

*Full Length Research Paper*

# “Identification of nursing care methods intended for reducing stress caused by environmental factors in neonates”

Meltem Kürtüncü Tanır\*, Latife Utaş Akhan and Şule Ergöl

Zonguldak School of Nursing, Zonguldak Karaelmas University, Turkey.

Accepted 18 January, 2011

The study is designed to define the practices of nurses in an attempt to reduce the stress in neonates caused by environmental factors. 100 nurses working in neonatal intensive care units of four hospitals in Istanbul are within the scope of the study. All hospitals are connected to Turkish Ministry of Health and three of them are training and research hospitals. It is determined that 47% of the nurses are graduates of Vocational Highschool of Health, 10% of them got post graduate education and 51% of them have been working in Neonatal Intensive Care Unit for 1 to 5 years. It is also determined that 61% of the nurses got education on neonatal intensive care nursing. 97% of the nurses working in Intensive Care Unit implied that they apply position changing method, 82% of them apply Kangaroo care, 95% of them apply massage, 87% of them apply the method of reducing environmental stimulations, 63% of them apply personalized developmental nursing. It is possible to say that methods used by nurses working in neonatal intensive care units are compatible with the literature.

**Key words:** Neonate, nursing practice, environmental factors, stress

## INTRODUCTION AND AIM

Uterus is the normal environment for a developing fetus between 23 to 40 weeks. Intrauterine protects fetus in a dark and wet media that enables movement of and also surrounds fetus with filtered sounds to protect it from external stimulations. Walls of the womb provides protection besides underpinning (Blackburn, 1998). Newborn is exposed to various stimulations in intra-uterine period. Sound of the heartbeats of a mother, sound coming from her intestines, sound coming from external environment, vestibular, tactile and kinesthetic stimulations caused by movement of the fetus, periods in which the mother is asleep and in which she is awake, ritmic heartbeat sounds and neurohormonal changes can count as these stimulations (Neal and Lindeke, 2008; Cassidy, 2009). Every birth begin with a complex period that enable

adaptation to external world. A preterm that leaves intrauterine media untimely faces a very different environment and does various adjustments to adapt to it successfully (Butt, 2000; Neal and Lindeke, 2008; Cassidy, 2009).

Intensive care unit environment causes stress in a time when baby is not ready to come face to face with factors such as diseases, Neonatal Intensive Care Unit (NICU) noise, lights, recurrent painful stimulants, analgesic therapies, medications. Besides, baby is away from the things like touching, smelling, sucking from mother's breast, voice of mother and all these leads to stress (Blackburn, 1998).

Preterm babies or sick babies may show different stress indications while healthy term babies commonly response to stress by crying. Stress indications in preterm babies; can be classified by intensity of stress and physiological behavioral indications. Indications of stress seen in babies are;

\*Corresponding author. E-mail: [meltemkurtuncu@yahoo.com](mailto:meltemkurtuncu@yahoo.com).  
Tel: +90.372.2613369. Fax: +90.372.2613399.

Feeling uncomfortable with eye contact, turning right and

left, making hiccups, grimacing, closing eyes, sticking tongue out, sneezing, coughing etc (Peng et al., 2009).

An extrauterine environment such as neonatal intensive care unit causes incompatibility between the psychological process of development and the sensual stimulations experienced by babies. Signs of stress behaviour include colour changes: mottled, dusky, cyanosed apnoea, bradycardia, desaturation hiccoughing, sneezing, yawning, gagging, regurgitating feeds tremors, twitches, frantic activity, arching, frowning, gaze averting completely flaccid trunk, extremities and face easy fatiguability (Neonatal Handbook Editorial Board, 2005). Noise in neonatal intensive care units (NICUs) may impede growth and development for extremely low-birth-weight (ELBW, <1000 g) newborns. Excessive auditory stimulation creates negative physiologic responses such as apnea and fluctuations in heart rate, blood pressure, and oxygen saturation (Thomas and Uran, 2007). Preterm infants exposed to prolonged excessive noise are also at increased risk for hearing loss, abnormal brain and sensory development, and speech and language problems. Reducing noise levels in the NICU can improve the physiologic stability of sick neonates and therefore enlarge the potential for infant brain development (Brown, 2009).

