

PATTERNS OF ACUTE CHEMICAL POISONINGS IN A METROPOLIS AGAINST THE BACKGROUND OF THE COVID-19 PANDEMIC IN 2020–2021

Solonin SA¹ ✉, Belova MV^{1,2}, Tereshkina NE¹, Kasholkina EA¹, Tyurin IA¹, Godkov MA^{1,3}, Potkhveriya MM¹

¹ Sklifosovsky Research Institute for Emergency Medicine, Moscow Health Department, Moscow, Russia

² Federal State Autonomous Educational Institution of Higher Education I.M. Sechenov First Moscow State Medical University of the Ministry of Health of the Russian Federation (Sechenovskiy University), Moscow, Russia

³ Federal State Budgetary Educational Institution of Further Professional Education «Russian Medical Academy of Continuous Professional Education» of the Ministry of Healthcare of the Russian Federation, Moscow, Russia

The spread of COVID-19 in Russia has led to restrictive measures. The stress associated therewith had a noticeable psychoemotional effect on the population, which could not but affect the numbers and patterns of acute chemical poisonings (ACP). This study aimed to investigate the patterns of ACP in Moscow in the context of the COVID-19 pandemic. We analyzed data describing cases admitted with ACP to N.V. Sklifosovsky Research Institute for Emergency Medicine in 2019–2021, factoring in the dynamics COVID-19 prevalence as diagnosed with RT-PCR tests. The results of the analysis were processed using nonparametric methods and GraphPad Prism 9 software. Within the considered period, 2020 was the peak year. The number of acute poisonings (AP) with ethanol and its surrogates in 2020 was 109.7% greater than in 2019 (both sexes; the figure for women alone was 286.2%). Male patients suffered AP with drugs and corrosive substances more often than female ($p < 0.0001$). The number of drug abuse cases in 2019–2021 varied slightly, increasing by 2.4 and 6.7% annually. Synthetic narcotic substances were most common: methadone, cathinones, psychostimulants, and mixtures of substances. We discovered parallel trends in dynamics of ethanol intoxication and COVID-19 cases, and no such between drug poisonings and the said morbidity. Thus, the identified specifics of ACP patterns in the capital of Russia associated with the COVID-19 pandemic are a spike in alcohol abuse (especially among women), and lack of noticeable effect of the disease on use of drugs.

Keywords: Poisonings, substance abuse, COVID-19, drugs, methadone, alcohol, ethanol, medicines

Author contribution: Solonin SA — study idea, design development, data collection and processing, article authoring, analysis of the results; Belova MV — study design development, data collection and processing, article authoring; Tereshkina NE — article authoring, data collection, participation in the analysis of results; Kasholkina EA — data processing (technical part), data collection; Tyurin IA — data processing (technical part), participation in the analysis of results; Godkov MA — data processing, article editing and approval; Potkhveriya MM — article editing and approval.

✉ **Correspondence should be addressed:** Sergey A. Solonin
B. Sukharevskaya ploschad, 3, str. 1, Moscow, 129090, Russia; solonin@yahoo.com

Received: 06.10.2023 **Accepted:** 27.11.2023 **Published online:** 29.11.2023

DOI: 10.47183/mes.2023.052

СТРУКТУРА ОСТРЫХ ОТРАВЛЕНИЙ ХИМИЧЕСКОЙ ЭТИОЛОГИИ В МЕГАПОЛИСЕ НА ФОНЕ ПАНДЕМИИ COVID-19 В 2020–2021 ГГ.

С. А. Солонин¹ ✉, М. В. Белова^{1,2}, Н. Е. Терешкина¹, Е. А. Кашолкина¹, И. А. Тюрин¹, М. А. Годков^{1,3}, М. М. Поцхверия¹

¹ Научно-исследовательский институт скорой помощи имени Н. В. Склифосовского Департамента здравоохранения города Москвы, Москва, Россия

² Первый Московский государственный медицинский университет имени И. М. Сеченова Министерства здравоохранения Российской Федерации (Сеченовский Университет), Москва, Россия

³ Российская медицинская академия непрерывного профессионального образования Министерства здравоохранения Российской Федерации, Москва, Россия

Распространение COVID-19 в России обусловило проведение ограничительных мероприятий. Связанная с ними стрессовая ситуация оказала заметное психоэмоциональное воздействие на население, что не могло не отразиться на эпидемиологии острых отравлений химической этиологии (ООХЭ). Целью исследования было изучить структуру ООХЭ в Москве в условиях пандемии COVID-19. Проанализированы данные обследования лиц, поступивших с ООХЭ в НИИ СП имени Н. В. Склифосовского в 2019–2021 гг., с учетом динамики выявляемости COVID-19 методом ОТ-ПЦР. Для статистической обработки результатов использовали непараметрические методы и программное обеспечение GraphPad Prism 9. В 2020 г. количество госпитализированных с ООХЭ было наибольшим за анализируемый период. По сравнению с 2019 г. число острых отравлений (ОО) этанолом и его суррогатами в 2020 г. у лиц обоего пола возросло на 109,7%, у женщин — на 286,2%. У мужчин чаще ($p < 0,0001$) регистрировали также ОО наркотиками и разъедающими веществами. Число случаев ОО наркотиками в 2019–2021 гг. менялось незначительно, увеличиваясь на 2,4 и 6,7% ежегодно. Преобладали синтетические наркотические вещества: метадон, катиноны, психостимуляторы, а также смеси веществ. Выявлены соответствие тенденций помесечной динамики интоксикаций этанолом с выявляемостью COVID-19 и отсутствие такового при отравлениях наркотиками. Установлены характерные особенности структуры ООХЭ в столице на фоне пандемии COVID-19: рост числа ОО, связанных со злоупотреблением алкоголем (особенно у женщин), при сравнительно стабильном уровне ОО, обусловленных наркопотреблением.

Ключевые слова: отравления, злоупотребление алкоголем или наркотиками, COVID-19, наркотики, метадон, алкоголь, этанол, лекарственные средства

Вклад авторов: С. А. Солонин — идея и разработка дизайна исследования, сбор и обработка данных, написание статьи, анализ результатов; М. В. Белова — разработка дизайна исследования, сбор и обработка данных, написание статьи; Н. Е. Терешкина — написание статьи, сбор литературных данных, участие в анализе результатов; Е. А. Кашолкина — техническая обработка данных, сбор литературных данных; И. А. Тюрин — техническая обработка данных, участие в анализе результатов; М. А. Годков — обработка данных, редактирование и утверждение текста статьи; М. М. Поцхверия — редактирование и утверждение текста статьи.

✉ **Для корреспонденции:** Сергей Александрович Солонин
Б. Сухаревская пл., д. 3, стр. 1, г. Москва, 129090, Россия; solonin@yahoo.com

Статья получена: 06.10.2023 **Статья принята к печати:** 27.11.2023 **Опубликована онлайн:** 29.11.2023

DOI: 10.47183/mes.2023.052

In the early 2020, a new severe acute respiratory infection, COVID-19 (CoronaVirus Disease 2019), caused by the SARS-CoV-2 coronavirus, entered the Russian Federation and rapidly spread throughout. The country's capital, being a logistics and transport hub, was one of the first locations to see imported cases and a sharp increase in the incidence of COVID-19 [1, 2]. In March, Moscow imposed restrictions aimed at preventing spread of the new coronavirus infection: citizens were forbidden to leave their places of residence (stay) and told to observe social distancing [3].

