

Investigating the Effect of Quality Management Training to Operating Room Head Nurses on the Level of Compliance with Operating Room Standards: An Interventional Study

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Abstract

Introduction: Head nurses in the operating room are responsible for implementing and monitoring standards, which are crucial for ensuring quality medical care. The present study was conducted with the aim of investigating the impact of Quality Management Training on Compliance with Operating Room Standards.

Methods: This interventional study was conducted in 2021 on 22 operating room head nurses of Shiraz University of Medical Sciences hospitals selected by census method and randomly divided into two groups (14 intervention, 8 control). The data collection tool included a demographic information questionnaire and a checklist for checking equipment standards. The researcher taught the educational intervention in person (individually for each supervisor). Data were analyzed in SPSS-24 software using descriptive statistics (frequency, mean, standard deviation), Mann-Whitney U test, Kruskal-Wallis test, Spearman's correlation test, Point-Biserial correlation test, and regression analysis.

Results: The average age of the participants in the intervention group was 40.71 ± 5.26 , and in the control group was 40.37 ± 2.61 . The average level of adherence to the standards by the intervention group before the educational intervention was at a medium level (208.35 ± 20.37), and after receiving the educational intervention, it reached a high level (394.07 ± 2.464). There was a significant relationship between receiving the intervention of quality management training and the compliance of head nurses with operating room standards ($P < 0.001$).

Conclusion: Considering the effect of educational intervention in improving compliance with operating room standards, it is suggested that training courses be designed and implemented to maximize the level of awareness of operating room head nurses.

Keywords: Training, Quality management, Operating room standards, Operating room head nurses

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Introduction

One of the goals of medical centers is to improve health and provide quality services to patients (1). However, today, we see a high number of reports of injury to patient (1, 2). In developing countries, one out of ten patients is injured while receiving hospital services (3), and more than 3 million deaths occur annually due to unsafe care (4). Hospitals always need clear and comprehensive standards to evaluate and improve the quality of medical and health services (1, 5). In each treatment center,

standards are defined as favorable conditions that can lead to an increase in the quality of services by changing the processes (6). Adhering to these standards, in addition to ensuring the safety of patients and personnel (6, 7) can lead to the optimal use of manpower, energy, and equipment and create more effective communication (1). In this study, the standards related to the area of the operating room have been discussed.

The operating room, as the heart of the hospital (1), is responsible for about one-third of health care costs and half of the costs of hospitalization (8).

In addition, the operating room is a stressful and dangerous environment (9, 10), accounts for the majority of side effects in the hospital (8, 11). In this environment, it is essential to pay attention to the implementation of standards in the field of safe surgery (12) and the management of possible risks (11, 13). The standards of physical space, equipment, safety, and health are very vital due to the direct relationship to the health of personnel and patients and the improvement of personnel performance (6). The implementation of these standards by head nurses and managers helps to maintain patient safety and improve the quality of medical services (14).

Operating room head nurses, as operating room managers, are responsible for management through the processes of planning, decision-making, organizing, controlling, monitoring, and implementing standards (15). Considering the effectiveness of head nurses in increasing the productivity of hospitals, training and improving the management skills of these people is considered essential (16).

One of the important aspects of management is the ability to manage quality because insufficient attention to this issue can affect the quality of medical services, patient safety, and hospital profitability (17). Also, since improving the quality of care is at the top of hospitals' affairs (18) Quality management is essential as a continuous approach to improving the performance of organizations (19, 20).

The quality management strategy may assist hospital administrators in better comprehending the advantages of implementing quality management, which will help their hospitals achieve quality performance (21). On the other hand, Quality management training correlates with performance and development practices (22). Due to the importance of compliance with operating room standards on patient safety and the quality of medical services and the role of operating room head nurses in implementing these standards, quality management training is important to coordinate with up-to-date standards. Therefore, this study aims to investigate the effect of quality management training for operating room head nurses on the level of compliance with operating room standards.

Methods

The Study Design, participants, Data collection

tool, educational intervention, and Statistical Analysis are mentioned in this part of the research.

Study Design

The current study is interventional research conducted from December to May 2020.

