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Показатели травматизма у детей в период ограничительных мероприятий, связанных с распространением новой коронавирусной инфекции (COVID-19)

© О.А. Купцова[1], А.В. Залетина[1], С.В. Виссарионов[1], А.Г. Баиндурашвили[1], А.Г. Микава[2], С.В. Александров[2]

[1] Национальный медицинский исследовательский центр детской травматологии и ортопедии имени Г.И. Турнера, Санкт-Петербург, Россия;
[2] Детская городская больница № 2 святой Марии Магдалины, Санкт-Петербург, Россия

Обоснование. В связи с распространением новой коронавирусной инфекции (COVID-19) и введением ограничительных мероприятий по предупреждению ее распространения произошли изменения в организации и работе медицинских учреждений. В травматологических пунктах и больницах были установлены новые правила для приема пациентов с травмами, ограничена госпитализация плановых больных, введено обследование пациентов на новую коронавирусную инфекцию, обследование родителей детей с травмами, проведение консультаций удаленно, были выделены зоны без COVID-19 для повторной амбулаторной помощи. Новые условия организации и функционирования отделений амбулаторного и стационарного уровня могут влиять на картину детского травматизма.

Цель — провести сравнительный анализ уровня и характера травматизма у детей, обратившихся за медицинской помощью в период ограничительных мероприятий по противодействию распространению новой коронавирусной инфекции (COVID-19) и показателей травматизма за аналогичный период предыдущего года.

Материалы и методы. Проанализированы данные историй болезни 3820 пациентов в возрасте от 0 до 17 лет, которые обращались в Городской центр амбулаторной хирургии и травматологии СПбГБУЗ «Детская городская больница № 2 святой Марии Магдалины» в период с 16.03.2020 по 31.05.2020 и в аналогичный период в 2019 г.

Результаты. Количество первичных обращений с травмой в 2019 г. составило 2851, в то время как за аналогичный период 2020 г. — 969. В целом за исследуемый период 2020 г. уровень травматизма снизился на 66 % по сравнению с аналогичным периодом 2019 г. Несмотря на общее снижение уровня травматизма в исследуемый период 2020 г., в структуре повреждений опорно-двигательного аппарата доля переломов костей конечностей составляла 35 % и превышала аналогичный показатель 2019 г. ($p = 0{,}004$, критерий χ^2). В 2020 г. на 83 % снизился уровень уличного травматизма ($p < 0{,}0001$), при этом на 61 % отмечалось увеличение бытового ($p < 0{,}0001$) и на 47 % транспортного ($p < 0{,}0001$) травматизма.

Заключение. Была выявлена связь между вспышкой пандемии и снижением числа обращений в травматологический центр ДГБ № 2, изменением структуры травматизма в зависимости от его причины, что может быть связано с ограничительными мерами, переводом на дистанционное обучение, запрещением организованных спортивных мероприятий и сокращением использования детских площадок. Данная информация может быть полезна при планировании работы органов здравоохранения и распределении ресурсов при возникновении пандемических ситуаций в будущем.

Ключевые слова: показатели травматизма; дети; травма у детей; COVID-19; пандемия.

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Trauma rates in children in the period of restrictive measures related to the spread of the new coronavirus infection (COVID-19)

© Olga A. Kuptsova[1], Anna V. Zaletina[1], Sergei V. Vissarionov[1], Alexey G. Baindurashvili[1], Avtandil G. Mikava[2], Sergei V. Alexandrov[2]

[1] H. Turner National Medical Research Center for Children's Orthopedics and Trauma Surgery, Saint Petersburg, Russia;
[2] St. Mary Magdalene Children's City Hospital No. 2, Saint Petersburg, Russia

BACKGROUND: Due to the spread of the novel coronavirus infection (COVID-19) and the introduction of restrictive measures to prevent its spread, there has been a change in the organization and work of medical institutions. New rules for admitting patients with injuries, limiting hospitalization of planned patients, examining patients for coronavirus infection, examining parents of children with injuries, conducting remote consultations, and identifying areas without COVID-19 for repeated outpatient care have been introduced in trauma centers and hospitals. New conditions for the organization and functioning of outpatient and inpatient departments have had an impact on the picture of child trauma.

AIM: This study aims to conduct a comparative analysis of the level and nature of musculoskeletal injuries in children who sought medical care during the COVID-19 pandemic and injuries that occurred during the same period of the previous year.

