American Journal of Medicine and Medical Sciences 2024, 14(2): 183-188
DOI: 10.5923/j.ajmms.20241402.03

World (Foreign) Experience in Providing Medical Care to the Seriously Wounded and Injured on the Battlefield and in the Evacuation Stages

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Abstract It is desirable to timely identify the causes of death in combat mechanical injuries and to fight against them, starting from the pre-hospital stage, at all stages of medical evacuation and during the evacuation process. The article presents the foreign experience of providing medical care to seriously wounded and injured military personnel on the battlefield and in the evacuation stages.

Keywords Stages of medical evacuation, Air transport, Paramedic, Pre-hospital stage, Wounded and injured, Medical supply of troops, Battle injury

1. Introduction

System of assistance to combat wounded in the army of NATO member statesDivided into V levels, of which level I corresponds to the pre-hospital stage [12]. At this level, in military units performing a combat mission, first aid is provided in the form of self-help, that is, assistance from the wound itself (if it is in a situation where it is able to provide assistance to itself) and mutual (by its next-in-arms) support. Unit Medical Officer (combat medic – combat medic) to eliminate asphyxia by removing foreign bodies in the oral-laryngeal cavity that are performed in combat medic control to military personnel, to put an occlusive bond in an open pneumothorax, to insert a decompression needle in a tension pneumothorax, to temporarily stop external bleeding (tourniquet, clamping linkage), to administer drug painkiller injection from a personal Aptech, practical skills such as immobilization of injured limbs are taught using improvised means [5]. The combat medic, on the other hand, conducts service at the platoon level and is qualified as an emergency medical technician (V-basic), A "B" grade emergency care specialist who has completed a 16-week preparatory course. In the pre-hospital phase, medical care for the wounded is also provided by "paramedics" who have a higher category within combat units. In the U.S. Army, the 75th Special Operations Forces (Reyndjer) readiness system is designated as a model. In this system, all servicemen undergo an initial course of assistance to the wounded, with a special emphasis on the topic of stopping bleeding. In addition, they annually train in retraining courses for the provision of assistance to the wounded and before the combat tour of Duty2 days of intensive training. At the group level, one enlisted member takes a "V" - level emergency care course, while at the platoon level, either a 16-week General Training Program or a 26-week Special Operations Forces Medical Officer (medic) training program. The list of first and pre-doctor medical care measures in the armies of developed countries as part of pre-hospital medical care includes the elimination of acute asphyxia (a kit for conicotomy), assistance in tension and open pneumothorax (a kit made of hermetic valve adhesive film and needle-trocar), the injection of plasma replacement solutions into bone (a special needle) and a number of other [5].

Tactics of providing assistance to the wounded in battle.

Received: Jan. 18, 2024; Accepted: Jan. 30, 2024; Published: Feb. 4, 2024
Published online at http://journal.sapub.org/ajmms

2. Materials and Methods

In the US Army and many NATO member states, the provision of assistance to combat wounded is the main guideline for all participants in military actions and combat medics (paramedics) Tactical Combat Casualty Care (TCCC - a set of medical tactical measures aimed at maintaining the activity of vital organs of the body on the battlefield and in the process of direct evacuation and Research on TCCC was conducted by the U.S. Army Institute of Surgical Research (U.S. Army Institute of Surgical Research). Members of the committee's composition include participants in military exploits and at least 30% of combat medics (combat medics – ground troop), sanitarians (corpsmen – Marines) or Air Force Special Operations Command Parachute – rescuers (pararescuemen (PJs) or enlisted personnel currently operating. The TCCC is currently defined as the standard for providing

assistance to combat wounded in the pre-hospital Phase. Given the nature of combat injuries and the structure of potential life-saving causes, referring to the specific nature of combat assistance in the development of the TCCC manual, the following are defined:

1. Being wounded or under the rain of fire of a serviceman assisting him.
2. Focusing on the main causes that can potentially save lives: bleeding, pneumothorax, and airway obstruction.
3. The time of evacuation of a wounded serviceman to a treatment facility (it is envisaged that the evacuation in urban conditions will take a long time).
4. Combat medics and paramedics may have received good theoretical training, while there may be little practice in providing assistance to the wounded from their counterparts in civilian institutions.
5. The emergence of many victims in a single explosion or combat collision.
6. Need to provide assistance in difficult conditions: in the desert or mountainous area, at night.

