Original Article

The basics of trauma needs-based training in asymmetric warfare

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ABSTRACT

Introduction: Trauma is the leading cause of mortality and one of the main causes of disability among the active populations in the battlefields. Therefore, trauma education is an important need for asymmetric warfare, which is met through training based on existing needs and possibilities. **Methods:** In this qualitative study, validated using Delphi technique in Tehran in 2019, the participants were selected from the experts and activities in the field of trauma in asymmetric warfare. Inclusion criteria included willingness to participate in the research, history of treatment activity, and trauma training in asymmetric warfare. This study is based on the two axes: (1) Investigating existing upstream documents and resources on trauma in asymmetric warfare. (2) Conducting structured interviews (based on training elements and trauma experiences in asymmetric warfare) with trauma experts and professors in asymmetric warfare. **Results:** The results obtained from the above resources, are defined and classified as 10 element training model (Akker). These results and related tables have also been reviewed and validated by trauma experts. **Conclusion:** The achievements of the present research explained the dimensions and indicators of trauma needs based training in asymmetric warfare that is an effective approach to increase the effectiveness of trauma learning and training in asymmetric warfare and increase the cost effectiveness. It is also an effective approach to organize trauma preparedness for all troops present in asymmetric warfare and can be presented as an operational protocol in terms of methodology and roadmap.

Keywords: Asymmetric warfare, medicine, training, trauma

Introduction

Trauma is the leading cause of death and one of the major causes of disability among the active population present on the battlefields. The condition of the battlefields and the possibilities of asymmetric warfare given trauma treatment its unique features that have been that have received little attention. Trauma preparedness can lead to significant reduction in long-term casualties and complications. Investigation of trauma-related mortality in asymmetric warfare shows that most casualties occur shortly after the injury, which results in effective patient management, if they are prepared to deal with trauma and take initial measures shortly after injury, until they reach the treatment teams. There would be also a significant difference in mortality and mold morbidity rates. Therefore, all troops present in the asymmetric warfare need to be prepared to deal with trauma. Therefore, trauma training is an important need for assymetric warfare, which is achieved through training based on existing needs and possibilities. On the other hand, trauma has also imposed a lot of direct and indirect economic and social costs, which have led policymakers and practitioners of education and healthcare system to adopt fundamental measures in this regard. These systems today make their policy based on the care needed. The advantages of these policies also included a reduction in mortality rates, the ultimate recovery of patients with severe trauma, and a reduction in socioeconomic burden.

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Trauma needs-based training in asymmetric warfare has been thus raised. Therefore, we first introduce the trauma needs-based training and its components and then define need, need assessments, and training in this study. The trauma needs-based training requires a curriculum and its elements. According to previous studies on the training discussed in the present study, Akker's model has been used to define the basics of trauma needs-based training in asymmetric warfare, which will be defined and interpreted later.

Military medicine and the military medicine training are the basis of medical training in issues related to military affairs. Therefore, we will also discuss military medicine training and issues related to the subject studied in the military medicine.

Training need assessments

Need assessment is an important tool in the design, development, and evaluation of continuing curriculum. For this purpose, we will investigative basics of trauma needs-based training in asymmetric warfare using Delphi method.[1]

Curriculum

Curriculum is a learning plan. Grant writes: Curriculum is based on all the learners' experiences that enable them to achieve their intended achievement during the training course. A curriculum must be able to express tasks, which should be performed by learners, teachers, and managers. They must know their duties during the course. The curriculum should describe the intended achievements of learners, content, teaching, learning, supervision, feedback, and evaluation process, needed inputs, and the course structure. A syllabus is just a list of topics covered in the field of study and makes up just one part of the curriculum.[2]

The curriculum designed for the medical field depends on the designer's perspective on the learning process, medical practice, accountability, and social responsibilities, the role of basic knowledge, professional values, and development of health services. A curriculum should answer the following questions: What are the goals of the curriculum? What are the experiences needed to achieve these goals? How are these experiences organized? How can one determine if the educational goals have been met? A curriculum should be solely tailored the purpose and content of the present day. As defined by postgraduate medical education and training board (PMETB)[1]:

curriculum is a statement of the intended overall goals and objective goals, the content, the experiences, the process, the outcomes of a curriculum that includes:
1. Description of the educational structure (required inputs, duration, and organization of the curriculum using a flexible evaluation system).

2. Description of the expected methods of learning, teaching, monitoring, and feedback.

"Grants" writes about the concept of syllabus: Syllabus is the curriculum content that should express what the learner will acquire in terms of knowledge, attitude, experiences, and skills.

