were analyzed by Stata 13 (StataCorp, College Station, Texas). T-test used for comparison of

means between the two groups and Chi-square test was used to assess the independence between two categorical variables. For control of the pre-treatment variable due to cluster randomization (not random allocation at the individual level), we used inverse probability treatment weights (IPTW) to compute weighted averages of the outcomes for each intervention level.<sup>[33]</sup>

The IPTW method was utilized to control the heterogeneity in basic variables between the two groups. In this regard, variable entitled disease intensity was initially generated based on the infant's requirements and a lack of need for invasive and noninvasive ventilation. Then, the treatment variable was modeled by logistic regression on basic variables of infant's disease intensity, age, birth weight, the reception-time status of anxiety, and reception-time personality anxiety which is known as the propensity score (PS). The weights are  $1/PS$  for the intervention group participants and  $1/(1-PS)$  for the control participants.<sup>[25]</sup> The average treatment effect (ATE) is an adjusted estimate of difference scores between two groups using weights.

### Results

The baseline characteristics of intervention and control groups were presented in Table 1. Since the patients were not divided randomly rather the hospitals were randomly allocated to intervention and control group, both the control and experiment groups were significantly different in terms of some demographic (education, occupation, insurance status, and mother ethnicity) and clinical factors (birth age, birth weight, and a number of noninvasive ventilation days) [Table 1].

Adjusted mean differences (95% confidence interval) of outcomes between the two groups are depicted in Table 2. Results of this study showed that the all stress scores including 1- total  $1.18$  (95% CI  $0.93-1.44$ ), 2- stress over the NICU environment  $1.47$  (95% CI  $1.19-1.75$ ), 3- stress over the infant's appearance, behavior, and special treatments on him/her  $1.06$  (95% CI  $0.73-1.14$ ), and 4- stress over the change in parental role  $1.21$  (95% CI  $0.93-1.49$ ), in the experimental group were significantly lower than the stress scores of the control group. It is significant because the confidence interval not including the zero.

### Discussion

The present study focuses on determining the influence of implementation of designed interventions based on the supportive program of parents of preterm infants<sup>[28]</sup> on the stress of mothers in the first encounter with the preterm infants.

Its implementation declined significantly the total stress and stress in three areas of the NICU environment, infant's appearance and behavior, and parental role alteration significantly.

**Table 1: A comparison of demographic information and clinical data between the two intervention and control groups**

Variables	Control (%) n=68	Intervention (%) n=75	P
Mother's education			
Under diploma	24 (35.3)	15 (20.0)	0.01
Diploma	35 (51.5)	36 (48.0)	
Academic	9 (13.2)	24 (32.0)	
Mother's employment			
Household	65 (95.6)	64 (85.3)	0.05
Employed	3 (4.4)	11 (14.7)	
Status of insurance			
Social insurance or treatment services	39 (57.4)	33 (44)	0.03
Rural or health insurance	25 (36.8)	26 (34.7)	
Complementary insurance	4 (5.9)	16 (21.3)	
Mother's ethnicity			
Persian	8 (11.8)	36 (48.0)	<0.001
Non-Persian	60 (88.2)	39 (52.0)	
Family income (\$)	341.5±138.7	400/2±312/2	0.08
Mother's age	28.3±5.8	28.5±5.4	0.84
Parity			
1	35 (51.5)	51 (68.0)	0.13
2	24 (35.3)	20 (26.7)	
3	5 (7.4)	4 (5.3)	
4	3 (4.4)	0 (0.0)	
5	1 (1.5)	0 (0.0)	
Abortion			
0	53 (77.9)	59 (78.7)	0.72
1	11 (16.0)	9 (12.0)	
2	3 (4.0)	4 (5.3)	
3	1 (1.5)	3 (4.0)	
Alive children			
1	21 (30.9)	26 (34.7)	0.15
2	31 (45.0)	39 (52.0)	
3	12 (17.6)	10 (13.3)	
4	4 (5.9)	0 (0.0)	
Pregnancy status in terms of multiple births			
Single	42 (61.8)	40 (53.3)	0.053
Twin	26 (38.2)	29 (38.7)	
Triplet	0 (0.0)	6 (8.0)	
Type of delivery			
Natural	13 (19.1)	10 (13.3)	0.26
Cesarean	55 (80.9)	65 (86.70)	
Sex of infant			
Male	34 (50.0)	35 (46.7)	0.69
Female	34 (50.0)	40 (53.3)	
Birth age	32.3±2.1	30.9±2.6	<0.001
Birth weight (kg)	1.7±0.4	1.5±0.48	<0.001
Number of invasive ventilation days	0.7±3.1	2.4±10.4	0.09
Number of noninvasive ventilation days	0.8±3.5	2.4±3.8	0.01

