

## Original Article

## Nonpharmacological Interventions Practiced by Neonatal Nurses: The Example of Two Hospitals in Turkey

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### Abstract

**Background.** Neonates are exposed to many stimuli in the Neonatal Intensive Care Unit (NICU). Pharmacological agents and Nonpharmacological Interventions (NPI) are used to reduce or prevent such stimuli. This study was conducted to determine which NPI's NICU nurses use and the impact of these interventions.

**Methods.** The research was of qualitative descriptive design. Sixty-eight nurses working in three neonatal intensive units of two state hospitals in Istanbul participated and constituted the study sample. The data were collected with two questionnaires, which were analyzed using numbers, percentages and the chi-squared test.

**Results.** It was found that 98.5% of the neonatal nurses had performed one or more NPI. The nurses more commonly performed the interventions of positioning (86.8%), reducing environmental stimuli (79.4%), picking up the neonate (75%), initiating non-nutritive sucking (73.5%), offering breast milk (73.5%) and massaging (58.8%), but performed the interventions of feeding sucrose (48.5%), kangaroo care (42.6%) and exposing the neonate to music (13.2%) to a lesser degree. It was concluded that these interventions reduced the neonate's crying and pain and regulated oxygen saturation.

**Conclusions.** It was observed that the NICU nurses performed NPI's frequently and that such interventions had a positive impact on the health of the neonate.

**Key words:** neonate, neonatal intensive care, neonatal nursing

### Introduction

Neonates in need of intensive care experience intense pain and stress when they are exposed to various stimuli resulting from their daily care in the NICU and other invasive or noninvasive procedures such as diagnostic practices, the administration of medication, heel-prick blood sampling and Intravenous (IV) catheter insertion (Hocakenberry and Wilson 2011, Dagoglu and Ovali 2008). Intense pain and stress are barriers to the maintenance of physiological functions since these factors either reduce or consume the energy resources needed for the neonate's growth (Dagoglu and Ovali 2008, Gomella 2012). Pharmacological agents and nonpharmacological interventions are employed to reduce the adverse effects of intensive care and the pain and stress of neonates (Hocakenberry and Wilson 2011, Dagoglu and Ovali 2008, Buyukgonenec and Toruner 2012). The use of pharmacological agents, however, needs to be restricted because of their side effects and capacity to induce withdrawal syndrome, the immaturity of the neonate's organs and system, and general universal codes of ethics (Dagoglu and Ovali 2008). NPI's, on the other hand, are more commonly preferred practices because they are easier to implement, are painless and cost-free and have no side effects (Hocakenberry and Wilson 2011,

Buyukgonenec and Toruner 2012). NPI's that are commonly used with neonates are offering breast milk, kangaroo care, reduce environmental stimuli, initiating non-nutritive sucking, feeding sucrose, expose the neonate to music, picking up the neonate, positioning, and massaging (Buyukgonenec and Toruner 2012, Gomella 2012, Algren and Algren 2005). These interventions speed up the healing process by reducing the neonate's pain, stress, autonomic response and oxygen consumption, diminishing heart and respiration rates, increasing skin resistance, and establishing a regular sleep pattern, as well as providing comfort and immobilization (Dagoglu and Ovali 2008, Gomella 2012).

**Methods and Aims:** This study was conducted to determine which NPI's NICU nurses use and the impact of these interventions.

**Research questions:** With respect to the neonatal intensive care nurses participating in the study:

- Which NPI's do they implement?
- How often and how do they implement the NPI's?
- Which effects of the NPI's do they observe after the implementation?

