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APPLY A COMPETENCY EVALUATION MEASURES FOR OPERATING ROOM NURSES IN MATERNITY HOSPITAL

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ABSTRACT

Objective: To develop a scientific and reasonable competence evaluation index system for operating room nurses (ORN) in in Maternity hospital. **Methods:** A multiple-method approach including in-depth interviews in maternity hospital and Delphi and Analytic Hierarchy Process (AHP) was used. Eighteen interviews were undertaken to explore the components of ORN competencies, and then 30 operating room experts were consulted to gain consensus. Finally, the AHP was adopted to determine the relative weights of competency elements, thus increasing the accuracy of the results. **Results:** Results of the interviews suggested that there were 32 items of ORN core competency. Results of the DHP (Delphi and AHP) revealed 22 ORN core competencies in four dimensions, such as specialized knowledge, professional ability, personality and self-motivation. The weights of these four dimensions were 0.477, 0.138, 0.256, and 0.128, respectively. **Conclusions:** The construction of an ORN core competency evaluation index system in this study contained not only explicit competence but also implicit competence, which reflected the requirements for operating room nurses comprehensively in maternity hospital. In particular, as the system presented the specialized features of an operating room, it would be of great importance for both nurses and hospitals.

KEYWORDS: Competency, Operating room, Nurses, Nursing, Delphi, Evaluation measure.

1. INTRODUCTION

The health systems are facing formidable challenges: an increasing number of patients and a demand for higher quality nursing care. Given these challenges, the World Health Organization (WHO) and the International Union for Health Promotion and Education (IUHPE) place great emphasis on strengthening health systems.[1] In Egypt currently, the Ministry of health has put forward higher standards in both quantity and quality for the cultivation of nursing staff.[1&2] The operating room is one of the most important departments in a hospital especially in Maternity department. It can be regarded as the center of all surgical departments. The maternal mortality rate: 33 deaths/100,000 live births in Egypt 2015,[3] improving the competency level of operating room nurses has become a primary concern.

Competence is related to the nature of the nurses' role, and its acquisition is the foundation of excellent care; thus it has always been used as an evaluation index of nurses.4, 5 Rice and Rapson suggest that the reason for developing models of competence is to find local solutions to human resource development (HRD).[6] To date, competency-based HRM has become widespread in the US, in relation not only to HRD in general but also to leadership in particular, as well as in selection, retention and remuneration.[7] However, it must be noted that currently existing competency models mostly focus on skills, while excluding a host of attitudinal and other competencies that are relevant to the contexts where service encounters take place.[8] A better solution to the problem of how to evaluate operating room nurses' competence and which aspects to promote needs to be found in maternity hospital.

2. METHODS

2.1. Design

A multiple-method approach (Table 1) was used in this study. Stage I was an individual in-depth interview and Stage II was a consultation process involving two rounds of Delphi survey. Additionally, the Analytic Hierarchy Process (AHP) was adopted to determine the relative weights of the competency elements.

Table 1: Overview of the Orn Core Competency Evaluation Index System Development Process.

Stage	Activity	Time scale
I	Literature review	October 2014 to April 2015
	Individual interview	
	Sample frame for Delphi survey	
II	Delphi survey	
	Round 1	June 2015
	Round 2	August 2015
	AHP	October 2015

2.2. Sample

Eighteen nurses from one of the El Shatby Maternity University Hospitals for Children in Alexandria, Egypt were recruited for interviewing. These interviewees satisfied the following study criteria: (1) current registration as a nurse (RN); (2) working in operating room for at least three years; (3) and willing to participate in this study. DHP sampling was undertaken by those with operating room expertise from different cities in China. The 30 experts included 19 operating room nurses, 6 anesthetists and 5 surgeons selected on the basis of their technical title, position, working experience, etc. Table 2 details specifics about the panel profile.

Table 2: Delphi panel profile.

	Summary
Average working experience (year)	>24
Education level (*n*)	
Bachelor's degree	18
Master's degree	6
Doctoral degree	6
Technical title (*n*)	
Primary	1
Middle	11
Senior	18
Professional position (*n*)	
Nurse	19
Anesthetist	6
Surgeon	5

2.3. Data collection

2.3.1. Stage I: Individual interview

Before the interviews, a semi-structured interview guide was designed by the researchers based on the aims of the study. Interviewees were then invited to answer some questions. These included: (1) What competencies should an operating room nurse possess, in your opinion? (2) Based on your working experiences, what operation incident impressed you most? (Report one successful and one unsuccessful incident.) To encourage the nurses to express their perceptions as comprehensively as possible while not affecting them while on duty in a hospital, the 18 nurses interviewed after work, in a private space. All the interviews were tape-recorded with the nurses' consent and lasted about half an hour.

