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STUDY OF MEDICAL KITS FROM PASSENGER TRAINS

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Мета. Метою статті є дослідження складу аптечки медичної, якою повинні бути укомплектовані потяги.

Матеріали та методи. У дослідженні застосовувалися такі методи, як контент-аналіз, аналітичний, порівняльний та логічний, експертних опитувань. У процесі дослідження застосовувалося експертне анкетування, в якому брали участь начальники потягів та проводники, загальною кількістю 453 особи. В опитуванні задіяні фахівці регіональних філій Укрзалізниці, а саме Львівської, Південно-Західної, Південної, Одеської, Придніпровської залізниць. Висновки респондентів є обґрунтованими та збіжними, що підтверджено коефіцієнтом конкордації та критерієм Пірсона з урахуванням числа свободи, які перевищують нормативні (табличні) значення. Контент-аналіз використовувався для дослідження нормативної бази стосовно укомплектування потягів аптечками медичними.

Результати. Проведене анкетне опитування визначило, що всі респонденти впевнені в необхідності наявності в потязі аптечки медичної, але значна частина респондентів не знають про її наявність та місце розташування в потязі. 75,70 % респондентів вважають, що в потязі повинні бути в наявності два види аптечок медичних – у начальника потягу та у провідника. Лише 53,70 % респондентів відомий склад аптечки медичної, при цьому їх значна частина вважають за необхідне удосконалення складу аптечки та регулярного проходження відповідних курсів надання першої домедичної допомоги та отримання сертифікатів.

На підставі контент-аналізу визначено, що пасажирський вагон повинен бути оснащений однією медичною аптечкою та однією додатковою аптечкою на потяг на випадок аварії. При укомплектуванні аптечок медичних рекомендовано орієнтуватися аптечки медичні автомобільні.

Досліджено аптечки медичні, якими укомплектовані потяги Росії, Республіки Казахстан та Республіки Біларусь.

Висновки. Досліджено склад аптечок медичних, якими укомплектовані потяги України, Росії, Республіки Казахстан та Республіки Біларусь. Визначені переваги та недоліки цих аптечок та запропоновано напрямки удосконалення аптечок медичних, якими укомплектовані потяги Укрзалізниці

Ключові слова: аптечка медична, поїзд, аварія, залізниця, начальник поїзда, пострадавшие, лікарський засіб, виріб медичного призначення, провідник, долікарська допомога

1. Introduction

One of the problems that is worrying around the world is the continued increase in rail accidents, as their consequences are quite significant, both in terms of irreversible human and material losses and time losses.

The largest accidents involving trains include the accident at a railway in Denmark, which killed eight people [1]. In the Netherlands, a bicycle with four children was lost to the train, and two adults were traumatized [2]. In Serbia, a train and a bus collided, leaving five people dead, 30 injured, and more than 10 people in severe condition are in the hospital [3]. In Ukraine, the passenger train № 139 Kyiv-Kamyranets-Podilsky collided with a maneuvering

locomotive, resulting in the first train of the train descended from the rails, hospitalized four children and one adult [4].

2. Formulation of the problem in a general way, the relevance of the theme and its connection with important scientific and practical issues

In Ukraine, the number of traffic accidents on the railways is gradually decreasing, but the number of injured as a result of these accidents increases. Thus, during 2018, there were 79 accidents on the railroad, in which 16 people died and 30 [5] injured. During the corresponding period in 2017 there were 86 accidents, the number of deaths was 20, injured – 22 [6] (Fig. 1).

