

СТРУКТУРА И ДИНАМИКА ОСТРЫХ ОТРАВЛЕНИЙ В г. РЯЗАНИ В 2016–2021 гг.

С.В.Янкина¹, Н.В.Минаева¹

¹ ФГБОУ ВО «Рязанский государственный медицинский университет им. акад. И.П.Павлова»
Минздрава России, Рязань, Россия

Резюме. Цели исследования – проанализировать структуру острых отравлений в г. Рязани в 2016–2021 гг.; выявить общую динамику отравлений и отравлений по отдельным токсикантам, а также по половому признаку. Материалы и методы исследования. Материалы исследования – карты вызовов бригад скорой медицинской помощи (СМП) в г.Рязани в 2016–2021 гг.

Результаты исследования и их анализ. Анализ статистических данных за 2016–2021 гг. показал уменьшение количества вызовов бригад СМП к пострадавшим с острым отравлением. В Рязани, как и в России в целом, преобладали отравления алкоголем и токсичными спиртами, на втором месте находились отравления лекарственными средствами, на третьем – различными газами, парами хлора, двуокиси углерода, метана и др. Среди отравлений лекарственными средствами преобладали отравления психотропными, противосудорожными, седативными и снотворными препаратами. Среди пациентов преобладали мужчины – в основном за счет отравления алкоголем и токсичными спиртами, а также наркотиками и психодислептиками. В 2016–2021 гг. доля смертельных исходов в результате острых отравлений составила в догоспитальном периоде 0,1% и не имела тенденции к росту. В 57,5% случаев пациенты были госпитализированы в лечебные медицинские организации (ЛМО). Данные о распространенности и динамике острых отравлений позволяют определить ориентиры организационных мероприятий в контексте оказания скорой медицинской помощи в догоспитальном периоде.

Ключевые слова: бригады скорой медицинской помощи, г. Рязань, догоспитальный период, острые отравления, смертельные исходы, токсиканты

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STRUCTURE AND DYNAMIC OF ACUTE POISONINGS IN THE CITY OF RYAZAN IN 2016-2021

S.V.Yankina¹, N.V.Minaeva¹

¹ Ryazan State Medical University named after acad. I.P. Pavlov, the Ministry of Health Russia, Ryazan, Russian Federation

Summary. Investigation purposes – to analyze a structure of acute poisonings in the city of Ryazan in 2016-2021; to identify a summary dynamic of poisonings and poisonings classified according to separated toxicants, as well as sex characteristics.

Materials and methods of the investigation. Investigation materials – maps of ambulance crew calls in the city of Ryazan in 2016-2021.

Investigation results and their analysis. An analysis of statistic data collected in 2016-2021 showed a derision of ambulance calls for victims with acute poisonings. In Ryazan, as well as in Russia at all, alcohol poisonings and toxic spirits poisonings prevailed. On the second position there were medicines poisonings, on the third there were different fumes, chlorine vapors, carbon dioxide methane and others vapors. Among medicines poisonings a psychotropic, anticonvulsant, sedative and hypnotic medicines poisonings prevailed. Among the patients males prevailed primary because of alcohol and toxic spirits poisonings as well as drugs and psychodysleptics poisonings. In 2016-2021 proportion of lethal outcomes caused by acute poisonings was 0,1% in pre-hospital period and didn't have tendency to increase. Patients were hospitalized to medical treatment organizations in 57,5% of cases. Data on the spread and dynamic of acute poisonings allow to determine linkers for organization measures in a context of urgent medical treatment provision in pre-hospital period.

Key words: ambulance crew, acute poisonings, lethal outcomes, pre-hospital period, the city of Ryazan, toxicants

Conflict of interest. The authors declare no conflict of interest

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Контактная информация:

Янкина Светлана Витальевна – канд. мед. наук; доцент кафедры медицины катастроф и скорой медицинской помощи Рязанского государственного медицинского университета им. И.П. Павлова Минздрава России
Адрес: Россия, 390026, г. Рязань, ул. Шевченко, д. 34, корп. 2
Тел.: +7 (4912) 97-19-52; моб. +7 (920) 987-40-06
E-mail: ysvetlana0903@mail.ru

Contact information:

Svetlana V. Yankina – Cand. Sc. (Med.); Associate Prof. of Department for Disaster Medicine and Emergency Care of Ryazan State Medical University named after acad. I.P. Pavlov, the Ministry of Health Russia
Address: bld. 2, 34, Shevchenko str., Ryazan, 390026, Russia
Phone: +7 (920) 987-40-06
E-mail: ysvetlana0903@mail.ru

Introduction

According to the data of the World Health Organization (WHO) in recent decades acute poisonings remain one of the most important problems of public health. According to E. A. Luzhnikov (2014) in the Russian Federation the acute intoxication morbidity equals 1.0-1.5 cases per 1 thousand people, and about 20% of victims need urgent hospitalization [1]. As a rule, the first link in emergency care for acute poisonings is an ambulance team. However, in the pre-hospital period in some cases it is not possible to identify the poisoning substance, especially if the victim is unconscious and there are no witnesses of the incident. In such cases, ambulance ensure the maintenance of vital body functions and carry out the fastest possible delivery of the victim to the hospital [2]. Despite improvements in the quality of emergency medical care in Russia, mortality from acute poisoning is still high and amounts to about 17% in the pre-hospital period [3].

