



Combat Trauma System in Multinational Environment in comparison to Civilian Trauma System

Colonel Dr Renzo Mattei

MD, Department for Forensic Medicine, Caserta, Italy

Summary - The nature of the trauma patient injuries requires timely diagnosis and treatment by a multidisciplinary team, supported by appropriate resources in order to diminish or when possible to eliminate the risk of death or permanent disability. Most of the injured on the battlefield are trauma patients; therefore from the beginning of the warfare attempts to ameliorate the medical aid to injured military men have been made. The real combat trauma system started its development with Napoleonic and Crimean Wars in XIX century. The trauma system in civilian healthcare system started a century later in 1960-s.

The aim of this publication is to present the similarities and differences of the military Combat Trauma system and civilian Trauma System in order to deduce ways to ameliorate both systems.

By the means of descriptive method Combat Trauma System in Multinational Environment and Civilian Trauma System are described. Comparative method was applied in order to analyze their similarities and differences.

As a result of performed analyzes some educational and training proposals are emphasized.

Key words: Civil-Military Cooperation; Combat Trauma System; Multinational Environment; Trauma System; Medical Support Training

Introduction

From the very beginning of the medicine the treatment of injured, later called trauma patients, was in the focus of medical art. One explanation could be the number of wars in the early stages of mankind development, other could be the complexity of patients' condition and required multidisciplinary approach for their appropriate treatment. No one, nowadays, could find enough proves to define whether civilians or military physicians started the development of the trauma system. Most probably in the ancient world there were no differences between the principles of trauma patient treatment in peace or wartime environment. This statement is easily acceptable, because in the antiquity the profession military physician was not recognized, therefore the physicians were treating the injured patients following most probably similar protocols and strategies, but modified by the particularities of the environment where the trauma has to be treated. With the establishment of military medicine as a medicine dedicated only on war casualties' treatment diverse principals and doctrines, focused only on medical support to military campaigns started to be developed.

From the other side of medical art, the scientific developments after 16 century provide physicians with background knowledge that had led to remarkable change in civilian health care practice.

The article objective is to compare some of the challenges of civilian and military trauma systems, as they are established in our modern world. In the article I am presenting part of my experience gained during my assignment as medical advisor (MEDAD) to the Commander of NATO Joint Force Command Headquarters in Naples, Italy.

Materials and Methods

By the means of the historical and descriptive methods some of the main milestones of the civilian trauma system (TS) and the military combat trauma system (CTS) along with their main characteristics are described. Comparative analysis was applied to present their similarities and differences.

The article is generally divided into two parts. In the first one a brief historical review of the TS and CTS is performed in order to highlight the both systems' principles and key elements. In the following the challenges to the civilian and military trauma systems are analyzed in order to emphasize in the conclusion of the article the way of enhancing their capabilities via civil-military medical cooperation.

Results and Discussion

As it was mentioned above, because of the significance of the warfare in the early stages of the human development, the art of war and the related medical support were in the centre of states, kingdoms and empires' interest. It is not surprising that in one of the oldest recorded text the early CTS was described. (1)

The ancient Greeks did recognize the need for a system of trauma care and provide one of the first examples of a trauma system. The wounded were given care in special barracks (klisiai) or in nearby ships. This early trauma system was perfected by the Romans that established a system for delivery of combat care and set up a system of trauma centers, called "valetudinaria", surrounding the Roman Empire. After the fall of the Roman Empire, military trauma care did not make any major advances until midway in the second millennium, just before the Renaissance. Two French military surgeons could be called fathers of the modern CTS.

Ambrose Pare (1510 –1590) with his major contributions to treating of penetrating trauma including treatment of gunshot wounds, introducing ligature instead of cautery, and highlighting the use of nutrition during the postinjury period.

But the one who addressed trauma from a systematic and organizational standpoint was Napoleon's surgeon baron Dominique Larrey. He introduced the "flying ambulance" concept with the sole purpose to provide rapid removal of the wounded from the battlefield. Larrey also introduced the concept of putting the hospital as close to the frontlines as feasible to permit wound surgery as soon as possible. (2)

Contemporary CTS could be defined as preplanned, organized and coordinated injury-control effort in a defined geographic area that functions to engage in comprehensive injury surveillance and prevention programs; deliver trauma care from the time of injury to recovery, including immediate access to emergency medical services; rapid transport to appropriate level of care; acute services, including resuscitation, surgery, critical care and specialty services; and rehabilitation and reintegration into the community and workforce; engage in research, training and performance improvement; and establish linkages with an all-hazards emergency preparedness program. (3)

Nowadays military trauma system consists of the following 8 elements:

- Prevention;
- Battlefield care;
- Acute care facilities;
- Leadership;
- Professional resources;
- Information management;
- Research;
- Education and advocacy. (4)

When tracing the beginning of the civilian TS development the history is significantly shorter, than the CTS one, but with enormous leaps that have led to its greater efficiency and maturity.