Akker's curriculum elements spider web

While introducing elements of his syllabus, Akker showed the composition of these elements in the form of spider web. In fact, he seems to believe that these elements have a close and the complementary connection and any defect in each of them will endanger the whole system and prevent curriculum from reaching its goal.[1]

Steps in curriculum planning

Bazrafkan writes about the steps in curriculum planning: Curriculum planning can be assumed to include seven steps. At the time of designing the curriculum, he proposed 10 important questions as follows: 1. Need assessment 2. Learning outcomes 3. Agreeing the content 4. Organizing the content 5. Educational strategies 6. Teaching methods 7. Assessment 8. Communication 9. Educational environment 10. Curricular management.[1]

Research background

Considering the scope of their research, Khoshi *et al.* found that need assessment will be presented using individual and collective Delphi method and semi-structured individual interviews with trauma experts in a separate article along implementation of the trauma needs-based training scenario. It seems that combination and interdisciplinary learning using the science of education, training planning and trauma with both educational approaches is an effective approach to increase the effectiveness of trauma learning and training programs and facilitate access to educational goals and increase cost effectiveness in the face of accidents and traumas. In addition to providing learning opportunities and paying attention to the individuals' needs, it increases the attractiveness of trauma education and also urges authorities to pay due attention to it because trauma patients and professionals have a variety of needs, which should be classified and explained in terms of their priority to achieve predetermined goals.[3]

Taba stated that need assessment was assumed to proceed the determination and facilitation of goals. Viewing need assessment as the basis of the goal setting is a long-standing tradition in curriculum planning.[4] Fathi categorized needs into two categories: Training and psychological needs. He noted that training needs refer to those that reflect training demands or goals. In other words, these needs emphasize the necessity and importance of certain training such as the need for critical thinking training, the need to acquire social skills, and etc., These needs highlight the discrepancy between norms with desirable values and status quo in a given context.[5]

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1   - Postgraduate Medical Education and Training Board

Regarding the history of military medicine, Namjonik writes: Although the clear distinction between military medicine, including martial and non-martial medicine from the general aspects of medicine has been introduced as a specialized academic discipline in the military field since the beginning of the 20th century, it can be said that the issue of military health has existed in its primitive form even during the warfare between Persia and Rome. Considering that the highest casualties occurred during ancient warfare were due to the spread of communicable diseases among the troops and people of war–zone cities, on the one hand, and the multitude of casualties and the need to combat a variety of diseases have necessitated the need for some form of organization, training, and the use of medical and relief services, therefore, in practice, a distinction has been made between military and marital medicine in the general medical sense from the same time.[6]

In a study on the causes of the development of military medicine, Hetz Cole writes: As medical equipment evolved, military medicine also evolved. As the weapons used in the battle became more destructive and deadly, medical care improved proportionally and, therefore, wounded soldiers were more likely to be treated. In the early 20th century, the concept of military triage was gradually introduced, and advances in casualty transportation systems led to the introduction of more seriously injured soldiers who had previously had no access to medical facilities into the military medicine system. The military medicine structure and system must be adapted with the number of injuries caused by the use of new weapons. Prior to the emergence of general anesthesia, surgery was rarely used to treat intra-abdominal, intracranial, or thoracic injuries and medical care was mostly focused on the limb injuries, and amputation was also regarded the only surgical intervention. With the introduction of general anesthesia, improvement in primary care, and the possibility of transporting the injured soldiers from the battlefield to the hospital, the concept of triage was identified as a key a step in dealing with the war casualties. Moreover, with the increasing number of casualties who survived the primary injuries, military medical systems were forced to promote their system of transporting the patients from the site of injury to a safe place to ensure initial stabilization and then to transport them to a place for final treatment.[7] MacCallum writes: Worsening and more destructive properties of the weapons exacerbated the casualties, which necessitates the improvement of care for the casualties (development of military medicine).[8]

Liner and Sudery, in a study on the development of military medicine and the need for its continuity using new approaches, write: Throughout the long history of military medicine, advances in treatment of war casualties occurred in parallel to the developments of war weapons and their destructive properties. The variety and severity of tissue injury depends on the release of the primary energy in that tissue. The highest-speed, high-energy modern weapons led to deeper tissue injuries than those caused by the weapons used in previous wars. Therefore, treating and caring for the casualties in today's modern wars and terrorist attacks requires specialized and modern approaches to managing these casualties.[9]