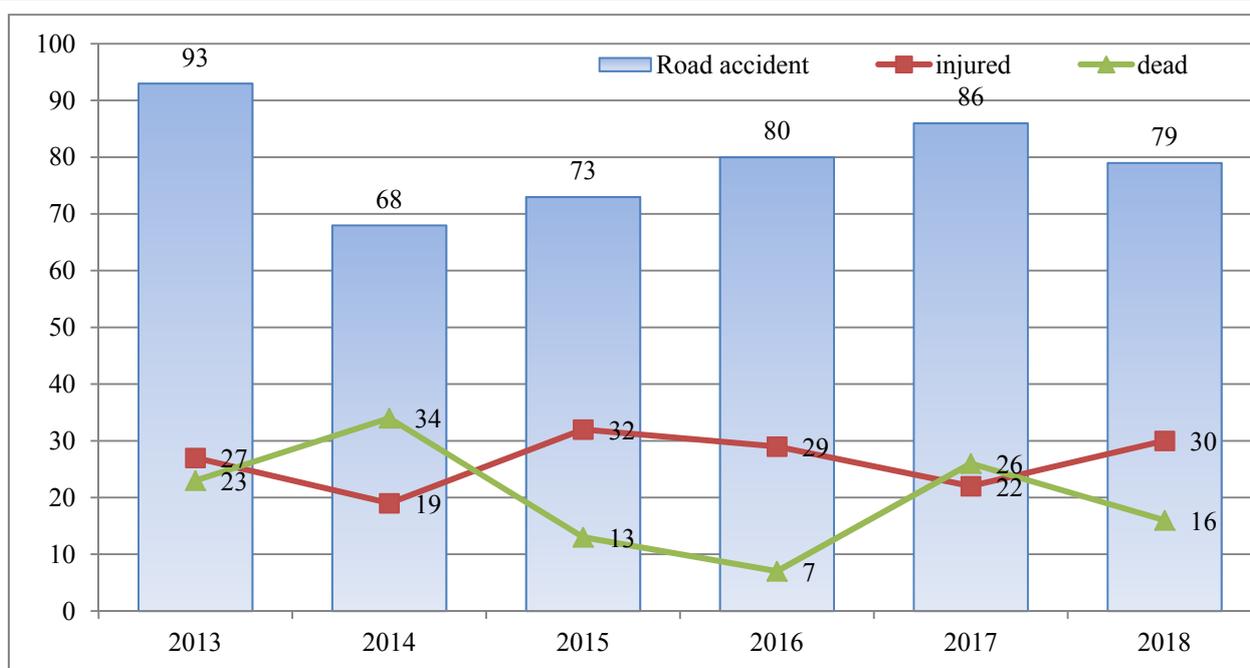


Fig. 1. Statistics on the railway accident in Ukraine

The largest number of accidents is observed on the Southwest Railway, the second place is Lviv, the third place is the Odessa railway, Prydniprovskya and Southern railways [6].

According to statistics, there are 5422 traffic accidents on the railway in Ukraine, 49.78 % of which are equipped with an automatic sound and traffic signaling alarm, 27.61 % are equipped with

barriers and guarded by regular, 22.61 % – not equipped with alarm system and are not guarded by regulars (Fig. 2) [7].

Most often, these accidents occur remotely from settlements, therefore, it is necessary to provide the first medical aid before the arrival of doctors, so the train should have a medical first-aid kit, which will save the life of the injured person.

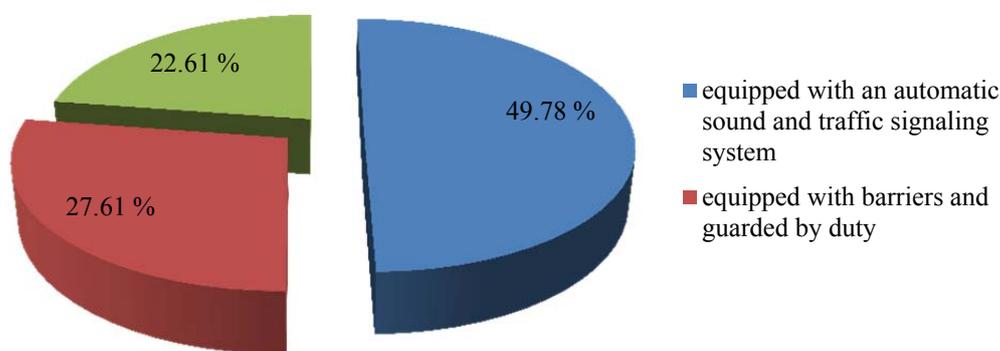


Fig. 2. Distribution of traffic accidents on the railway, depending on the arrangement