The forced self-isolation, characterized by drastically fewer social contacts, and much less active habitual social and physical activities, had a significant stressful effect on the population [3], including vulnerable groups thereof, comprised of, inter alia, drug addicts and people suffering from anxiety and depressive disorders [4-6]. The resulting traumatic conditions could not but affect the patterns of acute chemical poisonings (ACPs). In this connection, investigation of the character and frequency of acute poisonings (APs) in the capital metropolis during the new coronavirus infection spread was deemed to be a relevant task.

The purpose of this study was to investigate the patterns of chemical poisonings in Moscow the context of the COVID-19 pandemic.

METHODS

This is a retrospective cohort study assessing the results of chemical-toxicological analysis of samples taken from patients admitted to the acute poisonings and somatopsychiatric disorders department (APSD) of N. V. Sklifosovsky Research Institute for Emergency Medicine (Sklifosovsky Institute) in 2020–2021. To create a comparison dataset, we analyzed similar cases (APs, presumably associated with COVID-19) of 2019.

In ACP cases, laboratory diagnosis included 2 stages: preliminary, which employs immunochromatographic assay and thin-layer chromatography, and confirmatory, which uses liquid chromatography with mass-selective detection enabled by SCIEX QTRAP 6500+ (Sciex; USA) to detect phenazepam (benzodiazepines), synthetic cannabimimetics, and derivatives of cathinone, and gas chromatography enabled by Agilent 7890B with mass-selective detector 5977B (Agilent Technologies; USA), Agilent 7820A with mass-selective detector 5975 (Agilent Technologies; USA), to detect other substances.

The study included citizens with various types of AP admitted to the Sklifosovsky Institute via the emergency room and the reception ward. Persons that refused hospitalization were excluded from the study. All AP cases were ranked according to the main nosologic groups according to ICD-10 (Table 1). We analyzed cases of poisoning with individual

toxic compounds, medicines, drugs, psychotropic substances, and combinations thereof. APs with illicit stimulants, such as amphetamine (methamphetamine), were considered intoxication with psychotropic agents (ICD-10 class T43, T43.6 - Psychostimulants with abuse potential).

The patients were tested for SARS-CoV-2 RNA by reverse transcription- polymerase chain reaction (RT-PCR), using a set of reagents registered in the Russian Federation. Nasopharyngeal and oropharyngeal swabs served as biological material for molecular studies. Data for the retrospective analysis of COVID-19 incidence were taken from the unified city medical informational and analytical system (ALISA).

Detectability, the ratio of the number of positive SARS-CoV-2 tests to the total amount of tests made within a certain period (as a percentage), was used in collation of the ACP and COVID-19 cases admitted to the Sklifosovsky Institute.

The results were processed using GraphPad Prism 9 (GraphPad Software; USA). The data is given as absolute (n) and relative (%) values. The trends of the frequency of ACP cases with COVID-19 in the background were established with the help of moving average. The relationship between COVID-19 cases registered in the Sklifosovsky Institute and in Moscow in general was determined using the Spearman's rank correlation coefficient. In the context of analysis of attributes, we looked into the frequencies of their occurrence by building contingency tables and applying the Pearson's chi-squared test. The differences were considered statistically significant at $p < 0.05$ (95% probability).

RESULTS

From 2019 to 2021, 9590 patients sought medical assistance at APSDD of the Sklifosovsky Institute (Table 1).

To compare the dynamics of admittance with ACPs (and the respective etiological patterns) to the Sklifosovsky Institute with the specifics of spread of coronavirus infection in Moscow, we analyzed the overall rate of detection of COVID-19 in people admitted in 2020-2021 (Table 2, Figures 1, 2).

Previously, it was established that SARS-CoV-2 morbidity in the capital of Russia has two seasonal spikes [7], which is consistent with data from the concurrent epidemiological studies [2]. A comparative analysis has shown that detection of SARS-CoV-2 RNA in all patients admitted to the Sklifosovsky Institute reflected the COVID-19 epidemic process in the metropolis perfectly: the correlation with the screening of Moscow's population (data collected at the city's clinics and hospitals of various profiles) was very high, Spearman's $r = 0.8402$, $p < 0.0001$ [7]. Thus, data on the COVID-19 cases in the Sklifosovsky Institute can be used in the analysis of ACP patterns in the context of the general epidemiological situation associated with the pandemic (Fig. 1, 2).

Table 1. Patients with ACPs by main etiological groups

Etiological groups of toxicants	ICD-10 code	Studied period (year)					
		2019		2020		2021	
		Abs.	%	Abs.	%	Abs.	%
Medicines	T36-39, T41-50	1642	50.7	1389	39.9	1377	48.1
Drugs	T40	583	18	597	17.1	637	22.2
Alcohol, organic solvents, aromatic and non-aromatic hydrocarbons	T51-T53	434	13.4	910	26.1	242	8.5
Corrosive substances	T54	324	10	349	10	267	9.3
Other	T55-T65	257	7.9	240	6.9	342	11.9
Total	-	3240	100	3485	100	2865	100

Table 2. Dynamics of COVID-19 detection among patients of the Sklifosovsky Institute, years 2020–2021

Month	Time of PCR testing for COVID-19					
	2020			2021		
	SARS-CoV-2 RNA detection results					
	Number of tested patients	Number of positive tests		Number of tested patients	Number of positive tests	
Abs.		%	Abs.		%	
January	–	–	–	4985	652	13.1
February	–	–	–	4262	359	8.4
March	–	–	–	5052	422	8.4
April	1031	354	34.3	4598	393	8.6
May	2406	524	21.8	4107	363	8.8
June	4526	345	7.6	5042	705	14
July	4102	87	2.1	4646	518	11.2
August	3981	139	3.5	3958	253	6.4
September	4490	209	4.7	4359	291	6.7
October	6987	889	12.7	5056	683	13.5
November	5906	910	15.4	4758	536	11.3
December	6537	1009	15.4	4990	325	7.2
Total	39966	4466	11.2	55313	5500	9.9

The age of those admitted with acute intoxication ranged from 16 to 96 years, with male patients and young people prevailing among them throughout the entire period covered by this study (Tables 3, 4).

From the perspective of etiology, acute poisoning with medicines prevailed among the reasons for admittance to Sklifosovsky Institute's APSDD, with most such patients being female (Table 5). In 2019 and 2021, the proportion of such poisonings in women, among all the acute intoxication cases, was largely the same, whereas in 2020 it decreased noticeably. The number of female acute alcohol (and its surrogates) poisoning cases, on the contrary, has increased significantly (by 286.2%) in 2020 compared to 2019, and in 2021 it dropped down again.

Within the entire analyzed period, the etiological patterns of ACPs in women remained largely the same. They sought medical assistance at Sklifosovsky Institute's APSDD because

of acute intoxications with prescription medicines, including dormitives and sedatives, antidepressants, neuroleptics, spasmolytics, antiparkinsonians medications, taken, in some cases, with alcohol and/or drugs. The most commonly identified drugs were psychodysleptics, psychostimulants, diacetylmorphine (heroin), and synthetic opioids — methadone, fentanyl, and tramadol.

Overall, men had similar medicines behind their acute poisonings. However, unlike women, they exhibited no spikes in respective numbers: the share of medication-induced acute intoxications has been decreasing steadily in relative and absolute values, with the drop in 2021 against 2019 equaling 22.4%.

Gender-related differences were observed for other types of toxic agents, too. Men were significantly more often ($p < 0.0001$) diagnosed with APs caused by drugs, alcohol and its surrogates, corrosive substances, etc. (Table 5).

