

AEROMEDICAL EVACUATION IN NATO LED MILITARY OPERATIONS

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Abstract: *The paper deals with issues connected with system of medical evacuation in NATO led military operations with stress on aeromedical evacuation. Firstly historical development of medical evacuation is outlined. Authors stress the fact that medical evacuation is dynamic system and every part of evacuation chain should be aware of it and adjust their decisions based on changes in operational situation. Later article deals with different aspects of medical evacuation as principles, types and priorities of medical evacuation are. At the end of article are presented the possibilities of usage unmanned aerial vehicles as an aeromedical evacuation and casualty evacuation means.*

Keywords: *medical evacuation, aeromedical evacuation, casualty evacuation, principles of medical evacuation, unmanned aerial vehicle*

1. INTRODUCTION

One of factors that significantly determine military operations is logistic support. High complexity of logistic systems and growing costs on logistic outputs increase necessity to introduce new target planning, management, control and coordination of partial components of logistics. (Šteuček, 2012:58)

One of the most important components of logistics is medical support. Effectiveness of military operation in the joint operational area is strongly influenced by medical support.

Key to success is evenly built medical support with strong, balanced system of medical evacuation. The evacuation of sick and wounded during military operations is influenced by many factors as are operational environment, weather, length and quality of medical evacuation routes and number and type of suitable medical evacuation means in time of need.

Majority of NATO member states is able to ensure robust ground medical evacuation but it is necessary to have enough aeromedevac capacities to meet timelines of medical evacuation practically in every military operation.

Aeromedical evacuation means are more and more key element to ensure medical evacuation is done in time.

Centrally coordinated multinational system of aeromedical evacuation is one of possibilities how to increase effectiveness of medical support.

Contemporary trends reveal the fact, that casualty evacuation in difficult operational environment can be realized through unmanned aerial vehicles (UAVs).

2. HISTORICAL DEVELOPMENT OF MEDICAL EVACUATION

In the history of armed conflicts were in the beginning for the movement of patients used improvised means as were branches, animal skins, some types of sledges and other different wains.

During great conflicts were gradually improved medical evacuation means. Prominent development of ground medical evacuation was done during Napoleon wars beginning by year 1795 by French surgeons Peter Frank Percy a Dominique Jean Larrey.

Napoleon based on their suggestion decided that each division will have unit for medical evacuation of 170 men, physicians and expediently created, horses pulled wains for immediate care for wounded and their transport to rear areas to quick surgical treatment. During subsequent centuries medical evacuation means became integral part of military medical system.

During Krym war and siege of Sevastopol England used evacuation with trains for the first time. Wounded were loaded on train trucks covered with straw. Czech and Slovak army had train medical evacuation means and in the 1938 mobile units consisted of 20 permanent medical trains, 6 ambulatory medical trains and 6 improvised medical trains.

Even much sooner was medical evacuation realised by water. In the ancient war flotillas probably existed extraordinary boats for evacuation of sick and wounded.

First news about use of aeromedical evacuation emerged in the context Paris' siege in the 1870 during Franco-Prussian war. In that time were 160 casualties evacuated by balloon. French were first to use aircrafts as medical evacuation means. During military manoeuvres in 1912 aircraft equipped with carrier parts executed first flight with patient model. Later Frenchmen arranged aircraft in a way, that the case for casualties was placed under fuselage and in 1913 declared preparedness for evacuation by air.

Aeromedical evacuation was noticeably influenced by invention of helicopters and by their development. In 1928 were USA given first sample of helicopter from French and in 1933 made helicopter able to carry pilot with two patients. Helicopter construction enabled evacuation of two lying patients and one sitting patient. Great boom of this type of medical evacuation was made during wars in Korea (1950-1953) and Vietnam (1964-1975). (Humlíček, Psutka, Witt, 2006:5-6)

3. ANALYSIS OF CHOSEN ASPECTS OF MEDICAL EVACUATION

Medial evacuation is movement of sick or wounded patients under medical supervision to medical treatment facility or between medical treatment facilities as integral part of medical treatment.

System of medial evacuation must always, when it is possible ensure that patient is evacuated to medical treatment facility that is able to provide medical treatment of patients' sickness or injury.

NATO recognizes three categories of medical evacuation related to ground, sea and air operations.

Firstly it's forward medical evacuation, secondly tactical medical evacuation and finally strategic medical evacuation.

Concept of medical evacuation is closely connected with medical service activity, number of sick and wounded and with strategy of keeping combat operation area.

Strength and reliability of medical evacuation system is connected and dependent upon amount of treatment means capabilities which will be needed in the area of combat operation.

This basic principle is main reason for establishment of strong and reliable system of medical evacuation.

It's extremely important to realize that medical evacuation is dynamic process.

Medical status of patient can change and this can require subsequent change of method or priority of medical evacuation.

Forward medial evacuation can be carried out through means of medical evacuation of relevant military unit with medical unit support or medical evacuation means of medical treatment facilities of different level.