**Research design:** The research was of qualitative descriptive design.

**Participants, setting and Instruments:** This study was conducted over the period December 2013 -

January 2014 with 68 nurses who agreed to participate in the research and were working in three neonatal intensive care units (two of the units were Level II, one was Level III) of two pediatric state hospitals in Istanbul, Turkey. The researchers collected the data using two questionnaires drawn up in the light of the literature. The Nurse Data Questionnaire consisted of 6 questions on the participating nurse's age, gender, educational status, level of the unit the nurse was working in, and the duration spent in this unit and in the profession. The NPI Implementation Questionnaire was created on the basis of the NPI most frequently applied to the neonates. The questionnaire consisted of 6 columns and 9 lines. In the columns, from left to right, were 5 questions on the name of the intervention and under which conditions it was implemented, the duration of the intervention and the effects observed. The lines from top to bottom contained the interventions of initiating non-nutritive sucking, feeding sucrose, and picking up the neonate, positioning, offering breast milk, exposing the neonate to music, massaging, reducing environmental stimuli, and kangaroo care. The nurses provided more than one response to the questions in the form. Instructions were given at the beginning of each questionnaire describing the aim of the study, how to answer the questions, and explaining that the responses would only be used for the purposes of research. A face-to-face meeting was organized with the nurses working at the NICU's and they were given information about the study. After the nurses provided their verbal and written consent, they were asked to answer the questions in the data forms; filling out the questionnaires took 6-8 minutes. Participants based their responses to the questions in the NPI implementation questionnaire on the time they spent on implementing the NPI, their own observations and applications. They were informed in writing in the instructions on the questionnaire that they were not to respond to any question regarding an intervention they had not implemented. Data were analyzed using the SPSS 22.0 package program. Statistical significance was indicated when  $p < 0.05$ .

**Ethical considerations:** Written permissions were obtained from the Clinical Studies Ethics Committees of a university and two state hospitals (Numbers; 2013-15 and 2013-106). The nurses working at the units provided their written and verbal consent after being informed of the aim of the study and about the data collection questionnaires.

**Results** The majority of the nurses were between the ages of 18-25 (44.1%), woman (92.6%), had bachelor's degrees (64.7%) and were working at Level III neonatal intensive care units (82.4%). Of the nurses, 39.7% had a total working history of 6 years or more in the profession; the duration of their work in the neonatal intensive care unit was 2-3 years (33.8%). **NPI's implemented by the nurses** It was found that 98.5% of the nurses had performed one or more NPI and more commonly performed the interventions of

positioning (86.8%), reducing environmental stimuli (79.4%), picking up the neonate (75%), initiating non-nutritive sucking (73.5%), offering breast milk (73.5%) and massaging (58.8%), but performed the interventions of feeding sucrose (48.5%), kangaroo care (42.6%) and exposing the neonate to music (13.2%) to a lesser degree. The nurses supervised the feeding of the neonates via the mother's breastfeeding (90%), with a baby bottle (84%) or by ora-/nasogastric tube (68%) feeding in 16-30 minutes (40%). The nurses applied kangaroo care to neonates with the mother (82.8%) and father (17.2%) in 5-10 minutes (34.5%). To reduce the environmental stimuli in the unit, nurses closed the incubator lid softly (98.1%), dimmed the lights in the unit (96.3%), and performed their routine daily care (83.3%) at the same time that they administered medications (81.5%). A 31.5% of the nurses were able to reduce environmental stimuli in 16-30 minutes and implemented the initiation of non-nutritive suckling by means of a pacifier (96%), their gloved finger (20%) or via a blown-up glove finger (10%) for 5-10 minutes (62%). They administered the sucrose by injector (90.9%), pacifier (21.2%), medicine dropper (6%) or baby bottle (3%) for less than 5 minutes (84.8%). Nurses exposed the neonates to Turkish classical music (44.4%), Western classical music (33.3%) and Turkish folk songs (22.2%) for 16-30 minutes (44.4%). A 78.4% of the nurses picked up the neonates themselves; mothers picked up 58.8% of the neonates and fathers picked up 3.9%. The time the neonate spent picked up was 5-10 minutes (43.1%). It was seen that the nurses positioned the neonates in lateral (55.9%), supine (52.5%) and prone (47.4%) positions and the time the neonates spent in these positions was 16-30 minutes (44.1%). Nurses spent 5-10 minutes (57.5%) massaging the neonate's entire body (92.5%), including hands-feet (70%), abdomen (57.5%) and back (5%). When a neonate cried, nurses offered breast milk (64.7%), kangaroo care (38.2%), reduced environmental stimuli (77.9%), fed sucrose (33.8%), exposed the neonate to music (10.3%), picked up the neonate (75%) and initiated non-nutritive sucking (70.6%). When a neonate became restless, the nurses were seen to position the neonate (57.4%) and perform a massage (45.6%) during daily care. A 63.2% of the nurses stated that breast milk reduced the neonate's crying; 42.6% referred to kangaroo care in this context, 79.4% to diminishing environmental stimuli, 72.1% to non-nutritive sucking, 45.6% to feeding sucrose, 10.3% to exposing the neonate to music and 72.1% said that picking up the neonate produced this effect. A 70.5% of the nurses reported that the neonate's oxygen saturation had improved after being positioned and 48.5% observed that pain was reduced after a massage (Table I). No statistically significant difference was detected in comparison of NPI's by the nurses' age, gender, level of education, duration of employment at the neonatal intensive care unit or time in the profession ( $p > 0.05$ ).

