

Association between Knowledge, Practice and Attitude towards Nursing Care in the Neural Development of Premature Newborns

Madeline Fonseca Fonseca^a, Isabel María Morales Gil^b and Ana María García Parra^b

Received: 21 October 2016 • Accepted: 29 December 2016

Abstract: The knowledge, practice and attitude of nursing personnel in Neonatal Intensive Care Units (NICUs) are critical in the effort to reduce sequelae in the neural development of premature newborns. This investigation aims to determine the relationship between level of knowledge, practice and attitude of nursing personnel working in NICU and the care and neural development of premature newborns. The specific objectives are the following: to obtain a profile on nursing personnel working in Neonatal Intensive Care Units (NICUs); to determine the level of knowledge of nursing personnel regarding the neural development of premature newborns; to determine the practical application of this knowledge by nursing personnel in the care of premature newborns as regards their neural development; to describe the attitude of nursing personnel when caring for premature newborns as regards their neural development; and to establish the existing relationship between the sociodemographic categories of gender and years working in the Neonatal Intensive Care Unit with the Knowledge, Attitude and Practice of the participants of this study. A questionnaire was administered to nurses working in four hospitals of the Metropolitan area of Puerto Rico. The study was descriptive and correlational with a transversal design; the Pearson Coefficient and Spearman's Rank Correlation were used for analysis. A correlation was found between level of knowledge, practice and attitude of nurses in NICUs and care and neural development of newborns ($r=.254$, $p < .05$), revealing that updating knowledge enables personnel to maintain positive attitudes and apply appropriate nursing care.

^a Universidad Metropolitana (SUAGM, Puerto Rico-United States); ^b University of Malaga (Spain). Correspondence: Madeline Fonseca Fonseca, Universidad Metropolitana, PO Box 21150, San Juan, PR 00928 (Puerto Rico, United States) mfonseca8@suagm.edu

Key-Words: Nursing Teaching, Nursing Practice, Higher Education, Nursing Competencies, Caring Skills, Nursing Education, Premature Baby, Nursing Programs.

1. Introduction

Most women receive the news of their pregnancy with great excitement, awaiting the required weeks to give birth and receive a healthy, full-term baby. Sometimes, due to certain circumstances, birth takes place before the necessary weeks have elapsed and the baby is born prematurely and presenting certain complications. Although there are organizations around the world dedicated to protecting mothers in their prenatal stage as well as their babies, and even with the great efforts taken and developments to avoid premature births, the rate of premature newborns is still high all around the world, including in Puerto Rico. According to the WHO, more than 15 million premature babies are born each year, of which a million die within a year due to health complications (World Health Organization, 2012). In Puerto Rico, according to the Health Department, 6,980 premature babies were born in 2010, around 16.5% of all births (Departamento de Salud, 2013). In 2011, the Head of Medical Sciences confirmed that one of every five births is premature, and 75% of premature babies born in Puerto Rico are born within 32 to 36 weeks of gestation (Primera Hora, 2011).

A premature baby is born before 37 weeks of gestation, and is classified according to the weeks in gestation. The classification is: late preterm, from 34 to 36 weeks; moderate preterm, from 32 to 34 weeks; very preterm, from 28 to 32 weeks; and extremely preterm, less than 28 weeks (World Health Organization, 2012). The complications a preterm baby can present are related to his gestational age and, depending on their severity, can cause death or health sequelae for the rest of the child's life. Short-term complications include: respiratory distress syndrome, bronchopulmonary dysplasia, patent ductus arteriosus, intraventricular hemorrhage, periventricular leukomalacia, retinopathy of prematurity and necrotizing enterocolitis, among others. Long-term morbidity consists of neurodevelopmental sequelae such as cerebral palsy, cognitive impairment, blindness and deafness, chronic lung disease, failure to thrive, difficulties with feeding, among others (Boat, Sadhasivam, Loepke & Kurth, 2011).