The structure of poisonings varies in different countries and depends, as a rule, on the socio-economic features of their development. In the Russian Federation the most frequent causes of acute poisonings are alcohol and toxic spirits, the second place is occupied by drugs and psychosleptics, the third place is taken by drugs. In a comparative analysis of the structure of poisonings in the United States, Poland and China, it was found that in these countries, drug poisonings prevailed, with the intentional nature in the United States, and in Poland and China were unintentional overdose of drugs or the result of their improper use.

Statistics on poisoning by gender also differ in Russia and other countries. Thus, in the Russian Federation, men of working age seek medical care for acute poisoning more often; abroad there is a slight predominance of poisonings among women; these differences are especially striking in cases of intentional poisonings [4].

The aim of the study is to analyze the structure of acute poisonings in Ryazan in 2016-2021, to identify their general dynamics and dynamics by individual toxicants, as well as by gender.

Materials and research methods. Materials of the study — maps of calls of ambulance crews in Ryazan in 2016-2021. Methods of research — analytical and statistical.

The results of the study and their analysis. A total of 949092 calls of ambulance crews were recorded in 2016-2021 — 168433; 161872; 160829; 144446; 155551 and 157961 calls, respectively, including 25044 calls about acute poisoning — 4275; 4684; 5025; 4147; 3365 and 3548 calls, respectively.

In the city of Ryazan in the total number of all calls the share of calls for acute poisoning was 2.6%. In 2020-2021, the share of calls for the investigated pathology decreased significantly and was 2.2% — in 2016- 2019 — 2.5; 2.9; 3.1 and 2.9%, respectively (Table 1).

When analyzing calls of ambulance crews to patients with acute poisonings it was found that in Ryazan the leading place (about 80% of all calls for this reason) is taken by alcohol and toxic spirits. The second place is occupied by poisonings with medicines (about 8% of all toxicants) that is 10 times less than with alcohol and other spirits. The challenges of poisoning with various gases, vapors of chlorine, carbon dioxide, methane and other gases, as a rule, occurring at the workplace, account for 1.2%.

Analyzing the data from scientific publications, we can note that in other regions alcohol and other alcohols poisoning also took the leading position, and drug and psychosleptic poisoning were in the second place [5].

Analysis of call dynamics for the most frequent poisonings over the last 6 years showed a slight decrease in alcohol and toxic alcohol poisonings — in 2017-2019 these poisonings occurred in 82% of cases, in 2020-2021 — in 79 and 78% of cases, respectively. It can be assumed that a slight decrease is associated with a decrease in alcohol consumption during the pandemic coronavirus infection, as most public places were closed and many people were on self-isolation [6].

In contrast, the proportion of drug poisonings during the pandemic increased to be in 2019-2021 — 8.6; 9.3 and

Таблица 1 / Table No. 1

Общее количество вызовов бригад СМП, в том числе к пациентам с отравлениями различной этиологии, 2016-2021 гг.

Total quantity of ambulance calls including calls from patients with different etiology poisonings, 2016-2021 years

Показатель Indicator	2016	2017	2018	2019	2020	2021	Итого
Всего вызовов, чел. Total calls, number of people	168433	161872	160829	144446	155551	157961	949092
- в т.ч. к пациентам с отравлениями, чел./% - including calls from patients with poisonings, people/%	4275/2,5	4684/2,9	5025/3,1	4147/2,9	3365/2,2	3548/2,2	25044/2,6

9.2%, respectively — while in the pre-pandemic period (2017-2018) — 6.8 and 7.1%, respectively.

The number of workplace poisonings tends to decrease, which is due to improved safety practices and improved protective equipment. For example, in 2016 ambulance crews responded to a call about poisoning by gases and vapors of various toxic substances in 1.8% of cases with a gradual decrease in subsequent years to 0.8-1.0%. However, the number of carbon monoxide poisonings has a clear tendency to increase, as such poisonings occur at home and in fires. In Ryazan, the number of calls for carbon monoxide poisoning was in 2016-2021 — 3; 14; 6; 17; 37 and 51 calls, respectively.

