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EMERGENCY MEDICAL SERVICE

RATOWNICTWO MEDYCZNE



AMBULANCE DRIVERS' KNOWLEDGE OF DRIVING AN EMERGENCY VEHICLE

ASSESSMENT OF PAIN MANAGEMENT AND ANALGESIA TRENDS

OPTIMIZING THE POLISH LIFELINE

HEAD INJURIES

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THE LEVEL OF AMBULANCE DRIVERS' KNOWLEDGE ON THE RIGHTS AND RESPONSIBILITIES ASSOCIATED WITH DRIVING A PRIORITY VEHICLE

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ABSTRACT

Aim: To analyse the level of knowledge of ambulance drivers on the rights and responsibilities associated with driving a priority vehicle.

Material and methods: A survey was conducted in the first quarter of 2023 among 112 ambulance drivers. The main criterion for inclusion in the survey was the possession of a permit to drive a priority vehicle.

Results: The level of ambulance drivers' knowledge on the rights and responsibilities associated with driving a priority vehicle is high. 98.2% consider that they know the road traffic regulations, while 53.6% always and 43.8% often comply with them.

Conclusions: Ambulance drivers know their rights and responsibilities when driving priority vehicles and mostly comply with road traffic regulations. They seek the causes of dangers in road traffic mainly in other participants, even though they do not always follow the regulations themselves. They are willing to improve their driving technique in additional priority vehicle driving courses.

KEY WORDS

driver, emergency medical team, priority vehicle

INTRODUCTION

Drivers of priority vehicles are an important part of the health care, police and fire brigade systems. They are the first to take action in emergencies [1]. In their job, which involves an increased risk of accidents, drivers of priority vehicles must absolutely know their rights and responsibilities arising from driving this type of vehicle.

A priority vehicle is one that simultaneously emits light signals in the form of blue flashing lights and audible signals of variable frequency. It travels with its full beam headlights or dipped headlights on. It is also a vehicle that travels in a column, where there are priority vehicles at the beginning and at the end that are sending additional light signals in the form of red flashing lights [2]. These actions are aimed at quick recognition of a priority vehicle by other road users. They signal the approach of a vehicle and a request to give way. A priority vehicle may only be driven by a person who has completed a course for drivers of priority vehicles and has obtained a permit to drive such vehicles [3].

The Road Traffic Act specifies the conditions for driving a vehicle, from which it follows that the driver of a priority vehicle may only disobey traffic regulations, stopping and parking rules, as well as traffic signals and signs, if they exercise particular caution. This means that, in a justified situation, a driver is entitled to disobey speed limits, traffic lights, may drive the "wrong way", and may also overtake in prohibited places [2, 3]. How-

ever, it should be emphasised that driving a priority vehicle is not about driving at high speed, but about being able to gain priority in a way that is safe for both the vehicle's passengers and other road users [4-6]. The light and sound signals that give privileges to a priority vehicle do not in any way ensure road safety [4]. Instead, they can be a source of dangerous traffic situations. A driver of a priority vehicle must be familiar with the rules related to the use of warning signals and be aware of the risks associated with their use, as well as the consequences of their abuse or misuse [7].

A driver of a priority vehicle may be a person who is over 21 years of age, has a driving licence corresponding to the category of the vehicle, has obtained a medical and psychological certificate, and has obtained a permit to drive a priority vehicle corresponding to the category of the driving licence held [8]. The permit is issued for 5 years, but its validity cannot exceed the validity period of the medical and psychological certificate [9]. The frequency of medical check-ups depends on a driver's age. For those under 55 years of age, it is 5 years. For those between the ages of 55 and 65 years old, it is 2 years, while drivers over the age of 65 undergo a medical examination annually [2].

The psychological examination of a priority vehicle driver is aimed at determining the driver's psychological capacity for driving in road traffic [9, 10]. Due to the risks drivers take, high demands are placed on them, fo-

cused on psychophysical abilities and skills [11]. The aim of the examination is also to exclude drivers whose behaviour could cause potentially dangerous road traffic situations. Those who are found to have deficiencies in terms of fitness, personality traits and/or temperament are disqualified [12].

The above provisions and requirements apply, among others, to ambulance drivers who are involved in actions related to saving human life and health [2]. A driver who is authorised to drive a priority vehicle is part of an emergency medical team (EMT). It is assumed that they should be a paramedic [13].

There are two different codes for the urgency of EMT departure from the station. Code 1 stands for an immediate departure of EMT, with the shortest possible time to reach the patient, and is reserved for patients whose health is at risk. The dispatcher receiving the call is obliged to dispatch the team within 30 seconds, and the EMT must leave the station within 60 seconds. For code 1, an ambulance becomes a priority vehicle and therefore drives with flashing lights and audible signals. Code 2 specifies the absolutely necessary departure of a free EMT to a patient. For code 2, an ambulance goes to patients who require immediate interventions due to their threatening health condition that may lead to the damage of bodily functions or even the loss of life. The dispatcher must dispatch EMT within 60 seconds, while the team must leave the station in no more than 120 seconds. For code 2, the use of light and sound signals depends on the decision of the dispatcher or the person in charge of the rescue operation [14].

THE AIM

The aim of the study was to analyse the level of knowledge of ambulance drivers on the rights and responsibilities associated with driving a priority vehicle and to determine to what extent drivers respect the rights and responsibilities associated with driving a priority vehicle in road traffic.

The study included EMT members who are licensed to drive priority vehicles and thus act as ambulance drivers.

MATERIAL AND METHODS

A survey was conducted in the first quarter of 2023 among 112 ambulance drivers using an author's own survey. The survey contained 27 questions: 5 open and 22 closed ones. They were made available to respondents at ambulance sub-stations in the Kujawsko-Pomorskie voivodeship. The completed surveys were dropped into ballot boxes, which ensured the anonymity of the respondents. Participation in the survey was voluntary. The main criterion for inclusion in the survey was the possession of a permit to drive a priority vehicle.

The results of the study were statistically analysed using standard Microsoft Excel spreadsheet functions. Values of the analysed parameters were presented using the mean value, standard deviation and, for non-measurable parameters, using the numerical strength and

Table 1. Social-demographic data.

Social-demographic data	N= 112	[%]
Gender		
Female	7	6,2%
Male	105	93,8%
Age		
20-29	27	24,1%
30- 39	38	33,9%
40-49	24	21,4%
50-59	14	12,5%
≥60	9	8%
Domicile		
City/town	81	72,3%
Village	31	27,7%
Work experience		
< 2 lata	14	12,5%
2 – 5 lat	24	21%
6 – 10 lat	20	18%
11 – 15 lat	22	20%
16 – 20 lat	13	12%
21 – 30 lat	5	4%
>30 lat	14	12,5%
Profession		
Paramedic	107	95,5%
Paramedic and nurse	4	3,6%
Nurse	1	0,9%
Education		
Post-secondary	43	38,4%
Bachelor degree	47	42%
Master degree	22	19,6%

percentage. The Mann-Whitney U test and Pearson linear correlation coefficient (r) were used to test the relationship between variables. The distribution of variables was assessed using the Shapiro-Whitney (S-W) test.

RESULTS

A total of 112 ambulance (EMT) drivers, mostly male (94%; $n=105$), participated in the study. The average age of respondents was 39 ± 11.5 years. The average age of women was 24.3 ± 1.5 years, while men 39.9 ± 11.3 years. Most respondents were in the age range of 30-39 years (33.9%; $n=38$). Most of the survey participants were town/city residents (72.3%; $n=81$).

Table 2. Driving license categories held by respondents.

Driving license category	N=112	[%]
B	14	12,5%
A, B	5	4,5%
B, C	44	39%
A, B, C	18	16%
AM, B, C	2	1,8%
B, C, C+E	1	0,89%
A, B, C, D	3	2,7%
A, B, C, T	4	3,6%
A, B, C+E	6	5,4%
B1, B, C1, C	2	1,8%
B, C, D+E	2	1,8%
A, B, C, D+E	4	3,6%
B, C, C+E, T	2	1,8%
B, B+E, C, C+E	2	1,8%
A, B, C, C+E, T	1	0,89%
A, B, C, C+E, D, T	1	0,89%
A, B, B+E, C, C+E, T	1	0,89%
A1 B, B1, C, C+E, D, D+E, T	1	0,89%

Table 3. Factors influencing increased stress levels in ambulance drivers.

Factors influencing increased stress levels in ambulance drivers	N=112	[%]
Time pressure	29	32%
Inappropriate behaviour of other road users	26	29%
Responsibility for team, patient and bystanders	12	13%
Patient condition	9	10%
Technical condition of a vehicle	4	4%
Other	9	10%

The vast majority of respondents were paramedics (95.5%, n=107). Most have completed a bachelor's degree (42%; n=47), and slightly fewer of them have completed post-secondary school (38.4%; n=43). The largest number of respondents had a relatively short work experience of 2-5 years (21%; n=24), and almost as many respondents had worked in the profession for 11-15 years (20%; n=22) (Table 1).

The respondents held driving licences for different vehicle categories. Most (39%, n=44) held category B and C driving licences (Table 2).

According to the majority of respondents, completing a priority vehicle driving licence course does not pro-

vide sufficient skills to drive such a vehicle (69%; n=77). For a third of them, such a course is sufficient to gain the skills to drive a priority vehicle (31%; n=35).

The majority of respondents believe that additional specialised training for drivers of priority vehicles would be useful (79.5%; n=89). The lack of need for such a course was indicated by 12.5% (n=14) and 8% (n=9) of respondents had no opinion on this matter. When asked what they would like to learn during such a course, the respondents could select several answers. Most respondents were interested in improving their driving technique (69.9%; n=78) and how to cope when driving in unfamiliar areas (24.1%; n=27). Respondents would also like to learn about current regulations, driver's rights and responsibilities (23.2%; n=26), and how to cope with stress (9%; n=11). Several respondents (8.1%; n=9) selected the answer "other", thus indicating their need for improvement, including dynamic driving, controlling the vehicle in an emergency situation, recovering from a skid, and the consequences of collisions with priority vehicles and the consequences for the driver.

Almost all respondents (98.2%; n=110) answered "yes" when asked about being familiar with the regulations applicable to priority vehicle drivers. 1.2% (n=2) were unsure of their knowledge. As regards the compliance with road traffic regulations, the respondents' answers were more varied. More than half of them always obey traffic rules (52.6%; n=60), often obey traffic rules 43.8% (n=49), occasionally obey traffic rules 1.8% (n=2) and 0.9% (n=1) never do this. The respondents also commented on the use of audible signals while driving. The vast majority (86.6%; n=97) do not use the signals when the situation does not require it. Every seventh participant admitted to misusing the signals (13.4%; n=15) and the reason for this was the desire to avoid traffic jams (66.7%; n=10) and to get back to the base quickly (33.3%; n=5).

In order to verify the research problem concerning the compliance of priority vehicle drivers with the rights and responsibilities associated with driving a priority vehicle in road traffic, three questions were used on: the knowledge of the traffic regulations applicable to priority vehicle drivers, compliance by the respondents with these regulations and use of the audible signal. Each respondent was assigned a value of one point for each correct answer to every test question, hence the final score (index value) ranged from 0-3 points. The higher the value achieved by an individual, the greater the degree to which respondents respected the rights and responsibilities of priority vehicle drivers. The mean index value was 2.67 points (SD=0.45 points, S-W=0.71055). Based on the score obtained, a classification of the respondents was carried out, which divided the study sample into three groups with different degrees of compliance with the rights and responsibilities of priority vehicle drivers: 0-1.5 pts – low degree; 1,6-2,25 pts – average degree; 2,26-3 pts – high degree.

The vast majority of respondents respected these rights and responsibilities to a high degree (82.1%;

n=92), 17% (n=19) of respondents to an average degree and 0.9% (n=1) to a low degree. This allows us to state that drivers of priority vehicles respect the rights and responsibilities associated with driving a priority vehicle in road traffic to a high degree.

According to 81% (n=91) of the respondents, the job of an ambulance driver is stressful, while 19% (n=21) of the respondents hold the opposite opinion. Increased stress levels are mainly caused by time pressure and inappropriate behaviour of other road users (Table 3).

More than half of the respondents were, as ambulance drivers, involved in a traffic incident with another road user (58%; n=65). Most respondents were involved in an accident 1 time (72.3%; n=34), and almost every fifth person had an accident 2 times (23.4%; n=11). One person was involved in an accident 5 times (2.2%; n=1), another as many as 10 times (2.2%; n=1).

When asked about the main risk factor posing a danger on the road while driving with the siren on, respondents could select several options. Respondents pointed to the misbehaviour of other drivers (95.5%, n=107), the misbehaviour of pedestrians (36.6%; n=41), the impact of weather conditions (24.1%, n=27), and the misbehaviour of drivers of priority vehicles (7.1%; n=8).

Almost all respondents (99.1%; n=111) correctly answered that an ambulance becomes a priority vehicle when it is moving in traffic with its dipped or high beam headlights on, while emitting a blue flashing light and audible signals of variable tone. Wrong answer was given by one person (0.9%), who indicated that it is during the transport to the hospital.

When asked about the absolute obligation of the driver of a priority vehicle, the vast majority of respondents (95.5%; n=107) indicated correctly that it was to exercise extreme caution. 4.5% (n=5) of respondents answered incorrectly, indicating compliance with road signs and signals (2.7%) and observance of speed limits (1.8%).

The majority of respondents (82.1%, n=92) gave the correct answer about the time of the EMT departure in code K1 from the moment of dispatch by the dispatcher. 17.9% (n=20) of respondents gave incorrect answers, indicating the time of 30 seconds (2.7%) and 2 minutes (15.2%).

When asked whether an ambulance driver driving with the siren on has to comply with the speed limit regulations, almost all respondents answered correctly that they are not obliged to do so (94%; n=105). The remaining answers were incorrect (6%; n=7).

When answering the question "when can an ambulance driver drive the wrong way?", the respondents could select more than one answer. The majority (89.3%, n=100) indicated the correct answer that an ambulance driver can drive the wrong way when he/she drives a priority vehicle. The remaining answers were incorrect: respondents answered that an ambulance driver can drive the wrong way when there are obstructions on the road (14.3%, n=16), and when the road is clear (5.4%; n=6). The answer "other" was chosen by 2.8% (n=2) of re-

spondents, stating that the driver of an ambulance driving with the siren on can drive the wrong way when he/she considers that the situation requires it.

When asked whether a priority vehicle driver must follow the instructions given by those directing the traffic, 76.8% (n=86) of respondents gave the correct affirmative answer.

Almost all respondents knew that the permit to drive a priority vehicle is valid for 5 years, but cannot exceed the validity of the medical and psychological certificate (94%, n=106). The wrong answer was given by 5.4% (n=6).

In order to determine the level of knowledge of the respondents on the rights and responsibilities related to driving a priority vehicle, an index was constructed based on seven knowledge-testing questions. Respondents could obtain 1 point for each correctly answered question, hence the value of the scale ranged from 0 to 7 points. High index values were indicative of greater knowledge. The average index value was 6.17 points. (SD=0.90 pts, S-W 0.91287). The respondents were classified into three groups according to their level of knowledge: 0-3 pts – low level of knowledge, 4-5 pts. – average level and 6-7 pts. – high degree.

The vast majority of respondents (79.5%) obtained a score indicating a high level of knowledge, while the rest obtained an average score (20.5%). This allows us to conclude that the level of knowledge of the Emergency Medical Team drivers on the rights and responsibilities associated with driving a priority vehicle is high. Women had higher knowledge index scores (6.71 points vs. 6.13 points), but there was no significant difference between the level of knowledge of the respondents depending on their gender ($p>0.05$). The level of knowledge was also not influenced by the age of the respondents ($p>0.05$) or seniority ($p>0.05$).

Respondents were also given the option to freely express their own opinions. This option was exercised by 3.6% (n=4) of the respondents. They pointed to issues mainly related to driving safety. In their opinion, drivers of priority vehicles should absolutely have their seat belts on. In addition to alcohol tests, drivers should also undergo drug tests. Law authorities should treat a priority vehicle driver during a traffic incident the same as an average driver. The respondents also pointed out the problem of abuse of light and sound signals by ambulance drivers when driving outside the National Medical Rescue Service (NMRS) system.

DISCUSSION

It is the responsibility of a priority vehicle driver to be familiar with the rights and responsibilities specified in the legislation governing the driving of this type of vehicles [2, 8, 9, 15]. This knowledge should translate into the quality of the driver's work, in which the life of another human being as well as the safety of oneself and other team members plays a huge role.

The study showed that ambulance drivers are knowledgeable about the rights and responsibilities associ-

ated with driving a priority vehicle. Despite this, the majority believe that priority vehicles driving courses they have completed do not provide sufficient skills and they have shown willingness to participate in additional specialised training. Drivers would like to improve their skills in particular in the following areas: driving technique, including dynamic driving; controlling the vehicle in an emergency situation, together with getting out of skid; avoiding priority vehicle collisions and dealing with unfamiliar terrain. Drivers are also interested in applicable legal regulations and ways of dealing with stress. Therefore, it seems reasonable to conclude that a priority vehicle driving licence course does not provide sufficient number of hours devoted to both practical and theoretical activities.

In a study by Penthong et al., [16] involving 83 ambulance drivers, respondents experienced both mild (43.4%) and severe (12%) stress at work. In this study, as many as 81% of respondents found the job of an ambulance driver stressful. The following factors were identified by the respondents as causes of stress: the behaviour of other road users, time pressure, responsibility for the team and the patient as well as the technical condition of the ambulance. While in a study by Tokarczyk [17], the main sources of stress were: the behaviour of other drivers (54.3%), changing road conditions, limited visibility, driving at night, different and variable weather conditions (37.1%) and fear of road incidents: collisions and accidents (34.3%).

Compared to other road users, ambulance drivers are more exposed to accidents [18]. Those accidents are usually related to the privilege of the vehicle, during which the ambulance driver, while exercising extreme caution, does not have to comply with applicable road traffic regulations. Mądrowska et al. presented data on such accidents that happened between 2012 and 2014. There were 97 of them in 2012, 105 in 2013 and 78 in 2014. Each year, one third of accidents were caused by a driver of a priority vehicle, 27.8%, 28.6% and 32%, respectively [19]. This study showed that nearly half of the respondents had been involved in a road traffic incident with another road user, of which 70.8% had experienced an accident once, while 22% had already been involved twice and 4.2% more than five times. This may indicate a relatively high accident rate of priority vehicles. An ambulance trip in urgency code 1 results in fast driving, which may cause decreased correctness and accuracy of the manoeuvres performed [20].

In a study by Mądrowska et al. the main risk factors in road traffic involving priority vehicles indicated by the

respondents included: incorrect behaviour of drivers of other vehicles, incorrect behaviour of pedestrians and cyclists, and adverse meteorological conditions [19]. The above is in line with the results of the present study, in which respondents pointed to the same factors as the main risk of dangerous situations on the road. This is interesting, as Article 9 of the Road Traffic Act indicates the obligations of other road users to behave correctly on the road when in contact with a priority vehicle [2]. Unfortunately, road traffic participants often react incorrectly or do not react at all [21].

Ambulance drivers have theoretical knowledge of the rights and responsibilities associated with driving a priority vehicle. Almost all respondents are aware that it is the driver's absolute responsibility to exercise extreme caution and that an ambulance driver driving with the siren on does not have to comply with the speed limit regulations. In a study by Whiting et al. which included 293 paramedics, only 2% of respondents knew that due care for safety is the most important requirement if an ambulance is approaching a red traffic light at an intersection and 28% knew that ambulances with the siren on are not subject to speed limits. Significantly higher results were obtained by respondents who attended at least one priority vehicle driver training course or had at least nine years of experience in emergency medical services. This indicated a need for more training of paramedics in the field of road traffic regulations [22].

The research study showed that ambulance drivers have appropriate knowledge about the rights and responsibilities associated with driving a priority vehicle. Almost all of them also believe that they know the road traffic regulations, while only half always comply with them, and every second driver does it often. This may translate into the number of accidents involving a priority vehicle. This field still requires additional research. Nevertheless, this may be why the respondents show an interest in attending additional training courses where they would like to improve their practical driving skills. It can mean that, despite having theoretical knowledge, some drivers do not feel confident driving such a vehicle.

CONCLUSIONS

Ambulance drivers know their rights and responsibilities when driving priority vehicles and mostly comply with road traffic regulations. They seek the causes of dangers in road traffic mainly in other participants, even though they do not always follow the road regulations themselves. They express interest in additional priority vehicles driving courses, mainly to improve practical skills.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest.

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Assessment of pain management and prehospital analgesia trends in selected emergency medical response teams in the Silesian Voivodeship

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ABSTRACT

Aim: Pain accompanies a large proportion of patients being taken care of by emergency medical teams (EMT). The catalogue of available medications extended to 45 positions from the previously used 23, with the amount of analgesics available doubling from 4 to 8. The purpose of the study is to answer the following questions: 1. What types of pain do patients report as most severe and for what types of pain do patients receive the most appropriate management in the prehospital setting? 2. Have changes in medical documentation and the introduction of mandatory pain intensity assessment affected the quality of prehospital pain management? 3. What changes have occurred in the use of analgesics during the study period?

Material and methods: An analysis of medical documentation was performed in the months of September 2016, September 2017 and June 2020. Respectively 688, 996 and 798 EMT medical cards were included. Inclusion criteria incorporated the following ICD-10 codes: M54, G54, R51, R52, R07, I21, R10, N20-N23, K80-K83, S10-S99, T00-T14, T20-T32.

Results: Stenocardia was observed to have a lower severity compared to other types of pain ($p < 0,001$). On the other hand, visceral pain was found to possess a greater intensity when compared to post-traumatic pain ($p < 0,001$). An increase in the use of various drugs' combinations and opioids was also noted. We observed that both metamizole and paracetamol have also seen increased use at the expense of ketoprofen ($p < 0,001$).

Conclusions: 1. In emergency medical teams in Silesia, patients suffering from visceral pain claimed the highest initial pain levels. However, prehospital analgesia in those patients was the greatest. EMT were also effective in post-traumatic pain management. 2. Introducing good practices coupled with the requirement for EMTs to evaluate pain intensity in medical documentation had a positive effect on prehospital analgesia in selected emergency medical teams in Silesia. 3. In selected silesian EMTs advantageous changes in prehospital analgesia were observed, including the diminishing use of NSAIDs which are being replaced by metamizole and paracetamol and an increase in opioid drugs' use.

KEY WORDS

pain, analgesia, emergency medical services, prehospital care, numerical rating scale

INTRODUCTION

Pain is often the first complaint of patients seeking medical attention. The most common reasons for calling an emergency medical team (EMT, ZRM in Polish) are injuries, circulatory disorders, and visceral pain. Pain affects a large group of EMT patients. The magnitude of the problem in a prehospital setting does not allow us to remain indifferent to it.

For many years, the prescription of analgesics and the treatment of pain was limited to the physician-led care. In a prehospital setting, there were never any limitations on the use of analgetics and adjuvant medications by physicians. Regardless of their specialty, they could use a wide range of analgesics as member of a specialist EMT (ZRM "S" in Polish) setting. These include acetylsalicylate (ASA), ibuprofen, ketoprofen, acetaminophen, metamizole, lidocaine hydrochloride, morphine sulfate, fentanyl, pethidine, and ketamine.

The first executive act describing the scope of medical rescue activities performed by a paramedic was the

Ordinance of the Health Ministry from 29th December 2006 regarding the detailed scope of medical rescue activities that can be performed by a paramedic. The catalog at that time contained 23 drugs that could be used independently by a paramedic. In the field of analgesics and adjuvants there were acetylsalicylic acid, ketoprofen, morphine sulfate, lidocaine hydrochloride and magnesium sulfate.

These qualifications were revised in 2009 based on another regulation of the Minister of Health, which amended the previous one. This new legal act on the detailed scope of medical rescue activities that can be performed by a paramedic expanded the authorized independent administration of a total of 27 drugs, including drotaverine hydrochloride as a co-analgesic for visceral pain.

The last change to the list of medications that a paramedic can prescribe independently took place in 2016, based on the Regulation of the Health Ministry on medical rescue activities and health care services other than medical rescue activities that can be provided by a para-

medic. The new catalogue of medications was expanded to 45 items. This amendment introduced many beneficial changes to the scope of analgesia, allowing paramedics and system nurses to administer paracetamol, ibuprofen, metamizole and fentanyl. Additionally, the legislator allowed for the administration of papaverine hydrochloride.

With the aim of improving the quality of medical services provided by paramedics, the legislator introduces the so-called “good practices” in various aspects of pre-hospital care. The authors are national experts in their respective fields, regional and national consultants and representatives of the academic community.

