OPEN ACCESS

Clinical Competence and Its Related Factors of Nurses in Neonatal Intensive Care Units

Jila Mirlashari[1], Robabeh Qommi[2], Shahin Nariman[3], Nasser Bahrani[4], Jamaloddin Begjani[1]*

[1]*Depatrtement of Nursing, Nursing and Midwifery Faculty, Tehran University of Medical Sciences, Tehran, Iran*
[2]*Depatrtement of Neonatal Intensive Care Nurse, Nursing and Midwifery Faculty, Tehran University of Medical Sciences, Tehran, Iran*
[3]*Neonatologist, Head of NICU unit, Arash Women Hospital, Tehran University of Medical Sciences, Tehran, Iran*
[4]*Specialist in Statistics, Nursing and Midwifery Faculty, Tehran University of Medical Sciences, Tehran, Iran*

ARTICLE INFO

ABSTRACT

Introduction: Clinical competence of nurses working in the neonatal intensive care units together with advancements in medical science and technology increased the survival rate of newborns that need specialized care. To ensure the quality of care and provide the safety of patients, evaluating the clinical competence of nurses seems necessary. This study aimed to evaluate the clinical competence of nurses in the neonatal intensive care units.

Methods: In this cross-sectional study, 117 nurses working in the neonatal intensive care units of the hospitals affiliated to Tehran University of Medical Sciences were selected by census method. The research tool was Development of Competency Inventory for Registered Nurses questionnaire which completed by self-assessment. The mean clinical competence scores of participants categorized into 3 levels: weak: <225, moderate: 225-273 and good: >273. Data were analyzed by SPSS version 13 using the Pearson correlation coefficient, t-test and Chi-square test.

Results: The highest levels of competence were related to critical thinking and research attitude and interpersonal relationships, and the lowest level was related to training and mentoring. There was a direct statistically significant relationship between marital status, employment status, level of interest in working in the neonatal intensive-care units and the clinical competence of nurses.

Conclusion: Since the clinical competence of nurses in the Neonatal Intensive Care Units is vital, some variables such as interest in the nursing profession, employment status, the neonatal intensive theoretical and practical training courses and the amount of overtime working hours should be taken into consideration.

Introduction

Regarding increased rates of premature and low birth weight newborns as well as associated factors with high risk pregnancies, the number of infants who require admission to neonatal intensive-care units (NICU) is growing.[1] Along with the increasing complexity of technology and the development of the NICU wards, the survival of these newborns have improved. Currently, the number of neonatal intensive care units in hospitals has met a rise; however, more complex diseases and preterm infants requiring critical care are also increasing. A major share of the responsibility for such care practices is related to the nurses working in the NICUs.[2] These changes have raised the need for skilled nurses with specialty regarding the infants more than ever.[3]

Nursing in intensive care units is dynamic, and nurses have to meet complex and changing needs of critically ill patients. Since competence is considered as a substantial part of mitigating the risks and damages to the patient, it is of great importance in the intensive care units.[4]

The complexity of competence dimensions have made it difficult to provide a single definition of competence.[5] In most studies, the Benner definition (1982) is referred to explain the concept of competence, which defines competence as "the ability to perform a task to obtain optimum and favorable results in changing conditions in the real world". The definition of competence can also be very simple, consisting of professional standards that the nurses use as an activation directory.[4,6] Professional competence in general activities of nurses includes a set of knowledge, abilities and skills. In some definitions, in addition to knowledge, abilities and skills, the concepts such as performance, attitudes and values are also added.[7]

Memarian et al., showed that the most important noviceal factor affecting the process of obtaining competence include work experience, effective communication, interest to the profession, responsibility, accountability and personal factors such as knowledge and skills, respecting ethical and professional principles and respect to self and others. Among external factors, environmental factors including efficient education system and providing technology, and professional factors including effective management, control, monitoring and having work permission can be mentioned.[8]

Community and government support, marital status and participation at in-service training programs are also the factors that affect the competence.[9]

During the competence acquisition process, with the development of practical skills and gaining insight based on work experience and effective ethical practices by the nurses, the problem solving skills and interacting with patients among the nurses will be improved.[10] One of the major challenges in assessing clinical competence of nurses is using tools with appropriate validity and reliability.[5]

Challenges in assessing and measuring nursing competence are due to a variety of nursing roles, which are resulting from the complexity of nursing activities and human interactions that measurement of each, even alone, is a difficult task. Problems regarding reliability and validity of assessment tools are seen when the tools used in assessing the clinical experience have a good validity, while the reliability of these devices is not considered; as a result, the presence of several variables in clinical environments may affect the results.[11]

In the recent years, nursing education in Iran has focused on theoretical education that could lead to the gap between knowledge and practice in nursing.[12] While in the developed countries since 1994, competence-based education and evaluation is a main priority.[13]

Currently our information about clinical competence of nurses in the neonatal intensive care units and applying the nursing skills by them is scarce.[14] Because of this lack of information; we decided to investigate the clinical competence of nurses working in the neonatal intensive care units affiliated to Tehran University of Medical Sciences.