3. Analysis of recent studies and publications in which a solution of the problem and which draws on the author

The study of the problem was not given much attention by foreign and Ukrainian scholars. In Ukraine, the list of medical products and medical devices that are included in the pharmacy of trains are given only in the order of the Ministry of Health of Ukraine No. 187 and DSTU 3961-2000. The issue of composition of the first-aid kit in Ukraine was investigated for Emergency Situation Ministry rescuers [8, 9] and the first-aid kit for car [10, 11]. That requires the intensification of research on this issue, taking into account the experience of the leading countries of the world.

4. Allocation of unsolved parts of the general problem, which is dedicated to the article

The need to effectively equip participants in first aid is obvious and is confirmed by the current regulatory documents, training programs for various categories of first aid participants, and first aid techniques. The implementation of these activities involves the development and implementation of lists of first-aid kits and stowages for various first aid providers. However, the mass character of first-aid kits and stowages, the presence of a commercial component and the apparent simplicity of the problems of their development can lead to the fact that the factors that are not related to first aid, high-quality and effective equipment of its performers can affect the

composition of first-aid kits and stowages. To avoid this, it is important to develop the composition of first-aid kits and first aid kits based on a comprehensive, comprehensive analysis of all aspects of their application, which allows for a clear and undeniable justification of the composition, principles of development, implementation and use. This necessitates the scientific substantiation of the principles of development and use of first-aid kits, which take into account the totality of factors (legal, economic, social, medical, organizational, production, etc.), as well as determining their qualitative and quantitative content. This determined the choice of goals and objectives of the dissertation research.

5. Formulation of goals (tasks)

The aim of the article is to study the composition of the medical first aid kit, which should be equipped with trains.

6. Statement of the basic material of the study (methods and objects) with the justification of the results

The study applied expert survey, which was attended by heads and train conductors. The total number of respondents was 453, of which 41 % were men, respectively, 59 % of women. The survey involves specialists of the regional branches of Ukrzaliznytsia, namely Lviv, South-Western, Southern, Odessa, and Pridneprovskaya railways (Fig. 3, a). Distribution of respondents by experience is shown in Fig. 3, b, by age – in Fig. 3, c.

The findings of the respondents are obedient and convergent, which is confirmed by the coefficient of concordance, which exceeds the minimum acceptable value ($0.8674 > 0.75$), and the Pearson criterion, taking into account the number of freedom (exceeds the table value).