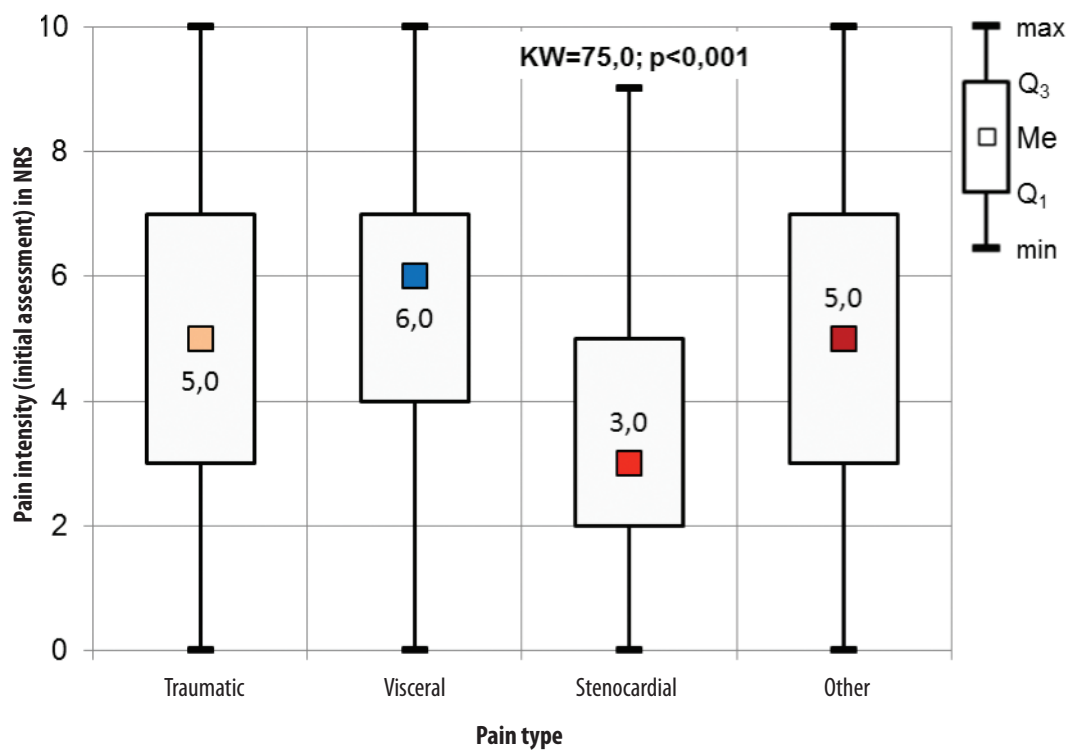
The Good Practices for Pain Management were published on June 13, 2019. They are a collection of four documents that describe suggested pain management procedures for adults and children performed by paramedics and specialist EMTs. These recommendations are based on the assessment of pain intensity, but also take into account the pathomechanism of pain and its location.

An important change affecting the coordination of the management and documentation of emergency

calls in the national system was the introduction of the teleinformatic National Emergency Rescue Command Support System (SWD PRM in Polish) in 2016-2017. It was implemented in the Silesian Voivodeship on October 17, 2017. This update introduced the requirement to assess the patient’s pain intensity using the NRS or Wong-Baker scale. Regardless of the type of intervention, the SWD PRM application requires that the pain scale be assessed and marked in the documentation. Without an assessment of pain intensity, it is not possible to submit the final EMT report in the SWD PRM system.

THE AIM

Ineffective pain management not only reduces patient comfort, but in many cases leads to a cascade of adverse reactions in the body, such as increased blood pressure, heart rate, metabolic rate, and even mental disorders. Therefore, there is a need for further research in this area to improve the quality of prehospital care and to develop efficient, easy-to-use tools that could increase the effectiveness of analgesia.



Post-hoc tests	Dunn-Bonferroni			
	traumatic	visceral	stenocardial	other
traumatic		0,002	p<0,001	0,299
visceral	0,018		p<0,001	0,987
stenocardial	0,005	0,002		p<0,001
other	0,091	0,190	0,005	

Fig. 1. Pain intensity (initial assessment) and pain type in the general patient population (Kruskal-Wallis test and post hoc tests).

The purpose of the study is to answer the following questions:

1. What types of pain do patients report as most severe and for what types of pain do patients receive the most appropriate management in the prehospital setting?
2. Have changes in medical documentation and the introduction of mandatory pain intensity assessment affected the quality of prehospital pain management?
3. What changes have occurred in the use of analgesics during the study period?

MATERIAL AND METHODS

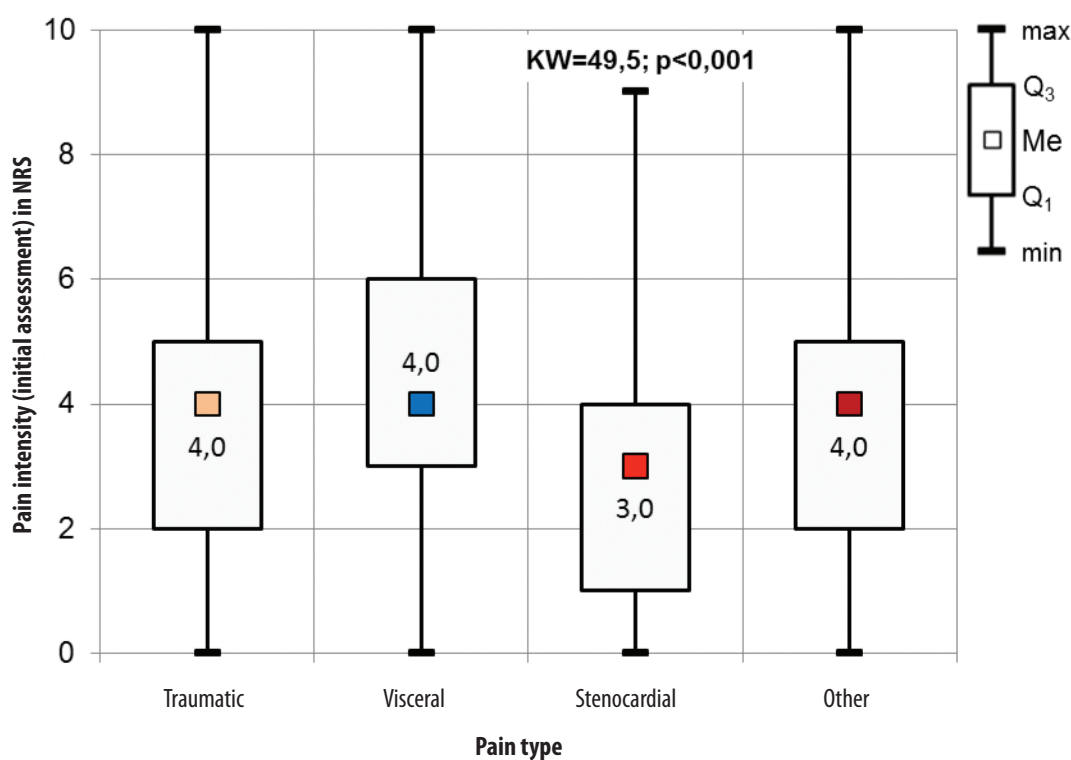
The study involved a retrospective analysis of three databases from different time periods in selected EMTs. Each database was analyzed on a one-month scale and included the same emergency teams each time.

The first database analyzed included 4135 medical dispatch cards (MDC) and medical rescue activities cards (MRAC) from calls during the month of September 2016.

The data was collected in the archives of the Provincial Emergency Medical Service in Katowice. The documentation was obtained in paper form and included 20 EMTs (14 basic EMTs and 6 specialized EMTs) from the area of Katowice (S03-15, S03-34, S03-36, S03-46, S03-11, S03-40, S03-42, S03-44, S03-38, S03-28, S03-30, S03-32, S03-09), Tarnowskie Góry (S04-32, S04-07), Knurów (S04-26), Pyskowice (S04-30, S04-05), Kalety (S04-34) and Tworóg (S04-09). Of all documentation in this database, 688 MDCs and MRACs met the inclusion criteria of adequate ICD-10 coding and were included in the study.

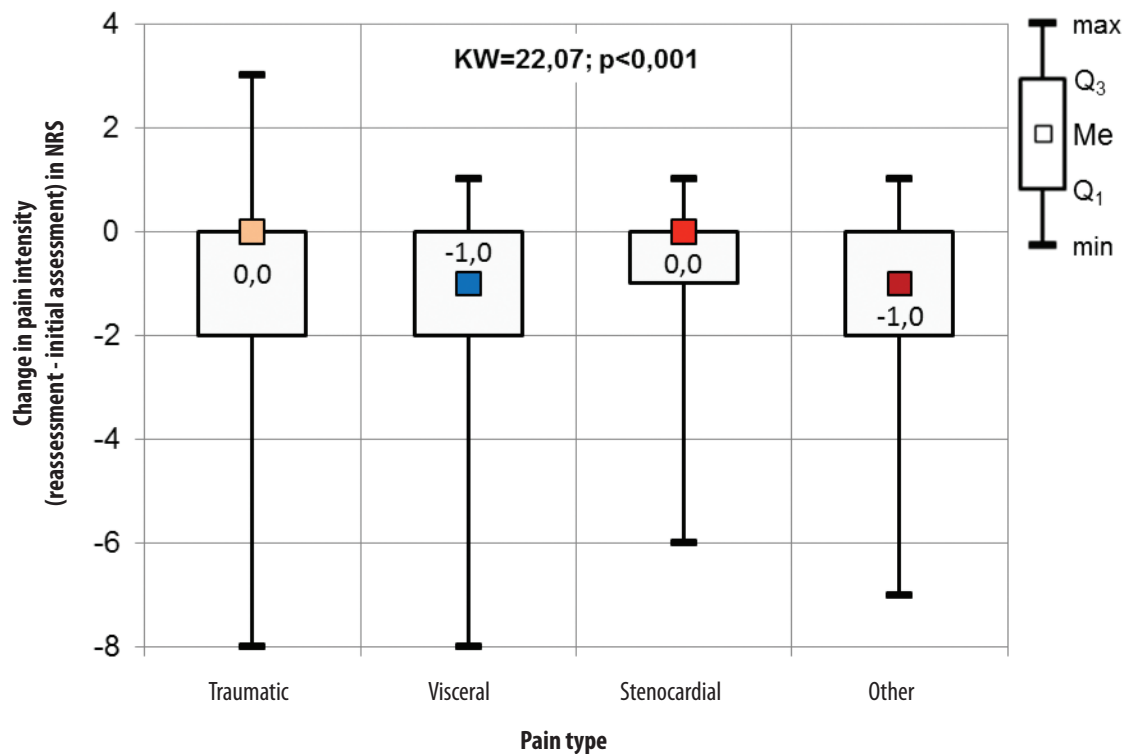
The second database contained 3747 MDC and MRAC documents, of which 996 were included in the study. The documentation was obtained from the SWD PRM system via the National Medical Rescue Monitoring Center in Warsaw. The second database included 21 EMTs due to the introduction of an additional team by the dispatcher in Tworóg (S04-28) and comes from September 2019.

The third database consisted of the documentation of 3460 EMS calls, of which 798 were included in the analysis. This data came from 21 EMTs in June 2020.



Post-hoc tests	Dunn-Bonferroni			
	traumatic	visceral	stenocardial	other
traumatic		0,005	p<0,001	0,461
visceral	0,024		p<0,001	1,000
stenocardial	0,011	0,003		p<0,001
other	0,119	0,196	0,009	

Fig. 2. Pain intensity (reassessment) and pain type in the general patient population (Kruskal-Wallis test and post hoc tests).



Post-hoc tests	Dunn-Bonferroni			
	traumatic	visceral	stenocardial	other
traumatic		1,000	0,002	0,528
visceral	0,233		p<0,001	1,000
stenocardial	0,020	0,014		p<0,001
other	0,132	0,271	0,015	

Fig. 3. Change in pain intensity (reassessment - initial assessment) and pain type in the general patient population (Kruskal-Wallis test and post-hoc tests)

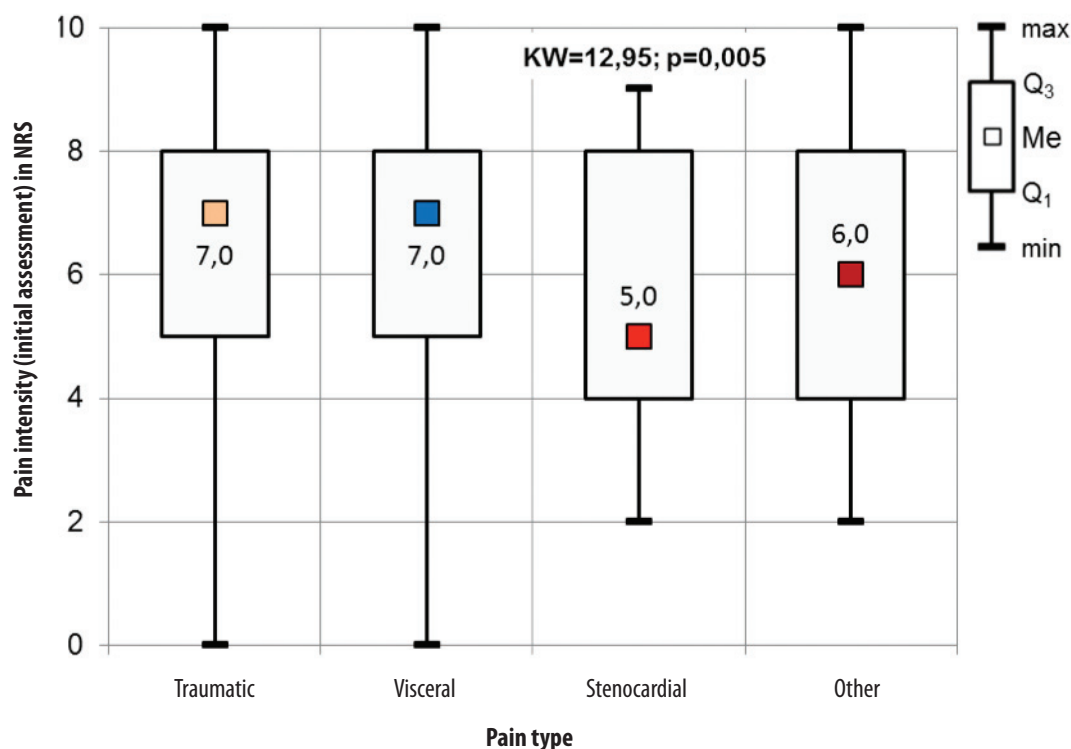
The time periods for data analysis were deliberately chosen. The first database from September 2016 was created four months after the introduction of new professional qualifications and equipment for basic EMTs, including a wide range of new analgesics. The second database covers EMT calls two months after the publication of the aforementioned good practices for pain management. The third database, from June 2020, was collected five months after the assessment of pain intensity became mandatory in the SWD PRM system.

From each of the analyzed databases, documents with the following ICD-10 diagnoses were extracted and evaluated: M54, G54, R51, R52, R07, I21, R10, N20-N23, K80-K83, S10-S19, S20-S29, S30-S39, S40-S49, S50-S59, S60-S69, S70-S79, S80-S89, S90-S99, T00-T07, T08-T14, T20-T32. Patients with hypertension-related headache were excluded from the study.

The statistical analysis of the results concerned the assessment of pain intensity using the eleven-point NRS scale. This is a typical ordinal scale, so quartiles were used in the descriptive statistics: minimum (quartile 0), quartile 1, median (quartile 2), quartile 3, and maximum (quartile 4).

The main part of the statistical analysis included non-parametric tests: Mann-Whitney test (comparison of pain scale scores with respect to patient gender) and Kruskal-Wallis test (comparison of pain intensity scores with respect to patient age, type of pain, and type of medication used). For statistically significant results in the Kruskal-Wallis test, post-hoc tests in two variants (Dunn-Bonferroni and Conover) were used. The results of the discussed analysis are presented in box and whisker plots.

To conclude the statistical analysis, the three data collection periods (2016, 2019, and 2020) were compared in terms of analgesics used. The chi-squared test of independence was used. Statistically significant results underwent a detailed analysis, which consisted of selecting cases (combination: drug - year) that influenced the achievement of statistical significance in the independence test. For this purpose, the test for standardized residuals (calculated in the independence test) was used and verified using the normal distribution. The results are shown in Figure 7. Labels for observed counts that differed significantly from hypothetical (expected) counts were distinguished based on the result of the test for standardized residuals. White color was used when the



Post-hoc tests	Dunn-Bonferroni			
	traumatic	visceral	stenocardial	other
traumatic		0,073	0,063	0,005
visceral	0,053		0,968	0,636
stenocardial	0,050	0,195		1,000
other	0,025	0,147	0,456	

Fig. 4. Pain intensity (initial assessment) and pain type in patients receiving medication (Kruskal-Wallis test and post hoc tests)

observed number significantly exceeded the expected number (i.e., the drug was used more often than expected in a given year), while dark green was used in the opposite case (when the drug was used less often than expected).

RESULTS

The key issue in this thesis is the assessment of pain intensity during an EMT intervention, both before and after the administration of analgesics. This was attempted after collecting data from 2017, 2019 and 2020.

In September 2017, a total of 4135 EMT calls were recorded, including 688 (16.6%) cases in which pain was one of the main complaints. Only in 14 cases (2.0%) was the initial assessment of pain intensity performed using the NRS scale, and a verbal assessment was documented in 112 cases (16.3%). Analgesics were used in 263 patients (38.2%), including 9 (3.4%; 1.3% of the total) in which the pain intensity was assessed using the NRS scale and 54 (20.5%; 7.8% of the total) in which the pain was described verbally. Pain intensity was reassessed in a total of 8 cases (1.2% of the total and 3.0% of the subgroup receiving medication). Of these, 3 were assessed with the NRS scale and 5 with the verbal pain intensity

scale. The percentages are 0.4% and 1.1% for the NRS scale and 0.7% and 1.9% for the verbal scale.

The information collected in September 2019 takes into account the recommendations of the Ministry of Health on the so-called good practices of pain management for paramedics. Out of 3747 calls, 981 (26.2%) involved the presence of pain. Again, pain intensity was assessed in two ways. The NRS scale was used for initial assessment in 79 (8.1%) cases, and verbal characterization of the pain was used in 99 (10.1%) cases. The response of the EMS personnel (administration of analgesics) occurred in 316 (32.2%) cases. Considering this subgroup, the initial pain assessment using the NRS scale was performed in 48 (15.2%) cases and verbal assessment in 39 (12.3%) cases.

In the interventions analyzed, pain intensity was reassessed using the NRS scale in 28 cases (2.9% of the total) and verbally in 13 cases (1.3% of the total). The corresponding numbers and percentages of cases in the subgroup that received analgesics were 27 (8.5%) for the NRS scale, and 10 (3.2%) for the verbal scale. In December 2019, the Ministry of Health introduced the requirement to assess pain intensity in adults only using the 11-point NRS scale (0-10).

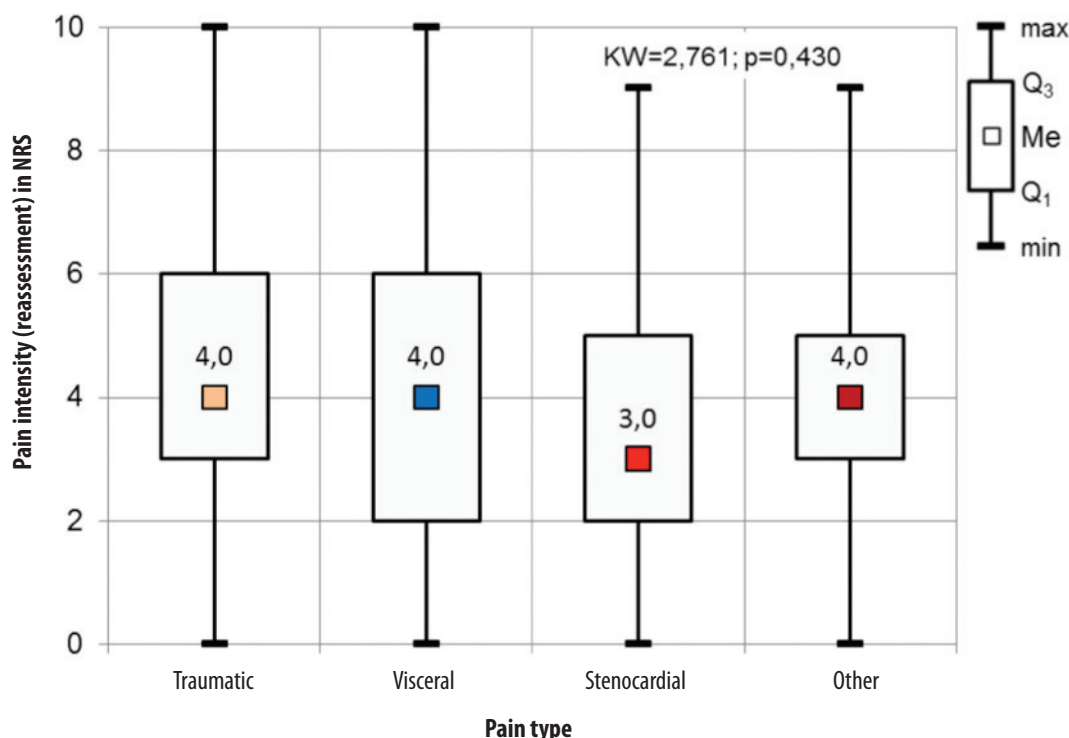


Fig. 5. Pain intensity (reassessment) and pain type in patients receiving medication (Kruskal-Wallis test and post hoc tests).

The data collected in June 2020 (3460 calls) included 798 cases in which pain was one of the main complaints and thus met the inclusion criteria. Pain intensity was assessed in 765 (95.9%) cases during the initial assessment. In 33 (4.1%) cases, pain was either not assessed or the assessment was not documented. The decision to administer analgesics was made in 335 (42.0%) cases. Therefore, based on this subset of interventions, pain intensity could be assessed in 332 (96.1%) patients. Pain intensity was reassessed 753 (94.4%) times, including 314 (39.3% of the total) cases from the subgroup that received medication, representing 93.7% of this subgroup.

To summarize the above data, it should be emphasized that due to the lack of adequate documentation of pain intensity assessment in 2017 and 2019, a detailed statistical analysis for these years is not justified. The reliability of the conclusions drawn from such an analysis is questionable. Therefore, it was decided that the main statistical analysis would only be applied to the database obtained for 2020. The next stage of statistical analysis concerned the assessment of pain intensity in relation to its type, taking into account four types of pain: traumatic, visceral, stenocardial and other.

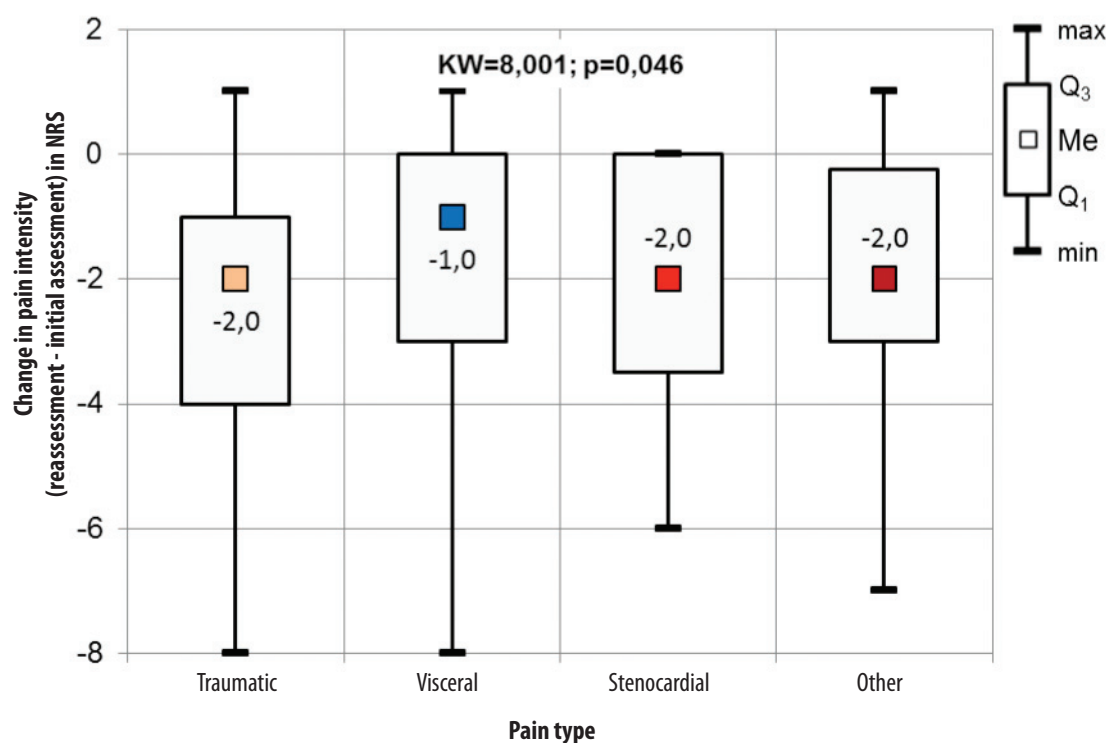
Figure 1 shows the pain intensity at initial assessment for the general population of patients, with a breakdown by type. The result of the Kruskal-Wallis test proves the statistical significance ($p < 0.001$) of the differences in pain intensity. The results of the post-hoc tests used in this situation indicate that stenocardial pain is characterized by a relatively lower level compared to the other types. On the other hand, the level of visceral pain

is statistically significantly higher compared to traumatic pain, and there is no significant difference in the intensity of other types of pain compared to traumatic and visceral pain.

In the reassessment, there is a significant decrease in pain intensity regardless of its type (Fig. 2). The mutual relations of the pain levels for the analyzed types remain, according to the result of the Kruskal-Wallis test, almost exactly the same as in the case of the initial assessment ($p < 0.001$). The results of the post hoc tests also lead to similar observations.

In subsequent assessment, pain intensity decreased the most for visceral and other types of pain (Fig. 3). As a result, the differences remained statistically significant ($p < 0.001$), but a flattening of the respective curves can be observed. The consistent results of both post hoc tests indicate, in principle, the statistical significance of the differences between the initial and subsequent assessments. However, the significance of the difference in pain intensity between traumatic and visceral pain is blurred.

Pain intensity by type in the subgroup of patients who received analgesics was another topic that was subjected to statistical analysis. The results are presented in Figures 4, 5 and 6. The results of the Kruskal-Wallis test (Fig. 4) show that the reported pain intensity was significantly different during initial assessment ($p = 0.005$). Given the consistent results of the post-hoc tests, the only statistically significant difference was observed when comparing traumatic and other types of pain. However, the median values do not seem to confirm this observation. It should be noted that the results of both the



Post-hoc tests	Dunn-Bonferroni			
	traumatic	visceral	stenocardial	other
traumatic		0,034	0,588	0,104
visceral	0,042		1,000	1,000
stenocardial	0,142	0,435		1,000
other	0,062	0,492	0,444	

Fig. 6. Change in pain intensity (reassessment - initial assessment) in NRS.

