The role of military medicine and the significance of training military medicine

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ABSTRACT

Military forces are exposed to various kinds of special diseases for their occupational condition. As an academic discipline, Military Medicine serves to meet the healthcare needs of the forces. Professional Military Medicine has started working nearly from modern wars time in the 20th century. Regarding the growing global trends of war, terrorism, and natural disasters as well as modern changes in war strategies, weapons, and their consequences, Military Medicine is undergoing an evolution process. This review study was conducted to investigate the role and place of Military Medicine and the related approaches, medical curriculum, and the priority of developing specialized academic subfields of Military Medicine in Iran. Military physicians are in great need of knowledge, attitude, and skills. Today, Military Medicine includes a specialized approach, mobility, resuscitation, and stabilization of the injured as well as pre-hospital practices. Developing a specialized field for military emergency medicine with a special curriculum has been a priority in Iran that can meet the requirements of military forces for successful missions. Medical medicine departments of Military Medicine schools require new educational plans and curricula with specialized Military Medicine approaches and developments based on emerging needs. The most appropriate and the best option for military missions and emergencies in Iran is the physicians educated and specialized in Military Medicine.

Keywords: Implications for educating military physicians, military forces, Military Medicine

Introduction

Military forces of a nation have determining parts in defending, saving security, and stability of the country. These people are significantly exposed to various injuries and special diseases due to their missions, duties, and job requirements. Military Medicine is responsible for delivering healthcare services to the military forces. Military Medicine is a specialized medicine that considers the risks and needs of soldiers and other military members. It can serve at many specialty and subspecialty levels, including prevention or cure of health problems of military forces, ergonomics, and effects of special military devices and tools. In the introduction of Military Medicine, Ward Hon of USUHS (The Uniform Services University of Health Sciences) writes: Medical Medicine is an academic discipline relying on a wide range of scientific practice. With expertise and knowledge, military physicians serve to diagnose and solve problems and

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requirements of military forces. Military Medicine involves inspection, prevention, clearing, transfer, replacement, care, and cure of illnesses among military forces who are at risk of diseases and injuries due to their special occupational condition. Therefore, Military Medicine is a branch of occupational medicine that seeks the prevention and treatment of diseases or injuries from military work in the operational environment. It is the science of illnesses or injuries resulting from military operations. In addition to common health problems, it seeks treatments for a wide range of particular symptoms, and harms rarely occur in or are unknown to, other populations. Best et al. note on clarifying missions and roles of Military Medicine: the major mission of Military Medicine all over the world is to maintain healthcare support of military forces in problems, harms or injuries, and diseases occurring due to their specific job environment. Eventually, military medical services lead to maintaining the military force’s health and promoting their military role. In a description of the military medicine role, Gutman writes: “a successful war is a dependant not only on the art and science of fighting, advanced defense system, and enthusiasm of the military members of a nation but also on strong support services of the war. Medicine is one of the effective supporting fields for wars.” He also notes that “the number of wounded people has declined in successful wars of the 20th and 21st centuries. One of the effective factors in this is resuscitation skills and surgical interventions. Ghanjal notes on the role of Military Medicine and military forces in natural disasters: Nowadays, military organizations and their dependant forces are among organizations with active participation during such disasters. Regarding the growth of terrorism and war events in the modern world, the diversity of modern weapons, their consequences, accidents, and the role of military forces in these, a change in Military Medicine approaches and development of educational plans and curricula is a necessity.

This study was conducted to investigate the role and place of Military Medicine and its related approaches and the priorities of developing and administering specialized fields of study for Military Medicine in the Islamic Republic of Iran.

Military Medicine

The term Military Medicine implies many potential concepts. It is a specialized medicine. Specifically, it is a branch of occupational medicine (military occupations) concerning risks and needs soldiers and other military members confront (including prevention and cure). Military Medicine focuses on supporting healthcare in military operations. It serves in various contexts like prevention and cure for infections among military servers, ergonomics, and health consequences of special military devices and machines, such as submarines, tanks, helicopters, planes, etc., planning for surgery management for the wounded people in as well as supporting them.