Appropriate endogeny and sensual neural activity have critical importance for normal brain development and any inconvenient stimulation may cause permanent damage to brain (Blackburn, 1998; Butt, 2000; Neal and Lindeke, 2008; Cassidy, 2009).

Stimulations such as stress and pain leads to diverse effects on development by activating neuroendocrine. Intensive care unit environment, which disturb the baby, cause stress, overstimulations and lack mother-father contact, negatively affects the fragile physical condition of a baby and it's immature organ systems (Blackburn, 1998).

For this reason, nurses working in neonatal intensive care units must;

- (i) Love children,
- (ii) Be good at Human Relations and must have good communication skills.
- (iii) Be experienced and well-versed.
- (iv) Be aware of nurses' independent functions and be ready to apply those functions.
- (v) Be able to solve problems reasonably and practically.
- (vi) Be open-minded, have entrepreneurial spirit and must have good observation skills (Neal and Lindeke, 2008; Cassidy, 2009).

A neonatal intensive care nurse also must keep records of observations and practices in order to provide medical doctors with information to help them decide on clinic decisions about baby's care. They must defense babies's rights and coordinate their practices. They must be able to take decisions about independent nursery and put their

decisions into practices and also they must participate in skill improvement practices.

Since 1980's along with scientific and technical developments in neonatology, there has been some changes in roles of intensive care unit nurses. Quality of nursing increased in units. Nurses became core member of intensive care unit team for high standard treatment and nursing care of newborns (Neal and Lindeke, 2008; Cassidy, 2009).

Nursing care needs must be baby-centered and must be applied in the way that they support development of babies "Individualized Supportive Developmental Nursing Care" to bring environmental factors under control and arrange them considering newborn's individuality and behavioral organisation (Yıldırım, 2001).

A neonatal intensive care unit (NICU) nurse is supposed to get the education special to this branch, she/he is supposed to be equipped with the knowledge needed to be able to reduce the factors that lead to stress in newborns to the minimum. In this way, stress caused by environmental factors can be reduced to minimum within the process that takes place in intensive care unit. For this reason, this research is made in an attempt to define the methods used in nursing care to reduce the stress caused by environmental factors.

## MATERIALS AND METHODS

### Design and sample

The research is made between November 2008 and March 2009 in Istanbul in neonatal intensive care units of four hospitals connected to Turkish Ministry of Health. Target population of the research is the group of nurses working in neonatal intensive care units of the hospitals. 100 nurses who agreed to take part in the research and who work in mentioned units are within the scope of the research. Informed consent forms are signed by the nurses after they are given the necessary information about the research.

### Data collection and analysis

Questionary form prepared by practising on current literature (Brown, 2009) is used in order to collect the data used in the research. Questionary form is prepared by searching literature and it includes; demographic information about nurses that are within the scope of the research, their education levels, the institutions they are working at, their evaluations about these institutions, their working hours and practices they do in order to reduce stress.

Windows SPSS 11.5 (Statistical Package for Social Sciences) was used for the statistical evaluation of the data. A 95% reliability interval was found, with significance found to be  $p \leq 0.05$ .

### Ethical approach

First of all, permission for the application is gotten from Istanbul City Health Administrative and from four mentioned hospitals and then the nurses are informed about the aim and method of the research thereby, cooperation is provided. Nurses within the scope of the research are also informed about the plan and benefits of the

**Table 1.** Distribution of socio-demographic properties of nurses (N = 100).

Age	n	%
18 – 30	50	50.0
31 – 40	50	50.0
<b>Education level</b>		
Medical Vocational Highschool	47	47.0
Associate Degree	13	13.0
Bachelor's Level	40	40.0
<b>Post graduate education</b>		
Yes	10	10.0
No	90	90.0
<b>Name of the institution the nurses working at</b>		
Hospital A	21	21.0
Hospital B	22	22.0
Hospital C	25	25.0
Hospital D	32	32.0
<b>Term of employment in NICU</b>		
Less than 1 year	26	26.0
1 to 5 years	51	51.0
5 to 10 years	19	19.0
10 years and more	4	4.0

research and they are asked to sign the consent form. In direction of the given explanations, consent forms are signed and the application started.

