Original Article

J Babol Univ Med Sci
Vol 19, Issu 6; May 2017. P:28-34

The Implementation of Pain Management and Assessment in Neonatal Intensive Care Units of Teaching Hospitals Affiliated to Tehran University of Medical Sciences

O. Rahimi (MSc)*[1], Z. Godarzi (MSc)[2], N. Khalessi (MD)[3], F. Soleimani (MD)[4], N. Mohammadi (PhD)[5], A. Shamshiri (MD)[6]

1.Bahrami Pediatrics Hospital, Tehran University of Medical Science, Tehran, I.R.Iran
2.Faculty of Midwifery and Nursing, Tehran University of Medical Sciences, Tehran, I.R.Iran
3.Faculty of Medicine, Iran University of Medical Sciences, Tehran, I.R.Iran
4.Pediatric Neurorehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, I.R.Iran
5.Department of Critical Care Nursing, Nursing and Midwifery Faculty, Iran University of Medical Sciences, Tehran, I.R.Iran
6.Dentistry Research Institute, Tehran University of Medical Sciences, Tehran, I.R.Iran

J Babol Univ Med Sci; 19(6); Jun 2017; PP: 28-34
Received: Dec 3rd 2016, Revised: Feb 22th 2017, Accepted: Apr 9th 2017.

ABSTRACT

BACKGROUND AND OBJECTIVE: Neonatal pain causes changes in the structure and function of brain in addition to acute physiologic symptoms and is followed by delayed development of infants. This study aims to determine the implementation of pain management and assessment in neonatal intensive care units.

METHODS: This cross-sectional study was conducted among 138 nurses working in neonatal intensive care units through census. The data were collected using researcher – made questionnaire including two parts: pain management and assessment and demographic information. The minimum and maximum scores were 0 and 552, respectively, shown in the form of percentage.

FINDINGS: At a response rate of 80.23%, the mean age of participants was 31.76±5.41 years and the mean experience of nurses working in a neonatal intensive care unit was 4.36 ± 3.58 years. The cases of implementation of pain management and assessment were as follows: care management for pain reduction (72.8%), allow parents to relieve pain (68.5%), swaddling (66.7%), pain assessment while implementing therapeutic and caring measures (62.9%), the use of sucrose solution (61.6%), teaching parents about observing pain symptoms in the infant's face (58.7%), recording infant's pain behaviors and the method for relieving the pain (52.4%), pain assessment at least every 4 hours (52.2%) and the use of valid tools for pain assessment (36.8%).

CONCLUSION: According to the results of this study, pain management and assessment was implemented in more than half of the cases.

KEY WORDS: *Implementation, Pain management, Infant, Neonatal intensive care unit.*

Please cite this article as follows:

Rahimi O, Godarzi Z, Khalessi N, Soleimani F, Mohammadi N, Shamshiri A. The Implementation of Pain Management and Assessment in Neonatal Intensive Care Units of Teaching Hospitals Affiliated to Tehran University of Medical Sciences. J Babol Univ Med Sci. 2017;19(6):28-34.

* **Corresponding author: O. Rahimi (MSc)**
Address: Bahrami Hospital, Tehran University of Medical Sciences, Tehran, I.R.Iran
Tel: +98 21 73013000
E-mail: mihan1387@yahoo.com

Introduction

In recent decades, the development of technological and pharmaceutical facilities and the improvement of newborn care have reduced the mortality rate of infants (1). However, it should be acknowledged that many care and treatment methods in the neonatal intensive care unit will have a negative effect on neonatal development (2, 3).

Studies have shown that infants admitted to NICU receive 10 to 16 painful ways of care during the day (4,5). Management and evaluation of pain is one of the important therapeutic goals for the newborns in the 21st century, while neonatal pain was overlooked during the twentieth century, (6) which, unfortunately, resulted in the surgery of infants without anesthesia or with minimal anesthesia until the late 1980s (7).

Since the early 1980s, researchers have realized that infants are capable of understanding pain and respond to it. In the meanwhile, the threshold of pain in premature infants is 30 – 50% lower than that of adults and children (8, 9).

Physiologic response to neonatal pain includes changes in the gastrointestinal tract, pulmonary function, and impairment in the immune system response (10). Infants develop more hormonal, metabolic and cardiovascular changes than children after surgery (11). Neonatal response to painful stimuli is a behavioral and physiological reflex, and is often overlooked (12).