Military Medicine is the science of diseases and harms (injuries) resulting from military operations. It also involves special forms of the organization providing medical support to military forces and transferring or curing the war patients as quickly as possible. Nowadays, military forces require nonstop medical support, from first aid for soldiers on the front to advanced hospitals within the interior lands. Through this continuum, the more the patients are taken back, the more advanced the medical services are. Military Medicine has enhanced life expectancy among the wounded people by providing medical services closer to the battlefields. In addition to common diseases, Military Medicine seeks treatment for a range of syndromes or special harms that are unknown or rare for ordinary populations. The effects and consequences of modern weapons, mental pressure from frequent operations, noise, poisons together with other dangers of the battlefield, cause many symptoms and syndromes that are not normally seen in non-military peaceful conduction. Historically, armed conflicts among military forces have been a trigger for advances in military medical facilities. Today, even in distinguished countries, there are similarities among the Military Medicine systems. These days, one of the most significant features of Military Medicine is its emphasis on prevention. The main goal of medicinal support is to preserve military power. Avoiding human force loss as a result of diseases or catastrophes preserves the united power before the battle. Hence, expanded security and improved safety programs are among the features of military medical care.

The major mission of Military Medicine worldwide is to provide medical support for military forces concerning their problems, risks, harms, and diseases resulting from their special occupational conditions. In sum, Military Medicine services would lead to preserved healthcare of the individuals as well as promoting health, which in turn leads to enhanced military power in missions.

History of Military Medicine worldwide

There is indeed a relationship between the history of war and surgery (medical services). From the 18th century, medical services have gained much attention from most armies. Lack of professional physicians and low levels of experience in taking care of victims and wounded people in wars in armies of such nations as England and France during the waterloo battle led to higher rates of casualties among soldiers. As a result, from that time on, nations began to mobilize their doctors for this.

Namjoo Nik writes on the history of Military Medicine: “Although the clear distinction between Military Medicine as a distinct specialized field of study, both martial and non-martial, from general aspects of medicine has been proposed from the early 20th century, it dates back to even Iranian-Roman battles and ancient Iranian wars as a simple clear cut matter. Because the highest rates of casualty were for epidemics/pandemics among army forces and the residents of the areas in war, and because of the high numbers of the wounded ones and the implication of fighting against diseases, a sort of organization and education as well as employing medical aid forces was needed”.

On the other hand, from early times, bioterrorism was used as a strategy to beat enemies, just like contaminating water wells
with dead bodies of animals in 300 B.C. to spread diseases, or the disintegration of Tatar reign in 1344 by throwing bodies dead from plague into their castles, which led to plague epidemic all over Europe and consequently killed one-quarter of Europeans. Another example is donating clothes and blankets of measles and pox victims to naïve aborigines of northern and southern America by the English in 1763, which killed a large number of aborigines. These events led to the employment of trained people to help the injured people and patients, and the first rescue teams were founded at the time of the independence wars of the United States of America, and they were completed gradually in the US and the world. By the 20th century, global Military Medicine had no specialized place, and doctors were employed generally at times of war and peace throughout military organizations and facilities.

Hetzcool[11] notes on the causes of the development of Military Medicine: “at the same time as a revolution in military equipment, Military Medicine grew as well. As the weapons in wars grew more destructive and fatal, the related medical services were developed more, and consequently, the number of saved soldiers increased. In the early 20th century, the concept of military triage was introduced, and advances in transferring the injured led to referring the soldiers with serious wounds to the military medical system, who had no access to medical facilities in the past. In addition, structures and systems of Military Medicine had to be adjusted to the number and variety of injured people as a result of modern weapons. Before developing general anesthesia, abdominoplasty, cranioplasty, and thoracoplasty surgeries were rare. A lot of medical care was limited to injuries in limbs, and the only surgical intervention was amputation. With the introduction of general anesthesia and improvements in first aid care, as well as the facilitation of transferring soldiers from battlefields to hospitals, the concept of triage was introduced as a crucial action in dealing with wounded people in wars and with the increase of saved wounded individuals, systems of Military Medicine were obliged to enhance their facilities for transferring and placement of patients to a safer place to reach a stable condition and then transferring them to a place where more healthcare service is provided.[12]

McCalum[13] has also written: when the weapons grew more destructive and worse, the harms and injuries were more severe too, which implies better care for the wounded people [developing Military Medicine].