2.3.2. Stage II: Delphi survey and AHP

The Delphi technique was the key research method used in achieving consensus on core competencies.[9] In the Delphi process, two rounds were needed to reach consensus. In round 1, an initial questionnaire extracted from interviews with 18 nurses was developed and e-mailed to all the experts. In round 2, the researchers summarized findings from round 1 and developed a feedback report, along with a second questionnaire. Experts were asked to score the importance of each competency element using a 5-point Likert-type scale, with responses ranging from 'not at all important' (score 1) to 'very important' (score 5). They were also asked whether any of the competency elements needed to be removed or modified or whether others should be added.

In the AHP process, researchers first needed to set up a hierarchy structure model. Three levels were considered in this study: the first was ORN core competency, which represented the overall goal; the second was the dimensions of ORN core competency; and the third was ORN core competency elements. Then, a comparison matrix was established for comparing each element in pairs, the results of which would form the basis for calculating the relative weights of ORN core competence elements. Comparison data were obtained from the same panel (Delphi) from an AHP questionnaire on a 9-point Likert-type scale suggested by Saaty.[10]

2.4. Data analysis

The interview data were analyzed qualitatively. Here are the main steps of that qualitative analysis

Transcribing, repeated reading, classifying, coding and themes extracting.[11] The DHP data were analyzed quantitatively. SPSS 19.0 software was used for the Delphi analysis and yaahp v6.0 for the AHP.

2.5. Ethical considerations

Prior to beginning their study, the authors obtained permission from all participants. Researchers explained the study's purpose and procedures to the participants. If nurses agreed to an interview, a consent form was signed and an appointment was arranged at their convenience. Given the varied locations, consulting experts obtained permissions via telephone.

3. RESULTS

3.1. Stage I: Individual interview

The theory of competency 'iceberg model' suggests that competence consists of explicit competence, seen above

water, and implicit competence, under water.[12] According to interview feedback and upon referencing these with the model, the ORN core competency evaluation index system comprises four dimensions (with 32 competency elements): specialized knowledge, professional ability, personality and self-motivation. Specialized knowledge and professional ability comprised explicit competence, while the other two dimensions comprised the implicit one.

3.2. Stage II: Delphi survey and AHP

It is recommended in the literature that there should be agreement on what will constitute "consensus" before the process begins.[13,14] A consensus point in the Delphi survey would be reached when the mean of the dimensions or competency statements scored more than 3.5 and the coefficient of variation less than 20% on a 5-point Likert-type scale.[1] In round 1 of this study, the mean ratings for the dimensions ranged from 4.56 to 4.71 and coefficient of variation from 11.66 to 16.76; all exceeded the retention point, thus indicating that these dimensions were approved by the panel. However, competency elements scored mean ratings ranging from 3.33 to 5 and the coefficient of variation from 0 to 27.08, showing that some parts of competency elements did not reach agreement. In accordance with standards and combined with the advice of the Delphi panel, 12 competencies were removed, 7 modified and 2 added. For example, the index "foreign language skills" was deleted because it scored only 3.33. The index "usage of surgical instruments" was modified to "usage and maintenance of surgical instruments," as 5 experts highlighted that operating room nurses should not only master the knowledge and skills relating to the use of surgical instruments but also ensure their maintenance. Moreover, 3 experts insisted that critical thinking contains observation, assessment and judgement and that these should merge into one index; some also emphasized the importance of legal knowledge and teamwork awareness of operating room nurses, and so added them to the system, etc. In round 2, the mean and coefficient of variation scored on all dimensions and competencies exceeded the retention point; at the end, the ORN core competency evaluation index system comprised 22 elements. Table 3 presents the results of the Delphi survey.

Table 3: Results from the Delphi surveys: rounds 1 and 2.

Core competency dimension	Round 1			Round 2		
	Number	Mean	C.V (%)	Number	Mean	C.V (%)
Specialized knowledge	9	4.64	15.07	6	4.55	13.78
Professional ability	9	4.71	16.76	5	4.36	17.64
Personality	11	4.56	14.36	8	4.45	14.54
Self-motivation	3	4.6	11.66	3	4.33	14.47
Total	32			22		

Within the 4 dimensions, the AHP calculated that specialized knowledge was the most important dimension ($W = 0.477$), followed by personality ($W = 0.256$) and professional ability ($W = 0.138$); self-motivation ($W = 0.128$) was rated the least important ORN core competency. Table 4 details the relative weights of ORN core competency evaluation index.

Table 4: ORN Core Competency Evaluation Index.