Data Analysis

Qualitative content analysis method was used to identify desirable goals of trauma needs-based training in asymmetric warfare. This method regards inductive data analysis as the basic technique. Inductive analysis means that patterns, themes, and classes are extracted from the data in a way that analysis begins after collection of accurate and regular information from the context of the research population. In fact, data interpretation is at the heart of the qualitative research, and data interpretation and collection are interrelated. Qualitative content analysis refers to the regular process of coding, classifying, identification themes or patterns. Qualitative content analysis goes beyond extraction of objective content from texts. Content analysis leads to the emergence of the hidden themes and patterns from the participants' data. This method consists of several steps: Adjusting data as text, coding units of meaning, classifying codes based on similarities and differences, and extraction of results as themes, classes, and patterns.[10] Qualitative content analysis uses the continuous comparison method for data analysis and continues it until data contents of each of resource is being compared with other resources. The similarities are identified using the base continuous comparison. To find differences and similarities, the data are first compared with other data; for example, we concurrently carried out comparisons between sentences and events in an interview of between different interviews, observations of events at different times and places. Data obtained from qualitative studies (interviews and group-based interviews, observations, and review of documentation, provides descriptions of concepts to the researcher who can use these descriptions to construct a hypothetical model for concepts.[11] In this method, all statements of the participants are transcribed verbatim, undergo content analysis, and coded to determine the dimensions and subscales.[12] In fact, data were collected, analyzed, and categorized simultaneously using the content analysis method in the present study. Ultimately, we identified features, needs, gaps, and the issues related to trauma needs-based training in asymmetric warfare. Data were then used in the model design after guaranteeing their meaningfulness generalizability, validity, and accuracy. In this study, the researchers used a qualitative content analysis process, which is not limited to any particular theoretical background, and is mainly used for analyzing the personal views gathered through interview. Data selection mainly depends on a predefined criterion, but it may also use criteria that are developed step-by-step. Since it allows for data reduction, this approach is clearer, less ambiguous, and easier to implement than other content analysis methods. In this study, qualitative content analysis was conducted in a way that the interview text was transcribed after each interview and reviewed several times. In the next step, the text was typed, codes of each interview were compared with each other and with codes of other interviews to determine their similarities and differences. Then, codes were merged based on their similarities. Finally, researchers agreed on

the meaning of the data and the content presented in the form of main themes and subthemes of their classes. Themes were extracted from the experiences of the participants at this step to explain different dimensions of desirable goals.

Ethical Considerations

Ethnic and regional sensitivities must be taken into consideration when presenting information and statistics and disseminating results.

Procedure

It is a qualitative study, which was validated through Delphi technique. In this regard, organized interviews were conducted with trauma experts present in asymmetrical warfare with a history of medical and educational activities at different ranks (physicians, nurses, etc.). Also, after reviewing upstream documents and researches on educational principles as well as adjusting and analyzing data obtained from participants, an organized model of trauma needs-based training elements in asymmetrical warfare has been prepared and validated by experts using Delphi technique. We will present the results of validating the extracted needs using Delphi method and semi-structured individual interviews with trauma experts.

Learning through the science of education and curricular planning seems to be an effective approach to increase the effectiveness of trauma-related learning and training and to facilitate access to educational goals and increase the cost effectiveness of trauma education in asymmetric warfare.

Military medicine

Military medicine is the science that deals with diseases and injuries occurring during military operations. It also includes specific forms of organizations that have emerged to provide medical support to the military forces as well as facilitate rapid transfer and treatment of patients during the battle. Military troops today need continued medical support ranging from first aids to frontline soldiers to advance hospitals on their own soil. In this continuous chain, as the patient or injured person keeps moving backwards, care gradually becomes more advanced. Military medicine increases the chance of survival and recovery as much as possible by offering various types of special care needed for war injuries to the vicinity of battlefield.

The main mission of global military medicine is to provide healthcare support to the military forces on issues, risks, injuries, and illnesses that arise due to specific occupational conditions. Ultimately, military medicine services maintain the health of the military forces, promote their health status, and enhances their capability during their missions.

History of Military Medicine

Since the 18th century, most of militaries paid special attention to the medical services during wars. The shortage of physician and their low experience level in caring for victims and casualties have increased death toll among soldiers in countries like Britain and France during the Waterloo war. Therefore, countries began a major effect to mobilize physicians in this regard.

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On the other hand, some form of bioterrorism has been used to defeat the enemy since ancient times, such as contaminating wells by carcasses of animals in 300 B.C to spread diseases or overthrow the Tatars in 1344 B.C by throwing corpses infected with plague into their fortress, which led to a plague epidemic throughout the Europe and loss of one-fourth of population in the region. Another example of bioterrorism was the donation of blankets and clothes belonged to victims of measles and smallpox to credulous Indians by the British in 1763 in North and South America that caused an epidemic and widespread mortality. The idea of using trained people to provide assistance to the injured, and patients thus became operationalized, and primary relief organizations emerged during the U.S. War of Independence then gradually become fully developed in the United States and the world. Until 20th century, military medicine has no specialized status and physicians have been employed in military organizations and places during peace and war.