Kruskal-Wallis test and the post-hoc tests are influenced not only by the pain intensity scores, but also by the number of cases for each type of pain. These numbers were as follows: 117 - traumatic type, 112 - visceral type, 23 - stenocardial type and finally 62 - other types of pain. The relatively small number of patients reporting stenocardial pain is largely responsible for the lack of statistical significance for the difference in pain intensity of this type of pain in relation to traumatic and visceral pain.

Figure 5 shows the pain intensity for the analyzed types after the administration of analgesics. The result of the Kruskal-Wallis test indicates the absence of significant differences in pain intensity ($p=0.430$). In view of this test result, it is not justified to perform calculations using post-hoc tests. Comparing the median values shown in Figures 4 and 5, a clear effect of the drugs administered can be observed. For each type, a significant reduction in pain intensity was observed. Notably, an increase in the dispersion of visceral pain intensity was observed, as shown by the interquartile range (Q3 - Q1). The opposite

is true for other types of pain, where a decrease in the spread of observed pain intensity values was observed.

The Kruskal-Wallis test results (Fig. 6) indicate that the change in pain intensity level is significantly variable ($p=0.046$) and depends on the type of pain. The results of the post-hoc tests consistently indicate that the differences in pain intensity were statistically significant only for traumatic and visceral pain. It is worth noting that the decrease in visceral pain intensity is smaller, which may raise doubts, especially when considering the results shown in Figures 4 and 5. This surprising observation is probably a consequence of the previously mentioned increase in the dispersion of visceral pain intensity after the administration of analgesics.

Figure 7 shows the percentages of analgesic use in subsequent years. There is a clear increase in the use of combined analgesics. A similar observation was made for opioids, and both metamizole and paracetamol were used relatively more often at the expense of ketoprofen. The analysis was performed using the chi-

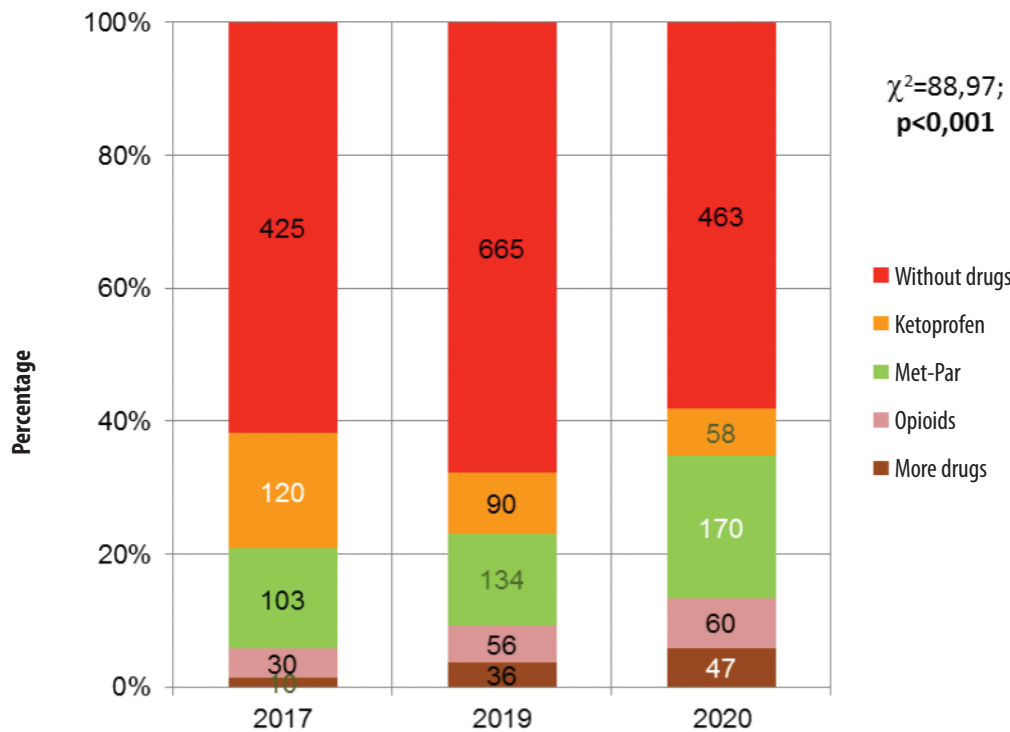


Fig. 7. Analgesics use in the years 2017, 2019 and 2020.

squared test for independence. The result of the test shown in the figure leaves no doubt that the proportions of use of the drugs considered differ between the years analyzed.

The labels highlighted in white and dark green had a statistically significant influence on the result of the independence test. The white labels (ketoprofen - 2017, more drugs - 2020 and metamizole-paracetamol - 2020) refer to numbers that are larger than expected, while the dark green labels (more drugs - 2017, metamizole-paracetamol - 2019 and ketoprofen - 2020) refer to numbers that are smaller than expected. The use of opioids in 2020 was close to statistical significance.

DISCUSSION

The collected data show that pain was present in 21.9% of the patients who required EMS intervention. Other Polish authors of similar studies reported that about 43.8% of patients reported pain as the main complaint [1]. This discrepancy may be explained by a different characteristic of EMT interventions in the evaluated region.

The first analyses of prehospital analgesia after the introduction of the National Medical Rescue Service Act and the designation of the paramedic as an independent profession were performed in 2009. The results of these studies showed that out of 1638 patients who reported pain, only 131 patients received treatment, which was 8% of the cases qualified for analysis [1, 2].

Krzyżanowski et al. conducted an analysis of prehospital pain management before the aforementioned

regulations came into effect in 2016. They found that pain management was performed in only 16% of cases with isolated injuries and 26.6% of cases with multiple injuries. In children, analgesia was used in 20% of cases [3]. In the group of pediatric patients with injuries, Holak et al. reported the use of analgesia in 16% of patients and Leszczyński et al. in 10.5% of patients in a group of 464 children in 2016-2016 [4]. The analysis conducted by the Ministry of Health over a period of 6 months (from November 1, 2017 to April 30, 2018) showed that pharmacological analgesic treatment was used in 25.23% of adults and 16.58% of children [5].

Our data analysis shows a higher percentage of pre-hospital analgesia use compared to the cited studies (38.2% in 2016, 32.2% in 2019, and 42% in 2020). However, the data refer to analgesia use regardless of pain type and without a pediatric subgroup. Nonetheless, this does not change the fact that more than half of the patients who reported pain did not receive any medication to relieve their symptoms.

A surprisingly high percentage of prehospital analgesic use is reported in the Podkarpackie Voivodeship. Kiszka et al. found the percentage of pharmacological analgesia used from June 1 to December 31, 2016 to be 71.2% [6].

Based on the cited national studies, it is clear that the percentage of pharmacological analgesia used by EMTs is increasing. These reports are of great practical value, as they allow an internal comparison of practices in Poland. It is much more difficult to compare the results of our research with foreign studies due to significant dif-

ferences in the organization of the EMS system. In addition, professional competencies vary from country to country, which does not allow for an accurate comparison of analgesic use in the prehospital setting.

Data from Polish authors are similar to research results reported in other countries. In Europe, the percentage of patients reporting pain in prehospital care ranges from 27.7% to 70% [7-12].

Galinski et al. showed in 2010 that 51% of EMS patients in France experienced pain relief, and an analgesic was administered to 73% of all patients reporting symptoms [12]. Despite the higher percentage of analgesic use compared to national statistics from a similar period, French researchers at the time considered pain management to be inadequate. Another conclusion of the French authors was the need for well-equipped ambulances to provide more effective pain relief [13].

An analysis of Swiss data from a registry of nearly 21,000 prehospital interventions from 2013-2016 by Kiaivalaitis et al. showed that 77% of patients received effective analgesia. The author also showed that ketamine and fentanyl provide the greatest chance of effective analgesia [14].

An analysis of data from the Austrian helicopter rescue system was conducted from 2006 to 2017, during which EMT assistance was provided to almost 140,000 adult patients and over 12,300 children. Analgesia was used in 34.3% of adults and 31.4% of children, and its main components were opioids and ketamine [15,16].

When analyzing the available literature from other authors, the only studies that evaluated similar characteristics were the Magnusson study and the Friesgaard study. Magnusson et al. analyzed 1234 patients from Gothenburg, Sweden, who reported chest pain, trauma-related pain (hip injury), or abdominal pain in 2016. Magnusson's observations on the intensity of stenocardial pain are similar to our own findings - this type of pain is characterized by lower intensity compared to trauma-related and visceral pain. In our own analysis, visceral pain is statistically significantly more intense than trauma pain, while in the Swedish researcher's study, trauma pain is more intense than visceral pain. After treatment, the reduction in pain intensity for all patients in our own material was most pronounced for visceral and trauma pain. In his work, Magnusson showed the greatest reduction in intensity for trauma pain [17].

A possible explanation for the differences in results may be the discrepancy in professional competence for drug administration and the recommendation of Swedish "good practice". The Swedish equivalent recommends the administration of morphine and diclofenac for visceral pain and morphine and ketamine for trauma pain. Polish national recommendations recommend morphine or fentanyl for trauma pain and metamizole with drotaverine for visceral pain. Swedish experience shows that trauma pain could be more effectively reduced by the introduction of ketamine under Polish conditions.

A lower initial intensity of stenocardial pain compared to other types of pain was reported in a study by Friesgaard et al. which included 2348 patients, of whom 577 were reported as having stenocardial pain. This study was conducted in 2011 in Denmark. Friesgaard also showed that pain reduction after fentanyl administration was statistically significant in each group, regardless of the type of pain (traumatic, visceral, stenocardial, or other). The paper found no statistical significance between the primary and subsequent intensity scores and the types of pain [18].

The general trend of change in prehospital analgesia is positive. In recent years, there has been a marked increase in interest in the topic in the available literature, scientific conferences, and postgraduate education. In addition, new systemic solutions have emphasized adequate pain management. It seems that this is not without importance in terms of improving the quality of services provided.

In the first year of observation, the EMS personnel relied significantly on ketoprofen for analgesia. In 2020, the use of this drug has significantly decreased. However, it is important to note that until 2016, ketoprofen and morphine were the only analgesics available in basic EMTs. This may also have contributed to the overuse of ketoprofen in 2017, due to the limited experience of EMT personnel with the newly available drugs and established habits.

The use of metamizole and paracetamol has increased significantly in the last year of observation. Metamizole is now the most commonly used drug for visceral pain, in part because of its spasmolytic properties, which provide significant pain relief for visceral pain. Contemporary medical literature indicates the high efficacy of metamizole in acute pain with a favorable side-effect profile, especially compared to NSAIDs. Paracetamol is not only the most popular, but also the most widely used antipyretic and analgesic in the world. In recommended doses, it does not cause the gastrointestinal adverse effects typical of NSAIDs [19].

Another important observation is that the use of more than one drug was significantly more common in 2020 than in previous years. Although we did not assess which drug combinations were used, the mere fact of using multimodal analgesia bodes well for the future. Although the results on the use of opioids in the last year of observation were not statistically significant, there was a noticeable upward trend in the use of this group of drugs. The current share of opioids in analgesia is incomparably higher than in 2009-2011, when Szyller and Kosiński described their use in no more than 1% of patients [20].

CONCLUSIONS

1. In selected EMTs in Silesia, patients with visceral pain report the highest initial pain intensity, but also the greatest reduction in visceral pain at subsequent assessments. EMTs are also shown to be effective in reducing traumatic pain in the prehospital setting.

2. The introduction of good pain management practices along with the requirement to assess pain intensity in documentation had a positive impact on the use of analgesia in prehospital care among selected EMTs in Silesia.
3. Positive changes in prehospital analgesia were observed in selected Silesian EMTs, including a decrease in the use of NSAIDs in favor of metamizole and paracetamol, and an increase in the use of opioids.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest.

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Interventions of Emergency Medical Teams for health threats caused by ethyl alcohol intoxication in 2021-2022

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ABSTRACT

Aim: Analysis of interventions by emergency medical teams (EMT) for alcohol-related patients in 2021-2022.

Material and methods: The study involved a 2-year retrospective analysis of dispatches by the Emergency Medical Services (EMS) from a part of the Lublin Voivodeship. The analysis covers the period from 01.01.2021 to 31.12.2022. Data were obtained from the medical documentation of the dispatch units of the National Medical Rescue System. The study included interventions based on the reason for the call communicated to the medical dispatcher (MD) by the reporter, diagnosis code according to ICD-10 (International Classification of Diseases).

Results: Using the inclusion and exclusion criteria, 820 interventions (303 in 2021, 517 in 2022) related to the study's objective were selected, accounting for 5.92% of all interventions in the analyzed area (2021- N=7069, 2022- N=6769). The one-way ANOVA confirmed the existence of statistically significant differences (all P for trend<0.05) between procedures (Detox/psych vs. Remained vs. Transfer ED) and time of the intervention, type of medical rescue team, location of the incident, pharmacotherapy, police co-participated, ICD -10.

Conclusions: Most EMT interventions (both single and multiple to the same patient) concern men. Hospital transport was mainly necessary in the group of causes: mental disorders and injuries. The longest intervention time was in the "mental disorders" group calls, which may be related to the necessity of hospital transport. Health risks were mainly identified from groups F, S, and Y.

KEY WORDS

emergency medical services, health threats, alcohol intoxication, EMT interventions

INTRODUCTION

Ethanol is a psychoactive and toxic substance, yet widely available. It has a calming and depressive effect on the central nervous system. Everyday life offers many reasons and occasions to consume ethanol. Initially, alcohol consumption can reduce anxiety, improve mood, and induce relaxation, which is why many people turn to it. Excessive alcohol consumption, regardless of the form, is harmful to human health, both individually and societally (social and economic problems). Chronic drinking ultimately leads to permanent brain damage [1].

Alcohol consumption has diverse effects on the central nervous system (CNS). It affects intracellular signaling mechanisms, making changes in gene expression. A better understanding of the psychodegenerative processes associated with alcohol could lead to the identification of new therapeutic targets and the development of new and effective treatment methods [2].

Addiction models emphasize the importance of the interaction of many factors in its development. As a consequence, there is a need to create tools to measure the level of addiction. Defining Alcohol Use Disorder (AUD) has allowed clinicians to assess patients' alcohol problems. Alcohol addiction syndrome (AAS) develops almost 20% of alcohol drinkers.

Low-risk drinking to excessive, harmful and alcohol use progresses gradually. Research indicates a bidirectional change in the intensity of alcohol consumption in many people diagnosed with addiction. Individual, AUD can be diagnosed on a scale from its absence to its severe form, e.g., non-pathological alcohol consumption when someone drinks daily but in small amounts or occasionally experiences intoxication, does not always lead to the diagnosis of the disease [3].

Focusing on treating individuals diagnosed with alcohol addiction, who were offered therapy aimed at alcohol abstinence, led to the neglect of those engaging in harmful drinking. It is estimated that for about four million people in Poland who drink alcohol riskily and harmfully, there were no appropriate therapeutic proposals [4, 5].

Social problems resulting from alcohol abuse, which are diagnosed based on certain criteria, e.g., concerning the relationship between alcohol consumption and fulfilling important duties, awareness of social harm resulting from drinking, refer to progressive lifestyle changes in the drinking person, consisting of weakening previously important interests in favor of drinking [6, 7].

THE AIM

Analysis of interventions by emergency medical teams for alcohol-related patients in 2021-2022

MATERIAL AND METHODS

RESEARCH DESIGN

The study involved a 2-year retrospective analysis of dispatches by the Emergency Medical Services (EMS) from a part of the Lublin Voivodeship. The analysis covers the period from 01.01.2021 to 31.12.2022. Data were obtained from the official documentation of the dispatch units of the National Medical Rescue System (NMRS):

- dispatch order card (DOC)
- medical rescue operation card (MROC). NRS entities that participated in the interventions included in the analysis:
- basic medical rescue teams (B-MRT) - led by a medical rescuer or a nurse from the system
- specialized medical rescue team (S-MRT) - led by a doctor from the medical rescue system - specialized team (S) [8, 9].

RESEARCH SETTING

The database was prepared in Microsoft Excel using MS Office 2016 for Windows 10. The interventions meeting the inclusion criteria were entered, including the length of the intervention (minutes), the date and time of the intervention, the reason for the call, the location of the event (urban and rural areas), the type of EMS team, the age and gender of the patient, the rescue procedure, the use of pharmacology. In the interventions covered by observation, pharmacological agents dedicated to EMS were used, in accordance with the Regulation of the Minister of Health. The following drugs were used: non-steroidal anti-inflammatory drugs (NSAIDs), non-opioid analgesics, opioid drugs, fluids in the form of drip infusions, and medical oxygen. Medicines used by emergency medical services are emergency measures, administered in response to disease symptoms, pain, and pathological reactions.

ETHICAL CONSIDERATIONS

All personal data (patients, medical personnel, and staff of cooperating services) remained anonymous and were not used for analysis purposes. In June 2020, permission was obtained from the director of the unit executing dispatch orders for access to EMS dispatch documentation. The analysis was conducted in accordance with the Helsinki Declaration principles, and therefore it was not necessary to seek the opinion of an ethics committee regarding the study's implementation.

STATISTICAL ANALYSIS

Results concerning quantitative variables were presented as average values \pm standard deviation. In the univariate comparison of characteristics of EMS interventions, a one-way analysis of variance (ANOVA) was performed. Qualitative variables (localization, sex) were presented as quantity (n) and percentage values of the whole group (%), while proportions in groups were assessed with a Chi-squared test. Statistica 13 software

(StatSoft Inc., Tulsa, OK) was used for the statistical analysis. A significance level of $P < 0.05$ was adopted.

Inclusion Criteria for Analysis:

1. interventions were included in the study based on the reason for the call provided to the medical dispatcher (DM) by the reporting person using the keywords: "patient after drinking alcohol", "alcohol intoxication", "smell of alcohol", "alcohol abuse", "alcohol addiction"
2. diagnosis code according to ICD-10 (International Classification of Diseases). Attention was paid to codes from groups typical of alcohol-related disorders:
 - F10-F19 - Mental and behavioral disorders caused by the use of psychoactive substances
 - X40-X49 - Accidental poisoning by exposure to harmful substances
 - T - injuries, poisonings and other specific effects of external factors
 - Y90-Y98 - Additional factors associated with causes of illness and death classified elsewhere (including alcohol) [10]
3. intervention dates: 1/01/2021 - 31/12/2022

Criteria for exclusion from analysis:

- interventions outside the range of dates consistent with the purpose of the work
- no patient at the place of call - incorrect address provided
- intentional and bona fide false events,
- no patient at the place of call - the family transported the patient with their own means of transport.

Characteristics of groups

The population included in the analysis was divided into 4 groups:

- alcohol intoxication - calls to patients lying in a public place with symptoms of alcohol intoxication, a noticeable odor of alcohol from the breath,
- mental disorders resulting from the use of alcohol - sober patient, with changed behavior (visual, auditory hallucinations) as a result of alcohol addiction.
- somatic symptoms (cardiological, metabolic) as a result of alcohol use - sober patient, without behavioral disorders, but reporting digestive system disorders, malaise, chest discomfort, feeling of shortness of breath. Confirmation of alcohol addiction in the interview
- alcohol-related injuries - body trauma/injury resulting from alcohol intoxication, loss of balance, or fight.

LIMITATIONS

1. The obtained permission to access data covered only the documentation of EMS dispatch teams, without access to further hospital treatment docu-

Table 1. General characteristics of the population including repeated interventions to the same patient for n>2.

Repeated calls	Gender/ age *	Repeated calls	Gender/ age *
9	M34	3	M52
6	M42	3	M44
5	M38	3	M33
4	M42	3	M50
4	M38	3	M63

*age refers to the last intervention included in the analysis

Abbreviations: M- men

Table 2. Comparison of Characteristics of MRTs Interventions According to Procedure.

Procedure	Detox/psych	Remained	Transfer ED	All	P
N	170	239	411	820	
Time, min	49 ± 21	33 ± 17	45 ± 20	42 ± 21	<0,001
Age,y	42 ± 12	44 ± 13	44 ± 13	43 ± 13	0,302
Sex, male, n(%)	162 (95)	226 (95)	376 (92)	764 (93)	0,152
S MRTs, n(%)	70 (41)	129 (54)	195 (48)	394 (48)	0,036
Localization, City, n(%)	70 (41)	76 (32)	192 (47)	338 (41)	<0,001
Pharmacology, n(%)	22 (13)	81 (34)	108 (26)	211 (26)	<0,001
Death, n(%)	12 (7)	12 (5)	1 (0,2)	25 (3)	<0,001
Police, n(%)	80 (47)	86 (36)	124 (30)	290 (35)	<0,001
Psychoactive, n(%)	6 (4)	1 (0,4)	6 (2)	13 (2)	
ICD-10, n(%)					<0,001
Mental disorders	117 (68)	37 (16)	34 (8)	188 (23)	
Somatic disease	45 (27)	115 (48)	166 (41)	326 (40)	
Injury	3 (2)	23 (10)	83 (20)	109 (13)	
Alcohol intoxication	5 (3)	63 (27)	127 (31)	195 (24)	

Table 3. Comparison of characteristic of MRTs interventions according to intervention group.

	Mental disorders	Somatic disease	Injury	Alcohol intoxication	P
N	188	326	109	195	
Time	49 ± 22	43 ± 21	39 ± 17	35 ± 18	<0,001
Age	41 ± 13	43 ± 11	46 ± 13	44 ± 14	0,001
Sex, male, n(%)	169 (90)	305 (94)	103 (95)	185 (95)	0,219
S MRTs, n(%)	81 (43)	161 (49)	52 (48)	100 (51)	0,406
Localization, City, n(%)	67 (36)	117 (36)	41 (38)	111 (57)	<0,001
Pharmacology, n(%)	21 (11)	157 (48)	9 (8)	24 (12)	<0,001
Death, n(%)	12 (6)	9 (3)	2 (2)	2 (1)	0,016
Police, n(%)	114 (61)	54 (17)	35 (32)	86 (44)	<0,001
Psychoactive, n(%)	10 (5)	0	0	3(2)	<0,001

- mentation in the emergency department (ED), detoxification unit, or other hospital wards.
- 2. EMS teams do not have equipment to measure the alcohol content in the body, nor procedures for obtaining such a parameter at the pre-hospital stage. According to the MROC form, the assessment of the patient regarding alcohol consumption is based on general examination, interview, and the smell of alcohol from the patient. The police perform the alcohol content test during joint operations with EMS, or the patient undergoes blood testing at the ED stage.
- 3. The division into 4 patient groups (Table 3) used in the Results chapter was developed based on the authors' observations, interpretation of the descriptive part of medical cards, analysis of the ICD-10 diagnosis code, and decision on the destination place of transport.
- 4. Direct coercive measures could have been used in joint activities with the police, the authors did not find such information in the analyzed exit cards

RESULTS

Using the inclusion and exclusion criteria, 820 interventions (303 in 2021, 517 in 2022) related to the study's objective were selected, accounting for 5.92% of all interventions in the analyzed area (2021- N=7069, 2022- N=6769). Importantly, the analysis included interventions whose number differed from the patient population, due to repeated calls to the same patients. Results of repeated calls are presented in Table 1.

During the observed period, there were 53 repeated EMS interventions to the same patient. Besides the data

from Table 1, 10 patients were intervened twice. Repeated interventions accounted for 6.46% of the total, involving men (N=52), women (N=1). The population included in the analysis was divided into 4 groups:

- alcohol intoxication
- mental disorders due to alcohol use
- somatic symptoms (cardiological, metabolic) due to alcohol use
- injuries after alcohol use

The one-way ANOVA confirmed the existence of statistically significant differences (all P-value <0.05) between procedures (Detox/psych vs. Remained vs. Transfer ED) and time of the intervention, type of medical rescue team, location of the incident, pharmacotherapy, police co-participated, ICD-10 (Table 2).

The one-way ANOVA confirmed the existence of statistically significant differences (all P-value <0.05) between diagnosis according intervention group (mental disorders vs. somatic disease vs. injury vs. alcohol intoxication) and time of the intervention, age, localization of incident, pharmacotherapy, police co-participated (Table 3).

In the comparative statistical analysis for the years 2021 and 2022 (Fig. 1), no statistically significant differences were shown in terms of intervention time (P= 0.773), age of the injured (P= 0.918), gender (P= 0.929), location of the event (P= 0.369), pharmacotherapy used (P = 0.864), and police intervention (P= 0.561).

An analysis of the most frequently used ICD-10 codes in the study group was conducted. The results are presented in Fig. 2.

Total of 1,056 ICD-10 diagnoses were entered in 820 interventions, and in 236 interventions, 2 diagnoses

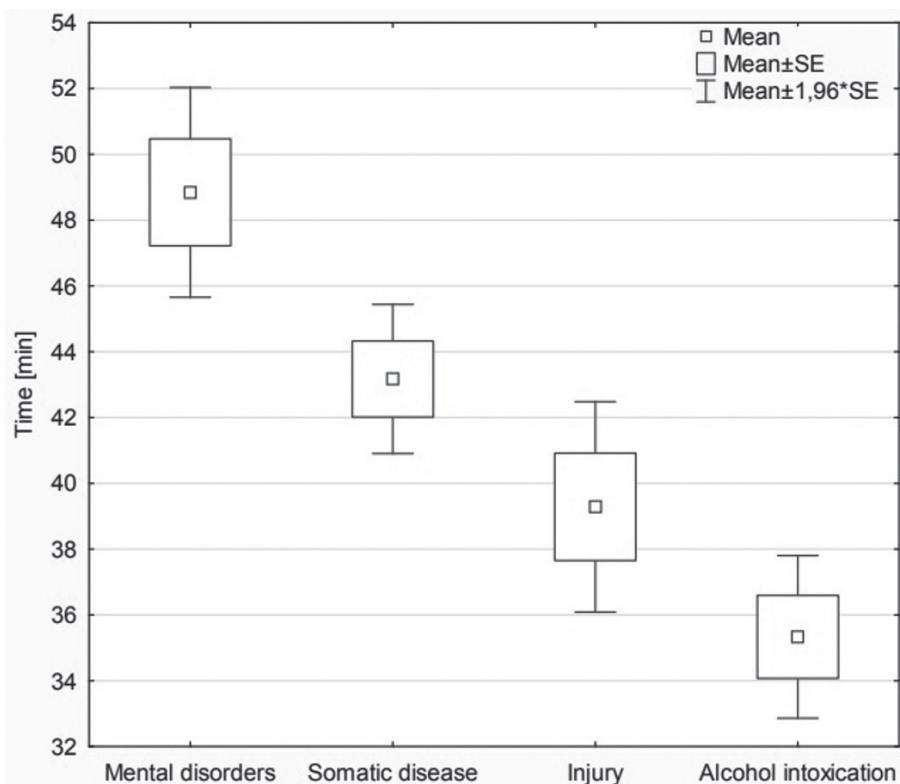


Fig. 1. Intervention group according to time of intervention.

were entered (often in a patient with an injury - the main diagnosis related to alcohol abuse, and an ICD-10 code describing the area or mechanism of the injury).

