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BASIC COMPETENCE AND ITS RELATED FACTORS IN CRITICAL CARE NURSES: A MANAGEMENT VIEW

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ABSTRACT

Background and Aim: Clinical competence plays a crucial role in quality of care and ensures safe and accurate performance of nurses. Critical care nurses require a high level of adequacy and competence to treat critically ill patients. Accordingly, we performed this study to determine the basic competence level of critical care nurses.

Materials and Methods: This descriptive and analytic study was performed using census method. Basic competence of 380 critical care nurses was evaluated using a demographic characteristics form including 12 related underlying factors and Intensive and Critical Care Nursing Competence Scale, version 1(ICCN-CS-1). This scale contained 144 items with 4 dimensions of knowledge, skills, experiences, as well as attitudes and values, by which two main areas of basic competence, that is, clinical and professional competence, were assessed based on a 5-point Likert scale, and their relationship with 7 personal and clinical characteristics was examined. Reliability and validity of the scale were previously confirmed by a psychometric research. Moreover, its face and content validities were re-evaluated. Data analysis was performed in SPSS, version 21, using statistical tests.

Results: In total, 245 (64.47%) of the critical care nurses expressed they had excellent basic competence, whereas 131 (34.47%) and 4 (1.05%) of the cases appraised their basic competences to be at good and moderate levels, respectively. In addition, according to the criteria of the research scale, means of clinical and professional competences of nurses were estimated at 4±0.38 and 4.04±0.46, respectively. According to the results, a significant relationship was observed between basic competence of nurses and variables of age, marital status, post in the ward, working shift, clinical work experience, intensive care unit work experience, and employment status.

Conclusion: According to our results, basic competence (professional and clinical competence) of the majority of the critical care nurses was excellent, and none of the nurses had weak competence. Mean levels of clinical and professional competences of nurses were reported to be good. From the 12 underlying factors, seven were significantly associated with clinical, professional and basic competences of the nurses.

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Introduction

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Intensive care unit is one of the most sensitive and important specialized wards of hospitals. Today, these units are an inseparable part of specialized hospitals in the world, which require the recruitment of professional and committed personnel with specific features [1]. Nurses are the major professional groups of these wards [2], who are responsible for care of patients with critical or acute conditions and their families [3].

Competence is a comprehensive set of knowledge, skills, and attitudes, which paves the way for safe and effective performance of nurses without the monitoring of others [4]. The basic competence is theoretically divided into clinical and professional competence [5, 6]. Basic competence is indicative of the primary qualifications for a particular care unit [5, 7]. Clinical competence of a nurse is defined as the ability to accurately perform tasks, which are directly related to the care of patients and professional competence is the ability to perform professional and basic tasks of nursing, which can be gained by nursing texts [7, 8].

Some of the outcomes of clinical and professional competence are safe [9] and accurate [10] performance of nurses, high-quality care [9], increased patient survival [11], patient satisfaction, professional development, and decreased health costs [9]. In addition, nursing competence, especially in critical care units, is significantly associated with accelerated recovery process, prevention of complications and deterioration of the patient condition [12], as well as decreased medical errors, nosocomial infections, mortality, post-surgery complications, and accidental extubation [13]. Nurses can be encouraged to increase their skill level, data retrieval, critical thinking, and self-learning by determining their level of competence [14].

In a study, professional and clinical competences of 25% and 75% of nurses in Tehran were good and excellent, respectively, and a significant positive association was found between professional and clinical competences and some background factors, including age, working experience, and experience of critical care nursing. However, no statistical difference was observed between professional and clinical competences of male and female nurses [15]. In another study, clinical competence of 22.8% of nurses working in intensive care units (ICUs) and coronary care units (CCUs) of Tehran was reported to be weak, whereas 67% and 9.8% were at a moderate and excellent level, respectively [16]. Lakanma et al. reported the competence of critical care nurses of Finland to be at an acceptable level. In their study, 67.5% of nurses had excellent competence, while 32.3% and 0.2% had good and moderate competence, respectively [6].

The results of this study, by determining the weaknesses and strengths of critical care nurses in various fields, can be applied in educational planning in terms of content and teaching methods; in orientation training programs of new nurses and continiuous education programs of nurses working in these wards. Therefore, given the limited number of studies in this area, the present study aimed to determine the basic competence and some of its associated factors in critical care nurses of teaching hospitals affiliated to Mazandaran University of Medical Sciences, Sari, Iran, in 2016.

