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Original article

EMERGENCY MEDICAL CARE FOR PATIENTS IN COMA IN RYAZAN IN 2016-2020

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Abstract. The study objectives were to investigate the prevalence and to determine the most frequent causes of coma in patients in Ryazan; to determine the frequency of fatal outcomes at the stage of medical evacuation and the frequency of hospitalizations; to identify the features of emergency medical care in the prehospital period.

Materials and methods. We analyzed statistical data on the number of witnesses who applied for emergency medical aid in cases of disturbance of consciousness in patients who were subsequently diagnosed as comatose patients; we revealed main causes and types of comatose states, number of fatal outcomes and frequency of hospitalizations in Ryazan. Materials of the study — cards of calls of ambulance crews in Ryazan in 2016-2020.

Results of the study and their analysis. Analysis of statistical data for Ryazan in 2016-2020 showed a steady increase in the number of ambulance calls to patients in coma. In Ryazan, as in Russia as a whole, cerebral coma prevailed, with diabetic coma in second place and toxic coma — in third. In 2016-2020, the proportion of coma-related deaths was 2.7% in the prehospital period and had no upward trend. In 84% of cases patients were hospitalized in medical treatment organisations, patients with hypoglycemic coma sometimes refused hospitalization, there was no tendency in increase of the number of refusals.

In the prehospital period, ambulance care for patients with coma was provided in accordance with the algorithms, average time to reach the call was 12.4 min, which corresponds to the respective norms for emergency calls for Ryazan.

Key words: *ambulance crews, coma, Ryazan, causes of coma, coma patients, ambulance, fatal outcomes, medical evacuation*

Conflict of interest. The authors declare no conflict of interest

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Оригинальная статья

ОКАЗАНИЕ СКОРОЙ МЕДИЦИНСКОЙ ПОМОЩИ ПАЦИЕНТАМ В КОМАТОЗНОМ СОСТОЯНИИ В г.РЯЗАНИ В 2016–2020 гг.

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Резюме. *Цели исследования* – изучить распространенность и определить наиболее частые причины развития коматозных состояний у пациентов в г.Рязани; определить частоту смертельных исходов на этапе медицинской эвакуации и частоту госпитализаций; выявить особенности оказания экстренной медицинской помощи (ЭМП) в догоспитальном периоде.

Материалы и методы исследования. Проанализированы статистические данные об обращаемости очевидцев за скорой медицинской помощью (СМП) при нарушении сознания у пострадавших, которым в дальнейшем был поставлен диагноз «кома»; об основных причинах и видах коматозных состояний, количестве смертельных исходов и частоте госпитализаций в г.Рязани. Материалы исследования – карты вызовов бригад СМП в г.Рязани в 2016–2020 гг.

Результаты исследования и их анализ. Анализ статистических данных по г.Рязани за 2016–2020 гг. показал постоянный рост количества вызовов бригад СМП к пострадавшим в коматозном состоянии. В Рязани, как и в России в целом, преобладала церебральная кома, на втором месте находилась диабетическая, на третьем – токсическая кома. В 2016–2020 гг. доля смертельных исходов в результате комы составила в догоспитальном периоде 2,7% и не имела тенденции к росту. В 84% случаев пациенты были госпитализированы в лечебные медицинские организации (ЛМО), от госпитализации чаще всего отказывались пациенты с гипогликемической комой, тенденции к увеличению количества отказов – не наблюдалось. В догоспитальном периоде скорую медицинскую помощь пациентам с комой оказывали в соответствии с алгоритмами и в полном объеме, среднее время доезда на вызов составило 12,4 мин, что соответствует нормативам для экстренных вызовов по г.Рязани.

Ключевые слова: *бригады скорой медицинской помощи, виды комы, г.Рязань, догоспитальный период, медицинская эвакуация, пациенты в коматозном состоянии, причины комы, скорая медицинская помощь, смертельные исходы*

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Introduction. Currently, coma is one of the most severe and dangerous complications of diseases or injuries that require emergency medical care. The prevalence of coma is associated with a high incidence of severe forms of chronic diseases (hypertension, diabetes mellitus, etc.) and infectious pathologies; with a large number of craniocerebral injuries (CCI), as well as with the increasing number of people who abuse alcohol, drugs and psychotropic drugs [1]. It is difficult to diagnose coma in prehospital period due to time and medical equipment shortages and due to the need for emergency medical treatment (EMT) in the short term [2]. Identifying the etiology of the coma as soon as possible is important for determining further EMT strategies, but only after ensuring that vital functions (breathing and circulation[1]) are maintained in the patient.