Participants

This study was done in educational and medical centers affiliated with Shiraz University of Medical Sciences. The research participants in this study were all the head nurses of the operating rooms, who were selected according to the study's inclusion criteria and willingness to participate. The inclusion criteria were: the hospital equipped with an operating room, the minimum operating room activity for one year, and at least 1 year of work experience as a supervisor. The exclusion criteria included the unwillingness of head nurses to cooperate and moving head nurses from one department to another. The sampling method in this research was the census method. Thus, the researcher evaluated the performance of 22 operating room head nurses in the intervention (14 people) and control (8 people) groups before and after the educational intervention.

Data Collecting Tools

Demographic characteristics questionnaire and operating room standards assessment checklist were used to collect data. The demographic information questionnaire included demographic information of the samples (age, work experience, education status, level of education, and income). The operating room standards measurement checklist was used to measure compliance with operating room standards. This checklist had 101 questions in 4 sections, including equipment standards (32 questions), physical space standards (25 questions), health standards (23 questions), and operating room safety standards (21 questions). A checklist for measuring operating room standards was prepared by Sahebzadeh and colleagues in 2009, and its validity and reliability (test-retest) were confirmed (23). Cronbach's alpha of the checklist was equal to 0.85, which indicates the validity of the measurement tool (24). The scoring method in this checklist is based on a 4-option Likert scale (completely

observed “score 4”; somewhat observed “score 3”; somewhat not observed “score 2”; not observed at all “score 1”. Operating rooms with a total score of 101 to 202 are poor standards, 203-304 are average standards, and 305-404 are high standards (23).

Educational Intervention

Pre-intervention

First, a list of educational and medical centers in Shiraz was prepared, and 22 qualified medical centers were identified. Then, after obtaining the code of ethics, the researcher went to the operating rooms of the hospitals and completed the checklist of operating room standards in the Pre-intervention phase by observing the relevant operating rooms. In the next step, 14 qualified head nurses were randomly selected through a lottery in the intervention group and 8 in the control group.

Intervention

Educational content based on the results of the needs assessment in the four dimensions of physical space, equipment, safety, and hygiene of the operating room was prepared through a review of texts and books (25, 26). It was provided to the head nurses along with the educational pamphlet made by the researcher. Also, the relevant pamphlet was taught face-to-face in a one-hour session in a quiet room in the surgery department and in person to the intervention group (individually for each supervisor) by the researcher. The control group did not receive any training.

Post-intervention

After 1 month of educational intervention, the checklists for all hospitals were completed again by the researcher, and the data was analyzed by SPSS version 18.

Statistical Analysis

The normality of quantitative data was measured using the Kolmogorov-Smirnov test to analyze the data. If they were normal, the mean and standard deviation were used; if not, the median and the first and third quartiles were used. Numbers and percentages were used to report qualitative data. Finally, chi-square and Wilcoxon tests were used to analyze the data. Data analysis was done with SPSS version 18 software. A significance level of 5% was considered.

Results

Examining the Demographic Characteristics

In the present study, the average age in the intervention group was 40.71 ± 5.26 , and in the control group was 40.37 ± 2.61 . The majority of participants in both groups were men. Also, the average work experience of head nurses participating in the research was 16.57 ± 4.8 in the intervention group and 13.25 ± 5.25 in the control group. In the control and intervention groups, no significant difference was found in terms of gender ($P=0.93$), marital status ($P=0.69$), educational qualification ($P=0.97$), monthly salary ($P=0.34$), and work shift ($P=0.42$), which indicates the homogeneity of the participants in both groups (The demographic information of the study participants is reported in Table 1).

Table 1: Comparison of Demographic Variables and their Relationship with Control and Intervention Group

Variable	Control Group (n=8)		Intervention Group (=14)		P value	
	Frequency	Percent	Frequency	Percent		
Sex	Male	5	62.5	9	64.3	0.933
	Female	3	37.5	5	35.7	
Marital Status	Single	1	12.5	1	7.2	0.693
	Married	7	87.5	13	92.8	
Education	Bachelor	5	62.5	9	64.3	0.979
	Master	2	25	2	14.3	
	Associate Degree	1	12.5	3	21.4	
Monthly Salary*	12-13	5	62.5	6	42.9	0.348
	13-14	3	37.5	5	35.7	
	>14	0	0	3	21.4	
Working Shift	Morning	2	25	1	7.1	0.426
	Night	1	12.5	1	7.1	
	Rotation	5	62.5	12	85.7	

