

Impact of Educational Program on Operating Room Nurses' Attitudes towards Patient Safety

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Abstract

Background: Patient safety culture is one of the cornerstones of quality healthcare. Providing safe patient care is one of the significant challenges in healthcare environment.

Aim: The purposes of this interventional study were to evaluate the effect of a surgical safety educational program on operating room nurses' attitudes towards patient safety culture.

Methods: This study used a quasi-experimental design. Convenience sampling technique was used to recruit 66 OR nurses who were working at RMS hospitals in Amman. A one-day Surgical Safety Education Program was given to all participants. Pre-test and post-test were done.

Results: The result of this study showed that the OR nurses' attitudes towards patient safety culture was negative, while significant improvement after attending the Surgical Safety Education Program was noticed (3.3 ± 0.20 versus 3.8 ± 0.30). There was a negative correlation between years of experience and nurses' attitudes towards patient safety culture.

Discussion: The findings of this study revealed that incorporating courses about safety culture in the continuing education programs in hospitals and other healthcare facilities will improve nurses' attitudes towards patient safety culture and consequently improve in all the quality of nursing care.

Keywords: Operating room nurses; Safety culture; Surgical safety education program; Attitude

Introduction

Patient safety is considered the cornerstone of quality healthcare. Providing safe patient care is one of the significant challenges in healthcare environment. Patient safety is a basic human right, and providing a culture of patient safety is the responsibility of all healthcare personnel, regulatory agencies, and governmental bodies [1]. Patient safety is defined as "the prevention of harm to patients" (Institute of Medicine (IOM) 2000, page 2). Based on this definition, prevention of patient harm and prevention of mistakes is the main focus of care at all levels of healthcare institutions. The Agency for Healthcare Research and Quality [2] has further defined patient safety as "A discipline in the healthcare sector that applies safety scientific methods towards the goal of achieving a trustworthy system of healthcare delivery. Patient safety is also an attribute of healthcare systems.

It minimizes the incidence and its impact, and maximizes recovery from adverse events" [2]. Making patient safety a top priority is dependent on having a strong and positive patient safety culture [3].

Patient safety culture refers to the prevailing attitudes of members, unit, or team of an organization towards patient safety. It shapes nurses attitudes about favorable behavior related to patient safety in their work area; thus, culture influences one's attitudes [4]. The term 'patient safety culture' is a relatively new and potentially very valuable concept. With the increasing emphasis of the safety issue in healthcare organizations throughout the whole world, creating and maintaining a patient safety culture becomes extremely important [5]. In an effort to identify the dimensions of patient safety culture, Liu, Kalisch [6] investigated the nurses' perceptions of safety culture in Chinese hospitals and identified three core dimensions as components of safety culture in healthcare settings: management commitment to safety, safety system, and work pressure. While Feng, Bobay [7] in their concept analysis on patient safety culture reviewed 45 papers, three books, and three theses to analyze the dimensions of patient safety culture. Feng, Bobay [5] identified four sub-domains of patient safety culture: the system sub-domain, the personal sub-domain, the task-associated sub domain and the interactive sub domain.

Background

Nurses serve as a hospital unit's twenty-four hours surveillance team; assessment of patient condition, evaluation of physician orders, administration of medications, and supervision of patient activity are all safety culture functions which fall within the nurse's scope of practice [7]. Domrose [8] argues that the most important factors that are essential to the advance of patient safety culture are human main beliefs such as leadership, communication, teamwork, and staff empowerment to create a culture of safety.

Breakdown in communication, whether between individuals or teams of healthcare personnel, underlies most adverse patient outcomes in all healthcare settings [9]. Failures of communication between personnel's in the operating room (OR) are common. This may involve communicating too little or even too much, too early or too late, and may involve a failure of either the person initiating the communication or the receiver, who may fail to understand or even hear the message. Most surgical errors are not related to a single person but involve multiple personnel [10].

The OR is a potentially high-risk setting that is exposed to multiple communication errors. Effective communication is more important than being technically skillful, as safe patient care is based on the accurate and timely exchange of information [11]. Thus, poor communication is the most frequent cause of adverse events across all facets of healthcare resulting in problems that range from delays in treatment to medication errors to wrong-site surgery.