## RESULTS

50% of the nurses working in NICU are between the ages of (n=50) 18 and 30, other half is between the ages of (n=50) 31 and 40. 47% of the nurses (n=47) are medical vocational highschool graduates. Only 10% of them have master's degree. Terms of employment of 51% of the nurses (n=51) are between 1 to 5 years (Table 1).

It is identified that 54% of the nurses working in neonatal intensive care unit (n=54) use the method of touching babies by rubbing softly, 46% of them use the method of just touching stably. 97% of the nurses (n=97) use the method of position changing to reduce stress in babies, 82% (n=82) apply kangaroo Care, 95% (n=95) apply massage, 34% (n=34) use the method of giving dummy to babies, 44% (n=44) give breast milk to babies, 87% (n=87) choose the method of reducing environmental stimulations, 24% of the nurses (n=24) use music to reduce babies's stress and 63% of them (n=63) use individualized developmental nursing care (Table 2).

When the trainings that the nurses working in NICU of mentioned hospitals attend and the institutions they are

working at are compared, it is identified that 38% of the nurses (n=8) working in Hospital A and 25.6% of the nurses (n=6) working in Hospital C attended Neonatal resuscitation Program; it is also identified that 67.9% of the nurses (n=19) working for Hospital D attended in-service training programs. This difference is found extremely important in terms of statistics ( $p < 0.05$ ) (Table 3).

In 25% of the institutions that hold educational events once a week (n=1), in 31.9% of the institutions (n=15) that hold educational events once a month and in 33.3% of the institutions that hold educational events once a year, the method of Giving Breast Milk is applied. It is determined that in 13.6% of the institutions (n=3) that do not have regularly hold educational events, the method of giving Breast Milk is not applied which is found statistically important ( $p < 0.05$ ).

When the usage of positive touch method is considered; it is identified that it is used in 75% of the institutions (n=3) that hold educational events once a week and in 88.9% of the institutions (n=24) that hold this kind of events once a year. In 59.6% of the institutions (n=28) that hold educational events once a month and in all institutions that do not have regularly hold educational events, it is found out that the applied method is to Touch Babies like rubbing ( $p < 0.05$ ) (Table 4).

## DISCUSSION

In this part; the methods that NICU nurses use to reduce stress in babies and findings that include frequency of the held educational events about Neonatal Intensive Care are discussed in consideration of literature.

In the study, it is determined that numeric points of the methods that neonatal intensive care unit nurses use in order to reduce stress in babies such as Position Changing, Kangaroo Care, Massage, Reducing Environmental Stimulations, Individualized Developmental Nursing Care are statistically meaningful ( $p < 0.05$ ).

It is identified in a study that massage applied to preterm infants and /or low-birth-weight babies has a positive effect on both weight gain and complications that are developed after birth (Beachy, 2003; Vickers et al., 2004; Field et al., 2010). At the same time, massage applied to newborn also has positive effects on term newborn infants such as weight gain, better sleep- wake pattern, enhanced neuromotor development, better emotional bonding, reduced rates of nosocomial infection (Anjali et al., 2010). In spite of the known positive effects of massage, in another study, it is seen that only 38% of nurses apply massage to babies (Field et al., 2010).

In some studies made in recent years, "minimum touch policy" is found safer. Besides, for babies who are not in bad condition, positive effects of social touch (touch of

**Table 2.** Distribution of the methods used by nurses to reduce the stress in babies (N = 100).

<b>Methods for reducing stress</b>	<b>n</b>	<b>%</b>
<b>Changing position</b>		
Yes	97	97.0
No	3	3.0
<b>Kangaroo care</b>		
Yes	82	82.0
No	18	18.0
<b>Massage</b>		
Yes	95	95.0
No	5	5.0
<b>Giving dummy</b>		
Yes	34	34.0
No	66	66.0
<b>Giving sugary things</b>		
Yes	6	6.0
No	94	94.0
<b>Giving breast milk</b>		
Yes	44	44.0
No	56	56.0
<b>Reducing environmental stimulations</b>		
Yes	87	87.0
No	13	13.0
<b>Music</b>		
Yes	24	24.0
No	76	76.0
<b>Individualized developmental nursing care</b>		
Yes	63	63.0
No	37	37.0

love) on growth and development are detected (Blackburn, 1998). The most suitable way of touching is to put hands stably on baby's head or arms and legs (Dağoğlu and Görak, 2002) It is identified in the study that 88.9% of the nurses that attend educational events once a year (n=24) use the method of touching stably while nursing babies.