The study of Beheshti *et al.* is consistent with the findings of this study.<sup>[34]</sup> Beheshti *et al.* investigated the effect of the training program in four areas of general conditions of infant, NICU equipment and setting, partner support, and problem-solving strategies, on the reduction of parents' stress.

Another program that showed a consistently positive impact on maternal stress was MITP.<sup>[12]</sup> MITP empowers mothers to recognize their infant's special characteristics, temperament patterns, and developmental potential, gradually sensitizing parents to infant physiological and social cues, thereby, stress-sensitive care-taking, and

**Table 2: The average score of stress between the two intervention and control groups**

Stress	Control	Intervention	Average treatment effect*	95% CI for difference**
Total stress	2.74±0.79	1.71±0.79	1.18	0.93-1.44
Stress over the NICU environment	3.2±0.95	1.77±0.85	1.47	1.19-1.75
Stress over the appearance, behavior, and treatment of infant	2.41±0.92	1.47±0.97	1.06	0.73-1.14
Stress over parental role alteration	3.01±0.91	2.05±0.93	1.21	0.93-1.49

\*Average treatment effect is adjusted for infant's disease intensity, birth age, birth weight, reception status anxiety, and reception trait anxiety using the inverse probability treatment weight method. \*\*It is significant if the confidence interval not including the zero

improving the mutual interaction between the mothers and the infants.

NIDCAP program showed an inconsistent impact on stress alleviation and had no significant effect on parental stress.<sup>[13]</sup> The NIDCAP program is based on the individuality of families and premature infants in which the infant's behavior as the expression of brain function is observed along with four subsystems: attention and interaction, state, autonomic, and motor. Observations are discussed with mothers and other caregivers as a caregiving plan and for synchronizing the infant's environment. The NIDCAP program might result in increased engagement of mothers compared to a basic form of care leading to more stress levels of mothers.

COPE also showed a positive impact on maternal stress.<sup>[11]</sup> In this program, Melnyk succeeded to alleviate the maternal stress related to the physical environment by combining the training support and psychological conformity. The training intervention was regarding premature infant's appearance and behavior, how parents participate in infant care, and how to interact positively with the infant. It is conducted within 1 week after admission and despite literature emphasizing,<sup>[35]</sup> the stress of the first encounter was not taken into account. Maybe that's it, one reason that COPE wouldn't help reduce the stress of parental role alteration.

Mianaei implemented the COPE intervention in Iran and contrast to Melnyk, COPE designer, could alleviate the stress in areas of change in a parental role.<sup>[36]</sup> It seems such differences related to cultural and economic differences. As such, the training and welfare facilities and higher psychological support create a more inflexible and demanding character in which the stress cannot be decreased easily.

In the present study, an intervention plan was designed based on the evidence.<sup>[28]</sup> Part of our multifaceted intervention was designing peer support and their introduction to mothers. Since the nurses probably don't have sufficient time to meet the parents' emotional needs, applying the members of volunteer supportive teams can be suitable.<sup>[37,38]</sup>

Sharing the experience and feeling with similar mothers helps to cope with the stress of premature birth and accepting infant clinical status. Furthermore, the health team can extend their support range by referring the

parents to other parents with the same experience. The unique empirical knowledge offered by the experienced parents in groups provides an opportunity for two-way sharing, creating a support system in which the extension for parents is continued until the post-discharge period. In such an environment, the mother receives confirmation, justification, and empathy from others in terms of thoughts and feelings and becomes aware of how other mothers cope with the stress of encountering current conditions.<sup>[39,40]</sup>