Patient safety is still far away from being sufficiently safe. Education and training in patient safety culture is one of the most significant nurse responsibilities to guarantee safe patient care in the future with a focus on human factors and systems safety. It is now the time to act, to get the resources needed to provide sufficient and relevant patient safety culture training for all involved in healthcare to a level needed for their job [12]. Training has been shown to decrease error and increase the ability to solve problems, particularly for inexperienced professionals, whereas failure of training is often attributed as a major cause of incidents [13,14].

In Jordan, AbuAlRub, Alhijaa [15] examined the impact of patient safety educational interventions among senior nurses on their perceptions of safety culture in a specialized hospital. The survey reported that the overall perception of safety was 51.5%. Nurses reported that the overall safety culture in the hospital was positive before intervention, while the

overall perception of nurses' after intervention was 60.6%. The current study is the first interventional study using educational programs to evaluate Jordanian nurses' attitudes towards patient safety culture in the OR. In Jordan, no studies have been conducted to evaluate Jordanian nurses' attitudes towards patient safety culture in OR. Few studies examined nurse's perception towards safety culture such as Hayajneh, AbuAlRub [16] who studied the causes and types of adverse events in Jordanian hospitals. Furthermore, Abu Al Rub et al. (2014) examined the impact of patient safety educational interventions among senior nurses on their perceptions of safety culture in a specialized hospital. AbuAlRub, Gharaibeh [17] examined the relationships between safety climate, teamwork, and intent to stay at work among Jordanian hospital nurses. The main purpose of this interventional study was to evaluate the effect of a surgical safety educational program on the OR nurses' attitude towards patient safety culture.

Methods

Design

One group of pretest-posttest quasi experimental design was used to assess OR nurses' attitudes towards patient safety culture before the SSEP by using the Safety Attitudes Questionnaire (SAQ) [18], and immediately after the intervention.

Settings

The current interventional study was conducted in six Military Hospitals in Amman. These hospitals, which are under the responsibility of the Royal Medical Services (RMS) located in Amman city, provide different surgical services which include General surgeries, pediatric surgeries, orthopedic surgeries, ear, nose, and throat surgeries, cardiac surgeries, ophthalmic surgery, neurosurgery, obstetric and gynecological surgeries, and vascular surgeries.

Sample

A convenience sampling technique was used to recruit the participants from the eligible nurses who were available at the time of the study. The sample size was calculated using the Power Primer to perform a two-tailed paired t-test ($\alpha = 0.05$) and assuming a power of .80 and a medium effect size ($d = .50$) [19]. A total number of 64 participants were needed to conduct the study. According to statistical standards, when attrition rate is expected to 20%, biases are usually of concern [20]. Therefore, the current study's sample size was increased by approximately 10% and, as a result, the total number of participants who were recruited to participate in the study was 70 participants. The response rate was 94%. Inclusion criteria were Nurses who have a BSc degree or diploma degree in nursing and have been working in OR in military hospitals for at least one year were included in this interventional study. Nurses who have less than one year or still have not finished the orientation program were excluded from the study. Ethical approval was obtained from the Scientific committee in the Royal Medical Service (Ref 10451).

Outcome measure

An Arabic version of the SAQ was used in the current study [18]. The original SAQ is a refinement of the Intensive Care Unit Management Attitudes Questionnaire, which was derived from the questionnaire widely used in commercial aviation. composed of 60 items including demographic information (age, sex, experience, nationality) and six safety culture related scales. After modification and factor analysis, the items were reduced to 30 items loaded on six domains that included: safety climate, job satisfaction, teamwork climate, stress recognition, perceptions of management, and working conditions. Each item is scored on a five point Likert scale (1 = Disagree Strongly, 2 = Disagree Slightly, 3 = neutral, 4 = Agree Slightly, 5 = Agree Strongly). The scores of the individuals were then ranked from 0 to 100 (1 = 0, 2 = 25, 3 = 50, 4 = 75, 5 = 100). The scores equal or above 60% (3.4)

were considered to represent a positive attitude towards a given safety culture subscale, while a score below 60% (3.4) was considered to represent negative attitudes and area of needed improvement or barrier to safety. Areas rated 75% or higher were considered areas of strengths [21,22]. The more positive the scores of the items and dimensions are, the better the perceptions of patient safety culture are. The SAQ is a psychometrically sound instrument that has a scale reliability of 0.9 with Cronbach's alpha ranging from 0.78 to 0.91 [23].

