Clinical competency of nurses working at Intensive Care Units and its associated factors

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Abstract

Background: Clinical competency is one of the performance indicators of nurses requiring the use of technical and communication skills, knowledge, clinical reasoning, emotions, and professional values at the bedside. The present study's aim was to assess the clinical competency of nurses working at intensive care units (ICUs) and explore some of its associated factors in hospitals affiliated with the Golestan University of Medical Sciences.

Methods: This descriptive-analytical study was conducted on ICU nurses working at the hospitals affiliated with the Golestan University of Medical Sciences in the northeast of Iran. A total of 160 eligible nurses were recruited using the simple random sampling method. The data were collected through the Intensive and Critical Care Nursing Competence Scale (ICCN-CS), which evaluates the 4 areas of knowledge, skill, attitudes and values, and work experience via 80 statements. The data were analyzed by SPSS 16 software using the Kruskal-Wallis and Mann-Whitney tests at a significance level of 5%.

Results: Most of the participants (69.2%) attained an excellent clinical competency score, and the overall level of clinical competency was excellent. Also, the highest level of competency belonged to the knowledge area (85.11 ± 82.63), and the lowest level was related to the field of skills (80.40± 17.19). Clinical competency showed a significant association with demographic features, including age (P<0.001), type of contract (P<0.001), work experience (P<0.001), marital status (P<0.001), and average overtime hours (P<0.003).

Conclusion: Evaluation of nurses' clinical competency can help improve the quality of care. It is suggested that health policymakers focus on upgrading the clinical competency of ICU nurses by improving their clinical skills.

Highlights

What is current knowledge?

The highest mean score of clinical competencies among ICU nurses belonged to the knowledge dimension and the lowest to the dimension of skills. The clinical competency of ICU nurses was significantly associated with age, marital status, type of contract, work experience, and overtime hours.

What is new here?

The distance between the clinical competency scores in the knowledge and skill dimensions highlighted a deep gap between theoretical and clinical education. Therefore, we need to update and enrich theoretical knowledge to fulfill requirements in terms of clinical nursing skills.

Introduction

Rapid changes in the health system demand providing quality and safe nursing care, which has always been a goal of nursing, a process that requires competency (1, 2). As frontline care providers, nurses need to maintain their competency in order to provide professional and clinical duties (1). Competency refers to the ability to recognize and judge behaviors and acquire the skills required for effectively fulfilling duties (3), and nursing competency is to use these skills to promote the professional position of nursing (4). Nursing clinical competency is one of the main indicators in the assessment of nursing performance and a behavior-oriented concept revolving around the clinical and professional duties of nurses (1, 5). The clinical competency of intensive care unit (ICU) nurses has been reported as desirable in some studies and average in others (6). Clinical competency indicates nurses' ability to deliver effective and safe clinical performance and fulfill professional responsibilities in practice (7). Clinical competency is a key concept in nursing, denoting the judicious application of technical and communication skills, knowledge, clinical reasoning, emotions, and values, and critical thinking in the clinical environment (3). Evaluation of clinical competency can help nurses and managers recognize and become aware of clinical performance in hospital wards and special care units in particular (8). Intensive care units are among the key wards of hospitals hosting patients with critical and acute conditions, such as acute respiratory distress syndrome (ARDS), trauma, multiple organ failure, acute sepsis, shock, and poisoning, who require constant and careful monitoring (9). These units are generally full of high-tech equipment and patients suffering from multi-organ failure who need to receive safe care from competent nurses (10). The professional and moral duties of nurses have expanded substantially in parallel with rapid growth in science, advances in technology, the complexity and diversity of therapeutic methods

(11), care levels, patient safety, and the need for providing quality care in wards such as ICUs (12). Researchers believe that delivering standard nursing care demands upgrading competency levels and employing experienced and competent personnel. The lack of clinical competency in ICU nurses can lead to medical errors, rework, patient dissatisfaction, and the waste of time and energy (13, 14). The results of a study by Haj-Bagheri and Eshraghi (2018) showed that there was a direct relationship between the level of clinical competency and the quality of nursing care (7). Also, the findings of Sasaki et al. revealed a direct and significant correlation between clinical competency level and work experience (14). Regarding the importance of the clinical competency of ICU nurses, this study aimed to determine the clinical competency of ICU nurses and its associated factors in hospitals affiliated with the Golestan University of Medical Sciences.