In a study on the causes of the development of military medicine, Hetz Cole writes: As medical equipment evolved, military medicine also evolved. As the weapons used in the battle became more destructive and deadly, medical care improved proportionally and, therefore, wounded soldiers were more likely to be treated. In the early 20th century, the concept of military triage was gradually introduced, and advances in casualty transportation systems led to the introduction of more seriously injured soldiers who had previously had no access to medical facilities into the military medicine system. The military medicine structure and system must be adapted with the number of injuries caused by the use of new weapons. Prior to the emergence of general anesthesia, surgery was rarely used to treat intra-abdominal, intracranial, or thoracic injuries and medical care was mostly focused on the limb injuries, and amputation was also regarded the only surgical intervention. With the

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The modern approach to extensive injuries, especially to the care of the organs, involves the need for appropriate treatment protocols based on the principles of damage control surgeries (DCSs). Extensive experiences of military medicine personnel in various modern military conflicts have provided the opportunity to develop new treatment protocols on basic and general patient life, and anesthesia, blood and fluid control, and infection prevention.

Jahanloo, quoting Husum, Hans, in their Book, War Surgery, describes the level and types of training required by military and war physicians. All health professionals involved in the management of war casualties: Medical assistances, surgeons, and organizers (health care centers) must know the principles of war surgery: How bullets work, how the body responds, and how we fundamentally can help the body overcome the damage caused by weapons.[13]

Levels of treatment in military medicine

Level 1: Medical assistances
Level 2: First surgeon
Level 3: Second surgeon

Objectives of military general medicine

A military general practitioner is expected to have the following important capabilities (knowledge, attitude, and skills).

Research axis

1. Reviewing existing upstream documents and resources on trauma and asymmetric warfare
2 .Structured interviews (based on elements)

Curriculum elements

1. Goals 2. Content 3. Teaching a strategy 4. Evaluation 5. Learning activity 6. Grouping 7. Materials and Resources 8. Place 9. Time 10. Ideology (Logic)

While introducing elements of his syllabus, Akker showed the composition of these elements in the form of spider web. In fact, he seems to believe that these elements have a close and the complementary connection and any defect in each of them will endanger the whole system and prevent curriculum from reaching its goal.

Ten elements of the curriculum based on Akker's model

The topic of curriculum elements is one of the categories that have undergone some changes. Tyler, a pioneer in systematizing curriculum activities, identifies the curriculum as having four elements: Goals, learning experiences, presentation, and evaluation.[14] Eisner referred to goals, content, content organization, learning opportunities, presentation, and evaluation as seven elements of curriculum.[15] Zais identified goals, learning activities, and evaluation methods as elements of the curriculum.[16] Kline identifies nine elements for the curriculum: Goals, content, learning activities, learning materials, and resources, teaching-learning strategies, evaluation, grouping, time, and place.[17] Akker believes that one of the major challenges in improving curricula is the coordination between its components.[18] Stark and Latoka considered the following elements for the academic curriculum: 1. Goals that include general goals and guide the learner's knowledge, skills, and attitudes. 2. Sequence that contains the order of presenting topics intended to guide the learning process. 4. Learner 5. Educational processes 6. Educational resources 7. Evaluation 8. Curriculum modification based on the evaluation results.[19]

According to Francis Kline's model, Akker has taken into account 10 elements for the curriculum, and except for one element "logic or the whys," other elements are similar with the Kline's model.[20] These ten elements are shown in Table 1.

Results

The present research (basics of trauma-needs based training in asymmetric warfare) is a study aimed at training and preparing trauma treatment among all military ranks present in symmetric warfare with regard to the current possibilities and conditions. Upon reviewing upstream documents and using the information and experiences of professionals in the field, a special model for trauma needs-based training in the asymmetric warfare is developed by defining training features of 10 element of

curriculum based on Akker's model and classified in military medicine along with the features of the same elements. The results were investigated and validated by trauma experts in asymmetric warfare. The results of the present study provide a