Chronic pain has a negative impact on the development of the brain; it also affects other vital organs and endangers the life of the infant, and ultimately has adverse effects on the future development of the infant (9, 13).

Given the neonatal pain complications, the American Academy of Pediatrics and the Canadian Pediatric Association in 2006 (14) suggested that each neonatal care department should have guidelines for controlling pain. With the development of knowledge on pain, the assessment and management of neonatal pain is still challenging (5, 14).

Today, more than 40 precautionary and pain assessment tools for preterm and term infants are designed for research purposes, which may be difficult to use at bedside (15). The neonatal pain is not well controlled for various reasons, including limited therapeutic options and the concern about the side effects of analgesics (11). It should be noted that neonatal pain management is interdisciplinary and should be performed with the help of doctors, nurses and other members of the treatment team (16, 17). Considering the need for painless care for optimal growth and development, developmental care was designed in this regard (2).

One aspect of developmental care management is pain management (18-20). The preferred method for assessing pain is the expression of pain by the patient. However, infants have no ability to speak and express pain, so nurses' ability to assess pain is very important in the management of neonatal pain (21).

Another important problem in managing pain in preterm and term infants is the use of non-pharmacological methods for mild pains that can be implemented by nurses and without a physician's prescription (16).

Several developmental care interventions including: hugging, shaking, swinging, breastfeeding, intrauterine conditions, nonnutritive sucking, sucrose, skin contact (22-24), and swaddling are among the non-pharmacological neonatal pain management techniques (16).

Decrease in the frequency of painful procedures (such as the frequency of tracheal suction, sampling from heel), using standard recommendations for sucrose solution use, neonatal pain assessment at least every 4 hours and using pain management methods during heel sampling, intravenous blood sampling, circumcision, tracheal intubation in non-emergency cases, mechanical ventilation and postoperative pain are other methods for management of neonatal pain (6, 11).

The pain in infants admitted to NICU is also worrying for parents. Providing parents with more information about neonatal pain encourages them to participate in pain management and reduces their anxiety (23).

Few studies have been conducted on the knowledge and performance of nurses in evaluating and controlling the pain of the infants (21). In a study, more than half of nurses in California acknowledged that pain in their neonates was not well managed, and the lack of evidence-based guidelines for pain control was one of the barriers to pain management (25).

According to studies in Jamaica and Australia, nurses and physicians had little knowledge about pain assessment and the use of pharmaceutical and non-pharmaceutical methods of pain control (26, 27). According to a study, less than half of the nurses (44%) stated that neonatal pain was well managed in their ward (21).

The results of the study of Lake indicated that according to nurses' view, neonatal pain was not

managed in 80% of the cases (17). In a study in Jordan, Razeq et al. indicated that nurses rated the implementation of neonatal pain care to be lower than optimal level (28).

Neonatal pain management in other countries is faced with problems and not desirable. Therefore, this study was conducted to evaluate the implementation of neonatal pain management by nurses of neonatal intensive care units in teaching hospitals affiliated to Tehran University of Medical Sciences in order to clarify the results of neonatal pain management and to help caregivers to improve the quality of neonatal pain management.

Methods

This cross sectional study was conducted in the second half of 2012 to evaluate neonatal pain management and assessment in the neonatal intensive care units in 9 neonatal intensive care units in Tehran University of Medical Sciences after being approved by the ethics committee of Tehran University of Medical Sciences. 172 nurses working in these wards with more than 6 months work experience entered the study by census and 138 nurses participated in the study.

The data on the implementation of neonatal pain management and assessment were completed using a self-made questionnaire entitled "An Assessment of the Implementation of Developmental Care Aspects" (20). The questionnaire consists of two parts: A. Demographic characteristics were analyzed based on three questions: age, work experience in neonatal intensive care unit and participation in workshop and training courses for management and assessment of pain; B.

The implementation of pain management and assessment included 10 items in which participants rated their performance using five-level Likert scale with the following options: "always" (a score of 4), "often" (a score of 3), "sometimes" (a score of 2), "rarely" (a score of 1) and "never" (a score of 0). Finally, the scores for each item were summed and expressed as the percentage of implementation for each item. The minimum and maximum points for each item range from 0 to 552.