Liner and Sodry[14] write on the development of Military Medicine and its maintenance by new approaches: Throughout the long history of Military Medicine, medical advances to cure the wounded people have been parallel to developing modern weapons and their related destructive power. The variety and severity of the harm to the tissue depend on the primary energy released within the tissue. The reason for deeper wounds compared to the past wars is that in modern wars, weapons with higher speed and potential power are employed. Hence, treatment and care for the injured individuals of modern wars and terrorism must be provided with specific new approaches to manage these people.

A modern approach to big harms, especially in taking care of limbs, includes the need for treatment protocols that are consistent with the principle of surgeries to control injuries. Bounty of experiences of military medical personnel during different modern military conflicts paves the way for the formulation of new treatment protocols for maintaining basic and general living of patients, anesthesia, blood and fluids control, and infection prevention.

Jahanloo (2000) recites from Hans Husum’s book “War Surgery” that levels and types of training military or war physicians need to have:

“All of the healthcare staffs who have a part in the management of the wounded people in wars include: doctors, surgeons, organizers (bureaus or the injured people); all of them must recognize the principles of war surgery, that is, how bullets work, how the body responds, and how we can help the body overcome the harms from weapons.

Training surgeons and assistants about old and new weapons and their resulting harm is a requirement.

He writes: as a general basic principle, I advise you to train medical staff in three levels: assistants, first surgeons, and second surgeons.

Training assistants: these individuals are numerous compared to the other two groups whose main job is to provide and stabilize early appropriate medical services in the region of conflict through the way of transferring the person to the hospital nearby the battlefield.

Experienced physicians must be trained in the following areas:
1. Knowledge of weapons: they must know the weapons employed in the region of war.
2. Knowledge of physiology
3. Knowledge of first aid
4. Relieving the pains of the injured people
5. Documentation: supplying medical documents.

He also defines the educational implications and strengths needed for a surgeon: “First surgeon must be able to run the clinic/hospital nearby the battlefield and do first aids or primary surgeries on 8% of all types of traumas. This surgeon is a key agent and the backbone of every war hospital.”

A surgeon must be aware of and powerful for the following:
• the knowledge of details of anatomy and physiological implications;
• the ability to perform clinical assessments of patients and do surgeries on the wounded tissues;
American performance levels in Military Medicine

Five levels are defined within the American military healthcare system, each one of which obtains modern facilities in addition to having lower-level capabilities that make them distinct from other levels.

Medical actions usually start with the comrades of the wounded soldier or military-trained people (paramedics). These actions are defined at the first level, BAS (Battle Said Station), where the wounded people are collected, and there are doctors and assistants to provide advanced resuscitation for traumas. The second level is the active type. In recent decades, Front Surgery Team (FST) has been added to that which does the surgical actions at the resuscitation stage. However, the first hospital to do the surgeries is Combat Support Hospital (CSH), which acts at the third level and is represented as an augmented CSH at the fourth level due to adding specific facilities and medical/surgical power. The fifth level is the highest level of care and the final destination for the wounded soldiers in the USA who are not able to go back to the front and accomplish their duties. These are the soldiers who have been under major abdominal operations, cerebrovascular, thorax, head and neck, eye and limbs surgeries, or have extensive burns. They need longer periods of rehabilitation in military medical centers. The ultimate goal is to return them to society with their recovered powers and strengths.[17]