The intervention

Nursing is usually taught in English in Jordan, so mixed languages (English & Arabic) were used in teaching sessions. Moreover, English is the communication language between healthcare providers in military hospitals. All participants were invited through phone call one week before the time of the workshop and confirmation was done one day before the workshop. The confirmation calls included the time and place for the workshop. The Surgical Safety Educational Program (SSEP) workshop was conducted from 8 AM to 12 MD at an auditorium at the Royal Medical Service (RMS), it included three sessions. Attending the SSEP also provided continuing education points to the participants as further encouragement for participation.

Data analysis

Upon completion of data collection, statistical analyses were completed by using the Statistical Package for the Social Science (SPSS 23.0) computer software. Data were coded and entered by the researcher. Data screening was performed to identify any missed cases and response inconsistency [24]. Descriptive and inferential statistical tests were used. Descriptive statistics for pre-test and post-test attitudes such as means and frequencies were used to describe the sample characteristics and to answer the first research question: "What are the OR nurses' attitudes towards patient safety culture?"

The scores equal or above 60% (3.4) were considered to represent a positive attitude towards a given safety culture dimension, while a score below 60% (3.4) is considered to represent negative attitudes and area of needed improvement or barrier to safety. Pearson correlation was used to answer the second research question: "Are there relationships between the OR nurses' attitudes towards patient safety culture and selected demographics variables (years of experience, nurse's gender, and level of education)?" The paired t-test was used to answer the third research question: "What are the differences in the OR nurses' attitudes towards patient safety culture before and after receiving an educational program on patient safety culture?" through comparing the mean of pre-test score with the mean of post-test score.

Results

Sample's Characteristics

Nurses working in the OR who met the inclusion criteria was recruited. Four of them were not included in the intervention because of failure to contact them at the time of intervention. Therefore, 66 OR nurses were included in the study (response rate = 94%). Males and females were almost equally represented (52% females and 48% males) and their age ranged from 21 to 37 years. The mean age of the nurse was 28 ± 5 years. The majority of participants hold diploma degree (65%) with an average of $5.3 (\pm 4.3)$ years of clinical experience. Most of the participants (89.4%, $n = 59$) had not attended an educational or training course on patient safety in the OR (Table 1).

OR nurses' attitudes towards patient safety culture

The total nurses' attitudes mean score of the pretest was 3.3 ± 0.20 . This result indicated relatively negative attitudes of the OR nurses towards patient safety culture, since the nurses' total attitudes was below score of 60%. Table 2 identified the total nurses' attitudes according to safety scales.

Table 1: Sample's Characteristics (n = 66).

Variables	Frequency (%)
Gender	
Male	32 (48.5)
Female	34 (51.5)
Education Level	
Bachelors degree in nursing	23 (35)
Diploma degree in nursing	43 (65)
Attending Safety Education	
Yes	7 (11)
No	59 (89)

Table 2: The SAQ Scale and Subscale Descriptive Statistics (n= 66).

Subscale	Mean (SD)
Total Teamwork Climate mean Score	3.3 (\pm 0.31)
Total Safety Climate mean Score	3.2 (\pm 0.30)
Total Stress Recognition mean Score	3.3 (\pm 0.39)
Total Job Satisfaction mean score	3.5 (\pm 0.34)
Total Perception of Management mean Score	3.2 (\pm 0.46)
Total Working Conditions mean Score	3.3 (\pm 0.32)
Total Attitudes mean Score Pretest	3.3 (\pm 0.20)

The highest total mean score of the safety scale was 3.5 ± 0.34 reported for the job satisfaction subscale which is slightly above the cut point. While the lowest subscale total mean score was 3.2 ± 0.46 reported for perception of management subscale. For the teamwork subscale, the total mean score was 3.3 ± 0.31 . For the safety climate subscale, the total mean score was 3.2 ± 0.30 and for the Stress Recognition subscale the total mean score was 3.3 ± 0.39 . Finally, the working condition subscale and the total mean score was 3.3 ± 0.32 (Table 2).