It is very important what kind of perception parents have of the NICU environment and it should be guided to alleviate the shock of first encounter and parents' reassurance that their children will be handed over to reliable hands.<sup>[9]</sup> Therefore, one element of our intervention is to introduce the unit, personnel, facilities, equipment, and unit routine affecting the stress reduction. As in various studies, various preparation methods like displaying the premature infant image,<sup>[41]</sup> running to NICU tour for mothers exposed to the preterm delivery were utilized and it was found that these interventions decrease the parents' fear and inspires the hope for infant future and reassures the cares offered in NICU.<sup>[42]</sup> Showing two image albums where in one album, pictures of a preterm infant since birth to 2 years old and in another, pictures of born preterm infants in different ages of 1–14, was another part of our intervention which prepared the mothers for the first encounter with the preterm infant with special premature characteristics<sup>[9]</sup> and was promising for the infant future.

NICU tour, teaching the characteristics of the premature infant and NICU environment for mothers exposed to the preterm delivery or mothers with premature infants lead to stress reduction in areas of NICU environment and infant appearance which is fully consistent with the present study.<sup>[1,11,15,43]</sup>

Chourasia *et al.* conducted a 30–45-min informational session to test the impact of counseling among mothers of preterm infants about the structure, settings, procedures of NICU and giving feedback to mothers on infant clinical progress. 48 h after the intervention, stress reduction was significant in the intervention group.<sup>[44]</sup>

In the current study, arranging the NICU tour after the preterm delivery and during the first encounter with an infant had the same effect in the reduction of mothers' stress.

Due to preterm birth, the parents feel frustrated due to the lack of their expected caring role as a parent<sup>[5,37]</sup> and the stress reduction resulting from the change in a parental role cannot be realized by a mere training intervention,<sup>[26]</sup> as such impact was not observed in studies by Melnyk,<sup>[11]</sup> Morey,<sup>[15]</sup> Giuseppe<sup>[5]</sup> Annie,<sup>[45]</sup> Glazebrook.<sup>[46]</sup>

In another intervention study, Voos *et al.* compared the impact of traditional rounds versus family-centered rounds in which parents actively participated in rounds, and found no effect of this intervention on parental stress,<sup>[47]</sup> which emphasizes that simply receiving information is not enough to relieve stress.

Franck *et al.* evaluated teaching families about signs and relief techniques of pain through written information. This intervention increased maternal satisfaction but showed no significant difference in parental stress,<sup>[48]</sup> While in the present study, the use of combined interventions and encouraging mother/infant interaction, as soon as possible, could be effective in reducing maternal stress.

Another component of the designed intervention is how to express breast milk, work with breast pumps, and store and transport the milk. In addition to positive impacts on the future breastfeeding success, it was conducted initially aiming at decreasing the deprivation of unique feelings of maternity.<sup>[15]</sup>

The most effective interventions appear to be those are not limited to education. Abd-e Yazdan with the implementation of a family support program including two informational and emotional supports could decrease the stress level among the parents significantly, but his intervention started 2–4 days after the admission of the infant in the NICU and made no support from the parents in the acute phase of admission.<sup>[49]</sup> Whereas in the present study, the use of various interventions in the first encounter of the mother with preterm infants, including early mother/infant interaction, could reduce maternal stress regarding the NICU environment, infant's appearance and behavior, and parental role alteration significantly.

### Limitation

As already mentioned in the results, concerning the mothers' encouragement to attend the hospital as much as possible, pollution was a limitation leading to sampling in two hospitals.

Despite this disadvantage, the intervention was highly effective in reducing mother stress. Moreover, for each outcome, the results remained mainly unchanged after adjustment for baseline differences between groups.

### Conclusion

In view of the successful implementation of intervention, which was designed based on the evidence and facilities,

it is proposed to conduct such program to promote the quality of offering the care to preterm infant parents and transforming the infant services into the welcoming, supportive and family-based models and it is suggested that another similar study is conducted on the fathers.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the mothers have given their consent for their clinical information to be reported in the journal. The mothers understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

### Acknowledgments

We would like to gratefully thank all mothers that accompanied us in this research.

### Financial support and sponsorship

The present article was extracted from the Ph.D. thesis (code: 9339) written by Sayedeh Saeedeh Mousavi and was supported by a grant from the Student Research Committee of Shahroud University of Medical Sciences.