MATERIALS AND METHODS: The analysis of the medical history data of 3820 patients aged 0 to 17 years, who were admitted to the City Center for Outpatient Surgery and Trauma of St. Petersburg St. Mary Magdalene Children's City Hospital No. 2 during the period from March 16, 2020, to May 31, 2020, and for the same period in 2019.

RESULTS: The number of initial visits with trauma in 2019 was 2851 patients, whereas during the same period in 2020, 969 patients came with trauma. In general, during the study period in 2020, the trauma rate decreased by 66% compared with the same period in 2019. Despite the general decrease in the level of injuries in the study period in 2020, in the injured structures of the musculoskeletal system, the proportion of limb fractures was 35% and exceeded the same indicator in 2019 ($p = 0.004$, χ^2 criterion). In 2020, the level of street injuries ($p < 0.0001$) decreased by 83%, while there was a 61% increase in domestic injuries ($p < 0.0001$) and a 47% increase in traffic injuries ($p < 0.0001$).

CONCLUSION: The relationship between the outbreak of a pandemic and a decrease in the number of visits to the trauma center of Children's Hospital No. 2 was revealed and a change in the structure of injuries depending on their cause. This change may be associated with restrictive measures, the transfer to distance learning, the ban on organized sports events, and the reduced usage of playgrounds. This information can be useful for planning the work of health authorities and distributing resources during future pandemic situations.

Keywords: trauma rates; children; child trauma; COVID-19; pandemic.

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BACKGROUND

The new coronavirus infection (COVID-19) has made significant changes in the lives of people and the work of the healthcare system. Because of self-isolation and kindergarten and school closure, the presentation of pediatric injuries has also changed. Theoretically, we can expect a decrease in the frequency of road traffic accidents and sports injuries and a possible increase in home traumatism. This, in turn, has led to a change in the hospitalization of patients with injuries and their medical care in different countries [1–8].

In trauma centers and hospitals, new rules were introduced for the admission of patients with injuries, mainly to protect medical personnel from contracting the viral infection; thus, hospitalization of planned patients was limited. Before admission, patients and their parents were examined for COVID-19, and the duration of hospital stay and examination of pediatric patients with injuries were minimized [5, 6, 9–11].

It was recommended to perform all consultations remotely, use video consultations more, allocate a COVID-free area for repeated outpatient care, perform surgical interventions with fewer staff, treat fractures in pediatric patients with COVID-19 conservatively until their condition stabilizes, further remove hardware without the presence of parents, and conduct subsequent consultations remotely [12, 13]. In the COVID-19 period, ambulatory telemedicine has become more widely used, and the number of patients attending consultations and being observed face to face has decreased [2, 3, 14].

St. Petersburg was no exception in the introduction of measures against the spread of COVID-19. Starting from March 13, 2020, restrictive measures to counter the spread of COVID-19 were gradually intensified from recommending not leaving residence places to prohibiting visits to schools and preschool institutions, sports clubs, playgrounds, parks, squares, and gardens.

In this regard, it was decided to analyze the presentation of pediatric injuries during this period.

The work aimed to conduct a comparative analysis of the level and nature of injuries in pediatric patients who sought medical help during the period of restrictive measures to counter the spread of COVID-19 and rate of injuries for the same period of the previous year.

MATERIALS AND METHODS

The case histories of 3820 patients aged 0 to 17 years who applied to the City Center for Outpatient Surgery and Traumatology of St. Mary Magdalene Children's City Hospital No. 2 from March 16 to May 31, 2020, and in the same period in 2019 were obtained.

The specified period was observed to analyze injury rates in connection with the introduction of restrictive measures to counter the spread of COVID-19, which were approved by the federal and regional governments (Decree of the President of the Russian Federation No. 206, 239, 294; Resolution of the Government of St. Petersburg of March 13, 2020 No. 121 "On measures to counter the spread of a new coronavirus infection [COVID-19] in St. Petersburg" with amendments and additions).

Since March 16, 2020, the government of St. Petersburg has systematically introduced measures aimed to counter the spread of COVID-19 and reduce the risk of infection of the population in the city. So, gradually, by March 30, 2020, various public events were prohibited, and educational activities, including sports training (until March 26, 2020, free attendance was allowed by the decision of legal representatives), and visits to swimming pools, parks, squares, and gardens were prohibited. In April, there was a prohibition on visiting entertainment centers and outdoor playgrounds.

