

**Psychometric properties of self-assessment clinical competency questionnaire in baccalaureate nursing students**Batoool Nehrir<sup>1</sup>, Abbas Ebadi<sup>1</sup>, Zohreh Vanaki<sup>2</sup>, Jamileh Mokhtari Nouri<sup>1</sup>, Seyed Mohammad Khademolhosseini<sup>1</sup><sup>1</sup> Behavioral Sciences Research Center, Lifestyle Institute, Faculty of Nursing, Baqiyatallah University of Medical Sciences, Tehran, Iran<sup>2</sup> Nursing Department, Tarbiat Modares University, Tehran, Iran**Type of article:** Original**Abstract****Background:** One of the main challenges of nursing student education is the lack of clinical competence that reduces the quality of patients care. Measuring the clinical competency of undergraduate nursing students is effective in curriculum developing, planning, and learning evaluation.**Objective:** To validate self-assessment clinical competence questionnaire of undergraduate nursing students.**Methods:** This was a cross-sectional study at Baqiyatallah University of Medical Sciences in Tehran, Iran, 2015-2016. The original version of the self-assessment questionnaire for baccalaureate nursing graduates was translated to Persian by the World Health Organization's (WHO) method. The psychometric evaluation of the questionnaire was conducted on 300 nursing students. The participants were selected by convenience sampling. The tool validity was confirmed by exploratory factor analyses. The reliability was investigated by internal consistency and test-retest.**Results:** Cronbach's alpha coefficient was 0.96 (0.82-0.91). Intraclass correlation coefficient (ICC) was 0.98 (0.88-0.99). Five factors were extracted by analysis of clinical competency tool of undergraduate nursing students. The factors included technical competence, advanced competence, ethical competence, care management and safety competence.**Conclusions:** The Persian version of the clinical competence assessment tool has acceptable psychometric characteristics in the Iranian nursing students' community. This questionnaire can be used as a valid tool in planning and research management areas.**Keywords:** Clinical Competency, Iran, Nursing students, Psychometric evaluation**1. Introduction**

Competence conceptualized as a continuum, assigns a level of competence on a continuous scale and can be used for comparisons of clusters such as graduates or other groups (1). Competence training in medicine and education has been used as a way of making educated people better at their jobs (2). Competence starts with training and becomes a life-long process, and also, reflects effective performance and can be evaluated against well-accepted standards (3). In nursing, the concept has been more related to whether or not nurses require education at all and whether being competent is not all that should be aspired to (2, 4, 5), moreover, competence is context-based such that the salience of each competency as well as its components and how it is executed, varies according to setting (1). From an international viewpoint, the Canadian Nurses Association defined continuing competency as the "ongoing ability of a nurse to integrate and apply the knowledge, skills, judgment and personal attributes required to practice safely and ethically in a designated role and setting"(4-7). Along with the international outlook, the context-based competency, Nehrir and colleagues in their systematic review paper recognized seven levels for the competence of

