

The management of medical rescue teams in the case of patients with multiple or multi-organ injuries

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SUMMARY

Injuries are one of the major health problems in the world. They are a challenge at all levels of the treatment process. In most cases, teams of paramedics are the first qualified personnel who help victims. Training of rescuers should be based on standards of care for patients with multiple and multi-organ injury is so important.

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INTRODUCTION

A significant development of industry, mechanization of labor and means of communication increases the number of injuries among all societies in the world. Nowadays, according to the World Health Organization data, trauma is defined as one of the major health problems [9]. International research on injuries are increasingly focusing on the improvement of management quality of this particular public health problem [3]. The term injury is determined as the effect of any factor on the system, which consequently causes damages within cells, tissues and organs. In the colloquial speech the term injury is wrongly used as a synonym for damage. Damage is a consequence of injury and it can be treated, however injury can only be prevented [8].

According to the Act of 8 September 2006 on National Medical Rescue Service, trauma patient is concerned to be in sudden life-threatening condition, which is caused by the action on an external factor, the consequences of which are severe, multiple or multi-organ injury [10]. The multiple injuries are described as the damage of at least two areas of the body, each individually requiring hospital treatment. Multi-organ injuries are damages to at least two organs in one area of the body, which also requires hospitalization individually [11].

The effects of injuries may be reduced by implementing the correct procedure specific for trauma patients. The extremely important is knowledge and efficient operation of medical rescue teams, which in most cases are the first qualified staff that contacts with the victim. Initial assessment and early implementation of lifesaving medical treatment by rescue team at the scene may result in the destruction of life processes will slow down [11, 12, 13]. The role of the paramedic has been thoroughly described

in the Act on National Medical Rescue Service. According to the law, duty of paramedic involves, among others:

- Protection of people in the scene and taking actions to prevent the increasing number of casualties and environmental degradation,
- Estimation of the health condition of people in emergency and making rescue operations,
- Transporting people in life-threatening condition [10].

Identification of the victims in life-threatening conditions, protection of basic vital functions and deciding on the destination of transport has a particular meaning in the case of trauma patients [12].

TRAUMA CENTERS

In order to ensure the highest quality of diagnosis and treatment of patients with multiple and multi-organ injuries the systems of care for trauma patients have been set up. Components of these systems vary in different countries [2]. In Poland there are 14 trauma centers. The legislature determines the trauma center as a separate functional part of the hospital, in which emergency department operates, where the specialistic departments are co-operating in the scope of tasks in a manner that allows for quick diagnosis and treatment of a the trauma patient, meeting requirements of the Act [18]. Many studies conducted around the world indicates that the establishment of trauma centers has led to decline the mortality among patients with multiple and multi-organ injuries. The program of access to trauma centers, which has been developed by the American College of Surgeons in 1976, not only showed a reduction in mortality among trauma patients, but also the improvement of the quality of life after hospitalization. Some results of the research are as high as 25% reduction in mortality of patients with multiple and multi-organ injuries hospitalized in trauma centers in relation to the treatment centers that are not trauma centers [4,5,6].

The establishment of trauma centers has raised the need to establish the conditions for eligibility of patients for treatment in these centers. The transport of patient to these centers has to be well-considered. Qualification of all patients with trauma to the TCs, regardless of their state, may lead to overcrowding TCs and make them less accessible to patients actually requiring complex care [7,5]. Today, many systems of the qualification to treatment in the

TC are based on an assessment of physiological parameters, anatomy and mechanism of injury [1]. In Poland the mechanism of injury is overlooked element of qualification, patients are qualified to the treatment in TCs if:

- there are at least two of the following anatomical injuries:
 - Penetrating wounds of the head, trunk or blunt trauma with signs of damage to the internal organs of the head, chest and abdomen.
 - Amputation above the knee or elbow,
 - Extensive conqassation of limbs,
 - Spinal cord injury,
 - Breaking the limbs with damage to vessels and nerves.
- Breaking at least two of the proximal long bones of limbs or pelvis;
- there are at least two of the following disorders of physiological parameters:
 - Systolic blood pressure equal to or below 80 mm Hg.
 - Heart rate of at least 120 per minute.
 - Respiratory rate below 10 or above 29 per minute
 - State of consciousness in the Glasgow Coma Scale (GCS) equal to or less than 8,
 - Arterial oxygen saturation equal to or less than 90% [18].