A quantitative analysis of the use of pharmacological agents in the study population was performed. Pharmacology was used in 211 interventions (25.7%). The quantitative results are presented in Fig. 3.

DISCUSSION

EMT interventions for patients intoxicated with ethyl alcohol are a common type of rescue operation, as the problem of alcohol abuse in Poland is noticeable according to statistics from the Central Statistical Office (GUS

and the State Agency for Solving Alcohol Problems (PARA). Interventions related to the effects of alcohol use generate almost 6% of all EMS interventions in the observed population. Considering the limitations of the study - patients transported directly to the ER by family, aggressive intoxicated individuals taken to police detention facilities, and people who call EMS and hide that their ailments result from alcohol abuse - the scale of the problem is greater than indicated by the results of our study [11, 12].

Due to the significant social burden of complications related to alcohol abuse, relevant state authorities undertake educational, preventive, and therapeutic ac-

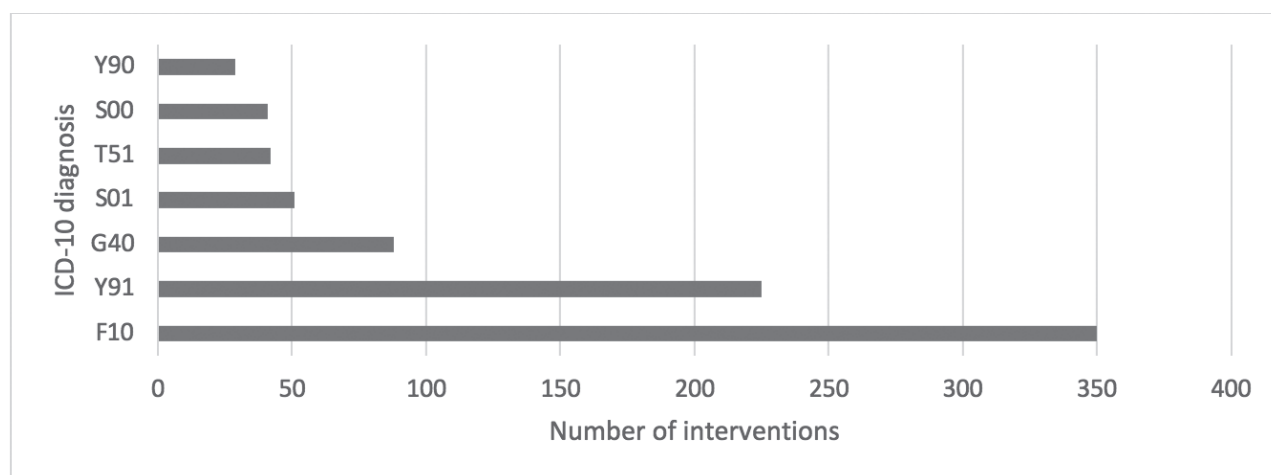


Fig. 2. Analysis of the most frequently used ICD-10 codes.

Abbreviations: Y90 - presence of alcohol in the blood, S00 superficial head injury, T51 - toxic effects of alcohol, S01 - open head wound, G40 - epilepsy, Y91 - effect of alcohol based on the degree of intoxication, F10 - mental and behavioral disorders due to alcohol use

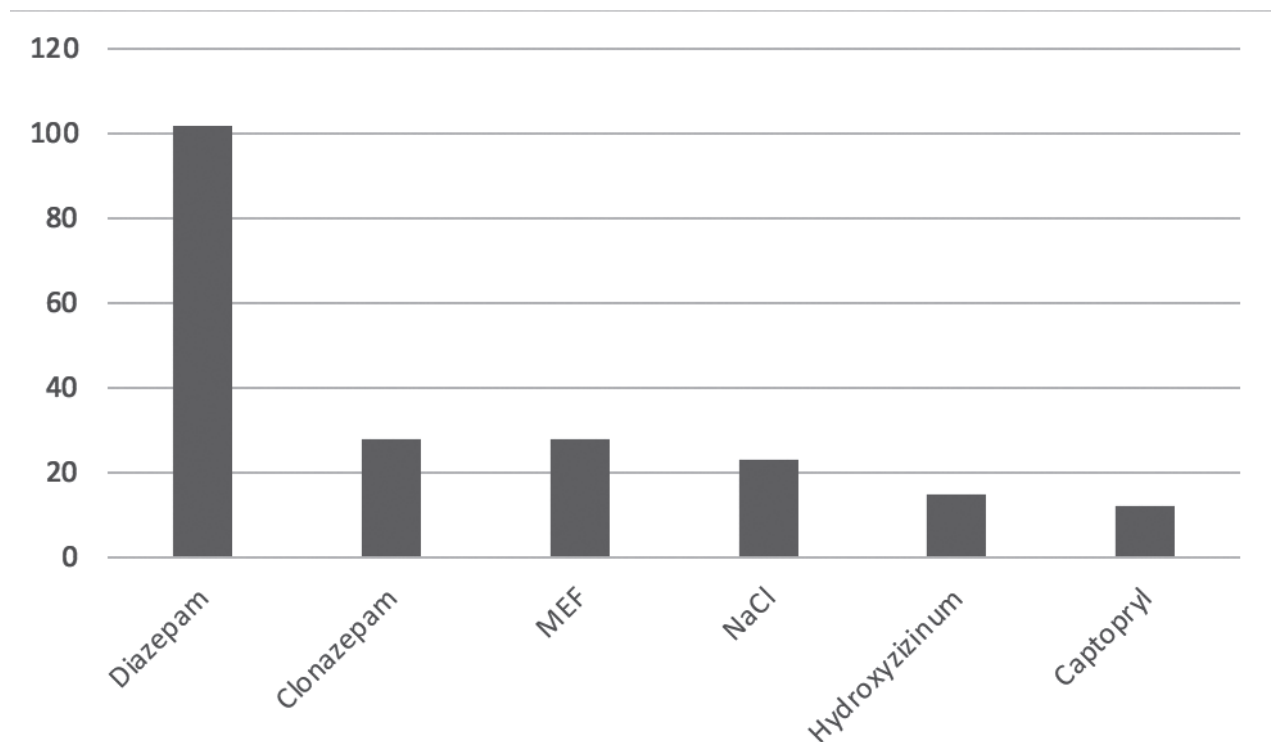


Fig 3. Pharmacological agents used (for n>10).

Abbreviations: MEF- multielectrolyte fluid, NaCl- natrium chloratum

tions for people addicted to alcohol under appropriate laws and regulations. Addiction is most commonly defined in three models, where the main goal is to achieve pleasurable intoxication:

- escapist – used for relaxation and mood improvement,
- social – convivial,
- for the pleasure of consumption itself [13, 14].

Alcohol adversely and depressively affects many areas of the human body. It affects the central nervous system (CNS) and manifests as quantitative disturbances of consciousness, the severity of which depends on the degree of alcohol intoxication and individual tolerance to the effects of ethanol. One of the first noticeable symptoms is excitement, manifested by psychomotor restlessness, talkativeness, irritability, increased excitement, aggression, and is the result of selective depression of centers regulating higher brain functions [15].

Aggression in patients under the influence of alcohol is a risk for medical personnel, including EMS entities, as noted by Wnukowski and colleagues. Among the many risk factors for the occupation of a medical rescuer, the authors describe aggression from patients, which does not always stem from emotional states or pain. Often it is caused by the consumption of alcohol or psychoactive substances by patients. In the study, the authors indicate numerical data; patients under the influence of alcohol or psychoactive substances may account for about 40% of all EMS patients. Our study did not achieve such a result, but the numbers are concerning considering repeated interventions to the same patients for alcohol-related reasons (up to 10 interventions to the same patient over 2 years) [16].

Pharmacological agents in EMS equipment have a rapid, immediate effect, administered intramuscularly (i.m.), intravenously (i.v.), or alternatively via intraosseous (i.o.) route in case of difficulties with intravenous access. Other routes of drug administration include oral tablets, including sublingual, aerosol preparations administered by inhalation, and rectal agents for adults (enemas) and children (suppositories). In the studied group, pharma-

cological agents were administered through all available routes [17, 18].

A significant part of medical diagnoses in the studied group included the F10 category. In the detailed classification, there are specific ailments “F10.1, F10.2, F10.3” defined as withdrawal syndrome (ZZA), and alcohol dependence syndrome (ZUA) without mental disorders, generating somatic symptoms related to other systems such as chest discomfort, abdominal pain, nausea, vomiting, hand tremors, seizures. Betkowska and colleagues describe such disorders based on the Diagnostic and Statistical Manual of Mental Disorders (DSM) classification by the American Psychiatric Association [19].

Samochowiec and colleagues described standards for pharmacological treatment and therapeutic programs influencing the reduction of alcohol consumption in people addicted in the course of Alcohol Use Disorder (AUD). Patients with medical diagnosis F10.0, Y91, T65, having mental disorders due to alcohol constitute a heterogeneous clinical group. In our study, there were about 75% of interventions related to the effects of AUD (diagnoses from groups F, T, Y) [20].

Wetterling describes situations with this specific health problem in German hospitals' practice, where over 100,000 people in a state of alcohol intoxication are admitted annually. Many of them refuse hospital observation or treatment. The collected documentation in our study did not include the hospital stage, but the lack of cooperation from patients and reluctance to treatment was described in the EMS cards [21].

CONCLUSIONS

Most EMT interventions (both single and multiple to the same patient) concern men. Hospital transport was mainly necessary in the group of causes: mental disorders and injuries. The longest intervention time was in the group of mental disorders calls. Police cooperation in the studied population was necessary mainly in the group of mental disorders, which is associated with the danger posed by the patient to themselves and their surroundings.

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Optimizing the lifeline: A comprehensive review and strategic reform proposals for the Polish State Emergency Medical System

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ABSTRACT

This article examines the Polish State Emergency Medical System (PRM), focusing on its current state, legal regulations, and operational challenges. It discusses the structure of emergency teams, the qualifications of medical personnel, and the implementation of collaborative models like the *rendez-vous* system. The article identifies significant issues such as the shortage of emergency medicine specialists and financial constraints faced by hospital emergency departments. Furthermore, this study delves into the impact of technological advancements on the PRM, highlighting how digital innovation can streamline emergency response and patient care processes. Additionally, it addresses the integration of international best practices into the PRM and the potential benefits of such an approach. It also explores proposed changes aimed at enhancing the efficiency and effectiveness of the PRM, including reforms in team composition and career development opportunities for medical professionals. The analysis underscores the need for continuous updates to the system in response to evolving medical practices and societal needs.

KEY WORDS

Polish State Emergency Medical System (PRM), Emergency Medical Services (EMS), Healthcare System reform, Emergency Response Efficiency, *rendez-vous* system

INTRODUCTION

In Poland, as in many countries worldwide, the emergency medical system is a critical component of the healthcare infrastructure, tasked with responding to acute health threats and providing immediate care in life-threatening situations. The Polish State Emergency Medical System (PRM), established under the Act on State Emergency Medical Services of September 8, 2006, is designed to deliver rapid and effective medical interventions across the nation. This article provides a comprehensive overview of the PRM's current operational state, its legal underpinnings, the challenges it faces, and the innovative strategies proposed to enhance its efficacy and efficiency [1, 2].

The PRM's role within the larger Polish healthcare framework is multifaceted, involving a spectrum of medical professionals and support staff, all of whom are crucial to the system's function. From emergency medical doctors and rescuers to system nurses and dispatchers, each member contributes to a cohesive emergency response. However, the dynamic nature of medical emergencies, coupled with advancements in medical practices and technologies,

necessitates an adaptable and forward-thinking approach to emergency medical services. Recognizing this, the authors of the document from which this article is derived conduct a thorough analysis of the PRM, identifying both strengths and areas for improvement [3, 4].

As the demand for emergency medical services evolves alongside societal changes and medical advancements, it becomes increasingly important to critically evaluate the PRM's readiness to address current and future challenges. This article delves into the nuances of the PRM's organizational structure, discusses the professional pathways for emergency medical specialists, and examines the financial and logistical hurdles that currently impede optimal service delivery. In doing so, it sheds light on the ongoing debate concerning the most effective composition of emergency teams, the leadership roles within these teams, and the potential implementation of collaborative models such as the *rendez-vous* system [5, 6].

Furthermore, the article explores the implications of the PRM's current financing model, particularly the impact of underfunding from the National Health Fund (NFZ) on the sustainability of emergency departments. It

also offers a critique of the proposed legislative and policy reforms aimed at not only addressing the immediate issues but also at fostering a more resilient and responsive emergency medical system for Poland [7-10].

THE AIM

This introduction sets the stage for a detailed investigation into the intricacies of the PRM, with the goal of contributing to an ongoing discourse on how best to navigate the complexities of emergency medical care in a modern context.

METHODOLOGY

The analysis of the Polish State Emergency Medical System (PRM) entailed a meticulous review of the existing legal framework, operational protocols, and performance outcomes. Primary data were derived from the Act on State Emergency Medical Services and related legislative texts, which provide the foundational legal structure for the PRM's function. Additionally, empirical data regarding the system's performance were sourced from the National Medical Emergency Institute's records, which include response times, patient outcomes, and resource allocation statistics.

Secondary research involved a comparative analysis with emergency medical systems in other European Union countries, utilizing reports and studies published by the European Resuscitation Council and the World Health Organization. This comparison offered a broader context for evaluating the PRM's effectiveness and identifying best practices that could be adapted to the Polish setting.

Interviews with key stakeholders in the PRM, including emergency medicine specialists, paramedics, system nurses, and policy-makers, were conducted to gain insights into the operational realities and the perceived challenges within the system. These qualitative inputs were crucial for understanding the nuances that quantitative data alone could not reveal.

The study also accounted for the dynamic nature of medical emergencies and the rapid pace of technological advancements in healthcare. Recognizing the potential impact of these factors on the PRM, the analysis included a review of recent technological innovations and their integration within emergency medical services globally.

Limitations of this study include the variability in reporting standards across different regions of Poland, which may affect the consistency of the data, and the rapidly changing landscape of emergency medicine, which requires continuous updates to the data set. Despite these challenges, the methodology was designed to provide a comprehensive and nuanced understanding of the PRM's current state and the avenues for its enhancement.

REVIEW

SYSTEM OVERVIEW

The Polish State Emergency Medical System (PRM) is a crucial element of the national healthcare infrastructure, designed to provide prompt and efficient medical

assistance in urgent situations. Governed by the Act on State Emergency Medical Services of September 8, 2006, the PRM operates under a legal framework that delineates its structure, responsibilities, and funding mechanisms. This system is composed of various operational units, including Emergency Medical Teams (ZRM), the Medical Emergency Notification Center (CPR), and Hospital Emergency Departments (SOR).

Emergency Medical Teams (ZRM) are at the forefront of the PRM's field operations. These teams consist of medical professionals trained in acute care, ranging from paramedics to specialized emergency physicians. The composition of these teams is subject to ongoing discussions and reforms aimed at optimizing the skill set available in emergency situations.

The Medical Emergency Notification Center (CPR) serves as the initial contact point for individuals in need of emergency assistance. It functions around the clock, coordinating the dispatch of ZRMs and ensuring that the most critical cases receive immediate attention. The effectiveness of CPR is instrumental in the overall responsiveness of the PRM.

Hospital Emergency Departments (SOR) represent the next line of care, where patients receive more comprehensive medical evaluations and interventions. These departments are integral to the PRM, providing a seamless transition from pre-hospital to in-hospital care.

The PRM's legal framework also establishes the guidelines for the creation, organization, and financing of emergency medical services. It specifies the procedures for incident reporting, the management of sudden health threats, and the criteria for emergency response.

In terms of financing, the system is primarily funded by the National Health Fund (NFZ). However, this funding is often insufficient, leading to financial strains on emergency departments. The document highlights the discrepancy between the allocated budget and the actual financial demands of maintaining high-quality emergency services.

The PRM's challenges are multifaceted, including the aforementioned financial constraints, a shortage of specialized medical personnel, and the need for updated training and equipment. To address these issues, the system is continually evaluated, with proposed reforms focusing on enhancing efficiency, improving patient outcomes, and ensuring readiness for future challenges.

CHALLENGES AND ISSUES

The Polish State Emergency Medical System (PRM), while robust in its design, confronts several pressing challenges that impact its efficiency and efficacy. These challenges are multifaceted, encompassing financial, personnel, and systemic issues that necessitate immediate and strategic responses.

Financial constraints: One of the most significant hurdles for the PRM is the chronic underfunding from the National Health Fund (NFZ). The funding allocated often falls short of the actual costs incurred by emergency

departments, leading to financial deficits. This situation forces many hospitals to reallocate funds from other departments or services, which can compromise the overall quality of care.

Shortage of specialized personnel: The PRM faces a shortage of medical professionals specialized in emergency medicine and anesthesiology. The limited number of specialists is a bottleneck that can lead to increased response times and affect patient outcomes. Moreover, the lack of attractive career paths and opportunities for further qualifications after specialization dissuades potential candidates from entering the field.

Systemic Issues: The structure of the emergency teams, particularly the leadership roles, is a subject of debate. The current system is evaluating whether emergency medicine doctors or anesthesiologists should lead specialized emergency medical teams. The specialization encompasses a broad spectrum of skills that are vital for managing complex emergency scenarios effectively.

Training and equipment: Keeping up with the rapid advancements in medical technology and practices is essential for the PRM. There is a need for continuous professional development for the medical staff and regular updates to the equipment and protocols to meet the evolving demands of emergency care.

Legal and regulatory framework: The legal documents governing the PRM require updates to reflect the current realities of emergency medicine. The field is dynamic, and the regulations need to be adaptable to incorporate the latest medical practices and technologies.

Addressing these challenges is crucial for the PRM to continue providing high-quality emergency medical services. The system must evolve to address the present issues and anticipate future needs, ensuring a state of readiness to save lives and maintain public health.

PROPOSED SOLUTIONS

The challenges confronting the Polish State Emergency Medical System (PRM) are significant, but they are not insurmountable. The document outlines a series of proposed solutions aimed at addressing the system's current limitations and enhancing its overall performance.

Financial Reforms: To alleviate the financial strain on emergency departments, a revision of the funding model by the National Health Fund (NFZ) is proposed. This includes advocating for increased budget allocations that accurately reflect the operational costs of providing emergency services and exploring alternative funding sources.

Specialization and career development: Encouraging more medical professionals to specialize in emergency medicine is crucial. This can be achieved by creating more attractive career paths, including opportunities for further education and professional growth post-specialization. Additionally, increasing the number of training programs for emergency medicine can help alleviate the specialist shortage.

Systemic reorganization: The document suggests reevaluating the composition of emergency medical teams to ensure that leadership roles are filled by those with the most appropriate expertise. This may involve defining clearer roles for emergency medicine doctors and anesthesiologists within these teams.

Technological and training advancements: Staying abreast of technological advancements is essential. Investing in state-of-the-art medical equipment and updating protocols to incorporate new medical practices can significantly improve the PRM's capabilities. Furthermore, ongoing training programs for all emergency medical personnel are recommended to ensure that their skills remain sharp and current.

Legislative updates: The legal framework governing the PRM must be dynamic, allowing for quick adaptations to the evolving landscape of emergency medicine. This involves regular reviews and amendments to existing laws and regulations to ensure they remain relevant and effective.

Rendez-vous system implementation: The proposed rendez-vous system offers a model for efficient collaboration between basic emergency teams and physicians, potentially improving the system's responsiveness. Implementing this system could be instrumental in enhancing the PRM's operational efficiency.

By addressing these areas, the PRM can improve its readiness to handle emergencies, ultimately leading to better patient outcomes and a more resilient healthcare system. The proposed solutions reflect a commitment to ongoing improvement and adaptation in the face of changing medical needs and societal expectations.

DISCUSSION

The proposed solutions for enhancing the efficacy of the Polish State Emergency Medical System (PRM) present a forward-thinking approach to emergency medical care. However, the implementation of these solutions requires careful consideration of their practicality, potential impact, and the resources required.

Financial reforms: Increasing the funding from the National Health Fund (NFZ) is a straightforward solution, but it faces budgetary and political constraints. While necessary, securing additional funds demands strong advocacy and may require a reevaluation of national healthcare priorities.

Specialization and career development: Offering more attractive career paths and further education opportunities is essential for drawing medical professionals into emergency medicine. However, this solution hinges on the availability of funds and resources to support such programs. Additionally, increasing the number of training positions must be balanced with the need for maintaining high educational standards.

Systemic reorganization: Redefining the roles within emergency medical teams could lead to a more efficient use of skills and resources. Nevertheless, this reorganization must be managed to prevent disruption to the

current system and to ensure that all team members are adequately prepared for their new responsibilities.

Technological and training advancements: While the adoption of the latest medical technologies and regular training are beneficial, they require ongoing investment. The challenge lies in ensuring that such advancements are sustainable and that training programs are consistently updated to reflect best practices.

Legislative updates: The dynamic nature of emergency medicine makes regular legal updates essential. The process for amending laws, however, can be slow and must be handled in a way that anticipates future developments rather than only responding to current issues.

Rendez-vous system implementation: The integration of a rendez-vous system could significantly improve response times and patient care. The success of this system depends on the coordination between various elements of the emergency medical services and the readiness of all stakeholders to adopt new operational models.

The feasibility of these solutions is closely tied to the willingness of the healthcare system to embrace change and the ability of policymakers to prioritize emergency medical care. The proposed innovations have the potential to substantially improve the PRM, but they must be matched with a commitment to continuous improvement and adaptation to the ever-evolving field of emergency medicine.

CONCLUSIONS

The Polish State Emergency Medical System (PRM) stands as a vital component of the nation's healthcare infrastructure, with the noble aim of delivering rapid and competent care in the most critical times of need. This article has traversed through the PRM's legal and operational landscape, revealing a system that, while robust,

is facing significant challenges that hinder its ability to function optimally.

Financial constraints, a shortage of specialized medical personnel, systemic and regulatory rigidity, and the need for technological and training advancements have been identified as key issues that require urgent attention. The solutions proposed within the document – encompassing financial reform, career development incentives, systemic reorganization, technological upgrades, legislative amendments, and the implementation of innovative operational models like the rendez-vous system – present a blueprint for a more resilient and effective emergency medical system.

The critical discussion has highlighted the intricacies of implementing these solutions, emphasizing the need for a pragmatic approach that considers the complexities of systemic change within the healthcare sector. The potential impact of the proposed reforms holds promise, with the prospect of improved response times, enhanced patient care, and a more robust healthcare system.

As Poland's PRM continues to evolve in response to changing societal needs and medical advancements, the importance of continuous evaluation and adaptation cannot be overstated. It is the commitment to ongoing improvement, informed by empirical data and international experiences, that will ensure the PRM remains a beacon of hope and a reliable support for the populace in times of dire medical emergencies.

In conclusion, the Polish State Emergency Medical System is at a crossroads, with clear pathways to enhancement laid out before it. The journey ahead is complex and challenging, but with concerted efforts from policymakers, medical professionals, and the society at large, a future where the PRM operates at its highest potential is within reach.

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Psychosocial risk in the work of a paramedic

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ABSTRACT

Safety at work and the health protection of employees hold a significant place in Poland's social policy. Emergency medical teams (EMTs) are particularly exposed to psychosocial hazards, especially psychological and physical aggression, while performing their duties. The impact of psychosocial hazards on medical rescuers can have negative consequences on both their mental and physical health. The work environment of medical rescuers, characterized by an increased risk of psychosocial factors, can lead to deterioration in the physical and mental health of these professionals. As a result, there is an increase in sick leave and a tendency to resign from their jobs. The consequences of exposing workers to psychosocial risks for their health depend on various factors, including the work environment, the type of economic activity, the technology used, and compliance with workplace safety and hygiene regulations. To minimize the negative impact on employees' health, there is a need for continuous monitoring of the work environment to eliminate or reduce potential psychosocial threats. Furthermore, it is essential to implement corrective actions and remedial measures at every stage of the work process to create a more conducive environment for the health and well-being of employees. Understanding these threats and the available management tools can help take more effective care of the well-being and mental health of medical rescuers, ultimately reflecting in the quality of healthcare services they provide. In the near future, it is crucial to raise awareness and approach the issue of psychosocial hazards in the work of EMTs.

KEY WORDS

paramedics, psychosocial risks, occupational health and safety, mental and physical health, stress

INTRODUCTION

One of the foremost challenges in the contemporary healthcare sector, aside from the risk associated with infectious diseases, is the exposure of employees to psychosocial hazards. This stems from socio-economic changes, work organization, and their impact on the workforce [1]. The SARS and COVID-19 pandemics have further emphasized the importance of healthcare worker's health. Occupational medicine, public health, and environmental health are increasingly dedicated to preserving and enhancing the mental, physical, and overall well-being of these workers [2-6].

