Development and validation of an evaluation tool for nurse interns' performance

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ABSTRACT

Evaluation is an innate component of any internship program. The availability of a valid and reliable performance appraisal tool is urgently needed as a cornerstone in the process of interns' evaluation. This methodological **study was aimed at** developing and validating an evaluation tool for nurse interns' performance. It was carried out at Ain-Shams University Hospitals, and involved a jury group and nurse interns. The researchers developed the proposed tool based on pertinent literature to evaluate the performance of nurse interns in their training areas. It had three sections covering professional behavior, professional performance, and communications skills. The tool was presented to the jury group for face and content validation. The acceptance level of any item was set at 70% or higher. Exploratory factor analysis was used to assess its construct validity. **The results** indicated high jury agreement upon the original items, with strong statistically significant positive inter-rater (r=0.940) and intra-rater (r=0.850) correlations for the total scale. The factor analysis showed a significant fit the original model, with high loadings of items upon the three factors, the lowest being 0.570. The scale explains 69.780% of the total variance of performance. The scores of the three factors had very high reliability with high Cronbach's alpha coefficients, reaching 0.93 for the professional behavior factor. Hence, **Conclusion** a valid and reliable tool was designed for the evaluation of nurse interns' performance covering the three main dimensions relevant to nurse interns' practice. **It is recommended** to use the tool in the study settings Further studies are suggested to assess the convergent and predictive validity of the tool.

Key words: Validation, Evaluation tool, Nurse interns, Performance

INTRODUCTION

Evaluation is a systematic and objective assessment of an ongoing or completed project, program, competency, or skill. The aim is to determine the relevance and fulfilment of objectives, efficiency, and effectiveness as set out in the evaluation policy. Many definitions have been developed, but a comprehensive definition presented by the **Joint Committee on Standards for Educational Evaluation (2016)** holds that evaluation is "systematic investigation of the worth or merit of an object." However, any particular definition of evaluation must be tailored to its context, needs, purpose, and the methodology of the evaluation process itself.

Evaluation looks at objectives, and at what was accomplished and how it was accomplished. Thus, most evaluations fall into one of three categories: process, outcome, and impact-based **(Imanipour & Jalili , 2012)**. One of its main purposes is to provide

useful feedback, which can help in decision-making and in improving performance **(Lindrag,2008)**. However, good evaluation can also answer other important questions. Furthermore, evaluation can be formative with the intention of improving the project or task performance, or summative drawing lessons from a completed action or project at a later point in time. Hence, summative evaluation examines effects or outcomes **(Lindsay et al, 2011; Joint Committee on Standards for Educational Evaluation, 2016)**

Evaluation is an innate component of any internship program to assess the impact of this learning opportunity on interns. Through evaluation, these students can receive feedback on their performance, so that they can grow professionally. This feedback may come from the internship site supervisor and/or the faculty or staff member grading the student. This experience is valuable to interns as a means of allowing them to experience how their studies are applied in the real world. **(Aga Khan Foundation, 2015)**. Conversely, the lack of a clear performance appraisal system with constructive feedback was identified as a barrier to quality practice among nurses **(Awases et al, 2013)**.

The internship program is a crucial period of training after study years **(Steven, Magnusson, Smith, and Pearson 2014).** It is an essential step in every nurse's career, which provide a balance between education, training and clinical responsibility enabling interns to develop the professional and personal competencies that result in good patient care and provide a foundation for lifelong learning **(Armitage, Foley, Surette, Belzile, and Mccusker 2010).**

Evaluation, as a way of determining the clinical competence, is one of the fundamental principles of development and intern achievement measurement in nursing education. In clinical evaluation, it must be ensured that the nurse intern in clinical settings have an appropriate professional behavior, establish an appropriate interaction with the patients, prioritize the problems, have the basic knowledge about clinical methods, perform the care procedures correctly, and apply critical thinking skill **(Khosravi et al., 2010**).

However, the process of evaluation requires resources such as experts, tools, labor, time, technology, and budget **(Yin, 2013)**. Moreover, the nurse interns' performance evaluation is challenged by problems related to the organizational context, as well as the structure, process and results of the evaluation **(Nikpeyma et al, 2014)**. Additionally, there is a lack of valid and reliable tools for assessment of nurses' clinical competence **(Nilsson et al, 2014)**.