**Table I: Status of Neonatal Nurses' Use of NPI's**

Status	Offering breast milk (n=50)	Kangaroo care (n=29)	Reducing environmental stimuli (n=54)	Initiating non-nutritive sucking (n=50)	Feeding sucrose (n=33)	Exposing the neonate to music (n=9)	Picking up the neonate (n=51)	Positioning (n=59)	Massaging (n=40)
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
<b><u>Application Period:</u></b>									
Less than 5 minutes	7(14.0)	7(24.1)	12(22.2)	8(16.0)	28(84.8)	-	9(17.6)	1(1.7)	1(2.5)
5-10 minutes	14(28.0)	10(34.5)	10(18.5)	31(62.0)	3(9.1)	2(22.2)	22(43.1)	7(11.9)	23(57.5)
11-15 minutes	9(18.0)	5(17.2)	15(27.7)	6(12.0)	-	3(33.3)	11(21.6)	19(32.2)	10(25.0)
16-30 minutes	20(40.0)	7(24.1)	17(31.5)	5(10.0)	2(6.1)	4(44.4)	5(9.8)	26(44.1)	6(15.0)
1-3 hours	-	-	-	-	-	-	4(5.9)	6(10.2)	-
<b><u>†Application Times:</u></b>									
When neonate cries	44(64.7)	26(38.2)	53(77.9)	48(70.6)	23(33.8)	7(10.3)	51(75.0)	38(55.9)	21(30.5)
When neonate is restless	20(29.4)	16(23.5)	38(55.9)	12(17.6)	8(11.8)	3(4.4)	19(27.9)	39(57.4)	21(30.5)
During daily care	5(7.4)	15(22.1)	32(47.1)	2(2.9)	-	4(5.9)	17(25.0)	36(52.9)	31(45.6)
Following aspiration	2(2.9)	4(5.9)	17(25.0)	1(1.5)	2(2.9)	1(1.5)	4(5.9)	20(29.4)	-
During heel-prick sampling	11(16.2)	9(13.3)	13(19.1)	17(25.0)	16(23.5)	1(1.5)	13(19.1)	7(10.3)	5(7.4)
While inserting IV catheter	7(10.3)	5(7.4)	13(19.1)	14(20.6)	15(22.1)	2(2.9)	15(22.1)	10(14.7)	4(5.9)
During administration of medicine	9(13.2)	8(11.8)	17(25.0)	7(10.3)	5(7.4)	2(2.9)	13(19.1)	12(17.6)	5(7.4)
<b><u>†Effects Observed:</u></b>									
Reduced crying	43(63.2)	29(42.6)	54(79.4)	49(72.1)	31(45.6)	7(10.3)	49(72.1)	33(48.5)	21(30.9)
Reduced pain	25(36.8)	21(30.9)	33(48.5)	21(30.9)	22(32.4)	1(1.5)	27(39.7)	41(60.3)	33(48.5)
Improved heart rate	25(36.8)	18(26.5)	37(54.4)	31(45.6)	19(27.9)	2(2.9)	36(52.9)	40(58.8)	24(35.3)
Improved oxygen saturation	28(41.2)	18(26.5)	41(60.3)	34(50.0)	22(32.4)	3(4.4)	34(50.0)	48(70.5)	25(36.8)
Faster healing period	26(38.2)	11(16.2)	25(36.8)	7(10.3)	2(2.9)	-	12(17.6)	18(26.5)	22(32.4)
Weight increase accelerated	25(36.8)	7(10.3)	7(10.3)	4(5.9)	1(1.5)	-	1(1.5)	5(7.4)	5(7.4)

