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Assessing Treatment Personnel's Trauma Patient Management Skills at Emergency Centers in Baghdad, Iraq

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Quantitative Study

Abstract

Background: Trauma is one of the most significant problems and challenges of a contemporary and industrial culture that has been addressed in most nations. Due to the significance of pre-hospital care in the trauma treatment system, the current study was conducted with the aim to examine the impact of learning-based education based on a modified team.

Methods: From among the 207 emergency center personnel in Baghdad, stratified random sampling was used to select 140 to participate in a clinical trial. The participants were divided into intervention and control groups. The intervention group was trained in trauma management using a problem-based learning strategy, whereas the control group received no training. The data collection tools included a demographic information form and the Brief Trauma Questionnaire (BTQ). The SPSS software was used for data analysis.

Results: Multiple post-hoc comparisons showed that the mean score of trauma patient management skills did not significantly differ between the two groups during the pretest ($P = 0.918$). However, a statistically significant difference was seen between the two groups during the posttest and follow-up stages ($P < 0.001$). An analysis of variance revealed that the interaction effect of time and intervention on the mean score of trauma patient management skills was statistically significant ($P < 0.001$).

Conclusion: Finally, it is concluded that taking appropriate, accurate, and scientific measures will reduce mortality due to trauma and irreversible complications in the family and society.

Keywords: Problem-based learning; Trauma nursing; Emergency medical services; Management

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Introduction

In developed and developing nations, trauma is among the leading causes of death and disability. According to global studies, 10% of deaths worldwide are caused by trauma. Moreover, 90% of trauma-related deaths occur in low-income and middle-income countries, and the number of trauma-related deaths is expected to rise by 2030 (Awwad, Ng, Lee, Lim, & Rawajbeh, 2021). Society has incurred substantial economic and social costs as a result of trauma. In light of this, health care policymakers have taken fundamental steps to create care systems for these patients. Managing and caring for trauma patients with acutely life-threatening conditions is typically challenging and increases anxiety among the medical staff (Colonna et al., 2022; Hogan & Boone, 2008).

Today, the provision of health care and medical services is regarded as one of the indicators of a society's level of development (Howard & Dumond, 2015). One of the important pillars of care is the provision of pre-hospital care and services; these services are provided to trauma patients based on the clinical judgment and timing of emergency technicians (Mohammadi, Zargar, Malekpour, Omidi, & Akbari, 2018). Consequently, clinical decision-making is an important process, and the validity of clinical decisions depends on appropriate and reflective judgment (Balfour, Powell-Bowns, Leow, & Arthur, 2021). Previous researches have demonstrated that the failure of emergency technicians to make timely and accurate decisions endangers the community's health, prolongs the treatment and care of patients, and causes them problems (Yan, Slidell, & McQueen, 2021; Su, Kaplan, Burd, Winslow, Hargrove, & Waller, 2017).

Evidence shows that enhancing patient care can reduce trauma-related complications and mortality, and increase patient survival. Advanced trauma life support (ATLS) was first introduced in Nebraska in 1978 by the American College of Surgeons. It enhances physicians' professional knowledge and skills in caring for trauma patients (Rattan, Ravi, Rao, Kaur, Kant, & Misra, 2021). This method is a combination of lecture and clinical simulation that is widely used worldwide. One of its objectives is to increase knowledge of the trauma care system and foster critical thinking in decisions related to trauma patients. In many nations, this course is required for emergency medical personnel. Studies have demonstrated that careful care based on current ATLS global trauma standards improves treatment and reduces long-term disability and trauma-related mortality. ATLS is a formal training program for physicians and nurses to increase their knowledge of providing prompt and timely care to trauma patients (Laghari et al., 2021). Its purpose is to expedite emergency interventions for these patients within the first few hours of hospital admission to improve their recovery outcomes (Wentian, Baoliang, & Fritzsche, 2020). Considering the significance of emergency nurses' work with trauma patients and the prevalence of accidents, accidents, and natural and artificial disasters, the preparation of nurses for the provision of medical care is crucial. By increasing the preparedness of emergency nurses and providing better care to trauma patients, it is expected that the effects of trauma (Perry, 2008). Inadequate preparation of emergency department nurses affects the quality of care provided to patients and trauma victims. Lack of practice, knowledge, and relevant skills are the primary causes of emergency nurses' subpar performance in providing care to trauma patients (Brown, Tidwell, & Prest, 2022; Mohammad, Branicki, & Abu-Zidan, 2014).