*Million Toman

Performance of Head Nurses in the Control and Intervention Groups

The results of the study show that there is a statistically significant difference ($P < 0.001$) between the head nurses' performance in compliance with all 4 standards (physical space, safety, health, and equipment) in the intervention and control groups. Compliance with the standards in the intervention group after receiving the educational intervention was higher than in the control group (not receiving the educational intervention). The standard compliance level of the intervention group before the educational intervention was moderate, and after receiving the educational intervention, it was high (Table 2).

Relationship between Compliance with Standards in Intervention and Control Group

In the intervention group, all 4 standards have become significant in the stage after receiving the educational intervention compared to the stage before it. However, in the control group, no significant relationship was found between the 4 standards before and after the intervention (Table 3).

Comparing the Performance of Head Nurses Separately for Each Standard

The level of compliance of head nurses in

compliance with all 4 standards (physical space, safety, health, and equipment) in the intervention group has increased more than the control group (Table 4).

Discussion

Paying attention to compliance with operating room standards due to its significant impact on the health of personnel and patients and improving the hospital is one of the basic goals of health and treatment center managers (6, 27). The present study examined the effect of quality management training on operating room head nurses' compliance with operating room standards. The results of the present study showed that the level of adherence to the operating room standards by the operating room head nurses was at a medium level before the training and at a high level after the training. In addition, a positive and significant statistical correlation was found between the training of quality management to the head nurses of the operating room and the level of compliance with the standards of the operating room. In the study, which involved 572 respondents, the quality of nursing care was evaluated based on the degree of client/family satisfaction with nursing and the nurse's adherence to standards of application of care processes in 14 medical surgical rooms in government hospitals. The results showed that

Table 2: Comparison of the performance of head before and after the educational intervention

	Before Intervention	After Intervention	P value	Effect Size
	Mean±SD	Mean±SD		
Intervention	209.35±20.37	394.08±2.464	< 0.001	Cohens d=12.733 Hedges g=12.362
Control	206.00±29.56	274.75±104.12		Cohens d=0.898 Hedges g=0.849

Table 3. Relationship between level of compliance with standards in intervention and control group

	Before and after intervention (P value)			
	Safety standard	Physical space standard	Equipment standard	Health standard
Intervention	0.001	0.001	0.001	0.001
Control	0.068	0.068	0.066	0.138

Table 4: The mean of the compliance of the head nurses in the control and intervention groups

	Safety standard (Mean±SD)		Physical space standard (Mean±SD)		Equipment standard (Mean±SD)		Health standard (Mean±SD)	
	Before	After	Before	After	Before	After	Before	After
	Intervention	Intervention	Intervention	Intervention	Intervention	Intervention	Intervention	Intervention
Intervention	34.29±7.75	83.79±0.426	40.50±8.86	97.00±1.30	52.71±11.35	121.29±1.816	80.81±6.97	92.00±0.00
Control	34.63±10.75	52.75±28.75	14.39±41.88	59.50±39.30	52.00±14.15	77.25±39.20	77.50±10.69	82.25±9.33

client/family satisfaction levels fell into three categories: acceptable (16.9%), moderate (81.5%), and fewer (1.55%).

This study showed that compliance with the standards also increased with the quality management training of the head nurses. The closest and most similar study found about the desired concept is the study of Koohsari et al., which showed that educational intervention can be standardized by increasing the level of awareness, knowledge, ability, and self-efficacy of employees and following standard precautions (28). In line with the present study, Fereidooni et al. (2022), in an intervention study with the aim of the effect of educational intervention on the performance of operating room nurses in compliance with electrosurgery standards, showed that teaching instructions and standards for the use of electrosurgery devices to operating room nurses can lead to the improvement of the quality of services provided and improve the safety of patients (29). Also, Zarei et al. (2012), in a study aimed at the effect of educational intervention on the application of total quality management concepts on 20 personnel, showed that after the educational intervention, the staff's participation, attention to the patient, and nurse-patient communication increased significantly (30). Another study, in line with the results of the present study, which was conducted on hospital head nurses in Japan, showed a significant improvement in knowledge, experiential learning, and competence among nursing managers after the educational intervention (31). In similar studies (all aligned references), educational intervention is considered a key factor in improving compliance with standards and personnel performance (28-32).