Significance of the study

As a college and university, our students' acquisition of practical skills is an important direction. However, the evaluation of students' practical abilities remains a challenge, since the use of traditional assessment tests may not be ideal. The availability of a performance appraisal tool that is valid and reliable is urgently needed as a cornerstone in the process of student evaluation.

Aim of the study

This study was aimed at developing and validating an evaluation tool for nurse interns' clinical performance.

SUBJECTS AND METHODS

Research design A methodological design for tool construction and validation was used in this study

Setting: This study was carried out at Ain-Shams University Hospitals. It involved the different departments where nurse interns undergo their internship year

training, including critical care, emergency, and dialysis units.

Subjects: The study involved two groups of participants, namely a jury group and intern students. **The jury group** role was for preliminary assessment of the face and content validity of the proposal evaluation tool. It included **31** faculty members selected by **multistage sampling technique** from Faculties of Nursing throughout the country representing both old and new universities such as Cairo, Ain-Shams, Mansoura, Zagazig, as well as Menoufyia, Fayoum, Menya, and Helwan universities.

The nurse interns group consisted of 46 students having their internship training at Ain shams University Hospitals. They were subjected to observation using the developed tool to provide the data necessary for assessment of the reliability and validity of the tool. This sample size was large enough for detection of an estimated minimal correlation coefficient of 0.2 at 95% level of confidence, and also to conduct an exploratory factor analysis when communalities are expected to be high **(MacCallum et al, 1999)**.

Data collection tools:

Tools development: The proposed tool was developed by the researchers based on pertinent literature **(DAC, 2004 and Evaluation Cooperation Group, 2013)** and in view of their professional experience in training and education. The tool aim was to evaluate the performance of nurse interns in their training areas. The researchers set a conceptual framework for the tool. Accordingly, the proposed tool consisted of three major sections covering professional behavior, professional performance, and communications skills (verbal and in writing).

The tool was presented to the jury group for face and content validation. and scrutinized its items regarding its relevance, consistency, and clarity **(Downing and Haladyna, 2011)**. The acceptance level of any item was set at 70% or higher. According to almost all jury group members, the items of face validity were fulfilled, with a minimal percent of agreement of 96.8%. This indicates that the proposed tool seems to reflect the construct it is intended to measure.

Pilot testing: A pilot study was conducted for assessing the initial tool clarity and applicability. It was carried out on a sample of **(5)** nurse interns from the same setting. Minor modifications were done based on the results of the pilot, mainly in the form of rephrasing of some items.

Tool validation: The piloted tool was then subjected to the process of assessment of its reliability and validity. The assessment of the tool reliability was first done using the inter-rater and intra-rater approaches. For inter-rater reliability, two of the researchers independently assessed the performance of the 46 nurse interns in the sample using the developed tool. For intra-rater reliability, one of the two researchers assessed the performance of the same 46 nurse interns in the sample after 14 days using the same developed tool. The correlation between the two raters, and the same rater on the two occasions were calculated to measure the reliability. This was done for each item of the scale, for its three sections, and for the total scale. Moreover, Cronbach's alpha coefficients were computed after factor analysis for further confirmation of the reliability through measuring the internal consistency of the scale. The generally minimally acceptable level of Cronbach's alpha coefficient is **0.7 (Meliá, 1990)**.

Concerning the assessment of the tool validity, the approach of exploratory factor analysis was used as a measure of its construct validity. This was started by a correlation matrix to ensure that the scale items are inter-correlated. After applying tests to assess the suitability of the data for factor analysis and its normality using with Kaiser-Meyer-Olkin and Bartlett's sphericity

tests, factor extraction was applied using the principal components analysis, the most commonly used method. The acceptable Eigen value was set at 1.0, and the minimal loading for items on components was set at 0.3. Varimax factor rotation was used for easy interpretation of factors obtained from extraction. Lastly, the quality of the obtained factor solution was evaluated in the final model. The three factors obtained along with their respective items fitted the original scale.