†The nurses provided more than one answer

## **Discussion**

Neonatal nurses implement one or more nonpharmacological intervention to reduce the adverse effects of intensive care on neonates and to relieve their pain and stress (Hocakenberry and Wilson 2011, Dagoglu and Ovali 2008, Gomella2012). This study found that, similar to other research, nurses carried out more than one intervention simultaneously to enhance the positive impact of intervention (Vienna et al 2011, Cignacco et al 2011, Efe and Savaser 2007, Liaw et al 2011, Boyle et al 2007). We found in this study that most of the nurses fed the neonates breast milk and reported that when they did so, crying time was reduced and oxygen saturation improved (Table I). Other studies have also revealed that suckled neonates have reduced pain and fewer changes in their physiological parameters<sup>8</sup> and that hospital stays are shortened in this way (Ahnfeldt et al 2011). The inducing of most of the neonates in the present study to suck as well as the effects of this intervention are similar to what has been reported in other studies. On the other hand, it was seen that neonates who could not tolerate oral feeding and/or were at risk of aspiration were fed by ora-/nasogastric tube and breast milk. The important and valuable observation was noted in this context that the nurses participating in the research were attentive to the rights of the neonate.

The literature states that kangaroo care can be started at 30 minutes and gradually increased daily to 1-3 hours (Hockenberry 2011). It was seen in the study that the nurses applying kangaroo care were few (n=29), suggesting that the use of kangaroo care in the NICU's in Turkey is not very widespread. At the same time, fathers have a low attendance in providing kangaroo care, a finding that may be associated with the passive role of the father in childcare in the family in Turkish culture. It was observed in the study that the nurses frequently applied kangaroo care when neonates cried or were restless and that they reported that the neonate's crying and pain decreased (Table I). Similarly, this study, as in two other studies, determined that kangaroo care was useful in painful procedures, causing reduced pain and crying (Choudhary et al 2011, Kostandy et al 2008).

It has been shown that environmental stimuli cause sleep irregularities in neonates and increase heart and respiration rates (Dagoglu and Ovali 2008). In a study conducted with preterms,

earplugs were used to reduce environmental stimuli and it was found that the preterms gained weight, displayed physical and mental development (Abou, Williams and Lasky 2009). Another study also reported that earplugs could improve the quality of sleep (Orsi et al 2015). In this study, to reduce the environmental stimuli the nurses made sure to close the incubator lid softly, dimmed the lights in the unit, and performed their routine daily care at the same time that they administered medications. No study in the Turkish literature was detected on the use of earplugs in the NICU or with preterm but the present study supports the observation that the interventions made by the nurses created the same positive impacts as reported in the studies in the literature.

It was determined in this study that the nurses frequently used a pacifier (96%) when a neonate cried and during invasive procedures, since they observed that this reduced the neonate's crying and pain and improved oxygen saturation levels and heart rate (Table I). There is other similar research in the literature pointing to reduced pain and crying and lower heart and respiration rates during painful procedures in neonates, where a pacifier is used (Liaw et al 2011, Kamhawy et al 2014). Pacifiers are not recommended in healthy neonates since it prevents nutritive feeding. However, studies that point to this are largely related to high-risk neonates or those that cannot be fed orally. There is still reason to believe that nurses make more use of the pacifier than necessary in their practices aiming to develop the neonate's sucking reflex, calm them during invasive and noninvasive procedures and foster a sense of security.