The results of the study by Carley and Driscoll (2001) revealed that the care provided to trauma patients falls far short of the international standards. There are

concerns regarding all aspects of emergency care provided to trauma patients. Due to the lack of skills and knowledge of emergency nurses regarding the rapid treatment of life-threatening conditions, many preventable deaths occur. Some studies on this topic have acknowledged that most nurses have insufficient knowledge, competence, and experience to care for trauma patients, which may be due to a lack of accurate assessment of nurses' abilities and identification of their weaknesses. In the study by Sand (2019), nurses in rural hospitals in the United States were inadequately prepared and required training in various skills to care for emergency patients. A lack of clinical competence can result in poor performance in the care of trauma patients; thus, it is essential to assess the competence of nurses and identify their knowledge and skill gaps. Before caring for a trauma patient, nurses should be aware of their knowledge and skill gaps. With appropriate training, the most important aspect of caring for a trauma patient should be addressing these limitations.

Given the significance and magnitude of trauma and its harmful material and immaterial consequences for the individual and society, particularly in developing nations, it is crucial to implement effective interventions to prevent and reduce its complications (Jorgensen, Monrad-Hansen, Gaarder, & Naess, 2021). In addition, given the importance of pre-hospital care in providing services and transporting the injured, these measures can serve as a criterion for evaluating the skills of emergency medical personnel in dealing with the wounded (Ali, Sorvari, Camera, Kinach, Mohammed, & Pandya, 2013). Therefore, continuous evaluation of the competencies of emergency medical personnel is necessary. The performance appraisal compares the current situation to the desired or ideal circumstances based on predetermined indicators and characteristics. By evaluating the performance of human resources, individuals can receive appropriate feedback to enhance their performance, modify their occupational behaviors within the organization, and develop their expertise while correcting errors. A performance evaluation system is a tool for increasing and improving the quality and quantity of human resources as part of management oversight (Mitchnik & Rivkind, 2022; Mastrianni et al., 2021).

Furthermore, qualitative studies conducted in Iraq have underestimated the ability of emergency technicians to think critically and make clinical decisions, highlighting the significance of implementing methods that influence the critical thinking and clinical decision-making abilities of emergency technicians. Some studies indicate that ATLS training improves the treatment outcomes of trauma patients. Although trauma patient education is increasingly incorporated into the curricula of medical and nursing students, medical personnel's level of knowledge and practice in treating trauma patients is questionable. In light of the significance of correct clinical decision-making and its effects on trauma patients, this study was conducted with the aim to determine the impact of implementing the ATLS method on trauma patient management. This study evaluated the skills and knowledge of the emergency department staff of hospitals in Baghdad, Iraq, regarding trauma patients in order to evaluate the quality of care provided to these patients and education in this regard.

Methods

The current study was a clinical trial conducted on 140 emergency medical personnel in Baghdad beginning in 2019. The participants were selected via stratified random sampling proportional to each group's population proportion. The study enrolled 70 participants to calculate the sample size using formula 1 to compare the two means with 98% confidence interval (CI) and 90% power for each group.

$$n1 = n2 = \frac{\left(Z_{1-\alpha/2} + Z_{1-\beta}\right)^2 (S_1^2 + S_2^2)}{(\mu_1 - \mu_2)^2} \quad (1)$$

First, the list of personnel working in emergency medicine in Baghdad (207 individuals, including 74 nursing specialists, 29 anesthesiologists, 78 emergency medical specialists and experts, and 26 nursing diploma technicians) according to Graduated was stratified randomly. Then, the participants (140 individuals) were chosen randomly based on each group's population ratio (51 nursing experts, 18 anesthesiologists, 54 emergency medical experts and technicians, and 17 nursing diploma technicians). Subsequently, using a table of random numbers, the participants were assigned to the control and intervention groups through simple randomization. After identifying the members of the intervention group using a simple random sampling method, they were divided into 7 small groups. The 7-person groups were determined through a lottery. The demographic characteristics of the research groups are presented in table 1.

The study inclusion criteria included consent to participate in the study, a minimum education of a diploma in nursing related to emergency medicine, no history of attending team-based training workshops or working in the operations field, and an employment order. The exclusion criteria included unwillingness to participate in the study and absence of more than 3 hours from the workshop. Among the data collection instruments was a checklist of trauma patient management skills. The trauma patient management skills checklist for pre-hospital trauma care includes a trauma patient survey on 48 points. Each skill on the survey was given 1 point, and non-performance received no points (Quon, Riddell, Bench, Roepke, & Burner, 2022). It should be noted that 10 lecturers and experts from Diyala University, the Iraqi Medical Emergency and Accident Management Center, and the Baghdad Emergency Center reviewed and approved the formal and content validity of the tools. The reliability of the clinical skills checklist was assessed using the Kuder-Richardson criterion. The reliability coefficient for each of the competencies on this list was 0.83.

