Original Research Article

The Clinical Competencies of Nurse Anesthetists in Response to Community Needs: A Delphi Study

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ABSTRACT

Introduction: Ensuring the clinical competencies of nurse anesthetists is an essential professional standard. The key and primary step in the assessment of nurse anesthesia educational programs is to understand the essential competencies from the perspective of anesthesia service providers in response to the community needs. This study aimed to determine the clinical competencies of nurse anesthetists for meeting the needs of the community.

Materials and Methods: This descriptive survey was based on the classical Delphi method. The study was conducted in three stages. In the first stage, 25 questions were prepared by a non-systematic literature review. In the second and third stages, a list of clinical competencies for nurse anesthetists was determined. For assessing the content validity, two indices of content validity ratio and content validity index were calculated. Data were analyzed by SPSS software (version 16) using descriptive statistics and consensus validity. **Results:** After analyzing the data in the first stage, one item was removed from the 25 selected items, and 11 items were added to the initial checklist. The maximum and minimum coefficient of agreement was 100 and 0.54, respectively. The findings of the second stage showed that the percentage of agreement in 35 items was at least 70.7 and maximum 95.1. A competence from the education dimension was removed with a percentage of agreement of 0.59 and a total of 34 items were approved.

Conclusions: This study determined the clinical competencies of nurse anesthetists. The development of clinical competencies for these nurses could be the starting point for understating, analyzing and planning in order to improve the quality of services provided.

KEYWORDS: Competency, Nurse Anesthetists, Delphi Study

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INTRODUCTION

Professional competence is a complex and multidimensional issue [1, 2]. Clinical competence is an essential requirement for ensuring knowledge, skills and performance of nurse anesthetists [3]. Evidences suggest that in this profession, paradigm shift toward reassessment processes relies on the assessment of nurse anesthetists' competence for improvement of quality of services. This requires quantification of competencies as the basis for nurse anesthetists [4]. In fact, the main and primary step in evaluation of nurse anesthesia educational programs is to understand the essential qualifications from the perspective of anesthesia service providers [5]. On the other hand, anesthetizing patients is a complex process that includes several microprocesses [6]. An anesthesia care team needs adequate knowledge, attitude and practice. In fact, clinical practice competencies regarding anesthesia techniques, care priorities, pre-anesthetic assessment and controlling of side effects or complications of anesthesia are required for providing quality services [6].

The quality and quantity of healthcare services indicate that service providers have been able to respond effectively to the needs of the community [8]. In order to meet community needs, planning with specific goals and effective decision making for identification of needs,

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shortcoming and abilities are needed [9]. Accountability is an integral part of educational programs. Experts consider social accountability as a new paradigm for medical education and a culture change, which requires evaluation and understanding [7]. Signs of shortcomings in social accountability are lack of knowledge, attitudes, skills and appropriate qualifications that fit the needs of the society [8,9].

Given the increasing advances in technology and various medical issues, and change in community needs regarding these issues, nurse anesthetists should possess the minimum professional capabilities for patient care to meet the needs of the community [10].

The Delphi technique was first introduced by Dalky and Hemeler (1963) as a scientific and basic method for determining and validating professional competencies based on expert judgment and wide range of opinions (11). This study aimed to determine the clinical competencies of nurse anesthetists in response to the needs of the community using the Delphi method.

MATERIALS AND METHODS

The study population included nurse anesthetists, faculty members, tutors and anesthesiologists who were selected by purposive sampling method. In the classic Delphi method, there are no robust and explicit rule on the method of selection and number of specialists. The number of participants is usually less than 50 and mostly 15 to 20 people. However, some studies have reported 10 to more than 2,000 people [12,13]. In this study, the number of samples was 15 to 45 in three stages of the study according to availability of samples.