“GOLDEN HOUR”

The results of treatment of trauma patients have a direct relationship with the time elapsed from the occurrence of the injury to making a final treatment – usually surgical. Dr. R. Adams Cowley noted that the greatest chance of survival after severe trauma had the patients who entered the operating room within an hour of the injury to occur. It is the time describes as the “golden hour” [16,12]. The heavier injury was the faster definitive treatment should be taken. It can be divided into three periods. The first is the time of waiting for help. During this time condition of the victim often deteriorates. The main role is played by bystanders. According to the survey, 80% of victims who have not arrived alive to the hospital died during this period. The second period of starts at the moment of the Medical Rescue Team’s arrival. Preliminary assessment and life-saving treatments taken by paramedics are to make the destruction of life processes slow down. The third period takes place in the destined center. [11,12,16]. Anti-shock treatment, ensure effective ventilation, diagnostic and life-saving treat-

ments in a hospital emergency department lead to the point where the decision on whether the patient should be urgently operated on, or whether treatment should be postponed and the patient moved to another hospital ward, has to be made [11,12]. It is essential therefore to cooperate efficiently both at the scene and after the arrival of the patient to the Emergency Department.

EVALUATION OF TRAUMA PATIENT

Evaluation of trauma patient is a major challenge for paramedics helping at the scene. Patients who have experienced trauma are often under the influence of alcohol or drugs, what makes the evaluation of injuries difficult. International Trauma Life Support (ITLS) – a global organization dedicated to action for the prevention of death and disability due to injuries, has developed guidelines for dealing with patient trauma. The study conducted, according to the standards of ITLS, consists of three parts, with reservation that the last element is repeatable. These are: a preliminary, repeated and further study. The purpose of the preliminary investigation is directly detecting life-threatening injuries as soon as possible. It includes evaluation of consciousness, breath and circulatory sufficiency and fast analysis of trauma. The study aims to re-discover any damage, not just those life-threatening. Repeated trauma patient survey component – further research have to help to identify the deteriorating condition of the victim [16]. Preliminary testing should always be preceded by an assessment of the scene. The team leader decides if the place is safe. He also should take a quick assessment of the victim. During the evaluation the mechanism of the injury should be considered. Any dents in the hood of the car may indicate the mechanism of injury the passenger suffered. Impact at the rear of the car can cause damage to the cervical and lumbar spine, and as a result deceleration can cause damage to internal organs. The team leader does not interrupt the test if the damages are identified. He gives dispositions to another rescuers, that injuries are provided, and then he continues the investigation. The aim is to detect any life-threatening injuries. As an exception, there are only three situations when the investigation may be stopped: airway obstruction, cardiac arrest and appearance in danger at the scene. Initial assessment with the rapid study of trauma should not take more

than two minutes. If the mechanism of injury indicates possible damage to the spine when assessing the state of consciousness gently but firmly the rescuer immobilizes the cervical spine. The person directing the action shall inform the victim about who he is and why he came as well as try to get information from him about the incident [13,14,16].

Assessment of the state of consciousness should be carried out based on a scale of Glasgow or AVPU. Among patients with impaired consciousness the airway should be always maintained. Whenever you suspect spinal injury airway management is carried out by hanging jaw. Just like apnea or stridor any wheezing, snoring or gurgling may mean for the obstruction of airways. Among the major causes of respiratory distress in trauma patients there are: aspiration, presence of foreign bodies in the respiratory tract, the tongue closing the entrance to the larynx, chest injuries, burst of larynx, trachea burst and pulmonary edema. Respiratory failure is manifested by the appearance of cyanosis and commissioning of accessory muscles, or expanding nostrils among children. [15,16,17]. Every patient with poly-trauma requires high flow oxygen.

The next stage of preliminary assessment is determining cardiovascular efficiency. To do this, the peripheral pulse at the radial artery in adults and humerus in infants should be examined. The evaluation shall assess heart rate, its tension and regularity. When the peripheral pulse is not palpable, the pulse on carotid artery should be controlled. No pulse at the carotid artery is an absolute indication to begin CPR. Tachycardia, tachypnea, increased breathing effort, pale skin with cold sweat, threadlike pulse, sunken jugular veins and capillary extension recurrence testifies about hypovolemic shock. Hypovolaemia among trauma patients is usually caused by a massive external or internal haemorrhage (usually abdomen). Hypovolemic shock develops with the loss of approx. 1/3 of circulating blood [11,12,16]. Quick traumatic examination focuses on detecting any life threatening injury. It may be limited to spot-tests just in case of isolated injury of victims whose basic life functions are without any deviations from the norm. The study further elements of the patient's body should be carried out systematically, starting from the head and ending with the feet. During assessment of the head and neck the attention should be paid to, inter alia, swelling of the face, expanding or collapsing of the jugular veins and the shift of

