Logistics in the rehabilitation process after aquatic incidents

INTRODUCTION

Logistics in the rehabilitation process after aquatic incidents has a significant specificity, particularly in the initial phase, in which it is difficult to establish any professional rigours. In the majority of submersion cases, the first reactions are spontaneous, and performed by individuals with generally no professional expertise in the field. However, from the arrival of a professional team onwards, the subsequent part of the rehabilitation process should be conducted in accordance with the accepted rules of logistic interrelations, the hierarchy of life- and health-determining factors, as well as the law in force.

In such cases, discipline in observing the established logistics of the consecutive rehabilitation phases is of exceptional importance. The reason for this is not only the fact that there are several actors representing various areas of social life (ordinary people, water rescuers, firefighters, ambulance service teams, physicians conducting the treatment process and rehabilitation specialists), but also the fact that success of the entire operation is primarily determined by the time factor. This means that the primary duty of all the actors involved in this process is to minimise improvisation for the strict observance of professional logistic rules in the accepted rehabilitation process.

1 SUBMERSION AND ITS CONSEQUENCES

In order to intelligibly and communicatively present the characteristics of the rehabilitation process after aquatic incidents, the phenomenon of submersion and its consequences require a short outline. The World Health Organisation estimates that drowning is responsible for the annual toll of 450,000 deaths worldwide. Drowning is one of the most common causes of death among young men, and the main cause of accidental deaths in this age group [20, p. 195-199]. More than 30 various definitions are used to describe the course and prognosis in the case of submersion or immersion [19, p. 255]. ILCOR (International Liaison Committee on Resuscitation) defines drowning as “a process resulting in primary respiratory impairment from submersion or immersion in a liquid medium. The liquid/air interface is present at the entrance of the victim’s airways, preventing the victim from breathing air. Regardless of whether the victim survives or dies, he/she suffered a drowning episode” [12, p. 45]. The pathophysiology of drowning is that after submersion and before laryngospasm, the respiratory arrest occurs. At this time, the victim often swallows a large amount of water. Hypoxia and hypercapnia are developed while the breath is being held and during laryngospasm. Alternatively, these reflexes become weaker, and water is aspirated into the victim’s lungs, thus exacerbating the hypoxaemia. Without assistance and restoration of ventilation, the heart rate of the victim slows down until circulation stops. In the past, much attention was paid to the difference between drowning in freshwater and in salt water. Numerous tests on animals, as well as the series of clinical cases published, have proved that – irrespective of the salt concentration of the water aspirated into the airways – the basic problem in the pathophysiology of drowning is the progressing hypoxia resulting from the flushing and destruction of the surfactant layer (the collapse of the pulmonary alveoli as well as the development of atelectasis, and intrapulmonary arteriovenous shunt). Minor electrolyte disorders occur rarely, are of no clinical significance and usually require no treatment [16, p. 1407].

Drowning victims are at risk of developing the adult acute respiratory distress syndrome (ARDS) [7, p. 93-97]. Pneumonia is a frequent complication as well. There is no scientific evidence to suggest
the efficiency of preventive antibiotic therapy [26, p. 393-394], but its implementation can be considered in the event of submersion in heavily contaminated water (e.g. waste water).

If there are symptoms of infection, the treatment must incorporate broad-spectrum antibiotics [25, p. 101-107]. Submersion victims may develop primary or secondary hypothermia. If the submersion occurred in ice-cold water (<5°C), hypothermia may develop at a fast rate, thus ensuring a certain degree of protection against hypoxia. Typical descriptions of such cases refer to children who experienced submersion in ice-cold water [20, p. 195-199]. Submersion causes cerebral hypoxia, which may result in cerebral oedema, coma, and death.

2 RESCUE OPERATION

The treatment of drowning victims encompasses four different, but interrelated, phases:

- water rescue
- basic life support procedures
- advanced life support procedures
- post-resuscitation care.

Rescuing and life-support of a drowning victim almost always requires involvement of a multidisciplinary team, which indicates the crucial role of logistics in the coordination of this process. Victims are usually pulled from water by eye-witnesses or trained water rescuers, or by the crew of the water rescue units. The first people to conduct the basic life-support procedures are often the rescuers who pulled the victim from the water, usually before the arrival of emergency medical service. Life support procedures are often performed whilst the patient is being transported to hospital, and in the event of return of spontaneous circulation, the victim is transferred to an intensive care unit [16, p. 1407].

