THERAPEUTIC DOCTORS’ COMPETENCE WHEN PROVIDING EMERGENCY MEDICAL CARE AT THE SCENE

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Abstract. During the last years the worldwide trend in regular creation, upgrading and implementation of emergency care protocols at the prehospital stage in the medical practice has been observed. The huge role is given to the methods of doctors’ simulation preparedness in case of the emergency care at the scene. Modern doctors’ preparedness requires resuscitation practicing in the simulation centers on the specific manikins or devices without the risk of making any harm to the patient, developing the ability to make quick and correct decision and conduct all necessary manipulations and interferences without any mistake. According to the professional literature, the lack of practical skills concerning the emergency care at the scene of an accident is usually observed among therapeutic doctors. Nowadays, one of the most important tasks of undergraduate and postgraduate medical education is the creation of simulation centers for quality training of highly qualified specialists, including emergency medical care.

The objective of the research was the evaluation of the professional therapeutic doctors’ competence in providing emergency medical care at the scene in accordance to the latest recommendations of the European Resuscitation Council (ERC, 2021) and American Heart Association (AHA, 2020). According to tests conducted in the 2017-2018 among therapeutic doctors regarding their abilities of the resuscitation conducting, it was revealed that only 52% of doctors were able to diagnose the state of clinical death; 63% of doctors were able to perform chest compression; 15% of doctors were able to provide opening of airways; the numbers of those who were able to use automated external defibrillator (AED) and ventilation were extremely low, namely 5% and 9% correspondently. Therefore, one of the key tasks of the modern medical education regarding simulation is to prepare therapeutic doctors to be able to perform emergency resuscitation at the scene.

Key words: simulative medicine, emergency medical care, the scene of an accident, therapeutic doctors.

Problem statement and analysis of recent research. According to the latest statistics, the number of errors made by primary care professionals at the scene has increased significantly in many countries around the world. Such situations are often associated with the doctors’ unpreparedness, especially of the therapeutic profile, to act in emergencies before the ambulance arrives, which often leads to the untimely death of victims [1]. According to the report “To Err is Human” by the US National Institute of Medicine (1999), from 44,000 to 98,000 people die each year in the country due to defects in the medical system [2]. In recent years, there has been a positive trend in many countries in improving outpatient emergency care outcomes related to innovations in health education and health care tactics, improving the medical literacy of the general population (youth, drivers, police, etc.) on emergency care and the emergence in this regard of such types of medical care as “street medicine”, “action medicine”, etc. [3]. Existing national laws and directives in the field of public health provide an improvement in the medical care quality, including emergency and urgent one. At the same time, the term “improvement of medical care quality” defines the ways to reduce the number of medical errors.

One of the reasons that reduce the effectiveness of emergency medical care on the spot is the lack of special programs aimed at conducting short-term systematic medical skills improvements in emergencies by physicians. The important role belongs to the timely analysis of medical errors, including those conducted in case of emergencies. Both regional and general monthly conferences and seminars should be held where the identified and common medical errors can be discussed (specifically for a particular clinical situation), and ways of their overcoming. Systematic analysis of clinical cases allows doctors quickly learn the generally accepted standards of the treatment approach for a certain category of patients, which also contributes to the formation of their clinical education with their own experience of care, including in critical conditions. Such conferences belong to a group of scientific and practical events that should motivate personnel, encourage their work, and improve professional skills. Family physicians also need similar events such as systematic seminars and on-the-job training taking into consideration their certain autonomy of work in order to deepen their knowledge of providing emergency care.

The effectiveness of emergency medical care provided at the scene by therapeutic physicians and which is considered to be an express alternative to the ambulance crew before its arrival, is always important. The therapeutic physician at the scene should be able to quickly identify possible danger, to conduct an initial assessment of the patient’s severity that can lead to death in minutes. The existing system of medical training, especially therapeutic physicians training, which has been previously practiced and is partially preserved, does not fully ensure the proper acquisition of the necessary resuscitation skills, including the use of modern medical and diagnostic devices, the algorithm...
of teamwork in case of emergencies, the use of existing emergency protocols, especially in limited conditions, psychological time against the background of the risk of losing previously acquired practical skills [4].

