

Development and Validation of a Competency Self-Assessment Tool for The Nurse Interns

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ABSTRACT

Contents: Nurse Interns need more attention to their self-confidence and self-assessment abilities. Self-assessment is an essential approach for testing their knowledge, skills, and attitudes.

Aim: This study aimed to develop a competency self-assessment tool for nurse interns and test its validity and reliability.

Methods: Methodological study for the development of a tool. The study was carried out at Ain-Shams University Hospitals on all 89-nurse interns in the internship year, and a jury group of 21 faculty members and 21 nurse managers for validation. The researchers developed a preliminary self-assessment tool with six selected nursing core competencies presented to the jury group for validation.

Results: The finalized tool had a very high total face CVI-S (0.99). The CVI-S ranged between 0.94 for environmental safety and hazardous materials safety and 1.00 for the content validity's attitude scale. The total scale had a CVI-S as high as 0.98. The tool had excellent overall reliability with a Cronbach alpha coefficient as high as 0.901 and an intraclass correlation coefficient of 0.888. The attitude scale also had excellent reliability with a Cronbach alpha coefficient of 0.965 and an intraclass correlation coefficient of 0.964. In the application of the tool, 95.5% of the nurse interns considered their competencies adequate. In terms of grades, only 32.6% and 10.1% considered themselves having very good and excellent competencies, respectively, and 70.8% had a positive attitude toward self-assessment.

Conclusion: A valid and reliable competency self-assessment tool was developed for nurse interns; it can be applied in various nursing internship programs. It could be used by the administrators of the internship programs to identify the individual learning and training needs of nurse interns. Further studies are proposed to evaluate the utility of the tool in evaluating and improving these programs.

Keywords: Competency, self-assessment, nurse interns, validation

1. Introduction

A nursing competency encompasses a spectrum of knowledge and skills and other characteristics essential for nursing practice and clinical decision-making. It is a constellation of knowledge, attitudes, skills, critical thinking, and values needed in a particular situation (Dorgham, 2013). There are technical and behavioral competencies, both based on knowledge and may require professional judgment.

An example of technical competencies is medication administration and dose calculation, while behavioral competencies involve ethical codes, support of the professional nursing practice, and teamwork (Pijl-Zieber *et al.*, 2014). In their practice, nurses need to apply their knowledge, skills, and personal traits to adapt them to various situations (Takase *et al.*, 2014). They need to develop their competencies to fulfill their roles towards patients (Kajander-Unkuri *et al.*, 2020).

The internship programs, an obligatory training year for the acquisition of the bachelor's degree by nurse students, are a crucial part of their education (Faraz, 2019). Nursing specific skills are promoted through these programs to help them apply knowledge to clinical practice through hands-on

training (Trede & McEwen, 2015; Carthon *et al.*, 2019). In this training, knowledge and skills are integrated into clinical settings, which is essential for gaining competencies (Park *et al.*, 2016). Nevertheless, nurse interns require ongoing direction and guidance (Delaram & Shams, 2019), and in this, they need more attention to their self-confidence and self-assessment abilities (Dorgham, 2013).

Self-assessment is an essential approach for testing competencies in nursing (Meghdad *et al.*, 2020). It can assess nurses' knowledge, skills, and attitudes (Brewer *et al.*, 2020). The utility of self-assessment was demonstrated in different areas, such as assessing clinical skills and communication skills (Brown *et al.*, 2018).

2. Significance of the Study

Nurse interns are still trainees, with a continuous need for improving their knowledge and practical skills, and thus need to identify their training needs. They should be able to assess their competencies, and for this, they need a simple self-assessment tool. Therefore, this study attempts to develop a self-assessment tool for nurse interns to help them evaluate their competencies.

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3. Aim of the study

This study aimed to develop a competency self-assessment tool for the nurse interns at Ain-Shams University Hospitals and test its validity and reliability.

4. Subjects & Methods

4.1. Research design

This study is a methodological study for the development of a tool. According to *O'Toole (2003)*, it is a process used to develop instruments' validity and reliability to measure constructs.

4.2. Research setting

The study was carried out at Ain-Shams University Hospitals and involved the different departments where nurse interns undergo their internship year training, including critical care, emergency, and dialysis units.