While conducting a rescue operation, a rescuer must always remember about his/her own safety, and at all times try to minimise both his/her own risk and the risk of the victim. Wherever possible, the rescue operation should be conducted without entering the water. Talking to the victim, giving him/her some object (like a stick or a piece of clothing), or throwing a line or a special rescue quoit towards the victim may be effective if he/she is near the shore. The victim can be reached by boat or other water equipment. If possible, entering the water should be avoided. If it is necessary to enter the water, it is crucial to take a rescue buoy or other floating device [4]. All the victims must be rescued from the water as quickly and safely as possible, and the life-support procedures must be initiated immediately.

The risk of injuries to the cervical spine in drowning individuals is very low (approximately 0.5%) [27, p. 658-662]. Immobilisation of the cervical spine may be difficult to perform in water, may delay the rescue operation and proper life-support procedures. A cervical collar, when improperly applied, may also result in airway obstruction in an unconscious person [3, p. 961]. Immobilisation of the cervical spine is not always indicated unless signs of severe injuries are determined or the possibility of their occurrence is implied upon history. The victim, having no pulse and being in respiratory arrest, should be rescued from the water in the shortest time possible.

The first and foremost objective of the treatment is to reduce the oxygen deficiency in the patient’s tissues after the drowning episode. Immediate initiation and proper performance of rescue breaths or positive pressure ventilation increases the survival [6, p. 183]. Where possible, rescue breaths should be administered with the use of oxygen [18, p. 63]. Five initial ventilations/rescue breaths must be given as quickly as possible. They can be launched when the victim is still in shallow water unless the safety of the rescuer is jeopardised. If the victim is in deep water and does not breathe after airway patency has been restored, rescue breathing must follow provided that one has been trained in the performance of this activity. It is important to administer 10–15 rescue breaths in about a minute. If normal breathing fails to return spontaneously, and the towing time of the victim to the shore is shorter than 5 minutes, rescue breaths must be continued while the victim is being towed. However, when the approximate distance to the shore indicates that the towing will take more than 5 minutes, it is necessary to perform further rescue breaths for a minute, and then bring the victim to the shore as
quickly as possible, without continuing the ventilation attempts [23, p. 25-31]. Prior to chest compression, the victim must be laid on a hard surface because this procedure is ineffective in water. Having verified that the victim fails to react and breathe properly, it is necessary to perform 30 chest compressions, and then continue the cardiopulmonary resuscitation (CPR) at 30 compressions to 2 ventilations. Every effort should be made to maintain ventilation until the arrival of rescuers, who have advanced apparatus for life-support procedures. The following figure shows a diagram of procedures to be taken in the case of submersion.

![Diagram of procedures to be taken in the case of submersion](image)

**Fig. 1.** The steps in the case of submersion [28]

It must be borne in mind that everyone who is a witness to an incident is obliged to render first aid to the victim. It is obvious that rescuers have access to professional equipment, such as a cervical collar or oxygen. However, if a witness reacts, succeeds in pulling the victim from water, and begins the rescue actions, it will shorten the duration of the entire operation, which can determine the survival of the victim.

### 3 HOSPITAL PROCEDURES FOR SUBMERSION VICTIMS

The next phase in the logistics of the discussed rehabilitation is the transportation of the victim to a health service unit. It is then that new circumstances emerge concerning the change of place, rigours, practices, forms of diagnosis, treatment, and defining the model of further rehabilitation. The medical conditions of the patient upon arrival, for example, at the hospital is primarily dependent on the reaction of the first witnesses of the event and the time in which medical rescuers arrive at the site of the incident. Each case must be examined on an individual basis; however, both in the literature and in the practices, crucial significance is attributed to the so-called “Golden Hour”. It is a time in which the patient must receive hospital care after an accident. It is assumed that the arrival to the patient should not take longer than 10 minutes, the operations on site about 10 to 20 minutes, transport the victim to a hospital 20-30 minutes from the time of injury. Proceedings at the scene, during transport to hospital, and the hospital is shown in Figure 2.