Methods

This descriptive inferential study was conducted on the ICU nurses of 2019. According to a study by Shuryabi et al. (2017), who reported excellent clinical competency in 75% of nurses, this ratio was used as the basis for determining the sample size (6). Considering the type, I error (α) of 5%, the accuracy of 10%, and the dropout probability of 20%, the sample size was calculated using the following formula as n= 128. After taking into account the 20% likelihood of dropout, the final sample size was calculated as n= 160.

$$n=(Z_{1-\alpha/2}^2 \times P \times (1-P))/d^2$$

Following a sampling framework, 160 nurses working in the ICUs of the hospitals affiliated with the Golestan University of Medical Sciences in Gorgan, Kalaleh, Aq-qala, Minodasht, Gonbad, Aliabad, Bandar-e-gaz, and Kordkoy cities were recruited by simple random sampling based on stratification and corresponding to the size of each stratum (the number of ICU nurses in each hospital) (Table 1). Simple random sampling of nurses was based on the national code. After preparing a list of nurses working in hospitals affiliated with the Golestan University of Medical Sciences, those whose national codes had an even number on the far-right side were chosen to be included in the study.

Inclusion criteria were willingness to participate in the study, providing informed consent, having at least six months of work experience in ICUs, and not suffering from evident physical or psychological problems. After explaining the objectives of the research and obtaining written informed consent, a demographic information form and the Intensive and Critical Care Nursing Competence Scale (ICCN-CS) were provided to the ICU nurses working in different shifts (i.e., morning, evening, and night) in the teaching hospitals affiliated to the Golestan University of Medical Sciences. It took approximately 10-15 minutes for each nurse to complete the questionnaires. The ICCN-CS is an

80-item questionnaire designed by Nakaya et al. in Finland and translated into Persian and culturally adapted by Shuryabi et al. (2017) in a study supported by the Shahid Beheshti University of Medical Sciences, Iran (6). The reliability of the questionnaire was approved by Cronbach's alpha coefficient (α) of 0.98. The 80 items of this scale assessed nursing clinical competency in four dimensions, including knowledge (20 items), skills (20 items), attitudes and values (20 items), and experience (20 items). The scoring was based on a Likert scale (1-5), where the scores of the knowledge and skills dimensions were categorized as poor (1 score) to excellent (5 scores). The score of the dimension of attitudes and values was categorized from complete disagreement (1 score) to complete agreement (5 scores), and regarding the experience dimension, the final score was categorized from completely inadequate (1 score) to completely adequate (5 scores). The range of the final clinical competency score was from 80 to 400, which was stratified as poor (80-160), average (161-240), good (241-320), and excellent (321-400) (6).

Table 1. Sampling framework for collecting study data

City	Hospital	Employed nurses (N)	Samples required (N)
Gorgan	Sayyad Shirazi	62	34
	5 Azar	56	31
	Talghani	15	9
Kalaleh	Hazrate Rasol	21	10
Agh ghall	Ale Jalil	12	6
Minodasht	Fatemeh Al-Zahra	17	9
Gonbad	Shahid Motahari	50	27
Ali abadekatul	Baqiyatallah	15	8
Bandartorkman	Imam Khomeini	15	8
Bandargaz	Shohada	9	4
Kordkoy	Amir Al-Momenin	24	14
Total	11	297	160

For data analysis, we used SPSS 16 software, descriptive statistics (such as frequency, percentage, mean, and standard deviation), and inferential statistics. As the Kolmogorov-Smirnov test revealed that the data had non-normal distribution, the Kruskal-Wallis (for age, type of contract, work experience, ethnicity, work shift, and overtime) and Mann-Whitney (for marital status, gender, educational status, and job position) tests were used for analysis. The confidence interval was designated as 95%, and the statistical significance level as 0.05.

Results

In this study, out of 160 ICU nurses enrolled, 156 responded to the questionnaires (a response rate of 97.5%). The mean age of responders was 32.02 ± 6.25 years, most of whom were female (75%), married (64.1%), and of Persian ethnicity (75%). Also, most of the nurses had bachelor's degrees (91.7%), worked on rotating shifts (39.7%), were permanently employed (42.3%), and had work experience of less than 5 years (41.7%). Data analysis showed that the level of overall clinical competency among the ICU nurses assessed was excellent. Regarding individual dimensions, clinical competency was also excellent in the knowledge dimension but poor in the dimension of skills (Table 2).