Despite the fact that the second place in the Russian Federation is taken by poisonings with drugs and psycho-toxic substances, in Ryazan the percentage of poisonings with these toxicants is quite low and is, according to the cards of the ambulance teams, confirmed in the chemical toxicological examination, about 0.5%. It should be noted that in Ryazan in 2014 the share of drug poisoning was 4% — the 4th place among the causes of all poisonings [7]. In 2015, this figure decreased significantly, which can be explained by changes in legislation regarding smoking mixtures¹, but in recent years there is again a tendency to increase the share of poisonings with these toxicants — from 0.3% of cases — in 2017-2018 to 1.0% of cases — in 2021.

In the pre-hospital period in 8% of cases we could not identify the poisoning substance, which is associated with the diagnosis of poisoning by history and clinical picture, which does not always allow to objectively determine the specific substance, especially in combined poisoning or in the background of alcoholic intoxication (Table 2). For this purpose, chemical toxicological diagnostics is carried out in specialized chemical toxicological laboratories. In the Ryazan region, such a laboratory has existed since 2003 on the basis of the forensic-chemical department of the Bureau of forensic-medical examination. The chemical toxicological laboratory works round the clock and performs urgent vital

¹ On Narcotic Drugs and Psychotropic Substances: Federal Law No. 3-FZ of January 8, 1998, as amended on February 15, 2015

identification of toxic substances in a victim's body in order to make an accurate diagnosis and control the efficiency of detoxification therapy [8].

Separately, the authors analyzed acute drug poisonings. The result of the analysis showed that in 66% of cases the drug that caused the poisoning was not identified in the pre-hospital period. This is mainly due to the fact that in drug poisoning, as a rule, there are no specific toxic syndromes. Psychotropic, anticonvulsant, sedative and hypnotic drugs took the leading positions among the identified drugs.

It can be assumed that poisonings with these drugs were intentional, as they are often consumed for the purpose of suicide or drug intoxication. Over the last 2 years, the number of unintentional poisonings with drugs acting on the cardiovascular system tended to increase (Table 3).

It is important to note that during the coronavirus infection pandemic, poisonings with antibiotics, non-opioid analgesics and antipyretics were detected — in 2020-2021, 19 and 20 cases, respectively.

In 2016-2021, the major proportion (76.5%) of acute poisoning victims were men — 3128; 3662; 3845; 3172; 2639 and 2713, respectively. The same category is the leading one for drug and psychoactive substances poisoning (90,3%) and for alcohol and other spirits poisoning (81,4%). Drug poisonings are more frequent among women (58.2%), because women are more attentive to their health and more careful in following the doctors' recommendations on taking medications, and they are also more prone to suicide. Poisonings from other gases, smoke, and toxic fumes are slightly more common in men, which is probably due to the fact that more men work in such industries (Table 4).

In 2016-2021, mortality from acute poisoning in the pre-hospital period was 0.1% (24 people) — 2; 6; 4; 3; 6 and 3 cases, respectively, and was usually caused by the use of unspecified alcohol or a psychotropic drug. In Ryazan during the reporting period 14,408 patients were hospitalized with acute poisoning, the share of which was 57.5%, which is extremely high as compared to 20% of hospitalizations for this reason in the Russian Federation as a whole. Over the past three years a decrease in the number of hospitalizations was detected compared to 2016-2018, which is certainly

Таблица 2 / Table No. 2

**Структура острых отравлений по отдельным группам токсикантов
в 2016–2021 гг., чел./%**

Structure of acute poisonings based on toxicants groups in 2016-2021 years, people/%

Группа токсичных веществ Groups of toxic substances	2016	2017	2018	2019	2020	2021	Итого Total
Наркотики и психодислептики Drugs and psychodisleptics	25/0,6	15/0,3	17/0,3	15/0,7	27/0,8	35/1,0	134/0,5
Лекарственные препараты Medicines	369/8,6	317/6,8	358/7,1	359/8,6	314/9,3	326/9,2	2043/8,2
Алкоголь и токсичные спирты Alcohol and toxic spirits	3298/77	3859/82	4133/82	3399/82	2657/79	2756/78	20102/80,2
Разъедающие вещества Corrosive substances	34/0,8	35/0,7	26/0,5	39/0,9	30/0,9	36/1,0	200/0,8
Оксид углерода Carbon oxide	3/0,07	14/0,3	6/0,1	17/0,4	37/1,1	51/1,4	128/0,5
Другие газы, дым, пар Other fumes, smoke, steam	78/1,8	69/1,5	49/1,0	34/0,8	27/0,8	37/1,0	294/1,2
Грибные токсины Mushrooms toxins	58/1,3	25/0,5	13/0,2	26/0,6	10/0,3	15/0,4	147/0,6
Неуточненные вещества Uncertain substances	410/9,6	350/7,5	423/8,4	258/6,2	263/7,8	292/8,2	1996/8,0