![Scheme of time-related factors of “golden hour”](image)

**Fig. 2.** Scheme of time-related factors of “golden hour” [10]
Individuals who report health problems or who manifest signs of respiratory insufficiency must undergo at least a 24-hour hospital observation. At least 48 hours of hospitalisation are recommended for those individuals who were submerged in water for more than 1–2 minutes, underwent life-support procedures, lost consciousness, developed cyanosis or apnoea. During hospitalisation, the patient should be regularly informed about his/her medical conditions, and cooperation with the victim’s family must be established as one of the significant logistic components in the treatment process. In the model of physician-patient relations presented, the term “physician” refers to the whole medical personnel, thus indicating the scope of the necessary and effective communication in the various states of the victim’s consciousness [table 1].

**Tab. 1. Models of collaboration between the patient-physician-family [13, p. 212-218]**

<table>
<thead>
<tr>
<th>Model</th>
<th>Role of a physician</th>
<th>Role of a patient</th>
<th>Role of a family</th>
<th>Characteristics of the physician’s communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unidirectional model - authoritarian</td>
<td>• dominant</td>
<td>• passive</td>
<td>• not significant</td>
<td>• unidirectional</td>
</tr>
<tr>
<td></td>
<td>• authoritarian</td>
<td>• subordinated</td>
<td></td>
<td>• narrow</td>
</tr>
<tr>
<td></td>
<td>• imperative</td>
<td>• executive</td>
<td></td>
<td>• limited</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• great emotional distance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• barrier in family matters</td>
</tr>
<tr>
<td>Bi-directional model - paternalistic</td>
<td>• dominant</td>
<td>• submissive</td>
<td>• following</td>
<td>• bi-directional</td>
</tr>
<tr>
<td></td>
<td>• paternalistic</td>
<td>• like a child</td>
<td>• indirect</td>
<td>• sufficient in relation with the patient</td>
</tr>
<tr>
<td></td>
<td>• informational</td>
<td>• submitting to</td>
<td>• negligibly</td>
<td>• with reduced emotional distance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>care</td>
<td>significant</td>
<td>• presuming the significance of family matters in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• receiving</td>
<td></td>
<td>the patient’s attitude</td>
</tr>
<tr>
<td></td>
<td></td>
<td>information</td>
<td></td>
<td>• presuming therapeutic relevance in relation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>with the family</td>
</tr>
<tr>
<td>Bi-directional model - cooperating</td>
<td>• cooperative</td>
<td>• cooperative</td>
<td>• assisting</td>
<td>• bi-directional</td>
</tr>
<tr>
<td></td>
<td>• advisory</td>
<td>• partly</td>
<td>• affecting the</td>
<td>• good in relation with the patient</td>
</tr>
<tr>
<td></td>
<td>• partially</td>
<td>decision-</td>
<td>decision</td>
<td>• assuming emotional closeness</td>
</tr>
<tr>
<td></td>
<td>partnership-based</td>
<td>making</td>
<td></td>
<td>• taking into account the family’s life model</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• partially</td>
<td></td>
<td>• taking into account the roles performed in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>partnership-based</td>
<td></td>
<td>family</td>
</tr>
<tr>
<td>Systemic model - partnership-based</td>
<td>• partnership-based</td>
<td>• partnership-based</td>
<td>• partnership-</td>
<td>• bi-directional</td>
</tr>
<tr>
<td></td>
<td>• cooperative</td>
<td>• based</td>
<td>• based</td>
<td>• full in relation with the patient</td>
</tr>
<tr>
<td></td>
<td>• supporting and</td>
<td>• based</td>
<td>• based</td>
<td>• full in relation with the family</td>
</tr>
<tr>
<td></td>
<td>• emphatic</td>
<td>• supporting and</td>
<td>• based</td>
<td>• establishing proper emotional ties</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• systemic</td>
<td>• based</td>
<td>• diagnosing health problems and diseases of the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• based</td>
<td>• advisory concerning the forms of assistance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• based</td>
<td>• preventive in terms of health and disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• based</td>
<td>• educational in terms of health and disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• based</td>
<td></td>
</tr>
</tbody>
</table>
The authoritarian model does not foresee a contact with the patient’s family, which is merely a background for the physician. This model assumes that the clinical medical knowledge and professional experience give sufficient guarantees to ensure the patient’s sense of security and appropriate relations with the physician, as well as the desired treatment effects. It fails to include (except for certain elements of clinical psychology) any particular need to additionally educate the physician in terms of his/her interpersonal relations with the patient, let alone the patient’s family. [29, p. 290, 30, p. 225-234].