For content validity and structural validity, the comments of 17 faculty members of the neonatal group of the Faculty of Nursing and Medicine, nurses and head nurses in the neonatal intensive care unit were used. For reliability, kappa coefficient tool was calculated for each questionnaire option and the kappa coefficient was found to be 60 to 95%.

In order to complete the questionnaire, it took participants about one week to complete it at the right time so that the working conditions and job stress would have the least effect in filling the questionnaire. Completing each self-report questionnaire took 10 minutes max.

Data were analyzed using descriptive statistics and independent t-test in SPSS 20 software, while $p<0.05$ was considered significant.

Results

With a response rate of 80.23%, the average age of 138 nurses participating in this study was 31.76 ± 5.41 years. The average nursing experience in the neonatal intensive care unit was 4.36±3.58 years. Of the 138 nurses, only 63 nurses (45.7%) participated in workshops and training courses on pain management and assessment.

There was a direct correlation between participating in the workshops and the training courses and the implementation of pain management and assessment ($r= 0.3$, $p<0.001$), which indicates that participation in the workshops and the training courses improves pain management and assessment. The mean percentage of implementation of pain management and assessment was 59.16±18.98%.

The rate of implantation of each pain management and assessment item respectively include: Regulating healthcare to reduce pain and discomfort in infants (such as decreasing the frequency of endotracheal suctioning, decreasing the frequency of blood sampling and venipuncture) (72.8%), allowing parents to relieve infant's pain and discomfort (68.5%), swaddling the infant (as a non-pharmacological method) to reduce the pain caused by stressful or painful treatment and care (66.7%), assessing neonatal pain at each treatment and care session (62.9%), using sucrose solution (as a non-pharmacological method) to reduce pain caused by stressful or painful treatment and care (61.6%), educating parents about how to pay attention to pain symptoms on the face of the infant (58.7%), recording the pain behaviors and how to relieve it (52.4%), assessing neonatal pain at least every 4 hours (52.2%) and the use of valid instrument for assessing neonatal pain (36.8%) (table 1).

Table 1. The rate of implementation of pain management and assessment items

Pain assessment and management items	Always N(%)	Often N(%)	Sometimes N(%)	Rarely N(%)	Never N(%)	Total implementation rate
Regulate care for reducing the pain or discomfort of infants (such as decreasing the frequency of endotracheal suctioning, reducing the frequency of blood sampling and venipuncture)	34(24.6)	70(50.7)	25(18.1)	6(4.3)	3(2.2)	72.8
Allow parents to relieve their infant's pain and discomfort	34(24.6)	48(34.8)	45(32.6)	8(5.8)	3(2.2)	68.5
In order to reduce the pain caused by any stressful or painful therapeutic and caring measure, use swaddling (as a non-pharmacological method)	34(24.6)	55(39.9)	31(22.5)	5(3.6)	13(9.4)	66.7
Assess the neonatal pain after each therapeutic and caring measure	26(18.8)	55(39.9)	31(22.5)	16(11.6)	10(7.2)	62.9
Use a sucrose solution (as a non-pharmacological method) to reduce the pain caused by any stressful or painful therapeutic and caring measure	26(18.8)	50(36.2)	38(27.5)	10(7.2)	14(10.1)	61.6
Teach parents how to pay attention to signs of pain or discomfort in the infant's face.	23(16.7)	35(25.4)	54(39.1)	19(13.8)	7(5.1)	58.7
Record neonatal pain behaviors and how to relieve it	25(18.1)	29 (21)	34(24.6)	34(24.6)	16 (11.6)	52.4
Assess neonatal pain At least every 4 hours	23(16.7)	35(25.4)	35(25.4)	21(15.2)	24 (17.4)	52.2
Use a valid tools to assess neonatal pain	9(6.5)	27(19.6)	27(19.6)	32(23.2)	43 (31.2)	36.8

Discussion

In the present study, nurses reported moderate management and assessment of neonatal pain. According to a study by Cong et al., less than half of nurses (44%) stated that the neonatal pain was well managed in their ward (21). The results of the Lake's study indicated that, according to nurses, 80% of the cases did not manage the pain in the infants (17). According to a study by Razeq et al. in Jordan, nurses reported suboptimal neonatal pain management (28). All of the above-mentioned results are consistent with the results of the present study and show the need for improvement in the management of neonatal pain. In the present study, less than half of the nurses were trained in neonatal pain management, while the results showed that participation in workshops and training courses improved neonatal pain management and assessment. A study in Finland showed that nurses had little knowledge about the fact that premature infants are more susceptible to pain and complications than term neonates (29).