All premature newborns should be cared for in the Neonatal Intensive Care Unit (NICU) by specialized personnel. Advances in research and science have provided new, high-tech equipment for use in NICUs. Along with this research, protocols and standards of care imply a better, more cost-effective and high-quality attention to this population. This means that care for preterm

babies is linked to advances in technology (intensive care) and developments in prenatal care as well as the level of specialization of health professionals equipped to deal with this population (Jorgensen, 2010). These units are specialized branches which require competent employees. Nurses are included among the employees working in NICUs, and they must be proficient in providing proper care to preterm newborns and the use of high-tech equipment, among other things. Nursing personnel is a key element of this unit, as they must provide round-the-clock care and keep track of the changes the patient presents, preventing future complications (Kaur, 2013, Darlow, Zin, Beecroft, Moreira & Gilbert, 2012). Nursing professionals, as leaders in neonatal care, must take three critical concepts into account to ensure proper care for premature babies: knowledge, practice and attitude.

The knowledge of nursing professionals working in specialized units begins with formal education in schools or nursing programs. Once the nurse begins to work and be exposed to complex situations, this basic knowledge starts to increase. Nurses working in NICUs must possess knowledge concerning the development of the newborn baby and the complications which may arise when it is premature. Regarding the neural development of newborns, studies have shown a correlation between premature births and neurodevelopmental sequelae, especially for babies who spent less than 34 weeks in gestation (Fernández, Calderón, & Berrera, 2001, Kiechl-Kohlendorfer, Ralser, Pupp, Peglow, Reiter & Trawöger, 2009). Similarly, the effects in the brain and the developmental consequences of prematurity arising from sudden exposure to bright lights, loud noises and frequent harmful interventions which take place in NICUs have been studied (Als et al., 2004, Sánchez-Rodríguez et al., 2010).

In terms of practice, nursing personnel must carry out their job with full knowledge of existing laws, practice standards and care protocols in their country. Therefore, nursing personnel must use the Nursing Process to reduce the incidence of neurodevelopmental sequelae. Premature birth interrupts the development of the central nervous system during a vulnerable growth process. Passing from a comfortable, intrauterine environment to a stressful environment including bright lights, noise, painful stimuli, sleep disturbances, temperature changes and the ceasing of continuous placental nourishment can adversely affect neurological development. Sequelae brought forth by stressful situations is linked to cognitive, motor and behavioral problems during childhood, adolescence and adulthood (low IQ score, attention deficit and hyperactivity disorder, among others) (Sánchez-Rodríguez et al., 2010).

A positive attitude in nursing personnel when caring for premature babies and their family can increase general wellbeing and reduce neurodevelopmental sequelae. Attitude depends on the level of knowledge nurses possess on specific areas (Polkki et al., 2010).

With the purpose of determining whether there is a relationship between these concepts (knowledge, practice and attitude), the general objective of this

study was to determine the relationship between level of knowledge, practice and attitude of nursing personnel working in NICUs and the care and neural development of premature newborns. The specific objectives included the following: 1) to obtain a profile on nursing personnel working in Neonatal Intensive Care Units (NICUs); 2) to determine the level of knowledge of nursing personnel regarding the neural development of premature newborns; 3) to determine the practical application of this knowledge by nursing personnel in the care of premature newborns as regards their neural development; 4) to describe the attitude of nursing personnel when caring for premature newborns as regards their neural development; and 5) to establish the existing relationship between the sociodemographic categories of gender and years working in the Neonatal Intensive Care Unit with the Knowledge, Attitude and Practice of the participants of this study.

2. Methodology

2.1. Design

The study was descriptive and correlational with a transversal design.

2.2. Subjects

Subjects consisted of nursing personnel working in the NICUs of 4 hospitals in the Metropolitan area of Puerto Rico. Inclusion criteria included: the nurse must have worked in the unit for at least one year and have an associate's, bachelor's, master's or higher degree in nursing; the nurse must be between 21 to 65 years of age and participate voluntarily in this study. Exclusion criteria included incomplete or incorrectly filled out questionnaires. 102 questionnaires were handed out to nursing personnel who met the inclusion criteria, 88 of which were received, 2 of which were eliminated because they did not comply with the inclusion criteria. The final sample consisted of 86 nurses in the selected hospitals.