The first civilian trauma system was created between WWI and WWII, in Austria by Bo"bler. Although it was initially designed for treatment protocols for industrial accidents' casualties, by the time of WWII, motor traffic accidents injured patients were also included.

In the 1970s in Germany occurred the most remarkable development of a statewide trauma system. But the first statewide trauma system was initiated in 1969, not in Germany, but in the State of Maryland by R. A. Cowley. Approximately the same time the American College of Surgeons Committee on Trauma started to develop common criteria to be implemented in establishment of trauma systems. But the first Optimal Trauma System Criteria document was published only in 1976. Shortly thereafter was developed a course designed for emergency physicians and surgeons - the Advanced Trauma Life Support (ATLS) course where criteria for resuscitation during the first hour after injury had been defined.

One of the most popular definitions is defining the TS as an organized, coordinated effort in a defined geographic area that delivers the full range of care to all injured patients and is integrated with the local public health system. The biggest value of a TS is related to the seamless transition between each phase of care, making best utilization of the available resources in order to improve the outcome of trauma patients' management. But it has to be emphasized that the success of a TS establishment and operational effectiveness are largely depended on the degree to which it is supported by public policy.

The development of trauma systems in the contemporary world is providing tool for seamless and effective care of trauma patients with possibility to react and expand in order to meet the medical needs of the community in case of man-made or natural disaster.

Finally the most comprehensive definition of TS is: Organized, coordinated effort in a defined geographic area that delivers the full range of care to all injured patients and is integrated with the local public health system. (5)

The main objectives of the trauma system are as follows:

- Ensures the seamless transition between each phase of care, integrating existing resources to achieve improved patient outcomes;
- Efficient use of health care resources;
- Emphasizes the prevention of injuries in the context of community health;
- Meets the medical needs of the community from a man-made or natural disaster.

A comprehensive trauma system consists of many different components that are integrated and coordinated to provide cost-effective services for injury prevention and patient care. At the center of this system is the continuum of care, which includes injury prevention, pre-hospital care, acute care facilities, and post-hospital care.

Some of the TS guiding principles are:

- Continuum of care, which includes injury prevention, pre-hospital care, acute care facilities, and post-hospital care;
- Consists of many different components that are integrated and coordinated to provide cost-effective services for injury prevention and patient care;

Eight are the TS key elements:

- leadership,
- professional resources,
- education and advocacy,
- information,
- finances,
- research, technology,
- disaster preparedness and response. (6)

All these elements are integrated and coordinated to provide the best possible, cost-efficient and appropriate services across the continuum of care.

NATO medical support doctrine is under constant development in order to incorporate the most advanced achievements of the both civilian TS and military CTS with the ultimate goal to provide the best medical practice to the servicemen deployed for missions. Some of the main challenges to the medical support to NATO-LED operations are depicted. (7, 8) All presented have their impact on the implementation of the trauma system in the field war medicine.

- A multitude nations – the multinationality in the NATO led operations leads to severe difficulties – each nation has its own preventive medicine program and training – the agreed NATO standards are advisable, as well are the recom-



mentation based on NATO medical experts health risk assessment. The multinationality leads to different pre-deployment training and level of first responders competence - training and skills of the first responders and the combat medics the differences between the troop contributing nations are becoming even more distinguished, related to national medical laws, different standards of equipment and Standard Operating Procedures (SOPs);

- Medical Treatment Facilities and MEDEVAC capabilities - National assets vs Theatre assets - Regarding acute treatment facilities/MEDEVAC assets the differences in the SOPs, protocols, equipment and the language barrier are just few of the challenges recorded. On the other hand troop contributing nation is retaining the command of the asset deployed, the NATO has only functional, coordinating authority, not real operational command and control. The main question of the coordinating authority of the NATO MEDADs is still having significant impact of appropriate and functional medical Command and Control (C2) establishment;
- National/ NATO leadership; National Caveats;
- Medical specialists' different professional training and competence; (9, 10)
- Medical information exchange – there are still many national regulation regarding the sensitivity of the patients' tracking and personal data exchange; (11, 12)
- Different level of military medicine experience;
- Different SOPs and clinical guidelines and treatment protocols.