Materials and methods

This was a cross-sectional study, in which a total of 132 nurses working in neonatal intensive care units in the hospitals affiliated to Tehran University of Medical Sciences were selected by census method during July 2012 to March 2013. Among them, 117 nurses were completed and returned the questionnaire.

The inclusion criteria were having at least six months of experience in NICU and nurses interest for participating in research. As our methodology was descriptive there were no exclusion criteria, unless the participant asked to withdraw from the research.

A two-part questionnaire was used for data collection. The first part of the questionnaire was the researcher-made part that assessed the nurse's demographic characteristics included age, marital status, job experience, educational status, specialized training programs, employment status, hours per month work and interest in the nursing profession. The second part was the "Competency Inventory for Registered Nurses questionnaire (CIRN). This questionnaire was used for the first time

by Ming Liu et al., in 2007 in China.[15] The questionnaire has 59 items in 7 aspects which assess the clinical competence of nurses. The dimensions and items include critical thinking and tendency to do research (10 items), clinical care (10 items), leadership (10 items), moral and legal activities (8 items), professional development (8 items), interpersonal relationships (6 items) and training and mentoring (7 items). To measure the competence level, a five-point Likert scale (1: never, 2: rarely, 3: sometimes, 4: most of the times and 5: always) was used for scoring each items. According to the total score of the questionnaire, the nurses competency was measured as poor: <225, moderate: 225-273, and good: >273, respectively.

To ensure the translation accuracy, an expert[16] in English language familiar with the nursing literature was asked to review the tool by back-translation method. The face and content validity of the research tools evaluated by ten expert faculty members of Tehran University of Medical Sciences.

The test-retest method was used to ensure reliability of the research tools. The questionnaire made available to 10 nurses working in the neonatal intensive care units of the hospitals affiliated to Tehran University of Medical Sciences after undergoing validity processes. One month later, the questionnaires refilled by the same subjects and the reliability of the tool evaluated using test-retest method (correlation coefficient: 0.78). Also, the Cronbach's alpha method was used in order to determine the correlations between competence aspects (correlation coefficient: 0.89).

The questionnaires were completed by nurses as a self-assessment method and by head nurses as a supervisor. The SPSS software version 13 was used for data analysis. Descriptive statistics methods including the frequency, mean (SD) and inferential statistics methods including Pearson correlation coefficients were used for analysis. The relationships between the categories of clinical competence and other factors such as demographic factors were assessed by the

Pearson correlation coefficient, t-test and chi-square test.

In this study a written permission was obtained from Ming Liu for using the tool CIRN. After obtaining the license from The Medical Ethics Committee of Tehran University of Medical Sciences (The Ethical code number: 92/d/130/839), by referring to the research environments and assuring the subject and authorities regarding anonymousness and confidentiality of information and explaining the objectives of the study, the required data were collected. Also we have observed all different aspects of ethical codes including voluntary participation, confidentiality, informed consent and autonomy.

Results

Of the 132 questionnaires, 117 (89%) questionnaires were completed and returned to the researcher. The mean age of the nurses was 33.08 (5.6) years. The mean job experience of subjects was 8.39 (5.7) years' work that 4.79 (3.67) years' work were in the neonatal intensive care unit. The educational level of the nurses was as follows: Bachelor of Nursing: 92.4%, and Master of sciences (MSc) in Nursing: 7.6%. The nurses who had undergone no specialized training programs regarding infants nursing accounted for 35%, while 42.7% had participated in workshops related to nursing care of the infants, such as breastfeeding and newborn resuscitation, and 22.3% had passed the infants nursing courses.

The employment status of the participants was as following: Novice nurses (12%); short-time contracts (1 year) (6.8%); long-term contracts (2-5 year) (54.7%) and formally employed (26.5%). The mean hours work per month among the nurses was as 72.88 (34.28) hours (Table 1). Among demographic variables, three variables of marital status, employment status and interest in the nursing profession had a direct statistically significant correlation with the degree of clinical competence of individuals, so that the mean competency score of married and single

participants was 239.01 and 228.17 respectively (P-value = 0.007). The mean competency score of nurses with short-time contracts was 219.62 while nurses with long-term contracts had the mean competency score equal to 240.52 (P-value = 0.03).