Therefore, one of the areas of primary care physicians’ training should be the regular improvement of on-site care skills, which includes individual short-term training aimed at acquiring practical skills on how to act in emergencies. The lack and loss of previously acquired skills are the main sources of medical and tactical errors made by both young professionals and experienced doctors. Analysis of emergency measures conducted at the scene have shown that special difficulties are observed in the following situations: when using new technologies, unexpected manifestations of the disease, and ignoring the requirements of existing clinical protocols and standards [5]. The results of the research conducted in recent years have reasonably encouraged medical education to optimize the management of medical staff training from the point of view of emergency logistics, by using simulation techniques of doctors’ education, especially the therapeutic ones as first-line doctors.

Simulation education is one of the modern methods of medical professionals training, aimed at studying or improving real skills of emergency care by modeling urgent clinical situations, which involves the creation and use of special programs, algorithms, mannequins, devices, etc. Due to the epidemic of trauma, and acute therapeutic conditions, it is becoming important to conduct short-term regular cycles of first-line physicians retraining for practicing how to provide emergency care at the scene.

The objective of the research. Simulation training is a way to optimize the professional competence of therapeutic physicians in providing emergency medical care at the scene.

Main text

Recently, in the process of future doctors’ training in many countries around the world, difficulties in mastering certain practical medical and diagnostic skills have been noted due to a number of ethical and legal norms, organization of training on the clinical bases, technical support of departments, restriction of access to thematic patients in the learning process [6]. An important problem is the psychological preparedness of students, and practicing physicians to provide emergency medical care at the scene (first on the scene) [7]. It is often forgotten that in some time many health workers lose the ability to perform skills properly and comply with the requirements of the algorithm of actions during resuscitation or other emergency measures on the background of previous theoretical and practical training. Therefore, optimization of the mastering the technique and sequence of medical manipulations during the training of doctors of different specialties is almost impossible without the use of special training simulation equipment of varying complexity, special programs, medical training centers, classes providing an opportunity to practice a huge number of medical manipulations without a real patient in the classroom on a mannequin, in a simulated and close to reality emergency or other clinical situation [8].

That is why short-term training courses and seminars are widely implemented in many developed countries in the process of doctors from various specialties’ work. The courses and seminars allow learning of clinical protocols and recommendations at the premises of simulation centers the activity of which is based on the achievements of evidence-oriented medicine, the modern medical industry [9]. This provides an opportunity to teach physicians how to diagnose and quickly provide help to patients in critical conditions in outpatient and sometimes in extreme conditions, and also how to reduce the manifestations of psycho-emotional stress.

The skills acquired in simulation centers allow doctors to increase the level of practical competence without real patients, without fear of doing any harm, which allows them to successfully transfer the acquired medical and diagnostic skills to a real emergency situation and, most importantly, to gain confidence in their actions [10].

Classes in simulation centers allow to assess the level of physicians’ theoretical preparedness in dynamic, the technique of practical skills performing in a simulated situation [11]. Training on the appropriate simulator or phantom allows to work out a certain manipulation step by step, which can be recorded on video, analyzed by all participants in the learning process and evaluated over time, without any risk to the “patient”.

Most of the mistakes at the scene, in outpatient settings during resuscitation activities were found to be made by doctors of “first contact”. However, the main reason for these mistakes is not the lack of diagnostic equipment or medical devices, but insufficient practical, psychological, and sometimes theoretical preparedness of medical staff for the initial phase of medical care provided in emergencies, lack of a clear plan, algorithm sequence of rescue operations.

Previously acquired competencies by specialists are known to disappear within 6-12 months in the absence of clinical practice. Therefore, there is a discrepancy between the reports on a growing number of resuscitation-trained students and reports of pre-hospital mortality, when medical care was actually provided to victims, but diagnostic and treatment mistakes were made, its effectiveness was low [1].

The results of tests conducted in 2017-2018 among physicians of therapeutic profile (n = 750), on the skills of resuscitation, revealed the following situation (Table 1). Thus, half of the test participants were not informed about the need to identify risks of danger at the scene. Also, 48% of physicians had difficulty in clinical death
diagnosis, and 37% of test participants were unable to perform chest compression. In addition, the correctness of the basic resuscitation manipulations performance was extremely low, in particular the skills of artificial lung ventilation, defibrillation, and difficulties in providing venous access.