The similarities between the two systems could be described easily:

- Common goal
- Common principles
- Common organization
- Common challenges
- Both of the systems are facing gaps in manning of the acute treatment facilities with highly specialized teams. The provision of timely efficient transport of the casualties to the level 2 healthcare is a long lasting challenge, due to traffic constrains and obstacles in civilian trauma system and lack of dedicated assets in the military one. The distance to the upper level health care is an unsolved till now problem for the Maritime and SOF operations in military environment and for the rural regions for the civilian one.
- The delayed implementation of the solutions to Lessons Identified is due to financial limitations, common for the both systems, as well as and for some national regulations, related to military CTS in multinational environment.
- In summary the common challenges could be defined in the following areas:
- Insufficient MEDEVAC capacities;
- Gap in the highly specialized coverage;
- Insufficient implementation of Lessons Identified;
- Financing.

The analysis of the both systems key elements leads to noted differences in 6 of the 8 elements:

- Authority – clear chain of management in the civilian and the coordinating MEDAD's authority in NATO Medical environment;
- Professional competence – equal level in civilian/ different in NATO Medical environment;
- Preventive programs implementation in civilian and desirable advice in NATO Medical environment;
- Medical information exchange – NATIONAL caveats and restriction in NATO Medical environment;
- Common finding in NATO as a solution for the financing;
- Clear and mandatory disaster preparedness for military medical specialists.

As a result of performed analyses could be stated that the common objectives, tasks and principles of the both civilian and military systems are the basis on what the solutions to the challenges is to be found. The solutions implemented in one of the systems, could be utilized by the other in order to further reduce mortality and residual disability.

Another conclusion based on performed analyses is that there are not two different trauma system – there is one system developed through the years for best traumatized patient management but performed in different environments and the way ahead is to converge the systems' protocols and SOPs for better serving to the patient's demands.



Bibliography

1. Homer. Iliad // <http://classics.mit.edu/Homer/iliad.html>
2. Trunkey D.D. The Emerging Crisis in Trauma Care: A History and Definition of the problem // *Clinical Neurosurgery* • Volume 54, 2007, pp. 200-205 <http://www.cns.org/publications/clinical/54/pdf/cnb00107000200.pdf>
3. Eastridge B., Costanzo G., Spott M.A., Blackbourne L. Implementation and Dissemination of a Military Trauma System: Utilizing Medical Lessons Learned from the Battlefield // <ftp.rta.nato.int/...//MP-HFM-182-07.doc>
4. Eastridge B.J., Jenkins D., Flaherty S., Schiller H., Holcomb J.B. Trauma System Development in a Theater of War: Experiences From Operation Iraqi Freedom and Operation Enduring Freedom // *J. Trauma* 2006; 61:1366-1373 <http://www.dtic.mil/dtic/tr/fulltext/u2/a480411.pdf>
5. Establishing a national trauma system. http://ec.europa.eu/transport/wcm/road_safety/erso/knowledge/Content/09_postimpact/establishing_a_national_trauma_system.htm
6. Trauma System Agenda for the Future. Executive Summary. // <http://www.nhtsa.gov/people/injury/ems/emstraumasystem03/exesummary.htm>
7. Kostadinov R.; Belokonski E. MEDICAL INFORMATION FLOW MANAGEMENT TOOL FOR MEDICAL SUPPORT TO NATO-LED OPERATIONS // Abstract Book 2012, 17-th Congress of the Balkan Military Medical Committee, May 29-June 01, 2012, Belgrade, Serbia page 93
8. Kostadinov Rostislav. OPERATION UNIFIED PROTECTOR – MEDICAL LESSONS IDENTIFIED // Abstract Book 2012, 17-th Congress of the Balkan Military Medical Committee, May 29-June 01, 2012, Belgrade, Serbia, page 93
9. Kostadinov Rostislav. Medical Teams' Theoretical Preparation for Major Incident Medical Support. // *Public Health and Health Care in Greece and Bulgaria*. Editors Jeliasko Hristov, John Kyriopoulos, Theodoris Konstantinidis, Elena Shipkovenska. Papazissis Publishers, 2010, pp. 223-229
10. Kostadinov Rostislav. Major Incident Management and Support – Bulgarian Policy. // *Public Health and Health Care in Greece and Bulgaria*. Editors Jeliasko Hristov, John Kyriopoulos, Theodoris Konstantinidis, Elena Shipkovenska. Papazissis Publishers, 2010, pp. 691-696
11. Kostadinov Rostislav. Medical Intelligence in Operational Planning Process // *Military Medicine*, Supplement 1, 2009, pp. 29-31
12. Kostadinov R., Kanev K. Medical Intelligence in Force Health Protection. // *Military Medicine*, Supplement, 2010, pp. 6-9.

CONFERENCE



Civil Military Cooperation
Enhancing Combat
Trauma System
and Disaster Medical
Management Capacities

12-14 september 2012
Nunziatella Military School, Naples