4.3. Subjects

The study involved two different groups. The first was a jury group consisting of two equal subgroups of faculty members (21) and nurse managers (21) to validate the tool. The faculty members included eight lecturers, nine assistant professors, and four professors from the nursing administration departments of the faculties of nursing at Ain-Shams (7), Mansoura (4), Zagazig (4), Helwan (4), and Fayoum (2) Universities. The 21 nurse managers were selected from the clinical areas where the nurse interns had their training, with the only inclusion criterion of three-year experience in their units.

The second group consisted of 89 nurse interns having their training in the study settings during data collection, and it served to test the tool reliability. Both were purposive samples recruited by convenience.

4.4. Tools of the study

Two forms were used for data collection.

4.4.1. Face and Content Validation Opinionnaire

It consisted of the preliminary self-assessment tool developed by the researchers. The jury members were asked for their agreement/disagreement with each item regarding face, content validity, and comments. It started with a section for face validation that included items for shape, appropriateness, logical sequence, no duplicity, and scale used for scoring. Then, for content validation, each item was checked "agree" or "disagree" along with any comments. An acceptance rule of inclusion of items with 80% or more agreement was set. The comments and suggestions of the jury members were adopted for tool finalization. These were in the form of adding a word such as adding "standard" to "precautions," correcting repetitions, changing "Performing CPR" to "Assisting in CPR."

4.4.2. The second form

It consisted of the finalized tool after validation by the experts and after pilot testing. It included six competencies:

emergency response, infection control, environmental safety, hazardous materials safety, fall prevention, and specific emergency skills.

4.5. Procedures

The fieldwork was carried out through a phase of preliminary development of the competency self-assessment tool, followed by validation, pilot-testing, and application on nurse interns to test its reliability.

Tool development phase: The researchers developed a preliminary self-assessment tool for nurse interns' competency based on the modification of the *MOH Nursing Competency Committee (2009)*. It included six selected nursing core competencies. The first was the emergency response competency and included three knowledge items: "Nurses' responsibilities in emergencies," and three skills items such as "Utilize emergency call system."

The second competency was infection control. It involved seven knowledge items such as "Measures to prevent needle sticks" and seven skills items such as "Perform correct hand washing technique." The third core competency was that of environmental safety. It involved seven knowledge items such as "Action to be taken in a patient with latex allergy" and four skills items: "Apply safe electrical practices for patients, self and others."

The fourth competency was hazardous material safety. It involved three knowledge items: "Role of other personnel regarding hazardous materials" and six skills items such as "Safely dispose of hazardous materials." The fifth competency was fall prevention and involved four knowledge items such as "Unsafe situations in the assigned environment" and five skills items such as "Fill incident report and post-fall evaluation." The sixth competency consisted of specific emergency care skills. It involved 40 items covering numerous areas such as "Fluid resuscitation, dressing, triage, defibrillation, mother in labor, burn patient."

The knowledge items' responses to be checked by the nurse intern were "Deficient/Basic/Up-to-date," respectively scored 0, 1, and 2. The skills items' responses to be checked were "Unable/Able under the supervision/Able alone," respectively scored 0, 1, and 2. The total performance assessment score of each area and the total performance was calculated by summing its related knowledge and skills scores. These were converted into percent scores and considered adequate if 60% or higher and inadequate if <60%. Moreover, in order to simulate the academic grading, the total score was categorized as excellent (85% +), very good (75-<85%), good (65-<75%), fair (60-<65%), and inadequate or fail (<60%).

The attitude section involved nine statements asking the respondent about own feelings towards issues such as respect for patients' life, dignity, rights, and safety, accepting patients with infectious disease, responsibility for environmental safety and fall prevention, and responsibility for health promotion. Each statement's response was on a five-point scale from "strongly agree" to "strongly disagree;" these were scored from 5 to 1. The total score was calculated by summing the items' scores and converted into

percent scores. The attitude was considered positive if 60% or higher, and negative if <60%.

Tool validation phase: The primary developed tool was presented to the jury group for validation in an opinionnaire form to elicit their opinion on the developed tool.

