Original Article

Determining operating room technologists' clinical competence in educational care hospitals of Iran University of Medical Sciences in the year is 2017

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ABSTRACT

Background: Due to the significant increase in the number and type of surgical operations, it seems necessary to increase the clinical competence of the operating room technologist. The aim of this study was to determine operating room technologists' clinical competence in educational care hospitals of Iran University of Medical Sciences in the year is 2017. Methods and Materials: In this cross sectional study, we analyzed clinical competency of 180 operating room technologists working in hospitals of Iran University of Medical Sciences by self-assessment method. The instrument for data collection was a valid and reliable questionnaire. Data was analyzed by using Kruskal-Wallis and U-Mann-Whitney Nonparametric tests and SPSS V.22. Results: The operating room technologists reported their overall level of competence as "good". They felt more competent in the categories of "general knowledge" and" Assessment, diagnosis and care of the surgical patient" (with maximum score of 78.4) and least competent in" Legal ethical performance" categories (with minimum score of 15.75). There was a meaningful relationship between clinical competence and work experience, educational level, Specialty field, age, responsibility, occupational relationship (P<. /001). Conclusion: The finding showed that clinical competence is based on self-assessment in the categories of" Legal ethical performance" and "Progress in research and professionalism" was weak. Since the courses for retraining and educational opportunities for technologists are limited in the operating room, the need for more interaction between the operating room and other departments and the provision of retraining courses to be seen.

Keywords: Clinical Competence, Self-assessment, operating room technologists.

Introduction

British Nursing & Midwifery Council defines clinical competence as "the overarching set of knowledge, skills and attitudes required to practice safely and effectively without direct supervision" [1]. Today, the clinical competence is regarded as the most important factor affecting the delivery of health services. Evidence suggests that lack of clinical competence causes a great number of problems including reduced quality of care and patients' dissatisfaction with healthcare services delivery [2, 3]. Promoting clinical competence in the healthcare system is so critical that it has been considered as a key factor for the maintenance and improvement of health centers [4, 5]. Maintaining a safe and healthy community has always been one of the primary responsibilities of governments. While with the improvements in the health monitoring system over the past decade and an emphasis on providing safe and affordable services, as well as raising public awareness of health and medical issues, the clinical competence of health care providers and treatment team has received a lot of attention by the government officials [6]. The surgical team, consisting of the surgeon, circulating

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nurse and surgical technician, plays a key role in providing care to patients [7]. The US Association of Perioperative Registered Nurses defined the clinical competence of the surgical technicians as the ability, knowledge and skills needed to provide safe patient care during, before and after surgery. With improved surgical procedures and increasing variety of surgical operations, it is necessary for the operating room technicians to acquire the knowledge and skills to enhance their professional development and be able to properly support patients with higher qualifications [8]. They (theatre nurses) need to acquire a high degree of knowledge and skill so that they can use it to improve the safety and care of patients, even in critical and uncertain situations, and be able to deal successfully with a difficult situation or problem through the establishment of necessary and appropriate Coordinationm echanisms [7]. Therefore, there is a close relationship between knowledge, skill, and clinical competence and further development of highly skilled operating theatres and practitioners lead to thepractical application of their skills at the bedside [9]. In addition, as it was mentioned before, the clinical competence of the surgical technicians (theatre nurses) has been regarded as one of the important factors influencing patient safety [7]. Numerous studies have reported the beneficial roles of three main issues in understanding the theater nursing competence: knowledge and awareness (theoretical, practical and situational knowledge), teamwork and communication (high communication skills among teams of divergent personalities and situations), and the ability to coordinate and manage time schedule [10]. Gillespis and Hamlin also stated that theatre nurse competence is an eclectic concept that has been difficult to define and even more difficult to measureand needs to be more precisely articulated, because competence is necessary for safe surgical patient outcomes [11]. Given the importance of clinical competence concept in medical and paramedical professions, the accreditation societies, physicians and Association of Surgical Technologists (AST) have identified a number of specific competency frameworks for assessing the competencies of physicians and operating room technicians. The ACGME endorsed six general competencies reflexive of different skill sets that all doctors should possess. They included patient care, medical knowledge, professionalism, systems-based practice, practice-based learning and improvement, interpersonal and communication skills (12). These criteria provide the basis for the development of educational aspects and facilitate the assessment of the surgical competence. Further, the European Association of Surgical Technologists (AST) has identified five role critical competenciesfor theatre nurses including professional-legal-ethical work, nursing care and perioperative skills training, interpersonal relationships and communication, leadership skills, knowledge development and professionalism and research [12]. In Australia, competency statements fall within five domains; professional practice, critical thinking and analysis, provision and coordination of care, and collaborative and therapeutic practice (ANMC 2006).