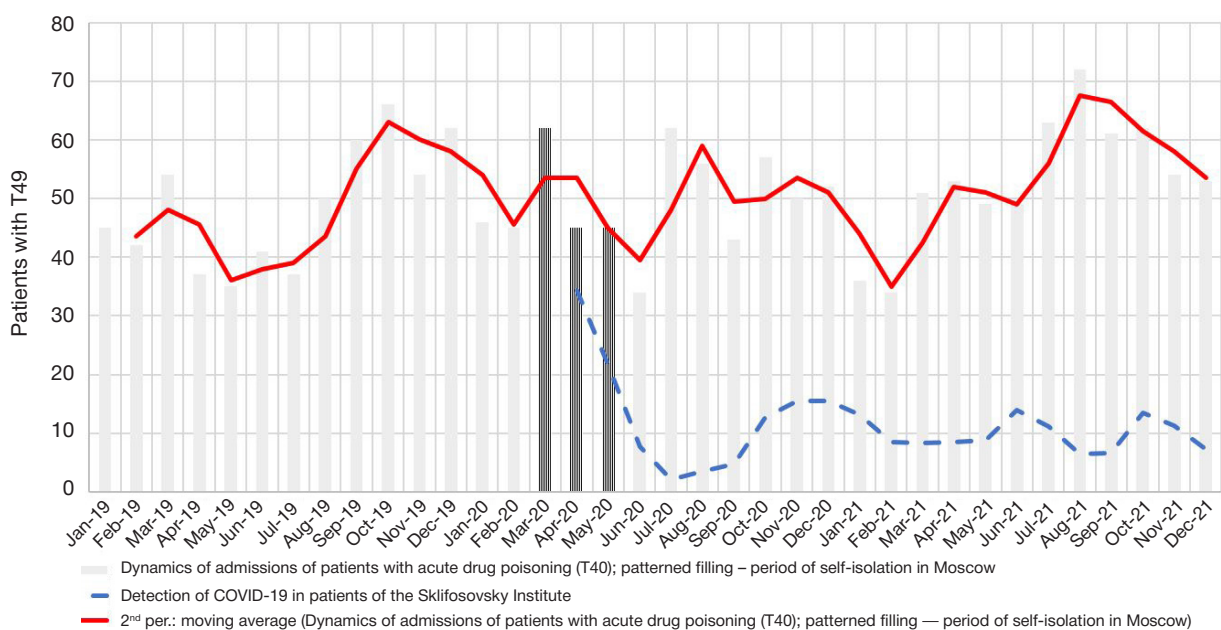


Fig. 1. Dynamics of admissions of patients with acute drug poisoning (T40) in 2019–21, and detection of COVID-19 in 2020–21 among patients of N. V. Sklifosovsky Research Institute for Emergency Medicine

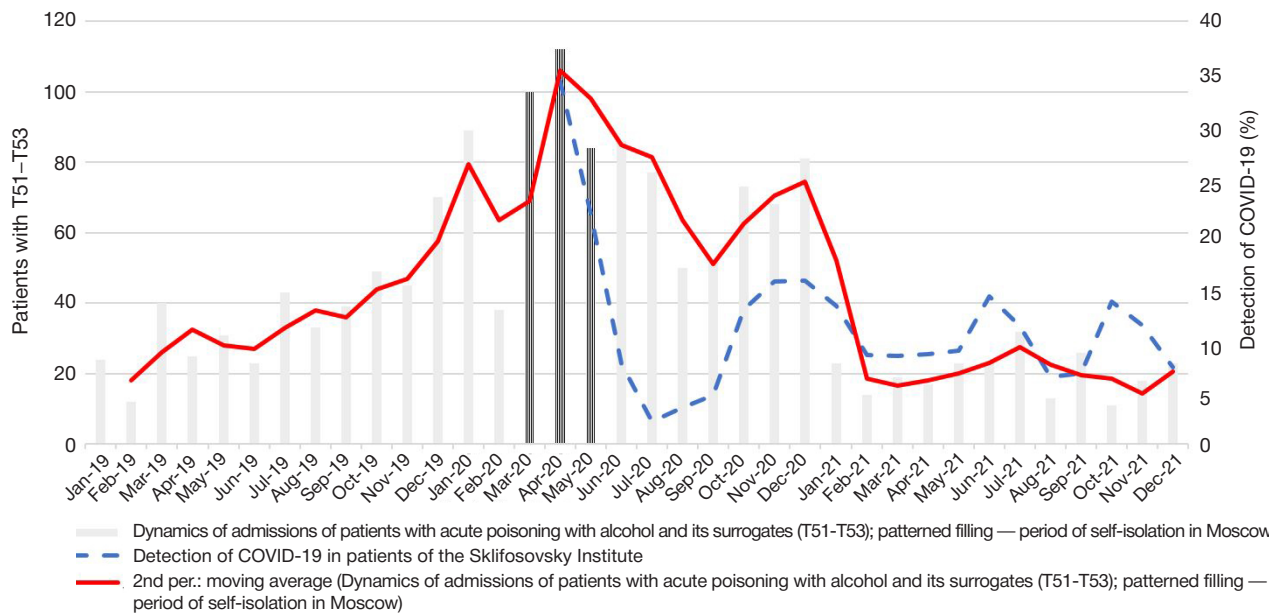


Fig. 2. Dynamics of admissions of patients with acute poisoning with alcohol and its surrogates (T51-T53) in 2019–21, and detection of COVID-19 in 2020–21 among patients of N. V. Sklifosovsky Research Institute for Emergency Medicine

With the COVID-19 pandemic in the background, the situation with drug-related APs has changed significantly from the viewpoint of range of substances abused, while the absolute number of cases remained largely stable. In 2020, the number of drug poisonings that required admission to the hospital has grown by only 2.4% compared to 2019. In 2021, the upwards trend continued, but the rise was still only slight (by 6.7% compared to the previous year) (Table 1).

During the entire study period, synthetic opioid methadone (T40.3) was the most frequently detected drug (Fig. 3). It was the prevailing reason of poisonings in men, with 148 patients hospitalized in 2019, 173 in 2020, 143 in 2021. In this group, acute intoxications with methadone were 1.5–2.4 times more common than with other opiates/opioids. As for women, there were only 17, 33, and 21 cases registered in the considered years, respectively.

The drugs detected in female patients most often were psychodysleptics (T40.9). Men also sought medical assistance because of intoxication with psychodysleptics, and the number of the respective cases doubled through the study period (48 cases in 2019, 76 in 2020, 101 in 2021).

It should be noted that intoxications solely with methadone were rare: 4.2–5.0% (men) and 0.3–0.8% (women) of all drug-induced APs. All other cases involved other drugs, ethanol and/or substances from different pharmacological groups.

Compared to 2019, in 2020 the share of APs with methadone and psychostimulants, psychostimulants/psychodysleptics, and medicines increased from 8.5 to 11.6% and from 6.3 to 13.7%, respectively. The proportion of intoxications with psychodysleptics in combination with opiates/opioids (excluding methadone) and psychostimulants increased from 7.4 to 9.7%, and poisonings with combinations of psychodysleptics and psychostimulants — from 8.3 to 10.2%. The share of APs caused by a combination of

methadone and medicines, psychodysleptics and cannabis/psychostimulants, psychodysleptics and medicines, including cases with involvement of ethanol, dropped in 2020, but increased again in 2021. New combinations of toxicants not registered in the previous years were recorded in 2021: opiates/opioids with medicines; synthetic drugs with medicines and/or psychodysleptics and/or cannabis; cocaine with psychostimulants and/or medicines (Fig. 3).