Pilot study: A pilot study was performed on 18 nurse interns in the setting. It was conducted to evaluate the simplicity, practicability, legibility, understandability of the tools, and feasibility of the study process to identify potential problems that might face the researchers during data collection. It also served to estimate the time needed to fill in the form. Based on the pilot results, no modifications were needed. Hence, the nurse interns of the pilot study were included in the main study subjects.

Application phase: The finalized tool was distributed to the nurse interns in the study sample. The researchers instructed them on how to fill the form. They were informed that this was not a test to evaluate their knowledge and skills. They were advised to check the appropriate response for each item according to their judgment of self-competency. The forms were to be filled individually by each nurse intern to avoid bias and influence of others. The researchers were present all the time for any clarification. The filled forms were collected and prepared for data analysis.

Administrative and ethical considerations: An official permission to conduct the study was obtained from the Dean of Faculty of Nursing, Ain-Shams University. The study was approved for the Scientific Research Ethical Committee at the Faculty. Verbal informed consent was taken from all participants after informing them about the study's aim and procedure and about their right to participate or refuse. The participants were also assured about anonymity and confidentiality of any obtained information and that data would only be used for research. The collected data were managed on a password-protected computer.

4.5. Data analysis

Data entry and statistical analysis were done using SPSS 20.0 statistical software package. Data were presented using descriptive statistics in frequencies and percentages for qualitative variables, means, standard deviations, and medians for quantitative variables. Content Validity Index for Items (CVI-I) and scales (CVI-S) was calculated. Cronbach alpha and intra-class correlation coefficients were calculated to assess the reliability of the developed tool. Statistical significance was considered at p-value <0.05.

5. Results

Table (1) reveals that the faculty and service groups' jury members had similar close age, medians 40.0, and 42.0

years, respectively. They were all females except for one in the service group. The years of experience were longer for faculty members.

As for the nurse interns, Table 2 demonstrates that their age ranged between 22 and 26 years, with around two-thirds (66.3%) were males. Most of them had less than a 12-month internship (70.8) and were in critical care rotation during the study (68.5%). The highest percentage of them (67.4%) had a "very good" graduation grade.

Table (3) demonstrates a very high level of face validity of the proposed self-assessment tool, as judged by the two groups' jury members. Most of the items had a full agreement (CVI-I = 1.00), and the lowest agreement index was 0.95.

Regarding content validity, Table 4 indicates full agreement of the service jury subgroup (CVI-I range 1.00-1.00) in several competencies such as infection control, hazardous material safety skills, and fall prevention knowledge and skills. This finding was also noticed in the faculty group validation of hazardous material safety knowledge and fall prevention skills.

As for the content validity of the specific emergency skills, Table 5 shows very high agreements by the two jury subgroups. Many of the items had a full agreement with CVI-I 1.00. On the other hand, the medico-legal case item had a low CVI-I (0.62) in the faculty subgroup judgment. However, in total, this item had a CVI-I 0.81, thus exceeding the inclusion criterion set.

Overall, the proposed tool has a very high total face CVI-S (0.99), as shown in Table 6. The CVI-S ranged between 0.94 for environmental safety and hazardous materials safety and 1.00 for the attitude scale for the content validity. The total scale had a CVI-S as high as 0.98.

Table (7) indicates that the developed self-assessment tool had excellent overall reliability with a Cronbach alpha coefficient as high as 0.901 and an intraclass correlation coefficient of 0.888. The subscale Cronbach alpha coefficients ranged between 0.601 for emergency response and 0.892 for specific emergency care skills. The attitude scale also had excellent overall reliability with a Cronbach alpha coefficient of 0.965 and an intraclass correlation coefficient of 0.964.

In applying the self-assessment tool on the nurse interns, Table 8 indicates that most of them (95.5%) considered their competencies adequate. The highest adequate assessment was for the specific emergency care skills (100.0%), whereas the lowest was for emergency response (51.7%). In terms of grades, only 32.6% and 10.1% considered themselves to have very good and excellent competencies. The table also demonstrates that 70.8% of the nurse interns had a positive attitude toward patient care issues in an emergency.

Table (1): Frequency and percentage distribution of juries' demographic characteristics in the two study panels.