Other results obtained from this study showed that the highest score in compliance with the operating room standards after the training was related to the dimension of equipment standards. In line with the results of the present study, a descriptive study by Naseri et al. (2013) in a survey of 10 hospitals showed that the standard of equipment is at a high and desirable level (80%) (27). In the descriptive and analytical study of Yazdan Parast et al. (2016), the results of the study on 88 working personnel indicated that the highest level of compliance with operating room standards is related to the dimension of equipment standards (89.62) (6). The high score related to the

equipment dimension can be related to the use of advanced equipment in the operating room (16). In addition, the presence of standard equipment in the hospital environment is one of the factors affecting the proper performance of clinical activities and the general health of the personnel (6, 32). Unlike the present study, the results of Fuji et al.'s study (2012) on 3 hospitals showed that the level of compliance with operating room equipment standards is at an average level (68%) (7). The reason for this discrepancy can be attributed to factors such as the hospital's financial policy, the environmental difference, and the time of the research implementation.

The lowest score of compliance with operating room standards in this study was related to the dimension of safety standards. In line with these results, in the analytical cross-sectional study of Sahebzadeh et al. (2009), which was conducted on 120 nursing personnel, the lowest score of compliance with operating room standards was assigned to the dimension of safe standards (23). Unlike the present study, the descriptive study of Habibi et al. (2013) and the study of Mehrtak et al. (2014) assessed the level of compliance with the safe standard of most of the studied hospitals as favorable (1, 33). The difference in the stated results may be due to the difference in the amount of budget and management of the respective hospitals, the level of awareness of the personnel about the standards of the operating room, and the lack of sufficient supervision and control of the managers (6, 33).

Strength of Study

Among the strengths of the current research, we can mention the high sample size in the sampling area, which can increase generalizability. Also, based on the database search, the present study is the first in Iran to examine the effectiveness of the quality management educational intervention on compliance with operating room standards.

Limitation of Study

This research suffered from some limitations. One of the limitations of the current research is the presence of the researcher in the operating room as an observer, which can be considered a factor in forcing the employees to comply with the items listed in the checklist. The researcher tried to reduce the effect of his presence as much as possible by regularly attending the

operating rooms. Considering the impact of training on reducing the harm caused by non-compliance with operating room standards and the importance of the health of employees and patients, it is suggested that quality management training be included in the retraining and training program of nurses and operating room head nurses.

Conclusion

The results of the present study showed that the degree of compliance with operating room standards by head nurses before and after the educational intervention was at a medium and high level, respectively. Researchers recommend that the results obtained from the study should be applied in practical situations to address existing issues and problems. This means that the gap between the current and desired states should be identified and addressed. Ultimately, training and enhancing managerial skills for operating room head nurses is essential to effectively improve the quality of medical services and ensure patient safety. Therefore, holding workshops and training courses on the standard principles of the operating room is necessary to improve the quality of medical services.

Future perspective

- Conducting qualitative studies and conducting interviews with head nurses can provide more findings.
- Conducting evaluations using a checklist at multiple time intervals, such as 3, 6, and 12 months after the intervention, provides valuable findings about the sustainability of educational effects.
- Future research should identify and control for potential confounding variables, such as preexisting differences in hospital resources or staff experience levels, by including them in the analysis as covariates or through more sophisticated statistical models.
- Since the training in this study lasted one hour, provide a more comprehensive training program that includes multiple sessions, workshops, or integration of digital learning tools. This can lead to major improvements in knowledge retention and application.
- Providing a comprehensive training program including multiple sessions, workshops or integration of digital learning tools

Ethical Considerations

This research has been approved by the ethics committee of Shiraz University of Medical Sciences with ethics code number (IR.SUMS.REC.1397.603). Written informed consent was obtained from each participant before completing the questionnaire. Before starting the study, all participants were informed about the study's objectives, the confidentiality of information, and the possibility of leaving the study at any time.