Educational needs in Military Medicine

Namjoonik believes that, just like teaching general and specialized medicine in non-military universities, some specific scientific matters are required to be included in military medical universities, including catastrophe assessment, special diseases prevention, diagnosis and treatment of diseases and harms of the military profession, casualty discharge, hearing impairments from explosion waves, shrapnel shells, medical matters related to air/space medicine, effects of chemical gases contact, chemical, microbial and nuclear weapons (CBRN), as well as infections like malaria, hepatitis, tuberculosis, human immunodeficiency virus (HIV), tropical diseases of the regions in war or military environments, upper atmosphere, lower deep inside seas or sea-level conditions, extremely hot/cold conditions, and diseases related to climate. Other aspects, including preventive medicine, traumatic patients management, and local diseases, are among the matters the military physician must master.[18] Regarding the development of the Military Medicine curriculum, Baker suggests: “These plans were developed in the US after World War II to improve medical care among the military staffs. At the time of the Korean war, USUHS began including supplemental medical courses (Military Medicine) for undergraduate levels. In addition, teaching military residents to be employed in wars was developed. At present, to maintain the healthcare of military staff and their relatives and also to respond to people’s needs in natural disasters, USUHS has supplemental medical education for land, air, and sea forces. In the 15th international conference of Military Medicine, Cloonan noted the needs and challenges for current curricula of Military Medicine and revised or adjusted implications in these programs: Applying changes in Military Medicine curricula can be effective in the performance of Military Medicine for responding to the healthcare needs of military servers in the future. Cloonan names some of these challenges: being contemporary with the era of information technology, emerging new technologies in medicine, changes in military organizations and the associated management like global military strategic changes, downsizing military units with multiple performances, and increased flexibility in them, less military forces employed in battles than the ordinary wars in the past, development of individual combat weapons, threats and emerging diseases and evolution of modern weapons and armaments, changes in social morals and expectancies, emerging disease and poisonings resulted from chemical/biological substances.[19] Llewellyn[20] assigns three time periods for Military Medicine and the related curricula:

1. Pre-modern period (before World War II): The Military Medicine of this era focuses mostly on infections and tropical illnesses and actions to prevent or treat them in a time when antibiotics were not discovered. There was a limited amount of knowledge in surgery and pre and post-operative care. Here, the professionals were just medical graduates, not an important component of Military Medicine.

2. Modern period (after World War II): This era was concurrent with the discovery of antibiotics and diagnostic methods, and prominent changes in the performance of health caregivers and doctors occurred. Through this period, pre and post-operative care and resuscitation improved significantly. Surgeons were able to do more invasive operative actions that were not thought of before World War II. In 1976, the USUHS founded special military education with a four-year curriculum. This curriculum emphasized mainly topics like tropical medicine, emergency room medicine, military psychology, and medical aspects of chemical, biological,
or radioactive weapons. During World War II, the most prominent universities in military systems were developed in the US that trained some of the best military medical physicians who struggled with the challenges of internal surgery and infections during World War II. In 1987, Albert E. Cowdrey wrote his great book, ‘The Medic’s War.’ Finally, at Walter Reed medical center, Medics depression and specialized and subspecialized courses were developed. One of the most important successes of American Military Medicine in the Korean War was the development of mobile Military Medicine (mobile army hospitals), doing crucial surgeries at the front, actions of resuscitation, stabilizing conditions for the patients by blood transferring, and replacement of crystalloid fluids as well as air drainage of the patients.