Demographic variables	Jury panel			
	Faculty (n=21)		Service (n=21)	
	No.	%	No.	%
Age				
<45	13	61.9	19	90.5
45+	8	38.1	2	9.5
Range	34-63		32-50	
Mean±SD	42.5±7.2		41.0±4.3	
Median	40.0		42.0	
Gender				
Male	0	0.0	1	4.8
Female	21	100.0	20	95.2
Experience years (total)				
<20	5	23.8	14	66.7
20+	16	76.2	7	33.3
Range	16.0-38.0		4.0-27.0	
Mean±SD	24.2±5.7		17.8±5.7	
Median	24.0		19.0	
Experience years (postdoctoral)				
<10	12	57.1	4	100.0
10+	9	42.9	0	0.0
Range	1.0-28.0		4.0-9.0	
Mean±SD	7.7±6.8		6.0±2.2	
Median	6.0		5.5	

Table (2): Frequency and percentage distribution of demographic characteristics of nurse interns in the study sample (n=89).

Sociodemographic variables	Frequency	Percent
Age		
<24	34	38.2
24+	55	61.8
Range	22.0-26.0	
Mean±SD	23.7±0.7	
Median	24.0	
Gender		
Male	59	66.3
Female	30	33.7
Internship duration (months)		
<12	63	70.8
12	26	29.2
Range	2.0-12.0	
Mean±SD	11.0±1.3	
Median	11.0	
Current rotation		
Medical-surgical	28	31.5
Critical care	61	68.5
Graduation grade		
Fair	2	2.2
Good	15	16.9
Very good	60	67.4
Excellent	12	13.5

Table (3): Face validity of juries' proposed self-assessment tool in the two study panels.

Opinion statements	CVI-I (range)		
	Faculty (N=21)	Service (N=21)	Total (N=42)
The proposed self-assessment tool looks structurally like an assessment tool (1 item)	1.00	1.0	1.00
The proposed tool covers competencies in the areas of emergency response, infection control, environmental safety, hazardous materials safety, fall prevention (5 items)	1.00-1.00	1.00-1.00	1.00-1.00
The proposed tool covers the elements of competencies of knowledge, skills, specific skills, attitudes (4 items)	0.95-1.00	0.95-1.00	0.97-1.00
The knowledge items are clear/comprehensive/measurable (3 items)	1.00-1.00	0.95-1.00	0.97-1.00
The skills items are clear/comprehensive/measurable (3 items)	1.00-1.00	1.00-1.00	1.00-1.00
The attitude items are clear/comprehensive/measurable (3 items)	1.00-1.00	0.95-1.00	0.97-1.00
The scales used are appropriate for knowledge, skills, specific skills, attitudes (4 items)	0.95-1.00	1.00-1.00	0.97-1.00
The wording of the proposed tool is clear, in a logical sequence devoid of repetitions/duplications (3 items)	1.00-1.00	1.00-1.00	1.00-1.00

Table (4): Content validity of the proposed self-assessment tool by juries in the two study panels.

Students' competencies	CVI-I (range)		
	Faculty (N=21)	Service (N=21)	Total (N=42)
Emergency response			
Knowledge (3 items)	0.95-1.00	0.95-1.00	0.95-1.00
Skills (3 items)	0.95-1.00	0.95-1.00	0.95-1.00
Infection control			
Knowledge (7 items)	0.95-1.00	0.91-1.00	0.91-1.00
Skills (7 items)	0.95-1.00	1.00-1.00	0.95-1.00
Environmental safety			
Knowledge (7 items)	0.95-1.00	0.86-1.00	0.86-1.00
Skills (4 items)	0.86-1.00	0.95-1.00	0.86-1.00
Hazardous material safety			
Knowledge (3 items)	1.00-1.00	0.86-0.95	0.86-1.00
Skills (6 items)	0.52-1.00	1.00-1.00	0.52-1.00
Fall prevention			
Knowledge (4 items)	0.95-1.00	1.00-1.00	0.95-1.00
Skills (5 items)	1.00-1.00	1.00-1.00	1.00-1.00

Table (5): Content validity of the proposed self-assessment tool by juries in the two study panels for specific emergency skills and attitude.