In Canada, the competencies are categorized into six critical domains: ethical and professional measures, safety (patient and others), infection control, protection, physiological stability for patient, emergency response management and preparedness [13]. Accordingly, a diverse range of methods and tools should be used for measuring the clinical competence of theatre nurses. In this regard, various assessment methods are available to measure the clinical competence in the surgical domain: multiple-choice questions, OSCE tests, Short-Answer Questions (SAQs), Direct Observation of Procedural Skills (DOPS) and Mini-clinical Evaluation Exercise (mini-CEX). The Ottawa Surgical Competency Operating Room Evaluation (O-SCORE) is one of the useful tools designed to assess the surgical competence skills using a variety of ways at the beginning and end of each training day [14]. Portfolios, OSCEs, peer review, self-assessment, direct observation and interviews are among the key assessment tools for nursing competency. Mo1reover, research has shown that there is no systematic tool for assessing the competence of operating room technicians [15]. In addition to the role of circulatory and scrub nurse, theatre nursesplay multiple roles before, during, and even after the operation in Iran; thus establishing clinical competence in all three areas may be at times unavoidable. Therefore, the present study aimed to investigate the clinical competence of operating room technicians in hospitals of Iran University of Medical Sciences using a self-assessment questionnaire.

Materials and Methods

This research is a cross-sectional descriptive study. The study population consisted of 180 operating room personnel working in teaching hospitals of Iran University of Medical Sciences and were selected using census method. The inclusion criteria were as follows: having an associate's, bachelor's, and master's degree in operating room nursing, willingness to participate in the study. The tool used to measure the clinical competence of the operating room technicians was a researcher-made questionnaire consisting of two sections. The first section deals with personal characteristics, including age, gender, educational level, work experience and specialized field. The second section contains a questionnaire on the clinical competence of operating room technicians. The self-assessment clinical competence questionnaire of operating room technologist consisted of 45 items and covers6 dimensions (general knowledge 13items, legal ethical performance 4 itemes, evaluation, diagnosis, and care of the surgical patient 8 item, interpersonal relationships7 items, leadership and management, professional progress, and research 5itemes) The alpha Cronbach of each dimension was respectively 0.936-0.801-0.746-0.660-0.907-0.426.

The responses are rated on a 5 point Likert Scale, ranging from 1= incompetent; 2 = somewhat incompetent; 3 =somewhat competent; 4 = competent; 5 = very competent. Items scores were categorized into 3 categories. Those with a score range of 45 to 105 as poor and those with a score range of 105 -165 as average; those with a score range of 165 to 225 as good. Content validity has been used to ensure the validity of the clinical competence questionnaire of the operating room technicians. For this purpose, a questionnaire was developed using standard items containing in the scales of surgical field and operating theatres. Then, the content validity was used to estimate the validity of the items. A survey was conducted among ten members of Board Examination committee and faculty members of the theatre nursing using Lawshe's method. Having made the necessary modifications, the questionnaire was developed with 45 items in 6 domains. The test-retest method, correlation coefficient and Cronbach alpha coefficient were used to calculate the reliability of the instrument in the pilot group. The total clinical competence was measured by Cronbach's alpha coefficient as 0.94. The correlation coefficient between the 2 sets of scores in the two measurement times was calculated as 0.988, indicating a strong correlation.