3. Post-modern period (future): Llewellyn holds that, in the future, the orientation of Medical Medicine would consist of 1) downsizing, mobility, and flexibility in military medicine, 2) increasing pre-hospital capacities at all levels, 3) establishing small resistant hospitals like surgery units at the front, and 4) ability to stabilize patients’ status and their management and transfer them to higher levels of healthcare. Stevens believes that, in 30 years, changes and challenges for biology and information technology would impose changes in the Military Medicine curricula.[21] In the 15th international conference on Military Medicine, it was suggested that new roles and missions of the army in the future would be: assisting in crises and disasters, humanitarian aid, helping peace, civil incidents, terrorism, employing modern weapons like ballistic missiles. He also holds that for the Military Medicine to play its supportive role properly, there should be changes and revolutions in areas like right human force, modern advanced equipment and technologies (for education, diagnosis, treatment in wars or non-military conditions), information and communications, and effective management and leadership.[22] Naomi introduces various types of threats for military forces in the future and emphasizes Military Medicine to respond to the needs of military servers[23]:

1) Chemical, biological, and nuclear threats, 2) Threats from poisoning by industrial chemicals, 3) Threats of drug-resistant infections and microorganisms, 4) Threats of conventional modified weapons or new weapons, 5) New infectious diseases, 6) Counterintelligence threats, non-military damages, post-traumatic stress syndrome related to war.

Cloonan proposes the need for changes in the Military Medicine curriculum to prepare the graduates for threats and challenges in the next 20–30 years. These challenges include emerging technologies, emerging threats, changes in military missions and performances, and cultural and moral changes.[23] Baker assumes that “needed skills for war medicine are different from non-military medicine. To prepare military medics for their assigned missions, a high-quality, comprehensive, deep, and unique curriculum is needed.”[24]

| Table 1: Goals of military medicine curriculum from an experts point of view |
|---------------------------------------------------------------|
| row | Strength in medicine                                                                 |
|-----|-------------------------------------------------------------------------------------|
| 1   | Interest in militarism and possessing the knowledge and basic and general skills related to military medicine |
| 2   | Being adequately aware of major health and treatment concerns, the national system of healthcare service, and one’s duties and tasks in the system. |
| 3   | Being scientifically and practically able to diagnose diseases and, if necessary, refer the patients to higher levels of the national healthcare system in addition to participating in preventive, general healthcare programs. |
| 4   | Having the general knowledge and skills of preventive medicine and environmental medicine that are specific to military occupations. |
| 5   | Being able to assess and manage the wounded people or critically ill patients and doing triage before transferring (pre-hospital, in-hospital) |
| 6   | Being able to look after traumatic patients or critically ill patients in military and non-military scenes. |
| 7   | Being able to look after patients of wars with modern weapons and unequal wars or patients of chemical, Biological, Radiological, Nuclear Explosives (CBRNE) |
| 8   | Being able to look after the patients of sea incidents |
| 9   | Being able to look after patients of aviation incidents |
| 10  | Looking after patients exposed to damages of military occupations |
| 11  | Having the knowledge and skills in accidents medicine |
| 12  | Being healthy, able, and physically adequate to be a military physician-officer |
| 13  | Being able to use the latest scientific sources and employing new information for their job |
| 14  | Having general abilities to educate and do research related to military medicine |
in missions. Therefore, the medicine department of military medical universities requires planning and designing modern curricula with an approach to specialized Military Medicine and its development according to new needs. Designing a military emergency medicine curriculum is the first step to developing a specialized clinical curriculum, and the specialized curriculum of this field has been investigated, formulated, and designed by the author.

Gutman notes on the role of emergency medicine: “In Vietnam war, the science of resuscitation was used widely as an intervention which led to providing advanced pre-hospital emergency and surgical care. Emergency medicine emerged as a specialty right at that time. The US military system views the military emergency medicine as a precious property, and the medical commander of the US has an approach to employing experts in wars, that is, employing people with emergency military/surgery professionals. A specialized emergency individual is just one of the professionals who not only has been trained, and is skillful in the resuscitation process but also can differentiate surgical illnesses and internal surgeries easily and provide appropriate treatments for them. Thus, it seems in any military system, much attention must be paid to emergency Military Medicine, war, and peace. Therefore, the trained professional with a specialty in emergency Military Medicine, who can take care of or manage critically ill patients and the people damaged in the war, is the best option for specialized medicine for the Iranian armed forces in missions and emergencies.

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