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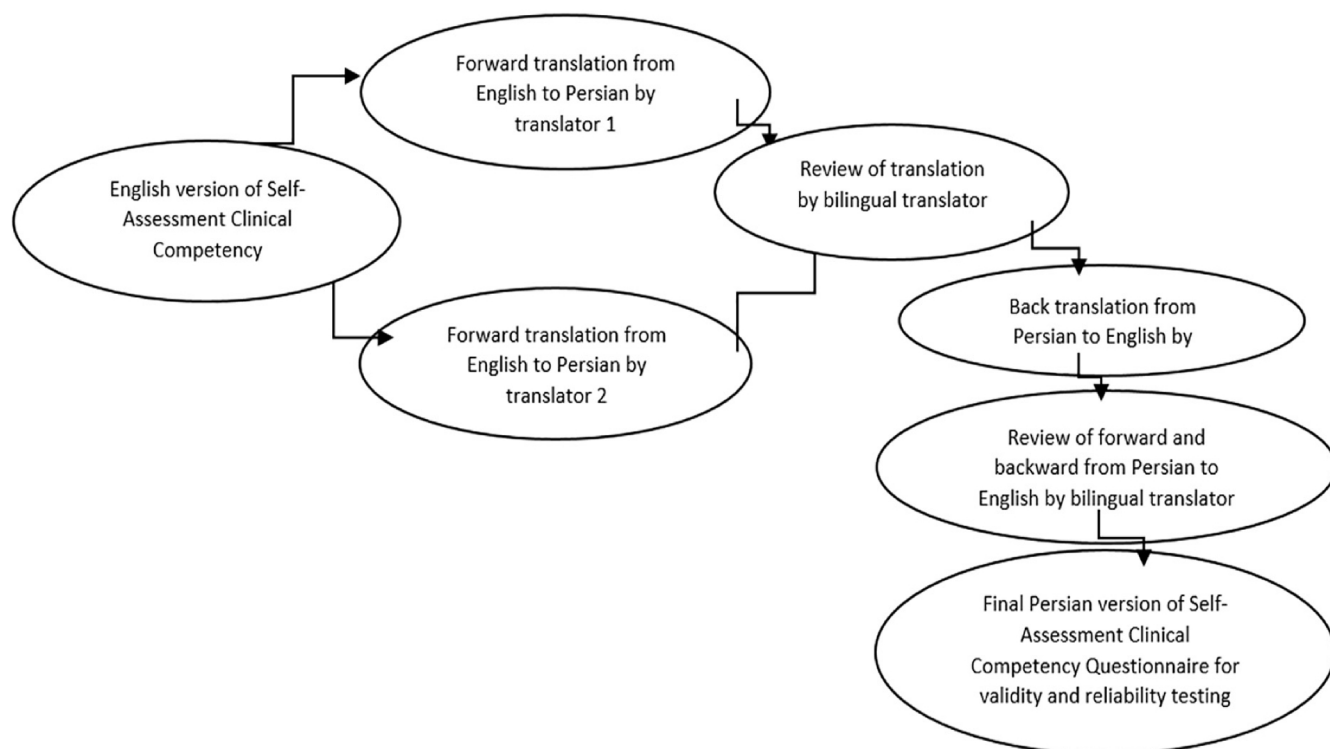
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nursing students in Iranian society from novice to expert (8). However, consistent with professional competence, clinical competence is very important and is one of the main factors for effective clinical learning. In this regard, students' assessment by faculty members and self-assessment by students from both professional and clinical competence can provide important information about nursing education (9). Thus, the study purpose was to measure psychometric properties of a self-assessment clinical competence tool, which is essential for upcoming baccalaureate nursing graduates. To detect the purpose, several tools have been developed and reviewed (3, 4, 6, 10-12), with a comprehensive overview of the existing tools (8), the Liu and Cheng competence tool (13) for having more comprehensive and consistency perspective to the Iranian context, the tool for measuring psychometric properties, was picked-up. The aim of this study was to validate a self-assessment clinical competence questionnaire of undergraduate nursing students.

## 2. Material and Methods

This was a cross-sectional study in Baqiyatallah University of Medical Sciences in Tehran, Iran, 2015-2016. The original version of the self-assessment clinical competency questionnaire was adapted from the 47-item inventory of Liu and Cheng (13). This tool had four sub-domains including skill competency (12-item), professional behaviors (16-item), basic nursing skills (12-item) and advanced competency (6-item). The tool validity was confirmed by exploratory factor analysis. The reliability was investigated by Cronbach's alpha ( $\alpha=0.96$ ). Scoring was based on the Likert scale, with five domains from one (unable to perform) to five (fluency in theoretical concepts and performing practical without supervision). The forward and backward processes were established by the WHO standard method (Figure 1). Then, the questionnaire was distributed among an expert panel in order to approve questionnaire content validity. The final version of the questionnaire was developed after applying the comments (13, 14). Subsequently, demographic characteristics of the undergraduate nursing students (including age, gender, marital status, and clinical experience) were added to the questionnaire. Kaiser-Meyer Olkin (KMO) was used to determine the suitability of sample size, and Bartlett's test to decide the appropriateness of the correlation matrix. The structural validity of the Persian version of the questionnaire was evaluated by factor analysis through principal component analysis and Varimax rotation. Convenience sampling was conducted on 300 nursing students for exploratory factor analysis (6 times greater than the number of scale questions). The informed consent was received from the participants for taking part in the research. Data were analyzed by IBM® SPSS® Statistics version 21 (IBM® Corp., Armonk, NY, USA).



