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ORIGINAL ARTICLE

Developing a National Trauma Management Workshop in Iran Applying an Animal Model

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Abstract

Background: Traumas take a heavy toll throughout the world and Iran is increasingly involved in this problem. So, education and training of medical staff for successful handling of traumatic patients seem necessary. In this study, we tried to develop and evaluate a national training program on trauma management to use animal models through a trauma management workshop.

Methods: After primary survey and designing an advanced trauma management workshop, 144 practitioners of one armed force were randomly selected to be trained. Participants could experience some practical and new aspects. For example, they handled high velocity traumas and were involved throughout the different phases of trauma management under the supervision of experienced leaders. To assess the program, participants completed open-ended (essay), multiple-choice question (MCQ), and skill exams before and after the workshop.

Results: A trauma training program was developed and evaluated. In essay exam, scores significantly increased from 26 to 58, MCQ scores significantly rose from 49 to 65, and the participant's practical competency significantly improved from 46 to 75.

Conclusion: Immense attention is required to optimize doctors' training in trauma care to avoid fossilization of cognitive knowledge and skills.

Keywords: Trauma; Animal model; Training; Workshop

Introduction

Trauma has become a significant health problem throughout the world. Every day, 16000 people die due to traumas, and several thousands more are injured, many of whom with permanent sequelae.[1] The burden of death and disability caused by trauma is especially notable in low and middle-income countries. The greatest part of the total burden of trauma, approximately 90%, has so far occurred in such countries.[2-4]

The mortality of traumatic patients is surprisingly high in Iran. Road accidents, unlike those in most other countries, result in a mortality rate up to 20%.[5] Furthermore, including some other common traumas such as falling, drowning, burns, gunshot injuries, assault, mine explosion-induced injuries, traumas caused by natural disasters, etc., we find a huge dissimilarity in comparison to the global statistics.[6,7]

In addition to all aspects of injury prevention such as road safety, de-mining, disaster prevention, etc., efforts to improve care of the injured seem to be critical. Trauma care represents a major challenge to the clinician, no matter what his or her background would be. The life- and limb-threatening injuries that are daily parts of trauma care present some of the most difficult decisions any clinician may face. Many lives can be saved through inexpensive modifications in education, organization and the availability of simple tools. Such changes greatly simplify decisions and actions.[8]

For education, a variety of different courses of trauma care have been utilized worldwide. Some of these courses are Advanced Traumatic Life Support

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(ATLS), National Trauma Management Course (NTMC), Definitive Surgical Trauma Course (DSTC), Essential Surgical Skills (ESS), Primary Trauma Care (PTC) and Trauma Team Training (TTT).[8]

ATLS course provided by American College of Surgeons is the most widely utilized education course in trauma care worldwide. This course lasts two to three days and covers the breadth of trauma care, oriented primarily towards the first hour of care in an emergency room. It includes didactic lectures and skill stations, where key technical skills can be demonstrated and practiced using mannequins and anaesthetized animals.[9]

In this study, we tried to develop and evaluate a national training program on trauma management. For the first time in Iran, animal model was used in a trauma management workshop. High velocity traumas were practiced and participants were involved throughout the different phases such as; sedation, traumatizing procedure, transferring the injured animals and medical interventions under the supervision of experienced leaders.

Materials and Methods

After the review of trauma training programs in different countries, an advanced trauma management workshop was designed. The first participants were 144 general physicians (GPs) of one armed force who were randomly selected. They were classified in 6 groups: staff GPs (involved in official affairs) (group A), interns of a military hospital (group B), military executive managers (with doctorate degree) (group C), GPs of a military medical university (group D), GPs of a military clinic (group E) and GPs of a military hospital (group F) (Table 1).

Table 1: Number and percent of contributors of each subunit.

Subunit	No.	Percent
A	32	22.2
B	45	31.3
C	10	6.9
D	16	11.1
E	11	7.6
F	30	20.8

This workshop was a trauma management training program with animal model. It was held in 2 days. The first day included general topics of trauma: airway management, CPR, bleeding control, fluid resuscitation, management of burn and hypothermia and the second day consisted of specific topics of trauma: head, neck and spinal injuries, chest wall injuries, abdominal trauma and limbs' trauma. All topics were presented in both oral lectures (in the morning) and skill training (in the afternoon).

Skill classes were held in a mobile hospital. At first, airway management (airway opening, mask ventilation, working with laryngoscope, intubation, tracheotomy, etc.), CPR (cardiac massage, breathing, using drugs, etc), bleeding control, wound dressing and insertion of peripheral IV lines were taught on mannequins. Then, the participants were rotationally divided into two teams of anesthesia and surgery. The anesthesia team had the responsibility of anaesthetizing the animals (before injury) and after injury doing primary assessment, position modification, airway management and CPR, bleeding control, IV line insertion and fluid therapy. The surgery team was responsible for preparing surgical instruments and performing the procedures such as cut down, diagnostic peritoneal lavage (DPL), chest tube insertion, fasciatomy, immobilization, etc. Simultaneously, the anesthesia team kept the animal asleep and made its vital signs stable.