Also based on our findings, the mean competency score for the nurses who had low level of interest in the nursing profession was 238.52, however, the mean competency score for nurses who had high level of interest in the nursing profession was 246.91 (P-value = 0.03) (Table 1).

Table 1. Comparison of competence score of nurses based on demographic data

Demographic factors	N (%)	Competency scores Mean (SD)	Statistical indicator$^\epsilon$
Age (Year)			
< 30	31(26.5)	235.63(3.48)	P= 0.424
30 - 40	68(58.1)	238.62(2.44)	r = 0.075
> 40	18(15.4)	238.17(3.77)	
Marital status			
Single	42(36)	228.17 (20.06)	P=0.007*
Married	75(64)	239.01(20.63)	t=2.75
Job experience (Year)			
< 10	83(71)	233.18 (21.85)	P=0.11
> 10	34(29)	239.85 (19.11)	r = 0.26
Educational status			
Bachelor of Nursing	108(92.4)	235.23 (20.89)	P=0.82
MS Nursing	9(7.6)	233.36 (24.34)	t=0.23
Specialized training programs			
No specialized training programs	41(35)	233.77(16.55)	P=0.26
Workshops	50(42.7)	240.31(22.36)	df =1.36
Infants nursing courses	26(22.3)	238.54(15.90)	
Employment status			
Novice nurses	14(12)	235.14(17.07)	P=0.03*
Short-time contracts (1 year)	8(6.8)	219.62(14.42)	df =3.07
Long-term contracts (2-5 year)	64(54.7)	240.52(20.35)	
Formally employed	31(26.5)	237.39(16.53)	
Hours per month overtime work			
< 50	22(18.8)	239.39(18.21)	P=0.39
50 – 100	68(58.1)	238.10(20.79)	r = -0.08
> 100	27(23.1)	234.98(15.89)	
Interest in the nursing profession			
Low (0 – 5)	29(24.8)	238.52(18.93)	P=0.03*
High (6 – 10)	88(75.2)	246.91(14.81)	t=2.17

$^\epsilon$t-test and Fisher's exact test,*Direct statistically significant relationship

The Pearson correlation coefficient was used to evaluate the relationship among the dimensions of clinical competence of the nurses. Hence, all of the seven dimensions of clinical competence were tested in a two-by-two pattern after categorization into 3 levels: weak/poor: <225, moderate: 225-273 and good: >273 using t-test and chi-square test. The test results showed that there was a direct statistically significant relationship among all aspects of clinical competence, which means with increased competence in one aspect, the rates of competence in other dimensions will also increase (P-value< 0.001). In our research most of the participants (92.3%) had good critical

thinking and research attitude, moderate clinical care (65.8%), moderate leadership (73.5), good interpersonal relationships (85.5%), moderate legal and ethical practice (75.2%), moderate professional development (69.2), and moderate teaching–coaching (66.7%) (Table2).

Table 2. The competence rate of nurses based on studied 7 aspects

Dimensions of clinical competence	Weak N (%)	Moderate N (%)	Good N (%)
Critical thinking and research attitude	108(92.3)	8(6.8)	1 (0.09)
Clinical care	20(17.1)	77(65.8)	20 (17.1)
Leadership	13(11.1)	86(73.5)	18(15.4)
Interpersonal relationships (IPR)	0(0.0)	17(14.5)	100(85.5)
Legal/ethical practice	13(11.1)	88(75.2)	16(13.7)
Professional-development	17(14.5)	81(69.2)	19(16.3)
Teaching–coaching	22(18.8)	77(65.8)	18(15.4)

Discussion

In this study, more than half of the nurses (65.8%) had a moderate competence. In Mertoja et al.,[17] Ying et al.,[18] and Bahraini et al.,[14] studies, most of the nurses reported their competence as good, which is not consistent with the results of the present study.

In a study by Ying et al., to investigate the relationship between clinical competencies and organizational atmosphere, most of the nurses assessed their competence as highly competent, which is not consistent with the results of the present study. The reason for high levels of care provided in the studied hospital may be due to its educational nature and position, since in such environments, the nurses are constantly learning and used to teach the nursing students.[18]

In another study, Bahraini et al., evaluated the nurses' clinical competence working in hospitals affiliated to Shiraz and Bushehr Universities of Medical Sciences.