The paternalistic model takes into account the need to convey information between the physician and the patient, but the family is still at the far end. Information from the patient is to enable the physician to make a diagnosis and direct the treatment, and information to the patient should motivate the latter to respect the recommended treatment. This model focuses on the role of the patient’s self-observation in the diagnosis of his/her non-medical problems, as well as on the necessity to provide the patient with psychological support [8, p. 136].

The cooperative model takes into consideration the problems of both the patient and his/her family, but concentrates on the patient. This model assumes a certain amount of partnership and cooperation between the physician and the patient, as well as between the physician and the patient’s family. It requires emotional closeness (processional emotional bond) between the partners, in which the physician is not indifferent to the problems of his/her patients and their families, but stays out of the social system of the family [14, p. 290].

The systemic – partnership-based model is the most effective one, assuming the formation of partnership-based relations among the physician, the patient and the patient’s family, which are the components of the interconnected medical and family systems, as well as of the local community systems. Its essence is the cooperation among the physician, the patient and the family in the diagnosis and planning of therapeutic actions [15, p. 224]. It is both the verbal and the non-verbal communication that is equally important within all the communication models (table 2).

Tab. 2. Verbal and the non-verbal communication [24]

<table>
<thead>
<tr>
<th>Communication</th>
<th>Verbal</th>
<th>Non-verbal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• language</td>
<td>• facial expression</td>
</tr>
<tr>
<td></td>
<td>• precision and speed</td>
<td>• visual contact</td>
</tr>
<tr>
<td></td>
<td>• perception of and reaction to the message</td>
<td>• gestures and body movements</td>
</tr>
<tr>
<td></td>
<td>• empathy</td>
<td>• tactile contact</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• body posture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• external appearance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• distance from the patient</td>
</tr>
</tbody>
</table>

An important factor increasing the therapeutic efficiency at this stage is the logistics of the internal communication process, not only between the medical personnel and the patient, but also within the medical personnel itself. Information concerning the medical condition of the patient must be provided to all the teams involved in the therapy in a form that is unambiguous and easily understood. If it seems to the physician that the patient failed to mention something, the physician should ask the patient about it, because s/he is responsible for the patient’s health and life. The diagram below indicates that the medical condition of the patient depends on the cooperation of the entire interdisciplinary team. Figure 3 shows the dependence of the patient's health status of the entire interdisciplinary team collaboration.
Practice has shown that good communication among the personnel ensures quicker rehabilitation, recovery and normal functioning of the patient in the society.

4 REHABILITATION OF INDIVIDUALS AFTER AQUATIC INCIDENTS

The rehabilitation efficiency requires precise diagnosis of the subsequent stage of logistic interrelations, namely the discharge from hospital and commencement of further therapy. Depending on the medical condition of the patient, rehabilitation after water accidents is indicated or redundant, which is highly dependent on the resulting complications. One of the most dangerous is the acute respiratory distress syndrome (ARDS), which may develop after submersion. This syndrome is characterised by the inflammation of the lung parenchyma, leading to impairment of gas exchange with the associated release of inflammatory mediators, and hypoxaemia. This factor is often leads to multiple organ failure syndrome (MOF). Patients then undergo oxygen therapy, as well as general and respiratory physiotherapies. Bronchial patency can be restored by means of such procedures as postural drainage. It can be divided into static and dynamic one [Figure 4]

Fig. 4. Characteristics of postural drainage[17, p. 204]

These procedures are indicated in the event where secretion is retained in the bronchial tree. However, for the therapy to be effective, it is essential to accurately localise the retention. It is recommended to perform the static postural drainage for the total of 45–60 minutes a day. It is recommended to perform 2–3 sessions per day. The effectiveness of postural drainage can be
enhanced by such procedures as: vibration, rib springing, chest clapping, effective coughing techniques, the forced expiration technique, the autogenic drainage (AD) technique [17, p. 204].
Other methods include controlled breathing exercises that involve breathing through pursed lips, training the respiratory muscles and active exhalation [Table 3]

Tab. 4. Types of controlled breathing exercises [22, p. 742].