Table 1. Frequency of correctly performed diagnostic and therapeutic methods during cardiopulmonary resuscitation (%)

<table>
<thead>
<tr>
<th>№</th>
<th>List of researched skills</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assess the danger at the scene</td>
<td>47.0</td>
</tr>
<tr>
<td>2</td>
<td>Diagnosis of clinical death</td>
<td>52.0</td>
</tr>
<tr>
<td>3</td>
<td>Chest compression</td>
<td>63.0</td>
</tr>
<tr>
<td>4</td>
<td>Open airway</td>
<td>15.0</td>
</tr>
<tr>
<td>5</td>
<td>Conducting mechanical ventilation</td>
<td>9.0</td>
</tr>
<tr>
<td>6</td>
<td>Use of AED</td>
<td>8.0</td>
</tr>
<tr>
<td>7</td>
<td>Use of manual defibrillator</td>
<td>5.0</td>
</tr>
<tr>
<td>8</td>
<td>Vein characterization</td>
<td>12.0</td>
</tr>
</tbody>
</table>

At the same time, according to the literature, there was often confusion and tension among physicians, inappropriate attempts to use complex and invasive techniques, use of drugs that are not prescribed by the protocol, as well as the inconsistency of team actions, ephemeral simulation, reluctance to learn and increase the level of preparedness of emergency care providing within the institution, place of residence [12].

Thus, lack of knowledge and skills are the main factors that have complicated and affected the cardiopulmonary resuscitation (CPR) effectiveness at the scene.

Therefore, it is important for doctors of different specialties to check and improve the acquired professional skills regularly at the premises of simulation centers to be prepared to provide resuscitation measures in case of sudden cardiac arrest, asphyxia, injuries, etc. [13]. Regular training should be conducted every six months in a simulation center with the individual use of a mannequin for at least 20 minutes, usage of artificial airways, automatic external defibrillator, medical intervention on the background of a simulated emergency scenario in order to successfully maintain and improve resuscitation skills.

Nowadays, it is recommended in medical simulation education to adhere to Miller’s well-known clinical competence pyramid: “to know about”, “to know how”, “to be able to show”, “to perform”.

It is necessary to conduct systematic cycles of improvement in the simulation centers by:
- studying of compliance of educational, referential, and special medical literature, updated recommendations of world scientific and practical centers;
- performing of theoretical and practical test tasks;
- observing and discussing thematic videos;
- performing tasks on the Internet platform, in workbooks;
- practice skills on special mannequins, devices;
- analysis of clinical situations (briefing, case method), etc.;
- conducting the research work.

Existing principles of evidence-based medicine are not always compatible with CPR, as care protocols are largely based on the considerations and consensus of international expert groups, which are often limited by ethical issues and technical difficulties. For example, sudden cessation of blood circulation is a poorly predictable condition, so it is difficult to conduct a prospective study, so the retrospective analysis of such cases is mostly used[14].

An important aspect of training and retraining of physicians is keeping of the principles of reasoned awareness of their practical preparedness for immediate rescue operations, which should include the developed standards (Ericsson AK, 1993):
- regular re-practice of practical resuscitation skills;
- division of complex skills into separate stages during their mastering;
- constant feedback with the evaluation and adjustment of the performed methods;
- increasing the level of clinical complexity of tasks, aggravating environmental conditions.

Currently, the implementation of existing requirements and standardized protocols among prehospital physicians remains low due to the late introduction of modern algorithms, lack of simulation centers with the necessary equipment on-site, lack of clear organization, and schedule of short-term training on prehospital logistics. [15].

Therefore, the expression “a doctor who does not know the alphabet of P. Safar, cannot be considered as “literate”, no matter how many diplomas he or she has” remains relevant.

Not all medical workers, including the therapeutic ones, can correctly perform the basic, and if possible, elements of extended emergency care, namely basic life support (BLS) and advanced life support (ALS). In recent years, the basic version of cardiopulmonary and cerebral resuscitation widely recommends the use of the automatic external defibrillator in addition to the well-known alphabetical triad.