Inclusion criterion for research units was at least two years of professional work experience. Exclusion criterion was unwillingness to continue participating in the study. The study was conducted in three stages. In the first stage, we searched databases including Proquest, Pubmed, Google scholar, Science direct, Persian databases SID, Magiran, and Iranmedex (2009-2017) for relevant literature, and prepared a list of essential nurse anesthetist competencies consisting of 25 questions on a Likert scale (ranging from absolutely necessary to absolutely unnecessary). In order to obtain the ideas of the participants in the first stage, an open-ended question was put at the end of the checklist.

Overall, 19 subjects including 17 nurse anesthetists and four tutors were included as the first-stage members. The checklist was given to the subjects for data collection. The checklist was also sent to the subjects via personal email. The participants were asked to mention their ideas and opinions on each item and clinical competencies required for a nurse anesthetist in the open-ended question section. After collecting the checklists, an item was removed from the checklist in the first stage. In the second stage, a structured questionnaire was prepared from the data collected in the first stage. In the second stage, 60 individuals were considered as the research unit and 30 individuals were also in the first-stage research unit. Overall, 41 subjects, four anesthetists, three clinical tutors and faculty members and 34 nurse anesthetists completed the questionnaire. At the end of this stage, the items that had less than 70 of the coefficient of agreement were removed.

The questionnaire was not structurally changed in the second stage. Therefore, the research team decided to prevent inclusion of the subjects who were already in the first two stages. For this purpose, nurses and anesthesiologists working in cities of Gonbad-e-Kavoos and Aliabad-e Katul were enrolled in the third stage. In this stage, of 60 subjects, 39 one anesthesiologist, two clinical tutors and 37 nurse anesthetists completed the questionnaire. After reviewing the answers, feedback was given by the research team on the competencies required.

In the final stage, content validity ratio

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and Bausellon content validity index was used to determine the CVI index. Each item was evaluated by 14 faculty members and anesthesiologists for three criteria of simplicity, clarity and relevance (based on a 4-point Likert scale). The CVI score was calculated by dividing the number of specialists who had given a grade of 3 or 4 to an item by the total number of experts. If 80 of the experts agreed on an item, the item was considered valid and could remain on the scale. In order to measure the CVI, a questionnaire was prepared and sent to the experts. The items with scores above 0.79 were acceptable, 0.7-0.79 were reassessable, and below 0.7 were rejected. CVI was calculated as 0.89.

For calculating CVR, 14 experts were asked to score each item based on a 3-point Likert scale (necessary, useful but not necessary, not necessary). CVR was calculated using the formula bellow. CVR was determined as 0.92.

The Cronbach's alpha was used to assess the reliability of the tool.

$$CVR = \frac{n_E - \frac{N}{2}}{\frac{N}{2}}$$

After post-coding of the questionnaire, the collected data were analyzed by SPSS software (version 16) using descriptive statistics and statistical validity. Descriptive statistics including frequency distribution, mean, and standard deviation (SD) were used to describe the demographic characteristics.

RESULTS

Overall, 19, 41 and 39 subjects participated in the first, second and third stage, respectively. The mean age of participants was 30.08 ± 7.2 years, and the mean work experience was 6.2 ± 5.63 years (Table 1).

Table 1. Demographic characteristics of the participants in the study based on the occupation

Stage	Participants (percentage)
Stage 1	3 anesthesiology faculty members (15.8) 16 nurse anesthetists (84.2)
Stage 2	4 anesthesiologists (8.9) 2 anesthesiology faculty members (4.9) 1 tutor (2.4) 34 nurse anesthetists (82.9)
Stage 3	1 anesthesiologist (6.2) 2 tutors (5.1) 37 nurse anesthetists (92.3)

After analyzing the data, item number 16 (development of new clinical guidelines) was removed from the 25 selected items (supplementary table 1) in the first stage. Maximum and minimum coefficient of agreement was 100 and 0.54, respectively. Based on the team's suggestion, the checklist included five dimensions including: education, research, clinical skills, leadership skills, and ethics. Based on the findings, 10 items were added and three items were corrected. According to the responses to the open-ended question in the first stage, adherence to the Islamic dress code and attention to the ethical aspects were also considered in the second stage.