According to the Russian National Scientific and Practical Society of Emergency Medical Care, in the prehospital period comatose states account for about 5.8 cases per 1,000 calls, and prehospital mortality — 4.4%. According to statistical data, the most frequent cause of coma is acute cerebovascular accident (CVA) and craniocerebral trauma — 59.2%; hypoglycemic coma — 15.3%; hyperglycemic coma — 7.7; hyperosmolar coma — 5.4; alcoholic coma — 3.4%. It is not always possible to establish the exact cause of coma in prehospital period, so, often the etiology of coma remains unclear — 9% — or even not suspected (coma of unclear genesis) — 11.9%. The outcome of coma depends to a large extent on the promptness of the EMT, on the completeness of emergency medical care and on the rapid medical evacuation of the patient to a medical treatment facility[3].

The study objectives were to investigate the prevalence and to determine the most frequent causes of coma in patients in Ryazan; to determine the frequency of fatal outcomes at the stage of medical evacuation and the frequency of hospitalizations; to identify features of emergency medical care in prehospital period.

Materials and methods. We analyzed statistical data on the number of witnesses who applied for emergency medical aid in cases of disturbance of consciousness in patients who were subsequently diagnosed as being in coma; we revealed the main causes and types of comatose states, number of fatal outcomes and frequency of hospitalizations in the city of Ryazan. Materials of the study — cards of calls of ambulance crews in Ryazan in 2016-2020.

Results of the study and their analysis. A total of 791131 ambulance team calls were recorded in 2016-2020 — 168433/ 161872/ 160829/ 144446/ 155551 calls respectively, including 804 coma calls — 95/149/188/161/211 calls respectively. Since coma is one of the most serious complications of some severe diseases, injuries and intoxications, it is rare. Its share in the total number of all calls in Ryazan was 0.1%.

In Ryazan there is a clear trend of increase in number of calls to patients who lost their consciousness and were diagnosed with coma at the scene by ambulance team. Thus, in 2016, ambulance crews responded to coma in 0.05% of calls; in 2017 — in 0.09; in 2018 — in 0.12; in 2019 — in 0.11; in 2020 — in 0.13% of calls (Table 1).

In prehospital period, if there is not enough time to collect the anamnesis, it is allowed to diagnose "unspecified coma" and to specify its presumed causes. A "syndromic" assessment and fixation of causes of pathological condition are also acceptable[2].

To establish the cause of coma is extremely important in case of a hypoglycemic coma, as in such a coma administration of glucose solution is a first priority. This problem has long been solved — the level of blood glucose is measured by express method, using a glucose meter, in all patients with impaired consciousness[4].

We have identified the following as the most common causes of coma — cerebral coma as a result of a stroke or of a traumatic brain injury; diabetic coma; coma as a result of drug or alcohol overdose. Since it is extremely difficult for an EMT in the prehospital period to determine the cause of a coma — he or she can only suspect it, the diagnosis was either "unspecified coma" or "diabetic coma".

As can be seen from the data in Table 2, there was an increase in the number of calls to patients with diabetic coma in Ryazan. It was found that most often it was hypoglycemic coma in patients with type 2 diabetes mellitus, which is comparable with the data of the Ministry of Health of Russia about an increase in number of patients with obesity and associated type 2 diabetes mellitus. Table 2 also shows that there is a clear tendency of increase in number

Таблица 1 / Table No. 1

Общее количество вызовов бригад СМП и количество вызовов бригад СМП к пациентам с комой разной этиологии в г.Рязани в 2016–2020 гг.

Total number of calls of ambulance teams and the number of calls of ambulance teams to patients with coma of different etiology in Ryazan in 2016-2020

Вызовы бригад СМП в г.Рязани Calls of ambulance teams in Ryazan	2016	2017	2018	2019	2020	Итого
Всего вызовов, чел. / Total number of calls, people	168433	161872	160829	144446	155551	791131
В т.ч. количество вызовов к пациентам с комой, чел./% Including the number of calls to patients with coma, people/%	95/0,05	149/0,09	188/0,12	161/0,11	211/0,13	804/0,1

[1] Gizatullin R.H., Lutfarakhmanov I.I., Gizatullin R.R., Rakhimova R.F. Comatose states: a textbook. Ufa, 2018. 63 c.