At the federal government level, to ensure the sanitary and epidemiological well-being of the population on the territory of the Russian Federation and under Art. 80 of the Constitution of the Russian Federation, nonworking days were announced from March 30 to April 5, 2020, which were then extended until May 11, 2020. During the periods, citizens were requested to stay at home and comply with measures and restrictions.

Thus, we divided the study period into three stages as follows:

1. March 16 to 31, 2020, was when the restrictions were introduced systematically. March 16, 2020, was considered a starting point as the introduction of all restrictive measures began on this day.
2. April 1 to 30, 2020, was the period of the most severe restrictive measures regime. Nonworking days have been announced.
3. May 1 to 31, 2020, was the period that preceded the first stage of restriction removal. (Stage 1 of restriction removal started on June 1, 2020.)

Patients who sought help due to injuries of the musculoskeletal system were distributed into four age groups, namely, up to 1 year old, 1–6 years old (preschool period), 7–14 years old (schoolchildren), and 15–17 years old (adolescence).

Patients were divided based on the causes of trauma using the codes of the International Classification of Diseases of the 10th revision (ICD-10; V01–X59). We have identified road accidents (traffic), home, street, sports, and school injuries. Traffic accidents were included in the road accident group (V01–V99 in ICD-10). The home injury group was composed of those received in a house, apartment, residential building (including in a summer cottage), and a special residential institution, whereas the street injury group comprised those received on the street. School

injuries included trauma received at school (including in kindergarten), other institutions, or public administrative area, whereas sports injuries included those sustained on the site for sports and sports competitions.

When comparing the distribution of patients in the study groups by gender, age, and injury circumstances, Fisher's exact test and χ^2 test for contingency tables 2 × 2 were used. Differences at the $p < 0.05$ were considered statistically significant. The Bonferroni adjustment for multiple comparisons was taken into account. The χ^2 test was used to determine the differences between groups by age scale and time intervals.

RESULTS

There were 2851 initial visits due to an injury from March 16 to May 31, 2019, whereas there were 969 visits for the same period in 2020, that is, three times (66%) less.

The distribution of patients applied by gender (Fig. 1) was 537 boys and 432 girls in 2020 and 1652 boys and 1199 girls in 2019. (The proportional difference was not significant with $p = 0.17$, χ^2 test).

The attendance rate for injuries in the periods analyzed is presented in Table 1.

From March 16 to 31, 2020, the number of visits decreased by 45% of the total number of visits. The rate further decreased by 78% from April 1 to 30, 2020, and by 66% from May 1 to 31, 2020. The difference for each period, according to the χ^2 criterion, was significant ($p < 0.0001$).

Table 2 reveals that in 2020, following the introduction of restrictive measures, the number of visits by pediatric patients with various injuries decreased, and their distribution changed depending on the period. In 2019, 16% of children sought medical help in March, and 84% of patients applied for medical help in April and May. At the same time, with the pandemic in May 2020, there was an increase in appealability, and even to a slightly greater extent than in 2019. Perhaps this is because children were merely tired of the constant restrictions on their activity. At the same time, in absolute terms, the strengthening of restrictive measures led to a decrease in child injuries. The distribution of seeking medical help by periods in absolute terms is presented in Fig. 2.

A statistically significant difference ($p < 0.0001$, χ^2 test) was revealed in the distribution of patients by age. Over the analyzed period of 2020, the number of appeals for injuries decreased by almost two times in the under 1 and 1–6 year age groups and by nearly four times in the 7–14 and 15–17 year age groups than in the same period in 2019 (Fig. 3).

Table 3 presents the distribution of injuries by injury types. Significant differences were noted in case of home trauma, street trauma, school injuries, and road accident.