In addition to these, the injury of a serviceman in a unit is considered to be not only a medical, but also a tactical problem that prevents the performance of a combat mission, including the following related, sequential activities:

1. Assistance to the injured.
2. Destroy the enemy so that the number of wounded does not exceed.
3. To carry out the task assigned to the unit.

In this case, assistance to the injured is carried out in three phases: [5,12]

1. Medical care under the rains of fire - the wounded and the rescuer will still be under the direct rain of fire of the enemy (immediate danger), there is very little time to provide assistance, only limited means are available (in pockets, etc.). The goal is to get the injured out of the immediate danger site and limit the practice of stopping bleeding using a tourniquet (CAT (Combat Application Tourniquet)).
2. Tactical field care (battlefield tactical assistance) - wounded in Phase and the Savior is shown in the pan, being a halos from the direct rain of fire of the enemy. Medical care is provided directly close to the battle (there is always a risk of worsening the situation and there is a possibility of returning to the stage of "medical care under the rains of bullets").
3. Medical care during the evacuation-during the evacuation, additional staff and medical facilities are available to be sought.

To eliminate the life-threatening consequences of a wound in combat wounds, its examination is carried out according to the instruction "MARCH PAWS": [11].

Stop external bleeding (Massive hamorrage).

Restoration of airway permeability (Airway management): laying the patient in a lateral position, installation of a nasopharyngial tube, if necessary, performing a conicotomy procedure;

Elimination of other breathing problems (Respiratory management): insertion of an occlusive dressing in an open pneumothorax, insertion of a decompression needle into the pleural space;

Elimination of circulatory disorders (Circulation): active detection of bleeding from other areas of the body and the transfer of infusion – transfusion therapy through hemostasis, infusion - stroke or bone, controlling the inserted tourniquets and, if possible, replacing them with a pressing bandage;

Fight hypothermia and cranial injury (Hypothermia, Head injury).

Pain relief.

Use of antibiotics for the purpose of prophylaxis of wound infection (Antibiotics).

Placing an aseptic bandage on the wound (Wounds dressing).

Performing immobilization using a tire (Splinting).

In order for the result of the above measures to be effective, a combat-injured serviceman is evacuated from the scene to a treatment area with a capacity to provide at least a second level of nearby qualified surgical care [15,9]. Evacuation of wounded military personnel in a combat situation with helicopters at intervals of 60 minutes or less, according to the instructions of the US Army Command, after implementation, it can be seen that the evacuation of wounded increased from 24.8% to 75.2%, and the mortality rate in the phase to hospital decreased from 16% to 9.9% [13].

The British Army is equipped with a heavy military - transport medical module called "Chinook", which has an emergency medical care team (MERT – Medical Emergency Response Team) for the purpose of aviybean evacuation of a critical-condition wounded, provides an opportunity to perform anesthesia, pleural cavity drainage, trachea intubation or conicotomy practice, blood and blood component transfusion Operations, helicopter use increases not only the evacuation rate, but also the quality of the pre-hospital stage. The Mert team has a highly qualified and experienced doctor of intensive care, 2 paramedics and a nurse. In order to ensure safe conditions when loading the wounded, 4 armed servicemen were also included in the team.

In most cases, large-scale blood loss from firearms and bullet fragments during combat operations, which continues with puncture-penetrating wounds to the neck, armpits, flue areas of the body, traumatic interruption and numbness of the arms and legs as a result of an explosion, open fractures of long tubular bones, non-stable fractures of the pelvis and cold hardening of the wound, leads to the development of traumatic hemorrhagic shock [13].

In the fight against traumatic hemorrhagic shock on the battlefield, the following main activities are carried out:

Finding a stroke. If possible, catheterization of the peripheral vein (catheter G 18). If catheterization into the peripheral vein is not possible, prepare to undergo infusion – transfusion therapy through the pelvis, shoulder bone head, large calf bones.