It is also important to note that the Brief Trauma Questionnaire (BTQ) was utilized in the study's continuation. The class dates were adjusted to accommodate shift schedules and participants' shifts to prevent shifts from interfering with training sessions. In the intervention group, trauma patient management training was administered in 3 stages using the ATBL method (Wise, Carpenter, Mohanty, Abdul, & Hughes, 2021).

Table 1. Comparison of frequency and demographic characteristics of research groups

Demographic characteristics		Intervention group		Control group	
		Number	Percentage	Number	Percentage
Gender	Male	31	44	27	39
	Female	39	56	43	61
Marital status	Single	16	23	12	17
	Married	54	77	58	83
Age (year)	< 35	21	30	19	27
	35-45	34	49	38	54
	45 ≥	15	21	13	19
Job rank	Nursing experts	25	36	26	37
	Anesthesiologists	9	13	9	13
	Emergency medical experts and technicians	27	38	27	39
	Nursing diploma technicians	9	13	8	11

The initial phase consisted of pre-class preparation. After the introductory session, the training method and educational objectives were described in detail. The staff was also briefed on the materials required for each training session based on the subject matter. The training materials included books, PowerPoint presentations, and videos. The second and third stages of the ATBL method were covered in the first and second training sessions a week after the introductory session (Kruse, Bruce, Bekker, & Clarke, 2021). The first 15 minutes of the second phase of each training session were devoted to evaluating the participants' readiness. At the beginning of the training session, the intervention group was given a readiness assessment consisting of 30 questions based on the educational content. This test took 20 minutes to complete. Then, the group readiness assurance test was administered in 20-minute increments with identical questions. After answering the questions, the instructor reviewed the responses and clarified several concepts that were not understood. The third and most important stage consisted of training in the practical management of trauma patients. Each group was tasked with introducing a patient to the topic's fundamental concepts and skills. Each group completed this task in 15 minutes. Then, the instructor requested that the teams demonstrate their abilities. Answers were presented in various ways, including on a patient, mannequin, or classroom board, and through presentation, discussion, and group feedback. Finally, the instructor reviewed each team's assignments and compiled the best answers and performances. The final 20 minutes of the third stage were devoted to staff training and troubleshooting. In accordance with the research objectives, members of the intervention group were instructed not to share any information with the control group or other personnel. The trauma patient management skills of both the intervention and control groups were evaluated 2 weeks and 2 months after the intervention. For statistical analysis, SPSS software (version 16; SPSS Inc., Chicago, IL, USA) was used. The Kolmogorov-Smirnov test was used to examine the data's normality. The data followed a normal distribution, so parametric tests were used for statistical analysis ($P > 0.05$). The means were compared before the intervention, and 2 weeks and 2 months after the intervention using a test of repeated measurements. Figure 1 depicts the study's steps in a schematic format.

Results

This study compared quantitative variables between groups using an independent t-test. There was no correlation between quantitative contextual variables and the study groups ($P > 0.05$). In terms of underlying quantitative variables, it can be concluded that the control and intervention groups are quantitatively equivalent. After the educational intervention, the mean scores of the trauma patient management skills increased in the intervention group. There was no difference between the mean pretest, posttest, and 2-month follow-up scores in the control group (Table 2).

The interaction effect of time and intervention on the mean score of trauma patient management skills was significant ($P < 0.001$), as indicated by the analysis of variance (ANOVA). The trend of variable response (skills in trauma patient management) over time differed between the 2 groups. Given that the significance level of the time variable is less than 0.05, the assumption that the various levels of the time factor are identical is false. Consequently, a statistically significant difference was observed in the mean trauma patient management skills scores at various times ($P < 0.001$).