The collection of data was carried out in the **period from 2014 to 2015.**

Ethical considerations:

The study was approved by an research Ethics committee at the Faculty of Nursing, Ain-shams University. The researchers followed all principles of ethics in research including informed consent, rights to refuse or withdraw at any time, confidentiality, and anonymity. No harmful maneuvers were performed or used, and no foreseen hazards were anticipated from conducting the study on participants.

Statistical analysis: Data entry and analysis were done using SPSS 20.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations and medians for quantitative variables. For validation of the developed scale, correlation matrix followed by factor analysis were done using principal component analysis, and Varimax rotation. Cronbach alpha coefficient was calculated to assess the reliability of the developed tools through their internal consistency. Statistical significance was considered at p-value <0.05.

RESULTS

Table 1 shows that the jury members' age ranged between 33 and 67 years, with median 45 years. Their median experience was 17 years. Slightly less than half of the group had lecturer position (48.4%).

Table 2 demonstrates high percentages of agreement upon the original items of the proposed tool by jury group members. The minimal agreement upon the proposed items was concerning the item "Shows motivation to learn and seek new learning opportunities" (71.0%). However, there were 100% agreements upon 16 out of the 20 items.

Concerning the reliability of the scale items, **Table 3** shows moderate statistically significant positive inter-rater and intra-rater correlations for the majority of the items. Only two items had no statistically significant correlations in both inter- and intra-rater testing. These were the items of "Implements nursing care plan competently" and "Follows standardized nursing procedures while providing nursing care."

Table 4 illustrates the presence of strong statistically significant positive inter-rater and intra-rater correlations for each of the professional behavior and professional performance sections of the scale. Additionally, the subsections of the third section of the scale (communication skills) had moderate statistically significant positive inter-rater and intra-rater correlations. The total scale had strong statistically significant positive inter-rater (r=0.940) and intra-rater (r=0.850) correlations.

The factor analysis and reliability of the tool as indicated in (**Table 5, 6, 7)** shows a distribution of the items upon the three factors fitting the original model. The loadings of items upon factors were high, the lowest one being 0.570 for the item "Follows standardized nursing procedures while providing nursing care," whereas the highest was for the item "Adhere to ethical and legal standards of practice" (0.879). The scale explains 69.780% of the total variance of performance. Lastly, the scores of the three sections show high reliability as indicated by the high Cronbach's alpha coefficients,

reaching as high as 0.93 for the first section of professional behavior.

DISCUSSION

The present study developed a tool for the evaluation of nurse interns' clinical performance with proven reliability and validity. With this, the aim of the study was achieved, and this would help accomplish the ultimate goal of improvement of the nurse interns' training experience during their internship year.

The approach to validation of the developed evaluation tool in the present study was through preliminary experts' opinions, and confirmatory construct validation. The jury group that helped in preliminary face and content validation consisted of experts from academia specialized in nursing administration. Their median experience years was more than 15, which adds to the value of their opinions. The group also included various levels of faculty staff positions to ensure input from different generations. Although it is the weakest evidence of validity being based only on subjective judgment, it does not mean that it is wrong since subjective judgment is sometimes needed in research, especially if this judgment comes from experts selected with high scrutiny. In fact, this approach has been used in previous similar studies in Iran **(Askari et al, 2016)** and in Malaysia **(Sowtali et al, 2016)**. Moreover, the number of experts was large and exceeded the seven as recommended by **DeVon et al (2007)**.

The proposed tool included three dimensions for the assessment of nurse interns' performance. These were namely professional behavior, professional performance, and communication skills. These are basic components of the professional attributes of health care providers. In this respect, **Leung et al (2012)**, in a qualitative study in Hong Kong, demonstrated that the professional attributes were professional knowledge and skills, behavior emphasizing holistic care, and effective communication skills. This shows that these are basic attributes that apply in both traditional as well as western settings.

To confirm the validity of the developed tool, factor analysis was carried out to examine whether the items can be classified in respective dimensions as proposed. The findings of the analysis revealed total consistency with the conceptual model with its three dimensions, namely the professional behavior, professional performance, and communication skills. This provides a statistical confirmation of the validity of the tool. Additionally, the contribution of each item to its dimension was high, as shown by the high loading values, thus adding to the validity of the tool. The loading of all items exceeded the level of 0.4, which is often applied in validation studies **(Mumtaz et al, 2016)**.