**Figure 1.** Forward and backward translation of Self-Assessment Clinical Competency Questionnaire

### 3. Results

The majority of participants were male (64.67%) with average nursing student's age  $21.93 \pm 1.5$  years and a mean of  $15.22 \pm 1.01$ . In addition, 34 student students were studying in the fifth semester of nursing. The formal validity of the questionnaire showed that the participants did not encounter problems in completing the items. Content validity was also evaluated by a 22-expert panel, and evaluated at the appropriate level. The validity of the tool structure was also accomplished through exploratory factor analysis. The KMO (0.89) and Bartlett sprite tests shown, which represent the adequacy of sample size ( $p < 0.001$ ). According to the scree plot slope and special values, five factors were extracted from this scale (Figure 2). The factors extracted from factor analysis using Varimax, according to Table 1, showed that the items of the clinical competency questionnaire of undergraduate nursing students were classified according to the nature of the items, factor load and consultation with the research team in the following five areas, and item twenty, due to factor load below 0.35 was deleted. In order to correctly measure the questionnaire's dimensions and statistical analyses, this was done: First dimension: technical competence includes items 29-35, 38 and 46. Second dimension: advanced competence including items 39-45 and 36-37. Third dimension: ethical competence includes items 12-16, 5-10 and 28. Fourth Dimension: The competence of care management includes items 20-27 and 17. Fifth Dimension: Safety competence includes items 1-4, 11, and 18-19. At the end of the questionnaire, 46 points with a Likert scale of 5 points were translated and psychometric. The minimum score was 46 and the maximum score was 230. From 300 distributed questionnaires, 286 questionnaires were returned (95% response rate). Factor loading was considered more than 0.35, then, item twenty was removed (with factor loading 0.24). Table 1 showed questionnaire factor loading information. For reliability, test-retest and intra-class correlation coefficient were used with distribution of 30 questionnaires between baccalaureate nursing students and 10 days later, 27 questionnaires were returned. Table 2 demonstrated information for the reliability test. Table 2 shows that the reliability and inter correlation coefficient of items in the areas specified in the clinical competency questionnaire for undergraduate nursing students, is in an acceptable level.

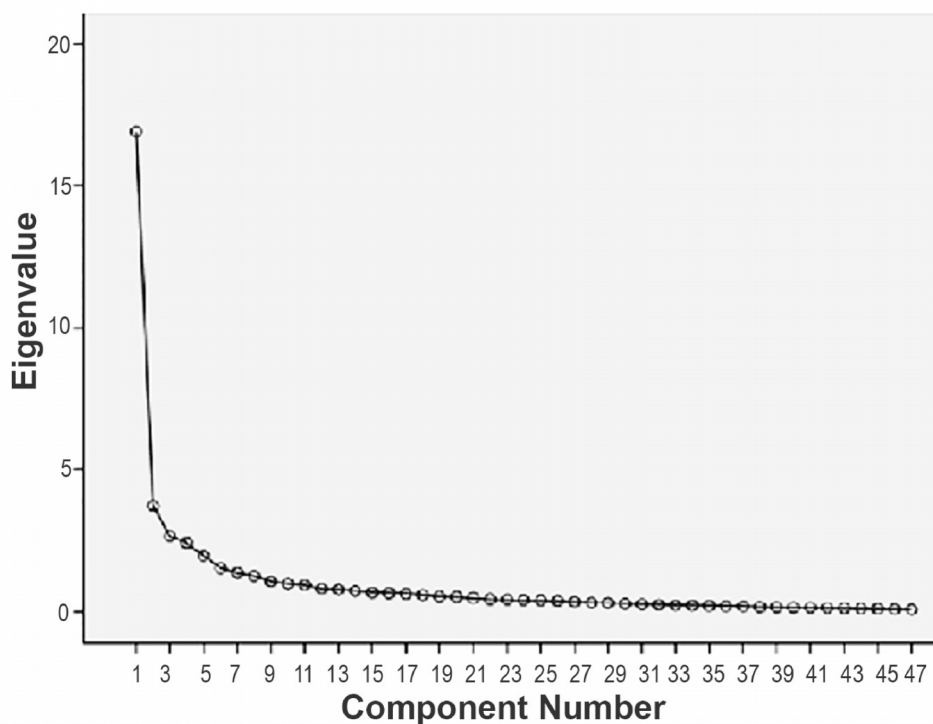


Figure 2. Scree plot curve in clinical competency

**Table 1.** Factors extracted from factor analysis using Varimax

Item number	Factor				
	1	2	3	4	5
C32	0.75				
C34	0.74				
C33	0.73				
C31	0.69				
C35	0.69				
C36	0.66				
C47	0.57				
C39	0.54				
C30	0.53				
C20					
C44		0.75			
C43		0.74			
C46		0.73			
C42		0.69			
C45		0.69			
C40		0.66			
C37		0.57			
C38		0.54			
C41		0.53			
C12			0.70		
C7			0.69		
C14			0.68		
C8			0.66		
C6			0.64		
C5			0.64		
C13			0.57		
C29			0.56		
C15			0.56		
C9			0.52		
C10			0.47		
C16			0.43		
C27				0.74	
C26				0.67	
C22				0.66	
C24				0.64	
C28				0.62	
C21				0.55	
C23				0.54	
C17				0.52	
C25				0.50	
C3					0.70
C11					0.68
C19					0.64
C1					0.61
C4					0.60
C2					0.58
C18					0.54