Table 2. The frequency of clinical competency dimensions' scores of Nurses (n=156)

Clinical Dimensions \ Competency levels	Poor N (%)	Moderate N (%)	Good N (%)	Excellent N (%)
Knowledge	1 (0.6)	3 (1.9)	40 (25.6)	112 (71.8)
Skill	8 (5.1)	8 (5.1)	57 (36.5)	83 (53.2)
Attitudes and Values	6 (3.8)	9 (5.8)	37 (23.7)	104 (66.7)
Experience	7 (4.5)	8 (5.1)	41 (26.3)	100 (64.1)
Total	0 (0.0)	12 (7.7)	36 (23.1)	108 (69.2)

The highest and lowest mean scores of clinical competencies among ICU nurses belonged to the knowledge and skill dimensions, respectively (Table 3).

Table 3. Mean score of clinical competencies and its dimensions in ICUs nurses

Dimensions	Mean±SD
Knowledge	85.82±11.64
Skill	80.40±17.20
Attitudes and Values	84.24±16.77
Experience	83.42±16.40
Total	334.02±52.99

Regarding demographic variables, the highest mean score of clinical competencies was observed in nurses in the age group of 42-47 years, as well as

male, married, and permanently employed nurses, those with 15-20 years of work experience, nurses with Persian ethnicity, those working in rotating shifts, nurses with bachelor's degrees, and those with <30 hours overtime work. However, nursing clinical competency showed a statistically significant relationship only with age, marital status, type of contract, work experience, and overtime hours (P<0.05, Table 4).

Table 4. Relationship between clinical competence and demographic characteristics in ICUs nurses

Variable		Mean±SD	P-value
Age (years)	23-28	316.29±54.76	*P=0.03
	29-34	335.86±43.26	
	35-41	356.77±56.84	
	42-47	359.24±41.00	
Gender	Male	342.15±47.70	**P=0.305
	Female	331.31±54.56	
Marital status	Single	305.14±56.67	**P< 0.001
	Married	350.19±4.31	
Type of employment	Plan	316.53±67.01	*P< 0.001
	Contract	324.42±41.62	
	Contractual	348.30±47.25	
	Official	348.57±48.18	
Work experience (Year)	<5	322.04±499.70	*P< 0.001
	5-10	348.58±49.98	
	11-15	347.53±67.36	
	16-20	383.90±25.00	
	>20	314.10±21.11	
Classification	Nurse	380.10±35.45	**P=0.35
	Head Nurse	349.35±24.66	
Ethnicity	Fars	375.04±39.72	*P=0.40
	Turkmen	348.20±31.55	
	Sistani	323.34±38.36	
	Other	310.90±23.20	
Shift work	Morning	310.00±21.64	*P=0.33
	Evening	348.76±399.80	
	Night	342.33±45.26	
	Shifts in rotation	364.30±21.11	
Educational status	Bachelor degree	353.15±47.52	**P=0.305
	Master's degree	321.35±31.75	
Overtime (On hour)	<30	356.08±289.91	*P=0.003
	30-60	345.21±51.02	
	61-90	340.32±54.88	
	>90	309.45±61.32	

Kruskal-Wallis Test*   Mann-Whitney Test**

Discussion

The results of the present study showed that most of the ICU nurses enrolled had excellent levels of clinical competency, which was consistent with the observations of Faraji *et al.* (15) and Elhami *et al.* (16). On the other hand, the clinical competency score fell in the good category in the studies of Sasaki *et al.* and Haj-Bagheri *et al.* and in the average category in the study of Karami *et al.* The relatively acceptable clinical competency of ICU nurses seems to be related to the deliberate apportion of competent nurses to special care units, continuous evaluation of nurses' clinical competency by nursing managers, implementing plans to improve clinical competency, and upgrading existing facilities (7, 14, 17). Among the dimensions assessed, our results indicated that nursing clinical competency was at an excellent level in the field of knowledge, but it was observed to be poor in the field of skills, and these dimensions attained the highest and lowest competency scores, respectively. Meanwhile, Hasani *et al.*

reported that the level of clinical competency was high in both the knowledge and skill dimensions (18).