<table>
<thead>
<tr>
<th>Controlled breathing exercises</th>
<th>Pursed lip breathing</th>
<th>Respiratory muscle training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• reduction of the respiratory rate</td>
<td>• improvement of stamina and strength of the respiratory muscles</td>
</tr>
<tr>
<td></td>
<td>• increase in the respiration volume</td>
<td>• increase in the maximum oxygen uptake and exercise capacity</td>
</tr>
<tr>
<td></td>
<td>• reduction of dyspnoea</td>
<td>• reduction of dyspnoea</td>
</tr>
<tr>
<td></td>
<td>• decrease in the partial pressure of blood carbon dioxide</td>
<td>• reduction of the nocturnal depletion in the saturation of arterial haemoglobin in patients with weakened inspiratory muscles.</td>
</tr>
<tr>
<td></td>
<td>• improved oxygen saturation of arterial haemoglobin</td>
<td></td>
</tr>
</tbody>
</table>

The above-mentioned exercises offer a number of benefits. Therefore, they should be combined. Moreover, changes and diversification prevent the therapy from being monotonous.

It is relatively difficult to rehabilitate individuals who fell into a coma as a result of a submersion experience. In this case, its objective is to boost the function of the central nervous system, prevent oedemas and bedsores, provide polysensory stimulation, improve the functions of the cardio-pulmonary system, and prevent contractures in the joints. Bedsores, which significantly complicate the therapeutic process, may appear very quickly. Continuous tissue pressure causes ischaemia and hypoxia of the cells, which results in the development of open, difficult healing wounds. As presented below, bedsores may most frequently appear in the following places [fig. 5].

Fig. 5. The most frequent location of decubitus ulcers (bedsores) [11]

Bedsores may appear everywhere, with certain sites being either more or less susceptible. They frequently affect places where the distance between the skin and the underlying bone is smaller. If the patient is not being nursed properly, a bedsore may develop on every single area of the body. For the
purposes of prevention, anti-bedsore mattresses, foam wedges and rolls, as well as pillows are used, and the patient’s position should be changes on average every two hours.

Rehabilitation is also undertaken in unconscious patients, where it involves passive exercise. It is then the therapist who makes movements, without active participation of the patient’s muscles. The objective of such a therapy is to maintain the efficiency of muscles, joints, and ligaments, to nourish the joint capsule, muscles, skin, and joints, to prevent stiffening and bedsores, to maintain the elasticity of muscles, and to stimulate the superficial and deep sensation.

5 PATIENT CARE AFTER DISCHARGE

Last but not the least, significant weight is also attached to the final effect of the logistic process which determines the success of the treatment. Hospital discharge initiates a process which requires the cooperation of the patient and his/her family/caregivers, the hospital personnel, the local authorities, and the primary health care. The purpose of the previous phases was to allow the patient to leave the hospital as soon as possible, yet at a time when it is appropriate and safe, as well as to provide the patient with all the necessary components to ensure full recovery at home. This requires the hospital personnel to provide full information on the necessary regimens and actions at home, and to get involved in such matters as:

- what will happen during recovery period;
- whom should the patient contact in emergency situations;
- whether continuous care will be needed at home;
- whether any medical equipment will be necessary when the patient returns home;
- whether the flat or house will need any adaptation;
- whether rehabilitation should be continued;
- medication dosage;
- organisation of homebound transport.

The key to effective management of these problems is the telemedicine, or the latest form of medical information exchange between two parties, by means of ICT tools. It aims to correct the potential deviations and control the results of the recovery system adopted for a given patient [2]. The term ‘telemedicine’ often goes hand-in-hand with the concept of ‘e-medicine’ or ‘medical telecare’. However, these terms should not be treated synonymously. E-medicine has a broader meaning than telemedicine. E-medicine is defined as any application of IT technology in healthcare [1, p. 1-2]. On the other hand, medical telecare refers to the monitoring of patients, and hence its essence is included in the concept of ‘telemedicine’. Monitoring is primarily used in the event of chronic patients, when there is difficulty and risk of negative consequences related to independent functioning [5]. The literature also uses the term ‘telerehabilitation’. „Telerehabilitation is a collection of rehabilitation services (consultations, diagnosing, therapy) rendered through interactive information and communication technologies (ICT) [21, p. 215-222]”.

Relevant studies indicate that for the rehabilitation process to be effective, the following three conditions must be fulfilled:

- The rehabilitation process should be commenced immediately upon the emergence of the cause of disability,
- The intensity of the rehabilitation process should be adapted to the patient’s abilities, and should last until the possible level of function restoration has been regained,
- Creation of conditions for the rehabilitation process to be continued at home.