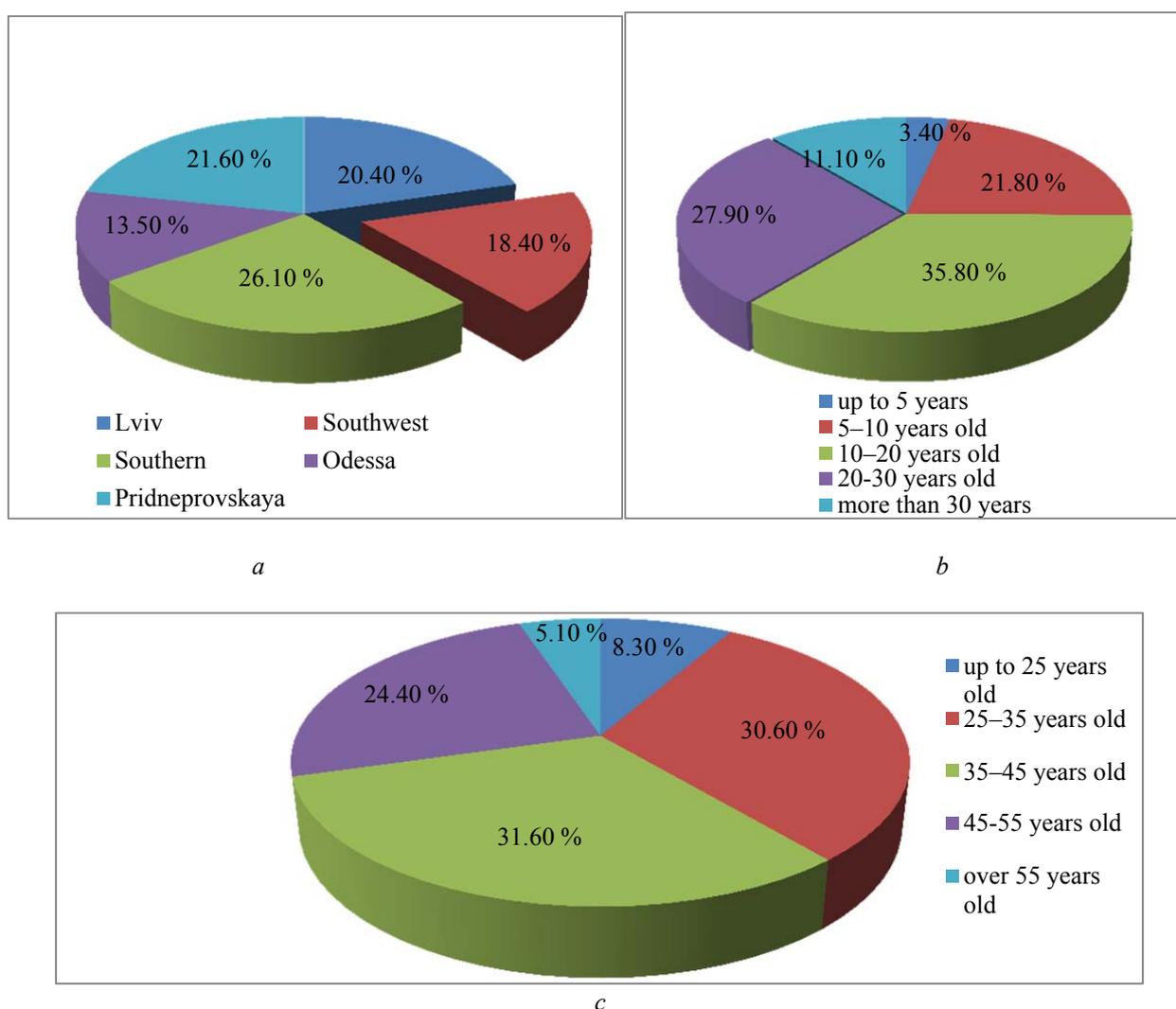


Fig. 3. Respondents who participated in a study concerning the provision of medical kits trains: a – by regions; b – by experience; c – by age

The research also used such methods as content analysis, analytical, comparative and logical.

The research was carried out in three stages: the first stage – questioning of railroad workers; the second stage – a content analysis of the regulatory framework

for the train staffing with medical first aid kits; the third stage – a comparison of the medical first-aid kit, which provides the attraction of different countries.

Due to the fact that a significant number of accidents on the railway are remote from or out of

settlements, there is a need for the provision of traffic accidents on the scene. An important element that allows the first aid to be provided in a timely manner is a medical first aid kit that is equipped with relevant medical products (RMPs) and medicinal products (medicines) located in the train.

A questionnaire survey revealed that all respondents (100.00 %) were convinced of the need for a medical first-aid kit in the train, but 36.80 % of respondents did not know if it was in the train; 30.90 % of respondents are confident in her absence; 15.40 % of respondents know about its existence; 16.90 % of respondents find it difficult to answer questions (Fig. 4, *a*). Regarding the location of a medical first aid kit in the train, 70.50 % of the respondents who gave a positive answer to the previous question answered that she was in the chief of the train; 5.60 % of respondents complicate the answer given (Fig. 4, *b*). Unfortunately, only 53.70 % of the respondents are well-known for the medical first-aid kit (Fig. 4, *c*), of which more than 80.00 % consider it necessary to improve it, taking into account current trends in treatment and world standards (Fig. 4, *d*), but this in turn leads to the necessity of regular passing of conductors and chiefs of trains (53.10 % of respondents) of the corresponding courses for the provision of traffic safety and certification (Fig. 4, *e*). In the opinion of 75.70 % of respondents in the train, two types of medical first-aid kits should be available in the train: one is at the head of the train, and the other one must be equipped with train cars and located in the conductor (Fig. 4, *f*).