On the individual level of the descriptive analysis of the nurses' attitudes towards patient safety culture subscale revealed that the highest items mean score was 3.77 ± 0.78 , reported for the item "I am less effective at work when fatigued" and the second highest item mean score reported for "I am proud to work in this hospital" with an item mean score of 3.6 ± 0.67 . The third highest item mean score was reported for "I have the support I need from other personnel to care for patients" with an item mean score of 3.6 ± 0.58 .

The lowest item mean score was 2.9 ± 0.60 reported for the item "When my workload becomes excessive, my performance is impaired". The next lowest mean score was for the item "In this clinical area, it is difficult to discuss errors" with a total item mean of 3.01 ± 0.56 and the last lowest mean score was for the items "I receive appropriate feedback on my performance", and "fatigue impairs my performance during emergency situations" with a total mean score of 3.0 ± 0.67 . Table 3 represents the total mean score for each item and scales before and after the intervention (n = 66) (Table 3).

Discussion

Effect of Education Program on Nurses' Attitudes towards Patient Safety Culture

In the current interventional study, the overall OR nurses' attitudes towards patient safety culture after SSEP significantly improved from total mean attitudes score of 3.3 ± 0.20 before the SSEP to total mean attitudes score of 3.8 ± 0.30 after the program. The mean difference before and after the SSEP was statistically significant $t = 8.59$, $p < 0.001$. Results indicated that the SSEP succeeded in significantly improving the percentages of positive responses of OR nurses on all six safety culture subscales.

All six safety culture subscales improved after the SSEP. According to the conceptual framework as adopted from TPB, the control beliefs

were identified as the factors that influence OR nurse's attitudes towards patient safety culture. Azimi, Tabibi [25] pointed out that external intervention was directed towards the attitudes. Perceiving the power of these factors was included in the content of SSEP to press towards positive attitudes. The results indicated that the highest subscale mean score was associated with Stress Recognition subscale, followed by the Teamwork subscale. The results also revealed that the highest positive attitudes mean scores were associated with the items "I like my job", and the next highest mean was associated with the two items "management doesn't knowingly compromise patient safety", and "I am less effective at work when fatigued". While the lowest mean scores were associated with the items "In this clinical area, it is difficult to discuss errors", and the next highest item was "trainees in my discipline are adequately supervised". The results of the current study were consistent with the conceptual framework as adopted from TBP. Implementing such intervention SSEP towards nurse's attitudes positively affected nurses' attitudes towards patient safety culture.

In fact, the OR nurses revealed that the program was the first experience for them. Nurses came to the class with hesitancy, wondering whether they would learn anything new or useful. By the end of each session, nurses stated that the information provided was indeed new to them and was very interesting. On the other hand, the other OR nurses who did not attend the SSEP asked the researcher to conduct the program for them. This result was expected since the program was well developed and the presenter was one of the OR team and had long experience in the OR.

The result of the current interventional study is congruent with Paige, Kozmenko [26] who studied the effect of repetitive training using simulation on the teamwork attitudes of the OR personnel. Training was conducted during two days and a half. Results indicated that a statistical significant improvement after training for module 1 was 0.46 units (0.23 versus 0.69 units) and for module 2 was 0.42 units (range, 0.15 to 0.53 units).

Similarly, Azimi and Bahadori [22] evaluated the attitudes of nurse managers towards patients' safety culture before and after the Safety Culture educational program. Their result indicated that the education program has positive impact on nurse managers' attitudes towards patient safety and documented statistically positive improvements in safety domains of the Hospital Survey on Patient Safety Culture (HSPSC) instrument. Thus, nurses' attitudes before and after education program were 61.7 versus 74.7. Moreover, Wolf, Way [27] studied the impact of a multidisciplinary MTT on the OR staff attitudes towards patient safety culture using the SAQ [18]. The result indicated a significant improvement on all six safety subscales after the MTT, the highest scores were for perception of management subscale and working condition subscale. Finally, Marshall and Manus [28] implemented a human factors program training in five diverse surgical facilities across the United States. The average positive responses between the pre-intervention assessment and the post-intervention assessment gain for the overall percentages of safety climate subscale were 6% among all respondents.