The findings of the second stage showed that the percentage of agreement for 35 items was at least 70.7 and maximum 95.1. The findings of the study showed that in the third stage, item 3 of education dimension was removed (agreement percentage of 0.59). Therefore, 34 items were approved (Table 2).

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Table 2. Clinical competencies of nurse anesthetists

Stage III	Stage II	**Dimensions of the checklist**	
Percentage of agreement	Percentage of agreement	**Education**	
0.79.5	79.5	Advanced training in professional areas such as pain management, and cardiac, pediatric and neuraxial anesthesia, etc.	1
0.82.1	0.82.1	The expertise and skill needed for management of acute and chronic pain at home	2
0.59	0.70.7	Expertise and skills needed for the management of acute and chronic pain in the final stages of life (removed in stage III)	3
0.87.2	0.90.2	Promoting the level of education to improve anesthesia performance	4
0.82	0.90.2	Learning new management skills and monitoring skills for increasing the range of performance	5
0.79.4	0.68.3	Promoting Advanced Skills such as regional neural blockade	6
0.76.7	0.78	Having a postgraduate degree (MSc or PhD)	7
0.70	0.87.7	Becoming a lifelong learner	8
0.71.8	0.87.7	Participation in educational activities and academic group discussions in the operating room	9
0.87.2	0.87.7	Knowledge necessary for clinical care providers to teach patients	10
0.74.2	0.73.1	Providing the necessary trainings based on new methods such as problem-based learning (PBI), challenge-based learning (CBL), and distance learning	11
0.84.6	0.82.9	Cooperation in educating students (added in stage II)	12
0.82	0.87.8	Presence of professional tutors for the expansion and promotion of education	13
0.74.3	0.82.9	Having the necessary skills to work with computers and access the information of patients list on computers	14
		Research	
0.63.9	0.93	Research activities for professional promotion	15
0.74.3	0.82.9	Creating new anesthesia techniques(corrected in stage II)	16
0.76.9	0.87.1	Having the necessary background for research(added in stage II)	17
		Clinical skills	
0.82	0.90.3	Ensuring the safety and effectiveness of anesthetic devices and equipment before every working shift(added in stage II)	18
0.82.1	0.97.6	Skills necessary about medication and injection knowledge	19
0.89.7	0.95.2	Pre-anesthetic interventions such as preparing patients' medical records and etc(added in stage II)	20
0.92.3	095.1	Interventions and care during anesthesia(added in stage II)	21
0.82	0.92.7	Post-anesthetic care and interventions(corrected in stage II)	22
0.89.7	0.90.2	Understanding sterilization and disinfection methods, and their application and observance at all stages of operation(added in stage II)	23
0.92.3	0.92.7	Having the necessary expertise and skills in the recovery unit(added in stage II)	24
0.87.2	0.95.1	Having necessary expertise and skills in the emergency ward and ICU (corrected in stage II)	25
		Management and Leadership	
0.87.2	0.85.4	Decision making ability in anesthesia	26

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0.89.8	0.90.2	Establishment and maintenance of respectful and cooperative relationship with patients, anesthesia group and the operating room staff	27
0.71.8	0.90.3	Independent supervisory management on the anesthesia unit, operating room, pain management clinic	28
0.75.3	0.83	Existence of sufficient motivation for anesthesia personnel	29
0.76.9	0.78	Participation in management issues and decision making	30
0.79.5	0.87.8	Independence in the anesthesia and care processes that the anesthetist is responsible for	31
0.70	0.87.8	Creating and developing tasks and roles of anesthesiologists by their own experts based on their responsibilities	32
0.84.6	90.82.9	Being a role model for the anesthesia group	33
Ethical			
0.82.1	0.82.1	Observing ethical standards for patients such as patient privacy, confidentiality, respectful relationship with the patient(added in stage II)	34
0.76.9	0.95.2	Maintaining moral standards such as adherence to the Islamic dress code and having respectful relationship with other personnel(added in stage II)	35

In order to assess the validity, CVR and CVI were calculated. The CVI score of 0.89 and CVR score of 0.89 were determined. Cronbach's alpha coefficient was 0.73.