Due to the unwanted noise in neonatal intensive care units; fatigue, stress, overstimulation, anxiousness etc., various stress based behaviours are observed (Peng et al., 2009). It can be thought that methods of reducing these stimulations play a big role in coping with neonatal stress.

Stimulation programmes for nursed neonatals that include controlling sounds and lights in, touching babies and rubbing them softly and making them listen to music are applied. After classical music, lullabies, songs and talks that include voice of man/woman are listened in NICU, a reduction is observed in the level of stress in preterm infants and it is supported by some studies that their sleeping conditions become better and they cry less (Whipple, 2000; Malinova et al., 2004; Arnon et al., 2006; Keith et al., 2009). Findings of the research also show similar results with our findings.

Another applied method, 'skin to skin care' (kangaroo care), is a secure nursing model that enables contact between mother-father and baby in early period. It is observed that with this method, nutrition by breast feeding rates increased, weight gain happened and neonates are discharged (Luddington-Hoe et al., 2003). Kangaroo Care method is a secure nursing model which enables contact between mother-father and baby in earliest period. This method let families feel secure/comfortable and principle of humanistical care can be protected despite high technology. Besides, mother and baby are not separated and baby's psychological development is healthy.

It is implied in some studies that Kangaroo care is effective in; completion of nursing care given in hospital, early beginning of mother-father roles, developing a feeling of trust while nursing baby, completion of ongoing developmental activities of baby, providing positive social interactive relation with baby, the increase in the amount of breast milk supply, the increase in body weight, baby's sleep time, the reduction in apnea and periodic respiratory attacks and early discharge from hospital (Bremmer et al., 2003; Brown, 2009; Salavitabar et al., 2010).

It is also identified in a study that making baby listen to music during kangaroo care both reduce anxiety of mothers and make preterm babies feel more comfortable during sleep and they cry less (Lai et al., 2006). It is identified in the study that 82% of the nurses (n=82) use kangaroo care to reduce stress in babies.

Effects of environment and social interaction on individualized developmental behaviour model are great. Environmental factors provide conceptual development and affect intelligence quotient and also adaptation of especially high-risk neonates to extrauterine life. For this reason, interaction of baby with nurse and it's family is extremely important (Peng et al., 2009). In studies made, music used for individualized developmental nursing (classical music, lullaby, traditional music, man-woman voice etc.) are designated to be useful in terms of development of baby (Standley, 2001; Peng et al., 2009). It is established in the study that nurses apply the method of Individualized Developmental Nursing with 63% (n=63).

Kemper et al. (2004) conducted a questionnaire survey of 37 doctors, 150 nurses and medical staffs to find if

**Table 3.** Comparison of neonatal intensive care oriented trainings that the nurses get in institutions (N = 100).

Name of institution	Neonatal intensive care oriented trainings that the Nurses get										X <sup>2</sup>	P
	NRP		STP		NICNSP		None		Total			
	n	%	n	%	n	%	n	%	n	%		
A Hospital	1	4.8	2	9.5	8	38.1	10	47.6	21	100	14.527	0.05
B Hospital	3	13.6	2	9.1	5	22.7	12	54.5	22	100		
C Hospital	3	12.0	3	12.0	4	16.0	15	60.0	25	100		
D Hospital	-	-	19	67.9	8	28.6	1	3.6	28	100		

NRP: Neonatal Resuscitation Programme. STP: In-service Training Programme. NICNSP: Neonatal Intensive Care Nursing Seminar Programme

**Table 4.** Frequency of educational seminars about NICU nursery and comparison of the methods used to reduce stress in Babies (N = 100).