Our animal model was goat (due to its size and availability). It had to be NPO from 24 hours before anesthesia. Specific parts of its body were shaved and the animal was anesthetized outdoor. It was hanged and then injured by a bullet/knife.

To evaluate the program, we applied two tests before and after the workshop including 1. MCQ to assess the knowledge quantity (9 questions), and 2. The open-ended exam (essay) to assess the knowledge quality (6 questions). We compared their knowledge before and after the workshop. References of questions were Pre-hospital Trauma Life Support (PHTLS),[10] Save limbs and Save lives.[11] The maximum possible grade was considered 100. The third skill exam was to assess the technical skills, using the mannequins and the injured animals. The maximum grade was 100 based on definite scales.

The obtained data) were analysed, using Paired t test for comparison of pre and post exam (MCQ, open-ended and skill) scores of all participants. ANOVA was also used to evaluate and compare pre exam and post exam mean scores of the mentioned 6 groups. The level of significance was set at $p<0.05$. All statistical analyses were performed using the SPSS software (Version 13.5, Chicago,

IL, USA).

This study was approved in the institution Ethics Committee based on humanity, intending to help mankind and manage injuries. Before bullet or knife injury, the animals were completely anesthetized. The animals were sacrificed at the end.

Results

A trauma training program was developed and evaluated. For the first time in Iran, animal model was used in a trauma workshop and high velocity traumas were focused. Participants were 144 GPs of different parts of an armed force. Their mean age was 34 years. Most of them were male (130) and the rest (14) were female. Figure 1 compares the aggregative score of the three exams between different groups before the workshop. Before the workshop, contributors' knowledge of answering written questions was lower than 50% of the total exam grade (except group E). Comparing the primary skill and knowledge abilities of different forces from A to F indicated that there was an apparent distinction between the primary total mean scores of groups B (132.58) and E (133.91) in comparison with those in groups A (106.97) and C (105.2), but this difference was significant only between groups A and B (p<0.05).

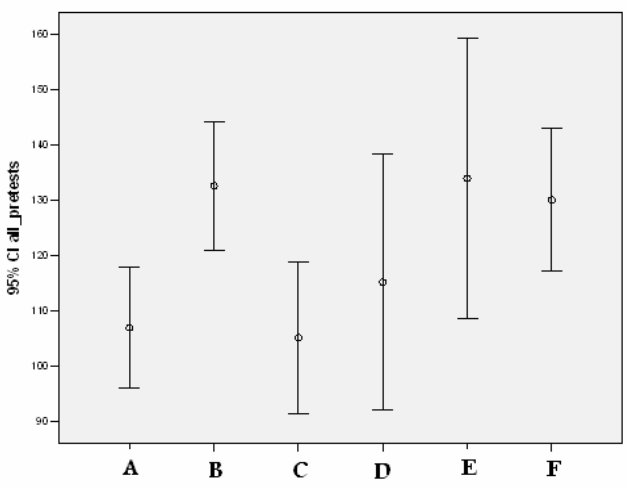

Fig 1: Comparison of the aggregative score of the three exams (MCQ open-ended and skill) among different groups before the workshop.

At the end of the workshop, contributors' skill mean score increased from 46.65±13.53 to 75.54±13.53. This improvement was statistically significant (p<0.001). The contributors' mean score in answering multiple choice questions (knowledge quantity) improved from 49.8±1.25 to 65.06±1.45 (p<0.01). Their ability of answering written questions (knowledge quality) changed from 26.14±2.02 to 58.14±1.92, which was statistically significant (p<0.01) (Tables 2). Totally, the three indicators revealed an improvement (workshop efficacy).

Table 2: Mean score of the three exams before and after the Workshop.

Type of Exam	Number of participants	Mean Score	SD
Pre-essay	144	26.1458	24.2489
Post-essay	144	58.1458	23.0314
Pre-MCQ	144	49.8264	15.0572
Post-MCQ	144	65.0694	17.4210
Pre-skill	144	46.6597	13.5338
Post-skill	144	75.5486	11.5103

Comparison of knowledge and skill ability improvement among the groups (A to F) demonstrated non-significant difference after the workshop; in other words, the participants entered the workshop with different levels of skill and knowledge, but became almost the same after the workshop. In addition, their knowledge (according to essay-type and MCQ exams) and skill (according to the practical exam) were promoted to even a higher level than standards (Figures 2-4).

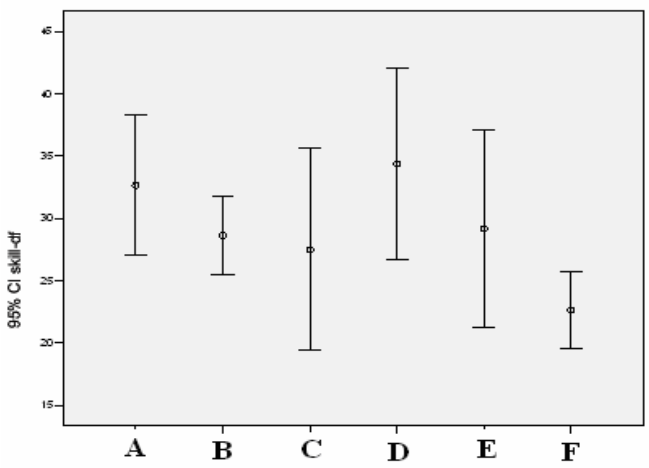

Fig 2: Comparison of skill scores among different groups after the workshop.