In summary, it's about encouraging and supporting employees to maintain good mental and physical well-being by implementing technical, medical, and organizational measures that mitigate the adverse effects of the work environment. It's undeniable that the work environment and the nature of work significantly influence the overall health and well-being of employees [7-8].

The literature widely agrees on characterizing and identifying psychosocial hazards stemming from various sources, such as professional demands, organizational structure, the nature of work, social interactions, relationships between work and the individual, workplace values, mutual respect, well-being, and offensive behaviors [9].

The International Labour Organization (ILO) defines psychosocial occupational hazards as "aspects of work organization and management in the context of the social and environmental factors, with the potential to cause psychological, social, or physical harm". These hazards primarily result from the interactions between the occupational environment, the nature of the work, its structure, and the skills, needs, culture, and life outside of work of the employees. These elements can affect health, work efficiency, and job satisfaction. A comprehensive approach considers many potential sources of tension, of which work-related stress is just one of many factors [10].

A mounting body of evidence highlights a strong correlation between psychosocial risk factors in the workplace and increased rates of sick leave, mental disorders, cardiovascular diseases, cancer, and musculoskeletal disorders. The profession of a medical rescuer presents a particularly unique level of demands as it involves providing medical assistance in life-threatening crises endangering patients' lives and health, as well as transporting them in a state of imminent risk to hospital facilities. All of this occurs in a variable work environment and circumstances, often at various times of the day. Consequently, medical rescuers are exposed to high levels of both mental and physical stress. Therefore,

those practicing this profession must not only possess advanced medical knowledge essential for performing their duties but also demonstrate resilience to stress, strong internal motivation, and the ability to make quick decisions in situations requiring immediate action [10].

High professional and societal standards for medical rescuers, driven by the nature of their work, necessitate continuous improvement of professional skills and an ongoing education process. Maintaining excellent physical and mental fitness is also crucial. Therefore, understanding the sources of psychosocial hazards and taking preventive actions to minimize potential adverse effects is an essential aspect of ensuring the well-being of healthcare workers.

THE AIM

The aim of the article is to present the problem of the work of paramedics, which is exposure to aggression from the patient, as well as the consequences of stress and burnout.

REVIEW AND DISUSSION

THE NEED TO COUNTERACT PSYCHOSOCIAL RISK IN THE WORKPLACE

Since the commencement of their professional careers, employees become the subjects of labor protection. This encompasses activities related to technical work safety, work form, hygiene and occupational medicine, as well as legal aspects. Due to the crucial importance of these aspects for the health of workers and ensuring workplace safety, it is necessary to combat and prevent all hazards in the workplace, including psychosocial hazards [4, 11].

The control of employees' health, health promotion in the workplace, counseling, and occupational safety and hygiene management constitute fundamental duties of employers in Poland, as stipulated by labor law. Legal regulations related to the protection of the life and health of workers are of immense significance not only from the perspective of preventive and healthcare measures for employees but also in reducing mortality and

Table 1. Identification of risks [7].

Threat	Source of danger	Possible consequences
Aggression	Patients, third parties, people under the influence of intoxicants	Beatings, bruises, fractures, injuries, bites, other injuries, stress
Overloading of the musculoskeletal system	Manual transport of patients and equipment	Degenerative diseases of the musculoskeletal system, injuries to the musculoskeletal system
Prolonged exposure to stress	Operating under time pressure, responsibility, difficult psychological situations	Sleep disorders, neuroses, transmission of tension to the home, occupational burnout syndrome

Table 2. Typology of psychosocial occupational hazards [8].

Psychosocial occupational hazards	
Resulting from the content of the work	Resulting from the context of work
Working conditions: working hours contract salary nature of work	Culture and functioning of the organization: atmosphere at work unclear tasks communication
Physical factors: lighting noise temperature	Role in the organization: conflict and role ambiguity
Tasks: fast pace of work too many tasks pressure regarding their completion time	Professional development: opportunity for personal development promotion
Tools and technology: too complex technology lack of skills to operate equipment	Interpersonal relationships: misunderstandings confrontations lack of support

illness rates associated with the nature of work and exposure to harmful factors in the work environment [12].

The fundamental legal act regulating the issues of protecting the lives and health of working individuals and guaranteeing them safe and hygienic working conditions is the Constitution of the Republic of Poland. The same norms are also contained in the Labor Code and executive acts. Such regulation of labor protection allows the state to fulfill the role of a guarantor of citizens' civil rights concerning workplace safety, including health and occupational hygiene aspects.

It's worth noting that in accordance with labor law regulations (Article 15 and Article 207 of the Labor Code), every employer is obligated to protect the health and lives of their employees by providing them with safe and hygienic working conditions, utilizing the available advancements in science and technology. This implies that employers must thoroughly assess occupational risks in specific work environments, identify potential hazards, estimate risks, and implement appropriate preventive measures [10, 12].

RECOGNIZING RISKS RELATED TO PSYCHOSOCIAL ASPECTS IN THE WORKPLACE

Identified various sources of psychosocial hazards among healthcare workers, including medical rescuers, are challenges arising from inadequate staffing, work overload, improper work standards, growing bureaucracy, patient behavior and attitudes, interpersonal difficulties within the work team, as well as issues related to management and organizational structure. Definitions of different types of psychosocial stressors are not uniform, but a common denominator for many of them is stressors, which are potential sources of stress whose negative effects can lead to psychological, physical, or social disorders [11].

In Europe, work-related stress ranks as the second most frequently reported health issue among employees. Research indicates that in 2005, as many as 22% of European workers experienced work-related stress. The economic cost of work-related stress in the EU-15 was estimated at approximately 20 billion euros in 2002. A 2009 European study revealed that 50-60% of all days of absence from work could be attributed to occupational stress, and the number of people suffering from stress-related disorders is expected to increase. In Australia, one in five employees reported mental health issues in the last year, generating costs associated with untreated mental disorders at work estimated at 10.9 billion dollars annually. Analyzing data from Japan, it can be observed that nearly one-third of employees reported work-related anxiety disorders in the previous year. In the United States, over 570,000 employees experience workplace violence annually [10, 12].

In the literature, various attempts to classify psychosocial hazards can be found, typically based on stress models or a compilation of stressors. Additionally, attempts are made to categorize psychosocial work-relat-

ed hazards, representing a crucial step in their identification and occupational risk management. Identifying these hazards through occupational risk assessment is currently one of the most effective ways to minimize potential negative effects on the health and life of employees in the work environment. It is a universal and widely used tool that can be applied throughout employees' employment to ensure suitable working conditions and minimize risks related to psychosocial aspects [12].

In Table 1, selected hazards and potential health impacts occurring in the work of medical rescuers are presented. Table 2 provides a typology of psychosocial occupational hazards.

CONSEQUENCES OF EXPOSURE TO PSYCHOSOCIAL RISK

Exposure to psychosocial risks can lead to various health consequences for employees, depending on the context of the work environment, type of business activity, applied technology, and compliance with safety and hygiene regulations [4, 9, 11].

Health consequences resulting from exposure to psychosocial hazards can be categorized into physiological and psychological aspects. Physiological aspects involve disturbances to the nervous, hormonal, cardiovascular, respiratory, and digestive systems. Psychological aspects encompass feelings of anxiety, anger, impatience, depression, loneliness, memory problems, decreased concentration, and decision-making difficulties. Consequences of exposure to these hazards may manifest as deteriorating health, elevated sick leave rates, an increased likelihood of work-related errors, substance abuse, social isolation, and sleep disorders [20].

The work of medical rescuers carries numerous potential psychosocial hazards, such as extreme emotional burdens associated with life and death situations of patients, exposure to violence from patients, their families, and others, sleep disturbances, nutritional issues, and musculoskeletal strain resulting from the nature of their tasks. Many of these hazards became particularly prominent during the COVID-19 pandemic. Paramedics were at risk of contracting COVID-19 while working with patients with suspected or confirmed cases of the virus. Constant fears about one's own health and the possibility of transmitting the disease to loved ones made the situation very stressful [13, 14].

The literature illustrates that musculoskeletal disorders among medical rescuers can be caused or exacerbated due to exposure to psychosocial factors and stress. Numerous studies on various professional groups confirm this association [11, 15-17]. Work-related stressors, particularly those related to safety, the physical environment, and ergonomics, are significant predisposing factors for musculoskeletal pain. Paramedics often perform their work in a dynamic and often unpredictable environment, which increases the risk of physical injuries such as falls, impacts and cuts. Excessive workload, long working hours, lack of breaks and time for rest can lead to overwork, fatigue and increased risk of making mistakes.

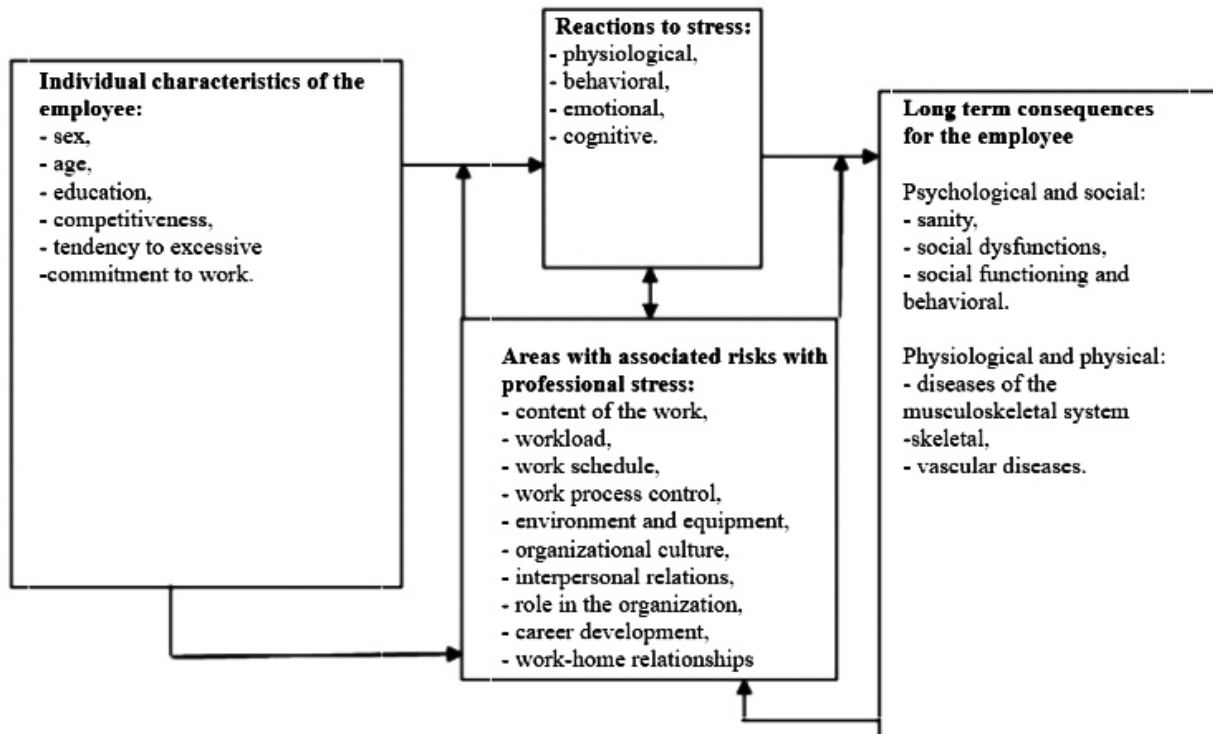


Fig 1. Dangers resulting from exposure to stress at work [7].

While performing their duties, paramedics may also be exposed to dangerous substances, such as blood, body fluids, drugs, chemicals, which may pose a threat to their health [16].

Most studies focused on exposure to psychosocial hazards and their impact on the health and well-being of medical rescuers primarily concentrate on the analysis of stress, post-traumatic stress, and burnout syndrome. Other aspects, such as the work atmosphere, job characteristics, and conflicts among employees, are studied to a lesser extent. The work atmosphere affects the relationships between members of the paramedic team. A positive atmosphere promotes cooperation, communication and trust between team members, which in turn translates into better coordination of activities and the effectiveness of medical interventions. A positive work atmosphere can be motivating for paramedics, increasing their commitment to their duties and motivation to achieve professional goals. A friendly and supportive atmosphere can make work more fulfilling and fulfilling. Therefore, it is important that management and medical staff take care to create a positive working atmosphere in the rescue environment. By promoting cooperation, communication, support and respect, you can create conditions that support effective teamwork and ensure the mental health and safety of all healthcare workers and patients [17].

Scientific research clearly shows that exposure to stressful working conditions or work environments has an impact on the development of burnout among medical rescuers. Paramedics often have to deal with dynamic and unpredictable situations in which they have little

control over the course of events. This can lead to a feeling of helplessness and an increase in stress levels. They often make quick decisions and have to act under high time pressure. The awareness that their actions may affect the patient's life or health may cause a high level of stress. Exposure to trauma and suffering may also lead to severe emotional experiences. The work of a paramedic often requires long working hours and shift work, which can lead to chronic fatigue and increased stress levels. All of these factors can contribute to increased stress in the work of a paramedic and require appropriate coping mechanisms. Both acute and chronic stress can lead to cardiovascular diseases, sleep disorders, and obesity in this professional group. The experience of a sense of threat is a significant predictive factor in the development of emotional exhaustion and aggressive reactions to emotional stress among medical rescuers. In particular, experiences related to violence can induce symptoms of burnout. The increased prevalence of occupational stress among medical rescuers carries the risk of developing cardiovascular diseases. High levels of stress can lead to increased nervous tension and increased blood pressure, which in turn increases the risk of hypertension, coronary heart disease and other cardiovascular diseases. Stress causes an increase in the secretion of the stress hormone cortisol, which can have a number of negative effects on the heart, including increased blood sugar levels, increased blood pressure and inflammation of blood vessels. As a result, regular exposure to high levels of occupational stress can lead to chronic inflammation, metabolic disorders, hypertension, coronary artery disease and other cardiovascular diseases. Therefore, it is impor-

tant to provide appropriate mechanisms for coping with stress and psychological support for people working in professions that involve high levels of stress [18-19].

A visualization of the risk of negative health effects resulting from occupational stress is presented in Figure 1.

AGGRESSION OF PATIENTS AS ONE OF THE MOST DANGEROUS STRESS FACTORS

Limited access to medical specialists and long waiting times in overcrowded clinics contribute to the increased number of emergency medical team calls, a phenomenon evident in the operations of emergency call centers (ECCs) as seemingly unwarranted situations. When medical rescuers arrive at the scene, they often have to confront the emotional burden of patients or their families, stemming from both the prolonged wait for assistance and questioning the necessity of the emergency team's arrival. Many calls involve individuals under the influence of alcohol, both those found on the streets and those living in dysfunctional family environments. Frequently, people in proximity to such patients are also under the influence of alcohol and may react aggressively towards the medical rescue team. The consequences may include beating medical staff and increasing the risk of mutilation of the aggressor himself. These aggressive behaviors are referred to as workplace aggression [20].

The European Commission defines aggression as "any incident in which a person is intimidated, offended, or attacked in the context of work, constituting a direct or indirect threat to their safety, well-being, and health". Aggression, whether physical or psychological, is particularly relevant in a professional context, especially for high-risk occupational groups such as medical rescue teams [23].

Workplace aggression can be categorized into two types. First, external aggression, arising from interpersonal interactions at the incident scene, is frequently encountered in the work of medical rescue teams. Second, internal aggression, in which the perpetrators are coworkers, superiors, or subordinates. Patients often react with aggression due to stress and emotions, which can lead to tension on the part of the injured. Patients and loved ones close to the emergency room may also not understand the full scope of emergency medical services. Aggression is also influenced by mental disorders, which may become more severe in stressful situations during rescue interventions [21-23].

Indicators of psychological aggression include raised voice, shouting, intimidation, verbal threats, the use of vulgar language, threats, and blackmail, as well as prejudiced behaviors like spitting, offensive gestures, or threatening body language. Explicit physical aggression involves physical attacks, such as hitting, pushing, or pulling, which can lead to bodily harm or damage to medical equipment and ambulances [23].

Factors increasing the risk of aggressive behaviors among patients include a young patient's age, male gender, a lack of acceptance from the patient's environment, a history of physical violence in the family, experiences of

sexual abuse, prior legal issues, substance abuse, and other addictions. It's worth noting that aggression can also manifest in the context of mental and psychiatric disorders, such as psychoses, manic disorders, mood disorders, and somatic diseases, e.g., thyroid disorders [20-22].

Aggression to which medical personnel are exposed in healthcare facilities is well-documented in both national and international literature. Examples include situations in hospitals, emergency departments in hospitals, and the practice of primary care physicians. Nonetheless, there is relatively little scientific research on aggression at the incident scene, i.e., in interactions between patients, their families, and personnel of emergency medical teams. E. Lewis was the first to address this issue, highlighting the absence of guidelines for dealing with aggressive patients outside of hospitals. By drawing attention to the need to develop guidelines for dealing with aggression outside hospitals, E. Lewis initiated a discussion on this problem and emphasized the urgent need for action to create appropriate strategies for dealing with patient aggression in places other than hospitals. The first studies on "pre-hospital" aggression appeared in 1993, and in 1998, an extensive American study was published, analyzing emergency medical team calls in cases of patient aggression [23].

In Poland, the issue of aggression was described based on a study conducted among 126 medical rescuers working in closed healthcare facilities in the Podlaskie Voivodeship. Looking at the test results, every day during their work, rescuers experienced various aggressive behaviors on the part of the people they helped. 8% of respondents reported cases of patients raising their voices, and 3% experienced acts of blackmail. Vulgar behavior was noticed by 4% of rescuers, while 2% of them were attacked or hit. When considering the impact of the workplace on the level of exposure, it was noted that 91% of employees working in field teams and emergency rooms experienced aggression and profanity in the presence of colleagues. In the case of Emergency Department staff, 59% of paramedics were exposed to aggressive behavior of patients, and 70% experienced vulgar behavior. The research also showed that paramedics were exposed to aggression from cooperating doctors. It was found that the most common form of aggressive behavior was verbal aggression such as "using a raised voice". This study assessed the occurrence of aggression in the workplace (emergency department/emergency medical teams).

Occupational stress among medical personnel can be exacerbated by patient aggression. Medical professionals often have to deal with challenging situations and emotional reactions from patients, which can lead to stress and burnout. Prolonged stress can have a negative impact on the physical and mental health of healthcare workers and on the quality of care they provide [24].

To address this issue, there are various strategies that can help reduce patient aggression and manage the occupational stress of medical personnel, such as communication training, increasing patient awareness of

the treatment process, and providing psychological support for healthcare workers. It's important for medical staff to have access to tools and resources to help them cope with difficult situations and prevent the negative effects of occupational stress. Having the right tools and resources to help cope with difficulties can help improve paramedic job satisfaction. By giving them a sense of competence and control over the situation, they can feel more motivated and engaged in their work. Access to psychological support and stress management tools can help prevent mental disorders and increase the mental resilience of paramedics.

CONCLUSIONS

Psychosocial hazards that medical rescuers face in the course of their work negatively impact their health. The primary source of stress in this professional group is the immense responsibility they must bear. Medical rescuers often feel the excessive pressure associated with the duties placed upon them.

It's essential to actively monitor the psychosocial factors affecting the health of medical rescuers. Their work

is often a source of stress, which can lead to both physical and psychological exhaustion.

To reduce the impact of these threats on the health of medical rescuers, there is a need for preventive measures in the workplace. Introducing activities such as: training in communication and conflict resolution, education on coping with stress, psychological support, access to social support, and analysis of incidents and improvement of processes in the case of aggressive behavior can help identify risk factors and develop strategies to prevent future incidents. There is a real issue with aggression from patients and their surroundings directed towards medical rescue teams at the scene, which poses a significant safety risk for these teams.

Therefore, there is an urgent need for training medical rescue teams on how to handle situations with aggressive patients. It's crucial to provide psychological support, organize stress management training, and regularly monitor the health of employees. This affects the reduction of costs related to medical rescuers' sick leave and the decrease in workplace accidents.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest.

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Prehospital management of patients with isolated head injury with impending cerebral edema leading to intussusception

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ABSTRACT

Cranio-cerebral injuries are one of the causes of mortality in the population around the world. It is estimated that the frequency of their occurrence in highly developed countries is in the range of 200 per 100 000 people per year. According to the Brain Trauma Foundation, approximately 1.5 million of cranio-cerebral injuries are reported in the US annually. These injuries occur as a result of a direct impact and indirectly as a result of violent accelerating or braking forces acting on the brain. These forces are referred to as deceleration and acceleration.

Traumatic Brain Injury (TBI) is difficult to determine with certainty, but 400 per 100 000 patients per year (range of 88 – 1967) have been reported, or approximately 1.4 million patients per year in the UK. TBI is the leading cause of death among adults under the age of 45 and in children (1-15 years old). Most TBIs are classified as mild, and about 8-10% are classified as moderate or severe.

KEY WORDS

head injury, cerebral edema, cerebral intussusception, rescue procedur

INTRODUCTION

Cranio-cerebral injuries are one of the causes of mortality in the population around the world. It is estimated that the frequency of their occurrence in highly developed countries is in the range of 200 per 100 000 people per year. However, the incidence of deaths according to statistics as a result of cranio-cerebral trauma is about 15-30 per 100 000 of the population per year. As a result of a head injury, victims may develop cerebral edema, the treatment of which in pre-hospital settings is still insufficient and may lead to brain herniation. The consequences of cranio-cerebral trauma are very often irreversible in the form of acquired disability by patients, which precludes them from active social and professional life for a long time or permanently.

According to the Brain Trauma Foundation, approximately 1.5 million of cranio-cerebral injuries are reported in the US annually. These injuries occur as a result of a direct impact and indirectly as a result of violent accelerating or braking forces acting on the brain [1]. These forces are referred to as deceleration and acceleration [2].

Traumatic Brain Injury (TBI) is difficult to determine with certainty, but 400 per 100 000 patients per year (range of 88–1967) have been reported, or approximately 1.4 million patients per year in the UK. TBI is the leading cause of death among adults under the age of 45 and in children (1-15 years old). Most TBIs are classified as mild, and about 8-10% are classified as moderate or severe [3].

MECHANISMS OF HEAD INJURIES

In emergent conditions treatment in the field of emergency medicine and medical rescue, the mechanisms of traumatic events are of strategic importance. According to the International Trauma Life Support (ITLS) classification, these consist of:

- traffic incidents, which include: vehicle collisions (head-on, rear-end, side-impact collision, rollover, rotation), vehicle-obstacle collision;
- falls from height;
- severe beatings;
- injuries in extreme sports;
- jumping headfirst into water;
- explosions;
- burns;
- gunshots;
- poisonings [4].

Polytrauma or multiple organ trauma requires a very high degree of vigilance during the assessment of the patient, both at the non-instrumental stage, often in pre-hospital care, and during a thorough analysis of the results of diagnostic imaging tests.

Thanks to the knowledge of this classification, medical staff proceeds to the next stage of patient management, which is the ITLS trauma examination. With the schematic assessment of the patient's condition, the medical staff is able to identify conditions that directly threaten the patient's health and life and take the so-

called critical decisions. The critical decisions are: immediate start of cardiopulmonary resuscitation (CPR), stopping massive hemorrhages (direct pressure on the bleeding site, compression dressing, tactical tourniquet, wound packing, dressings with hemostatic agents), device airway management, active oxygen therapy and assisted ventilation, decompression of tension pneumothorax, pleural drainage, pericardiocentesis, protection of flail chest, protection of open pneumothorax, stabilization of a foreign object in the wound, protection of burns, hyperventilation. The last activity is dedicated to patients with symptoms of intracranial compression.

Anatomically, the head is one of the most important organs of the human body and is composed of the following layers: hairy scalp, skull (its hard structure is designed to protect the brain), fibrous covering of the brain (meninges: hard, arachnoid, soft), brain, cerebrospinal fluid, vascular compartments. In emergency medicine, in patients with symptoms of craniocerebral trauma, the Monro-Kellie doctrine is used. It says that the contents of the skull: blood, brain and cerebrospinal fluid, have their constant volume. Increasing one of them comes at the expense of the other [5]. An estimated 42 million people worldwide suffer a mild brain injury (MTBI) or concussion each year. More severe traumatic brain injury (TBI) is a well-known risk factor for various neurodegenerative diseases, including Alzheimer's disease, Parkinson's disease and amyotrophic lateral sclerosis (ALS) [6]. In the case of craniocerebral injuries, primary and secondary injuries are mentioned. The primary ones include those that arise directly after the application of force, leading to damage to the brain tissue (trauma - occurs as a result of the application of a force related to the generation of kinetic energy at a given time: Kinetic energy (E_k) = $(m \times V^2)/2$, where m is mass and V is velocity [7]. These are referred to as high-energy injuries.

COUP AND COUNTERCOUP MECHANISM

In primary injuries, the mechanism of coup and contrecoup (rebound injury) is mentioned. Rebound injury occurs on the other side of the impact site. The consequence of this mechanism is contusion of the brain [8]. A coup injury occurs when the head hits hard against an obstacle [9]. Then, the head is bent vigorously to the chest with a strong stretching of the structures of the cervical spine, and then the head is dynamically moved back. As a result, the brain at the original point after hitting the structure of the skull (frontal or occipital part - depends on where the coup point is located, which results from the direction of the force generated when hitting a stationary obstacle) undergoes a strong contusion, and then, as a result, it moves with great force to the secondary point. The consequence is cerebral edema, which combined with other consequences of the injury (e.g. intracranial hematomas) eventually aggravates the damage to the brain. The type and strength of the acting traumatic factor determine the degree of injury in the cranial cavity. There are two types of cerebral edema: cy-

totoxic - during which fluid accumulates inside the cells, and vascular - during which excessive amounts of fluid accumulate in the brain tissues as a result of breaking the blood-brain barrier. The most tragic consequence of a contrecoup injury may be the displacement of the brain outside the cranial region and the sudden death of the patient at the scene.