Infusion and transfusion. Once a pathway is found to the blood vessel, it is recommended to administer tranexamic

acid ("Cyclocapron"), which has a plasminogen binding property that prevents acative plasmin dressing, which has the property of dissolving thrombus-specific fibrins. The international study of tranexamic acid positive specificity CRASH-2 (The Clinical Randomization of an Antifibrinolytic in Significant Hemorrhage) was conducted in 20,211 victims of bleeding in 270 hospitals in 40 states. A 4-week study found that administration of 1 gr tranexamic acid at the scene and re-Administration after 8 hours resulted in an average 9% mortality rate that developed from various causes, and a 15% reduction in bleeding-related mortality rate. For 1 hour after the injury, the mortality rate among patients with tranexamic acid administration decreased by an average of 20%.

In injuries that lead to the development of hemorrhagic shock, tranexamic acid (by adding 1 gr of tranexamic acid to 100 ml of physiological solution) was recommended to be administered intravenously (without mixing with other drugs being administered via a separate vein) at a faster rate than possible after injury but at intervals of no more than 3 hours, and re-administered the same dose after 8 hours.

According to experts, the most optimal solutions currently used in wounds that cause the development of hemorrhagic shock are:

1. Concentrated blood.
2. Blood components: 1 unit – erythrocyte mass (erm), 1 unit plasma (PL). and 1 dose-platelet mass (TrM).
3. Crystalloid solutions: Ringer's or Plasma-Lyte A. polyion solution.

In the first place, it is advisable to use concentrated blood, since in large-scale blood loss, donor blood will give a positive result in the treatment of advanced anemia, hypovolemia and hypocoagulation in the patient.

But for the storage of concentrated blood and its components, hand freezers and special devices for the purpose of dissolution before transfusion are necessary. Fresh frozen plasma needs to be thawed, dry plasma prepared for transfusion. Dry plasma is used in Germany, the United Kingdom, France, the Netherlands and Israel, not used in the United States.

The reason why U.S. Special Operations Forces servicemen rarely used dry plasma in their combat actions in Iraq and Afghanistan is explained by the fact that after taking them to a certain khudududud, military personnel must independently (in a walking position) continue to engage in combat, and the lack of the opportunity to carry a certain volume of blood and its components in accordance with It is in such combat conditions that it is advisable to use fresh warm rhesus positive 0 (i) donor blood. Fresh hot rhesus positive 0 (i) donor blood is always present, does not require heating, provides good oxygenation, has clotting components, and quickly restores lost blood volume.

The new hot rhesus positive 0 (I) is a source of donor blood in the unit of the injured military officer and is interpreted as "blood bank in motion" ("walking blood bank"). When using the "blood bank in motion", the Blood received in a volume of 500 ml does not adversely affect the quality marks of the military officer, but if the donor himself loses blood from the wound, he will have to pump more than 1 unit of blood into it. the use of the "blood bank in motion" is carried out on the basis of accepted protocols:

1. The absence of concentrated blood and its components.
2. When receiving blood, the serviceman himself must give his consent and ensure maximum security, and not receive more than 1 unit of blood.
3. When it is found that there is no disproportionate injury to life in case of injury.
4. It is necessary that the process of blood extraction and transfusion does not delay the evacuation of the injured serviceman.

Medical sorting (Triage). Medical sorting-according to the volume of medical care installed for the stage of medical evacuation, according to the medical guidelines, the symptoms that need to be followed by the same preventive and treatment-evacuation measures are mainly understood as the procedures for the distribution of wounded and patients in groups and the established evacuation. The main purpose of the" military " medical qualification is to return a medically assisted serviceman to the battlefield immediately or after a period of time, while at the same time inflicting a maximum number of woundedand consists of providing optimal medical care to victims for a short period of time [7].

In his time, the French philosopher Emil Littre, the founder of the "Littre's dictionary", expressed the definition of sorting as follows: "Examining and sorting out a large number of victims after selection". Therefore, sorting means determining the priority of choosing and optimizing available resources for the benefit of the most people, or, in other words, treatment and evacuation. Sorting concept, originally a French military surgeon who lived in the 9th century, D.J. Owned by Larrey (Baron Larrey). Of the Russian scholars, N.I. Pirogov was counted from the early surgeons who applied medical sorting in practice, and elaborated on the service activities carried out at the "Sorting point", saying: "In the event of a large number of khakim, not to distribute the wounded and mislead the work of the administration, lead to the fact that large-scale wounded remain helpless" [4]. Both Baron Larrey and N. in modern classification methods of patients and victims.I. The principles of medical sorting of scientists such as Pirogov remained the basis.