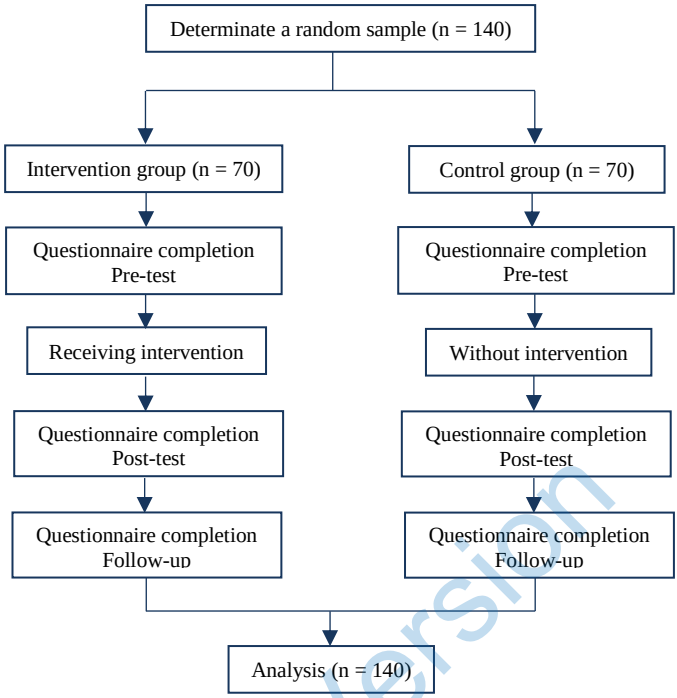

Figure 1. Different steps of the present study
Pre-test: Before intervention; Post-test: Two Week after intervention; Follow-up: Two months after intervention

Regarding the intervention's main effect, the ANOVA table reveals a statistically significant difference between the intervention and control groups in the trend of the mean score of trauma patient management skills ($P < 0.001$). (Table 3).

Multiple post hoc comparisons revealed that, prior to the intervention, the mean score of trauma patient management skills did not differ significantly between the two groups ($P = 0.918$), indicating that, prior to the research, the two groups' trauma patient treatment skills were comparable. Table 4 reveals a significant difference between the two groups' mean scores on the trauma patient management skills test 2 weeks and 2 months after the intervention.

Multiple comparisons between the mean scores of trauma patient management skills in the control and intervention groups revealed a significant difference between the intervention group's pre-intervention and post-intervention scores. Moreover, the mean scores of trauma patient management skills were significantly different 2 weeks and 2 months after the intervention ($P < 0.05$).

Table 2. Mean and standard deviation of trauma patient management skills score in the intervention and control groups before and after training

Time	State	Intervention group (mean ± SD)	Control group (mean ± SD)
Before intervention	Pretest	26.71 ± 4.13	26.93 ± 3.43
Two weeks after the intervention	Posttest	35.63 ± 3.57	26.14 ± 4.17
Two months after the intervention	Follow-up	34.19 ± 3.72	26.73 ± 3.27

SD: Standard deviation

Table 3. Comparison of pretest, posttest, and follow-up of trauma patient management skills in the intervention and control groups using analysis of variance

Trauma patient management	Total squares	Average squares	Degrees of freedom	P-value
Main effect (time)	612.43	612.43	1	< 0.001
Main effect (intervention)	1973.12	1973.12	1	< 0.001
Reaction (with intervention)	738.92	738.92	1	< 0.001
Error component (time)	253.67	2.73	89	0.590
Error component (intervention)	3015.17	27.64	89	0.410

After the intervention, the score of trauma patient management skills increased significantly. Furthermore, in the control group, the mean scores of trauma patient management prior to, 2 weeks after, and 2 months after the intervention did not differ significantly (Table 5).

Discussion

The researchers aimed to look into the impact of trauma patient management training based on a modified team-based learning method on emergency center personnel in Baghdad in 2019. As the first line of treatment for trauma patients, physicians should be able to control and manage the critical situation that arises when dealing with these patients. Consequently, emergency rooms and medical centers should have a formalized training program. Moreover, given that one of the objectives of ATLS is to teach patients rescue skills in critical and stressful trauma situations, it seems that a more concerted and formal effort should be made to provide such training across disciplines. Among them are the medical and other related fields, including the nursing care of trauma patients in primary care centers.

Before the intervention, there was no statistically significant difference between the two groups regarding the mean score of trauma patient management skills. In comparison, this difference was statistically significant after the intervention. In other words, the group that participated in the educational intervention based on the modified team-based learning had a higher mean score of trauma patient management skills than the control group. Training emergency medical personnel in a group setting is more effective. In this study, the posttest was administered 2 weeks after the intervention, and the follow-up was 2 months after the intervention without the participant's knowledge. A lack of study time may have been a result of this situation. ATBL's ability to thrive can be attributed to its high posttest scores. This finding is consistent with that of other researches indicating that learning is better retained for a longer time following ATBL.

Williams, Lockey, and Culshaw (1997) demonstrated that even condensed training could significantly improve staff and student performance in dealing with a simulated trauma patient. Such training must be conducted with extreme caution. Jayaraman, Sethi, and Wong (2014) examined ATLS skills training in individuals other than physicians and nurses, i.e., dispatch ambulance teams, and found no advantage to ATLS training for these teams.