THE AIM

The aim of the work is to present the issues related to isolated head injuries with impending cerebral edema leading to intussusception. The work also presents pre-hospital and hospital procedures in the case of victims with isolated head injuries. Types of head injuries were also analyzed.

REVIEW AND DISCUSSION

CLASSIFICATION OF HEAD INJURIES

Secondary consequences are the result of the adverse evolution of the primary injury, which leads to hypoxia and impaired cerebral perfusion. Head injuries include:

- concussion - characterized by a head injury without significant damage to the brain. There is a temporary loss of consciousness and amnesia (retrograde or anterograde). In addition, transient symptoms such as headache, dizziness and nausea are observed. Neurological examination shows no deficits or focal symptoms. CT is negative.
- cerebral contusion - characterized by limited areas of petechiae and/or swelling of the brain, usually in the frontal and temporal lobes (especially on their inferior surface). Damage can occur at the site of injury (coup) or on the opposite side of the brain (contrecoup). Medical measures consist of controlling intracranial pressure. Patients with features of this type of injury require hospital observation.
- diffuse axonal injury - the affected area usually involves the subcortical white matter, especially at the border with the gray matter as well as the corpus callosum and brainstem. This injury is usually the result of acceleration and deceleration - often without direct impact [10];
- intracranial hematomas:
 - acute epidural hematoma - occurs in approximately 1% of head injuries. It is the result of rupture of the meningeal artery (usually the middle meningeal artery). Extradural hemorrhage (epidural hematoma) should be suspected in patients with skull fractures involving the temporal bone, where the middle meningeal artery runs between the dura mater and the skull. Typical symptoms are: loss of consciousness, lucid interval lasting minutes or hours, followed by neurological disorders caused by an increase in intracranial pressure.
 - acute subdural hematoma - is present in about 30% of severe head injuries. It is a reservoir of blood that accumulates between the dura mater

and the arachnoid mater. Subdural hematoma usually results from damage to the veins running through the subdural space. Neurological deficits may be the result of both compression by the hematoma and contusion of the underlying brain.

- intracerebral hematoma - usually occurs after an acceleration-deceleration type of injury. On CT, it shows a small, round or oval, high-density lesion (delayed hematomas may not appear on initial CT scans).
- subarachnoid hemorrhage - the most common site of bleeding after a head injury. It causes the presence of blood in the cerebrospinal fluid. The patient may suffer from headaches and have photophobia [11].

The general classification of head injuries also includes fractures of the skull - open or closed, linear without displacement of the bone edges, skull dents and scalp wounds, which may cause increased bleeding.

INTRACRANIAL COMPARTMENT SYNDROME

A characteristic set of symptoms that often appears in patients with severe craniocerebral injuries, indicating the syndrome of intracranial compartment (brain herniation) is the Cushing's triad. When trauma occurs, the volume of fluids surrounding the brain increases. Intracranial pressure (ICP) is an important parameter determining the pressure of the cerebrospinal fluid in the ventricular system of the brain. Intracranial pressure, also known as intracranial hypertension, cerebral edema and raised intracranial pressure, is a condition involving an abnormal increase in cerebrospinal fluid pressure. This is when the pressure of the cerebrospinal fluid exceeds the normal values: 7-15 mmHg. In the case of massive cerebral edema, cerebral herniation may occur, i.e. the displacement of part of the brain from a physiological anatomical compartment to another. Types of herniation:

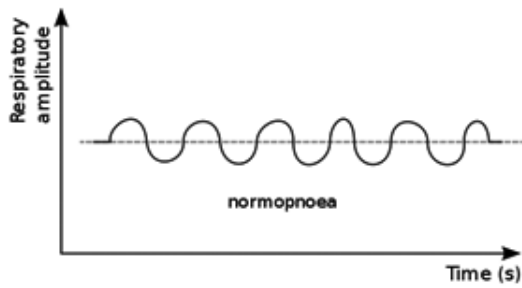
- subfalcine herniation, in which the cingulate gyrus is compressed in the first place;
- uncal herniation (transtentorial herniation, tentorial notch herniation), when the medial part of the temporal lobe called the uncus moves between the tentorium and the midbrain;
- tonsillar herniation involving the displacement of the cerebellar tonsils into the foramen magnum, which may lead to rapidly progressing damage to the brainstem;
- posterior herniation (tectal) - a rare pathology involving the pressure of the posterior parts of the medial temporal lobes on superior colliculi of the tectal lamina;
- central herniation (axial herniation) involving the displacement of the entire brainstem into the foramen magnum. There is tension and tearing of the perforating branches coming from the basilar artery, infarction and hemorrhage into the trunk.

The set of symptoms occurring in a patient with symptoms of compartment syndrome, i.e. Cushing's triad, consists of: bradycardia, which is the result of activation of the parasympathetic system, which innervates the myocardium as a result of the release of conduction of the X craniocerebral nerve (vagus nerve) due to an increase in intracranial pressure (ICP) and nerve compression, bradypnea - similarly the compressed X nerve causes bronchoconstriction and respiratory disorders in the form of characteristic Biot's breath, increase in blood pressure and ICP. Respiratory disorder, in the form of Biot's breathing, is characterized by rapid, shallow and irregular breathing with periodic apneas. This leads to limited cerebral perfusion, excessive accumulation of free fluid within the cell and cerebral edema. The partial pressure of carbon dioxide increases (hypercapnia), and the saturation decreases (hypoxia). There is unilateral or bilateral dilation of the pupils, unilateral or bilateral paralysis of the limbs, deterioration of consciousness and neurological status.

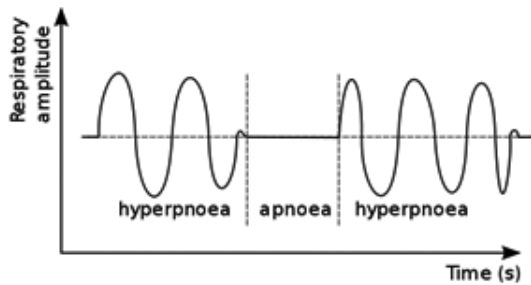
PREHOSPITAL AND HOSPITAL PROCEDURES

Rescue procedures, after the ICLS traumatic examination, focus on achieving normal cerebral blood flow with mean arterial pressure MAP in the range of 60 - 70 (80) mmHg, effective oxygenation of the patient with oxygen saturation above 95%, reducing the symptoms of cerebral edema by placing the victim's head at an angle 15-30 degrees and the use of diuretics, ensuring airway patency, controlling the patient's body temperature (patients should not be overheated or cooled down, passive thermal protection is appropriate - thermal blankets, fleece blankets, sleeping bags or active protection - heated air ventilation, warm, moist breathing mixture, intravenous or intraosseous infusion of warm fluids, rinsing body cavities with warm fluids at 40 degrees Centigrade should be considered - bladder, pleural cavity, peritoneal cavity), controlling glucose levels (energy deficit increases the risk of seizures and aggravation of cerebral blood flow damage, hypoglycemia and hyperglycemia should not be induced), fighting seizures if they occur, draining cerebrospinal fluid, or undertaking surgical treatment (Table 1).

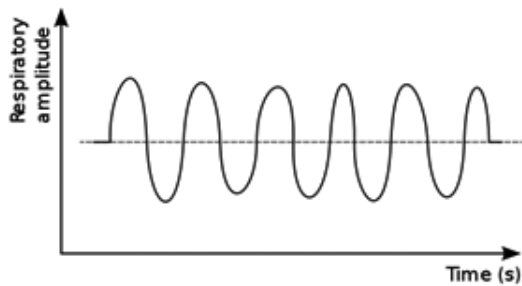
A drop in PaO₂ <60% should be avoided. The cause of hypoxia at the prehospital stage may be airway obstruction caused by aspiration of food content or blood, respiratory tract disorders, chest and lung injuries. All head trauma patients are treated as with a full stomach. In such situations, medical personnel must be prepared to suction the patient's airway. In about 10% of cases there is a coexisting injury of the cervical spinal cord. The most effective way to open the airway is endotracheal intubation performed through the mouth or nose. In the case of extensive craniofacial trauma, surgical methods of airway management should be used: cricopuncture or tracheostomy. Alternative methods of airway management provide support for medical staff who have difficulty performing endotracheal intuba-



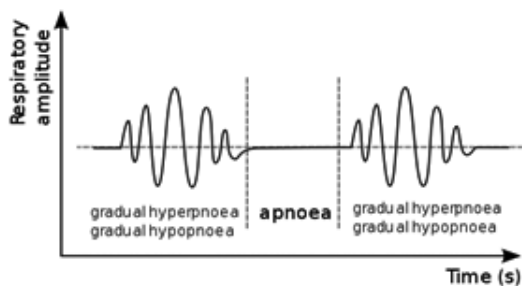
Normal respiration



Biot's respiration



Kussmaul breathing



Cheyne-Stokes respiration

Fig. 1. Types of breathing in patients [5].

tion. Prior to endotracheal intubation, analgo - sedation should be applied to the patient. For this purpose, Midazolam is used at a loading dose of 0.03-0.3 mg/kg bw and Fentanyl at a dose of 50-200 micrograms intravenously. Mechanical ventilation should be also implemented. Indications for mechanical ventilation after TBI are: hypoxia ($PaO_2 < 80$ mmHg with $FiO_2=0.5$,

convulsions, increase in ICP > 25 mmHg, spontaneous hyperventilation ($PaCO_2 < 25$ mmHg), decerebration symptoms, increase in body temperature, concomitant chest injuries, signs of intracranial pressure on CT scan of the head [12]. Monitoring of intracranial pressure should preferably be performed with a sensor placed in the anterior horn of the lateral ventricle.

The initial assessment is based on obtaining an interview, if possible, e.g. according to the SAMPLE scheme: Symptoms, Allergies, Medications, Past medical history, Last meal, Event and assessment of vital systems, e.g. according to the ABCDE scheme: Airway, Breathing, Circulation, Disability, Exposure. This approach will systematize the patient's data in a short time, assess the

patient's overall clinical condition, save valuable time and increase the efficiency of the rescue team [13, 14]. In the case of a decrease in systemic pressure, aggressive fluid therapy with CVP =8-10 cm H₂O should be implemented first (CVP - central venous pressure). Invasive or non-invasive haemodynamic monitoring should be considered in patients responding poorly to vascular bed re-

Table. 1. Scheme of the examination according to ITLS.

Rapid Trauma Survey: Overall Injury ("head to toes")
SCENE SIZE-UP
(own safety and safety of the incident place/type – mechanism of the incident/ scale of the incident/ primary hazards/ secondary hazards/ number of patients/ location of patients/ patients' behaviour/ terrain conditions /approach/ support/ present at the scene after certain period of time)
INITIAL ASSESSMENT
(mechanism of the incident/general impression – initial examination of the patient by looking – general appearance, age, approximate weight, sex, body position, visible serious injuries – wounds, life-threatening external haemorrhage, activity, sounds - state of consciousness according to AVPU/interview from the patient according to SAMPLE (when conscious), interview from services, witnesses (AMPLE)/when bleeding→effective control of bleeding: compression dressing, tactical tourniquet/manual stabilization of the spine /ABCDE rating)
RAPID TRAUMA SURVEY
head
(oedema, wounds, contour distortions, nasal/ear discharge, hematomas, Battle's sign, bruises behind the ears, assessment of the mouth, eyes, presence of burns, assessment of pupils; reactivity to light, width)
neck
(symmetry, jugular veins, edema, wounds, location of the trachea, subcutaneous emphysema - placement of a cervical collar - if indicated)
chest
looking (symmetry, arching, respiratory tract, wounds, edema, hematomas); palpation (subcutaneous emphysema, friction of broken rib fragments, chest stability, pressure pain); symmetrical auscultation of the lungs (breath murmur, other sounds), auscultation of murmurs over the apex of the heart; chest percussion (when asymmetric murmurs) - pneumothorax decompression, when indicated - wound dressing (Asherman chest seal or sealing dressing), dressing flail chest, assessment of tamponade and possible intervention (decompression? emergency thoracotomy?)
abdomen
looking (symmetry, girth, wounds, eventration, oedemas, hematomas), palpation (muscle tension, pressure pain are examined from the smallest to the greatest), treatment of eventration, wounds
pelvis
(contours, swelling, hematomas, soreness, wounds/pelvic stabilization - do not roll when injured)
upper/lower extremities
(contours, swelling, wounds, distortion of the axis, pressure pain, active and passive movements, sensation, pulse in the radial arteries and dorsum of the foot/ limb wound dressing/ limb immobilization)
posterior
(swelling, hematomas, wounds, pressure pain, bruising in the spinal area)
In a critical situation, patient should be transferred to the ambulance and the examination should be completed there
ONGOING EXAMINATION
(every 3-5 min in unstable patients): ABCD assessment; evaluation of the effectiveness of performed procedures; assessment of changes in relation to the previous examination
SECONDARY SURVEY
(in stable patients after 15 min – instead of ongoing examination): we carry it out as in initial assessment: ABCDE plus complete what has not been examined; Glasgow Coma Scale; assessment using available devices (BP, pulse oximetry, FAST ultrasound, EtCO ₂ , thermometer, blood glucose, ECG monitoring)

placement and vasopressors. The fluid of choice is saline. Blood and blood products are given as needed [15].

Simultaneously with medical imaging, basic laboratory tests should be performed (blood grouping, complete blood count, coagulogram, urea and creatinine concentrations, glycaemia, electrolyte concentrations, gasometry, plasma osmolality, urinalysis). Depending on

the interview and physical examination, the test panel can be extended.

The Marshall scale is used to assess diffuse lesions in the cranial cavity. It distinguishes four degrees of diffuse brain injury that can be defined on the basis of CT. This scale is useful in predicting the survival of trauma victims (Table 2). It shows the possibilities of brain com-

Table 2. Marshall scale for the assessment of diffuse brain injuries.

SCORE	TYPE OF INJURIES IN CT	MORTALITY
I	None	10%
II	Basal cisterns visible, with 0-5 mm midline shift and/or the presence of densities. No lesions with high or mixed density >25cm ³ . There may be bone fragments or foreign objects	14%
III (swelling)	Cisterns compressed or absent with 0-5mm midline shift. No high- or mixed-density lesion >25cm ³	34%
IV (shift)	Midline shift >5mm. No high- or mixed-density lesion >25cm ³	56%

Source: Marshall LF et al A new classification of head injury based on computerized tomography. JNS 1991;75:S14-S20. doi: 10.3171/sup.1991.75.1s.0s14

Table 3. Glasgow Coma Scale (GCS). The latest version agreed with Glasgow center.

EYE OPENING		
CRITERION	OBSERVED	RATING
Eyes open before stimulus	√	Spontaneous
After spoken or shouted request	√	To sound
After fingertip stimulus	√	To pressure
No eye opening at any time, no interfering factors	√	None
Closed secondary to local factors	√	Non testable
VERBAL RESPONSE		
CRITERION	OBSERVED	RATING
Correctly gives name, place, and date	√	Oriented
Not oriented but communicates coherently	√	Confused
Intelligible single words	√	Words
Only moans and groans	√	Sounds
No audible response, no interfering local factors	√	None
Factors interfering with communication	√	Non testable
BEST MOTOR RESPONSE		
CRITERION	OBSERVED	RATING
Obeys two-part request	√	Obeys commands
Brings hand above clavicle to stimulus on head/neck	√	Localizing
Bends arm at elbow rapidly but features not predominantly abnormal	√	Normal flexion
Bends arm at elbow, features clearly abnormal	√	Abnormal flexion
Extends arm at elbow	√	Extension
No movement in arms or legs, no interfering factors	√	None
Paralyzed or other limiting factors	√	Non testable

Source: The Glasgow Structured Approach to assessment of the Glasgow Coma Scale <https://www.glasgowcomascale.org>

compensation depending on the size of the lesions and preservation of the basal cisterns. The Glasgow Coma Scale is most commonly used to assess the severity of an injury. It is the most common diagnostic and prognostic scale (Table 3). It is currently being verified by its creators in terms of the correctness of interpretation. Depending on the GCS score, the severity of the craniocerebral trauma is assessed:

- light damage (>12 points) - short-term loss of consciousness and short-term retrograde amnesia;
- moderate damage (9-12 points) - loss of consciousness for 24 hours with retrograde amnesia from 1 to 24 hours;
- severe damage (<8 points) - loss of consciousness for more than 24 hours with amnesia lasting more than 1 day.

Output GCS score is of significant prognostic importance. Mortality in the group of patients assessed at 6-7 points is 50%, while in the group of patients assessed at 3 points it is as much as 90%. In the group of patients with severe injuries, 60% are people with multi-organ injuries. 25% of them require surgical treatment [16].

ANTI-EDEMA TREATMENT

Another medical measure is the reduction of cerebral edema using pharmacological treatment and positioning the patient's head at an angle of 15-30 degrees. The drug used to lower ICP after TBI is Mannitol 20% at a dose of 0.25-1 mg/kg/bw, then 0.25 mg/kg every 6 hours.

It is indicated in the following situations: signs of herniation, rapidly deteriorating neurological condition not related to extracranial causes. Urinary fluid loss should be replaced with physiological saline. Long-term use of mannitol may lead to dehydration, prerenal azotemia and hyperkalemia [17]. With continuous infusion or long-term use of mannitol (over 72 hours), there is a risk of the blood-brain barrier disruption and accumulation of intracerebral fluids (the so-called rebound effect). In addition, it is worth adding Furosemide 20 mg i.v. 30 minutes after the mannitol infusion.

If there is no decrease in ICP, the dose of mannitol may be increased to 1 mg/kg b.w. every 6 hours. Furosemide (loop diuretic) is a second-line drug used to reduce cerebral edema at a dose of 1mg/kg/bw every 6 hours, not exceeding an osmolarity of 320 mOsm/ml. Steroid therapy is not recommended for patients with symptoms of cerebral edema because it poses a risk of gastrointestinal bleeding, glucose increase and metabolic disorders.[18]

However, if it is included in the treatment, glucocorticoids should be administered only in the case of ICP increase caused by brain tumors. Corticosteroids reduce angioedema, which is predominant in brain tumors. They are not recommended for use in craniocerebral injuries. The recommended dosage is 4 mg of Dexamethasone every 6 hours i.v. In the event of seizures or anticonvulsant protection, it is recommended to use Phenytoin at a loading dose of 15-20 mg/kg within 30 minutes or

benzodiazepines (Relanium 10 mg intravenously/intraosseously or intramuscularly, Clonazepam 1 mg intravenously/intraosseously or intramuscularly).

Simultaneous use of mannitol with glucocorticoids and phenytoin may cause hyperosmolar coma.

In the absence of improvement after treatment with Mannitol, or instead of it, administration of hypertonic salt may be considered - an infusion of 250 ml of 3% NaCl or a bolus of 10-20 ml of 23% NaCl (concentrations from 3% to 30% NaCl are used). The recommended sodium concentration is 145-155 mmol/l. Sodium levels should be monitored every 2-4 hours initially (for the first 24 hours), then every 12 hours. The therapy can be continued for up to 7 days. The concentrated salt should be slowly discontinued. Acetazolamide, a carbonic anhydrase inhibitor, reduces the production of cerebrospinal fluid. It is recommended in benign intracranial hypertension; dosage 1000-2000 mg/24 h in 3 divided doses, maximum 4 g/24 h.

At the rescue level, hyperventilation is a last resort and is not routinely recommended. It is essential to oxygenate the patient properly by ventilating them with 1 breath every 6-8 seconds using high-flow oxygen therapy to maintain a carbon dioxide (ETCO₂) concentration of 35-45 mmHg.

Hyperventilation can be performed by bag-type ventilation or by using a ventilator. Adult patients should be ventilated every 3 seconds (20 breaths per minute), children every 2.5 seconds (25 breaths per minute) and infants every 2 seconds (30 breaths per minute). A capnometer should be connected if the patient is intubated or has alternative means of airway management, such as laryngeal mask airway, gel laryngeal mask airway, laryngeal tube. The value of carbon dioxide concentration in a patient with cerebral herniation should be between 30-35 mm Hg [19].

In the case of patients with the mass effect in head imaging diagnostics, i.e. computed tomography or magnetic resonance imaging, the appropriate procedure is neurosurgical intervention, i.e. decompressive craniectomy. The technique of fronto-temporoparietal craniectomy is more effective than bilateral because it reduces mortality and improves the final outcome of treatment.

Craniocerebral injuries constitute a continuous deepening challenge for modern medicine. The most reliable source of information are studies based on evidence-based medicine (EBM), which often provide evidence of numerous, non-specific symptoms of craniocerebral injuries. At the same time, this information is an indicator for many rescue solutions that lay the foundations for innovative methods of handling and treating craniocerebral injuries. Patients with moderately severe brain injury score on the Glasgow scale in the range of 9-13 points. About 30% of them have palpable intracranial pathology in the CT image. Out of these, 1.3 show progression and late changes, 4-10% require craniotomy during hospitalization. Mortality in this group is 0.9-2.5%, a further 15% require intensive care, and only 60% show a good

clinical condition 6 months after the injury. More than 70% of patients are unable to return to work within three months. Severe brain damage is indicated by a Glasgow score below 9. The risk of death in this group ranges from several to several dozen percent. Cured patients present a significant or very significant sphere of cognitive disorders, memory deficits, behavioral disorders, and neurological deficits. In extreme cases, they represent a persistent vegetative state or brain death occurs [20].

Imaging diagnostics in head injuries is a reference to clinical symptoms. Among other things, Dietrich showed that severe clinical symptoms of traumatic brain injury correlate poorly with changes in computed tomography. He proposed the following indications for computed tomography in a child after head injury: GCS <15 points or GCS equal to 15 points in the case of reversal of amnesia, loss of consciousness, vomiting, epileptic seizures, neurological symptoms - i.e. circumstances in which a neurological examination is unreliable or impossible to be performed (e.g. general anesthesia, poisoning, neurological diseases) [21].

The target management in pre-hospital and in-hospital care in patients with severe head injuries with

symptoms of intracranial compartment syndrome focuses on the treatment of raised intracranial pressure, which, presented in a 2012 study by Wijayatilake, can be started at the roadside and completed in the intensive care unit in several ways. Pre-hospital care led by a physician can provide significant benefits that go beyond airway management. Routine use of cooling worsens respiratory outcomes without significantly improving neurological endpoints. Oxygen monitoring in brain tissue is becoming more common and is increasingly used to manage the procedure. Decompressive craniectomy in refractory intracranial hypertension is associated with poor functional outcomes [22].

CONCLUSIONS

Cranio-cerebral injuries, although they occur frequently, constitute a challenge for modern emergency medical services and emergency medicine.

Despite indications, targeted therapy aimed at maintaining cerebral blood flow by maintaining a normal mean arterial pressure (MAP) >90 mmHg in combination with pharmacological and non-pharmacological techniques is rarely used.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest.

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A case report of preterm homebirth in twin pregnancy

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ABSTRACT

The aim: To present a unique event in prehospital medicine, which was a home birth in extreme prematurity. At the same time, we try to present ways of dealing with such an unusual condition in emergency medicine.

Material and methods: The basis for the considerations was a case taken from a Pediatric Teaching Clinical Hospital University Clinical Center of the Medical University of Warsaw. In this case, we report a premature birth in a twin pregnancy that occurred in home, so it was out-of-hospital environment. The twin infants were at home born at 22 weeks and 6/7 days of gestational age. After initial resuscitation at the scene, the patients were transported to an Emergency Department in the hospital of the highest referral level.

Conclusions: Prehospital medicine is not prepared to handle extremely preterm birth. The unique clinical needs of infants born at ≤ 23 weeks are noticed and should be distinguished from those of more mature infants. Only a few high-quality sources of clinical evidence exist to guide care for this population, which requires specialized attention. The problem of prehospital delivery in extreme prematurity is almost absent in the medical literature. Additional investigation is required to enhance our comprehension of optimal care practices for infants born during these early gestational stages.

KEY WORDS

twin pregnancy, premature infants, resuscitation, Emergency Medical Services, Emergency Medicine, home childbirth

INTRODUCTION

Premature birth is a global concern considered to be one of the main risk factors for neonatal mortality. It is the leading cause of death in children under the age of 5 years. According to data from the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) together with the Partnership for Maternal, Newborn & Child Health (PMNCH) in 2020 an estimated 13.4 million babies were born too early [1]. Preterm survivors, especially those born extremely prematurely, may encounter lifelong health consequences, with an increased likelihood of disability and developmental delays, including adverse long-term neurodevelopmental and metabolic outcomes [2]. The delineation of gestational age that distinguishes infants deemed too premature for intensive care from those who could gain advantages has undergone a significant shift over the last 50 years. Nowadays, the most immature infants routinely cared for by neonatologists in some parts of the world are born at 22 or 23 weeks of gestation. In current clinical practice, infants born within the range of 22–23 weeks of gestation represent a particularly vulnerable “grey zone.” The medical and ethical challenges posed by infants born extremely prematurely are notable and the decision to commence intensive therapy for these infants is predominantly influenced by the hospital or the country of their birth [3]. In Poland, the legal criteria for distinguishing between a miscarriage and a premature birth is the 22nd week of pregnancy. In this case, we report an episode of the home delivery of twins at 22 weeks and

6/7 days of gestation age. In connection with this, the Emergency Medical Service had, from a legal standpoint, dealt with a premature birth. It is worth mentioning that twin pregnancies have a five times higher risk of early neonatal and infant death related to prematurity [4].

Moreover, home birth is associated with increased risk for the mother and the baby, which results from the lack of appropriate medical equipment and out-of-hospital environment [5]. Complications caused by home birth may manifest as a low Apgar score, neurological dysfunctions, and an increase in mortality [5]. In similar cases, we review the relevant literature regarding the current guidelines for resuscitating extremely premature infants and prehospital care. We discuss the unique physiological challenges and vulnerabilities of infants ≤ 23 weeks, and the availability of appropriately sized equipment in ambulances.