Specific emergency skills and attitude	CVI-I (range)		
	Faculty (N=21)	Service (N=21)	Total (N=42)
Specific emergency skills			
Performance of physical health assessment (5 items)	0.95-1.00	0.91-1.00	0.95-1.00
Medication (5 items)	0.95-1.00	0.91-1.00	0.95-1.00
Fluid resuscitation (1 item)	1.00	1.00	1.00
Dressings (1 item)	1.00	1.00	1.00
Performing CPR (1 item)	0.95	0.95	0.95
Administering respiratory/oxygen therapy (1 item)	1.00	1.00	1.00
Applying care for airway (1 item)	1.00	1.00	1.00
Using Ambu bag (1 item)	1.00	0.95	0.97
Inserting oral airway (1 item)	1.00	0.95	0.97
Defibrillation / Cardioversion (2 items)	1.00-1.00	0.95-1.00	0.97-1.00
Administration of thrombolytic therapy (1 item)	0.95	0.95	0.95
Administration of vasopressin (1 item)	0.90	0.95	0.93
Following aseptic techniques in each procedure (1 item)	0.95	1.00	0.97
Documentation (2 items)	1.00-1.00	1.00-1.00	1.00-1.00
Triage (2 items)	1.00-1.00	1.00-1.00	1.00-1.00
Admissions procedure (4 items)	0.90-0.95	1.00-1.00	0.95-0.97
Medico-legal cases (1 item)	0.62	1.00	0.81
Special situations			
Mother in labor (3 items)	0.95-1.00	0.95-0.95	0.95-0.97
Trauma patient (4 items)	0.90-0.95	1.00-1.00	0.97-0.97
Burn patient (1 item)	1.00	1.00	1.00
Performing discharge procedures (1 item)	1.00	1.00	1.00
Attitude (9 items)	0.95-1.00	1.00-1.00	0.97-0.97

Table (6): Total face and content validity of the proposed self-assessment by juries in the two study panels.

Domains	No. of items	Content Validity Index (CVI-S)
Face validity	26	0.99
Content validity		
Emergency response	6	0.96
Infection control	14	0.99
Environmental safety	11	0.94
Hazardous materials safety	9	0.94
Fall prevention	9	0.99
Specific emergency skills	40	0.98
Attitude	9	1.00
Total scale	124	0.98

Table (7): Reliability of proposed nurse interns' self-assessment tool.

Scale domains	No. of Items	Cronbach's Alpha	Intraclass Correlation		p-value	
			Coefficient	95% CI		
				Lower		Upper
Self-assessment of performance						
Emergency response	6	0.601	0.591	0.443	0.709	<0.001
Infection control	14	0.854	0.841	0.787	0.885	<0.001
Environmental safety	11	0.715	0.701	0.599	0.785	<0.001
Hazardous material safety	9	0.775	0.761	0.678	0.829	<0.001
Fall prevention	9	0.678	0.655	0.536	0.753	<0.001
Specific emergency care skills	40	0.892	0.877	0.838	0.911	<0.001
Total	89	0.901	0.888	0.852	0.919	<0.001
Self-assessment of attitude	9	0.965	0.964	0.952	0.974	<0.001

Table (8): Frequency and percentage distribution of nurse students' opinion in their performance of self-assessment and attitude (n=89).

Variables	Frequency	Percent
Self-assessment: adequate (60%+):		
Emergency response	46	51.7
Infection control	71	79.8
Environmental safety	49	55.1
Hazardous material safety	60	67.4
Fall prevention	74	83.1
Specific emergency care skills	89	100.0
Total self-assessment		
Adequate	85	95.5
Inadequate	4	4.5
Total self-assessment grade		
Inadequate (fail)	4	4.5
Fair	12	13.5
Good	35	39.3
Very good	29	32.6
Excellent	9	10.1
Attitude		
Positive (60%+)	63	70.8
Negative (<60%)	26	29.2

6. Discussion

The term competency may be very simplistic, such as professional standards that nurses use to guide the practice and individual's qualities and characteristics that lead to effective work performance. This study was carried out to develop a competency self-assessment tool for the nurse interns and test its validity and reliability. It was achieved, and a valid, reliable tool was reached too. The tool was developed and validated according to standardized methodology, as recommended by *Polit and Hungler (2009)*. Moreover, statistical approaches were utilized in the tool validation, including the measurement of the Content Validity Index (CVI) for items and scales, as well as the Intraclass Correlation Coefficient (ICC). Similar approaches were used in tool validation studies in the United States (*Wieck et al., 2018*), South Korea (*Seo et al., 2019*), and in Belgium (*Decleve et al., 2020*).