The literature includes studies where it has been reported that sucrose may be fed using a pacifier, an injector or medicine dropper and that sucrose reduces a neonate's stress and pain and regulates the neonate's physiological and behavioral reactions (Dagoglu and Ovali 2008, Algren and Algren 2005). It was observed in the study that the nurses fed the neonates sucrose more frequently with an injector (90.9%) and did this especially when the neonate cried, observing that the neonate's crying and pain lessened in this way (Table I). Studies indicate that pain scores drop when sucrose is given to neonates during painful procedures (Liaw et al 2011, Boyle 2006). In this study too, the nurses observed similar results and it was noted that sucrose was offered for short periods (less than 5 minutes), as

recommended in the literature (Hockenberry 2011, Dagoglu and Ovalı 2008).

It was seen in the study that the neonates were exposed mostly to Turkish classical music for a period of 5-30 minutes. Another study has reported that neonates were exposed to Turkish classical music (Aydın and Yıldız 2014) while still another referred to classical music (49%) and children's songs (31%) and to offering this music session for 2 hours or more. (Polkki, Korhonen and Laukkala 2012). The results are similar to the present study in terms of the type of music preferred but the period of exposure in the present study is shorter. The study indicated that neonates exposed to music cried less and that their oxygen saturation levels and heart rates improved (Table I). Research has shown that neonates that listen to music gain weight faster, cry less, have shorter hospital stays, (Pölkki, Korhonen and Laukkala 2012) displays less stress, (Polkki, Korhonen and Laukkala 2012, Amini et al 2013) have more regular heart rates (Polkki, Korhonen and Laukkala 2012, Loewly et al 2013) and an increase in calorie intake (Loewly et al 2013).

Picking a neonate up in one's arms sets body temperature in balance and calms the neonate (Sullivan 2012, Karakoc and Turker 2008). In this study, it was found that the nurses frequently picked up the neonates when they cried and that the neonate's crying and pain lessened while their heart rates and oxygen saturation levels improved (Table I). Another study reported a similar outcome, noting that babies picked up during the procedure of heel pricking cried less (Karakoc and Turker 2008).

In this study it was found that the majority of the nurses placed the neonates in lateral, supine and prone positions when the neonates were restless or crying and during their daily care, and it was observed that this positioning reduced the neonates' crying and regulated their oxygen saturation levels and heart rates (Table I). It is recommended in the literature that positioning neonates in lateral, supine and prone positions ensures the continuation of their physiological functions and reduces their behavioral reactions (Dagoglu and Ovalı 2008, Karakoc and Turker 2008). Research has revealed that the prone position increases oxygenation in neonates (Abeyazdan et al 2010) and affords them longer periods of sleep (Bhat et al 2009). The findings of this study are in parallel with the literature and

other research results and it has been observed that nurses calm neonates when they are under stress by positioning them, appropriate to their clinical status, in the manner recommended in the literature. The literature recommends the massaging of neonates, starting from the head and moving down to the legs and feet and then, one by one, to all parts of body (Sullivan 2008). In this study, the nurses frequently massaged the neonates during their daily care, covering the whole body, including the hands, feet and abdomen, noting reduced pain and crying in the neonate, improved oxygen saturation and heart rate, shorter healing periods and a gain in weight (Table I). Similar effects have been reported in another study where it has been noted that neonates have reduced colic pain and display a gain in weight following a regional massage (Tekgunduz et al 2014).

**Strengths and limitations of the study:** The strength of this study in that statistical data have been added to the literature for commonly employed NPI's. The limitations have been that the fact that the data derived from the nurses working in only two hospitals of a developed province of Turkey, that the sample was small, and that a qualitative approach was used in the research.

**Implications for practice:** This study will be beneficial to neonatal nurses in their care plans and will allow them to make more use of NPI's.

**Conclusions:** The study has attempted to determine, on the basis of the self-reports of the participating nurses, the status of how nurses providing neonatal intensive care use NPI's and what the effects of these interventions are. It was found that most of the nurses working in the NICU employed NPI's and that these interventions reduced the crying and pain of neonates and also improved their oxygen saturation levels. According to the results of the study, it might be recommended that similar research be conducted using a quantitative approach so that application protocols with regard to the use of NPI's in the NICU's may be drawn up.

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