### Conflicts of interest

There are no conflicts of interest.

**Received:** 27 Aug 19 **Accepted:** 18 Apr 20

**Published:** 25 Jun 21

### References

1. Chertok IRA, McCrone S, Parker D, Leslie N. Review of interventions to reduce stress among mothers of infants in the NICU. *Adv Neonatal Care* 2014;14:30-7.
2. Brett J, Staniszewska S, Newburn M, Jones N, Taylor L. A systematic mapping review of effective interventions for communicating with, supporting and providing information to parents of preterm infants. *BMJ Open* 2011;1:e000023.
3. Guillaume S, Michelin N, Amrani E, Benier B, Durrmeyer X, Lescure S, *et al.* Parents' expectations of staff in the early bonding process with their premature babies in the intensive care setting: A qualitative multicenter study with 60 parents. *BMC Pediatr* 2013;13:18. PubMed PMID: 23375027. eng.
4. Horsch A, Tolsa JF, Gilbert L, du Chene LJ, Muller-Nix C, Bickle Graz M. Improving maternal mental health following preterm birth using an expressive writing intervention: A randomized controlled trial. *Child Psychiatry Hum Dev* 2016;47:780-91. PubMed PMID: 26659113. Epub 2015/12/15. eng.
5. De Bernardo G, Svelto M, Giordano M, Sordino D, Riccitelli M. Supporting parents in taking care of their infants admitted to a neonatal intensive care unit: A prospective cohort pilot study. *Ital J Pediatr* 2017;43:36. PubMed PMID: 28412958. Pubmed Central PMCID: PMC5392981. Epub 2017/04/18. eng.
6. Alkozei A, McMahon E, Lahav A. Stress levels and depressive symptoms in NICU mothers in the early postpartum period. *J Matern Fetal Neonatal Med* 2014;27:1738-43.
7. Cano Giménez E, Sánchez-Luna M. Providing parents with individualised support in a neonatal intensive care unit reduced