From 2019 through 2021, the overall proportion of AP cases involving a mixture of different substances has grown by 44.2%, but the gender-wise distribution of this rise was very unequal: 0.6% for men, 152.8% for women. As a rule, the mixtures included drugs combined with one or more psychotropic or multidirectional medicines, or with alcohol. Quite often, NSAIDs (sodium metamizole, ibuprofen, naproxen, salicylates, paracetamol) and/or psychotropic medicines (barbiturates, benzodiazepines, tri- and tetracyclic antidepressants) were found combined with drugs. Overall, through the study period, the frequency of registration of intoxications with combinations of drugs and medicines in men increased by 6.6% (Table 5).

The shares of APs with opiates (heroin, morphine, codeine (T40.0–T40.2)) taken alone or in a complex combination of drugs (excluding methadone) and psychopharmacological medications, including T43.6 (derivatives of amphetamine and methamphetamine), varied during the study period from 11.0 to 18.5% (108 cases in 2019, 110 cases in 2020, 70 cases in 2021). In 2019 and 2020, such intoxications were registered in men exclusively, but in 2021, women appeared in the respective group of patients, with these kinds of poisonings making up 13.3% of all cases.

In 2020 and 2021, COVID-19 epidemic process did not influence the monthly dynamics/number of admission of patients with drug-induced APs (Fig. 1). Moreover, when the frequency of detection of SARS-CoV-2 RNA decreased, which

Table 3. Dynamics of acute poisoning, men and women, years 2019–2021

Gender	2019		2020		2021	
	Abs.	%	Abs.	%	Abs.	%
Male	1721	53,1	1988	57	1473	51,4
Female	1519	46,9	1497	43	1392	48,6

Table 4. Age of patients with ACPs admitted to the Sklifosovsky Institute's APSDD

Age group	2019		2020		2021	
	Abs.	%	Abs.	%	Abs.	%
16–29 years old	944	29,1	1014	29,1	926	32,3
30–39 years old	884	27,3	1044	30	772	27
40–49 years old	612	18,9	668	19,2	485	16,9
50–59 years old	347	10,7	333	9,5	265	9,3
60–74 years old	271	8,4	262	7,5	239	8,3
≥ 75 years old	182	5,6	164	4,7	178	6,2
Total	3240	100	3485	100	2865	100

indicated a temporary improvement of the epidemiological situation, the number of such intoxications increased sharply, reaching the maximum in July–October 2021.

During the study period, 2020 was the year when the number of cases of intoxication with alcohol and its surrogates spiked (109.7% more than in 2019 and 2021), and this reason became more common in the overall patterns of ACPs (Table 1).

In 2020, on the level of months, there were 2.5–4.5 times more admissions for this reason than in 2019; the respective indicator spiked in March and April, same time when the number of COVID-19 registrations was maximum (Fig. 2). In 24.8–31.4% of cases (880 persons in 2019, 729 in 2020, 651 in 2021), patients with poisonings of various etiology, with the exception of group T51–T53, were also in a state of alcoholic intoxication.

The number of APs with corrosive substances peaked in 2020 (Table 1). However, in 2021, the respective figures decreased significantly, both in absolute and relative values. In this group, the prevailing patterns were oral intake of organic (acetic) and inorganic (sulfuric, hydrochloric) acids, alkalis (ammonia, sodium hydroxide), oxidants (potassium permanganate, iodine), and corrosive substances part of household chemicals. There were also cases of poisoning with chlorine vapors.

In 2021, compared to the means recorded in 2019 and 2020, the quantity of intoxications with primarily non-medical

substances (groups T55–T65, "Other") increased by 33.1%, which translated into growth of their share in the overall ACP patterns (Table 1). The most common reasons for poisonings were carbon monoxide (31.1–39.2%) and toxic substances contained in mushrooms (13.6–29.2%). Cases of the latter kind were registered throughout the year, predominantly during summer and autumn.

In 2020 and 2021, compared to 2019, the number of hospitalizations with toxicological trauma caused by poisonous plants increased 4-fold, from 13 cases in 2019 to 50 and 53 in the following years, respectively. These injuries were mainly seasonal, registered in spring and summer, with photochemical dermatitis (burns) caused by *Heraclium sosnowsky* being the most common: their proportion varied from 72 to 100% within the studied three years.

DISCUSSION

ACP is a serious public health problem, one of the frequent causes of admission to emergency rooms [8, 9] and mortality in working age [10, 11].

Although far from all persons suffering intoxications of various etiology seek medical assistance, analysis of prevalence and patterns of APs based on the records from multidisciplinary hospitals of metropolises yields valuable information that

Table 5. Etiology of ACPs, men and women admitted to the Sklifosovsky Institute's APSDD

Year	Etiological groups	Male		Female		Statistical analysis results, 95% CI
		Abs.	%	Abs.	%	
2019	Medicines (T36-39, T41-50)	604	18.6	1038	32.1	$p < 0,0001$ ($\chi^2 = 466,7$, $df = 4$)
	Drugs (T40)	471	14.5	112	3.5	
	Alcohol and its surrogates (T51-T53)	340	10.5	94	2.9	
	Corrosive substances (T54)	166	5.1	158	4.9	
	Other (T55-T65)	140	4.3	117	3.6	
	Total	3240 (100%)				
2020	Medicines (T36-39, T41-50)	553	15.8	836	24.0	$p < 0,0001$ ($\chi^2 = 421,9$, $df = 4$)
	Drugs (T40)	500	14.3	97	2.8	
	Alcohol and its surrogates (T51-T53)	641	18.4	269	7.7	
	Corrosive substances (T54)	180	5.2	169	4.9	
	Other (T55-T65)	114	3.3	126	3.6	
	Total	3485 (100%)				
2021	Medicines (T36-39, T41-50)	469	16.4	908	31.7	$p < 0,0001$ ($\chi^2 = 407,6$, $df = 4$)
	Drugs (T40)	502	17.5	135	4.7	
	Alcohol and its surrogates (T51-T53)	177	6.2	65	2.3	
	Corrosive substances (T54)	131	4.5	136	4.7	
	Other (T55-T65)	194	6.8	148	5.2	
	Total	2865 (100%)				