2.3 Procedure

The "Knowledge, Practice and Attitudes of Nursing Personnel in the Care of Premature Newborn Babies" questionnaire (Conocimientos, prácticas y actitudes en el personal de enfermería en el cuidado de neurodesarrollo del recién nacido prematuro) was used, with due permission and transcultural adaptation by its author Gabriela Alegre Frenández (2011). This questionnaire includes general sociodemographic questions in its first section, and three dimensions encompassing items related to Knowledge, Attitude and Practice. To recruit participants, an advertisement was placed in the NICUs of the selected hospitals to promote the investigation. In coordination with the area supervisor, personnel were oriented regarding the investigation and doubts were cleared up. Questionnaires were handed out, three days were provided to fill them out and deposit them in a sealed box prepared for this purpose.

2.4. Ethical conditions

The Institutional Review Board (IRB) of the Ana G. Méndez University System (SUAGM) approved the study. During this study, the researcher complied with all established regulations concerning research involving human subjects, such as anonymity, confidentiality and privacy. Additionally, subjects were informed of their right to choose not to participate in the study during any stage.

2.5. Analysis

A descriptive analysis of the variables was carried out, using central tendency (mean, median) and dispersion measures (standard deviation) for quantitative variables, as well as calculating frequencies and percentages. To analyze the influence of predictor variables on dependent variables, the Pearson Correlation Coefficient and Spearman's Rank Correlation were used. The *t* test was used to discern significant differences between level of knowledge, practice and attitudes according to gender and years of service. The maximum value of each variable is related to the amount of questions and the value attached to each response by the researcher. Data was analyzed using the statistical program SPSS v.23.0. Results were considered significant at $p < 0.05$.

3. Results

The sample was composed of 88.4% female ($n=76$) and 11.6% male ($n=10$) participants. 51.2% of the sample was married ($n=44$), 33.7% was single ($n=29$), 12.8% was divorced ($n=11$) and 2.3% ($n=2$) did not specify their civil status. Regarding highest level of nursing education attained, 68.6% of the sample had a bachelor's degree ($n=59$), 29.1% had an associate's degree ($n=25$) and only 2.3% had a master's degree ($n=2$). The age of the participating nurses ranged from 23 to 58. Of the 86 participants, 12 chose not to specify their age (14%). The average age registered was 38. The most years of service working in NICU registered was 27. The average (mean) years of service for this group was 11 years, while the mode was 5 years working in NICUs.

In terms of knowledge, 20 points was considered the optimum level of knowledge regarding the neurodevelopmental care of preterm newborns. The score of the surveyed nurses ranged from 11 to 20, with a typical value of 18 points (mean=17.66, median=18.00). The study revealed that 10 of the participating nurses scored 20, the highest value, while 24 professionals had a score of 19. A total of 53 nurses, or 61.6% of the sample, scored between 18 to 20 points in the knowledge domain. However, a significant percentage (38.4%) scored less than 18 points. Analyzing the responses, the questions

which posed the most difficulty concerned intraventricular bleeding of the premature baby and the organization and structure of their nervous system.

As relates to the domain of practice, a score of 63 was established to indicate good practice. The nurses scored between 37 to 62 points, with a median of 51 points, indicating that none of the surveyed professionals attained this optimum level. Moreover, the mode for 14 nurses (16.4%) was 49. The highest observed values, between 60 to 62 points, were obtained by 5 of the 86 surveyed professionals, which represents 5.8% of the sample. On the other hand, 39 nursing professionals (45.3%) obtained a score of 50 points or less, with 30 nurses obtaining a score under 50, representing 34.9% of the sample. Upon analysis, personnel tended to have more difficulty with the prompts concerning: softly touching the baby with a warm hand without caressing for 12 minutes, four times a day; massaging the baby (caresses and passive leg movements) for 5 minutes, three times a day; establishing sleeping hours; and giving the baby 50% dextrose orally before a procedure.

Concerning the attitude variable, the score obtained by the nursing professionals ranged from 11 to 15, with the mean, median and mode coinciding at 13. Two participants were excluded from this analysis as they did not answer one of the questions, which would have resulted in underestimating their attitude level. We established that the maximum value of 15 points indicated a favorable attitude, and results show that various nursing participants reached this level. Upon examining the distribution of the participants by the attitude scale, 13 participants were located at the highest level, which reflects 15.1% of the sample presenting a favorable attitude. 73 subjects scored close to the maximum, between 13 and 14 points, which corresponds to 84.9% of surveyed personnel. Upon analysis of the answers, participants showed the most difficulty in questions related to unrestricted access of parents to NICUs.