At the next stage, a content analysis of the regulatory framework for the training of trains with medical first-aid kits was carried out. Thus, according to the Order of the Ministry of Transport of Ukraine of 20.11.2001 [12], each carriage must be equipped with one medical first-aid kit, as well as one additional emergency medicine kit in the event of an accident. When equipping medical first-aid kits, they are guided by the recommended medicines and RMPs, which are provided in the first-aid kits of medical automobiles [13, 14]: an emergency kit – a tourniquet for stopping arterial bleeding, sterile gauze bandages 5m x 10m and x 14cm, napkins with chlorhexidine 6cm x 10cm, hemostatic napkins with furagin 6cm x 10cm, sterile dressing bag, elastic bandage 5m x 10cm, gauze bandage unsterile 7m x 14cm and 5m x 5cm sterile napkins 6cm x 10cm, scissors with blunt ends and a ballpoint pen pad; operating set – adhesive plaster in a roll of 5cm x 5m,

plaster bactericidal 2.3cm x 7.2cm, bandage gauze sterile 7m x 14cm, bandage gauze unsterile 5m x 5cm, gauze sterile sterile napkins and sterile cotton wool 50 gr.

At the third stage of the study there was a comparison of the composition of medical first-aid kits, which ensure the attraction of different countries. The analysis revealed that in Russia [15] three types of medical first-aid kits are used:

1) medical first aid kit (for the head of the train), intended to provide the first medical aid to workers and passengers in trains of long-distance trains in case of emergencies and various diseases before the arrival of specialized medical brigades [16];

2) medical railway first aid kit for conductor [17];

3) medical laying for the provision of traffic rules to victims in railway transport (in long-distance trains and suburban electric trains) [18].

In accordance with the Law of the Republic of Belarus "On Public Health" [19] and the Decree of the Ministry of Health of the Republic of Belarus dated January 15, 2007 No. 4 "On approval of the list of attachments included in the first aid kits and the procedure for their completion" [20] medical kits are divided into:

- first-aid kit of universal first aid;
- first-aid kit for medical equipment;
- first aid kit for newborns;
- medical kit for healthcare professionals student teams.

The Law of the Republic of Belarus of June 23, 2008 No. 356-3 "On Occupational Safety" all industrial sites and vehicles should be equipped with medical first aid kits, complete with the necessary medical devices and RMPs. The sanitary rules and norms of the Republic of Belarus "Hygienic requirements for the organization of passenger transport by rail" also stipulate that the first-aid kit for the universal medical aid, which must be completed with all trains of the Republic of Belarus railway, with an additional list of attachments to the medical first-aid kits.

In the Republic of Kazakhstan, the first-aid kits are provided for railway passenger AGD-010, which are a set of medical and veterinary medicines intended for the provision of medical care in the railway transport.

The comparative table of medical first-aid kits, which must be equipped with trains from different countries, is given in the Table 1.