Used methods	Frequency of educational seminars/ trainings								X <sup>2</sup>	P
	once a week		once a month		once a year		Not hold regularly			
	n	%	n	%	n	%	n	%		
<b>Giving breast milk</b>										
Yes	1	25	15	31.9	9	33.3	19	86.4	20.64	0.01
No	3	75	32	68.1	18	66.7	3	13.6		
<b>Touch method</b>										
like rubbing baby softly	1	25	28	58.6	3	11.1	22	100	40.67	0.01
touching stably	3	75	19	40.4	24	88.9	-	-		
<b>Making babies listen to music</b>										
Yes	4	100	11	23.4	3	11.1	6	27.3	15.26	0.05
No	-	-	36	76.6	24	88.9	16	72.7		

music is effective on preterms in NICU or not. The questionnaire consisted of 57 questions. As a result, it is identified that music reduces stress by 86%, reduces crying by 79% and takes baby a shorter time to get to sleep by 79%. It is also identified in the study that 76% of the nurses working in neonatal intensive care units of the institutions do not use music to reduce stress in babies. This difference is statistically meaningful to a great extent ( $p < 0.05$ ). Our study shows dissimilarity between its result and the literature. We can relate this result to inadequate neonatal intensive care nursing oriented educational events.

To give baby a dummy provides increase in Transcutaneous Partial Oxygen Pressure, weight gain, hours of sleep and it reduces gestures (Peng et al., 2009). In the study, it is identified that 66% of the nurses ( $n=66$ ) who are within the scope of the study do not use the method of 'giving baby a dummy' to reduce stress in baby. This difference is also extremely important when considered from a statistical point of view ( $p < 0.05$ ). The study identifies a difference between this result and the literature. We think that using a dummy is not preferred because of the fact that it causes infection.

In-service training is an education that provides increase in the performance- efficiency of individuals, aims enrichment of knowledge, skills and manners which provide development. It is a training that always affects general working order of institutions (Akyolcu, 1997). In-service trainings take an important place in effectively running nursing services. Gaining core competency, improving and strengthening it and increasing the quality of nursing care is possible with in-service training.

It is observed in the study that nurses who attend in-service trainings apply stress reducing applications, such as giving breast milk, touching stably and playing music, more often. The relation between them is found statistically meaningful ( $p < 0.05$ ).

It is identified in Literature that knowledge, skills and nursing qualities of the nurses who attend in-service trainings improve (Duran et al., 2007; Barb and Bridget, 2007; Çetinkaya et al., 2008).

## CONCLUSION AND RECOMMENDATIONS

It is possible to say that methods used by nurses working

in neonatal intensive care units are compatible with the literature. However, in-service educational programmes related to this method are suggested to be held in order to provide common usage of Individualized Developmental Nursing Methods.

### Limitations

Some other studies with repeated long period observations and larger group of samples are needed to be made to be able to generalize the results of this study that includes nurses working in NICU.