The method of data collection was that the researcher, after receiving the letter from the university's ethics committee and obtaining permission from the paramedical faculty, as well as after obtaining permission from the hospital staff, two days a week, to the operating room of the educational hospitals, affiliated Iran University of Medical Sciences visited the questionnaires and provided them with research units. Then the questionnaires were completed by the research units and the same day, the questionnaires were received by the researcher.

The results were analyzed using SPSS 22 software via descriptive (mean, standard deviation, frequency distribution) and inferential statistics including parametric (independent t-test, ANOVA test, Chi-Square Test) and nonparametric tests. Spearman's correlation coefficient was also used to assess the linear relationship between clinical competency dimensions. The significance level was set at p<0/05.

Ethical considerations: Due to the nature of the work and the work of the technologists of the operating room, the probability of lack of proper cooperation of the operating room technologists is somewhat necessary to complete the questionnaire or to complete the incomplete completion of some questionnaires by the personnel, so the explanation will be provided to clarify the subject**.**

Results:

The mean age of participants in our study was 32.43 with a standard deviation of 9.06 years and in the age group less than 30 years of age. Of the total, 70% (n = 126) were female and 30% (n = 54) were male. It was found that 45.6% of participants (n = 82) had a general field and 54.4% (n =98) had a specialized field. The data indicated that 13.9% (n = 25) of the participants had associate degree, 77.2% (n =139) bachelor degree and 8.9% (n = 16) master degree. In addition, 42.8% of the work group (n =77) had 1-5 years of experience in their field of specialization and 9.4% (n = 17) had 15-20 years of experience. Regarding the type of employment, 26.7% (n =48) of the participants were permanent employees, 34.49 % (n =69) were contract (temporary) employees and 38.9% (n = 70) were from agency staff and apprenticeship.

Meanwhile, rotating working shift had the highest frequency (68.3%) among the participants (n =123) and permanent evening shift had the lowest frequency (9%) among the participants (n = 5). 4.4% of the participants (n = 8) were nursing officer (matron), 3.3% (n = 6) were staff, 8.3% (n =15) charge nurse, 83.9 (n =151) regular staff. Overall, 56% of participants (n =101) reported their clinical competence at good level and 42.2% (n = 76) at moderate level and 1.7% (n = 3) at weak level.

Table 1 shows the scores of clinical competence of operating room technicians in different areas. The highest score of competency (166.84) was related to the general knowledge aspect, evaluation, diagnosis, and care of the surgical patient with an average (78.4) and the lowest score (15.75) for the legal ethical performance.

Table 1. Descriptive Characteristics of Clinical Competency Score of Operating Room Technicians in Educational and Therapeutic Hospitals of Iran University of Medical Sciences in different dimensions in 2017-2018

Clinical competence dimensions	Standard deviation	Minimum	Maximum	Median
Knowledge	46.5(9.93)	24	64	49
Moral principles	15.75 (2.90)	5	20	16
Assessment	32.42(5.77)	13	54	34
Relationships	27.86 (6.04)	13	66	28
Leadership	28.07(6.08)	12	40	28
Progress or development	16.7 (4.65)	6	55	16
Total	166.84(28.24)	85	216	170

In the context of the relationship between clinical qualitative demographic variables, because the clinical competency dimensions are quantitative variables, their distribution was normalized or non-normalized using the Kolmogorov-Smirnov test, which resulted in a non-normal distribution of clinical competency dimensions (P <0.001). The Mann-Whitney nonparametric test was used to compare the overall clinical competence score in both men and women. The result of the Mann-Whitney test showed that the overall score of clinical competence in men with a mean of 170 did not have a significant difference with women's with a mean of 169 (p> 0.05). Meanwhile, there was a significant relationship between the qualitative and qualitative Mann-Whitney test results. The