In the present study, the tool development was based on the *MOH Nursing Competency Committee (2009)*, and the researchers added to it more recent evidence-based elements from the literature and their inputs based on their experience in internship program management. Thus, the tool involved all the competencies needed to ensure total patient safety, one of the main issues underlying nurse interns' training. In congruence with this, a study in Sweden on newly graduated nursing students identified patient safety as needing the most significant emphasis in their training during the internship (*Willman et al., 2020*).

For each of the competencies included in the current study proposed tool, the underlying knowledge and the practical skills were included in the assessment. This finding is of utmost importance, given that the internships programs aim to bridge the gap between theory and practice. These programs are aimed at helping interns to apply what they learned in clinical practice. Moreover, the training ensures that each skill practiced is backed-up by sound-related knowledge. In this regard, a study on nursing students in Jordan identified a wide gap between theory and practice in the nursing curriculum, and the author recommended an urgent closure of this gap (*Suliman, 2019*).

Two different groups of experts' opinions were solicited in the current study, one from academia and the other from service. This finding was quite essential to provide a broad scope of the interns' competencies. Thus, the faculty group would emphasize the scientific background underlying such competencies, whereas the service group would give more focus on the practical bedside application and the clinical environment in which the competencies are practiced. Thus, the agreement of both groups would provide complete validity to the tool. A similar collaboration between academia and service was reported and proved to be of great importance in studying in the United States (*Kim et al., 2020*).

Regarding the content validity of the proposed self-assessment tool, the present study findings indicated that most of the two jury groups agreed upon all items, with only a few suggestions. This high level of the agreement demonstrates that the new tool's items adequately represent the content's universe. This type of validation is considered

the most important since it confirms the excellent fit between the object to be assessed and the measuring tool (*Gray et al., 2017*).

The applicability of the developed tool was assessed in the present study through a group of nurse interns. The findings revealed that nurse interns easily utilized the tool. Moreover, their self-assessment, using the tool, demonstrated a normal distribution of their scores, with around two-thirds assessing their competencies at "good" or "very good" levels and lower percentages at the two extremes. Moreover, four assessed their competencies as inadequate and twelve as fair, compared with only two having a "fair" grade at graduation. This result indicates that these nurse interns have an excellent self-assessment ability and the developed tool's validity and reliability. However, there is some discrepancy with their graduation grades, which tended to be higher in comparison with self-assessment.

In agreement with this initial present study finding, a study in Sweden by *Forsman et al. (2020)* who revealed a discrepancy between nursing students' self-assessed competencies and their academic examinations' grades. The authors concluded that nursing students might over- or under-estimate their competencies, and thus the nurse educators should consider this. Therefore, *Ganni et al. (2018)*, in a quasi-experimental study in the Netherlands, demonstrated the importance of training students in the process of self-assessment and showed that such training improved the correlation between the results of self-assessment and those of official examinations.

The tool's application on the nurse interns in the current study has also revealed low self-assessment in the emergency response and environmental safety competencies. Thus, the tool could be a valuable instrument for the nurse internship program management to identify the areas of weakness and the gaps that need to be improved in the training and academic program. Consequently, these two areas need to be considered in improving the internship program to improve better nurse intern's competencies related to patient safety. In congruence with this, *Taylor et al. (2020)*, in a study in Norway, demonstrated the importance of self-assessment in identifying the educational needs and the staff development areas in nursing. Similar findings were also reported in a national nursing study in the United States (*Davis et al., 2019*).

7. Conclusion

A valid and reliable competency self-assessment tool was developed for the nurse interns in Ain-Shams University Hospitals. The tool can be applied in various nursing internship programs. It could be used by the administrators of the internship programs to identify the individual learning and training needs of nurse interns. Further studies are proposed to evaluate the utility of the tool in evaluating and improving these programs. Moreover, further validation of the tool is suggested by correlating its findings with nurse interns' actual knowledge and performance.

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