Materials and Methods

This descriptive and analytic study was conducted in 430 nurses of teaching hospitals affiliated to Mazandaran University of Medical Sciences, Sari, Iran, in 2016. Sampling was carried out through census method. In total, 410 eligible nurses were found, of whom 388 volunteers were entered in the study. However, considering the exclusion criteria, 380 questionnaires were assessed. The inclusion criteria comprised of related educational degree and working in ICU for at least one year [6]. The exclusion criterion was lack of completing the questionnaires by the nurses.

The data collection tools comprised of a questionnaire containing two parts; the first part included 12 items on demographic characteristics and related factors obtained from content review. The second part was Intensive and Critical Care Nursing Competence Scale, version 1 (ICCN-CS-1), containing 144 items, which evaluated 7 variables through self-assessment. In general, 80 items of this scale (20 items of each dimension) are related to clinical competence, and 64 items (16 items of each dimension) are associated to professional competence.

Clinical competence is divided into 3 subcategories of nursing care principles, clinical guidelines, and nursing intervention and professional competence is divided into 4 subcategories of ethical activities and familiarity with health care laws, decision-making, work development, and collaboration. Moreover, basic competence included four bases of knowledge, skill, attitude and value and experience. Each of these items was scored based on a 5-point Likert scale. Possible scores were within the range of 144-720, and the total scores were indicative of level of competence. In detail, scores between 144 and 288 were regarded as weak, whereas scores within the ranges of 289-432, 433-576, and 577-720 were considered as moderate, good, and excellent, respectively. Mean scores were reported as 1-2.49 (weak), 2.5-3.49 (moderate), 3.5-4.49 (good), and 4.5-5 (excellent) [5, 6].

In this study, the English questionnaire was translated into Farsi with the permission of the designer of the questionnaire through email and by using the standard techniques. Afterwards, we back translated the questionnaire and compared it to the original version [17]. After applying the necessary modifications, the final version was sent to the designer of the questionnaire and its accuracy was confirmed prior to the study.

In terms of reliability and validity of the data collection tools in psychometric assessment of the Farsi version of ICCN-CS-1, the scientific load of items was estimated from 0.304 to 0.727. In evaluation of the internal consistency of the questionnaire with Cronbach's alpha, the total consistency of the scale was calculated at 0.98, whereas the consistency of the subscales was estimated at 0.93-0.96. Scale stability was 0.86 with a 2-week interval [15].

In this study, face validity of the applied tools was determined by a panel of experts and providing the translation of the questionnaire to 12 faculty members of the School of Nursing. Using qualitative validity, the opinions of professors on each of the items, in terms of difficulty, proportionality, ambiguity, and appearance of the tools were obtained. After that, the questionnaires were given to 10 critical care nurses and their opinions about sentence structures, ambiguous points, alternatives in the demographic characteristics section, and logical appearance of the questionnaires were obtained.

Assessment of content validity was carried out both in quantitative and qualitative forms; according to Waltz and Bausell indicator, Content Validity Index (CVI) for total tools was 0.86, and within the range of 0.63-1 for each of the items. In addition, Content Validity Ratio (CVR) was calculated at 0.71. Given the importance of relevancy indicator in evaluation of CVI and CVR, which was > 0.79, and based on the opinions of the experts of the research team, none of the items was excluded and only some modifications were applied in the translation of items by providing some parenthetical remarks.

In order to evaluate the reliability of the applied tools, test-retest was used. Spearman-Brown correlation coefficient was 0.80-0.99 for components of the study tools, which was indicative of high reliability of the tools. In addition, internal consistency of the scale was calculated at Cronbach's alpha of 0.94 for the total scale and 0.92-0.97 for its subscales (dimensions).

Prior to the study, the researcher obtained the necessary permissions from the authorities of hospitals and made arrangements with the respective supervisors of the morning, evening, and night shifts at the selected wards. At first, the study objectives were explained to the participants and they were assured of the confidentiality terms regarding their personal information. Afterwards, the questionnaires were distributed among the eligible subjects and were collected after a few rounds of presenting to the wards.