ORN core competency (dimension/element)	Weight
Specialized knowledge (47.7%)	
Knowledge of medical anatomy	0.037
Basic nursing knowledge and skills in the operating room	0.116
Specific nursing knowledge and skills in the operating room	0.208
Usage and maintenance of surgical instruments	0.116
Knowledge of infection and disinfection	0.460
Knowledge of security and law	0.063
Professional ability (13.8%)	
Ability to communicate with different patients	0.081
Ability to cooperate with anesthetists and surgeons	0.340
Ability to use critical thinking	0.234
Ability to handle emergencies	0.317
Ability to manage the operating room	0.028
Personality (25.6%)	
Love working in the operating room	0.048
Sense of responsibility	0.318
Spirit of devotion	0.033
Care consciousness	0.019
Team consciousness	0.183
Cautiousness	0.098

Agility	0.157
Attention to detail	0.144
Self-motivation (12.8%)	
Autonomous learning	0.250
Emotion control	0.250
Stress coping	0.500

4. DISCUSSION

The study employed multiple research methods that proved successful in developing ORN core competencies in El Shatby Maternity University Hospitals for Children. Individual interviews were the basis of the research, all of them in a private space after the nurses' workday. This approach enabled participants from different backgrounds to contribute without feeling intimidated by other participants,[13] thus ensuring the authenticity of the first-hand information. Delphi was the core of the research, and all experts consulted had many years of operating room work experience that ensured the scientific integrity of the results. Thus, the final ORN core competency evaluation index was as relevant, succinct, meaningful and useable as possible.

In recent years, researchers have mostly used qualitative techniques to create lists of competencies for nurses. For instance, Huang has expounded on the competencies for ICU nurses,[15] Davis et al.[16] has developed an integrated career and competency framework for diabetes nursing, Fang et al.[17] has constructed a competency model for psychiatric nurses and McCarthy et al.[18] has explored core competencies for different levels of nursing managers, etc. Despite numerous discussions about the need for nursing competencies, few studies have quantified them. Therefore, this study answered the need for quantifying the components of competency via the AHP, which enabled ORN core competencies to be measured and hierarchy disparities to be traced.

Some similarities were found in the components and weights of ORN core competencies between this study and existing models. Alongside conceptual frameworks from China.[19,20] "specific nursing knowledge and skills" and the "ability to cooperate with anesthetists and surgeons" were the most important index within ORN explicit competency, while "sense of responsibility" and "stress coping" were the most important within implicit competency; these results were also confirmed by the research of Gillespie and Jiang et al.[21,22] In contrast, the weight of the index "ability to manage" was widely considered low, which may have been effected by the circumstances of China's health care system. Moreover, as mastering anatomical knowledge is more inclined to be the duty of doctors in China—such as choosing the surgical site, and placing or transforming the operation position—the weight of the "knowledge of medical anatomy" index appeared to be not very high. Of course, there were some notable differences. For example, this study placed high emphasis on the importance of "knowledge of infection and disinfection" for operating room nurses, and added the "knowledge of security and law" index; but to our surprise, the weight of the "security and law" index seemed to be too low, in that it did not match the current situation of the increasingly tense doctor–patient relationship in maternity hospital.

Competency-based HRM is the keystone in the bridge between individual career development and organizational strategy.[23] Presently in China, parts of hospitals have begun to bring out competency-oriented HRM into nursing administration, and with some degree of success. Xu et al.[24] adjusted post-entry criteria for registered nurses, Gao et al.[25] launched an investigation of operating room nurses' training needs and Lu et al.[26] even developed a surgical nursing curriculum, all based on competency. In this study, the ORN core competency evaluation index system, based on multidisciplinary competency concepts, theories, and research, will also provide a resource for operating room workforce development through articulating the necessary knowledge, abilities and attitudes required for effective practice. It will enable nurses to recognize their own strengths and weaknesses to help them make rational personal career plans. For the whole hospital, it will facilitate HR leaders in formulating unified and coordinated management strategies, including hiring, retention, training, performance management, employee development, or succession planning and compensation system.[27]

The limitations of this study included the use, for convenience, of a sample of interviews recruited from only one general hospital; thus, it may not be representative. Moreover, reliability and validity are fundamental issues in the use of measurement and should be applied rigorously to the measurement of clinical competence,[28] the reliability and validity of this study need to be measured against results obtained in other hospitals.

5. CONCLUSIONS

The construction of an ORN core competency evaluation index system in this study contained not only explicit competence but also implicit competence. In particular, it presented the specialized features of the operating room. As it reflected the requirements for operating room nurses comprehensively in maternity hospital, the system would be of great significance to both nurses and hospitals.

CONFLICTS OF INTEREST

All contributing authors declare no conflicts of interest.

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ABBREVIATIONS
ORN Operating Room Nurses
AHP Analytic Hierarchy Process
WHO World Health Organization
IUHPE International Union for Health Promotion and Education
HRD Human Resource Development
RN Registration Nurse
HR Human Resources
HRM Human Resources Model

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