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Authors' Contribution

Study conception and design: A.F, A.A, Data collection: F.F, Statistical analysis: A.F, HR. S, Interpretation of results: A.A, S.M, Drafting of the manuscript: All authors, Revision of the final manuscript: S.M

Conflict of Interest

There are no conflicts of interest.

References

1. Mehrtak M, Mahdavi A, Ebrahimi K, NASROLAHI A, Sorkhi A. Operating room safety status based on patient safety friendly hospitals standards at Ardabil university hospitals. *Journal of Healthcare Management*. 2020;10(34):95-102.
2. Janghorbani M, Raisi A, Dehghani S, Mousavi A. Assessment of safety status in operating rooms of shahid beheshti hospital, Isfahan, Iran by the World Health Organization Standards for Safety-Friendly Hospitals. *Health Information Management*. 2013;9(7):1066-72.
3. Mosleh S, Fard FB, Jokar M, Akbari L, Aarabi A. Prevalence of surgical site infection after orthopedic surgery and some related factors at the selected hospitals of isfahan university of medical sciences. *Prevalence*. 2019;13(4):43-53.
4. Organizatin WH [Internet]. Patient Safety. [cited 11 September 2023]. Available from:

- <https://www.who.int/news-room/fact-sheets/detail/patient-safety>.
5. Zareh Moayedi M, Hesam S. Effective Components on Promoting Patient Safety Culture at Fayazbakhsh Hospital. *Journal of Healthcare Management*. 2018;9(3):55-64.
 6. Parast EY, Fakhrealizadeh F, Moghadam FD, Ramezani H, Ghorbani S, Davoudi M. The relation between physical space standards, equipment standards, safety, health care and general health issues concerning the operating room personnel in university/educational hospitals affiliated with Birjand university of medical sciences. *Occupational Medicine*. 2019.
 7. Akrami R, Tabasi H, Akbar Zade R, Foji S. Assessment of safety standards in the operating room in hospital, Sabzevar University of Medical Sciences in 2014. *Beyhagh*. 2015;19(1):58-64.
 8. Lee DJ, Ding J, Guzzo TJ. Improving Operating Room Efficiency. *Curr Urol Rep*. 2019;20(6):28. doi: 10.1007/s11934-019-0895-3.
 9. Hanani S, Sadeghi M, Kashaninia Z, Hosseini AF. Knowledge Evaluation of Surgical Technologists about Laws and Standards of Patients Rights in the Academic-Medicinal Hospitals of Iran University of Medical Sciences in 2016-2017. *Paramedical Sciences and Military Health*. 2017;12(3):47-54.
 10. Auerbach AD, Patel MS, Metlay JP, Schnipper JL, Williams MV, Robinson EJ, et al. The Hospital Medicine Reengineering Network (HOMERuN): a learning organization focused on improving hospital care. *Acad Med*. 2014;89(3):415-20. doi: 10.1097/ACM.000000000000139.
 11. Sonoda Y, Onozuka D, Hagihara A. Factors related to teamwork performance and stress of operating room nurses. *J Nurs Manag*. 2018;26(1):66-73. doi: 10.1111/jonm.12522.
 12. Ramezanpoor E, Amiri F, Rashidi N. Relationship between leadership style of operating room head nurses and Job self-efficacy of operating room technologists. *Journal of Health Promotion Management*. 2020;9(1):51-8.
 13. Movahed KE, Arab M, Akbari S, Hosseini M. Inpatient perceptions of participating in cure decision making and safety among public hospitals of Tehran Medical Sciences University. *Hospital*. 2012;11(1):29-38.
 14. Neisi A, Albooghobeish M, Geravandi S, Adeli Behrooz HR, Mahboubi M, Omidi Khaniabad Y, et al. Investigation of health risk assessment sevoflurane on indoor air quality in the operation room in Ahvaz city, Iran. *Toxin reviews*. 2019;38(2):151-9. doi: 10.1080/15569543.2018.1434796.
 15. Razzaqzadeh Z ZH, Zamanizadeh M, Khodayarian M. determining the characteristics of supervisors from the perspective of supervisors and internship students in the field of management: qualitative research. *The first national conference of students on social factors on health*. 2019. [Persian].
 16. Marquis BL, Huston CJ. Leadership roles and management functions in nursing: Theory and application. Philadelphia: Lippincott Williams & Wilkins; 2009.
 17. Austin JM, Kachalia A. The State of Health Care Quality Measurement in the Era of COVID-19: The Importance of Doing Better. *JAMA*. 2020;324(4):333-4. doi: 10.1001/jama.2020.11461.
 18. Ebrahimipour H, Vafae Najar A, Haghghi H, Mohammadpour S, Mahmoudian P. Education Quality Assessment in the Field of Focus on Workforce: Iranian Education Quality Management (IEQM) Model. *Iranian Journal of Medical Education*. 2017;17:211-9.
 19. Afzal N, Hanif A, Rafique M. Exploring the impact of total quality management initiatives on construction industry projects in Pakistan. *PLoS One*. 2022;17(9):e0274827. doi: 10.1371/journal.pone.0274827.
 20. Hidayah N, Arbiansih, Ilham. The impact of integrated quality management-based health services on general hospital quality. *Front Public Health*. 2022;10:1011396. doi: 10.3389/fpubh.2022.1011396.
 21. Alshourah S. Total quality management practices and their effects on the quality performance of Jordanian private hospitals. *Management Science Letters*. 2021;11(1):67-76. doi: 10.5267/j.msl.2020.8.029.
 22. Davies EO, Nsiegebe G, Egbuchulan EI. Total Quality Management Training and Development Practice and Performance in Rivers State University. 2022.
 23. Sahebzadeh M, Hosseini S M, Javadi Nejad N, Farazandeh M. The study of equipment,