[2] Algorithms of emergency medical care outside of a medical organization: Manual for medical staff of ambulance teams / Edited by S.F. Bagnenko, M.D., prof., RAS academician, SPb., 2018. 158 c.

of patients with toxic coma — as a rule, this coma develops during drug overdose or from toxic effects of alcohol and its surrogates, indicating that, despite the promotion of a healthy lifestyle, alcohol consumption in the country is increasing. In the city of Ryazan, the indicators are similar: 21% of citizens seeking emergency medical assistance are intoxicated. In connection with the abovementioned it is important to carry out measures to combat alcoholism, to draw people's attention to the fact that the risk of injury to persons under the influence of alcohol increases several times [5]. In about 12% of cases, the etiology of coma in prehospital period could not be established.

In prehospital period comas occur more frequently in men than in women, 59.2% and 40.8%, respectively (Table 3). According to different statistical data and stroke registries, men in Russia are more prone to acute impairment of cerebral circulation than women, especially in the age group 45-59 years old, whereas in the age group 70 and older the morbidity in women is significantly higher than in men. This is explained by relatively low life expectancy of men in our country, as well as by certain physiological features of the female body associated with age [6]. In addition, the higher frequency of coma in men can be explained by the fact that men are injured more often than women and use alcohol and drugs more often.

In 2016-2020, ambulance doctors failed to save the lives of 22 patients (2.7%) in coma, with no significant dynamics identified by year. Despite the fact that coma is an absolute indication for hospitalization, an average of 84% of patients were hospitalized in Ryazan (Table 4). Most often, patients with hypoglycemic coma (or their relatives) refused hospitalization after emergency medical care was provided in the prehospital period.

The volume and rate of medical care rendered by specialists in emergency medical teams depend on the severity of the coma. In any coma, it is recommended to call anesthesiology and resuscitation teams. It should be taken into account that severity of patient's condition does not allow enough time to collect the anamnesis. The interview has to be shortened: the main thing to find out is the circumstances and the exact time of loss of consciousness, the complaints before and the concomitant pathology [7].

Examination of coma patients was performed according to the following algorithm: assessment of general severity and depth of consciousness impairment — using Glasgow scale; signs of external respiration disorders and disorders of central and peripheral circulation — by measuring blood pressure (BP), pulse, respiration rate, saturation; neurological examination — to a minimum extent; presence of vomiting and convulsions, if possible — identification of concomitant pathology such as trauma and somatic pathology, which could affect the severity of coma;

Emergency medical care was provided according to the following protocols: "seizures", "hypoglycemia", "poisoning", "acute respiratory failure". Priority measures: maintenance or restoration of vital functions such as breathing and circulation, sanation of airways, installation of airway, tracheal intubation, artificial lung ventilation, oxygen therapy, control of arterial hypotension using dopamine, noradrenaline, with arterial hypertension — urapidil. In case of any suspected trauma — immobilization of the cervical spine. Peripheral vein and bladder catheterization were always performed; gastric or nasogastric tubes were inserted if indicated [9].

All data obtained during examination and monitoring of the patient's condition during prehospital period, as well as all medical manipulations performed were recorded in the call cards and in the accompanying lists for hospitalization. When we analyzed the call cards, we noted that the doctors of ambulance teams acted in strict conformity with the

Таблица 2 / Table No. 2

Частота вызовов бригад СМП к пациентам с комой различной этиологии в г.Рязани в 2016–2020 гг.
Frequency of ambulance calls to patients with coma of different etiology in Ryazan in 2016-2020

Этиология комы / Etiology of coma	2016	2017	2018	2019	2020	Итого / Total
Кома неуточненная, чел./% / Unspecified coma, people/%	86/90,5	118/79,2	148/78,7	115/71,4	140/66,3	607/75,5
Кома неуточненная – церебральная /токсическая, чел. Unspecified coma –cerebral/toxic, people/%	69/7	81/23	102/32	66/39	83/45	401/146
Кома диабетическая, чел./% / Diabetic coma, people/%	9 /9,5	31/20,8	40/21,3	46/28,6	71/33,7	197/24,5