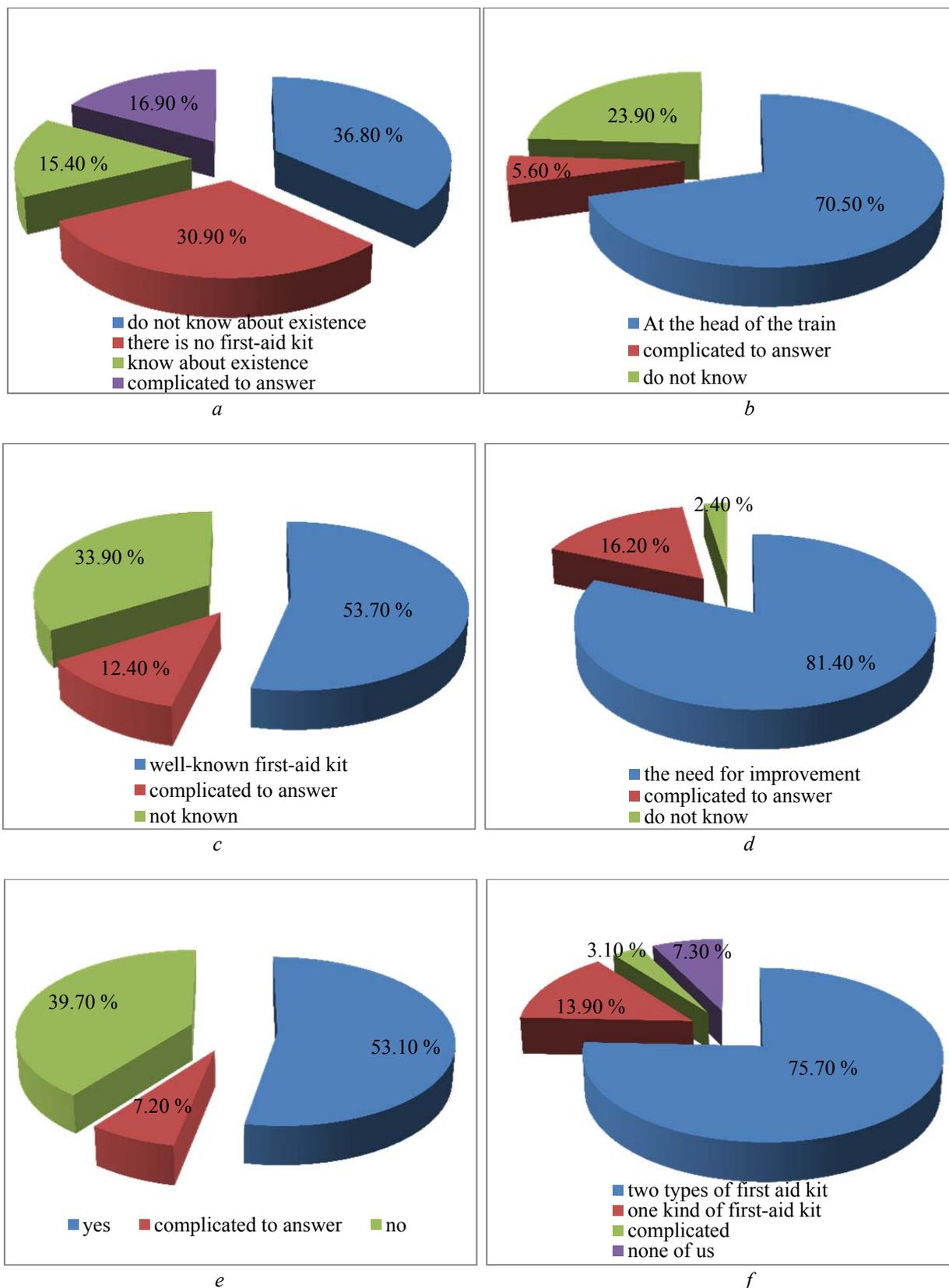


Fig. 4. The results of the expert survey conducted by railway workers on the provision of trains with medical first aid kits: *a* – availability of medical first-aid kit; *b* – the medical first-aid kit location; *c* – respondents are well-known for the medical first-aid kit; *d* – perfection of the medical first-aid kit; *e* – passing training in medical care; *f* – optimal number of medical first-aid kits