In North America, about 50 percent of nurses did not receive adequate and continuous education about neonatal pain, and nurses' perceptions of pain control were significantly related to their training in this field (21). Therefore, one of the most important reasons for the poor management of neonatal pain is the lack of awareness of nurses in this area. In the present study, most nurses regulated the healthcare to reduce neonatal pain (such as decreasing the frequency of endotracheal suctioning, reducing the frequency of blood sampling and venipuncture), which is consistent with the results of the study by Cong et al. (21).

Therefore, it shows that most nurses have a positive attitude toward reducing the pain of the neonates and they try to do this. In the present study, more than half of the nurses allowed parents to relieve the pain of their infant and educated parents about pain symptoms on the infant's face. In another study, nurses agreed with the parents' participation in controlling the neonatal pain (30). In a study in Finland, the majority of nurses also stated that the parents' hug and touch of the infant are some of the pain relief methods (31). According to the results of a study in Canada, the presence of parents alongside infants had a positive effect on non-pharmacological control of pain (32). In a study by Franck et al., educating parents about pain helped parents play a more active role in controlling neonatal pain (33). Consequently, according to results of the studies, parents' education and their presence are effective in controlling the neonatal pain. In the present study, more than half of the nurses used swaddling and

sucrose to reduce the neonatal pain. In a study by Khoza et al. in South Africa, nurses preferred Non-pharmacological methods of pain control such as sucrose and swaddling over other methods (34). The results of a study by Cong et al. indicated that 79% of nurses used non-pharmacological pain control (21). Jeong et al. in their study in South Korea stated that nurses used non-pharmacological methods more than pharmacological methods for pain control (35). According to the results of a study by Johnston et al. in Canada, half of the painful care and treatment methods were performed without pain relief (32). The results indicate that with a positive attitude, nurses can manage neonatal pain without restrictions and doctors' order and by using non-pharmacological methods.

In order to manage neonatal pain, nurses' ability to assess neonatal pain is very important and should be done using a valid instrument (21). In the present study, more than half of the nurses assessed the pain of the infant at each stage of the treatment and care sessions. Half of them recorded the neonatal pain and how it was relieved, and they assessed the neonatal pain as vital signs every 4 hours, but unfortunately few nurses used valid pain assessment tools. The results of Noghabi et al. showed that nurses' performance was poor in assessing pain and none of the nurses used the pain assessment tools (36).

Pölkki et al. in Finland reported that more than half of nurses assessed pain in premature infants without using pain assessment tools (29). A study by Harrison et al. in Australia found that only 6% of neonatal sections used pain assessment tools for regular pain assessment (37). In UK, Akuma et al. reported that only 2.5% of nurses and doctors were familiar with pain assessment tools (38). A study in Japan also found that more than 60% of neonatal intensive care units did not use pain assessment tools, and less than 20% had written guidelines for pain management (39). In a study in South Africa, two third of nurses referred to the lack of guidelines for controlling neonatal pain (34). In the study of Cong et al., only 43% of nurses stated that the neonatal pain management guidelines were evidence-based (21). A study by Harrison et al. demonstrated that most neonatal intensive care units in Australia do not have a policy to guide pain management (37). According to a study in South Korea, 92% of neonatal nurses mentioned guidelines in their section, but only about 70% read the guidelines and were trained for its implementation (35). In a study in Italy, Lago et al. focused on improving the neonatal pain management after a five-year period since the provision of a pain management instruction from 2004 to 2010, and reported that despite all improvements, management of pain is still not optimal and the subject of neonatal pain should be addressed through quality improvement programs (40).

Therefore, the results of this study and most other studies show that in neonatal care units, pain assessment tools and neonatal pain management guidelines are either absent or are not appropriately used and implemented.

However, lack of appropriate trainings for nurses regarding the use of pain assessment tools is one of the barriers to neonatal pain control (25, 38). Considering that neonatal pain has negative effects on recovery process and can increase health care costs, it is recommended that key measures be taken by the Department of Maternal and Child Health, Ministry of Health, in order to bring about a fundamental change, improve the performance and assess pain as the fifth vital symptom.