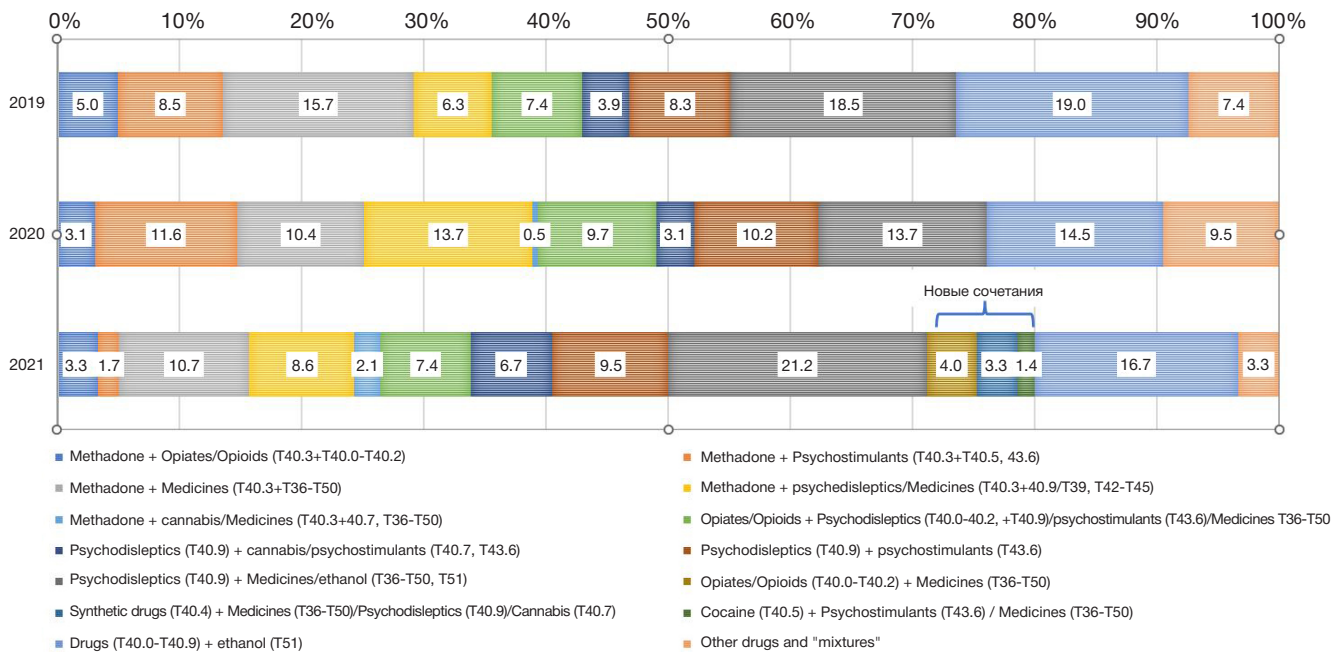


Fig. 3. The proportion of poisonings with drug mixtures

allows deducing trends and regularities peculiar to this branch of medical toxicology [8, 12]. Therefore, it was interesting to investigate the degree and etiological patterns of ACPs against the background of a complicated sanitary and epidemiological situation associated with the COVID-19 pandemic.

Fluctuations of COVID-19 incidence caused, inter alia, by the emergence of the new genetic variants of SARS-CoV-2, and the respective rise and fall of the hospitalizations curve were registered in Moscow and generally in Russia both in 2020 and 2021 [2, 13]. However, from the point of view of population's socio-psychological adaptation to the sanitary and epidemiological situation, the most difficult was 2020, when the imposed restrictive measures were most stringent, and the level of psycho-emotional stress highest [5, 14].

Our study revealed distinct differences in the dynamics of admissions to the Sklifosovsky Institute with toxicological trauma throughout the year preceding the COVID-19 pandemic, then when it was at its highest point, and afterwards, when the epidemiological situation has stabilized. Our data on the number of laboratory-confirmed cases of the new coronavirus infection among those admitted to the hospital allowed objectifying information about the spread of infection in the population during the study period.

Compared to 2019 and 2021, the frequency of referrals to the Sklifosovsky Institute's APSDD with ACPs in 2020 was considerably greater, which is a noteworthy fact. Another interesting aspect in this context is the growth of hospitalizations with APs caused by ethanol and its surrogates. In absolute values, the peak thereof was registered during the first months of sanitary restrictions. This sharp growth of the share of patients with alcohol poisoning probably stems from the high level of psychological stress [5, 15] caused by movement restrictions imposed due to the COVID-19 pandemic, and, apparently, from the widespread opinion that drinking strong alcohol reduces the risk of contracting colds [16].

Intoxication with isopropyl alcohol, a result of abuse of alcohol-containing liquids intended for sanitary treatment of hands and surfaces, also shaped the general patterns of alcohol poisoning. As reported in the published studies, against the background of the COVID-19 pandemic, many countries registered unusually numerous complaints connected with poisoning with disinfectants [17].

On the other hand, there may be another reason behind the increased number of admitted patients with APs caused by ethanol and its surrogates: when COVID-19 was spreading, the process of rendering emergency medical care in Moscow was adjusted to challenges. Thus, some of the inpatient clinics that previously received such cases were completely or partially repurposed to work with COVID-19 patients (under Orders № 44 of January 30, 2020, № 349 of April 5, 2020, № 392 of April 10, 2020, № 584 of June 4, 2020, all issued by the Moscow Department of Health and in force during the study period), which largely diverted the flow of AP cases to the Sklifosovsky Institute.

However, such a redistribution of the said ethanol/surrogates AP cases between Moscow's hospitals should have mainly affected the absolute number of hospital admissions. This is exactly what happened in St. Petersburg, Russia's second largest metropolis, where I. I. Dzhanelidze Research Institute of Emergency Care marked a decrease in the number of referred alcohol poisonings because of the changes in the conditions of hospitalization to medical institutions of the city during the pandemic [18].

At the same time, regardless of the absolute number of admitted patients, the apparent coincidence of the peaks of hospitalizations and COVID-19 detection that occurred in both 2020 and 2021 indicates a spike in alcohol abuse against the background of the pandemic, which is confirmed the moving averages calculated with a smoothing interval of two (Figure 2). This phenomenon may be explained by the psychogenic factor rooted in the population's constant awareness of the morbidity dynamics and the gradual tightening of restrictive measures. This hypothesis is further confirmed by a considerable drop in the absolute number of hospitalizations with this type of poisonings in 2021, as compared to 2020: many restrictions had been canceled in Moscow during the second year of the pandemic, regardless of the still high incidence [2, 19]. In addition, the dependence we have established is consistent with the data of some foreign researchers, who also registered abnormally higher numbers of alcohol poisonings in 2020 [20, 21]. The factor of stress can also be behind the increased proportion of female patients in the 2020's alcohol APs pool: in adverse conditions, women are more likely to develop various

affective disorders, like reactive depression, generalized anxiety and panic disorders [22].

A particularly interesting subject was that of the effect of COVID-19-associated stress and restrictive measures on the patterns of acute drug poisonings in the metropolis.

Both the absolute number of such intoxications and their share in the overall patterns of ACPs remained stable throughout the study, showing only a slight growth by 2021. During the two years of the pandemic, neither the total number of patients admitted with drug poisonings nor the undulating fluctuation thereof through the year have shown any dependency on the COVID-19 incidence rate (Fig. 1), which makes the dynamics of drug-induced APs within the considered period totally different from that of acute intoxications caused by alcohol.

To a certain extent, a probable reason behind the growth of the number of drug poisonings is the involuntary social isolation and the related stress, which turned people to drugs [5], and some of them continued using them afterwards. On the other hand, people who used drugs irregularly before COVID-19 could reduce or even stop taking them during the pandemic, while regular users, on the contrary, could increase doses and/or frequency [23]. In this case, we would have witnessed more intoxication cases requiring hospitalization. Anyhow, it is obvious that sanitary and epidemiological situation has a significantly lower effect on drug abuse than on alcohol overindulgence, since spirits are a more affordable, legal "corrector" of the psycho-emotional status.

Against the background of the pandemic, drug use patterns have changed more qualitatively than quantitatively, with an upwards trend for simultaneous consumption of several narcotic and psychotropic substances. Such mixtures, detected with the help of laboratory tests, indicate either a "falsification," when the initial drug is diluted with other substances, or a switch to an "alternative" preparation with the aim of relieving the withdrawal syndrome [24–26].

Throughout the entire study period, we have also registered a consistently high proportion of "pharmaceutical addiction" cases, i.e., people suffering intoxication with official medicines taken either alone or in combination with alcohol [27].

In 2020, the number of poisonings with natural (morphine, opium) and semi-synthetic (heroin) opiates decreased significantly, by 33.3%, which was probably caused by disruption of the supply chains carrying these drugs along the "Balkan route" from Afghanistan and Pakistan due to the closed borders between the countries [28]. The admitted cases of APs with synthetic narcotic substances and their various combinations with other drugs, medicines and ethanol, on the contrary, have spiked during the pandemic (Fig. 3).