Pertaining to gender, a Student's *t* test was carried out to compare means; results show that men and women surveyed had similar average scores across all three dimensions relating to the care of premature newborns. Upon relating the variables with years of service in NICU, table 1 shows that the level of practice the participants presented was statistically correlated with the years of service they reported. In order to further analyze this result, we prepared a distribution table of study participants in order to compare nurses with less than 10 years of service in NICU to those with 10 years or more. Table 2 shows that 64% of participants with less than 10 years of service in NICU reflected a score over 50 in the practice domain. Among those with 10 years or more of service in NICU, the majority (55%) scored 50 points or less in this domain. This implies that the fewer years of service, the higher the practice score as relates to the care of preterm newborns.

Domains		Value	Asymptotic standard error	Approx. T	Approx. Sig.
Knowledge	Pearson Correlation	-.080	.112	-.731	.467
	Spearman Correlation	-.114	.114	-1.055	.294
	<i>n</i>	86			
Attitude	Pearson Correlation	.074	.110	.674	.502
	Spearman Correlation	.028	.114	.253	.801
	<i>n</i>	84			
Practice	Pearson Correlation	-.264	.098	-2.511	.014
	Spearman Correlation	-.287	.105	-2.746	.007
	<i>n</i>	86			

Table 1. *Correlations, domains of knowledge, attitude and practice in nursing personnel regarding care of premature newborns by years of service in NICU*

Practice Domain		Years of service in NICU	
		Less than 10 years	10 years or more
50 points or less	<i>f</i>	16	23
	%	36.4	55
Over 50 points	<i>f</i>	28	19
	%	63.6	45
Total	<i>f</i>	44	42
	%	100.0	100.0

Table 2: *Level of practice of surveyed nursing personnel as relates to years of service in NICU*

Pertaining to the association between the domains of knowledge, practice and attitude, results showed a significant correlation between these variables. The knowledge of nursing personnel regarding the neurodevelopmental care of premature babies was statistically correlated to the practice level of these personnel, ($r=.254, p=.018$). Similarly, results point to a statistical correlation between attitude and practice in the care of premature newborns as relates to neurodevelopmental care ($r=.251, p=.021$). In summary, variables were significantly correlated and results showed that

knowledge influenced the practice of nursing personnel when caring for premature newborn babies, and that practice was also associated to the attitude of these professionals (see table 3).

Variables		Knowledge	Attitude	Practice
Knowledge	Pearson Correlation r	1	.163	.254*
	Significance		.138	.018
	n	86	84	86
Attitude	Pearson Correlation r	.163	1	.251*
	Significance	.138		.021
	n	84	84	84
Practice	Pearson Correlation r	.254*	.251*	1
	Significance	.018	.021	
	n	86	84	86

* Correlation significant at 0.05 (bilateral).

Table 3: Pearson's Correlation Coefficients for the main domains or variables of the study

4. Discussion

The results of the study regarding the profile of nursing personnel working in NICUs show that most are female, the average age is 38, and that most are married. Regarding highest educational level, the majority had a bachelor's degree, and the average of years of service in NICU was 11 years. Part of the findings presented here coincide with studies related to the profile of nursing personnel working in NICUs in other countries (Machado, Christoffel, De Souza Tassinari, 2014, Alegre, 2011).

The scores obtained regarding the knowledge domain reflect a need to reinforce the knowledge of personnel working with premature newborns, especially regarding the following factors: nervous system of preterm babies, intraventricular bleeding, reducing time of manipulation, vital signs and adequate positioning, level of attachment (statistical analysis showed that less than 89% of participants answered the corresponding premises correctly). The results of this study match those of Alegre (2011), where some of the participants obtained the highest score in the knowledge domain. In this study, some coincidences were observed on the following domains: risk of prematurity (bleeding), pain, nervous system of premature babies, attachment and manipulation (namely, reduction of time).

None of the participants obtained the highest score in the domain of practice. These results coincide with Alegre (2011), where none of the participants obtained the highest score. The difficulty of the following premises coincides with the difficulty observed in Alegre's study: establish "silent hours", touching the baby, massage the baby and giving dextrose before a procedure. Studies show that these interventions reduce the amount of stressors in NICUs (light, noise, pain, among others). Reducing stressors favor the

development of the premature newborn and can help to reduce neurodevelopmental sequelae (Ranganath & Porus, 2011, Rugiero et al, 2008, Liaw et al., 2010, Gallegos-Martínez & Salazar-Juárez, 2010).