Структура острых отравлений лекарственными средствами в 2016–2021 гг., чел.
Structure of acute poisonings by medicines in 2016–2021 years, number of people

Группа лекарственных средств Group of medicines	2016	2017	2018	2019	2020	2021	Итого
Противосудорожные, седативные и снотворные препараты Anticonvulsant, sedative and hypnotic medicines	16	15	21	41	39	29	161
Психотропные препараты Psychotropics medicines	30	27	25	31	39	33	185
Препараты, действующие на сердечно-сосудистую систему Medicines which influence on cardiac-vascularly system	4	4	4	8	23	27	70
Неуточненные лекарственные средства Uncertain medicines	317	261	296	209	137	130	1350

related to the Covid-19 pandemic, as the emergency medicine hospital in Ryazan was fully involved in the treatment of patients with the new coronavirus infection (Table 5).

Doctors and paramedics of general and resuscitation teams of the emergency medical services provided medical care according to the protocol "poisoning" — in case of comatose, they prevented aspiration and obstruction complications, performed gastric lavage, performed intravenous (IV) infusions, controlled pulse and blood pressure (BP), measured blood sugar levels [9]. Given the difficulties with the differentiation of a toxicant in the pre-hospital period, the actions of ambulance were primarily aimed not at the use of antidotes, but at maintaining the vital functions of the body and the rapid delivery of patients to the hospital. There is no doubt that the organization of toxicological care in the pre-hospital period should include the early division of patients into differentiated groups (acute poisoning by alcohol and narcotic substances, acute poisoning by drugs, etc.) in order

to quickly administer the antidotes available in the general field package of an ambulance: ethanol — for poisoning by methyl alcohol; naloxone — for poisoning by opioid drugs; acisol — for poisoning by carbon dioxide, etc. Administration of antidotes can not only save the life of the victim, but also reduce the number of hospitalizations. It should be emphasized that in the pre-hospital period, the ambulance relies on clinical and instrumental diagnostic data, but a final diagnosis can be made only after a toxicological study of blood, urine or stomach contents. All this points to the need for further research in this area and the development of rapid tests to determine the most common toxicants.

Conclusion

1. The analysis of statistical data for 2016–2021 showed that acute poisonings were the reason for ambulance crews to be called in 2.6% of cases and in 2020–2021 there was a tendency of decrease of this indicator.

2. In Ryazan, as well as in Russia in general, acute poisonings with alcohol and toxic spirits prevail, the second place is occupied by poisonings with medicines, the third one with poisonings with different gases, vapors of chlorine, carbon dioxide, methane and other substances, as a rule, occurring at work.

3. Analysis of acute poisonings by gender showed the pre-dominance of men among the poisoned persons — mainly due to alcohol and unspecified alcohols, as well as drugs and psychoactive drugs.

4. Psychotropic, anticonvulsant, sedative and hypnotic drugs prevailed among drug poisonings.

5. According to the protocol "intoxication" all the patients with acute intoxications were given medical care, afterwards 14408 patients (57,5%) were hospitalized in the medical treatment organizations; the rate of lethal outcomes in the pre-hospital period was 0,1%.

Таблица 4 / Table No. 4

**Частота вызовов бригад СМП
к мужчинам и женщинам с острыми
отравлениями в 2016–2021 гг., чел./%**

Frequency of calls of ambulance for males and females with acute poisonings in 2016–2021 years, people/%

Группа токсичных веществ Group of toxic substances	Мужчины Males	Женщины Females
Наркотики и психодислептики Drugs and psychodisleptics	121/90,3	13/9,7
Лекарственные препараты Medicines	854/41,8	1189/58,2
Алкоголь и его суррогаты Alcohol and its surrogates	16355/81,4	3747/18,6
Газы, дым, пар Fumes, smoke, steam	162/55,1	132/44,9

Таблица 5 / Table No. 5

Итоги работы бригад СМП с пациентами с острыми отравлениями в 2016–2021 гг.
Results of ambulance crew working in cases of patients with acute poisonings in 2016–2021 years

Показатель Indicator	2016	2017	2018	2019	2020	2021	Итого, чел./% Total, people/%
Число пациентов, доставленных в ЛМО, чел./% Quantity of people transported to medical treatment organizations, people/%	2922/68,3	3014/64,3	3057/60,8	1845/44,5	1725/51,3	1845/52,0	14408/57,5
Количество смертельных исходов, чел. Quantity of lethal outcome, people	2	6	4	3	6	3	24/0,1

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