

# Neonatal Intensive Care Unit Nurses' Perceptions and Knowledge of Newborn Individualized Developmental Care and Assessment Program: A Multicenter Study

## Abstract

**Background:** The newborn individualized developmental care and assessment program (NIDCAP) is a new multifaceted approach, which is developmentally and functionally supportive of health especially in premature newborns at the neonatal intensive care unit (NICU). This study is designed for assessing the knowledge and perception of nurses as the most important members of the multidisciplinary team of NIDCAP about this program. **Materials and Methods:** This cross-sectional study was conducted on 120 nurses working in the NICUs of Alzahra, Taleghani, and Children hospitals affiliated to the educational and treatment centers of Tabriz University of Medical Sciences as well as 29 Bahman Hospital affiliated to Tabriz Social Security Organization in 2016 using census sampling method. Three questionnaires were employed to collect demographic data and to explore the nurses' perceptions and knowledge of the NIDCAP program. **Results:** Findings of the study indicated that the mean (SD) nurses' knowledge and perception scores for NIDCAP were 71.83 (1.64) and 76.80 (0.79), respectively. In the terms of knowledge, significant differences were found with regard to being married ( $t = -2.39, p < 0.019$ ), having an MSc degree ( $t = -2.14, p = 0.034$ ), and employment experience ( $t = -3.38, p = 0.001$ ). However, there was no significant relationship between perception and demographic variables ( $p > 0.05$ ), nor was there any significant relationship between perception and knowledge ( $p = 0.275$ ). **Conclusions:** The results of this study showed that the majority of nurses participating in the study had high knowledge about NIDCAP.

**Keywords:** Knowledge, nurses, perception, premature infants

## Introduction

Premature birth as the main factor of infants' mortality and adverse health effects remains a global problem in developing and developed countries. Annually, out of approximately 15 million babies who are born premature in the world, one million children die due to complications of premature birth. According to the report of a meta-analysis study, the overall prevalence of premature birth is 10% in Iran. Therefore, there is a dire need to adopt an appropriate approach in order to reduce complications, improve life skills training, and enhance self-care as well as pregnancy care.<sup>[1]</sup> Results of the studies on premature infants' development have shown that their development is largely affected by the medical environment and caring method.<sup>[2]</sup> While taking care of premature infants, not only their survival but also the promotion of their health must be taken into

account.<sup>[3]</sup> To this aim, Dr. Als designed a series of care, Newborn Individualized Developmental Care and Assessment Program (NIDCAP), in the mid-1980s and recommended its implementation in NICUs. In this program, the NICU is simulated to the uterine environment to some extent, improving the infant's development process besides preventing the harmful factors affecting the premature infant's development. This care program positively affects the infants' development process by focusing on the infant, family, and treatment staff during the care and by proportionating the physical structure with specific requirements.<sup>[4]</sup>

The NIDCAP, as a care philosophy for infants, has been highly regarded in recent years. Due to the staff-oriented nature of the program,<sup>[5]</sup> the nurse is the executor having a major key role in the success of developmental care,<sup>[6]</sup> which, in turn,

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necessitates improving the NICU nurses' awareness and knowledge in order for them to exhibit better performance in nursing the developmental care of infants.<sup>[3,7]</sup>

Due to their full-time presence beside the infants' beds and their close relationship with families, nurses as executors of developmental care must be featured with high levels of competency and awareness.<sup>[8,9]</sup> Therefore, enhancing their capability and promoting their nursing care quality for achieving a desirable performance require scientific as well as practical awareness and knowledge since promoted awareness would lead to improved performance and services.<sup>[10-12]</sup>

In fact, the major obstacle on the path of developmental care implementation is insufficient knowledge and awareness.<sup>[13]</sup> Furthermore, if the nurses' perceptions are known, the negative ones could be changed and directed toward the right path; thereby, an effective step could be taken toward providing appropriate and desirable nursing care and performance.<sup>[14]</sup>

A recent study has shown that nurses need to enhance their knowledge regarding developmental care and emphasized the need of developmental care. So far, no study has been conducted on the knowledge and perception of nurses about NIDCAP in Iran. There is no study on the perception of the executors of this care program toward developmental care, and it is not yet clear whether or not the training offered by the related workshops has managed to improve the nurses' awareness and knowledge in this care program. Accordingly, since Tabriz is one of the pioneers and executors of NIDCAP in Iran, it seems necessary to explore the knowledge and perception of nurses working in this city toward this care model. On this basis, the present study was aimed to investigate the awareness and attitudes of the NICU nurses toward developmental care as well as their perception of the obtained results at the hospitals.