Kruskal-Wallis test was used to investigate the relationship between clinical competence and age, work experience, work-shift and responsibilities, and type of employment, and the results showed a significant relationship. (Table 2)

Table 2. Comparison of clinical competence of operating room technicians in educational and treatment centers of Iran University of Medical Sciences with demographic variables during 2017-2018

Variable		Mean	Median	Standard deviation	Probability value
sex	men	166.54	170	9.66	0.870
	women	167.54	169	28.53	0.870
Field	General	151.86	145	27.86	<0.0001
	Specialized	179.87	182.5	20.82	<0.0001
Educational level	Associate	187.80	185	13.66	<0.0001
	Bachelor	160.47	163	27.93	<0.0001
	Master	189.44	194	19.79	<0.0001
work experience	1-5 years	141.43	141.43	20.35	<0.0001
	6-10 years	183.59	183.59	15.73	<0.0001
	11-15 years	181.4	181.84	14.56	<0.0001
	15-20 years	189.47	189.47	15.64	<0.0001
	Up to 20 years	191.80	191.80	14.20	<0.0001
Employment	Permanent	53.64	189.94	15.09	<0.0001
	Temporary	182.45	182.45	15.37	<0.0001
	Contractual	172.3	172.53	25.27	<0.0001
	Agency staff	158.60	158.60	19.92	<0.0001
	Apprenticeship	138.22	138.22	19.28	<0.0001
Shift work	Morning	167.41	179	38.76	<0.0001
	Evening	178.78	184	17.08	<0.0001
	Night	187.4	186	16.13	<0.0001
	Rotating	160.69	163	27.09	<0.0001
Responsibility	Matron	201.00	200	5.70	<0.0001
	Staff	183.83	183	11.25	<0.0001
	Charge nurse	196.80	297	14.43	<0.0001
	Regular personnel	161.38	164	27.08	<0.0001
Age	<30	151.35	145	25.99	<0.0001
	30-37	184.94	184	16.81	<0.0001
	37-44	184.25	185	16.22	<0.0001
	>44	191.39	194	14.11	<0.0001

Discussion and Conclusion

The aim of the study was to investigate the clinical competence of operating room technicians. According to the finding, more than half of the study participants reported their clinical competence at good level. Consistent with our finding, in the study by Bahreini et al. (2008), the majority of nurses assessed their overall nursing competencies as good [16]. Similarly, in another study by Lieu et al. (2007), the majority of the nurses demonstrated acceptable level of clinical competence, which is consistent with the results of the present study. In contrast, in an analysis of the clinical competency of novice nurses working in one of the educational centers of Tehran, Jafari Golestani reported low level of nursing competency and the conditions were far from ideal [17].

The results of our study showed that the highest clinical competency score (78.4%) was related to the general knowledge dimension, evaluation, diagnosis, and care of the surgical patient, which is in agreement with the findings of the study by Yang et al. [18]. It was also found that the highest score belongs to the dimension of knowledge, special skills and teamwork ability, which is consistent with the results of the research by Gillespie and Jiang et al. [19], and is incongruent with those findings by Lieu et al. (2007), reporting that the highest score belongs to the dimension of interpersonal relationships; this discrepancy may be due to the cultural diversity in both studied populations. In addition, the results of this study are not consistent with those by Bahreini et al. (2007) and Mortague et al. (2004) based on the competency levels among the nurses. In their research, the highest score belongs to the managerial dimension [9, 20]. This inconsistency may be attributed to the different occupational nature of both nursing groups compared to operating room technologists. It was also shown that the lowest score of this study (15.75) belongs to the dimension of legal ethical performance, which is consistent with the result of the study by Jahanpour et al. In their study, nurses' level of knowledge of professional rules was reported at low (6.2%), moderate (90.7%) and high (6.7%) levels [21]. Further, in the study by MohajlAghdam et al., the overall awarenesswas poor in 88.9% of the nurses and average in 11.1%, which corroborate the results of our study. The legal duties and responsibilities of the operating room technicians are defined and established by law and in addition to ethical and professional duties, they are required to perform a range of statutory responsibilities. Meanwhile, the lack of knowledge or a failure to perform the function may result in a personal and judicial indictment; therefore, it is necessary to take some important measures to improve this dimension. In this study, the clinical competence score of the operating room technician in interpersonal relations was at moderate level (27.82). However, Karim et al. reported that the mean scores of nursing competence in interpersonal dimensionwere significantly higher than other dimensions [22]. This rather contradictory result may be due to the different nature of interdisciplinary teamwork in the operating room compared to the teamwork of nurses in other wards. Additionally, the mean score forclinical competence in management dimension was 28.07.