### REFERENCES

- Akyolcu N (1997). Training strategies that improve effectiveness of in-service training programs held by clinician nurses. (IV. National Nursig Education Symposium Bulletin), Çevik matbaacılık, Kıbrıs, pp. 286-288.
- Anjali K, Jaya Shankar K, Piyush G, Harsh S, Agrawal RK (2010). Massage and touch therapy in neonates: the current evidence. *Indian Pediatr.*, 47: 771-776.
- Arnon S, Shapsa A, Forman L, Regev R, Bauer S, Litmanovitz I, Dolfin T (2006). Live music is beneficial to preterm infants in the neonatal intensive care unit environment. *Birth.*, 33(2): 131-6.
- Barb MC, Bridget E (2007). Meeting the needs of graduate nurses in critical care orientation. *Critical Care Nurse.* 27: 36-51.
- Beachy JM (2003). Premature infant massage in the NICU. *Neonatal Netw.*, 22(3): 39-45.
- Blackburn S (1998). Environmental impact of the NICU on developmental outcomes. *J. Perinat Neonatal Nurs.*, 4: 42-54.
- Bremmer P, Byers JF, Kiehl E (2003). Noise and the premature infant: physiological effects and practice implications. *J. Obstet Gynecol. Neonatal Nurs.*, 32(4): 447-54.
- Brown G (2009). NICU noise and the preterm infant. *Neonatal Netw.* 28(3): 165-73 (Abstract).
- Butt ML, Kisilevsky BS (2000). Music modulates behaviour of premature infants following heel lance. *Can J Nurs Res.*, 31(4): 17-39.
- Cassidy JW (2009). The effect of decibel level of music stimuli and gender on head circumference and physiological responses of premature infants in the NICU. *J. Music Ther.*, 46(3): 180-90.
- Çetinkaya B, Turan T, Ceylan SS, Altundağ S (2008). Knowledge levels of pulse oximetry usage among pediatricward nurses' and physicians'. *Adnan Menderes Üniversitesi Tıp Fakültesi Dergisi.*, 9(2): 25-28.
- Dağoğlu T, Görak G (2002). Basic principles of neonatology and nursing. In: Ovalı F, Samancı N (Eds), *The organization of the neonatal intensive care units*, İstanbul. Nobel Tıp Kitabevi, pp. 17-29.
- Duran R, Aladağ N, Şen F, Vatansver Ü, Acunaş B (2007). Knowledge gained and retained by neonatal nurses following neonatal resuscitation program course. *Turk Arch Ped.*, 42: 153-155.
- Field T, Diego M, Hernandez-Reif M (2010). Preterm infant massage therapy research: a review. *Infant Behav Dev.*, 33(2):115-24.
- Keith DR, Russell K, Weaver BS (2009). The effects of music listening on inconsolable crying in premature infants. *J. Music Ther.*, 46(3): 191-203.
- Kemper K, Martin K, Block SM, Shoaf R, Woods C (2004). Attitudes and expectations about music therapy for premature infants among staff in a Neonatal intensive Care Unit. *Altern Ther Health Med.*, 10(2): 50-4.
- Lai HL, Chen CJ, Peng TC, Chang FM, Hsieh ML, Huang HY, Chang SC (2006). Randomized controlled trial of music during kangaroo care on maternal state anxiety and preterm infants' responses. *Int. J. Nurs. Stud.*, 43(2): 139-46.
- Luddington-Hoe SM, Ferreira C, Swinth J, Ceccardi JJ (2003). Safe criteria and procedure for kangaroo care with intubated preterm infants. *J. Obstet Gynecol Neonatal Nurs.*, 32(5): 579-588.
- Malinova M, Malinova M, Krusteva M (2004). Therapeutic effects of music on preterm infants in neonatal intensive care units. *Akush Ginekol.*, 43(4): 29-31.
- Neal DO, Lindeke LL (2008). Music as a nursing intervention for preterm infants in the NICU. *Neonatal Netw.*, 27(5): 319-27.
- Neonatal Handbook Editorial Board (2005). *Neonatal Handbook Index*. Enquiries: Bowman E, Fraser S. Retrieved January 4, 2011, from [http://www.rch.org.au/nets/handbook/index.cfm?doc\\_id=719](http://www.rch.org.au/nets/handbook/index.cfm?doc_id=719).
- Peng NH, Bachman J, Jenkins R, Chen CH, Chang YC, Chang YS, Wang TM (2009). Relationships between environmental stressors and stress biobehavioral responses of preterm infants in NICU. *The J. Perin. Neon. Nurs.*, 23(4): 363-371.
- Salavitabar A, Haidet KK, Adkins CS, Susman EJ, Palmer C, Storm H (2010). Preterm infants' sympathetic arousal and associated behavioral responses to sound stimuli in the neonatal intensive care unit. *Adv Neonatal Care.*, 10(3): 158-66.
- Standley JM (2001). Music therapy for the neonate. *Newborn and Infant Nursing Rev.*, 1(4): 211-216.
- Thomas KA, Uran A (2007). How the NICU environment sounds to a preterm infant: update. *MCN Am J Matern Child Nurs.*, 32(4): 250-3.
- Vickers A, Ohlsson A, Lacy JB, Horsley A (2004). Massage for promoting growth and development of preterm and/or low birth-weight infants. *Cochrane Database Syst Rev.* 2: DOI:10.1002/14651858.CD000390.pub2.
- Yıldırım Z (2001). Individualized developmental care in the premature. XI. National Neonatology Congress Book, Samsun, pp. 236-242.
- Whipple J (2000). The effect of parent training in music and multimodal stimulation on parent-neonate interactions in the neonatal intensive care unit. *J. Music Ther.*, 37(4): 250-68.