- safety, hygiene, personnel standards and their correlation with employee performance in surgery department of the educational hospitals in Isfahan 2009-2010. *Hospital*. 2011;10(2):76-87.
24. Sahibzadeh M HS, Javadnejad N, Farazande Mehr A. Relationships between standards of physical space, equipment, safety, health and features Demographics with performance of nursing personnel in surgical departments of Isfahan teaching hospitals. *Hospital*. 2011;10(2).
 25. Phillips N, Hornacky A. Berry & Kohn's Operating Room Technique-E-Book. Amsterdam: Elsevier Health Sciences; 2020.
 26. Rothrock JC. Alexander's care of the patient in surgery-E-Book. Amsterdam: Elsevier Health Sciences; 2022.
 27. Naseri M, Sadati L, Jalali A, Firuzabadi M, Golchini E. Assess of the status of the Karaj operating rooms in comparison with international standards in 2011. *Alborz University Medical Journal*. 2012;1(4):213-9. doi: 10.18869/acadpub.aums.1.4.213.
 28. Koohsari M, Mohebibi B, Sadeghi R, Tol A, Forooshani AR. Assessing the effect of educational intervention based on health belief model in improving standard precautions adherence to prevent needlestick among clinical staff of hospitals. *Hospital*. 2017;15(4):49-57.
 29. Fereidouni A, Amiri M, Moayedi SA, Teymoori E, Torabizadeh C. The effects of educational intervention on operating room nurses' use of electrosurgical units. *Perioperative Care and Operating Room Management*. 2022;27:100250. doi: 10.1016/j.pcorn.2022.100250.
 30. Zareie F, Taghdisi MH, Mohebifar R, Tehrani H, Shojaezade D, Motamedi A. Total quality management (TQM): is an educational intervention effective to apply the model in routine practice? *Payesh (Health Monitor)*. 2014;13(1):33-40.
 31. Kuraoka Y. Effect of an experiential learning-based programme to foster competence among nurse managers. *J Nurs Manag*. 2018;26(8):1015-23. doi: 10.1111/jonm.12628.
 32. Gholizadgougjehyaran H, Motaarefi H, Sakhaei S. A Survey of Knowledge, Attitude, and Adherence to Standard Precautions of Infection Control among Khoy Nursing Students during the COVID-19 Pandemic in 2021: A Short Report. *Journal of Rafsanjan University of Medical Sciences*. 2022;21(1):127-34. doi: 10.52547/jrums.21.1.127.
 33. Habibi R, Jorabbafan H, Habibi G. Operating room safety standards in teaching hospitals of Qazvin (2012). *Journal of Inflammatory Diseases*. 2014;18(4):66-9.