Despite the fact that the number of visits due to home injuries in the analyzed period of 2020 decreased by 18% than in the same period in 2019, in general, the share of home injury rate increased and amounted to 61% of all injuries received. (In 2019, the share of home injuries of the total number of injuries accounted for 25%.) The number of those seeking medical care for traffic injuries almost tripled, and their share among the total number of injuries was 1%. The number of visits due to street injuries decreased by 83%

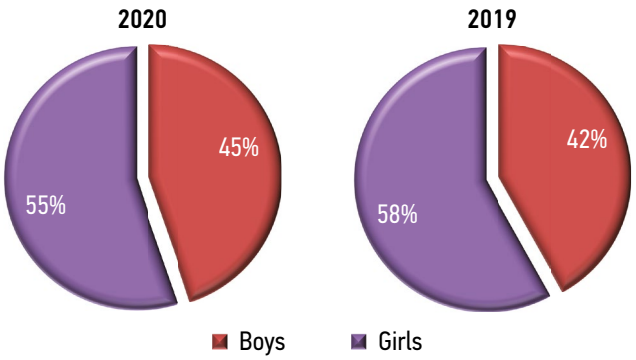

Fig. 1. Distribution of patients by gender in 2020 compared with 2019

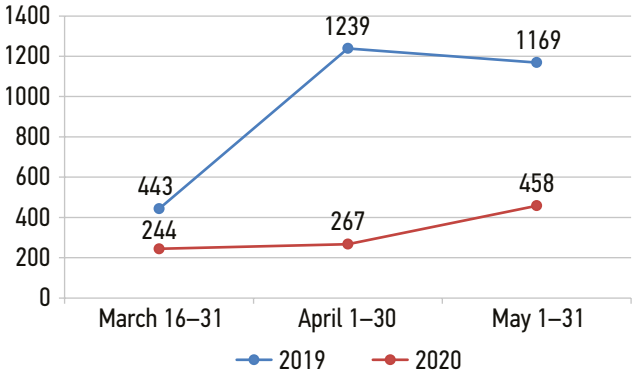

Fig. 2. Distribution of appeals of pediatric patients with various injuries by periods

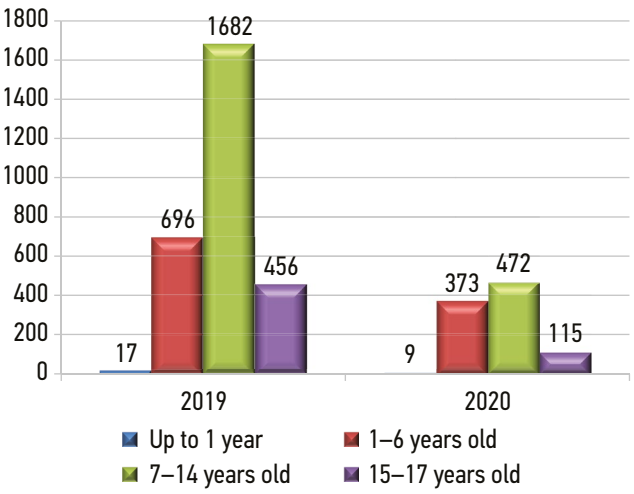

Fig. 3. Distribution of trauma patients by age

Table 1. Appealability for injuries from March 16 to May 31 in 2019 and 2020

Period	Number of pediatric patients applied		Dynamics (number of applies/percentage)
	2019	2020	
March 16–31	443	244	–219/–45%
April 1–30	1239	267	–972/–78%
May 1–31	1169	458	–712/–61%
Total	2851	969	–1882/–66%

Table 2. Distribution of pediatric patients who sought medical care due to injuries in 2019 and 2020

Period	Pediatric patients who sought medical care (%)		Dynamics of applies (%)
	2019	2020	
March 16–31	16	25	+9
April 1–30	43	28	–15
May 1–31	41	47	+6
Total	100	100	

Table 3. Distribution of injuries by injury type

Injury type	2019		2020		χ^2 test
	n	%	*n*	%	
Road traffic accidents (V01–V95)	8	0.3	15	1	$p < 0.0001$
Home trauma	716	25	590	61	$p < 0.0001$
Street trauma	1491	52.3	260	27	$p < 0.0001$
School injury	438	15.4	27	3	$p < 0.0001$
Sports injury	87	3	16	2	$p = 0.020$
Other injuries	111	4	61	6	$p = 0.25$
Total	2851	100	969	100	

than in the same period in 2019, and the share of street injuries in the structure of all injuries was 27%. (In 2019, the share of street injuries was 52.3%.) The share of school injuries during the period of restrictive measures in 2020 was only 3% of all injuries of the musculoskeletal system.

The dynamics of indicators of injury types, depending on the strengthening of restrictive measures, are presented in Table 4.