It is obvious that, despite the complete or partial lockdown in different countries, drug users were able to quickly adjust to the difficulties of trafficking. Illicit substances were actively purchased through specialized Internet websites and delivered in a contactless manner [29]. It is likely that the growing frequency of use of synthetic drugs, and, consequently, their

rapid spread among consumers, have been supported by their lower cost compared to the traditionally used narcotics.

In the context of the pandemic, the dynamics of referrals to the Sklifosovsky Institute's APSDD with APs of a different genesis has also changed.

It seems quite understandable that, at the height of the pandemic, the number of poisonings with corrosive substances increased, since they could be used for the purpose of additional disinfection. The cases of APs with chlorine vapor have also become more frequent. This type of ACPs, resulting from improper use of disinfectants, was especially common in the first months of the pandemic [30].

There are obvious reasons behind the surge in hospitalizations with toxicological injuries caused by poisonous plants. Because of the switch to remote work patterns and the need for isolation, summertime, many residents of Moscow left for the country, where the possibility of contact with plants is much higher. The prevalence of photochemical dermatitis among phytotoxicoses is the consequence of the continued invasion of Sosnovsky's hogweed, the plant behind such conditions [31].

The stress caused by the spread of COVID-19, with changes of the usual way of life in the background, has been shown to worsen chronic somatic and endogenous mental disorders, the aggravation manifested as insomnia, anxiety, depression [6]. Attempts at arrest thereof often lead to uncontrolled intake of various drugs and dietary supplements. From 2020, we have been registering a growing number of intoxications associated with microdoses of psychedelics contained in fly agaric (*Amanita muscaria*) or panther amanita (*Amanita pantherina*) [32], a consequence of the so-called agaric microdosing.

According to the Sklifosovsky Institute, mushroom poisonings are no longer limited to summer and autumn, as they previously were, when the only cause thereof was consumption of poisonous mushrooms by mistake.

CONCLUSIONS

The dynamics of admissions with ACPs to the Sklifosovsky Institute's APSDD during the first two years of COVID-19 differ distinctively from those seen in the year before the pandemic. Apparently, the greater number of alcohol-induced APs is connected with the level of psycho-emotional tension and stress against the background of a complex sanitary and epidemiological situation. The restrictive measures designed to upkeep social isolation do not affect the level of drug use in Moscow fundamentally, but change the respective etiological patterns. The pandemic is associated with an increased number of APs caused by consumption of mood-enhancing substances (psychostimulants, ethanol, agaric microdosing) and use of agents possessing or deemed to possess a disinfecting effect. The data collected at the emergency care hospitals can help identify the actual ACP trends peculiar to a metropolis.

References

1. Kutyrev VV, Popova AYu, Smolenskiy VYu, Ezhlova EB, Demina YuV, Safronov VA, et al. Epidemiological peculiarities of new coronavirus infection (COVID-2019). Communication 2: Peculiarities OF epidemic process development in conjunction with performed anti-epidemic measures around the world and in the Russian Federation. *Problems of Particularly Dangerous Infections*. 2020; 2: 6–12. Russian.
2. Akimkin VG, Popova AYu, Ploskireva AA, Ugleva SV, Semenenko TA, Pshenichnaya NYu, et al. COVID-19: the evolution of the pandemic in Russia. Report I: manifestations of the COVID-19 epidemic process. *Journal of Microbiology, Epidemiology and Immunobiology*. 2022; 99 (3): 269–86. DOI: 10.36233/0372-9311-276. Russian.
3. Vodenko KV, Samygina LV, Samygin PS, Samygin SI. Social