**Table 2.** Cronbach's alpha and inter correlation coefficient

Dimensions	$\alpha$	Number of items	ICC*
technical competence	0.91	9	0.98
advanced competence	0.91	9	0.88
ethical competence	0.90	12	0.99
competence of care management	0.82	9	0.91
Safety competence	0.89	7	0.99
Total	0.96	46	0.98

\* Intraclass correlation coefficient

#### **4. Discussion**

This study was conducted with the aim of psychometric evaluation of the clinical competency self-assessment questionnaire for undergraduate nursing students. In this study, the various psychometric properties of the instrument, including formal credentials and content, were within acceptable limits. This finding is consistent with the study by Liu and Cheng (10). Sampling and matrix correlation between items in this tool was sufficient. Liu and Cheng studies (10) also coincide with the above results. In this study, the stability of questionnaire calculated by test-retest that for total scale and all five domains was more than 0.7. This finding is consistent with Liu and Cheng's (10) studies. From the obtained results, it can be concluded that the samples were sufficient in each dimension. In the present study, the inter correlation coefficient between nursing undergraduate students' clinical competencies questions were calculated more than 80%. This finding is consistent with Liu and Cheng's (10) studies. Factor analysis revealed the critical component of technical, ethical, advanced, safety and care management of a nursing bachelor's degree student. In the study of Lenberg (13), eight components of nursing competence have been obtained that seem to have overlapping relationships of human communication and care, and on the other hand, the scope of education and its items in the field of ethical psychometric competence is present. Given the passing of the unit of nursing ethics and the patient education process, in the nursing bachelor's degree curriculum, there is a distinct field of moral competence. On the other hand, ethical action is an integral part of nursing student qualifications that determines professional attitudes, values and behaviors. Then technical competence is one of the important dimensions of the questionnaire. Upon graduation, a nursing student should have a high level of clinical skills in order to be able to play a role as a nurse in the future. In the present questionnaire, The sub-areas of general skills in the Liu and Chang questionnaire (10) such as patients' emotional and mental support were categorized in the moral competence field whereas submissions of a written report, oral presentation and care plan were categorized in the care management competence field. The safety domain specifications of the present questionnaire are fully consistent with the safety culture presented in the study of Vincent (15) and Heling et al. (16). Subordinate areas of technical qualifications that are classified at the beginner level, are psycho-motor skills that, by practicing and repeating, the ability of nursing students increase and become individually professional. These subsystems are essential for the nursing of the patient and the foundation of nursing. Some of these sub-measures, such as intravenous administration and injections, are classified in the Liu and Chang (10) study as advanced competencies. The sub-areas of advanced competency in the current questionnaire are partly consistent with the study of Liu and Cheng. A nursing bachelor's degree student needs a clinical judgment to perform advanced skills, and should also perform procedures on the basis of specific priorities and guidelines. The only questionnaire of Liu and Chang with the title of teaching patients and families with disease-related care was removed from the questionnaire. The reason for deleting this item is low factor load. On the other hand, this clause is included in the questionnaire in paragraphs 7 and 12. According to the Cheng and Liu questionnaire validated in Iran, it follows Box 1 and 2 according to the following nursing student's diagram in the first year of the student. A nursing student treats Box 3 in year 2. This field corresponds to the 20 to 37 validated questionnaires in Iran (technical competence and competence of care management). Nursing students in year 3, work in accordance with Boxes 4 and 5. This field corresponds to items 1 to 19 plus items 20 to 37 of the validated questionnaire in Iran (ethical competence, safety competence and technical competence and care management). A third-year nursing student is expected to be able to handle most of the patient's needs through regular coaching. Boxes 6 and 7 are devoted to nursing students of 4 years. This area of advanced competence, with paragraphs 38 to 46, in general, overlaps with other terms (8). The results of this study indicate that the self-assessment questionnaire for nursing undergraduate students' clinical competency has a good reliability and validity for assessing the clinical competencies of nursing bachelor students. This tool is also useful for evaluating the clinical competencies of the nursing students according to the curriculum offered in the four-year period in Iran.

#### **5. Conclusions**

This study validated a practical, 46-item instrument to evaluate clinical competence for nursing undergraduate students in Iran. This tool demonstrated evidence of internal consistency reliability, content validity and construct validity, and it provides an objective tool for assessing baccalaureate nursing graduates' competencies in the various fields. Certainly, the professional and clinical competencies are dynamic and partially context-based, thus its assessment and domains are iterative and should extend across the student course.

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**Conflict of Interest:**

There is no conflict of interest to be declared.

**Authors' contributions:**

Batool Nehrir, Abbas Ebadi, Zohreh Vanaki, Jamileh Mokhtari Nouri, Seyed Mohammad Khademolhosseini were responsible for the study conception and design, data collection and analysis, and the drafting of the manuscript. Furthermore, they made critical revisions to the paper for important intellectual content.

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