Since neonatal pain management is an interdisciplinary task, educating all group members should be a priority and more attention should be paid to the topic of neonatal pain control and its methods in nursing courses, especially in courses of Master of Neonatal Care Nursing, Neonatology Super Specialty and Pediatric Surgery. More attention should be paid to the role of parents as the best neonatal pain reliever.

Acknowledgment

Hereby, we express our deepest sense of gratitude and indebtedness to Research Deputy of Tehran University of Medical Sciences for their financial support. We would also like to thank the Officials in School of Nursing and Midwifery and all nursing colleagues working in neonatal intensive care units affiliated to Tehran University of Medical Sciences hospitals.

References

1.Hunt KN. The NICU: Environmental Effects of the Neonatal Intensive Care Unit on Infants and Caregivers: Southern Illinois University; 2011. Available From: http://opensiuc.lib.siu.edu/cgi/viewcontent.cgi?article=1068&context=gs_rp

2.Wielenga JM. Stress and discomfort in the care of preterm infants: a study of the comfort scale and the newborn individualized developmental care and assessment program (NIDCAP®) in a dutch level III NICU: University of Amsterdam; 2008. Available From: http://www.proefschriftenverpleegkunde.nl/wp-content/uploads/gravity_forms/6-e9dc63308c2d8e347e8c9e1a28bb67ce/2015/11/Stress-and-discomfort-in-the-care-of-preterm-infants-A-study-of-the-Comfort-Scale-and-the-Newborn-Individualized-Developmental-Care-and-Assessment-Program-in-a-Dutch-level-III-NICU.pdf?TB_iframe=true

3.Krishnan L. Pain Relief in Neonates. J Neonatal Surg. 2013;2(2):19.

4.Evans JC, McCartney EM, Lawhon G, Galloway J .Longitudinal comparison of preterm pain responses to repeated heelsticks. Pediat Nurs. 2005;31(3):216.

5.Carbajal R, Rousset A, Danan C, Coquery S, Nolent P, Ducrocq S, et al. Epidemiology and treatment of painful procedures in neonates in intensive care units. JAMA. 2008;300(1):60-70.

6.Hall RW, Anand KJ. Pain management in newborns. Clin Perinatol. 2014;41(4):895-924.

7.Unruh AM. Voices from the past: ancient views of pain in childhood. Clin J pain. 1992;8(3):247-54.

8.Fitzgerald M. The development of nociceptive circuits. Nat Rev Neurosci. 2005;6(7):507-20.

9.Slater R, Fabrizi L, Worley A, Meek J, Boyd S, Fitzgerald M. Premature infants display increased noxious-evoked neuronal activity in the brain compared to healthy age-matched term-born infants. Neuroimage. 2010;52(2):583-9.

10.Anand KJS. Clinical importance of pain and stress in preterm neonates. Neonatol. 1998;73(1):1-9.

11.Sharek PJ, Powers R, Koehn A, Anand KJS. Evaluation and development of potentially better practices to improve pain management of neonates. Pediatrics. 2006;118(2):78-86.

12.Anand KJ, Hickey PR. Pain and its effects in the human neonate and fetus. N Engl j Med. 1987;317(21):1321-9.

13.Brummelte S, Grunau RE, Chau V, Poskitt KJ, Brant R, Vinall J, et al. Procedural pain and brain development in premature newborns. Annals of neurology. 2012;71(3):385-96.

14.Pediatrics AAo, Fetus, Committee N. Prevention and management of pain in the neonate: an update. Pediatrics.2006;118(5):2231-41.

15.Cong X, McGrath JM, Cusson RM, Zhang D. Pain assessment and measurement in neonates: an updated review. Adv Neonatal Care. 2013;13(6):379-95.

16.Cignacco E, Hamers JPH, Stoffel L, Lingen RA, Gessler P, McDougall J, et al .The efficacy of non-pharmacological interventions in the management of procedural pain in preterm and term neonates. Eur J Pain. 2007;11(2):139-52.

17.Lake SW. Barriers to Effective pain management in preterm and critically Ill neonates: university of kentucky; 2013.Available From: http://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1006&context=nursing_etds

18.Coughlin M, Gibbins S, Hoath S. Core measures for developmentally supportive care in neonatal intensive care units: theory, precedence and practice. Journal of advanced nursing. 2009;65(10):2239-48.