- atomization in Russia during the coronavirus pandemic: features of manifestation and prospects for overcoming. Bulletin of the South-Russian State Technical University (NPI). Series: Socio-Economic Sciences. 2020; 2: 100–7. DOI: 10.17213/2075-2067-2020-2-100-107. Russian.
4. Yao H, Chen J, Xu Y. Patients with mental health disorders in the COVID-19 epidemic. *Lancet Psychiatry*. 2020; 7 (4): e21. DOI: 10.1016/S2215-0366(20)30090-0.
 5. Shulgina EV. Analysis of the impact of the coronavirus pandemic on drug use in the Russian Federation. *Svobodnaya mysl'*. 2020; 5: 45–50. DOI: 10.24411/0869-4435-2020-00004. Russian.
 6. Reinstadler V, Ausweger V, Grabher AL, Kreidl M, Huber S, Grandler J, et al. Monitoring drug consumption in Innsbruck during coronavirus disease 2019 (COVID-19) lockdown by wastewater analysis. *Sci Total Environ*. 2021; 757: 144006. DOI: 10.1016/j.scitotenv.2020.144006.
 7. Godkov MA, Shustov VV, Kasholkina EA. Dynamics and gender and age features of the COVID-19 epidemic process in Moscow (results of screening survey for 1.5 years). *Laboratory Service*. 2021; 10 (4): 30–7. DOI: 10.17116/labs20211004130. Russian.
 8. Maheswari E, Abraham L, Chacko CS, Saraswathy GR, Ramesh AC. Assessment of Pattern, Severity and Outcome of Poisoning in Emergency Care Unit. *Journal of Applied Pharmaceutical Science*. 2016; 6 (12): 178–83. DOI: 10.7324/JAPS.2016.601225.
 9. Aydinov GT, Marchenko BI, Sinelnikova YuA. Acute chemical poisonings as an index of the system of socio-hygienic monitoring in the Rostov region. *Hygiene and Sanitation*. 2018; 97 (3): 279–85. DOI: 10.18821/0016-9900-2018-97-3-279-285. Russian.
 10. Drapkina OM, Samorodskaya IV, Semenov VYu. Top ten causes of death in Moscow and St. Petersburg in 2015 and 2018. *The Russian Journal of Preventive Medicine*. 2020; 23 (5): 18–24. DOI: 10.17116/profmed20202305118. Russian.
 11. Rosstat RF. *Zdravookhranenie v Rossii*. [cited 17 Dec 2023 g.]. Available from: https://gks.ru/bgd/regl/b21_34/Main.htm. Russian.
 12. Sinenchenko AG, Lodyagin AN, Batocyrénov BV, Shikalova IA, Antonova AM. Epidemiological analysis of prevalence and structure of acute poisonings in Saint Petersburg (according to a multiprofile hospital). *Toxicological Review*. 2019; 4: 4–8. DOI: 10.36946/0869-7922-2019-4-4-8. Russian.
 13. Briko NI, Korshunov VA, Krasnova SV, Protserenko DN, Glazovskaya LS, Gostishchev RV, et al. Clinical And epidemiological characteristics of hospitalized patients with COVID-19 during different pandemic periods in Moscow. *Journal of Microbiology, Epidemiology and Immunobiology*. 2022; 99 (3): 287–99. DOI: 10.36233/0372-9311-272. Russian.
 14. Khoroshilov DA, Gromova OA. Perception of pandemic and vaccination in the period of COVID-19 “second wave” (on the basis of in-depth interviews). *National Psychological Journal*. 2021; 2: 3–11. DOI: 10.11621/npj.2021.0201. Russian.
 15. Burkova VN, Butovskaya ML, Fedenok YuN, Ermakov AM, Kolodkin VA, Spodina VI, et al. Anxiety and aggression during COVID-19: on the example of four regions of Russia. *Siberian Historical Research*. 2022; 2: 132–58. DOI: 10.17223/2312461X/36/8. Russian.
 16. Ouchi E, Niu K, Kobayashi Y, Guan L, Momma H, Guo H, et al. Frequent alcohol drinking is associated with lower prevalence of self-reported common cold: a retrospective study. *BMC Public Health*. 2012; 12: 987. DOI: 10.1186/1471-2458-12-987.
 17. Kweon H, Choi J, Yoon S. Analysis of consumer exposure cases for alcohol-based disinfectant and hand sanitizer use against Coronavirus Disease 2019 (COVID-19). *Int J Environ Res Public Health*. 2021; 19 (1): 100. DOI: 10.3390/ijerph19010100.
 18. Lodyagin AN, Sinenchenko AG, Shilov VV, Batotsyrenov BV, Sinenchenko GI. S Structure of acute chemical poisoning during COVID-19 pandemic (according to a multidiscipline hospital). *Toxicological Review*. 2022; 30 (1): 4–11. DOI: 10.47470/0869-7922-2022-30-1-4-11. Russian.
 19. Godkov MA, Shustov VV, Korshunov VA, Stepanov FS, Bazhenov AI. Formation of herd immunity to SARS-COV-2 in the population of Moscow. *Epidemiology and Vaccinal Prevention*. 2022; 21 (1): 81–91. DOI: 10.31631/2073-3046-2022-21-1-81-91. Russian.
 20. Pollard MS, Tucker JS, Green HD Jr. Changes in adult alcohol use and consequences during the COVID-19 Pandemic in the US. *JAMA Netw Open*. 2020; 3 (9): e2022942. DOI: 10.1001/jamanetworkopen.2020.22942.
 21. Calina D, Hartung T, Mardare I, Mitroi M, Poulas K, Tsatsakis A, et al. COVID-19 pandemic and alcohol consumption: Impacts and interconnections. *Toxicol Rep*. 2021; 8: 529–35. DOI: 10.1016/j.toxrep.2021.03.005.
 22. Dmitrieva TB, Drozdov AZ. *Polovye i gendernye aspekty stressoustoychivosti (analiticheskiy obzor)*. Chast' 1. *Russian Journal of Psychiatry*. 2010; 1: 18–24. Russian.
 23. European Monitoring Centre for Drugs and Drug Addiction. *European drug report 2021: trends and developments*. [cited 2023 Aug 2]. Available from: https://www.emcdda.europa.eu/publications/edr/trends-developments/2021_en.
 24. Broséus J, Gentile N, Esseiva P. The cutting of cocaine and heroin: A critical review. *Forensic Sci Int*. 2016; 262: 73–83. DOI: 10.1016/j.forsciint.2016.02.033.
 25. Mellos E, Paparrigopoulos T. Substance use during the COVID-19 pandemic: What is really happening? *Psychiatriki*. 2022; 33 (1): 17–20. DOI: 10.22365/psych.2022.072.
 26. Gosudarstvennyy antinarkoticheskiy komitet. *Doklad o rezul'tatakh monitoringa narkosituatsii v gorode Moskve v 2022 godu*. [cited 2 Aug 2023 g.]. Available from: https://www.rogovskoe.ru/obwestvennaya_bezopasnost/arg/doklad_o_rezultatah_monitoringa_narkosituatsii_v_gorode_moskve_v_2022_godu/. Russian.
 27. Seytakova BK. "Pharmacy" drug addiction: causes and counteraction measures. *Nauchnyy komponent*. 2020; 7 (3): 16–23. DOI: 10.51980/2686-939X_2020_3_16. Russian.
 28. United Nations Office on Drugs and Crime (UNODC). *World Drug Report 2022*. [cited 2023 Aug 2]. Available from: <https://www.unodc.org/unodc/en/data-and-analysis/world-drug-report-2022.html>.
 29. Groshkova T, Stoian T, Cunningham A, Griffiths P, Singleton N, Sedefov R. Will the current COVID-19 Pandemic impact on long-term cannabis buying practices? *J Addict Med*. 2020; 14 (4): e13-0. DOI: 10.1097/ADM.0000000000000698.
 30. Belova MV, Ilyashenko KK, Simonova AYU, Potkhveriya MM, Trusov GV. The structure of acute exotoxicosis during the first three months of the COVID-19 pandemic (according to the acute toxicosis department of NV Sklifosovskiy research institute for emergency medicine). *Russian Sklifosovskiy Journal of "Emergency Medical Care"*. 2021; 10 (1): 27–32. DOI: 10.23934/2223-9022-2021-10-1-27-32. Russian.
 31. Simonova AYU, Belova MV, Ilyashenko KK, Pidchenko NE, Potkhveriya MM, Sachkov AV, et al. Photochemical Dermatitis Due to Contact with Sosnovskiy Hogweed. *Russian Sklifosovskiy Journal "Emergency Medical Care"*. 2021; 9 (4): 653–8. DOI: 10.23934/2223-9022-2020-9-4-653-658. Russian.
 32. Polito V, Stevenson RJ. A systematic study of microdosing psychedelics. *PLoS One*. 2019; 14 (2): e0211023. DOI: 10.1371/journal.pone.0211023 eCollection 2019.

Литература

1. Kutyrev VV, Popova AYU, Smolenskiy VYu, Ezhlova EB, Demina YuV, Safronov VA, et al. Epidemiological peculiarities of new coronavirus infection (COVID-2019). Communication 2: Peculiarities OF epidemic process development in conjunction with performed anti-epidemic measures around the world and in the Russian Federation. *Problems of Particularly Dangerous Infections*. 2020; 2: 6–12. Russian.
2. Akimkin VG, Popova AYU, Ploskireva AA, Ugleva SV, Semenenko TA, Pshenichnaya NYU, et al. COVID-19: the evolution of the pandemic in Russia. Report I: manifestations of the COVID-19 epidemic process. *Journal of Microbiology, Epidemiology and Immunobiology*. 2022; 99 (3): 269–86. DOI: 10.36233/0372-9311-276. Russian.
3. Vodenko KV, Samygina LV, Samygin PS, Samygin SI. Social