The nurses in their self-assessment had reported their competence at good level, which is not consistent with the results of the present study. In this comparison, the nurses in hospitals affiliated to Shiraz University of Medical Sciences had a better competence level, which Bahraini et al., considered due to factors such as better educational facilities, more in - service training programs, and organizing of educational processes. Given that the study conducted in the neonatal intensive care units and teaching hospitals affiliated with the university, the nurses in these wards have many opportunities for experiential learning in the real environments.[19]

However, perhaps one of the issues may affect the nurses' competence would be not conforming the nursing standards such as the number of shifts required and further working hours per month that could cause fatigue and exhaustion in nurses and leaving them no opportunity to study and doing research. One of the standards in the NICU, which is not followed, is the nurse to patient ratio. This ratio in some level of NICU is 1 to 1, and in some other is two nurses per one baby based on the patient's condition.[20] In our research environment, the ratio is most of the 3 patients per one nurse. At such times, the nurse probably would not have enough time to perform the care tasks appropriately, and obviously not enough time to study and update information, and thus, he/she will estimate his/her competence lower than the real rates.

One of the most important issues in nursing is to employ nurses based on standards developed by the Ministry of Health. The curriculum and terms document of subspecialty pediatrics and perinatal medicine approved by the Iran Ministry of Health and Medical Education states that "The care of patients in the NICU

must be provided under the supervision of and by specially trained and experienced nurses in neonatal intensive care. The nurses working in NICU must have at least five years of experience of working in one of the child or infants wards such as infants' medical and surgical wards or operating room. It is referred that employing the graduates in master's degree of nursing in the NICUs and the nurses with bachelor's degrees that have at least five years of experience in the mentioned units is permitted.[20] However, we found that all nurses working in the neonatal intensive care units do not meet the Ministry of Health standards. Due to the shortage of skilled human resources, the hospitals have employed the nurses with little working experience. As reported, in some cases, the nurses had not passed the courses required to work in the NICUs.

A study conducted in Scotland refers to the same challenge that the nurses working in infants units are graduated nurses in nursing courses for adults or children.

Although such nurses receive some training courses before working formally in NICUs, but they have not yet achieved the full competence in this regard. They also need supervising in performing nursing activities, and it refers that there is a need to pass the NICU-required complementary nursing courses to provide nursing care with good quality in such units. In addition, standardized training courses according to the required competencies are needed.[21]

Also, according to specialty in the neonatal intensive care units and given the standards for hiring nurses in NICUs, the need for specialist nurses is issued.

However, only 7.6% of nurses in the study population have passed the Master of Nursing, despite the existing standard that defines the nurses working in the neonatal intensive units should have at least 5 years' experience of working with infants or children's associated wards. Among the nurses working in Neonatal ICUs, 12% are undergoing their course of novice. As noted

above, one reason to employing the novice students in NICUs is the workforce shortage.[20]

In the present study, there was statistically significant relationship between marital status, employment status, number of hours per month work, interested in a neonatal intensive care units and the level of clinical competence. As shown, interest in the profession is also considered as factors affecting the competence[8]; hence it is better to provide the conditions in such a way that people can choose their academic field based on their interest, and thus, select the nursing profession and serve in hospital wards.

The biggest limitation of this study was the used tool. Given the extension and complexity of competence, the number of evaluation items is very high and this can affect the given responses. However, to reduce the restrictions of the self-assessment method, supervisor assessment method was also used simultaneously.

Conclusion

To improve and enhance the clinical competence of nurses in performing their professional tasks and roles in a safe way and with good quality, some effective variables on the competence of individuals, including: interest in the nursing profession, employment status, passing neonatal intensive theoretical and practical training courses and the amount of overtime working hours should be considered. Employing interested and competent nurses and considering the standards required in the NICU can increase the quality of care in these wards.

Acknowledgments

implementation of project that we would mind to appreciate them one by one.

Ethical issues

None to be declared.

Conflict of interest

The authors declare no conflict of interest in this study.