## Materials and Methods

This cross-sectional study was conducted on 120 nurses working in the NICU Wards of Alzahra, 29 Bahman, Taleghani, and Children hospitals, Tabriz, Northwest of Iran, from February to December 2016. In all of the four hospitals studies, the NIDCAP was implemented. The inclusion criteria included the nurses working in the NICUs, having a work experience of at least 1 year, and a consent for participation in the study. The sample involved all NICU nurses employed in Tabriz hospitals selected via census sampling method. In this investigation, three questionnaires were used for data collection. The first contained demographic characteristics including marriage status, having child, employment background, work shift, and field of study. The second questionnaire was a researcher-made questionnaire to assess the knowledge of nurses about developing neonatal care. The questionnaire was designed using a literature review in line with the goals set. The validity of the instrument were assessed with respect to the opinions of 10 nursing experts

and neonatologists, and its reliability was calculated via test-retest and Cronbach's alpha coefficient (0.70 or higher is considered as reliability coefficient). The questionnaire consisted of 20 four-option questions, with each question having one correct answer receiving one score, whereas the other options were considered incorrect answers receiving a zero score. To make a better comparison, the range of scores was reported from 0 to 100. The classification of the status of nurses' knowledge about evolutionary care was as follows: grades 0–25, 25–50, 50–75, and 75–100, which were classified into weak, moderate, good, and excellent status, respectively.

The third questionnaire of this study dealt with the nurses' perception of the results of infant developmental care, using the second part of Wallin's questionnaire. Wallin's questionnaire contains 25 questions of which 5 were removed for ensuring reliability. Reliability of this questionnaire has already been assessed in various studies on nurses, and its alpha coefficient has been reported to be equal to 92%. However, to assess its validity, the questionnaire was first translated into Persian, then into English, and again into Persian. Afterward, it was examined and modified in accordance with the opinions of 10 nursing experts and neonatologists. This tool contains 20 items, each of which is scored on a Likert scale from one to five. However, in our study, it was graded from 0 to 100 for homogeneity. Each question was individually scored and the average score for each question was reported.<sup>[15]</sup>

After obtaining the permission from the Research Council of Tabriz University of Medical Sciences and from the heads of the hospitals mentioned, the researcher started the project. Subsequently, with coordination of the nursing office of the hospitals studied and using a census method, the nurses who met the inclusion criteria were selected. After encouraging them for cooperation, explaining the research objective, and obtaining their informed consent, we asked them to answer the questions and complete the questionnaire precisely and accurately. The questionnaires were completed in the selected NICUs. It should be noted that the questionnaires were given to the nurses at the onset of their working shift; then, the researcher briefed the nurses for a few minutes, either individually or in groups, about how to fill in the questionnaire correctly in order to avoid any problems or ambiguity. At the end of the working shift, the completed questionnaires were collected in closed envelopes.

Multivariable analysis was conducted using a backward elimination multiple linear regression model. The presence of two variables of age and employment experience in both hospital and NICU led to multicollinearity. For this reason, one of these three variables (i.e., employment experience in hospital) was used for multivariate analysis of the data. The relationship between perception and knowledge was examined based on Pearson correlation coefficient. The Chi-square for qualitative variables and analysis of variance (ANOVA)

for quantitative analysis of two or more groups with CI = 95% were utilized. The  $p$  values  $<0.05$  were regarded as statistically significant. The results were presented as frequencies or percentages. The data were analyzed by SPSS, version 23 (IBM Corp. Released 2015; IBM SPSS Statistics for Windows, Version 23.0, IBM Corp., Armonk, NY).

### Ethical consideration

This project was approved by the Ethic Committee of Tabriz University of Medical Sciences with the number IR.TBZMED.REC.1395.136. The signed consent was obtained from each individual participating in this research work. The questionnaires were unnamed and the information of all participants was kept secret.

### Results

In this study, 120 nurses participated, all of whom were female. According to Table 1, 70.00% of the participants were married, and their mean (standard deviation) age was 33.89 (5.85) years. Their educational levels were either a bachelor's degree (89.20%) or a master's degree (10.80%), respectively. About 117 (97.50%) of nurses were familiar with the NIDCAP through workshops (50.00%), learning from collaboration (35.00%), free study (3.34%), and other

methods (9.16%). The mean (SD) years of the nurses' employment background was 9.10 (5.26) and 5.97 (4.88) years in hospital and NICU Ward, respectively. Other demographic characteristics are described in detail in Table 1.