The dissemination of telerehabilitation forms a new paradigm in medical rehabilitation, taking account of the technological opportunities that help to follow the principles of this paradigm. Telerehabilitation therefore is to fill the gap by facilitating rehabilitation of the disabled who find it difficult to travel, and individuals from small towns and villages, who cannot afford to cover the long distance to modern rehabilitation centres.
Fig. 4. Relations between the components of e-medicine [9]

Telemedicine has also got a broader aspect. Besides giving the patient an opportunity to contact the physician/physiotherapist, it also forms a cutting-edge system of transferring and storing general data, which may be useful in the development of statistics, information exchange between specialists, and for a general expansion of science and further enhancement of technologies for telemedicine.

CONCLUSIONS

Construction of an effective system of logistic interrelations in the rehabilitation process is essential for effective fulfilment of related objectives. However, it requires further improvements and development of a more accurate system of interrelations between the components in the entire rehabilitation process. They make it possible to minimise the extent of the negative consequences arising from harmful improvisation, inadequate discipline, as well as organisational and procedural errors. Proper logistics of this process requires absolute adherence to the time factor, which often determines the survival of the patient in the discussed scope of services. Its advantage is the precise determination of behaviours and procedures at the time when the victim is transferred between the subsequent teams involved in the treatment process, thus being more efficient, friendly and successful in terms of higher recovery rate.

Abstract

The effectiveness of the treatment and rehabilitation of patients after the incident in the aquatic environment is highly dependent on the proper construction of the logistics scheme links of the various phases of treatment, hierarchical dependence of its components and the discipline in the use of both medical and time-related rigors. The article presents not only the medical process, but also the associated organizational conditions and applicable requirements that determine the construction of the logistics links, which eliminate harmful improvisation, that might cross out the possibility of a final success. Beyond cognitive function of medical aspects in study highlights the need for strict specifying and continuous improvement of logistics connections, not only between the parties involved in the subsequent phases of the treatment of the patient, but also between individuals responsible for each section of the process. With this policy, the whole staff has the same knowledge about the patient, thus marginalizing any mistakes in treatment. The article also highlights a new range of treatment and rehabilitation, e-medicine. Logistics of this process requires coordination between its components, that is telemedicine, medical telecare and telerehabilitation. This form allows to reach people whose contact with professional entity providing the services is not possible due to the degree of disability or very burdensome, due to significant distance.

Logistyka w procesie rehabilitacji po incydentach w środowisku wodnym

Streszczenie

Skuteczność procesu leczenia i rehabilitacji pacjenta po incydencie w środowisku wodnym jest w znacznym stopniu zależna od prawidłowego skonstruowania schematu logistycznych powiązań poszczególnych faz terapeutycznych, hierarchicznej zależności jego elementów składowych oraz dyscypliny w stosowaniu rygorów
zarówno medycznych jak i czasowych. W artykule przedstawiono nie tylko medyczny przebieg tego procesu lecz także związane z nim uwarunkowania organizacyjne i obowiązujące wymogi, które decydują o skonstruowaniu logistycznych powiązań eliminujących szkodliwą improwizację, przekreślając możliwość uzyskania koncowego sukcesu. Poza funkcją poznowczą aspektów medycznych w opracowaniu zwrócono uwagę na konieczność ścisłego precyzowania i ciągłego doskonalenia logistycznych powiązań, nie tylko pomiędzy podmiotami uczestniczącymi w kolejnych fazach leczenia pacjenta, lecz także pomiędzy poszczególnymi osobami odpowiedzialnymi za każdy odcinek tego procesu. Dzięki tym zasadom, cały personel dysponuje identyczną wiedzą o pacjencie, co marginalizuje ewentualne pomyłki w leczeniu.

W artykule zwrócono również uwagę na nowy zakres leczenia i rehabilitacji, czyli tzw. e-medycynę. Logistyka tego procesu wymaga koordynacji pomiędzy jej elementami składowymi, czyli telemedycyną, teleopieką i telerehabilitacją. Ta forma pozwala na dotarcie do osób, których kontakt z profesjonalną jednostką świadczącą te usługi jest niemożliwy ze względu na stopień niesprawności lub bardzo uciążliwa ze względu na znaczne oddalenie.

**LITERATURE**