19.Altimier L, Kenner C, Damus K. The Wee Care Neuroprotective NICU Program (Wee Care): The Effect of a Comprehensive Developmental Care Training Program on Seven Neuroprotective Core Measures for Family-Centered Developmental Care of Premature Neonates. Newborn and Infant Nursing Reviews. 2015;15(1):6-16.

20.Godarzi Z, Rahimi O, Khalesi N, Soleimani F, Mohammadi N, Shamshiri AR. The rate of developmental care delivery in neonatal intensive care unit. Journal of Critical Care Nursing. 2015;8(2):117-24.

21.Cong X, Delaney C ،Vazquez V. Neonatal nurses' perceptions of pain assessment and management in NICUs: a national survey. Advances in Neonatal Care. 2013;13(5):353-60.

22.Heath N. Neonatal Pain Management: University of Nottingham; 2008.

23.Franck LS, Scurr K, Couture S .Parent views of infant pain and pain management in the neonatal intensive care unit. Newborn and Infant Nursing Reviews. 2001;1(2):106-13.

24.Harrison D, Bueno M, Reszel J. Prevention and management of pain and stress in the neonate. Research & Reports in Neonatology. 2015;5.

25.Byrd PJ, Gonzales I, Parsons V. Exploring barriers to pain management in newborn intensive care units: a pilot survey of NICU nurses. Advances in Neonatal Care. 2009;9(6):299-306.
26.Young J, Barton M, Richards-Dawson M, Trotman H. Knowledge, perception and practices of healthcare professionals at tertiary level hospitals in Kingston, Jamaica, regarding neonatal pain management. The West Indian medical journal. 2008;57(1):28-32.
27.Schultz M, Loughran-Fowlds A, Spence K. Neonatal pain: a comparison of the beliefs and practices of junior doctors and current best evidence. Journal of paediatrics and child health. 2010;46(1-2):23-8.
28.Razeq NMA, Akuma AO, Jordan S. Status of Neonatal Pain Assessment and Management in Jordan. Pain Management Nursing. 2016.
29.Pölkki T, Korhonen A, Laukkala H, Saarela T, Vehviläinen-Julkunen K, Pietilä AM. Nurses' attitudes and perceptions of pain assessment in neonatal intensive care. Scandinavian journal of caring sciences. 2010;24(1):49-55.
30.Cong X, McGrath JM, Delaney C, Chen H, Liang S, Vazquez V, et al. Neonatal nurses' perceptions of pain management: survey of the United States and China. Pain Management Nursing. 2014;15(4):834-44.
31.Pölkki T, Laukkala H, Korhonen A. Nurses' and Parents' Perceptions of Parental Guidance on Using Nonpharmacological Pain-Relieving Methods Among Neonates in the NICU. Pain Management Nursing. 2016;17(4):272-80.
32.Johnston C, Barrington KJ, Taddio A, Carbajal R, Filion F. Pain in Canadian NICUs: have we improved over the past 12 years? The Clinical journal of pain. 2011;27(3):225-32.
33.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:peds. 2011-0272.
34.Khoza SL, Tjale A. Knowledge, attitudes and practices of neonatal staff concerning neonatal pain management. curationis. 2014;37(2):1-9.
35.Jeong IS, Park SM, Lee JM, Choi YJ, Lee J. Perceptions on Pain Management among Korean Nurses in Neonatal Intensive Care Units. Asian nursing research. 2014;8(4):261-6.
36.Knowledge, attitude and performance of nurses regarding pain assessment and measurement, Bandar Abbas, Iran. hormozgan medical journal. [Research]. 2012;16(5):403-13.
37.Harrison D ،Loughnan P, Johnston L. Pain assessment and procedural pain management practices in neonatal units in Australia. Journal of paediatrics and child health. 2006;42(1-2):6-9.
38.Akuma AO, Jordan S. Pain management in neonates: a survey of nurses and doctors. Journal of advanced nursing. 2012;68(6):1288-301.
39.Ozawa M, Yokoo K. Pain management of neonatal intensive care units in Japan. Acta Paediatrica. 2013;102(4):366-72.
40.Lago P, Boccuzzo G, Garetti E, Pirelli A, Pieragostini L, Merazzi D, et al. Pain management during invasive procedures at Italian NICUs: has anything changed in the last five years? The Journal of Maternal-Fetal & Neonatal Medicine. 2013;26(3):303-5.