the trachea. Furthermore, important are bleeding from the nose, ears or mouth and leakage of cerebro-spinal fluid. During the test, chest deformities, asymmetry or paradoxical movements require attention. The chest should be auscultated and percussed. Breathing sounds ought to be heard with the same intensity on both sides. The less audible murmur or complete lack of breathing sound on one side, may indicate a pneumothorax or pleural hematoma. The most common sign of chest injury is pain and the shortness of breath. Whenever there is a chest injury the damage of the heart muscle should be always suspected. Hypotension, excessively filled jugular veins and muffled heart tones indicates cardiac tamponade. Research of abdomen focuses primarily on identifying tenderness, increased muscle tone, gastrochisis and deep wounds. Visible bruises within the abdomen may indicate damage to internal organs. The pelvis should be examined by a steady pressure on the front upper iliac spines. Deformity, instability, tenderness and crackles may be indicative of its damage, and thus the possibility of internal bleeding. 10% of all injuries are complex pelvic fractures running with massive hemorrhage. During the test, both extremities of the upper and lower assess the presence of swelling, deformation and instability. The mobility of the limbs, blood circulation and nerve supply should be also checked. Back and buttocks are best to examine when moving the patient's spine board. In the case of injuries of the pelvis patient movements should be minimized, it is best to use a stretcher carrying nets. During a quick survey of trauma patient the team leader should also assess the value of blood pressure, pulse and breathing. If possible the interview should be collected SAMPLE [11,13,14,16].

The patient's condition determines the category of the urgency of patient transport to the hospital. For stable patients the necessary medical procedures are performed at the scene - the category "stay and play". Critically ill patients should be immediately transported to a specialist center, and at the scene are performed life-saving procedures only – the category of "load and go". A necessary condition for the principle of "load and go" is the time to reach a specialist center in less than 10 minutes. To qualify patient to fast transport there are some conditions: head injuries, impaired consciousness, respiratory distress, shock, out-of-control bleeding, internal bleeding suspected, cardiac tamponade, massive damage of the chest, pel-

vic fractures, bilateral fractures of thigh and high-energy- trauma [13 15].

More accurate form of preliminary examination is to take re-examination of trauma. It is not routinely performed, for instance, where the time of arrival to a specialized center is short and during transport therapeutic interventions are taken. Re-examination consists of: a initial reassessment; pulse rate, respiration, blood pressure and oxygen saturation check; Monitoring heart rate; ECG execution; A neurological examination and a detailed study of trauma [16].

Further studies are the continuation of the evaluation of the patient's condition. Among patients in serious condition the evaluation should be made in every 5 minutes, the remaining patients every 15 minutes. In addition to assessing vital functions they are focused on controlling areas where the injury is diagnosed. Indications for further testing are any transfer of the patient, performing therapeutic interventions and the deterioration of its condition [16].

TRANSPORT OF TRAUMA PATIENT

Transport of all patients should be done in a way that ensures the safety of both the patient and the staff. It is required to use a suitable protection of a patient in order to eliminate secondary damage. Clear airway and adequate ventilation should be provided. Peripheral intravenous access is also required. Patients with symptoms of shock should have two-way cannulas size at least 18G. If the patient's condition allows the injuries should be recognized and initially equipped. Patients with suspected spinal injury should be transported in a neck brace for using orthopedic boards equipped with a complete set of belts and head stabilizers. It should also reassure the victim thermal comfort. While transporting a patient in serious condition, the rescue team should contact with the Emergency Notification Centre. Dispatchers have information on, among others, the availability of hospital beds and equipment failure. Their task is to direct the Medical Rescue Team to the appropriate facility and to inform its staff about the possibility of arrival of the patient in serious condition. Informing about the transport of such patients gives hospital staff time to prepare the proper equipment, space or bring extra help [12,13,14,15].

SUMMARY

The trauma patient, especially with multiple and multi-organ injuries, is a major challenge for the medical staff. In the first period the rescue activities must be focused on the initial diagnosis, maintaining or restoring vital functions. The incidence of injuries is increasing and therefore the medical staff should make

every endeavor to the quality of trauma patient care at the highest level. It seems necessary to continue education of medical staff and to take preventive measures designed to reduce both traffic accidents as well as all kinds of injuries experienced during the labour. The benefits of the creation of trauma centers in our view testify to the necessity of expanding the system.

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