- atomization in Russia during the coronavirus pandemic: features of manifestation and prospects for overcoming. Bulletin of the South-Russian State Technical University (NPI). Series: Socio-Economic Sciences. 2020; 2: 100–7. DOI: 10.17213/2075-2067-2020-2-100-107. Russian.
4. Yao H, Chen J, Xu Y. Patients with mental health disorders in the COVID-19 epidemic. *Lancet Psychiatry*. 2020; 7 (4): e21. DOI: 10.1016/S2215-0366(20)30090-0.
 5. Shulgina EV. Analysis of the impact of the coronavirus pandemic on drug use in the Russian Federation. *Svobodnaya mysl'*. 2020; 5: 45–50. DOI: 10.24411/0869-4435-2020-00004. Russian.
 6. Reinstadler V, Ausweger V, Grabher AL, Kreidl M, Huber S, Grandner J, et al. Monitoring drug consumption in Innsbruck during coronavirus disease 2019 (COVID-19) lockdown by wastewater analysis. *Sci Total Environ*. 2021; 757: 144006. DOI: 10.1016/j.scitotenv.2020.144006.
 7. Godkov MA, Shustov VV, Kasholkina EA. Dynamics and gender and age features of the COVID-19 epidemic process in Moscow (results of screening survey for 1.5 years). *Laboratory Service*. 2021; 10 (4): 30–7. DOI: 10.17116/labs20211004130. Russian.
 8. Maheswari E, Abraham L, Chacko CS, Saraswathy GR, Ramesh AC. Assessment of Pattern, Severity and Outcome of Poisoning in Emergency Care Unit. *Journal of Applied Pharmaceutical Science*. 2016; 6 (12): 178–83. DOI: 10.7324/JAPS.2016.601225.
 9. Aydinov GT, Marchenko BI, Sinelnikova YuA. Acute chemical poisonings as an index of the system of socio-hygienic monitoring in the Rostov region. *Hygiene and Sanitation*. 2018; 97 (3): 279–85. DOI: 10.18821/0016-9900-2018-97-3-279-285. Russian.
 10. Drapkina OM, Samorodskaya IV, Semenov VYu. Top ten causes of death in Moscow and St. Petersburg in 2015 and 2018. *The Russian Journal of Preventive Medicine*. 2020; 23 (5): 18–24. DOI: 10.17116/profmed20202305118. Russian.
 11. Rosstat RF. *Zdravookhranenie v Rossii*. [cited 17 Dec 2023 g.]. Available from: https://gks.ru/bgd/regl/b21_34/Main.htm. Russian.
 12. Sinenchenko AG, Lodyagin AN, Batocirenov BV, Shikalova IA, Antonova AM. Epidemiological analysis of prevalence and structure of acute poisonings in Saint Petersburg (according to a multiprofile hospital). *Toxicological Review*. 2019; 4: 4–8. DOI: 10.36946/0869-7922-2019-4-4-8. Russian.
 13. Briko NI, Korshunov VA, Krasnova SV, Protsenko DN, Glazovskaya LS, Gostishchev RV, et al. Clinical And epidemiological characteristics of hospitalized patients with COVID-19 during different pandemic periods in Moscow. *Journal of Microbiology, Epidemiology and Immunobiology*. 2022; 99 (3): 287–99. DOI: 10.36233/0372-9311-272. Russian.
 14. Khoroshilov DA, Gromova OA. Perception of pandemic and vaccination in the period of COVID-19 "second wave" (on the basis of in-depth interviews). *National Psychological Journal*. 2021; 2: 3–11. DOI: 10.11621/npj.2021.0201. Russian.
 15. Burkova VN, Butovskaya ML, Fedenok YuN, Ermakov AM, Kolodkin VA, Spodina VI, et al. Anxiety and aggression during COVID-19: on the example of four regions of Russia. *Siberian Historical Research*. 2022; 2: 132–58. DOI: 10.17223/2312461X/36/8. Russian.
 16. Ouchi E, Niu K, Kobayashi Y, Guan L, Momma H, Guo H, et al. Frequent alcohol drinking is associated with lower prevalence of self-reported common cold: a retrospective study. *BMC Public Health*. 2012; 12: 987. DOI: 10.1186/1471-2458-12-987.
 17. Kweon H, Choi J, Yoon S. Analysis of consumer exposure cases for alcohol-based disinfectant and hand sanitizer use against Coronavirus Disease 2019 (COVID-19). *Int J Environ Res Public Health*. 2021; 19 (1): 100. DOI: 10.3390/ijerph19010100.
 18. Lodyagin AN, Sinenchenko AG, Shilov VV, Batotsyrenov BV, Sinenchenko GI. S Structure of acute chemical poisoning during COVID-19 pandemic (according to a multidiscipline hospital). *Toxicological Review*. 2022; 30 (1): 4–11. DOI: 10.47470/0869-7922-2022-30-1-4-11. Russian.
 19. Godkov MA, Shustov VV, Korshunov VA, Stepanov FS, Bazhenov AI. Formation of herd immunity to SARS-COV-2 in the population of Moscow. *Epidemiology and Vaccinal Prevention*. 2022; 21 (1): 81–91. DOI: 10.31631/2073-3046-2022-21-1-81-91. Russian.
 20. Pollard MS, Tucker JS, Green HD Jr. Changes in adult alcohol use and consequences during the COVID-19 Pandemic in the US. *JAMA Netw Open*. 2020; 3 (9): e2022942. DOI: 10.1001/jamanetworkopen.2020.22942.
 21. Calina D, Hartung T, Mardare I, Mitroi M, Poulas K, Tsatsakis A, et al. COVID-19 pandemic and alcohol consumption: Impacts and interconnections. *Toxicol Rep*. 2021; 8: 529–35. DOI: 10.1016/j.toxrep.2021.03.005.
 22. Dmitrieva TB, Drozdov AZ. Polovye i gendernye aspekty stressoustoychivosti (analiticheskiy obzor). *Chast' 1*. *Russian Journal of Psychiatry*. 2010; 1: 18–24. Russian.
 23. European Monitoring Centre for Drugs and Drug Addiction. *European drug report 2021: trends and developments*. [cited 2023 Aug 2]. Available from: https://www.emcdda.europa.eu/publications/edr/trends-developments/2021_en.
 24. Broséus J, Gentile N, Esseiva P. The cutting of cocaine and heroin: A critical review. *Forensic Sci Int*. 2016; 262: 73–83. DOI: 10.1016/j.forsciint.2016.02.033.
 25. Mellos E, Paparrigopoulos T. Substance use during the COVID-19 pandemic: What is really happening? *Psychiatriki*. 2022; 33 (1): 17–20. DOI: 10.22365/jpsych.2022.072.
 26. Gosudarstvennyy antinarkoticheskiy komitet. *Doklad o rezul'tatakh monitoringa narkosituatsii v gorode Moskve v 2022 godu*. [cited 2 Aug 2023 g.]. Available from: https://www.rogovskoe.ru/obvestvennaya_bezopasnost/arg/doklad_o_rezultatakh_monitoringa_narkosituatsii_v_gorode_moskve_v_2022_godu/. Russian.
 27. Seytakova BK. "Pharmacy" drug addiction: causes and counteraction measures. *Nauchnyy komponent*. 2020; 7 (3): 16–23. DOI: 10.51980/2686-939X_2020_3_16. Russian.
 28. United Nations Office on Drugs and Crime (UNODC). *World Drug Report 2022*. [cited 2023 Aug 2]. Available from: <https://www.unodc.org/unodc/en/data-and-analysis/world-drug-report-2022.html>.
 29. Groshkova T, Stoian T, Cunningham A, Griffiths P, Singleton N, Sedefov R. Will the current COVID-19 Pandemic impact on long-term cannabis buying practices? *J Addict Med*. 2020; 14 (4): e13-0. DOI: 10.1097/ADM.0000000000000698.
 30. Belova MV, Ilyashenko KK, Simonova AYU, Potshkveriya MM, Trusov GV. The structure of acute exotoxicosis during the first three months of the COVID-19 pandemic (according to the acute toxicosis department of NV Sklifosovsky research institute for emergency medicine). *Russian Sklifosovsky Journal of "Emergency Medical Care"*. 2021; 10 (1): 27–32. DOI: 10.23934/2223-9022-2021-10-1-27-32. Russian.
 31. Simonova AYU, Belova MV, Ilyashenko KK, Pidchenko NE, Potshkveriya MM, Sachkov AV, et al. Photochemical Dermatitis Due to Contact with Sosnovsky Hogweed. *Russian Sklifosovsky Journal "Emergency Medical Care"*. 2021; 9 (4): 653–8. DOI: 10.23934/2223-9022-2020-9-4-653-658. Russian.
 32. Polito V, Stevenson RJ. A systematic study of microdosing psychedelics. *PLoS One*. 2019; 14 (2): e0211023. DOI: 10.1371/journal.pone.0211023 eCollection 2019.