Since the adoption of the recommended restrictions in March 2020 and their tightening in April and May, there has been a significant increase in home injuries in the range of all injuries. The proportion of street injuries decreased in March and April 2020 but increased in May than in previous periods. The frequency of traffic injuries did not have significant differences in March 2020 than in the same period in 2019, but their share increased in April and May 2020. There was a significant decrease in school injuries during all periods of restrictive measures to counter the spread of COVID-19 in 2020.

In the range of street injuries, we identified that the most significant circumstance of injury was various falls while riding personal mobility devices, such as rollerblading, skateboarding, boarding, scooter riding, and cycling (Table 5). There was a statistically significant difference in indicators in 2020 than in 2019, mainly due to the prevalence of their occurrence in May.

From March 16 to 31, 2020, after introducing restrictive measures, the number of injuries associated with roller skating, skateboarding, and scooter riding decreased, and there were no falls while cycling during this period. From April 1 to 30, 2020, there was a significant decrease in the number of injuries associated with roller skating and skateboarding, and from May 1 to 31, 2020, the frequency of injuries during roller skating, skateboarding, and scooter riding increased by almost three times than in 2019, despite the remaining restrictions.

In the distribution of seeking medical care, depending on the external causes of injuries, according to ICD-10, injuries sustained as a result of falls under various circumstances and mechanical forces prevailed. However, given the multiplicity of comparisons, the proportion of these injury types in 2019 and 2020 differ statistically insignificantly (Table 6). Statistically significant differences were registered in the class "V01–V99 Traffic accidents" and "W00–X59 Other

Table 4. Distribution of injuries by injury type, depending on the period

Type of injury	March 16–31			April 1–30			May 1–31		
	2019	2020	Dynamics (*n*/%)	2019	2020	Dynamics (*n*/%)	2019	2020	Dynamics (*n*/%)
Road traffic accidents (V01–V95)	3	0	–3/0	1	2	+1/+100*	4	13	+9/+225*
Home trauma	121	130	+9/+7*	344	179	–165/–48	251	281	+30/+12*
Street trauma	213	106	–107/–50*	429	51	–378/–87*	849	103	–746/–88*
School injury	73	19	–54/–74*	191	8	–183/96*	174	0	–174/–100*
Sports injury	18	13	–5/–28	46	3	–43/–93	23	0	–23/–100
Other injuries	28	21	–7/–25	34	8	–26/–76	49	32	–17/–35
Total	456	289	–167/–37	1045	251	–794/–76	1350	429	–921/–68

* Statistically significant difference ($p < 0.0001$, χ^2 test).

Table 5. Distribution of injuries sustained while riding on personal mobility devices in the range of street injuries

Type of injury	March 16–May 31		March 16–31		April 1–30		May 1–31	
	2019	2020	2019	2020	2019	2020	2019	2020
Falling while rollerblading/skateboarding/ boarding	110	56*	19	3	77	14	14	39
Falling while riding a scooter	54	73*	4	2	39	37	11	34
Falling while cycling	16	12*	0	0	4	3	12	9

* Significant difference in the share in the number of street injuries (considering multiple comparisons).

Table 6. Distribution of injuries depending on external causes according to the International Classification of Diseases of the 10th revision, classes V01-X57

External causes of injury	2019	2020	χ^2 test
V01–V99 Traffic accidents	8	15	$p < 0.0001$*
W00–X59 Other external causes of injuries in accidents, including:	2732	954	$p = 0.0001$*
W00–W19 Falls	1335	416	$p = 0.036$
W20–W49 Exposure to inanimate mechanical forces	881	317	$p = 0.29$
W50–W64 Exposure to living mechanical forces	220	63	$p = 0.21$
X00–X09 Exposure to smoke, fire, and flames	2	0	–
X10–X19 Contact with hot and incandescent substances (objects)	19	4	$p = 0.38$
X40–X49 Accidental poisoning and exposure to poisonous substances	1	0	–
X50–X57 Overstrain, travel, and deprivation	274	131	$p = 0.0006$*
Other causes not related to injury	111	23	$p = 0.026$

external causes of injuries in accidents" due to an increase in the proportion of injuries in the subclass "X50 X57 Overstrain, travel and deprivation." In this subclass, muscle overextension of the cervical, thoracic, or lumbar spine, and abrupt or repetitive movements of the head or trunk were the causes of injury.