Table 4. Investigating the difference in the mean of trauma patient management skills between the study groups using post hoc method

Time	State	Group	Difference of mean ± SD	Adjusted P-value
Before intervention	Pretest	Intervention-Control	-0.22 ± 0.54	0.918
Two weeks after the intervention	Posttest	Intervention-Control	9.49 ± 0.67	< 0.001
Two months after the intervention	Follow-up	Intervention-Control	7.46 ± 0.36	< 0.001

SD: Standard deviation

Table 5. Investigating the difference in the mean of trauma patient management skills within the groups using post hoc method

Group	Comparison	Difference of mean ± SD	Adjusted P-value
Intervention	Pretest vs. Posttest	-8.92 ± 0.47	< 0.05
	Pretest vs. Follow-up	-7.45 ± 0.51	< 0.05
	Posttest vs. Follow-up	1.44 ± 0.37	< 0.05
Control	Pretest vs. Posttest	0.79 ± 0.39	0.83
	Pretest vs. Follow-up	0.2 ± 0.23	0.49
	Posttest vs. Follow-up	-0.59 ± 0.48	0.76

SD: Standard deviation

In addition, they concluded from an analysis that mortality increased in patients with a Glasgow Coma Scale (GCS) score of less than 9 who received ambulance care from personnel who had received ATLS training. According to the study by Alwawi, Amro, and Inkaya (2019), training nurses in trauma patient care based on the ATLS protocol increased their awareness and abilities to provide the best care to trauma patients worldwide, particularly in developing countries. Due to a lack of nursing education, this issue is less prevalent in developing countries. In a study by Studnek, Fernandez, Shimberg, Garifo, and Correll (2011) in the United States, titled "the relationship between performance in the medical emergency services scene using simulated stations and theory test," 96% of the 133 participants passed the practical exam. In a study conducted in Sweden, Lampi, Junker, Berggren, Jonson, and Vikstrom (2017) found that clinical decision variables improved significantly after implementing a life-saving exercise program. The findings of the study conducted by Baird, Kernohan, and Coates (2004) indicate that this exercise program positively impacts the performance and clinical decision-making of emergency department nurses after its implementation. In terms of the effectiveness of the educational intervention in enhancing clinical decision-making, it can be concluded that these studies support the findings of the present study.

The current study revealed that most of the emergency personnel in Baghdad are competent in caring for trauma victims in pre-hospital settings. Since some scores were significantly lower than the desired level, it is important to draw attention to them. In addition, the repetition and practice of practical skills, relevant training in this area, and additional workshops and training for emergency personnel are necessary in Baghdad to improve personnel's knowledge and skills. Given that attempting to save a trauma patient is one of the fundamental skills that medical personnel must acquire and that these skills and knowledge evolve, such training should be formally incorporated into the student education program and repeated in the form of refresher training. Depending on the readiness of medical staff to care for trauma patients, strengths and weaknesses of staff, and related demographic and organizational factors, managers of medical and nursing services can design and implement comprehensive training programs based on ATLS to strengthen the weaknesses of emergency personnel. Moreover, they must examine the effects of this training on the quality of care, patient safety, patient and family satisfaction, and the degree of disability and mortality among trauma patients.

The present study's limitations include a simple and accessible sampling technique and data collection via a self-report questionnaire. Different medical management positions, including nursing experts, anesthesiologists, emergency medical experts and technicians, nursing diploma technicians, and appropriate and local tools in the preparation field following ATLS guidelines are other limitations of

this study. In addition, the present study's strength lies in the improvement of learning and retention of the material 2 months after the intervention, which resulted in a significant rise in trauma patient management scores. It also resulted in the significant survival of course material.

Conclusion

In conclusion, the present study's findings demonstrate a correlation between trauma management program training and the improvement of emergency personnel's abilities and decision-making skills in the management of trauma patients. As a result, the pre-hospital emergency trauma management training program can be integrated into the emergency medical technician training program and regularly used as an on-the-job retraining program. Given the significance of clinical decision-making in pre-hospital emergencies, determining the level of appropriate clinical decision-making skills can be considered a requirement for hiring technicians. Determining the ideal level of clinical decision-making skills can be the subject of additional study. Clinicians should get regular retraining to keep their decision-making skills up to date and make sure they are making good clinical decisions. Based on the content of the trauma management program, it appears that this program effectively establishes a unified procedure in the principles of dealing with a trauma patient using a systematic approach by emergency medical technicians. In addition, it is suggested that qualitative research be conducted on nurses' perspectives regarding barriers to and facilitators of the quality of nursing care for trauma patients.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

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