Medical sorting is currently being interpreted with the phrase – "triage" and surgical sorting measures in the mass admission of victims make it possible to logically classify victims according to the severity of the injury, the need for treatment and the degree of urgency.

Medical sorting should begin early and continue through the treatment - evacuation phases between the location of the disaster and the appropriate point of final assistance. In the pre-hospital stage, sorting optimizes the preparation of patients for transportation, evacuation procedures and vehicles. In the hospital stage, the sorting consists in determining in what order patients should be sent to the operating room,

the need for additional diagnostic information and the preparation for the patient to be held or transferred to other structures. Therefore, sorting must be continuous and dynamic, at the same time reliable and complete [10]. In European and US countries, medical sorting is done by color coding patients and victims into four groups.

those marked with red are those who are in love with emergency care at an interval of one hour, and if no help is provided at the appointed time, the Death Guard is considered a high-level patient and victim, and is included in the group of those who need urgent evacuation;

those marked with yellow are a group of fans of emergency medical care and transportation after their general condition stabilizes;

those marked with Green are a group of those who independently reach the treatment facility and do not have the need to provide them with emergency medical care;

those marked with black, a patient in clinical death or agonal condition and being considered a group of victims, they are not provided with medical care. When sorting mass victims and patients associated with the delimitation of the number of medical personnel and means of Transportation, 60 Minutes are allocated to assess the general condition of victims and patients and are completed by attaching marks in the form of a joint or tape (triage tag).

In medical sorting, it is advisable for the surgeon and resuscitator to work together. The surgeon must determine the guidelines for the required surgical procedure and estimate its duration, while the resuscitator must assess the victim's general condition. Teamwork in the treatment of shock and its causes gives a good result. In the event of an increase in the reception of mass victims and several different groups of wounded and patients in the operating room, the most experienced surgeon "responsible surgeon" should take responsibility. His decision must be done by everyone [2].

There are different methods of medical sorting: SALT (Sort, Assess, Lifesaving Interventions, Treatment/Transport), SAVE (Secondary Assessment of Victim Endpoint) [3], JumpSTART, Care Flight Triage, Triage Sieve, Sacco Triage Method, Pediatric Triage Tape, etc. The above methods are designed for use in different conditions. The SAVE method, for example, is designed to conduct secondary triage in the wake of urban infrastructure disruption in an earthquake, when it is not possible to urgently hospitalize victims [14]. The JumpSTART method is used when conducting medical sorting of victims of the Pediatric Category [1]. Many of the listed methods are used when conducting triage in emergencies and natural disasters. Alternatively, there are also methods for conducting medical sorting of victims of chemical, biological and radiation damage.

3. Results and Discussions

There have been studies on a number of models in the direction of predicting hospitalization of victims, sorting their flow by weight level, increasing medical staff, starting from the 1980th century, several of the patient sorting scales that are common around the world have been developed and studied. Among them, the most significant are: Australian qualifying scale (ATS), Canadian qualifying scale (CTAS), Manchester qualifying scale (mts) in the UK, emergency severity index (ESI) in the US, South African qualifying scale (SATS). The BA'ry of the above standardized sorting systems is based on general principles. Their primary goal is to prioritize providing emergency care to critically ill patients and victims. The main difference between these is that while qualifying scales in Australia, Canada, Manchester, USA (ESI) are developed for use in high-level resource settings, the African qualifying scale is intended for use in bounded resource settings. In North America, the" START "method is used, the" UA/UR " classification is usually used in France.

Currently, the following main groups of wounded and patients are allocated as a result of sorting in the stages of medical evacuation in the troops:

1. Those that pose a danger to those around them and therefore need special processing or isolation (infectious diseases, toxic and highly toxic, damaged by biological agents, skin and clothing contaminated with radioactive substances, radiation doses above safe levels, and those in acute psychomotor arousal);
2. Those who need medical care at this stage of medical evacuation;
3. Those who need to be evacuated to the next stage;
4. Those who have suffered disproportionate life injuries and only need symptomatic therapy (those in agony);
5. Those who are returned to their units after a short period of rest, taking the appropriate amount of medical care.