The results of the present study reflected a more significant improvement than other international research studies. For instance, AbuAIRub, Alhijaa [15] studied the impact of patient safety educational interventions among senior nurses on their perceptions of safety culture in private hospital. After four months of education program, data were collected. The result indicated that the educational program succeeded in improving significantly the percentages of positive responses of participants in only two safety subscales. While the overall perception of safety was 51.5 versus 60.6. van Beuzekom, Boer [29] studied the effect of education program on operating room staff focusing on selected latent risk factors (material resources, communication, teamwork) that influence patient safety culture found a positive effect of the intervention on seven out of twelve subscales.

Table 3: The total mean score for each item and subscale before and after intervention (n = 66).

	Pretest		Posttest	
	Mean	Standard Deviation	Mean	Standard Deviation
Teamwork				
It is easy for personnel in the ORs here to ask questions when there is something that they don't understand.	3.5	0.63	3.9	0.63
I have the support I need from other personnel to care for patients.	3.6	0.58	3.8	0.70
Nurse input is well received in this clinical area	3.3	0.70	3.8	0.80
In the ORs here, it is difficult to speak up if I perceive a problem with patient care.	3.1	0.74	3.5	0.73
Disagreements in the ORs here are resolved appropriately (i.e., not who is right but what is best for the patient).	3.51	0.789	3.90	0.80
The physicians and nurses here work together as a well- coordinated team	3.2	0.52	3.7	0.80
Total teamwork climate	3.4	0.32	3.7	.35
Safety Climate	Mean	Standard Deviation	Mean	Standard Deviation
The culture in this clinical area makes it easy to learn from the errors of others	3.3	0.77	3.7	0.82
Medical errors are handled appropriately in this clinical area	3.31	0.61	3.81	0.67
I know the proper channels to direct the questions regarding patient safety in the ORs here	3.36	0.77	3.59	0.76
Safety Climate	Mean	Standard Deviation	Mean	Standard Deviation
I am encouraged by my colleagues to report any patient safety concerns I may have	3.2	0.68	3.8	0.79
I receive appropriate feedback about my performance	3.0	0.67	3.6	0.79
I would feel safe being treated here as a patient	3.31	0.66	3.96	0.76
In this clinical area, it is difficult to discuss errors	3.0	0.56	3.3	0.75
Total Safety Climate Score	3.2	0.30	3.6	0.38
Stress Recognition	Mean	Standard Deviation	Mean	Standard Deviation
When my workload becomes excessive, my performance is impaired.	2.9	0.60	3.98	0.59
I am more likely to make errors in tense or hostile situations.	3.3	0.59	4.0	0.90
Fatigue impairs my performance during emergency situations	3.0	0.82	3.7	0.66
I am less effective at work when fatigued.	3.8	0.78	4.0	0.71
Total Stress Recognition Score	3.3	0.39	3.9	0.44
Job Satisfaction	Mean	Standard Deviation	Mean	Standard Deviation
This hospital is a good place to work at	3.2	0.76	3.7	0.73
I am proud to work at this hospital	3.6	0.67	3.7	0.70
Working here is like being part of a large family	3.4	0.55	3.6	0.74
Job Satisfaction	Mean	Standard Deviation	Mean	Standard Deviation
Moral is high in the ORs here	3.6	0.63	3.7	0.74
I like my job	3.5	0.66	4.0	0.78
Total Job Satisfaction score	3.5	0.34	3.7	0.41
Perception of Management	Mean	Standard Deviation	Mean	Standard Deviation
Management does not knowingly compromise patient safety	3.3	0.73	4.0	0.66
Management supports my daily efforts	3.0	0.80	3.6	0.70
I am provided with adequate, timely information about events in the hospital that might affect my work	3.1	0.76	3.6	0.71
The levels of staffing in this clinical area are sufficient to handle the number of patients	3.3	0.66	3.8	0.76
Total Perception of Management score	3.2	0.46	3.8	0.45
All the necessary information for diagnostic and therapeutic decisions is routinely available to me	3.5	0.50	3.8	0.74
This hospital deals constructively with the problems of physicians and employees	3.1	0.85	3.5	0.72
Working Condition	Mean	Standard Deviation	Mean	Standard Deviation
Trainees in my discipline are adequately supervised	3.5	0.72	3.4	0.72
This hospital does a good job of training new personnel	3.3	0.56	3.8	0.65
Total Working Conditions Score	3.3	0.32	3.6	0.43