Table 1

Composition of medical colleges, equipped with trains in different countries

Composition	Ukraine		Russia			Re- public of Kaza- khstan	Republic of Belarus	
	Order of the Ministry of Health of Ukraine No. 187	State Standard of Ukraine 3961 - 2000	for the chief of the train	for conductor	laying for first aid		universal	additional list
1	2	3	4	5	6	7	8	9
Ammonium solution 10 % 1 ml No. 10 (fl. 10 ml, 40 ml)						+	+	+
Aminophylline pills 0,15 No. 30								+
Analgin tablets No. 10			+	+		+		
Acetylsalicylic acid pills No. 10				+		+	+	
Baralgin pills No. 10			+	+				
Bisacodyl pills 0,005 No. 30								+
Medical bandage gauze unsterile 5 m×5 cm		+			+			
Non-sterile gauze bandage 5 m×10 cm							+	+
Non-sterile gauze bandage 7 m×14 cm		+						
Bandage gauze sterile 5 m×10 cm	+	+	+	+		+	+	
Bandage gauze sterile 5 m×7 cm				+				
Bandage gauze sterile 7 m×14 cm		+	+		+			
Elastic bandage 5 m×10 cm		+						
Tubular bandage No. 1,3,6				+		+		
Boric acid powder 10,0 gr								+
Safety pins	+							
Brilliant green solution 1 % 10 ml			+	+		+	+	+
Validol tablets not less than No. 6			+	+		+	+	
Sterile cotton wool		+	+	+		+	+	+
Activated carbon tablets No. 10				+		+	+	+
Gyceryl trinitrate tablets 0,0005 gr No. 40							+	
Portable hypothermic package container	+							
Tourniquet hemostatic	+	+	+	+	+	+	+	
Drotaverine hydrochloride (no-shpa) tablets No. 10				+			+	
Aminophylline solution 2.4 % 5×5						+		
Gastric probe						+		
Intubation tube						+		
Iodine alcohol solution 5 % 10 ml	+		+	+			+	+
Potassium permanganate 5,0 gr (3,0 gr)						+	+	+
Kit for childbirth			+					
Corvalol drops of at least 15 ml			+	+			+	
Scarf medical dressing 50cm×50cm	+					+		
Plaster germicidal sterilized at least 1.9cm×7.2cm	+	+		+	+			
Plaster germicidal sterilized not less than 4cm×10cm			+	+		+	+	
Rolled adhesive plaster	+	+				+		
Balsamic liniment (by Vishnevsky) 30.0 (50.0)								+
Flashlight						+		
Loperamide tablets 0.002 gr No. 10 (No. 20)							+	
Loratadine tablets 0,01 gr No. 10							+	
Magnesium sulfate solution 10.0 ml (20.0)						+	+	+
Ointment reparef-1 (reparef-2) 25,0 (30.0)								+
Mask medical non-sterile three-layer					+	+		
Metamizole sodium tablets 0.5 No. 10							+	
Bags for corpses			+			+		

Continuation of the Table 1

1	2	3	4	5	6	7	8	9
Polyethylene bag with clip at least 20 cm×25 cm					+			
Rubber bullet							+	
Sodium bicarbonate 20.0 (25.0)							+	+
Naphazoline 0.1 % (xylometazolin 0.1 %)							+	
Nitroglycerin capsule No. 20	+		+	+				
Scissors	+	+	+	+		+	+	
Cloak-clothes NA-2						+		
Individual dressing package	+	+			+	+		
Paracetamol tablets 0,5 gr No. 10							+	
Paper compress No. 10								+
Hydrogen peroxide 3 % 40 ml						+	+	+
Tweezers anatomical						+		
Pipette							+	
Antimicrobial bandage with chlo-rohexidine sterile 6 cm×10 cm			+	+				
Hydrogel bandage against burn 10 cm×10 cm			+	+				
Endage homeostatic sterile 6 cm×10 cm No. 3			+	+				
Air duct						+		
Blanket rescue	+		+			+		
Device for artificial respiration "mouth-device-mouth"	+		+	+				
Sulfacyl sodium solution of 20 % 1 ml in a syringe tube	+							
Recommendations for icons for using VMP					+	+	+	
Repellent								+
Mouth extender						+		
Non-sterile gloves	+		+	+	+	+		
Sterile gauze cloth		+	+	+	+			
Antiseptic alcohol wipes			+	+	+	+		
Napkins of nonwoven material with hydrogen peroxide			+	+				
Napkins from nonwoven material with ammonia solution			+	+				
Wipes with chlorhexidine 6cm × 10cm	+	+						
Hemostatic wipes with furagin 6cm x 10cm	+	+						
Scalpel						+		
Ethyl alcohol 70 % 40.0						+		
Sulfacetamide solution of 30 % 5 ml (20 % 1 ml No. 2)							+	
Thermometer medical maximum						+	+	
Tonometer with a phonendoscope						+		
Phthalazole pills 500 mg No. 10				+				
Furazolidone 0,05 gr No. 10								+
Chloramphenicol drop 0,25 % No. 20								+
Citramon pills No. 10				+			+	
Splint for transport immobilization	+		+					
Arm splint for transport immobilization	+		+					
Collar splint for transport immobilization	+		+			+		
Splint for wrap	+							
Syringe disposable 2 ml, 5 ml, 10 ml, 20 ml						+		
Glossotilt						+		
Notepad with ballpoint pen		+						