Although two items of the professional behavior dimension had no significant inter- and intra-rater correlations, their loading on the dimension was high, exceeding 0.5. These items were thus not removed from the scale due to their weight and importance. Moreover, they did not have a negative impact on the subscales and total scale reliability. Similar situations were reported in previous studies, and some recommended keeping the items **(Aradilla-Herrero et al, 2013)**, while others preferred removing them **(Martın-Albo et al, 2010)** from the scales.

The present study has also assessed the reliability of the developed tool. This was carried out using different approaches. The first was through examining its inter-rater and intra-rater correlations, and this showed good reliability except for the two items outlined above. Moreover, the subscales and total scale reliability indices were very high, reaching 0.94 for the total scale. This is even higher than the test-retest reliability reported by **Gözüm et al (2015)** in their study

psychometric study of a competence scale, where the correlation was 0.90.

The second approach to assess the tool reliability in the present study was after factor analysis, using the internal consistency approach. This demonstrated very high levels of reliability, with Cronbach's alpha coefficients around 0.9. This is even higher than the coefficient reported by **Yildiz Güngörmüş (2016)** in their study of the validity and reliability of a Turkish version of nurses' competence questionnaire, where Cronbach's alpha coefficients was 0.826. Our range of Cronbach's alpha coefficients (0.89-0.93) is close to that reported by **Finnbakk et al (2015)** in a study in Norway for psychometric testing of Professional Nurse Self-Assessment Scale. Their range was 0.737-0.940.

Conclusion and Recommendation

A valid and reliable tool was designed for the evaluation of nurse interns' performance. The tool covers the three main dimensions relevant to interns' practice. It is recommended to use the tool in the study settings to measure the nurse interns' performance. Further studies are suggested to assess validity and reliability of the proposed evaluation tool in another settings where nurse interns are getting their training.

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Table 1: Personal characteristics of jury group (n=31)

	Frequency	Percent
Age:		
<40	9	29.0
40+	22	71.0
Range	33.0-67.0	
Mean±SD	44.9±8.1	
Median	45.0	
Experience years:		
<20	19	61.3
20+	12	38.7
Range	1.0-40.0	
Mean±SD	17.0±7.7	
Median	17.0	
Job position:		
Professor	4	12.9
Assistant professor	12	38.7
Lecturer	15	48.4

Table 2: Agreement upon preliminary tool items by jury group (n=31)

	Agree	
	No.	**%**
Professional behavior:		
1. Maintains good attendance record and punctuality	31	100.0
2. Complies with dress code and grooming standards	31	100.0
3. Complies with professional ethics	28	90.3
4. Cooperates with other members on multidisciplinary team	31	100.0
5. Shows motivation to learn and seek new learning opportunities	22	71.0
6. Adhere to ethical and legal standards of practice	24	77.4
7. Proceeds working in an organized manner	28	90.3
8. Performs independently the assigned task	31	100.0
9. Implements nursing care plan competently	31	100.0
10. Follows standardized nursing procedures while providing nursing care	31	100.0
Professional performance:		
11. Follows six rights while administering medication	31	100.0
12. Follows Universal precautions to control infection	31	100.0
13. Follows aseptic technique while providing nursing care.	31	100.0
14. Applies principles of patient safety	31	100.0
15. Incorporates patient/family education into treatment	31	100.0
Communication:		
Verbally:		
16. Patients and families	31	100.0
17. Health care professional	31	100.0
In writing		
18. In documenting patient care	31	100.0
19. With professional (reports, letters, plans of care)	31	100.0
20. With patient and patient family	31	100.0

Table 3: Intra and inter-rater reliability of the tool items (n=46)