Findings of the study indicated that the mean (SD) nurses' knowledge and perception scores for NIDCAP was 71.83 (1.64) and 76.80 (0.79), respectively. In this study, most of the nurses had a good and excellent level of knowledge about NIDCAP (excellent, 31.70% and good, 55.80%). Also, 7.50% of the participants had a moderate knowledge status and only a small percentage of them (5.00%) had little knowledge in this regard. The highest score of nurses' perception in NIDCAP was related to infant's well-being during its hospital stay 81.36 (1.21) and the parents' way of caring for their infant 81.36 (1.33), whereas the lowest score was job satisfaction due to the demand for reduced light 69.44 (2.33). The obtained results showed that the nurses gained better job satisfaction through developmental care implementation and exhibited better performance, assuming a higher self-confidence toward their professional role. Furthermore, from the nurses' viewpoint, developmental care implementation would improve the infant's comfort and entail more assessment opportunities of infants [Table 2]. In this study, in the terms of knowledge, significant differences were found with respect to being married ( $p = 0.019$ ), having an MSc degree ( $p = 0.034$ ), and employment experience ( $p = 0.001$ ) [Table 3]. However, no significant relationship was found between perception and demographic variables ( $p > 0.05$ ) or between knowledge and these variables ( $p = 0.275$ ) [Table 4].

### Discussion

In this study, only 31.8% of the nurses had excellent knowledge, and the mean score of knowledge was 71.83 (1.64) of 100. Also the mean (SD) perception score of the nurses about NIDCAP was 67.75 (0.76) from the possible range score of 0–100. The results demonstrated that knowledge had a significant relationship with demographic variables of being married, having a master's degree, and employment experience. As far as perception was concerned, there were significant differences between perception and being married. Also, there was no significant relationship between perception and knowledge.

Mosqueda *et al.*<sup>[16]</sup> examined staff perception (neonatologists, nurses, and nursing assistants) of NIDCAP during its implementation in two Spanish neonatal level III intensive care units (NICUs). Their results demonstrated that most staffs had a positive perception of the developmental care. According to their results, the highest score was the infant's well-being during its hospital stay, whereas the lowest score was related to job satisfaction due to the demand for reduced light. The results of this study were consistent with our findings, although our study was conducted only on nurses. On the other hand, the results of a study conducted by Milette *et al.*<sup>[17]</sup> indicated significantly higher test scores

**Table 1: The characteristics of nurses working in NICU**

Variables	n (%)
Marriage	
Single	35 (29)
Married	84 (71)
Having child	
Yes	69 (57.50)
No	51 (42.50)
Educational level	
Bachelor	107 (89.20)
MSc	13 (10.80)
Field of education	
Nursing	106 (88.40)
NICU nursing	10 (8.30)
Employment	
Governmental	30 (25)
Contract	90 (74.10)
Work shift	
Fixed	11 (9.20)
Rotational	109 (90.80)
Getting to know the evolutionary care program	
Yes	117 (97.50)
No	3 (2.50)
Academic curriculum	
Free study	17 (14.20)
Participate in a Hospital Workshop	77 (64.20)
The way of knowing developmental care program (more than one option can be choised)	
Participate in a Country Congress	12 (10)
Learning by experience	58 (48.70)
Participate in a International Congress	4 (3.30)

**Table 2: The distribution of perception domains of nurses about presenting developmental care program**

Question	Mean (SD)
<b>Baby related questions</b>	
The infant's well being during its hospital stay	81.36 (1.21)
The parent's way of caring for their infant	81.36 (1.33)
The infant's opportunities to rest and sleep	79.45 (0.93)
The infant's ability to cope with enteral feeding	79.27 (1.30)
The safety of the infant	78.39 (1.24)
The infant's well being due to the demands on reduction in sound	78.15 (0.87)
My capability to assess the infant's condition	77.80 (1.40)
The infant's well being due to the demands on reduction of light	77.52 (1.01)
The infant's wellbeing due to the demands on reduction in activity	77.52 (1.17)
The presence of the parents at the infant's bedside	77.31 (1.43)
The parent's attachment to their infant	76.68 (1.26)
My capability to influence the infant's well being	72.52 (0.90)
<b>Nurse related questions</b>	
My own confidence in my professional role	77.52 (1.31)
My job satisfaction due to the demand for a reduced sound level	77.12 (1.43)
My job satisfaction due to the demand for reduced activity	77.12 (1.33)
My opportunities to adequately assess the infant's condition	77.1 (1.54)
My overall job performance	76.65 (1.56)
Overall satisfaction of my job performance	74.16 (1.69)
The conditions for performing my job	74.15 (1.78)
My job satisfaction due to the demand for reduced light	69.44 (2.33)
Average perceptual score	76.80 (0.79)