A detailed analysis of traffic accidents (Table 7) revealed that in 2020, most injuries were sustained while cycling, which led to an increase in this injury type in general.

In the structure of the section "W20–W49 Exposure to inanimate mechanical forces" (Table 6), we focused on damage to soft tissues as a result of cuts (Table 8) and of pinching and crushing of limb parts (mainly fingers) between objects (Table 9).

The number of wounds recorded during the pandemic decreased by 43% than in the same period in 2019.

A detailed analysis of the case histories revealed that in 2020, 21 pediatric patients sustained skin wounds (5 children in 2019) as a result of contact with the sharp edge of glass at home (broken doors, glasses, and mugs) and 7 pediatric patients (6 patients in 2019) as a result of a cut knife. Studying the history, it was established that 5 out of 7 patients received soft tissue wounds as a result of opening school lunch boxes given during the pandemic.

Table 7. Distribution of injuries due to traffic accidents

Type of traffic case	May 16–31	
	2019	2020
V01–V99 Traffic accidents	8	15
V01.0 Pedestrian injured in collision with cyclist. Nonroad accident	1	–
V03.1 Pedestrian injured in collision with a passenger car, pickup truck, or van. Road accident	2	1
V13.4 Cyclist-driver injured in road accident in collision with passenger car, pickup truck, or van	1	–
V18.9 Unspecified cyclist injured in non-collision road accident	–	12
V28.4 Motorcyclist-driver injured in non-collision road accident	–	1
V28.9 Unspecified motorcyclist injured in non-collision road accident	–	1
V43.6 Passenger injured in road accident in collision of a passenger car with a passenger car, pickup truck, or van	1	–
V80.0 A rider or person in a carriage injured when falling or being dismounted off an animal or carriage as a result of a traffic accident without collision	1	–
V86.0 Driver of a cross-country vehicle or other nonroad motor vehicle, injured in a road accident	2	–

Table 8. Injuries resulting from exposure to sharp objects

Type of wound	May 16–31		March 16–31		April 1–30		May 1–31	
	2019	2020	2019	2020	2019	2020	2019	2020
Total wounds received	49	33	11	5	20	16	18	12
W25.0 Contact with sharp edge of glass in a house, apartment, or residential building	5	21	1	3	2	12	2	6
W25.2 Contact with sharp edge of glass in a school, other institutions, or a public administrative district	15	0	4	0	6	0	5	0
W25.4 Contact with sharp edge of glass on the street or motorway	10	2	1	1	3	1	6	0
W25.5 Contact with sharp edge of glass in the institution or area of trading and servicing	1	0	0	0	0	0	1	0
W25.8 Contact with sharp edge of glass in other specified locations	3	1	0	0	2	0	1	1
W25.9 Contact with sharp edge of glass in an unspecified location	3	1	2	0	1	1	0	0
W26.0 Contact with knife, sword, or dagger in a house, apartment, or residential building	6	7	1	1	3	2	2	4
W26.2 Contact with knife, sword, or dagger in a school, other institutions, or a public administrative district	1	0	0	0	1	0	0	0
W26.8 Contact with knife, sword, or dagger in other specified locations	5	1	2	0	2	0	2	1
Total	49	33	11	5	20	16	18	12

Table 9 shows that the number of injuries reported in 2020 on the street and associated with hooking, crushing, squeezing, or pinching between objects has decreased significantly. (There were 64 injuries in 2019 and 4 in 2020.) At home, the opposite presentation is noted, with 1 case reported in 2019 and 35 cases in 2020. Probably this is because pediatric patients spent relatively more time outdoors before the introduction of anti-epidemiological restrictions, and they spent more time at home after their implementation.