	Agreement (%)				Correlation	
	Intra-rater		Inter-rater		Intra-rater	Inter-rater
	Mean	SD	Mean	SD		
Professional behavior:						
1. Maintains good attendance record and punctuality	89.6	13.2	91.7	13.7	.540**	.693**
2. Complies with dress code and grooming standards	88.3	15.0	88.7	13.8	.519**	.565**
3. Complies with professional ethics	84.8	17.0	90.9	14.4	.224	.589**
4. Cooperates with other members on multidisciplinary team	88.7	15.6	86.1	15.7	.582**	.429**
5. Shows motivation to learn and seek new learning opportunities	87.0	13.5	86.5	17.4	.544**	.353*
6. Adhere to ethical and legal standards of practice	79.1	19.8	86.5	15.8	-.018	.512**
7. Proceeds working in an organized manner	86.5	15.8	87.8	13.6	.463**	.587**
8. Performs independently the assigned task	79.6	19.5	85.2	18.1	-.002	.369*
9. Implements nursing care plan competently	78.7	17.1	80.4	20.0	.024	0.184
10. Follows standardized nursing procedures while providing nursing care	83.0	19.8	81.3	20.0	.207	0.161
Professional performance:						
11. Follows six rights while administering medication	83.5	16.5	85.7	17.7	.243	.438**
12. Follows Universal precautions to control infection	87.4	17.1	87.4	16.0	.470**	.531**
13. Follows aseptic technique while providing nursing care.	84.8	16.4	83.5	18.0	.402**	.299*
14. Applies principles of patient safety	84.8	17.5	86.5	15.8	.381**	.532**
15. Incorporates patient/family education into treatment	83.9	16.7	87.4	16.0	.265	.412**
Communication:						
Verbally:						
16. Patients and families	83.5	17.5	88.7	15.6	.329*	.616**
17. Health care professional	85.2	19.5	85.7	18.2	.283	.398**
In writing						
18. In documenting patient care	82.2	19.9	90.9	15.0	.148	.629**
19. With professional (reports, letters, plans of care)	83.9	15.6	85.2	18.6	.320*	.325*
20. With patient and patient family	84.8	15.3	84.3	21.5	.497**	0.290

(*) Statistically significant at p<0.05 *(**) statistically significant at p<0.01*

Table 4: Intra and inter-rater reliability of the tool sections (n=46)

	Agreement (%)				Correlation	
	Intra-rater		Inter-rater		Intra-rater	Inter-rater
	Mean	SD	Mean	SD		
Professional behavior	86.2	9.6	88.4	8.0	.720**	.847**
Professional performance	83.6	9.8	85.0	9.4	.778**	.712**
Communication skills:						
Verbally	84.3	14.1	87.2	13.1	.438**	.658**
In writing	83.6	13.6	86.8	13.9	.407**	.469**
Total evaluation	96.0	4.3	97.1	2.2	.850**	.940**

(**) Statistically significant at p<0.01

Table 5: Factor analysis and reliability of the tool

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Professional behavior:	7.828	39.138	39.138	6.156	30.782	30.782
Professional performance:	3.860	19.299	58.437	3.986	19.929	50.711
Communication:	2.269	11.343	69.780	3.814	19.069	69.780

Table 6. Loading of Items in the designed tool

Items	Components			Communalities
	1	2	3	
1-Professional behavior:				
1. Maintains good attendance record and punctuality	.685			.480
2. Complies with dress code and grooming standards	.787			.637
3. Complies with professional ethics	.806			.756
4. Cooperates with other members on multidisciplinary team	.827			.750
5. Shows motivation to learn and seek new learning opportunities	.859			.768
6. Adhere to ethical and legal standards of practice	.879			.809
7. Proceeds working in an organized manner	.835			.700
8. Performs independently the assigned task	.648			.470
9. Implements nursing care plan competently	.672			.693
10. Follows standardized nursing procedures while providing nursing care	.570			.445
2-Professional performance:				
11. Follows six rights while administering medication		.885		.874
12. Follows Universal precautions to control infection		.770		.771
13. Follows aseptic technique while providing nursing care.		.776		.675
14. Applies principles of patient safety		.798		.659
15. Incorporates patient/family education into treatment		.712		.541
3-Communication:				
16. Patients and families			.849	.779
17. Health care professional			.837	.827
18. In documenting patient care			.798	.818
19. With professional (reports, letters, plans of care)			.864	.758
20. With patient and patient family			.845	.745
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 5 iterations.				