MATERIALS AND METHODS

Data for this case report were collected on the basis of medical records from the Emergency Department and Neonatology and Rare Diseases Department in Pediatric Teaching Clinical Hospital University Clinical Center of the Medical University of Warsaw. The approval for anonymous publication has been received from the hospital's director. The study adhered to the Polish Act on Patient Rights and the Patient's Rights Ombudsman provisions. Following the Helsinki Declaration, the case report was fully anonymized, ensuring no data could be used to identify the patient. Photos are not presented to

maximize anonymity. The presentation of this case does not require the consent of the Bioethics Committee, as per the requirements of Polish law. The literature review was conducted using PubMed resources.

CASE REPORT

At 16:04, a call came to emergency medical services (EMS) from a 40-year-old woman in twin pregnancy. The woman was having abdominal pain and contractions. She was in her first pregnancy, 22 weeks and 6/7 days gestation age. The current pregnancy had no additional reported complications. At 16:12, a team of one physician and one paramedic from the Helicopter Emergency Medical Service (HEMS), came to the woman's home. The woman was found in the toilet with one newborn in the mother's arms in the amniotic sac, and the other newborn was on the floor. When the medical team were allowed to evaluate the premature infants (female and male), they found them extremely premature. They were also cooled (28°C) with central and peripheral cyanosis, overgrown eyelids, and numerous bruises - mainly on the face and chest. The abdomen was big and tight; the chest did not rise despite high ventilator values, gasping was visual. The infants were without external congenital abnormalities. Their skin was thin - they had a small amount of subcutaneous fat. Infants did not respond to stimulation. The emergency medical team simultaneously started Newborn Life Support (NLS) compliant with the latest guidelines for both newborns [8]. It was impossible to simultaneously perform NLS on both newborns and transport them by helicopter. A specialist emergency medical team of two paramedics and a physician was called to transport newborns. The umbilical cord was clamped. The NLS was continued afterwards by the HEMS. Initially, pulseless electrical activity (PEA) was present, then the return of spontaneous circulation (ROSC), and then PEA again. The pain scale was not assessed due to consciousness disorders, and then it was not assessed again due to cardiac arrest. Chilled infants in medical insulating bags arrived in the Emergency Department (ED) of Pediatric Teaching Clinical Hospital University Clinical Center of the Medical University of Warsaw (hospital with the highest degree of reference - this hospital can care for premature babies born at any stage of pregnancy, it is also a Level 1 trauma center [9]) at 17:40 during the bag valve mask (BVM) ventilation and heart massage. The umbilical vein catheterisation was made. In the pediatric emergency department, infants were placed under the radiator, they were intubated and 100% oxygen was given. The heart rate in newborns was almost absent during the examination, the NLS was continued and the adrenaline was given. Then the heart rate was satisfactory (>100/min), and saturation was 80 - 85%. 20 ml of 0,9% sodium chloride and 10% glucose (1,5 ml/h) were administered.

Blood gases analysis has been performed (results in the table 1 and table 2). Patients were transferred in the incubators to the neonatal intensive care unit. Respirator

ventilation of newborns was continued in the neonatal intensive care unit. Respirator settings for the female infant were: SIMV f 50/min, PIP 20 cm H₂O, fiO₂ 0.9-1.0, PEEP 5 cm H₂O, Ti 0.35 sec; and for the male infant: SIMV f 45/min, PIP 20 cm H₂O, fiO₂ 1.0, PEEP 5 cm H₂O, Ti 0.36 sec. Basic tests have been performed. Heart rates were 80-100/min, and saturations were 70-90%. The infant's temperature was between 33.0°C and 35.5°C. The weight of the female infant was 530 g, and the male infant 505 g.

10% glucose (1,5 ml/h), dobutamine (5 mcg/kg/min), and surfactant (200 mg/kg) were given. A temporary increase in saturation to 98% was achieved. The female infant intubated with a 2.5-gauge tube through the mouth to a depth of 7 cm had a big, bloated, tensed abdomen. Again a chest x-ray was made. Both infants had lungs that were very poorly aerated and low-located endotracheal tubes. The female infant had a large amount of air in the abdominal cavity. Due to suspicion of perforation of the pharynx and slow heart rate <100/min, an urgent surgical intervention was requested. A cannula was inserted into the peritoneal cavity in the lower right quadrant. Large amounts of air were depressurized (approximately 20 ml), the abdomen was visibly smaller, and the mobility of the chest improved. The tube was pulled up to the depth of 6,5 cm (female infant) and 7,5 cm (male infant). The boy had an umbilical vein catheter, and a blood culture was collected. No tests could be obtained from the female infant. Attempts to insert a cannula or a peripherally inserted central catheter (PICC) into the girl's peripheral veins were ineffective. Intraosseous access was not established in the female newborn due to the lack of appropriate equipment and her low birth weight. Antibiotic therapy was ordered for both infants (ampicillin and gentamicin). The girl had a temporary increase of heart rate >100/min and saturation >90% on 100% oxygen. At 20:30 the female infant was still without intravenous access and the heart rate was again around 60-70/min. The boy still had bradycardia, and adrenaline was administered - heart rate increased to 100/min.

There has been no response to the treatment despite the provision of all recommended steps of resuscitation. The decision to withhold life-sustaining treatment was made after a discussion with parents. At 20:36 the death of a male infant was found, and at 20:43, a female infant. Because of extreme prematurity, the decision to withdraw from the autopsy examination was made.

DISCUSSION

Resuscitation of a newborn child poses technical and emotional challenges for Emergency Medical Service providers, as observed in this case [6]. It is crucial to notice that preterm infants are not merely smaller patients; clinicians recognize the unique physiological challenges and vulnerabilities of infants ≤23 weeks. This patient group often requires invasive or non-invasive respiratory support as the lungs develop and are susceptible to pulmonary interstitial emphysema and pneumothorax after birth. Approximately 91% of neonates born at 23

Table 1. Blood gas analysis from female infant.

FEMALE INFANT	Blood gas analysis 1	
	Venous blood 37°C 21,0% 17:59	
ph	indeterminate	
pCO ₂	99,2	mmHg
pO ₂	31,5	mmHg
Oximetry values		
ctHb	10,2	g/dL
sO ₂	26,7	%
FO ₂ Hb	25,8	%
FCO ₂ Hb	1,5	%
FHHb	70,9	%
FMetHb	1,8	%
Electrolyte values		
cK+	6,3	mmol/L
cNa+	136	mmol/L
cCa+	1,4	mmol/L
cCl-	-	mmol/L
Metabolite values		
cGlu	61	mg/dL
cLac	14,4	mmol/L
ctBil	0,1	mg/dL
Values corrected for temperature		
pCO ₂ (T)	99,2	mmHg
pO ₂ (T)	31,5	mmHg
Oxygenation status		
ctO ₂ c	1,7	mmol/L

- 25 weeks gestation will experience respiratory distress syndrome compared with 52% of those born at 30 – 31 weeks gestation, primarily due to surfactant deficiency. Scientific studies demonstrate that prehospital surfactant administration can be performed successfully by a prehospital critical care retrieval team, even at moderately high altitudes in a developing country [7]. The respiratory management of 22–23-week-old infants is complicated by the small size of the mouth, nostrils, pharynx, larynx, and trachea, in addition to physiological immaturity. Approaches to ventilating the 22–23-week infant aim to adequately support the infant while minimizing lung injury [3]. Not every ambulance carries the proper equipment; for example, adequately sized endotracheal tubes or bag–valve–masks designed explicitly for extremely premature infants may be lacking [6]. The initial depth of endotracheal tube insertion following oral intu-

bation does not follow the rules derived for older, larger infants, such as “6 + weight in kg.” An appropriate depth for infants ≤23 weeks may be closer to 5.5 cm to the lip [3]. Another significant factor increasing the mortality of preterm children is hypothermia. The incidence of admission hypothermia is inversely proportional to gestational age, partly due to high evaporative losses from a larger surface area and less keratinized skin. In some centres, a majority of infants ≤23 weeks are admitted to the NICU with moderate or severe hypothermia [3], which also occurs in this case.

Challenges to the study and care of infants born at 22–23 weeks also result from the small number of such cases at any single hospital; their birth is often unplanned and urgent, and their inpatient care is often prolonged. In such cases, EMS responders focus on proper basic life support and rapid transport to the Neonatal Intensive Care

Table 2. Blood gas analysis from male infant.

MALE INFANT	Blood gas analysis 1	Blood gas analysis 2	Blood gas analysis 3	
	Venous blood	Venous blood	Venous blood	
	37°C	37°C	37°C	
	21,0% 17:58	21,0% 18:06	100,0% 18:58	
pH	6,884	7,191	7,041	
pCO ₂	43,6	50,5	54,3	mmHg
pO ₂	108	93,2	58,8	mmHg
Oximetry values				
ctHb	5,6	7,7	10,0	g/dL
sO ₂	101,5	-	30,6	%
FO ₂ Hb	96,0	97,2	82,4	%
FCOHb	3,7	3,7	1,3	%
FHHb	-1,4	-	17,1	%
FMetHb	1,7	1,7	1,4	%
FHbF	-	-	82	%
Electrolyte values				
cK+	4,9	5,5	5,7	mmol/L
cNa+	123	132	134	mmol/L
cCa ²⁺	1,11	1,05	0,57	mmol/L
cCl-	107	103	109	mmol/L
Anion gap	-	-	10,4	mmol/L
mOsm,c	-	-	295,1	mmol/kg
Metabolite values				
cGlu	822	634	499	mg/dL
cLac	11,5	13,1	14,0	mmol/L
ctBil	0,0	-	0,3	mg/dL
Oxygenation status				
ctO ₂ ,c	3,4	-	5,1	mmol/L
p50,c	42,05	-	34,38	mmHg
Acid-base balance status				
cBase(Ecf),c	-24,9	-8,9	-15,9	mmol/L
cHCO ₃ -(P,st),c	7,4	-	12,5	mmol/L
cHCO ₃ -(P),c	8,2	19,3	14,7	mmol/L
Values corrected for temperature				
pH(T)	6,884	7,191	-	
pCO ₂ (T)	43,6	50,5	-	mmHg
pO ₂ (T)	108	93,2	-	mmHg

Unit (NICU) [6]. According to the latest European Resuscitation Council Guidelines (2021) on Newborn Resuscitation and Support of Transition of Infants at Birth, resuscitation for preterm infants is the same as for newborns. However, it is also necessary to consider alternative/additional methods such as polyethylene wrap for thermal care, gentle support-initially with CPAP if breathing-and continuous monitoring (pulse oximetry, ECG) instead of intermittent monitoring [8]. International guidelines for postnatal stabilization support a bundle of interventions to avoid hypothermia, including maintaining an ambient temperature of 24–26°C and using a radiant warmer, thermal mattress, plastic wraps, or hats [3]. In Poland, the practice of heating the ambulance for transporting the infant is widely known. Moreover, in this case, medical insulating bags have been used. It is important to note that premature children who were admitted to the Neonatal Intensive Care Unit have significantly improved outcomes [6]. The Polish Emergency Medical Services system has been established to provide care to patients in this type of emergency. Additionally, it is essential to notice diagnosed premature labour as the main reason for HEMS interventions concerning pregnant patients. The system is based on cooperation between hospital emergency departments and medical rescue teams, including Helicopter Emergency Medical Service (HEMS) teams. In this case, this cooperation was present. HEMS crews, consisting of a professional pilot, a physician, and an emergency medical technician or nurse, were involved [10]. It is typical for Poland that interventions by basic EMS teams in cases of suspected labour concern patients with term pregnancies, while three-person specialist EMS teams most often attend to patients with suspected preterm labour dispatched with a urgency code [11]. However, the availability of specialist teams is limited, as they constitute approximately 1/4 of all teams or less [12]. In such situations, the team with the fastest arrival time is selected, regardless of its type. It is worth mentioning that in Poland, only four incubators are accessible for transportation in HEMS [13], which means that sometimes EMS team members should provide women in labour with the best quality

of care, offering professional assistance on-site [11]. Between January 2011 and December 2022, HEMS crews intervened in Poland in infant out-of-hospital cardiac arrests only 111 times [14]. Data on the morbidity and mortality of extremely preterm infants are still insufficient. In the USA, as reported for the years 2013–2018, only 10.9% of infants live-born at 22 weeks survived to discharge or one year [15].

CONCLUSIONS

Based on the analysis carried out on premature birth, infant morbidity, and mortality, and considering the presented case, the following conclusions were drawn:

- Premature infants born <23 weeks gestation face unique physiological challenges compared to more mature newborns. There are few high-quality clinical resources to guide the care of this population - further research is needed to ensure they receive appropriate care.
- Resuscitating infants <23 weeks gestation, especially in the pre-hospital setting, remains a challenge, partly due to the limited number of such cases.
- Premature birth is often sudden and leads to logistical challenges - cooperation between hospital emergency departments and medical rescue teams, including Helicopter Emergency Medical Service teams, is crucial.
- In ambulances, there is a lack of equipment adapted for the resuscitation of prematurely born infants, and in HEMS, there is a small number of transport incubators.
- Such a newborn's proper intubation and ventilation exert a vital influence, ensuring thermal comfort and continuous monitoring is essential.
- The prognosis in such cases is extremely unfavourable. Early transportation of born infants to the Neonatal Intensive Care Unit improves outcomes.

The conclusions mentioned above only address some of the problems. Additional investigation is required to enhance our comprehension of optimal care practices for infants born during these early gestational stages.

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CONFLICT OF INTEREST

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Enhancing prehospital ACS management: Insights from the 2023 ESC guidelines

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ABSTRACT

Aim: This paper aims to elucidate the key changes and insights from the 2023 European Society of Cardiology (ESC) guidelines for prehospital management of Acute Coronary Syndromes (ACS).

Material and methods: The guidelines are thoroughly analyzed, focusing on diagnostic tools, treatment strategies, and pharmacological interventions. Specific attention is given to the utilization of electrocardiogram (ECG) in ACS diagnosis, oxygen therapy thresholds, the use of nitrates and contraindications, morphine and alternative pain management, aspirin administration, and the application of beta-blockers and benzodiazepines.

Results: The guidelines emphasize the critical role of the 12-lead ECG in early ACS diagnosis, categorizing patients based on ST-segment elevation. Revised oxygen supplementation protocols and cautious use of nitrates are highlighted, considering their potential harmful effects. Alternatives to morphine for pain management and the importance of prompt aspirin administration are stressed. The guidelines also advocate for the use of intravenous beta-blockers in certain patients and recognize the role of benzodiazepines in managing stress-related symptoms. The importance of rapid treatment in reperfusion strategies and the use of ECG telemetry in enhancing communication with medical facilities are underscored.

Conclusions: The 2023 ESC guidelines present a comprehensive and updated approach to the prehospital management of ACS. They emphasize the need for rapid and accurate diagnosis, judicious use of pharmacological interventions, and the importance of standardized care protocols. These guidelines are pivotal in improving patient outcomes, reducing mortality and morbidity, and necessitate continued education and adaptation by emergency medical personnel.

KEY WORDS

acute coronary syndrome, emergency medicine, prehospital management

INTRODUCTION

Acute Coronary Syndromes (ACS) represent a growing public health challenge with an increasing incidence worldwide. Prompt and effective intervention in ACS cases is crucial for saving lives and minimizing long-term cardiac damage. The 2023 European Society of Cardiology (ESC) guidelines emphasize the importance of precise diagnosis and management of ACS, with a special focus on the role of electrocardiogram (ECG) in assessment. In ECG analysis, specific changes in the ST segment are particularly significant: new ST elevation at the J-point in at least two contiguous leads is considered suggestive of ongoing coronary artery occlusion. The criteria for ST elevation are ≥ 2.5 mm in men under 40 years, ≥ 2 mm in men 40 years and older, or ≥ 1.5 mm in women regardless of age in leads V2–V3, and/or ≥ 1 mm in other leads. These changes necessitate immediate reperfusion therapy [1-3].

ECG AS A FIRST-LINE DIAGNOSTIC TOOL

The 12-lead ECG is the cornerstone in evaluating suspected ACS. It should be obtained immediately upon first medical contact (FMC) and interpreted within 10 minutes by qualified personnel. Patients with suspected ACS based on the initial ECG are categorized into two groups: those with persistent ST-segment elevation (or equivalents) indicating STEMI, and those without persistent ST-segment elevation, indicating NSTEMI-ACS. The latter group may exhibit other ECG changes, such as transient ST-segment elevation, ST-segment depression, or various T wave abnormalities. It's crucial to note that while the majority with STEMI will have myocardial necrosis and troponin elevation, STEMI might not be the final diagnosis in all cases. Similarly, in NSTEMI-ACS, patients may have a rise and fall in troponin levels indicative of NSTEMI, or remain below the 99th percentile, leading to a final diagnosis of unstable angina (UA).

OXYGEN THERAPY AND VASCULAR EFFECTS

One significant change in the new guidelines is the revised oxygen supplementation threshold, now set for patients with saturations below 90% compared to the previous 94%. This adjustment reflects a growing recognition of the potential harmful effects of unnecessary oxygen therapy, particularly concerning vascular constriction. Excessive oxygen can induce vasoconstriction, reducing coronary blood flow and potentially exacerbating myocardial ischemia in ACS patients [4].

USE OF NITRATES

Nitrates, such as sublingual nitroglycerine, remain an important aspect of ACS management for relieving ischemic symptoms. However, it's crucial to note that a reduction in chest pain following nitroglycerine administration should not be used as a diagnostic tool. In patients with ongoing STEMI, a repeat 12-lead ECG should be obtained after nitroglycerine administration, as complete normalization of ST-segment elevation, coupled with symptom relief, may indicate coronary spasm.

The 2023 ESC guidelines caution against the use of nitrates in certain patient scenarios. Nitrates should not be administered to patients with hypotension, marked bradycardia or tachycardia, right ventricular (RV) infarction, known severe aortic stenosis, or in those who have used phosphodiesterase 5 inhibitors within the previous 24–48 hours. This contraindication is due to the potential for nitrates to exacerbate these conditions, thereby increasing the risk of adverse outcomes. It is imperative for emergency medical personnel to assess these factors before administering nitrates to ensure the safety and efficacy of ACS treatment [5].

MORPHINE AND ALTERNATIVE PAIN MANAGEMENT

While morphine is effective for severe chest pain in ACS, its impact on the gastrointestinal absorption of oral medicines, including antiplatelet agents, is a concern. This can lead to delayed onset of action of crucial medications. To minimize these effects, alternatives like intravenous acetaminophen/paracetamol should be considered. They have shown efficacy in pain relief and possess a lesser impact on drug absorption. To prevent nausea and vomiting, which can further hinder drug absorption, co-administration of antiemetics like metoclopramide with morphine is advisable [6, 7].

ASPIRIN (ASA) ADMINISTRATION

One of the key interventions in the prehospital management of ACS is the prompt oral administration of aspirin (acetylsalicylic acid, ASA). Aspirin plays a vital role due to its antiplatelet properties, which are crucial in the early stages of ACS. Upon entering the bloodstream, aspirin inhibits the function of platelets, preventing them from clumping together to form clots. This action is particularly important in ACS, where blood clots can obstruct coronary arteries, exacerbat-

ing myocardial ischemia and increasing the risk of myocardial infarction [8].

The 2023 ESC guidelines underscore the urgency of administering aspirin as soon as ACS is suspected. A rapid administration of aspirin, typically at a dose of 300–600 mg, can significantly reduce the mortality rate and severity of an acute myocardial infarction. This simple yet effective intervention is a cornerstone of ACS treatment and can be readily administered by EMS personnel, making it an essential component of prehospital care for patients exhibiting symptoms of ACS.

BETA-BLOCKERS IN ACS MANAGEMENT

The guidelines highlight the use of intravenous beta-blockers, especially in patients with STEMI undergoing percutaneous coronary intervention (PPCI) without signs of acute heart failure and with a systolic blood pressure (SBP) above 120 mmHg. Beta-blockers like metoprolol have shown a reduction in the incidence of ventricular fibrillation and microvascular obstruction [9].

BENZODIAZEPINES IN ACS

The guidelines also acknowledge the role of benzodiazepines, especially in managing patients who exhibit anxiety or extreme stress. While these are not primary ACS treatments, they can be instrumental in alleviating symptoms that could aggravate the cardiac condition [10].

TIME TO TREATMENT IN REPERFUSION STRATEGIES

Time to treatment is vital, particularly for patients in the STEMI pathway. Primary PCI, the preferred reperfusion strategy, should be initiated as soon as possible, ideally within 120 minutes from first medical contact. When PCI is not available, thrombolysis should be considered within a 30-minute window from EMS contact. This emphasizes the need for EMS to rapidly identify suitable candidates and facilitate swift transport to capable facilities/

ECG TELEMETRY AND COMMUNICATION WITH CATHETERIZATION LABS

The role of ECG telemetry in the ambulance service is crucial. Transmitting ECGs from the field to cardiologists and catheterization labs enables pre-arrival consultation and preparation. This protocol enhances the efficiency of the STEMI treatment pathway, reducing delays in care and improving clinical outcomes [11].

CONCLUSIONS

The 2023 ESC guidelines represent a significant advancement in the prehospital management of Acute Coronary Syndromes (ACS), emphasizing a more nuanced and evidence-based approach. Key interventions, such as the prompt oral administration of aspirin for its antiplatelet effects and the careful use of nitrates with consideration of specific contraindications, are

critical for improving patient outcomes. The guidelines also stress the importance of a rapid and accurate ECG interpretation in diagnosing ACS and guiding the appropriate treatment pathway.

Furthermore, the guidelines highlight the necessity of understanding and applying these updated protocols to enhance the effectiveness of prehospital care. As ACS continues to pose a significant challenge in emergency medicine, the role of first responders and emergency medical personnel in implementing these guidelines is more crucial than ever. Adherence to these guidelines not only improves the quality of

care but also ensures a consistent and standardized approach to ACS management across various prehospital settings.

Ultimately, the goal is to reduce mortality and morbidity associated with ACS through timely and effective treatment. The 2023 ESC guidelines provide a robust framework for achieving this, guiding emergency medical services in making critical decisions that can have a profound impact on patient outcomes. As such, continuous education, training, and adaptation to these guidelines are essential for all personnel involved in the prehospital management of ACS.

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SUPPORT AND EMERGENCY ASSISTANCE FOR PEOPLE FROM THE RISK GROUP

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ПІДТРИМКА І НЕВІДКЛАДНА ДОПОМОГА ЛЮДЕЙ З ГРУПИ РИЗИКУ

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Вступ: У надзвичайних ситуаціях не всі мають серйозні психологічні проблеми. Багато людей виявляють стійкість, тобто здатність відносно добре справлятися з важкими ситуаціями. Існують численні взаємодіючі соціальні, психологічні та біологічні фактори, які впливають на те, чи розвиваються у людей психологічні проблеми чи виявляють стійкість перед лицем труднощів. Залежно від контексту надзвичайної ситуації, певні групи людей мають підвищений ризик виникнення соціальних та/або психологічних проблем. Незважаючи на те, що багато ключових форм підтримки повинні бути доступні для населення, яке постраждало від надзвичайних ситуацій, правильне програмування зокрема включає надання відповідної підтримки людям із найбільшим ризиком, яких необхідно визначити для кожної конкретної кризи.

Мета: Визначення ресурсів у людей з групи ризику.

Матеріали і методи: Описовий.

Результати: Визначення людей як «групи ризику» не означає, що вони є пасивними жертвами. Хоча люди з групи ризику потребують підтримки, вони часто мають можливості та соціальні зв'язки, які дозволяють їм робити внесок у сім'ї та брати активну участь у соціальному, релігійному та політичному житті. Постраждалі групи мають активи або ресурси, які підтримують психічне здоров'я та психосоціальне благополуччя. Характер і обсяг наявних і доступних ресурсів може змінюватися залежно від віку, статі, соціокультурного контексту та надзвичайної ситуації. Поширеною помилкою в роботі над психічним здоров'ям і психосоціальним благополуччям є ігнорування цих ресурсів і зосередження виключно на недоліках – слабкостях, стражданнях і патологіях – постраждалої групи. Постраждалі особи мають такі ресурси, як навички вирішення проблем, спілкування, переговорів і заробітку на життя. Приклади потенційно сприятливих соціальних ресурсів включають сім'ї, місцевих урядовців, громадських лідерів, народних цілителів (у багатьох суспільствах), громадських медичних працівників, вчителів, жіночі групи, молодіжні клуби та групи громадського планування, серед багатьох інших. Постраждалі громади можуть мати такі економічні ресурси, як заощадження, земля, посіви та тварини; освітні ресурси, такі як школи та вчителі; і ресурси охорони здоров'я, такі як медичні пункти та персонал. Значні релігійні та духовні ресурси включають релігійних лідерів, місцевих цілителів, практики молитов і поклоніння, а також культурні практики, такі як обряди поховання.

Висновки: Щоб спланувати належне реагування на надзвичайні ситуації, важливо знати природу місцевих ресурсів, чи є вони корисними чи шкідливими, а також ступінь доступу постраждалих до них. Дійсно, деякі місцеві практики – починаючи від певних традиційних культурних практик і закінчуючи опікою в багатьох існуючих установах позбавлення волі – можуть бути шкідливими та порушувати принципи прав людини.

Ключові слова: ресурси, група ризику, психічне здоров'я, психосоціальне благополуччя

Key words: resources, risk group, mental health, psychosocial well-being

DEVELOPMENT OF TELEMEDICINE IN UKRAINE DURING THE WAR

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РОЗВИТОК ТЕЛЕМЕДИЦИНИ В УКРАЇНІ ПІД ЧАС ВІЙНИ

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ПОЛТАВСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ, ПОЛТАВА, УКРАЇНА

Вступ: У 2023 році впровадження телемедицини в Україні вийшло на новий рівень: в липні 2023 року Кабінет Міністрів України схвалив Стратегію розбудови телемедицини в Україні, були внесені законодавчі зміни та інтегровані гуманітарні телемедичні рішення у заклади охорони здоров'я.