Basic principles of medical evacuation is constant ability to evacuate sick and wounded into medical treatment facility or between medical treatment facilities in whatever weather, through whatever terrain and in whatever operation environment; furthermore it is sustainable provision of medical care by well-trained medical personnel and adequate medical equipment according clinical state of patient during whole evacuation; and last but not least ability to regulate flow of patients with different injuries to the most suitable medical treatment facility and track movement of patient through evacuation chain.

To fulfil requirements for medical evacuation are required evacuation means present in the battlefield suitable for accomplishment of mission and constructed on the same technological level as unit that are supported. They can comprise ground evacuation assets (armoured or non-armoured, wheeled or tracked depending on unit they are assigned), air assets (airplanes and helicopters), sea and river assets (depending on geographical limitation of operation). Evacuation means for tactical medical evacuation are as well dependent on a mission. The most probable choice will be use of airplanes, but helicopters and ships can be at disposal depending on character of operational area and evacuation distances.

Casualty evacuation is not sort of medical evacuation because it is unplanned movement of wounded without assigned medical support, or only opportunistic movement with free medical personnel. This type of evacuation will necessarily occur but it is not decisive factor during planning of medical support of military operations a therefore have no influence on process of medical estimation.

Forward medical evacuation is movement of patient from point of injury to the first medical treatment facility and during this type of medical evacuation is necessary to meet clinical timelines in any operational circumstances.

Forward medical evacuation can be to a medical treatment facility of any Role and should be, where possible, to the most appropriate level of care within the timelines and not necessarily to the nearest medical treatment facility.

Forward medical evacuation needs to be configured to meet similar force protection levels as the forces in the area they are required to enter.

Forward medical evacuation teams should be equipped and trained to carry out appropriate pre-hospital care.

Tactical medical evacuation is evacuation of casualties within Joint Operational Area transporting patients between different medical treatment facilities with various level of care (ROLE 1, ROLE 2, ROLE 2 light manoeuvre, ROLE 2 enhanced, ROLE 3). This type of evacuation is realised after patients have been stabilized and can be conducted with ground or air assets.

Strategic medical evacuation is evacuation of patient from Joint Operational Area to the home nation or other NATO country or to a temporary out of theatre safe area. Strategic medical evacuation is national responsibility and in case of non-availability of military means, consideration should be made for the use of civilian charter airplane with adequate medical equipment.

Medical evacuation comes under certain principles, between which belongs principle, that all wounded (especially seriously wounded) must be transported to medical treatment facility of various levels of care as soon as possible; and principle that it is essential to move wounded quickly, but sparingly so that transport would cause as little health damages as possible. (Humlíček, Psutka, Witt, 2006:8)

Sick and wounded, who need evacuation must be sorted into categories based on their medical status. Great number of factors must be balanced to achieve successful evacuation of sick and wounded.

To reach optimal results, decision about evacuation of casualties should be primarily based on clinical decision.

Patients that are designated for aero medical evacuation are sorted into priorities, so urgent patients are evacuated sooner than less urgent cases. Categorization of patients according priorities is done into three groups. (Stanag 2087, 2008:5) Patients are evacuated in succession urgent (P1), priority (P2) and routine (P3).

Priority 1 is labelled urgent and consists of casualties to whom quick evacuation (to 2 hours) is essential for life, limb or function saving treatment or to prevent complication of serious illness or to avoid serious permanent disability. Priority 2 labelled priority comprise casualties, who require specialized treatment, which is not locally accessible and patients have tendency for worsening of their clinical status, if they would not be evacuated with the least possible delay (to 4 hours). Priority 3 labelled routine consist of patients, to whom treatment is locally accessible, but their prognosis would definitely benefit by aeromedical evacuation. (see table 1).

Table 1 – Timeline of medical evacuation

Category	P1	P2	P3
Forward medical evacuation	90 minutes	4 hours	24 hours
Tactical medical evacuation	12 hours	24 hours	72 hours
Strategic medical evacuation	24 hours	36 hours	7 days

3. DISCUSSION ABOUT NEW TRENDS IN MEDICAL EVACUATION

From the times of first usage of aeromedical evacuation, almost every newly developed type of airplane was tested as mean of aeromedical evacuation. Medical evacuation through helicopters is important factor of survival of wounded in contemporary military operations and the level of survival is on the highest level in military history.

This fact has contributed to bringing survival rates of U. S. Forces in Afghanistan and Iraq up to 89.9% compared to 69.7% in World War II. It appears that the next aircraft type to be used in this role may well be the UAV.

The use of Unmanned Aerial Vehicles (UAVs) in many roles is one of the fastest growing of all fields in military aviation.

Through the use of several varieties of UAVs for operational military purposes has most recently been brought to public attention as the result of their use in Afghanistan and Pakistan, there is much more development going on than most people realize.

UAVs have in recent years become even more versatile and essential assets on battlefield.