Regarding the attitude of nursing personnel when caring for premature newborns, few subjects obtained the highest score, for which steps should be taken to emphasize this domain. The results of this study do not coincide with Alegre (2011), where no participant achieved the highest score. The question which presented the most difficulty in this domain was related to the access of parents to NICUs. Studies point towards the importance of parents in the improvement of premature newborns (Reynolds et al., 2013, Gallegos-Martínez & Salazar-Juárez, 2010).

This study found a similarity in the domains of knowledge, practice and attitude across genders. The correlation between domains of knowledge and attitude related to years of service was not statistically significant. The results of this study regarding knowledge and years of service concur with those of Mohamed, Newton, & Lau (2014), who did not find a statistically significant relationship between years of service in NICU and knowledge regarding the skin care of premature newborns. In the study carried out by Stanley & Pollard (2013), unlike the previously mentioned study, a statistically significant relationship was found between knowledge and years of service as pediatric nurses.

This study showed statistically significant differences between the variable of practice and years of service. The fewer years of service, the better the score obtained in the practice domain, and conversely, the more the years of service, the lower the obtained score. This can be compared to the findings of Bjork & Kirkevold (1999), who found that experience itself does not guarantee positive skill development in a clinical environment.

The results of this study showed a relationship between its variables of interest, the influence of knowledge, practice and attitude of nursing personnel working in NICUs on the care and neural development of premature newborns. Previous studies show a relationship between two of these variables, such as Shrestha, Petrini, & Turaes, (2013), who found a positive correlation between knowledge and practice, or Almerco Huayanay (2014), who found a positive correlation between knowledge and attitude. Benoit & Semenic (2014), indicate that “educating NICU personnel on lactation has been linked to improvements in knowledge and attitudes related to this practice.”

In their study, Taylor, Gribble, Sheehan, Schmied & Dykes (2011) concluded that education is seen as a solution to overcome the attitudes of settled personnel. Clairat Sierra (2014) argues that “occupational skills, considered as the application of knowledge, abilities and attitudes in a work situation, allow the subject to efficiently carry out his or her functions.”

5. Conclusions and implications for practice

The results of this study should not be generalized, as it was limited to a geographical zone within Puerto Rico, and generalization would require a multi-site investigation. However, findings concur with others regarding the profile of nursing personnel working in NICUs insofar as most nurses were female, and it would be interesting to broaden the research to complement this information with qualitative studies that allow us to investigate the reason behind this female tendency among nurses of NICUs. Generally, most professionals achieved high scores regarding knowledge of proper care for premature newborns, but it is nonetheless necessary to establish strategies to strengthen some aspects where NICU personnel obtained a low score.

Most personnel did not obtain high scores in the domain of practice of premature newborns, for which measures should be taken to improve this domain in relevant aspects such as how to handle a premature baby, the need for silence and minimal manipulation, as well appropriate attention and procedures to reduce and/or avoid pain. These areas should be stressed upon to improve the outcome of premature babies' neural development.

It is also necessary to improve the attitude of professionals working in NICUs regarding visiting hours and the participation of parents in the care of their children, as most studies point out the benefits of promoting the interaction of parents with newborn children to improve their health and reduce length of hospital stay. Currently, there is a trend towards a care model centered on family.

Implications for practice in this study include: the need for review of existing knowledge, as time spent performing particular work does not imply its perfect execution, for which reason it is necessary to work on the domains of practice with professionals who obtain lower scores independently of their work experience.

The statistical results allow us to conclude that there is a correlation between the variables of knowledge, practice and attitude. It is critical for nursing personnel to possess adequate knowledge, which allows them to maintain a positive attitude and in turn practice appropriate care for newborns. Nursing personnel must keep informed of new information regarding proper care of newborns and their neural development in order to reduce or eliminate health sequelae during the child's development. Continuing education for personnel in NICUs is critical, regardless of length of time working in the unit. This education must be related to the proper care of premature newborns, possible complications and nursing care proved to be effective at reducing or eliminating future complications, emphasizing adequate care to reduce stress in premature newborns and to foster early and continuous bonds with their parents.

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