The use of defibrillator on the spot has become widespread in many developed countries. Theoretically, AEDs can be accessible to all citizens in a public place, even the option of delivering them to the scene by drones is being considered (ERC, 2021).

Therefore, the information about its presence nearby and the purpose of the usage are of great importance in case of suspicion of sudden cardiac death. According to the statistical data, 70% of cases of the sudden cardiac death occur at the prehospital stage, and the application
of AED electric discharge in the first 3-5 minutes after a sudden cessation of blood circulation can increase the survival of victims by 50-70% in case of defibrillation rhythm, indicating the relevance of its application. However, not all health professionals, including therapists are able to use AEDs in a timely manner in an emergency due not only to the lack of the AEDs nearby, but also to confusion, lack of knowledge, and skills regarding their use.

In addition, one of the important areas of training is the ability to identify and analyze mistakes that often occur during emergency measures conducted by prehospital doctors, in particular: delayed start of basic care, loss of time for secondary diagnostics, organizational and therapeutic activities, lack of a leader, communication with the dispatcher of the Emergency center, the presence of third persons, etc.

Therefore, an important role in improving and enhancing knowledge and skills belongs to the analysis of complex clinical cases and mistakes. At the same time, the route cause analysis (RCA) method deserves special attention, which focuses on the following issues:

1. What has exactly happened, how, and where (accident, injury, etc.)?
2. What has contributed to the medical mistake?
3. What is the degree of preparedness of physicians for priority action at the scene?

According to the RCA, the main obstacles that can often complicate the work of the therapeutic profile and providing of effective care include:
- limited time, psychogenic factors, meteorological and difficult technical conditions;
- lack of resources;
- lack of feedback;
- the unwillingness of individual health professionals to increase their competence in emergency care;
- lack of team action skills on the spot;
- lack of proper control by the management of institutions over the implementation of RCA requirements;
- insufficient number of available and equipped simulation centers;
- lack of approved programs regulating short-term improvement cycles on emergency response.

Today, the principles of RCA and its modifications have become widespread in many developed countries, in particular, the program “Maccabi” (Israel) has introduced a system of mistake analysis called “5M”. According to it, each mistake is considered from five positions, within each of them the factors that most often contributed to the occurrence of mistakes are identified, in particular:
- M (man) - the human factor;
- M (machine) - any equipment problems;
- M (medium) - environmental factors that reduce the effectiveness of emergency care;
- M (mission) - specific types of activity, elements of chance, difficulties in performing certain activities;
- M (management) - methods of training and logistics (implementation of standards of medical care quality, complete training of doctors for acting in emergencies, proper control system, etc.).

The requirement of modern medical education is to create and expand a network of simulation centers in medical universities, at the remises of medical institutions with proper medical equipment and simulators of different realities, which simulate clinical scenarios close to real-life conditions, allow to learn and practice practical execution measures step by step, regulate their intensity and correctness with the help of computer technologies [16].

It is this innovative development in this area of undergraduate and postgraduate education that confirms the importance of creating a network of simulation centers to improve the skills of medical staff systematically.

Continuing and highly informative education in the medical field, advances in medical science and technology, increase in the number of pre-hospital patients in critical conditions require doctors to be ready for immediate action and conscious attitude to improve professional competence, including systematic training based on simulation centers, according to the individual electronic schedule [17]. This approach provides an opportunity to successfully implement standardized recommendations in 60-70% of critical situations.

However, we must not forget the existing “golden rule”, namely the computer technology complements but not replaces the classic doctor’s training.

Conclusions

One of the main tasks of modern medical education is the development of the necessary professional competence in providing emergency care among medical workers and doctors at the scene.

The world medical practice indicates the undoubted effectiveness of the introduction of simulation training in the practical training of students and physicians of various specialties, which is especially relevant for primary care physicians.

Currently, computer simulators and mannequins of different levels of complexity provide an opportunity to acquire and improve skills and learn algorithms for action in simulated urgent situations. Increasing the competence of doctors and logistics of pre-hospital care at the site requires improvement of the operational control by health care managers both in terms of acquired rescue skills quality and in conducting short-term regular cycles of pre-hospital retraining at the premises of simulation centers every six months.

Prospects for further research involve the development of information based on the criteria and
indicators of quality of pre-hospital medical care.

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**References**


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