Regarding the association of clinical competency with demographic variables, our findings showed that the mean competency score was higher in the age group of 42-47 years than in other age groups, and there was a statistically significant link between clinical competency and age. This observation agreed with the results of Karami *et al.*, Shuryabi *et al.*, and Haj-Bagheri *et al.* (6, 17) but opposed the findings of Faraji *et al.* (16). In the present study, the highest mean score of clinical competencies belonged to male nurses; however, there was no significant relationship between clinical competency and gender. This observation was also consistent with the findings of Sasaki *et al.* and Mirlashari *et al.* In the present research, unlike previous studies, we utilized a specialized tool to assess nursing clinical competency, which could reveal more details on this topic, justifying preferences toward relying on male nurses for managing critical clinical situations (14, 19).

We also noticed that married nurses attained a higher mean clinical competency score compared to single nurses. There was also a significant association between clinical competency and marital status, which was consistent with the findings of Karami *et al.* but inconsistent with the observation of Mirlashari *et al.* It seems that married nurses have better motivations to fulfill their professional duties and acquire higher competency in the work environment, allowing them to have superior job security than unmarried nurses (17, 19).

Moreover, we observed that permanently employed nurses attained a higher mean clinical competency score than nurses with non-permanent contracts, and there was a significant link between clinical competency and the type of contract. This finding was in line with the report of Shuryabi *et al.* It is obvious that permanently employed nurses have more incentives to acquire experience and achieve promotion due to their better job security (6).

The mean clinical competency score was also the highest among nurses with a work experience of 15-20 years, and there was a significant relationship between clinical competency and work experience. This was consistent with the observation of Elhami *et al.* but inconsistent with the report of Faraji *et al*. It appears that the high clinical competency of nurses with work experience beyond 15 years can reflect the substantial impact of work experience on acquiring clinical competency skills (15, 16).

We here observed no significant relationship between clinical competency and the job position of nurses, which was in agreement with the study of Sasaki *et al.* (14). Although nurses of Persian ethnicity acquired a higher clinical competency score, no significant association was identified between clinical competency and ethnicity. We found no studies assessing the association of clinical competency with ethnicity or the job position of nurses, so we could not provide comparisons in this regard.

Also, the highest mean clinical competency score was obtained by nurses working in rotating shifts; however, work shift was not significantly associated with clinical competency, which was in line with the findings of Haj-Bagheri *et al.* and Faraji *et al.* (7). Taking into account that most nurses experience rotating shifts at the beginning of their careers, one can justify the lack of a significant relationship between the type of work shift and clinical competency.

The highest mean score of clinical competencies was obtained by nurses who hold bachelor's degrees, but no significant association was noticed between clinical competency and the level of education. This finding was in parallel with the report of Shouryabi *et al*. (6). It seems that specialized clinical competency skills can be determined by not only their educational levels but also their clinical experience as nurses in wards such as ICUs. Due to advances in science and technology, the level of education alone cannot be adequate for providing quality nursing care, so nurses need to participate in specialized courses and acquaint themselves with novel nursing care methods.

Finally, the highest mean clinical competency score was achieved by nurses who had overtime working below 30 hours, reflecting a significant association between clinical competency and overtime work. This observation agrees with the report of Elhami *et al.* (15). It seems that prolonged overtime work can exhaust nurses, leading to their burnout and providing low-quality care.

One of the strengths of this study was the assessment of the clinical competency of ICU nurses using a specialized and indigenized tool in Iran. Among the limitations of the present study, one can mention the potential impacts of ICU nurses' high workload, many items in the questionnaires, and the lack of adequate time to complete the questionnaires on nurses' responses. Health system planners are recommended to focus on improving the clinical competency of ICU nurses by boosting their clinical skills.

Conclusion

It is of crucial importance for ICU nurses to achieve high clinical competency. Clinical competency assessment can help boost the quality of nursing care during crises and critical conditions. In our study, the overall clinical competency of ICU nurses was observed to be excellent, and this level was also observed in the knowledge dimension; however, the lowest clinical competency belonged to the dimension of skills. In addition, the clinical competency of ICU nurses was significantly associated with age, gender, marital status, work experience, and the type of contract, highlighting the need for paying more attention to these variables to boost the clinical competency of ICU nurses.

Ethical statement

The present study was related to a MSc. thesis in the field of critical care nursing approved by the Faculty of Nursing and Midwifery and the Ethics Committee of the Golestan University of Medical Sciences (IR.GOUMS.REC.1398.065). Written informed consent was obtained from the nurses participating in this research.

Conflicts of interest

The authors declare that they have no conflict of interest.

Author contributions

All authors actively participated in the study's design and implementation, as well as in the preparation of the initial and final drafts of the manuscript. All authors approved the final version of the manuscript.

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