DISCUSSION

In this study, the clinical competencies of nurse anesthetists in response to the community needs were determined by the Delphi method. Based on the professional practice, anesthesia care providers have a great responsibility in providing care for patients. With the increase in healthcare demands, the need for improvement of care processes has also increased in order to meet the needs of the community. Anesthesia care requires professional competence to meet the needs of patients before, during and after anesthesia. This type of patient-care could vary in different countries, depending on geographical features and legal and organizational constraints [15]. Response to needs of the community requires planning with clear goals, views of the people involved in the field, and effective decision making for identification of needs, deficiencies and capabilities.

The findings of this study showed that competencies are in the five fields of education, research, clinical skills, management-leadership and ethics. The field of education had the highest number of items. The most important competence in this field was advanced training in professional areas. Being scientifically up to date is one of the indicators for nurse anesthetists' professional competence [16]. Training in this field has a significant impact on the quality and effectiveness of services provided to the community. William reported that nurses are not aware of many aspects of anesthesia and its complications, which requires training in anesthesia and post-anesthesia care [17]. Jeon et al. also reported that training and its continuation are among the most essential competencies of nurses [18]. Several medical and nursing studies have addressed the issue of education, which have reported findings that are somewhat different from the findings of the present study. Sohrabi et al. identified the general need for nursing education, the most important of which is the clinical training in the emergency department [19]. Nurse anesthetists as providers of anesthesia care require adequate knowledge about anesthetic techniques, care priorities, and pre-anesthesia assessment [6]. Anesthesia is a complex procedure involving thousands of microprocessors [20] that require special skills in the field of medicine. In this study, the required clinical skills included

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preparation of the anesthesia environment, pre-anesthesia assessment, and measures during and after anesthesia.

Ghasemi et al. identified clinical skills as essential competencies for nurses. In this study, nursing care planning has been introduced as a nursing care process [21]. It seems that identifying the clinical practice competencies of nurse anesthetists in different areas should be highlighted in future studies, which could help expand skills to meet the needs of patients.

In the present study, nine competencies were obtained in the field of management and leadership. Accurate identification of nursing competencies in this field could improve management structure in the future. Jiale Hu reported that nurse anesthetists in China are highly dependent on anesthesiologists in practicing their skills, while in the United States, nurse anesthetists have independence in decision making and sufficient participation in managerial activities [15]. Decision making for care planning and organizational management planning is essential for nurses. In this regard, the results of this study are consistent with the results of Yamani et al. [22].

We also found that research was an essential dimension. Research activities for professional promotion were an important item in this dimension, which is in line with the findings of Sohrabi et al. [19]. Chang et al. also indicated that nurses should carry out their care activities based on valid research evidence [23] that can be used for expanding the knowledge by identifying nurse anesthetists' research competencies.

Since the nurses' goal is patient care and elimination of signs and symptoms of illness, they must always act in a completely moral and spiritual manner [21]. One of the competencies considered in this study was the ethical dimension. According to the participants of our study, observance of moral standards in relation to the patient such as privacy, confidentiality, respectful relationship with the patient, and maintaining ethical standards such as adherence to the Islamic dress code and mutual respectful relationship are the basic principles required for any nurse anesthetist.

Considering characteristics of nurses and especially nurse anesthetists, there is a need for a special and desirable relationship between nurse anesthetists and patients based on the ethical principles. Nurse anesthetists need to gain a thorough understanding regarding their individual values while finding the best ways for improving the quality of patient care, so that they can defend their decisions in the moral and ethical issues.

CONCLUSION

In this study, the clinical competencies of nurse anesthetists were determined. This study could be a starting point for understating, analyzing and planning for improving the quality of healthcare services by determining the clinical competencies of nurse anesthetists.

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