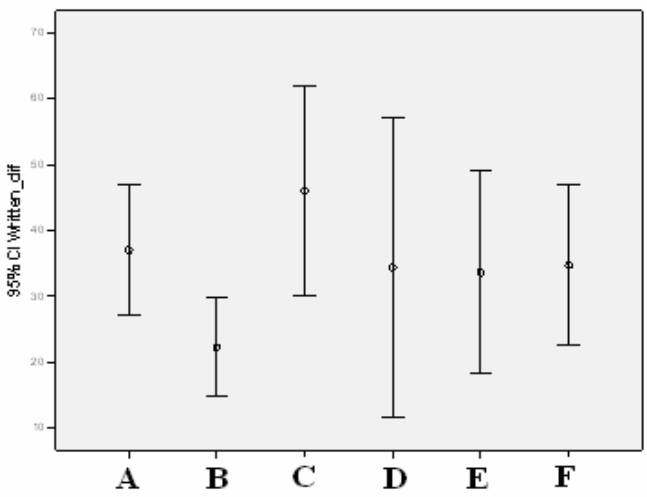

Fig 3: Comparison of essay scores among different groups after the workshop.

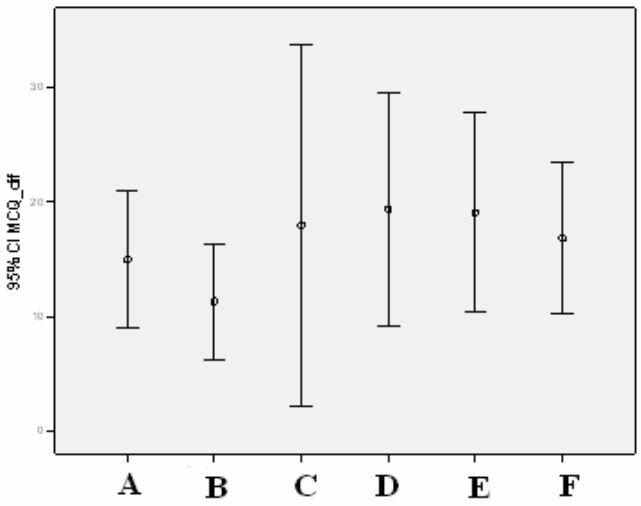

Fig 4: Comparison of MCQ scores among different groups after the workshop.

Discussion

The study demonstrated a significant improvement in knowledge quantity mean score (from 49 to 65), knowledge quality mean score (from 26 to 58) and skill mean score (from 46 to 75) of participants. This confirms GPs' dramatic progress in knowledge and skill after attending such workshops.

Great attention is needed worldwide to define and optimize doctors' training in trauma care. This pertains to both trauma-related skills imparted in basic education and those acquired during post graduate training. Continuing medical education (CME) for all practitioners involved must be promoted to prevent degeneration of cognitive knowledge and skills. Such continuing education also provides updates to all practitioners, no matter what volume of trauma care they are handling. Finally, continuing education courses offer the opportunity to better define the core elements of trauma care for a given environment. Not only in developed countries but regular CME courses have been implemented in developing countries to improve the process and outcome of trauma care.[7] For example, Ali et al.[12,13] evaluated the effect of regular provision of a two-day continuing education course, Advanced Trauma Life Support, at the largest hospital in Trinidad. Most of the doctors providing care for the injured patients at that hospital had taken this course. Compared to the period before such widespread trauma training, the authors noted an increase in appropriate use of several therapeutic modalities, including early (in the Emergency Department) endotracheal intubation, early insertion of chest tubes and the use of urinary and nasogastric catheters. In Ghana, a trauma continuing education course was developed to meet the needs of rural hospitals. This locally developed course improved the participants' knowledge and their self-reported process of trauma care.[14] Several similar CME courses have been utilized in low-income settings. The National Trauma Management Course (NTMC) in India and the Primary Trauma Care (PTC) course worldwide are two-day courses on initial trauma management. The Essential Surgical Skills (ESS) course in East Africa is a week long and covers a breadth of surgical problems, including trauma. As with ATLS, all of these courses approach improving trauma skills through the format of a brief, CME course.[15]

In Iran, many separated courses have been held on trauma care. For the first time, this course was established as a regular course. None of previous courses have focused on high velocity traumas which are greatly needed for military medical cadre. Using animal simulation as one of the fundamental changes recently introduced to medical education[16] (in different educational fields from endoscopy[17] and trauma management to pancreas transplantation[18] and laparoscopy[19]) was applied in this course for the first time.

In conclusion, this course had a significant effect on promoting the ability and knowledge of contributors. It is necessary to hold such workshops periodically as medical education continues. In addition to candidates' knowledge and performance improvement (the main goal), the project was successful in increasing collaboration between the Trauma Research Center and

medical subunits, and resulted in enhanced, on-going trauma education for general physicians.

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