- stress, anxiety and depression. *Acta Paediatr* 2015;104:e300-5.
8. Janvier A, Barrington K, Farlow B. Communication with parents concerning withholding or withdrawing of life-sustaining interventions in neonatology. *Semin Perinatol* 2014;38:38-46. PubMed PMID: 24468568. Epub 2014/01/29. eng.
  9. Arnold L, Sawyer A, Rabe H, Abbott J, Gyte G, Duley L, *et al.* Parents' first moments with their very preterm babies: A qualitative study. *BMJ Open* 2013;3. PubMed PMID: 23550091. Pubmed Central PMCID: 3641451. Epub 2013/04/04. eng.
  10. Cleveland LM. Parenting in the neonatal intensive care unit. *J Obstet Gynecol Neonatal Nurs* 2008;37:666-91. PubMed PMID: 19012717. Epub 2008/11/18. eng.
  11. Melnyk BM, Feinstein NF, Alpert-Gillis L, Fairbanks E, Crean HF, Sinkin RA, *et al.* Reducing premature infants' length of stay and improving parents' mental health outcomes with the creating opportunities for parent empowerment (COPE) neonatal intensive care unit program: A randomized, controlled trial. *Pediatrics* 2006;118:e1414-e27.
  12. Ravn IH, Smith L, Smeby NA, Kynoe NM, Sandvik L, Bunch EH, *et al.* Effects of early mother-infant intervention on outcomes in mothers and moderately and late preterm infants at age 1 year: A randomized controlled trial. *Infant Behav Dev* 2012;35:36-47.
  13. Als H, Gilkerson L, Duffy FH, Mcanulty GB, Buehler DM, Vandenberg K, *et al.* A three-center, randomized, controlled trial of individualized developmental care for very low birth weight preterm infants: Medical, neurodevelopmental, parenting, and caregiving effects. *J Dev Behav Pediatr* 2003;24:399-408.
  14. Holditch-Davis D, White-Traut RC, Levy JA, O'Shea TM, Geraldo V, David RJ. Maternally administered interventions for preterm infants in the NICU: Effects on maternal psychological distress and mother-infant relationship. *Infant Behav Dev* 2014;37:695-710.
  15. Morey JA, Gregory K. Nurse-led education mitigates maternal stress and enhances knowledge in the NICU. *MCNAM J Matern Child Nurs* 2012;37:182-91.
  16. Whelan ML. *Training Parents in Multimodal Neurological Enhancement: A Survey of NICU Music Therapists*. Tallahassee, Florida: Florida State University; 2019.
  17. Preyde M, Ardal F. Effectiveness of a parent "buddy" program for mothers of very preterm infants in a neonatal intensive care unit. *CMAJ* 2003;168:969-73.
  18. Matricardi S, Agostino R, Fedeli C, Montiroso R. Mothers are not fathers: Differences between parents in the reduction of stress levels after a parental intervention in a NICU. *Acta Paediatr* 2013;102:8-14.
  19. Landsem IP, Handegård BH, Tunby J, Ulvund SE, Rønning JA. Early intervention program reduces stress in parents of preterms during childhood, a randomized controlled trial. *Trials* 2014;15:387.
  20. Horwitz SM, Leibovitz A, Lilo E, Jo B, Debattista A, St. John N, *et al.* Does an intervention to reduce maternal anxiety, depression and trauma also improve mothers' perceptions of their preterm infants' vulnerability? *Infant Mental Health J* 2015;36:42-52.
  21. Komoto K, Hirose T, Omori T, Takeo N, Okamitsu M, Okubo N, *et al.* Effect of early intervention to promote mother-infant interaction and maternal sensitivity in Japan: A parenting support program based on infant mental health. *J Med Dent Sci* 2015;62:77-89.
  22. O'Brien K, Bracht M, Robson K, Xiang YY, Mirea L, Cruz M, *et al.* Evaluation of the family integrated care model of neonatal intensive care: A cluster randomized controlled trial in Canada and Australia. *BMC Pediatr* 2015;15:210.
  23. Sgandurra G, Beani E, Inguaggiato E, Lorentzen J, Nielsen JB, Cioni G. Effects on parental stress of early home-based care toy intervention in low-risk preterm infants. *Neural Plasticity* 2019;2019:7517351.
  24. Castel S, Creveuil C, Beunard A, Blaizot X, Proia N, Guillois B. Effects of an intervention program on maternal and paternal parenting stress after preterm birth: A randomized trial. *Early Hum Dev* 2016;103:17-25.
  25. Afand N, Keshavarz M, Fatemi NS, Montazeri A. Effects of infant massage on state anxiety in mothers of preterm infants prior to hospital discharge. *J Clin Nurs* 2017;26:1887-92.
  26. Cho E-S, Kim S-J, Kwon MS, Cho H, Kim EH, Jun EM, *et al.* The effects of kangaroo care in the neonatal intensive care unit on the physiological functions of preterm infants, maternal-infant attachment, and maternal stress. *J Pediatr Nurs* 2016;31:430-8.
  27. Johnston AM, Bullock CE, Graham JE, Reilly MC, Rocha C, Hoopes RD, *et al.* Implementation and case-study results of potentially better practices for family-centered care: The family-centered care map. *Pediatrics* 2006;118(Suppl. 2):S108-14.
  28. Mousavi SS, Chaman R, Mohagheghi P, Mousavi SA, Khosravi A, Keramat A. Development of a support system for parents of premature infants. *Iran J Pediatr* 2017;27:e9578.
  29. Ghorbani M, Dolatian M, Shams J, Alavi-Majd H. Anxiety, post-traumatic stress disorder and social supports among parents of premature and full-term infants. *Iranian Red Crescent Med J* 2014;16:e13461.
  30. Busse M, Stromgren K, Thorngate L, Thomas KA. Parents' responses to stress in the neonatal intensive care unit. *Critical Care Nurse* 2013;33:52-9.
  31. Miles MS, Funk SG, Carlson J. Parental stressor scale: Neonatal intensive care unit. *Nurs Res* 1993;42:148-52. PubMed PMID: 8506163. Epub 1993/05/01. eng.
  32. Borimnejad L, Mehrnoush N, Seyyed Fatemi N, Haghani H. Maternal stressor agents with premature infants in neonatal intensive care units. *IJCCN* 2011;4:39-44.
  33. Mansournia MA, Altman DG. Inverse probability weighting. *BMJ (Clinical research ed)* 2016;352:i189.
  34. Beheshtipour N, Baharlu SM, Montaseri S, Ardakani SMR. The effect of the educational program on Iranian premature infants' parental stress in a neonatal intensive care unit: A double-blind randomized controlled trial. *Int J Community Based Midwifery* 2014;2:240.
  35. Kaaresen PI, Rønning JA, Ulvund SE, Dahl LB. A randomized, controlled trial of the effectiveness of an early-intervention program in reducing parenting stress after preterm birth. *Pediatrics* 2006;118:e9-e19.
  36. Mianaei SJ, Karahroudy FA, Rassouli M, Tafreshi MZ. The effect of creating opportunities for parent empowerment program on maternal stress, anxiety, and participation in NICU wards in Iran. *Iran J Nurs Midwifery Res* 2014;19:94-100.
  37. Tran C, Medhurst A, O'Connell B. Support needs of parents of sick and/or preterm infants admitted to a neonatal unit. *Neonatal Paediatr Child Health Nurs* 2009;12:12-7.
  38. Fakhri B, Hasanpoor-Azghady SB, Farahani LA, Haghani H. The relationship between social support and perceived stress in the mothers of infants with colic. *Iran J Pediatr* 2019;29:8. En.
  39. Hamid N, Wasy S. Effectiveness of logotherapy together with Quran recitation and prayers on treatment of depression and T helper Cell (CD4+). *Interdiscipl Quranic Stud* 2013;3:27-38.
  40. Hunt H, Whear R, Boddy K, Wakely L, Bethel A, Morris C, *et al.* Parent-to-parent support interventions for parents of babies