Data analysis was carried out in SPSS, version 21, using statistical descriptive methods (i.e., frequency, mean, median, and standard deviation) and Kolmogorov-Smirnov test for evaluation of normality of the data. Moreover, Mann-Whitney U and Kruskal-Wallis were applied to compare the clinical, professional, and basic competences of nurses according to various background factors. Further, Chi-square, Friedman, and Spearman's correlation coefficient were applied to evaluate the level of basic competence, mean levels of clinical and professional competence, and the relationship between clinical, professional, and basic competence and the variable of age, respectively. P-value less than 0.05 was considered statistically significant

Results

In total, 299 (78.68%) of the subjects were female, 259 (68.18%) were married, 344 (90.63%) had BSc, 239 (62.89%) were graduates of public universities, 132 (34.74%) were officially employed, 190 (50%) had no post(responsibility) in the wards, and 338 (88.95%) were working in rotational shifts. Mean age of the participants was 7.31±33.01 years, and means of clinical work experience and experience of intensive care nursing were 7.69±6.61 and 6.11±4.90 years, respectively (Table 1).

The majority of the nurses working in ICUs (n=245; 64.47%) expressed their basic competence to be at an excellent level, and none of the nurses was reported to have weak competence. Clinical and professional competence of the nurses was at a good level according to the criteria for mean scores of the research questionnaire (Table 2). According to the Friedman test, clinical competence was prioritized first with mean rank of two and professional competence was the next priority with mean rank of one (P<0.001). Therefore, the dimension of attitudes and values of nurses was prioritized one with the mean rank of 3.42, whereas skill, knowledge, and experience were ranked second, third, and fourth with means of 2.34, 2.20, and 2.04, respectively (P<0.001). In addition, the dimension of attitudes and values were estimated at an excellent level, and dimensions of knowledge, skills, and experiences were at a good level (Table 2).

With regards to mean scores, in the table of subcategories of competence, all the subcategories including principles of nursing care, clinical guidelines, nursing interventions, ethical activity and familiarity with health care laws, decision-making, and work development were at a good level, with the exception of the subcategory of collaboration, which was at a moderate level (Table 2).

According to the results, a significant relationship was observed between clinical, professional, and basic competences of nurses and variables of age (P<0.001), marital status (P=0.016, 0.035, 0.024), post in the ward (P<0.001), working shift (P=0.002, 0.003), clinical and ICU working experience (P<0.001), and employment status (P<0.001). The mentioned competences were higher in older and married nurses, who had a post in the ward, a fixed shift, background of general clinical work or intensive care nursing experience more than 5 years, and a contractual or official (full-time) employment (Table 3).

Moreover, only clinical competence had a significant association with type of university (P=0.032) (clinical competence of nurses graduated from public universities was higher, compared to those graduated from other universities). Mann-Whitney U test reflected a significant relationship between clinical and basic competence of nurses and official employment status compared to all other employment statuses (contractual, conditional, man power plan and company based contractual; P<0.001), and the levels of clinical and basic competences were higher in officially employed nurses.

Table 1. Demographic characteristics of samples

Variables(Background factors)	Category	No.	Percentage	Mean & SD	Rang
Gender	Male	299	78.68		
	Female	81	21.32		
Age(n=375)	-	-	-	33.01±7.31	22-56
Marital status(n=378)	Married	259	68.18		
	Single	118	31.05		
	Divorced	1	0.26		
	No response	2	0.53		
Educational document	Bachelor of nursing	344	90.53		
	MS nursing	36	9.47		
Type of university	Governmental	232	62.89		
	Non Governmental	141	37.11		
Responsibility in ward (n=376)	Yes	186	48.95		
	No	190	50		
	No response	4	1.05		
Work shift	Constant	42	11.05		
	Rotation	338	88.95		
Ward	CCU	101	26.58		
	Surgical ICU	27	7.11		
	General ICU	76	20		
	ICU OH	39	10.26		
	BICU	28	7.37		
	NICU	49	12.89		
	PICU	19	5		
	CICU	11	2.89		
	Dialysis	30	7.89		
Hospital	Razi	62	16.32		
	Boalisina	64	16.84		
	Emam Khomeini	75	19.74		
	Fateme Zahra	150	39.47		
	Zare	29	7.63		
Years of clinical work(n= 378)	-	-	-	8.79 ± 6.61	1-29.30
Years of intensive care nursing	-	-	-	6.11± 4.90	1-23
Employment status	Official	132	34.74		
	Contractual	78	20.53		
	Other	170	44.74		

(Conditional, Man power plan, Company based contractual)

Table 2: The domains, bases and subdomains of scale ICCN-CS-1 and the self-assessment mean scores.