framework for the development of trauma training programs in asymmetric warfare and also provide a scientific and practical basis for organizing and developing the field to reduce the mortality and morbidity of human resources present in asymmetric warfare. The achievements of the present study explain the dimensions and indicators of trauma needs-based training in asymmetric warfare, which is an effective approach to increase the effectiveness of trauma learning and training in asymmetric warfare and increase the cost effectiveness. It is also an effective approach to organize trauma preparedness in all forces presence in asymmetric warfare and can be presented as an operational protocol in terms of methodology and the roadmap. The results obtained from the above resources are defined as ten-elements training using Akker's model. These results and relevant tables have also been reviewed and validated by trauma experts. Interviewees were selected from individuals with trauma training and treatment experience, including 3 surgery professors with sub-specialty sub-disciplines (such as vascular and thoracic surgery), 3 emergency medicine and 3 anesthesia professors, 2 surgical residents, 2 urology residents, 1 emergency medicine resident, 4 general practitioners, 2 nursing faculty members (with history of training 3000 military

Table 1: Ten elements of the curriculum

Row	Component	Description
1	Goals	What are the goals of the learning?
2	Content	What should be learned?
3	Teaching strategies, Learning (Teacher's role)	How does the teacher facilitate the learning process?
4	Evaluation	How can we guarantee the learning progress?
5	Learning activities	How does learning happen?
6	Materials and Resources	What are the prerequisites for the learning process?
7	Grouping	Who are who are involved in the learning process?
8	Time	When does learning happen?
9	Place	Where does learning occur?
10	Ideology	

A military general practitioner is expected to have the following important capabilities (knowledge, attitude, and skills).

Row	Physicians abilities
1	Being Interested in militarism and having basic and general military knowledge and skills related to military medicine
2	Having adequate knowledge of the major healthcare issues and healthcare delivery systems of the country and being of aware of responsibilities and duties in this system
3	Having sufficient scientific and practical capability in diagnosing diseases, referring patients to a higher level of healthcare in the country, if needed, and participating in prevention and public health program
4	Having general knowledge and skills in preventive medicine and environmental medicine for military occupations
5	Ability to evaluate and manage casualties and critically-ill patients, perform triage and transfer (prehospital and hospital)
6	Ability to care for trauma victims and critically-ill patients in military and nonmilitary scenes
7	Ability to care for casualties caused by modern and asymmetrical weapons used in warfare, managing chemical, biological, radiological, nuclear explosive (CBRNE) casualties
8	Ability to handle casualties and patients caused by sea, air, and space accidents
9	Providing care to patients and casualties exposed to military occupational injuries
10	Having knowledge and skills in disaster medicine
11	Having physical health, fitness, and ability as a military medical officer
12	Ability to use the latest scientific resources and make use of new information
13	General ability in military medicine training and research

1.Goals

Basic needs of the current situation	Solutions
-Incompatible and incomprehensive goals	-Goals tailored to the current needs of the trainees
-Ambiguity of goals based on the trainees' needs	-Strengthening the approach and enhancing the learning that is deep, meaningful, and applicable in real life situations
-General goals and lack of due attention to practical aspects	
-Limiting the educational goals to the knowledge dimension	-Institutionalizing ethical behaviors and beliefs in the trainees along with providing specific programs to achieve these goals
-Ignoring the skill dimension	
- Goals that disregard the current needs of the trainees and the need to revise them	-Paying attention to the needs of the trainees in all areas of knowledge, attitudes, and skills
-Lack of proper response to fundamental doubts and solutions to deal with them	-Acquaintance with responsibilities, professional and skill commitments, and social issues and bottlenecks
	-Providing favorable conditions to guide trainees toward higher needs, i.e. growth and development
	-Ability to understand Islamic and professional values to distinguish between wrong behaviors and decisions with the rights ones

2. Content

Basic needs of the current situation	Solutions
-Inappropriate content selection based on the needs of the trainees	-Integration with the curricula of trainees
-Lack of compatibility between content and goal	-Curriculum content with interdisciplinary approach
-Lack of compatibility between content and educational needs	-Integration and interaction between educational and training areas
-Ignoring issues of interest to the trainees	-Learning courses related to the discipline and major courses
-Lack of compatibility between content with professional or social experiences of the trainees	-Content development according to the native, racial, and geographical features of each area
-Mismatch between content volume and number of courses	- Appropriateness of content in three areas of knowledge, insight, and skill
-Mismatch between theoretical and practical aspects of content	
-Ignoring content organization for activities in the learning environment	-Providing content organization for effective student activities in the learning environment
-Failure to provide subjects required by the field of study	-Exclusive content presentation for a particular discipline

personnel), 10 nurses and practical nurses. The present study revealed the need to produce educational content appropriate to the asymmetric warfare in order to empower medical treatment and education staff.

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Conflicts of interest

There are no conflicts of interest.

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