While the communication domain showed lower posttest scores than pretest scores. Lapoint [30] examined the impact of training education on the safety culture attitudes of preoperative caregivers. Change in respondents' attitudes regarding the overall patient attitudes safety culture with a total mean score of 35% versus. 52%. The

teamwork climate subscale showed significant improvement after intervention with average percent of positive responses increased up to 17%. Furthermore, management support for patient safety subscale showed positive responses increase by 13%.

The findings of the current study are consistent with other

international studies. For instance, Hull, Arora [31] who assessed the attitudes of junior OR nurses towards patient safety culture. The result of baseline assessment revealed that the total attitudes of participants were documented negatively with a total mean score of 55%. A significant improvement was observed after the education program with a total mean score of 68%. Furthermore, it was consistent with Watts, Percarpio [32] who studied the effect of the MTT program on the operating room staff attitudes towards patient safety using the SAQ [18]. The baseline assessment showed that the total attitudes were positive with a total mean score of 64.9%. The attitudes post MTT intervention improved with a total mean score of 69.3%. The highest score was for the job satisfaction climate subscale with a total mean score of 73.4%. While the lowest score was for the perception of management climate subscale with a total mean score of 63.7%.

The findings of the current study were lower than Weaver, Lyons [33], who studied the effect of team training program of the OR staffs on perceptions of patient safety culture and teamwork attitudes. The result revealed that the staff perceived the safety culture positively with a total mean score of 3.63 ± 0.80 versus 4.0 ± 0.96 . Furthermore, the teamwork subscale perceived by staff positively with a total mean score of (4.89 ± 0.58) vs. (5.18 ± 0.61) . The result showed a positive impact of team training program on the OR staff's attitudes. Furthermore Azimi and Bahadori [22] who studied the effect of training on nurses' attitudes towards safety culture three months after the end of the training course. The results indicated that all safety culture attitudes have significantly improved with average nurses' safety attitudes gained by 44% which is higher than the mean scoring reported in the present study. Finally, Arora, Aggarwal [34] studied the effect of a 3-hour safety culture training program on surgical residents' attitudes and awareness of patient safety culture. The result indicated that a significant improvement was documented post training intervention with a total mean score of 45.26% versus 70.59.

Study Limitation

This study used a convenience sample technique which possibly resulted in selection bias. Data were collected from Military organization which limits the generalizability of study findings. However, this study has several strengths. It is the first study in Jordan that assesses the OR nurses' attitudes towards patient safety culture using an education program intervention thus building on a body of knowledge. The findings of this study can provide a basis for comparisons with findings from other healthcare sectors. This study also provides information about selected demographic variables in relation to patient safety culture. The study used a research design that is suitable to achieve the study purposes and to answer the study questions.

Conclusion

Enhancing a culture of patient safety needs collaboration and networking among all Jordanian health institutions such as Jordanian Nursing Council (JNC), Jordanian Nursing and Midwifery Council (JNMC), RMS, MOH, and private sector through incorporating patient safety concepts into the nurses' orientation programs and continuous education programs. Moreover, preparing well-informed nurses through university curricula is critical for enhancing patient safety culture.

Relevance to Clinical Practice

This study used a convenience sampling technique to recruit the participants. Using random selection methods is highly recommended. Further studies including all multidisciplinary personnel working in OR with a larger sample size and across multiple health sectors i.e. governmental, military and private hospitals could reveal important information.

It can be helpful to develop strategies and action plans that focus on improving the areas of weaknesses of the safety culture that contributes

to patient safety culture outcomes, evaluate the impact of different patient safety interventions and identify barriers to improve. The finding of this study provided baseline data of the factors that attributed to negative attitude towards safety culture. Clinical setting can promote appropriate measures that improve the working environment.

Ethical Approval and Consent to Participate

The ethical approval was obtained from the Medical school and from the hospital. In addition, Consent form was sought from all the study participants.

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