The domains, bases and subdomains of basic competence	Self assessment scores (likert 1-5) (n=378-380)	
	Mean	**SD**
Clinical competence	4	0.38
Nursing interventions	4.24	0.45
Clinical guidelines	4.19	0.38
Principles of nursing care	4.13	0.44
Professional competence	4.04	0.46
Decition- making	4.14	0.54
Development work	4.03	0.32
Ethical activity and familiarity with health care laws	3.81	0.47
Collaboration	3.13	0.66
Atitude and value base	4.52	0.64
Skill base	4.21	0.45
Knowledge base	4.07	0.44
Experience base	3.99	0.38

Table 3: Statistically significant background factors in relation to basic competence.

Variable (Background factor)	Mean & SD	Statistic test, Statistic or Coefficient	Pvalue
Age	-	Spearman correlation, 0.28	0.0009
Marital status		Man-Whitney,	0.024
Married	601.51 ± 63.18	– 2.257	
Single	580.89 ± 75.17		
Responsibility in ward		Man-Whitney,	0.0009
Yes	609.7 ± 61	3.770	
No	581.4 ± 72.1		
Years of clinical work		Man-Whitney,	0.0009
≤ 5 year	575.2 ± 68.3	– 4.827	
> 5 year	609.8 ± 64.3		
Years of intensive care		Man-Whitney,	0.0009
nursing	579.3 ± 70	– 5.332	
≤ 5 year	617 ± 59.3		
> 5 year			
Work shift		Man-Whitney,	0.002
Constant	625 ± 56.2	– 3.077	
Rotation	592 ± 68.6		
Employment status		Kruskal –Wallis,	0.0009
Official	620 ± 56.4	34.188	
Contractual	576.8 ± 65.1		
Other	586.36 ± 69.2		

Discussion and Conclusion

According to the results of the present study, basic competence of the majority of the nurses working in intensive and critical care wards (64.47%) was at an excellent level. In a study by Ghahri Sarabi et al. (2016), most of the nurses (75%) had excellent basic competence [15]. Moreover, Lakanma et al. (2015) reported that 67.5% of ICU nurses had excellent basic competence, which is in line with the results of Mahdavi Saeb et al. [6, 18]. This can be justified since ICUs require especial nurses due to their specific features, and these nurses are mainly selected from among experienced and efficient ones. Given the independence of these nurses and more facilities in intensive care units, they are able to perform more specialized and patient-centered cares, compared to other hospital wards [19].

In the current study, the participants expressed their basic competence to be higher, compared to professional competence, which was in congruence with the results obtained by Laknama et al. (2015). This similarity might be due to technical necessities and high clinical skills in ICUs [6].

As mentioned before, the dimension of attitudes and values was assigned the highest score, whereas the dimension of experience received the lowest score in self-assessment of the nurses. In the study by Laknama et al. (2015), the prioritized dimensions were attitudes and values, knowledge, skills, and experiences. The results of the mentioned study were consistent with our findings regarding the highest and lowest scores of competence dimensions [6]. In the studies by Laknama et al. (2014) and Ghahri Sarabi et al. (2016), the highest mean scores of competence dimensions were related to the dimension of attitudes and values (excellent score), which was in line with the current results [5, 15].

Given the mean intensive care nursing experience (6.11±4.9) in the present study, it seems logical for experience to receive the lowest score. However, there was a difference in arrangement of knowledge and skill between the present study and similar studies since the score of skill was slightly higher than knowledge in this study. It seems that the longer nurses work in the wards, the more they become involved in clinical care and gaining skills, which distances them from maintaining and improving the clinical and professional knowledge level. However, this issue requires further investigations and highlights the necessity and importance of periodic evaluation of scientific competence and constant implementation of in-service courses.