References

1. Malusky Sh, Donze A. Neutral head positioning in premature infants for intraventricular hemorrhage prevention: an evidence-based review. J Neonatal Nurs 2011; 30 (6): 381-96. doi: 10.1891 / 0730-0832.30.6.381

2. Phibbs CS, Baker LC, Caughey AB, Danielsen B , Schmitt SK, Phibbs RH. Level and volume of neonatal intensive care and mortality in very-low-birth-weight infants. N Engl J Med 2007; 356: 2165-75. doi: 10.1056/NEJMsa065029

3. Cavaliere TA, Sansoucie DA. The use of family nurse practitioners and pediatric nurse practitioners as providers of neonatal intensive care: Safe practice or risky business? Newborn Infant Nurs Rev 2001; 1 (3): 142-7. doi: 10.1053/ nbin. 2001.25105

4. Kamel SSA, Fakhry SF, Ibrahim RM. Self-assessment competency tool for nurses working in critical care units: development and psychometric evaluation. Life Science Journal 2011; 8 (3): 156-64

5. Evans A. Competency assessment in nursing. a summary of literature published since 2000. 1st ed. Australia: EdCaN; 2008.

6. Windsor C, Douglas C, Harvey T. Nursing and competencies—a natural fit: the politics of skill/competency formation in nursing. Nurs Inq 2012; 19 (3): 213-22. doi: 10.1111/j.1440-1800.2011

7. Istomina N, Suominen T, Razbadauskas A, Martinkenas A, Meretoja R, Leino-Kilpi H. Competence of nurses and factors associated with it. Medicina (Kaunas) 2011; 47 (4): 230-7.

8. Memarian R, Salsali M, Vanaki Z, Ahmadi F, Hajizadeh E. Professional ethics as an important factor in clinical competency in nursing. Nurs Ethics 2007; 14 (2): 203-14. doi: 10. 1177/09 69733007073715

9. Saeki K, Izumi H, Uza M, Murashima S. Factors associated with the professional competencies of public health nurses employed by local government agencies in Japan. Public Health Nursing 2007; 24 (5): 449-57. doi: 10.1111/j.1525-1446. 2007. 00655.x

10. Benner P. Using the Dreyfus model of skill acquisition to describe and interpret skill acquisition and clinical judgment in nursing practice and education. Bull Sci Technol Soc 2004; 24 (3): 188-99. doi: 10. 1177 /027 0467604265061

11. Joint commission accreditation healthcare organizations. Comprehensive Accreditation Manual for Hospitals: The Official Handbook. 1st ed. USA: Joint Commission Resources; 2007.

12. Dehghany Z, Abaszadeh A, Moattari M, Bahreini M. Effective reflection on clinical competency of nursing students in Shiraz university. Payesh 2013; 12 (1): 63-70. (Persian)

13. Cowan DT, Norman I, Coopamah VP. Competence in nursing practice: a controversial concept–a focused review of literature. Nurse Educ Today 2005; 25 (5): 355-62. doi: 10.1016/j .nedt .2005.03.002

14. Bahreini M, Shahamat S, Hayatdavoudi P, Mirzaei M. Comparison of the clinical competence of nurses working in two university hospitals in Iran. Nurs Health Sci 2011; 13 (3): 282-8. doi: 10. 1111/j. 1442-2018.2011.00611.x

15. Liu M, Kunaiktikul W, Senaratana W, Tonmukayakul O, Eriksen L. Development of competency inventory for registered nurses in the People's

Republic of China: scale development. Int J Nurs Stud 2007; 44 (5): 805-13. doi: 10.1016/j.ijnurstu.2006.01.010

16. Burns N, Grove SK. Understanding nursing research: Building an evidence-based practice.5th ed. Philadelphia: Saunders; 2010.

17. Meretoja R, Leino-Kilpi H, Kaira AM. Comparison of nurse competence in different hospital work environments. J Nurs Manag 2004; 12 (5): 329-36. doi: 10. 1111/j.1365-2834.2004.00422.x

18. Ying L, Kunaviktikul W, Tonmukayakal O. Nursing competency and organizational climate as perceived by staff nurses in a Chinese university hospital. Nurs Health Sci 2007; 9 (3): 221-7. doi:10.1111/j.1442-2018.2007. 00 3 24 .x

19. Bahreini M, Moattari M, Ahmadi F, Kaveh MH, Hayatdavoudy P, Mirzaei M. Comparison of head nurses and practicing nurses in nurse competence assessment. Iran J Nurs Midwifery Res 2011; 16 (3): 227-34

20. Council on medical education and professionally. Curriculum and criteria of the neonatal and perinatal medicine. Tehran: Iranian Ministry of Health and Medical Education; 2010. Available form: http://medicine.tums.ac.ir/ uploads /portals/763/SharedFiles/2015043010554 6264_920_Curriculumfogh_TebeNozadi. pdf. (Persian)

21. Wright A. Neonatal nursing in Scotland. J Neonatal Nurs 2012; 18 (1): 1-5. doi : 10. 1016 / j.jnn. 2011.11.011