Таблица 3 / Table No. 3

Частота вызовов бригад СМП к мужчинам и женщинам с комой в г.Рязани в 2016–2020 гг., чел./% /
Frequency of ambulance teams calls to men and women with coma in Ryazan in 2016-2020, people/%

Показатель / Indicator	2016	2017	2018	2019	2020	Итого / Total
Кома у мужчины – неуточненная/ диабетическая / Coma in a man — unspecified/diabetic	62 – 58/4	84 – 73/11	115 – 97/18	105 – 81/24	110 – 71/39	476/59,2
Кома у женщины – неуточненная/ диабетическая / Coma in a woman — unspecified/diabetic	33 – 28/5	65 – 45/20	73 – 51/22	56 – 34/22	101 – 69/32	328/40,8

Таблица 4 / Table No. 4

Итоги работы бригад СМП с пациентами в коматозном состоянии в г.Рязани в 2016–2020 гг.
Results of work of ambulance teams with patients in coma in Ryazan in 2016-2020

Показатель / Indicator	2016	2017	2018	2019	2020	Итого, чел./% Total, people/%
Число пациентов, доставленных в ЛМО, чел./% Number of patients delivered to medical treatment organisatio, people/%	79/83,0	132/88,0	163/86,0	126/78,0	178/84,0	678/84,0
Количество смертельных исходов, чел. Number of fatal outcomes, people	7	4	6	2	3	22/2,7

algorithms of emergency medical care for comatose states; the time of ambulance arrival did not exceed 20 minutes; the average time of arrival was 12.4 minutes. It took an average of 61.8 min to provide ambulance care (Table 5).

The proportion of fatal outcomes among patients with coma in prehospital period — 2.7% — also highlights speed and competence of emergency medical care, as well as high qualification of doctors and paramedics of ambulance teams (see Table 4).

Conclusion

1. Analysis of statistical data for Ryazan for 2016-2020 showed a steady increase in the number of ambulance calls to patients in coma.

2. In Ryazan, as well as in Russia as a whole, cerebral coma prevailed, diabetic coma was in second place, toxic coma in third place.

3. In 2016-2020, the proportion of coma-related deaths was 2.7% in prehospital period, with no upward trend.

4. In 84% of cases patients were hospitalized in medical treatment organisations, patients with hypoglycemic coma refused hospitalization more often, there was no tendency for increasing of number of refusals.

5. In prehospital period, emergency medical care for patients with coma was provided in accordance with the algorithms and in full volume, the average time of arrival to the call was 12.4 minutes, which corresponds to the norms for emergency calls in Ryazan.

Таблица 5 / Table 5

Среднее время доезда бригады СМП к пациенту в коматозном состоянии и среднее время оказания помощи на месте вызова в г.Рязани в 2016–2020 гг.

Average time of arrival of ambulance team to the patient in coma and average time of assistance at the scene of the call in Ryazan in 2016-2020

Показатель, мин Indicator, min	2016	2017	2018	2019	2020	Итого Total
Среднее время доезда Average drive time	13	13	13	11	12	12,4
Среднее время, проведенное у постели больного / Average time spent at the patient's bedside	60	61	63	62	63	61,8

REFERENCES

1. Bolobonkina T.A., Dement'ev A.A., Shatrova N.V., Yankina S.V. Factors of biological nature in work of mobile teams of Emergency Medical Care Station on the eve of Pandemics of New Coronavirus Infection (COVID-19). *Rossiyskiy Mediko-Biologicheskiy Vestnik imeni akad. I.P.Pavlova* = I.P. Pavlov Russian Medical Biological Herald. 2020;28(3):283-289. doi: 10.23888/PAVLOVJ2020283283-289 (In Russ.).

2. Bolobonkina T.A., Dement'ev A.A., Shatrova N.V. The Severity and Intensity of the Labor Process of Emergency Medical Workers in the Modernization of Health Care. *Nauka Molodykh* = Eruditio Juvenium. 2019;7(4):501-8. doi:10.23888/HMJ201974501-508 (In Russ.).

3. Khubutia M.Sh. Organization of emergency medical care in case of emergency conditions. *Zhurnal im N.V. Sklifosovskogo Neotlozhnaya meditsinskaya pomoshch'* = Russian Sklifosovsky Journal of Emergency Medical Care. 2012; 2:4-7 (In Russ.).