According to the results of the current study, nursing interventions and collaboration were the strongest and weakest subcategories, respectively. These findings were in accordance with the results obtained by Blažun, Kokol, and Vošner (2015), which indicated that MSc nursing students had the lowest competencies in collaboration and teamwork areas [20]. However, these results were not in congruence with those of other similar studies [5, 6, 15, 21, 22]. Collaboration is an indicator of excellent nursing performance and a part of professional competence, subcategories of which include cooperation, interaction, and teamwork [7]. Nursing is an interdisciplinary profession and depends on experts and specialists of various fields, including physicians, psychologists, information technology experts, physiotherapists, radiologists, and laboratory staff [20]. In addition to collaboration and teamwork with colleagues, an ICU nurse with professional competence must be able to interact and cooperate with other units (e.g., paraclinic departments), other health care wards (other inpatient wards) and patient companions. This subcategory of competence can be obtained through academic aducation, continues aducation and in-service nursing practice and must be regarded by educational and professional authorities and nurses themselves.

Considering the results of the present study, a significant positive association was found between clinical, professional, and basic competences of nurses and variables of age and more than 5 years of ICU work experience, which is consistent with the results obtained by other studies [6, 15, 23-32]. In a study by Komeili Sani et al. (2015), the more the working experience of individuals, the further was their level of experience and expertise [33]. From the perspective of Liou et al., work experience increases clinical competence of nurses [34]. In the first 10 years of clinical experience of nurses, their competence level improves at an accelerated pace, and then reaches a plateau since nurses have more learning opportunities at this stage of their professional life and have further capacities, which allow them gain knowledge and skills from their experiences [26].

In the present study, a significant relationship was found between marital status and clinical, professional, and basic competences, which were higher in married individuals. In this regard, our findings were in line with the results obtained by Mirlashari et al. [35]. Nevertheless, no significant association was observed between the competences and the mentioned variable in other studies [31, 36, 37]. It seems that married nurses used the favorable aspects of having a spouse, including increased self-confidence, accountability, eliminated physical and emotional needs, reduced stress and anxiety caused by concerns regarding marriage, and reaching a relative stability in personal and social life, to improve their competence.

According to our findings, a significant difference was noted between means of clinical, professional, and basic competences in nurses with a post in wards, compared to other nurses. In addition, competence level of nurses with a specific role in the ward was higher, compared to those without it, which was in agreement with the findings of other studies [6, 32]. However, no significant link was observed in some other studies in this regard [21, 31, 38]. It seems that the result of this study is reasonable since nurses with higher competences and capabilities are selected as head nurse, staff, shift responsible and etc.

Nurses with fixed shifts had better clinical, professional, and basic competences, compared to those with rotational shifts, which was not consistent with results of other studies [21, 39]. Given the fact that the majority of fixed shifts are morning

shifts, higher competence level of nurses with fixed shifts seems reasonable since head nurses tend to use more efficient and capable nurses in morning shifts due to the high workload in the morning.

According to the results, clinical and basic competence levels of official nurses was higher, compared to different types of employment status in Iran such as contractual, conditional, man power plan and company based contractual. In a study by Mirlashari et al. (2016), a statistically significant relationship was reported between employment status and clinical competence of nurses [35]. Nevertheless, no significant association was found in this regard in other studies [31, 37]. Nurses with full-time contract (official nurses) have more care experience, which leads to higher skills and knowledge compared to nurses with other types of employment; thus, our obtained results seem to be logical.

Self-assessment helps nurses recognize their professional weaknesses and strengths, encouraging them toward planning and making more efforts through reflecting about their shortcomings. Further, self-assessment or other periodic evaluations determine the educational needs of nurses, and educational authorities of schools of nursing and hospitals will be able to design basic or continues education programs for critical care nurses. In addition, determining the competence level of nurses helps to the nursing management perform tasks in selection and remain of nuerses in ICUs with more accuracy.

One of the limitations of this study was the fact that individuals would tend to assess themselves higher or lower than their actual level due to the nature of self-assessment or do not devote the necessary attention to completing the questionnaires. It is also possible that the questionnaires were filled by other people due to heavy workload of nurses. Therefore, we recommend conducting replication studies with a combination of other competency assessment methods in critical care nurses, such as assessment by supervisor or a colleague, knowledge evaluation tests, and objective tests, including Objective Structured Clinical Examination (OSCE) and portfolio. In addition, it is suggested that other variables, including interest and motivation, retraining and skill courses, use of related scientific articles, amount of overtime work in a week, and the educational atmosphere prevailing in wards, that is, presence of professors and students of higher educational degrees in wards and scientific interaction with them, be assessed as underlying factors of clinical and professional competence.

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