- cared for in a neonatal unit-protocol of a systematic review of qualitative and quantitative evidence. *Syst Rev* 2018;7:179. PubMed PMID: 30382886. Pubmed Central PMCID: PMC6211448. Epub 2018/11/02. eng.
41. Huckabay LM. Impact of a research study a decade later: The use of pictures in a neonatal intensive care unit as a mode of nursing intervention to enhance maternal-infant bonding. *Sch Inq Nurs Pract* 1999;13:367-73. PubMed PMID: 10731851. Epub 2000/03/25. eng.
  42. Griffin T, Kavanaugh K, Soto CF, White M. Parental evaluation of a tour of the neonatal intensive care unit during a high-risk pregnancy. *J Obstet Gynecol Neonatal Nurs* 1997;26:59-65. PubMed PMID: 9017548. Epub 1997/01/01. eng.
  43. Turan T, Başbakkal Z, Özbek Ş. Effect of nursing interventions on stressors of parents of premature infants in neonatal intensive care unit. *J Clin Nursing* 2008;17:2856-66.
  44. Chourasia N, Surianarayanan P, Bethou A, Bhat V. Stressors of NICU mothers and the effect of counseling—experience from a tertiary care teaching hospital, India. *J Matern Fetal Neonatal Med* 2013;26:616-8.
  45. Petteys AR, Adoumie D. Mindfulness-based neurodevelopmental care: Impact on NICU parent stress and infant length of stay; a randomized controlled pilot study. *Adv Neonatal Care* 2018;18:E12-22.
  46. Glazebrook C, Marlow N, Israel C, Croudace T, Johnson S, White IR, *et al.* Randomised trial of a parenting intervention during neonatal intensive care. *Arch Dis Child Fetal Neonatal Ed* 2007;92:F438-F43. PubMed PMID: 17301114. Epub 02/14. eng.
  47. Voos KC, Ross G, Ward MJ, Yohay A-L, Osorio SN, Perlman JM. Effects of implementing family-centered rounds (FCRs) in a neonatal intensive care unit (NICU). *J Matern Fetal Neonatal Med* 2011;24:1403-6.
  48. Franck LS, Oulton K, Nderitu S, Lim M, Fang S, Kaiser A. Parent involvement in pain management for NICU infants: A randomized controlled trial. *Pediatrics* 2011;128:510-8.
  49. Abdeyazdan Z, Shahkolahi Z, Mehrabi T, Hajiheidari M. A family support intervention to reduce stress among parents of preterm infants in neonatal intensive care unit. *Iran J Nurs Midwifery Res* 2014;19:349-53.