In the troops, two types of medical sorting (intra-point and evacuation transport) are used:

Sorting within the point is the division of the wounded into groups at the current medical evacuation stage, to determine the queue for providing assistance in accordance with the need for treatment-preventive measures for the wounded and patients, and to which functional units should be sent.

Evacuation transport sorting-dividing the wounded and patients into groups according to the direction and turn of the next evacuation, the type of transport, the condition of the wounded during transportation, the need for an observer.

In practice, point-in-place and evacuation transport sorting are interconnected in solving the issues of optimal organization of medical care for each wounded and patient in a specific setting.

Medical sorting, as a rule, is carried out on the basis of determining the diagnosis of the disease and its prognosis, and therefore always has a diagnostic and prognostic nature. To determine the results of medical sorting at the stages of medical evacuation, color sorting marks are used, entries are made on the primary medical card and other medical documents.

The quickness of evacuation in the provision of assistance to the doctor, the turn of assistance and there are instructions to paramedics to estimate the severity of the injury, which determines the severity of the Hussite. They are based on criteria for assessing simple vital activity, and not on the qualitative diagnosis of injuries and the life-threatening consequences of injuries. When the wounded are admitted to the collection point and the battalion medical point, the wounded are separated into those who can walk and those on the stretcher.

The advantage of assistance to the wounded in the stretcher up to the doctor is based on the assessment of fainting, breathing and pulse with speed. As a result of this, there is a violation of the hush, respiratory failure and severe shock groups of wounded who need urgent medical attention are distinguished. This is a rapid evacuation to the stage of specialized surgical assistance to the wounded by means of a helicopter, where the assistance to the doctor is first provided in full volume, and then, if there is an opportunity.

Pre-doctor care is indicated in the second place for the wounded, who have a pulse detected in the unconscious, peripheral arteries and have an effective breath.

Assistance to the wounded who can walk (those who do not have bleeding) is provided in the third place.

If the battalion has a doctor at a medical point, the life-threatening wound will sort out the wounded on the stretcher with the aim of isolating the existing seriously wounded. This will provide the wounded with the first doctor's assistance in a reduced capacity to be evacuated to a military hospital or to branches of the nearby Republican urgent Ambulance Science Center.

While medical evacuation is regulated in the provision of the first doctor's assistance, only the first doctor's assistance in the amount of evacuation received preparation is carried out at the medical point. Medical sorting at the medical point is directed to those who can walk the wounded (to the sorting area for the light wounded) and implies separation into those on the mattresses. The advantage of the first doctor's assistance measures to the wounded in the stretcher is the determination of their shift to the next evacuation (based on the need for surgical assistance with urgent, prompt and delayed instructions), which are carried out as a pre-evacuation preparation. The wounded in the groups allocated to the same sequence are provided with First Doctor's assistance in the qualifying-evacuation unit of the medical point or, if necessary, in the binding room, and then surgical assistance at optimal deadlines (2 hours after injury for emergency operas, for fast operas 4 hours and 24 hours for delayed operations) rapid evacuation is carried out to multidisciplinary hospitals or to branches of the nearby Republican Emergency Medical Research Center.

4. Conclusions

Taking into account the high incidence of bleeding, asphyxia among the consequences of severe life-threatening and fatal injuries, the primary task of all military personnel is to teach the composition the volume of serious injuries and first aid in their complications in the methodology of tactical medicine, its quality and the program to increase the size must be valid. It is advisable to train, retrain and improve the qualification of military medical personnel based on the development of specific standards in accordance with all medical evacuation stages, adapting the volume and form of pre-medical and first medical assistance, medical tools and kits, medical sorting forms to local medicine on the basis of the TCCC concept.

Wounded in military conflicts, armed conflicts, natural and man-made disasters and taking into account the fact that the application of the concept of providing early specialized surgical assistance in saving the lives of victims is giving a positive result, the construction of helicopter runways on the territory of the regional branches of military hospitals and the scientific center of emergency medical care of the Republic, the formation of advanced resuscitation-surgical brigades and thus, the rapid development of organizational forms of the medical supply of troops provides an opportunity for the emergence of favorable conditions for saving the lives of many wounded and patients, as well as the rapid recovery of their combativity and working capacity in modern armed conflicts of any intensity.

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