As can be seen from the given data, the joint RMPs, which is equipped with medical kits for trains of all countries, including Ukraine, is sterile 5 × 10 cm gauze, hemostatic jute, sterile cotton wool, scissors and individual dressing bundle. For Russia, Belarus and Kazakhstan, the

presence of such drugs as acetylsalicylic acid tablets № 10, brilliant green solution of 1 % 10 ml, validol tablets no less than No.6, charcoal activated tablets No.10, which allow to provide traffic regulations in time, thereby contributing to the improvement of human health and life. Based on the

content analysis of the contents of the first-aid kits, which are compiled by trains of distant directions from different countries, one can conclude that the first-aid kit should include such parts as: Analgin tablets № 10, Acetylsalicylic acid pills № 10, Bandage gauze sterile 5m × 10cm, Brilliant green solution 1 % 10 ml, Validol tablets not less than № 6, Sterile cotton wool, Activated carbon tablets № 10, Tourniquet hemostatic, Iodine alcohol solution 5 % 10 ml, Plaster germicidal sterilized not less than 4cm × 10cm, Scissors, Individual dressing

package, Blanket rescue, Non-sterile gloves, Collar splint for transport immobilization, Antiseptic alcohol wipes. In addition, in the form of first-aid kits, which include longitudinal trainings should include a tongue holder, a medical thermometer, an electronic tonometer, semi-automatic tonometer or drotaverin hydrochloride (nocturnal) tab. № 10, loperamide tablets 0.002 g № 10 (№ 20).

Prices for medical kits vary widely in different countries from 13.5 USD to 1,187.3 USD (Table 2).

Table 2

Price analysis for medical first aid kits for trains

Type of kit	The cost, USD			
	Russia		Republic of Kazakhstan	Ukraine
	TOV "SPEC-OBORONA®"	TOV "As-trom"		
The first-aid kit railway (first-aid kit of the conductor)	33.6	37.4		22.6
First-aid kit railway (first-aid kit of the head of the train)	985.2	1187.3	306	
The first-aid kit laying for the Russian Railways cars	13.5			

On the basis of the research carried out, it was established that there should be two types of first-aid kits in the train – one first-aid kit – emergency, which is located at the head of the train; the second is the conductor's first-aid kit with which each train should be equipped. Medical kits must include certain medicines and medical products, which is caused by the significant distance between stops and the location of railway tracks far beyond the city limits, which results in a long time for an ambulance (emergency) brigade to arrive. An important condition that allows the head of the train to use drugs is the presence of a certificate, which is issued after passing the courses on first aid and basic pharmacy. On the basis of the study, the first-aid kits of other countries are offered to introduce a first aid kit for newborns. Its composition will be in line with the pharmacy of the studied countries, but this only applies to distant trains on the territory of Ukraine.

7. Findings from the research and prospects of further development of this area

1. The state of traffic accidents in different countries and Ukraine was investigated.

2. The urgency of the provision of the first medical aid to victims of accidents on the railway was determined.

3. On the basis of an expert survey, deficiencies in the trains' staffing were determined by medical chemist's and the direction of their solution.

4. The normative base of Ukraine, Russia, the Republic of Kazakhstan and the Republic of Belarus for the provision of trains by medical first-aid kits was analyzed.

5. A comparative analysis of the composition of medical first-aid kits, equipped with trains of Ukraine, Russia, the Republic of Kazakhstan and the Republic of Belarus, and their prices were done.

6. Measures to improve the provision of trains with first-aid kits are proposed.

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