4. Kondratskaya I.M., Mankovsky B.N. Emergency conditions in diabetology. Comas. *Meditsina neotlozhnyih sostoyanij* = Emergency medicine. 2014;5 (60):35-39 (In Russ.).

5. Yankina S.V., Shatrova N.V., Efratov A.Ju. Prevalence, Structure and Nature of Injuries in City of Ryazan and Ryazan Region, According to Records of Emergency Medical Teams. *Meditsina Katastrof* = Disaster Medicine. 2021; 1: 31-34. doi:10.33266/2070-1004-2021-1-31-34 (In Russ.).

6. Machinskiy P.A., Plotnikova N.A., Ul'yankin V.E., Kemaykin S.P., Rybakov A.G. Comparative characteristics of the indicators of mortality and letality from ischemic and hemorrhagic insult in Russia. *Izvestiya vysshih uchebnyh zavedenij. Povolzhskij region. Medicinskie nauki* = University proceedings. Volga region Medical sciences. 2019;3(51):101-118 (In Russ.).

7. Dumansky Yu.V., Kabanova N.V., Verkhuletsky I.E., Sinepupov N.A., Osipov A.G., Sinepupov D.N. Comatose states. *Meditsina neotlozhnyih sostoyanij* = Emergency medicine. 2012;4 (43):146-150 (In Russ.).

8. Gorodetsky V.V., Vertkin A.L., Lukashov M.I. Management of patients with unspecified coma at the pre-hospital stage. Consilium medicum. 2007; 5(4):75-97 (In Russ.).

9. Almukhanbetova E. F., Almukhametov M. K., Balkonnoy B. G., Baisengirova F.A. Therapy of comatose states at the pre-hospital stage. *Vestnik Kazahskogo nacional'nogo medicinskogo universiteta* = Kazan medical journal. 2015; 2:233-235.

СПИСОК ИСТОЧНИКОВ

1. *Болобонкина Т.А., Дементьев А.А., Шатрова Н.В., Янкина С.В.* Факторы биологической природы в работе медицинских работников выездных бригад станции скорой медицинской помощи накануне пандемии новой коронавирусной инфекции (COVID-19) / Российский медико-биологический вестник им. акад. И.П.Павлова. 2020. Т.28, №3. С. 283–289. doi: 10.23888/PAVLOVJ2020283283-289

2. *Болобонкина Т.А., Дементьев А.А., Шатрова Н.В.* Тяжесть и напряженность трудового процесса медицинских работников выездных бригад скорой медицинской помощи в условиях модернизации здравоохранения // Наука молодых. 2019. Т.7, №4. С. 501–508. doi:10.23888/HMJ201974501-50

3. *Хубутия М.Ш.* Организация оказания экстренной медицинской помощи при неотложных состояниях // Неотложная медицинская помощь. 2012. № 2. С. 4-7.

4. *Кондрацкая И.М., Маньковский Б.Н.* Неотложные состояния в диабетологии. Комы // Медицина неотложных состояний. 2014. №5. С. 35–39.

5. *Янкина С.В., Шатрова Н.В., Ефратов А.Ю.* Распространенность, структура и характер травматизма в г.Рязани и Рязанской области, по данным вызовов бригад скорой медицинской помощи // Медицина катастроф. 2021. №1. С. 31–34. doi:10.33266/2070-1004-2021-1-31-34

6. *Мачинский П.А., Плотникова Н.А., Ульянкин В.Е., Кемайкин С.П., Рыбаков А.Г.* Сравнительная характеристика показателей смертности и летальности от ишемического и геморрагического инсультов в России // Известия высших учебных заведений. Поволжский регион. Медицинские науки. 2019. №3. С. 101–118.

7. *Думанский Ю.В., Кабанова Н.В., Верхулецкий И.Е., Синепупов Н.А., Осипов А.Г., Синепупов Д.Н.* Коматозные состояния // Медицина неотложных состояний. 2012. №4. С. 146–150.

8. *Городецкий В.В., Верткин А.Л., Лукашов М.И.* Ведение больных с неуточненной комой на догоспитальном этапе // Врачебный консилиум. 2007. Т.5, №4. С.75–97.

9. *Альмуханбетова Э.Ф., Альмуханбетов М.К., Балканай Б.Г., Байсенгирова Ф.А.* Терапия коматозных состояний на догоспитальном этапе // Вестник Казахского национального медицинского университета. 2015. № 2. С. 233–235.

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