**Table 3: Results of multiple regression knowledge with demographic variables**

Variables	B	SE	Beta	t	p
<b>Marriage</b>					
Single Married	-8.09	-3.38	-0.20	-2.39	-0.019
<b>Educational level</b>					
Bachelor MSc	-10.03	-4.91	-0.18	-2.14	-0.034
<b>Employment experience in hospital</b>					
	0.08	0.02	0.28	-3.38	0.001

**Table 4: Results of multiple regression knowledge with perception variables**

	B	SE	Beta	t	p
<b>Marriage</b>					
Single Married	-2.76	-1.19	-0.21	-2.31	-0.023
<b>Educational level</b>					
Bachelor MSc	-2.94	-1.77	-0.15	-1.69	-0.100

for knowledge after training programs, such as NIDCAP, which help nurses implement developmental care.

Van der Pal *et al.*<sup>[15]</sup> conducted a descriptive-analytic study on the perception and knowledge of nursing staff about NIDCAP. They showed that although this care is time-consuming for nurses and makes the working conditions of the institutions more difficult, the perception and knowledge of care for progress are positive, and the use of this model is helpful for the neonate. Also, it promotes the development and the well-being of the neonate, which is consistent with the results of our study. NIDCAP is a multidisciplinary process, which not only requires the active presence of the physician and nurse but also embraces the family and the organization from the psychological perspective. The philosophical objective of the family-oriented nature of this program is to develop supportive care and, most importantly, focus on practicing and replacing the traditional care with common scientific methods. Therefore, the processes and relationships, which lead to further involvement of the families in care, are taken into consideration. Overall, this study showed that the health staff working in the studied NICUs had positive perceptions of the NIDCAP, and such positive attitude and perceptions would have a useful effect on the infants' health, leading to professional satisfaction. Despite the different opinions in some aspects, NIDCAP is assessed positively in general. Results of studies conducted in other countries, such as Sweden, Netherlands, Norway,<sup>[5,9,15,18,19]</sup> are similar to ours with respect to a high degree of general satisfaction in spite of the difference in the sample size. However, results of one study in this regard showed that since NIDCAP was time-consuming and required the relationship between nurses and infants and their families, the NICU nurses did not have a positive perception regarding the acquisition of awareness and knowledge about NIDCAP, which was not consistent with the results of this study.<sup>[15]</sup> However, some other studies found that nurses with good awareness, knowledge, and experience of NIDCAP were capable of the prognosis of the changes in the infant's status at an earlier stage and could prevent the severity of their status by rapid intervention. This would lead to more stable consequences in the infant's physiological status, reduced nursing time, and increased job satisfaction. These findings were consistent with those of the present study.<sup>[20]</sup>

Regarding the positive opinions of the nurses about NIDCAP and achievement of valuable results from this program, despite limitations such as high costs, difficulty of implementation, and time-consuming nature of the program, the studied nurses expected the newly involved staff to increase their level of knowledge on developmental care, spend more time on the successful implementation of this care program, and act in an appropriate teamwork (including all the professionals and parents), which is the basis of optimization of this program.<sup>[13]</sup>

Since NIDCAP would lead to the improved competency and efficiency of the staff and parents in taking care of premature infants, hospital managers are recommended

to consider it for the appropriate promotion of NICU treatment staff.

Of course, implementation of such supportive care requires perfect commitment of the staff at all levels as well as the mental flexibility of the staff and organization. Accordingly, it is recommended to continuously evaluate the staff and organization in order for them to devise a very coordinated discipline-based approach for providing better care. One of the limitations in this study was the self-reporting method for completing questionnaires by nurses, because there is a possibility of people being biased or not expressing their reality due to some expediency and concerns.

Due to the limited research sample size, the obtained results cannot be generalized to the nurses out of this range. Therefore, further studies are recommended to choose a larger sample size in different cities and provinces so that the results of their studies can be documented more powerfully.

## Conclusion

The results of this study showed that the knowledge and perception of nurses were generally in the excellent level. The highest score in knowledge belonged to the nutrition of the neonates, whereas the lowest score was related to the evolutionary care universals. Also, the results of this study showed that the majority of nurses having high knowledge about NIDCAP had better job satisfaction and attitudes toward their profession.

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## Conflicts of interest

Nothing to declare.

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