Current rapid development and fielding of UAVs provide opportunity to evaluate potential of this new type of aircraft for the transportation of casualties. (NATO STO, 2012:19)

Range of requirements for medical evacuation system is determined by defining basic rules and timelines for providing of well-balanced medical care.

The first 60 minutes after traumatic injury has been referred to in the past as the “golden hour”.

Delivering an injured casualty to an appropriate level of care within the prescribed time constraints is the goal of medical evacuation or casualty evacuation.

Current NATO medical doctrine (AJP-4.10(A), 2011:15) has modified this requirement somewhat, with so-called 10-1-2 concept, which mandates that bleeding and airway control for the most severely injured casualties must be achieved within 10 minutes of wounding; medical evacuation assets (either ground or air) should reach the seriously injured casualty with advanced skilled medical aid within 1 hour of wounding at the latest; and casualties requiring surgery must be within a facility equipped to provide this within 2 hours of wounding at the latest.

Current operations by the International Security Assistance Force in Afghanistan have demonstrated that this goal cannot always be met, often due to operational requirements or simple unavailability of dedicated medical evacuation means.

Present evacuation trends indicate that both air and air ambulances will continue to serve in the battle areas of the future, but the increased depth, width, and complexity of the operational areas indicates a recurring need for both lateral and rearward movement.

In this context, smaller and quieter aircraft, whether manned or unmanned, may prove safer and capable of responding in timely manner.

Therefore it appears evident that all potential means for achieving these goals must be considered, including possible use of UAVs.

It has been recommended by many authors that the use of UAVs for casualty evacuation may offer a viable alternative method for casualty extraction and evacuation.

If UAVs are present on the battlefield for logistic support, they may provide a capability for casualty evacuation which could serve in specific instances as a supplement to dedicated medical evacuation means.

It is understandable that the use of UAVs for casualty evacuation under certain circumstances might effectively reduce the exposure of aircrew from enemy fire, while carrying out a casualty extraction to a safer location where a casualty can be transferred to better equipped medical evacuation asset.

Although a UAV might not be equipped to provide medical care en route, time would not be lost in either configuring the aircraft for medical personnel and supplies or in arranging escort gun ships, and thus the time lost before casualty can reach advanced medical care, could be reduced. (NATO STO, 2012:22-23)



Fig. 1. Boeing Unmanned Little Bird (ULB)

The U. S. Marine Corps used ULB in their Limited Objective Experiment, June 2009 to explore the concept of unmanned casualty evacuation.

The current ULB retains the manned version's cockpit/co-pilot seats which could be used to hold casualties. Additionally, the cockpit could be modified to accommodate one or more medical litters.

In the conclusion can be stated that potential use of UAVs for casualty evacuation is ethically, legally, clinically and operationally permissible, so long as the relative risk for the casualty is not increased through the use of the UAV.

The use of this type of aircraft for medical evacuation is neither technologically possible nor acceptable at this time primarily due to the lack of capability of in-flight medical equipment, but we can predict their use in medium-term and long term.

3. CONCLUSIONS & ACKNOWLEDGMENT

The quality of medical evacuation system directly determines effectiveness of medical support in military operations. Sufficient number of adequate ground but particularly air medical evacuation assets ensures guaranteeing the medical timelines for every single type of injuries and this significantly increase prognosis for treatment of casualties. Possible solution for patient evacuation from point of injury is use of UAVs.

Contemporary legislative environment and present development of UAV technology however allow us to use UAVs only for casualty evacuation and thus can be used only for transportation of patient without presence of medical support. This can under certain conditions save life of casualty in case of his acute state in difficult operational conditions. These facts could be inspiring and thought-provoking to further discussion about these issues.

BIBLIOGRAPHY

1. HUMLÍČEK, V. – PSUTKA, J. – WITT, P. (2006) *Medical evacuation*. [Study texts FVZ UO] Brno, University of defense. ISBN 80-85109-94-8.
2. NATO. MC 326/3. (2011) *NATO Principles and Policies of Operational Medical Support*. Brussels. 25 p.
3. NATO. AJP-4.10(A). (2011) *Allied Joint Medical Support Doctrine*. Brussels. 98 p.
4. NATO. AMedP-8.1. (2013) *Documentation relative to initial medical treatment and evacuation*. Brussels. 18 p.
5. NATO. STANAG 2087 (2008) *Medical Employment of Air Transport in the Forwarded Area*. Brussels. 8 p.
6. NATO. STANAG 3204. (2007) *Aeromedical Evacuation*. Brussels. 27 p.
7. NATO. STANAG 7112. (2011) *Recommended medical equipment for aeromedical evacuations*. Brussels. 10 p.
8. NATO STO. (2012) *Safe Ride Standards for Casualty Evacuation Using Unmanned Aerial Vehicles*. Neuilly-Sur-Seine Cedex, Francúzsko. ISBN 978-92-837-0174-3.
9. ŠTEUČEK, J. (2012) *Effective purchasing and commercial logistics*. In: International science conference in Uherské Hradiště. ISBN 978-80-7454-145-2.