Similarly, in the research by Kaljeh, 94% of nurses received a low competence management score [6], which is consistent with the results of our study. The professional research and development score of participants is found to be 16.07, which was congruent with the results of the study by Meretoja and Rodgers, suggesting a low clinical competence in nursing staff

[9, 23]. The further analysis also showed a correlation between demographic variables and clinical competence (Table 2). No significant relationship was found between the gender variable and clinical competence, which is in line with the results of the study by Morgjeh et al. (2004) and Liu et al. (2007), as well as Ghalje et al. There was also a significant relationship between clinical competence and the age and experience of operating room technology technicians (Table 2). These findings confirm the results of the study by Morjeo et al., showing a positive correlation between the age and length of work experience and the overall rate of competency self-assessment [9]. Similarly, Liu et al. found no significant relationship between clinical competency and in-service training and nurses' experience [24]. It means that nurses with more years of experience were more likely to have a high level of clinical competence resulting in the improvement of nurse's adjustment to their new environment and promotion of professional competencies. Ghalje also found that age variable does not have a significant effect on clinical competence, which is incongruent with the results of our study [6]. In this study, the specialized field of operating room technician was associated with the overall self-assessment score, showing that operating room technician with more specialized fields experience higher competency in their professional setting. This could be attributed to the selection of more experienced personnel for delivering more services in specialized fields. In line with the results of our study, Bahreini et al. (2010) found that the clinical competencies of nurses working in the CCU and special care units were higher than those in the general, emergency and operating rooms; although this difference was not significant [20]. This finding is also in line with the results of the present study. There was also a significant correlation between clinical competence, work shift and responsibility, which could be attributed to the selection of experienced people to cover night work and permanent shifts as nursing officer (matron), staff and charge nurse. A significant correlation was shown between educational level and clinical competency, which was consistent with the results of the study by Bartlett et al. (2000). In general, therefore, it seems that nurses with higher education were able to overcome any constraints and develop a higher level of competence and accomplishment than nurses with a lower educational level [25].

Conclusion

The evidence from this study suggests that the majority of participants reported low clinical competence in the domains of legal ethical performance and research and career development based on the self-assessment.In addition, since the operating room technician has limited educational opportunities for holding retraining courses within the scope of the operating theatre, it is necessary to create more interactive atmosphere for specialists in the field with other wards and organize retraining courses for them. The researcher believes that the implementation of this intervention can contribute to the growth and promotion of these domains.

Limitations of the current study:

The study findings need to be interpreted cautiously due to the application of self-assessment instrument. Despite of this limitation, the researcher believes that building trust with the operating room technician and practical application of researcher-made questionnaire, with a high validity and reliability score, can create a positive motivational climate for thinking and rethinking in the design and implementation procedures of surgical cares. Nowadays, self-assessment of clinical competence is one of the most commonly instruments used to assess, certify and provide evidence of the professional ability of the operating room technicians in advanced countries.

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