Мета: Дослідити розвиток телемедицини в Україні під час війни.

Матеріали і методи. Проаналізовані матеріали Міністерства охорони здоров'я України щодо розвитку телемедичних технологій. Методи: контент-аналіз, бібліосемантичний.

Результати. У період воєнного стану Україна отримала телемедичну гуманітарну допомогу на суму близько 4 млн доларів США. За підтримки партнерів 6 телемедичних рішень вже успішно діють в українських закладах охорони здоров'я, ще 3 – на етапі підготовки. Телемедичні консультації довели свою ефективність у роботі з особливо вразливими групами людей, які через певні обставини часто не можуть фізично звернутися на прийом до лікаря. Для допомоги людям, що знаходяться у прифронтових, деокупованих та важкодоступних територіях, Міністерство охорони здоров'я України підтримало ініціативу громадської організації «Академія сімейної медицини України» та Бюро ВООЗ в Україні щодо створення мобільних медичних команд, до складу яких увійшли фахівці «первинки». Наразі мобільні команди продовжують роботу на прифронтових територіях в 5 областях та важкодоступних локаціях. Завдяки телемедичним рішенням медичні працівники надають допомогу пацієнтам із вогнепальними та вибуховими травмами, використовують нейрореабілітаційне рішення з інструментами доповненої реальності для комплексного лікування пацієнтів із пошкодженням мозку або ортопедичною травмою. У двох лікарнях вже встановлені віртуальні операційні, які дозволяють хірургам брати участь в онлайн-консультаванні. В 182 медзакладах України вже можливо проводити дистанційний моніторинг вагітності за допомогою портативного діагностичного комплексу. В 30 закладах охорони здоров'я встановлені телемедичні платформи, за допомогою яких пацієнти можуть самостійно провести такі базові обстеження, як: вимірювання температури тіла, артеріального тиску, насичення крові киснем, виконання ЕКГ тощо. Загалом до надання телемедичних послуг підключені 328 закладів охорони здоров'я: На виконання Стратегії розробляється функціональні можливості електронної охорони здоров'я для застосування телемедицини за трьома напрямками: телеконсультавання, телеметрія та телерадіологія. Зростає кількість телемедичних послуг у Програмі медичних гарантій. У 2024 році вони увійдуть у 31 із 41 пакету медичних послуг, що майже втричі більше, ніж у 2023 році. Поміж іншим стратегічними цілями залишається підвищувати цифрову компетентність працівників охорони здоров'я та розвивати технічне забезпечення для впровадження телемедичних рішень. МОЗ спільно з НСЗУ впроваджують зміни у сфері електронної охорони здоров'я, створюючи на рівні держави нові функціональні можливості для телемедицини. Так, надалі в межах електронної охорони здоров'я будуть впроваджені сервіси телеконсультавання, телерадіології та телеметрії – послуг, які наразі є найбільш актуальними для українців. Ця ініціатива, зокрема, є відповіддю на гостру потребу в забезпеченні доступу до медичних послуг для людей, які проживають у віддалених від медичної допомоги регіонах, та для тих, хто постраждав від війни.

Висновок: МОЗ України ініціює зміни у законодавстві, які регулюють сферу телемедицини, ці зміни спрямовані на інтеграцію телемедицини в усі види медичної допомоги – екстрену, первинну, спеціалізовану, паліативну та реабілітаційну. У перспективі це покращить доступність та якість медичної допомоги в цілому та, зокрема, для хронічних хворих, людей, які внаслідок воєнних дій вимушено змінили місце свого проживання, мешканців прифронтових зон, сільської та віддаленої місцевості.

Ключові слова: телемедицина, Стратегія розбудови телемедицини, телемедичні послуги, заклади охорони здоров'я

Key words: telemedicine, Strategy for the development of telemedicine, telemedicine services, healthcare facilities

SELF-MEDICATION PRACTICE AS AN ALTERNATIVE TO TREATING PATIENTS WHO NEED AN EMERGENCY DENTAL CARE: THE REALITIES OF TODAY

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Introduction: Dental diseases are quite common in our society. At the same time, the symptoms of dental pathology are varied. This may be a carious cavity or discoloration of the tooth, bad breath, bleeding gums, tooth mobility, calculus, soft tissue swelling, etc. Any of these conditions require professional intervention, which may be in the form of emergency or palliative care. Pain in its different manifestations is still in the first place among the complaints of dental patients. It creates discomfort and requires emergency care. In addition, this symptom is often accompanied by a certain fear of dental intervention, conscious or forced postponement of the visit as well as self-medication practice to eliminate the problem. The availability of analgesics, anti-inflammatory and antibacterial drugs, which has existed for a long time, has created a tendency for self-medication in the society, including manifestations of dental diseases accompanied by pain. Doctors of all specialties are facing a global problem - microbial resistance to antibiotics, which has developed against the background of their irrational administration. Currently, this access is limited, as the Law on the Regulation of Antibiotic Sales by Introducing an Electronic Doctor's Prescription has come into force. It should be remembered that pain is given to us to warn us of danger. And it is logical that in case of pain, a person would turn to the experience of generations, to eliminate the disease at an early stage. The ancient manuscripts recommended the application of essential oils topically, orally, or in aroma lamps and smoking pipes. Well-known spices and herbs such as cloves, thyme, mint, lavender, garlic, cinnamon, salvia, chamomile, calendula, mallow, nettle and others have long been used in nontraditional medicine in different regions of the world to treat many diseases. And nowadays, despite the level of medical development, this is a fairly common experience around the whole world, as demonstrated by numerous studies. Access to outpatient dental care is currently problematic in many regions of Ukraine that are located near the hostilities zone. When faced with a situation involving dental or orofacial pain, patients are forced to seek pain-reducing remedies on their own.

The aim: To investigate the range of agents used by patients to relieve pain in conditions of limited access to outpatient dental care.

Materials and methods: A survey of patients who sought emergency dental care was conducted. Also they had toothache of varying intensity and limited access to outpatient dental care in several days before the visit. The application form contained questions about the means used to relieve pain.

Results: A total of 87 people took part in the survey. Pain associated with caries complications was experienced by 62 people (or 71.3%). Twenty-five people (or 28.7%) came to the clinic with pain due to periodontal disease. The results of the questionnaires revealed the use of both pharmacological and non-pharmacological means to relieve pain symptoms. The list of pharmacological products includes oral nonsteroidal anti-inflammatory drugs such as paracetamol, nimesil, ibuprofen, and antibiotics. Among the non-pharmacological remedies, respondents mentioned salt water rinses, chewed garlic, or taped to the wrist. They also used other herbal remedies such mixture of clove and olive oils, peppermint tea, tincture of calendula and chamomile decoction that were rinsed oral cavity, placed into a caries cavity, applied on a gingiva. Several patients reported drinking excessive amounts of alcohol and smoking tobacco and cannabis.

Conclusions: Self-medication practice is typical not only for people with financial problems. Lack of time, environmental conditions or negative treatment experiences also "push" financially independent patients to seek this practice. It should be noted that even if the remedy was chosen properly, the method of its application was not always correct. Methods of health education among the Ukrainian population should be strengthened. It is essential to pay attention to the online consultations available now. They allow patients to access distant medical diagnostic methods, treatment and monitoring, as using even well-known prescriptions without consulting a doctor can be harmful to health.

Ключові слова: Ключові слова: самолікування, невідкладна стоматологічна допомога, зубний та орофасціальний біль

Key words: self-medication practice, emergency dental care, dental and orofacial pain

PROVIDING EMERGENCY AND URGENT DENTAL CARE TO UKRAINIAN REFUGEES IN THE REPUBLIC OF ESTONIA

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Introduction: The number of Ukrainian refugees in Estonia who had a residence permit based on the temporary protection exceeded 38,000 at the beginning of 2023. The Estonian state is helping refugees from the war in Ukraine to adapt more quickly and comfortably in Estonia and cope with everyday life including the receiving of proper medical care.

The aim: To analyze the volume and sequence of the receiving of emergency and urgent dental care for Ukrainians on the territory of the Republic of Estonia in the conditions of a long-term war in Ukraine.

Materials and methods: Providing emergency and urgent dental care to Ukrainian people who crossed the border with the Republic of Estonia on February 24, 2022 and later due to the outbreak of a full-scale war on the territory of Ukraine in search of the temporary shelter by analyzing data prepared with the support of United States Agency for International Development (USAID) provided on behalf of the people of United States of America with the support of the Good Governance Fund Program of the Government of Great Britain, provided on behalf of the people of Great Britain.

Results: Ukrainians who crossed the border with Estonia on, or after February 24, 2023 can receive necessary and urgent medical care. However, they do not automatically receive the health insurance, so it means that they do not have access to a full list of medical services on the same level as the Estonian citizens. Estonia guarantees emergency dental care for all citizens of Ukraine who crossed the border with Estonia on, or after February 24, 2023. Emergency dental services provide assistance in case of an abscess, phlegmon, acute toothache etc. In this case, Ukrainians can contact the dentist directly, without visiting the family doctor, who makes the first medical decision regarding each health-related problem of the patient in institutions that provide emergency dental care. Children up to 19 years of age (inclusive) can count on free services. And pensioners, people older than 63 and the persons, who have the partial or total disability can receive benefits e.g. for prosthetics. A scheduled visit to the dentist is a paid service in Estonia, even if you have the insurance. Ukrainians must obtain the medical insurance to access the full list of the medical services. In order to receive the insurance from the Republic of Estonia, Ukrainians who changed their country of residence due to the war need to issue the temporary protection, that is, a residence permit in Estonia for a period of one year. After a citizen of Ukraine has received a residence permit and an Estonian identification code, he/she can apply for the medical insurance on the same level as Estonian citizens. The Estonian Hospital Fund organizes the state medical insurance. Also, you can call emergency help – 112 in the case of fractures, burns and other serious injuries e.g. maxillofacial area. This service is free for Ukrainians. If it is necessary, the patient can be referred to a specialist doctor after providing the emergency care. Emergency dental care is free for everybody in Estonia. But you can get such services only in those medical institutions that have a contract with the Estonian Hospital Fund. The dentist decides whether the patient currently needs emergency care. The list of free services that are compensated by the Hospital Fund in the case of emergency care contains examination of the patient, consultation, status making, drawing up a treatment plan, determination of hygienic or periodontal indices; plaque removal; superficial anesthesia (analgesia of the oral mucous membrane); injection anesthesia; extraction of a tooth having one root; extraction of a tooth having several roots; extraction of a deeply broken tooth, or destroyed tooth; opening of an abscess in the maxillofacial area and its treatment; hemostasis with suturing; repeated control after surgical treatment; tooth or implant removal using osteotomy; intraoral X-ray picture of one tooth; panoramic picture of teeth.

Conclusions: The medical system in the Republic of Estonia operates according to the principle of general solidarity state health insurance that provides the equal access to quality medical care to all insured persons. Without health insurance a person also has access to all medical services but for money. Estonia provides Ukrainians with limited access to medical services, so they without medical insurance can only count on free emergency medical care and those medical services that are critically important for their lives, including emergency dental care.

Key words: emergency, urgent dental care, Republic of Estonia, long-term war

EFFECTIVENESS OF DIFFERENT METHODS OF TREATMENT OF SOFT TISSUE HEMANGIOMA OF THE MAXILLO-FACIAL REGION IN CHILDREN

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ЕФЕКТИВНІСТЬ РІЗНИХ МЕТОДИК ЛІКУВАННЯ ГЕМАНГІОМ М'ЯКИХ ТКАНИН ЩЕЛЕПНО-ЛИЦЕВОЇ ДІЛЯНКИ У ДІТЕЙ

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ПОЛТАВСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ, ПОЛТАВА, УКРАЇНА

Вступ: Дослідники зазначають, що частота виявлення гемангіом (ГА) щелепно-лицевої ділянки (ЩЛД) у дітей в Україні останнім часом значно збільшилась. Враховуючи те, що дана патологія здатна супроводжуватися низкою досить непередбачуваних ускладнень з ймовірністю загрози життю хворих, питання надання висококваліфікованої, адекватної, нерідко екстреної та невідкладної, допомоги цій категорії пацієнтів набуває особливого значення.

Мета: Проаналізувати ефективність різних методик лікування в комплексній терапії дітей з гемангіомами м'яких тканин ЩЛД.

Матеріали і методи: В ході дослідження узагальнено зміст 32 стаціонарних історій хвороб та 47 амбулаторних карт тематичних дітей, пролікованих в клініці кафедри дитячої хірургічної стоматології Полтавського державного медичного університету. Всім їм після загальноклінічного обстеження призначалися консультації суміжних спеціалістів, а у сумнівних випадках для визначення остаточного клінічного діагнозу та планування об'єму і виду лікувальних заходів застосовувались додаткові методи дослідження (діагностична пункція, УЗД, КТ чи МРТ, ангіографія та доплерографія судин) із урахуванням нозологічної форми захворювання.

Результати дослідження: Згідно отриманих результатів, в структурі гемангіом за клінічними ознаками склали: 16 – (20,2%) капілярні, 9 – (11,4%) піогенна гранульома (дольчаста капілярна гемангіома), 18 – (22,9%) кавернозні, 36 – (45,5%) змішані. В 25 % спостережень (4/16) капілярні гемангіоми самостійно редукувалися протягом 7-12 місяців після народження дитини. Незначні за обсягом і глибиною залягання новоутворення, які зустрічалися у 56 % випадків (9/16), було ліквідовано діатермокоагуляцією або введенням місцево малих доз преднізолону, що добре зарекомендував себе в клінічній практиці саме за такої ситуації (у всіх випадках вдалося досягти позитивного ефекту). Для усунення «великих плям» (у 3 пацієнтів із 16), застосовувалась фракційна лазеротерапія, яка в 2 випадках дала гарні результати, а у 1 пацієнта, на жаль, бажаного результату досягти не вдалося. Для запобігання рецидивування при значних розмірах піогенної гранульоми у 33% пацієнтів (3/9) проводилось радикальне хірургічне видалення утворення під місцевим чи загальним знеболенням, а у 67% (6/9), за малих розмірів, ми обмежились діатермокоагуляцією, чим також досягли гарного косметичного ефекту. У 72% пацієнтів з кавернозними гемангіомами (13/18) проводилось консервативне лікування Дипроспаном його чотирьохразовою інфільтрацією по периферії утворення. Така методика з інтервалом 1 раз на місяць дозволила досягти гарного косметичного ефекту в 50% спостережень (9/18), а у 22% дітей (4/18) додатково була проведена хірургічна корекція залишкових явищ. При цьому особливу увагу приділяли залученню суміжних спеціалістів для визначення протипоказань до проведення кортикостероїдної терапії. Коли кавернозні гемангіоми активно прогресували та розташовувалися на губах, у щічній або привушній ділянках, навколо носових ходів, що зустрічалось в 23% спостережень (5/18), виникала необхідність в комбінованому підході до лікування. В таких випадках ми розпочинали роботу з черезшкірного прошивання пухлини швами Крогіуса, для запобігання прорізування яких з наступним формуванням грубих рубців на шкірі і з метою створення сприятливих умов для проведення санаційних заходів використовувався поліетиленовий катетер, розрізаний навпіл в довжину. Після накладання швів через поверхню катетера із проміжками в 2-2,5 см один від одного та ізоляції судин, що забезпечують кровопостачання гемангіоми, проводили пункцію новоутворення з різних полюсів, за рахунок чого евакуйовували кров. Кількість проколів залежала від розмірів ГА. У порожнини каверн, що виникали внаслідок цієї маніпуляції, вводили 70% розчин спирту, за можливості зворотньо проводячи його аспірацію, вміст якої був мізерним. Накладали асептичну пов'язку та призначали медикаментозний супровід із врахуванням клінічної ситуації. Шви знімали через 2 тижні. По завершенні цього етапу, за наявності рубцевозмінених тканин або залишків видозмінених ділянок, додатково проводили хірургічну корекцію. Таким методологічним підходом у всіх випадках вдалося досягти гарного косметичного ефекту. Враховуючи той факт, що в наукових публікаціях активно висвітлюються питання щодо високої ефективності селективних β -адреноблокаторів при лікуванні гемангіом, у 86% пацієнтів (31/36) зі змішаними їх формами після всебічного клінічного обстеження, консультацій спеціалістів суміжних профілів і за відсутності протипоказань провели їх усунення застосуванням Анаприліну, який використовувався перорально 1 раз на добу в дозі 1,0 мг/кг для

пацієнтів віком до 2 міс і 2 рази на добу в добовій загальній дозі 2 мг/кг для пацієнтів старше 2 міс. Тривалість лікування складала від 3 до 12 місяців та залежала від динаміки клінічних проявів. В результаті лікування у всіх випадках спостерігалася стабілізація або зменшення розмірів пухлини із її розм'якшенням і поблідінням, що уже є ознакою позитивного ефекту. При цьому зміни починали з'являтися уже в перші тижні лікування та досягали найбільшого ефекту через 2-3 місяці. Здебільшого до 5-6 місяця терапії гемангіоми набували вигляду блідих рожевих плоских плям. За такої динаміки для закріплення отриманих результатів і з метою запобігання рецидивуванню, курс лікування продовжували протягом наступного місяця, в результаті чого утворення поступово фрагментувалися на дрібні судинки на тлі появи острівців здорової шкіри. Ускладнень, пов'язаних із даною методикою лікування гемангіом, не спостерігали. Окремі випадки незначних побічних ефектів Анапріліну потребували корекції дозування препарату кардіологом. По завершенню комплексного лікування гемангіом всі діти, відповідно до індивідуального плану, пройшли курс реабілітаційних заходів, обсяг і вид яких залежав від клінічної ситуації в кожному окремому випадку.

Висновок: Вибір адекватного метода лікування гемангіом м'яких тканин щелепно-лицевої ділянки із урахуванням їхньої нозологічної класифікаційної форми надає можливість запобігти розвитку життєвонебезпечних ускладнень та грубих рубцевих змін і досягти гарного косметичного ефекту, що потребує виваженого диференційованого підходу із урахуванням форми пухлини та анатомічної ділянки її розташування.

Ключові слова: діти, гемангіома, щелепно-лицева ділянка, м'які тканини.

Key words: children, hemangioma, maxillofacial area, soft tissues.

IMPERFECT DIAGNOSTICS OF ACUTE INFLAMMATORY PROCESSES IN THE MAXILLO-FACIAL AREA BEFORE CHILDREN HOSPITALISATION IN CLINIC

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НЕДОСКОНАЛІСТЬ ДІАГНОСТИКИ ГОСТРИХ ЗАПАЛЬНИХ ПРОЦЕСІВ ЩЕЛЕПНО-ЛИЦЕВОЇ ДІЛЯНКИ У ДІТЕЙ НА ДОГОСПІТАЛЬНОМУ ЕТАПІ

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ПОЛТАВСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ, М. ПОЛТАВА. УКРАЇНА

Вступ: В останні роки спостерігається збільшення дітей з гострими і хронічними запальними процесами щелепно-лицевої ділянки, чому переважно сприяє підвищення вірулентних властивостей мікроорганізмів, що вегетують в порожнині рота, їх поліантибактеріальна резистентність, рівень сенсibiliзації організму та зниження факторів неспецифічного імунітету. Вони займають одне з провідних місць в структурі всіх нозологічних форм захворювань і за стаціонарних умов на них припадає до 54,0%, а їх частка варіює в залежності від вікового цензу. До найбільш вагомих чинників, які сприяють формуванню такої негативної ситуації відносяться соціально - біологічні, соціально-гігієнічні і суто соціальні. Ці важливі фактори можуть чинити вплив на розвиток організму як в антенатальному, так і постнатальному періодах життя дитини, а прояви їх агресивності залежать від багатьох складових, починаючи з характеру вигодування після народження, рівня фізичного розвитку і закінчуючи низькою ефективністю стоматологічних профілактичних заходів, застарілою матеріально-технічною базою та відсутністю програм стосовно медичного забезпечення декретованих груп населення.

Мета: Встановити частоту діагностичних помилок на догоспітальному етапі при гострих запальних захворюваннях щелепно-лицевої ділянки у дітей.

Матеріали та методи: Для досягнення поставленої мети було проведено ретроспективний аналіз історій хвороб тематичних пацієнтів за 5 років, які лікувалися в дитячому хірургічному відділенні. Нами було проаналізовано результати даних анамнезу захворювання 207 хворих. Із них 123 з гострим гнійним лімфаденітом (59,4%), 29 з аденофлегмоною (14,0%) і 55 з гострим одонтогенним остеомієлітом (26,6%). Статистична обробка виконувалася відповідно до рекомендації Голованової І.А., і співавт. (2017).

Результати дослідження: В групу дітей з гострим гнійним лімфаденітом увійшло 123 особи. Результати вивчення анамнезу захворювання дозволили встановити, що перші прояви запалення безпосередньо в лімфатичному вузлі виникли у 52 пацієнтів (42,3%), але враховуючи той факт, що на початку захворювання загально-клінічні прояви превалювали і маскувалися під гостре респіраторне захворювання, їх лікували педіатри відповідно цього діагнозу. Лише, тоді, коли з'являлися локальна припухлість м'яких тканин в певній анатомічній ділянці та больова симптоматика, на це була звернута їх увага. Така ж ситуація мала місце і у випадках, коли перебіг запалення в лімфатичних вузлах асоціювалося з гострою патологією ЛОР – органів та бронхолегеневої системи, що стосувалося 19 пацієнтів (15,4%), при цьому, починали їх лікувати лікарі відповідних спеціальностей. Інша ситуація виникала коли мова заходила, безпосередньо, про лімфаденіти одонтогенного походження, незалежно від нозологічної форми провокуючого чинника. Не дивлячись на те, що причиною гострого гнійного запалення у всіх 39 пацієнтів (31,7%) був гострий періодонтит чи загострення однієї з його хронічних форм від тимчасових та постійних зубів, вірний клінічний діагноз на догоспітальному етапі було зафіксований в 17 випадках (43,6%) стоматологами. Решті 12 – 30,7%, які звернулися до суміжних спеціалістів встановлено помилковий діагноз. Рідні 10 дітей (25,7%), із цієї групи, зовсім не зверталися за медичною допомогою. Слід зауважити, що у 13 пацієнтів (10,6%) етіологічний чинник не вдалося встановити, а за спеціалізованою допомогою вони зверталися, в переважній більшості, на 2 – 4 добу від початку захворювання і цей термін був меншим при одонтогенній інфекції. Із 29 дітей з аденофлегмоною преморбідний фон, що передував її виникненню розподілився наступним чином: 11 дітей (38,0%) – гостра респіраторна вірусна інфекція гострі, запальні захворювання ЛОР – органів та бронхолегеневої системи стосувалися 5 пацієнтів (17,2%), у 2 гнійничкове враження шкіри (6,9%) і у 11 – 38% етіологічним чинником була стоматогенна інфекція. При цьому, у 6 випадках причиною слугував гострий періодонтит (54,6%), у 4 – 36,4% цьому передувало чергове загострення хронічного періодонтиту від тимчасових та постійних зубів, і тільки у одного пацієнта це виникло на тлі стоматиту (9,1%). На початку захворювання, як і при гострому гнійному лімфаденіті, на перший план виходили загальносоматичні порушення. Діти з аденофлегмоною неодонтогенного походження направлялися на госпіталізацію спеціалістами суміжних спеціальностей протягом 4 - 6 діб від початку захворювання, після безуспішного амбулаторного лікування. На жаль, із 18 пацієнтів з неодонтогенною етіологією захворювання, у 9 – 50% діагноз лікувального закладу, який направляв дитину, не співпадав. При стоматогенній патології, у

випадках, коли пацієнти зверталися безпосередньо за стоматологічною допомогою, із 11 випадків невірний діагноз було встановлено у 6 дітей (54,5%). Слід зауважити, що аденофлегмона у даної категорії хворих мала більш агресивний перебіг, зі стрімким наростанням місцевих клінічних проявів, тому і на госпіталізацію вони потрапляли переважно на 2 - 3 добу.

Із 55 дітей з гострим одонтогенним остеомиєлітом тільки 12 - 21,8% звернулися за допомогою до суміжних фахівців при перших проявах захворювання і враховуючи значне порушення загальносоматичного стану відразу чи протягом перших двох діб були направлені на стаціонарне лікування з діагнозами, які не потребували уточнення. Інші 43 – 78,2%, що звернулися безпосередньо за допомогою до стоматологічних закладів, досить різнилися за характером перебігу захворювання і видами надання медичної допомоги. При первинному зверненні, на госпіталізацію була направлена із суто різними стоматологічними діагнозами 31 дитина (72,1%), проте, у 19 із них (61,3%) вони не співпадали з діагнозом спеціалізованої клініки. Решта, 12 дітей (38,7%), на догоспітальному етапі отримували стоматологічну допомогу терапевтичної спрямованості і загальне медикаментозне лікування, які не давали позитивної динаміки навіть після видалення «причинного» зуба у 7 пацієнтів (58,3%). Із цих 12 дітей діагноз установи, що направляв дитину, у 5 - 41,7% не співпадав з клінічним.

Висновки: Не дивлячись на виражену клінічну маніфестацію перебігу гострих гнійних запальних захворювань щелепно-лицевої ділянки у дітей, доступність до візуальної оцінки ситуації і можливість проведення суто інформативних стоматологічних та додаткових методів обстеження, частота діагностичних помилок на догоспітальному етапі досить вагома. Це потребує більш прискіпливої уваги всіх суміжних спеціалістів до вивчення деяких нюансів збору анамнезу захворювання і знання анатоμο- фізіологічних особливостей будови м'яких тканин і кісток обличчя в віковому аспекті.

Ключові слова: діти, лімфаденіт, аденофлегмона, остеомиєліт, недосконалість діагностики.

Key words: children, lymphadenitis, adenophlegmona, osteomyelitis, imperfect diagnostics