Table 9. Distribution of injuries depending on the location of sustaining

Injury-sustaining location	2019	2020
W23.0 Hooking, crushing, squeezing, or pinching in or between objects in a house, apartment, or residential building	1	35
W23.2 Hooking, crushing, squeezing, or pinching in or between objects in a school, other institutions, or a public administrative district	21	0
W23.4 Hooking, crushing, squeezing, or pinching in or between objects on the street or motorway	64	4
W23.5 Hooking, crushing, squeezing, or pinching in or between objects in the institution or area of trading and servicing	13	0
W23.8 Hooking, crushing, squeezing, or pinching in or between objects in other specified locations	1	5
W23.9 Hooking, crushing, squeezing, or pinching in or between objects in an unspecified location	2	12

Table 10. Distribution of injuries by the nature of trauma, the International Classification of Diseases of the 10th revision

Trauma type	2019	2020	χ^2 test
S00–S09 Head injuries	24	5	0.31
S10–S19 Neck injuries	92	40	0.18
S20–S29 Injuries of the chest	111	31	0.32
S30–S39 Injuries to the abdomen, lower back, lumbar spine, and pelvis	119	30	0.13
S40–S49 Injuries of the shoulder girdle and shoulder	146	71	0.010
S50–S59 Injuries to the elbow and forearm	433	184	0.005
S60–S69 Injuries of the wrist and hand	611	223	0.3
S70–S79 Injuries to the hip joint and thigh	58	17	0.6
S80–S89 Injuries of the knee and lower leg	297	95	0.6
S90–S99 Injuries to the ankle and foot	707	219	0.17
T00–T07 Injuries involving multiple areas of the body	17	3	0.29
T20–T25 Thermal and chemical burns of the outer surfaces of the body, specified by their localization	21	5	0.5
T80–T88 Complications of surgical and therapeutic procedures, not elsewhere classified	1		–
T90–T98 Consequences of trauma, poisoning, and other influences of external causes	2		–
Z03.8 (tick bite)	30	23	0.002
Z03.8 (case in conditions other than trauma)	11	4	0.9
Other	171	16	0.0001
Total	2851	969	

Table 11. Structure of fractures among all injuries of the musculoskeletal system

Trauma type	2019	2020
All injuries to the musculoskeletal system	2851	969
Bone fractures	853	340
Proportion of fractures from all injuries, %	30	35

In the range of child injuries by the nature of trauma in 2019 and 2020, ankle and foot injuries prevailed, as well as wrist, hand, elbow, and forearm injuries (Table 10). Among them, elbow and forearm injuries and tick bites were statistically significant in 2020.

Over the analyzed period of 2020, the proportion of fractures in the structure of all injuries of the musculoskeletal system (Table 11) amounted to 35%, which was higher than the indicator for the same period in 2019, which was 30% ($p = 0.004$, χ^2 test).

DISCUSSION

According to the study of indicators of the level and nature of child injuries during the period of restrictive measures aimed to combat the spread and fight against COVID-19, the measures taken by the federal and regional authorities have led to a decrease in the number of those seeking medical help by pediatric patients with injuries.

When analyzing those seeking medical help for the periods selected, we noted a certain tendency of a decrease in the frequency of injuries, depending on the tightening of measures to counter the spread of COVID-19. For the selected period of 2020, the more stringent the restrictions were introduced, the fewer were the number of visits due to injuries. So, from March 16 to 31, 2020, the number of visits was 456, which was 45% less than in the same period in 2019. With the tightening of restrictive measures, the number of visits decreased even more and was 78% less in April 2020 and 61% in May, which are less than in the same periods of 2019. In general, in 2020, the injury rate decreased by 66% than in the same period in 2019.

A decrease in the number of those seeking medical care during the COVID-19 pandemic was noted by many authors of publications from different countries, reporting a 20% to 80% reduction in injuries in both adult and pediatric patients [1, 14]. Other researchers cite data that the number of visits with minor fractures and wounds has decreased in the pediatric population, as parents were afraid to go to a medical institution for minor injuries [4, 14, 15]. It is possible that in St. Petersburg, there were also cases when parents did not go to medical organizations due to the fear of contracting COVID-19. However, it is not possible to reliably identify such cases in our study.

We did not reveal significant statistical differences when evaluating the indicators of the frequency of injuries by gender. In both 2020 and 2019, boys were injured more often than girls.

The differences in the injury rates by age periods are the most interesting. Thus, for the analyzed period of 2020, the number of complaints about injuries in the under 1 and 1–6 year age groups decreased by almost two times, which is probably due to the limited attendance of preschool children in kindergartens and playgrounds. In the 7–14 and 15–17 year age groups, the number of visits due to injuries was four times less than the indicators of the same period in 2019. The authors of the publication also noted that the average age of all patients with fractures decreased during the pandemic (7.5 ± 4.3 *vs.* 9.4 ± 4.4 years, $p < 0.001$) due to a decrease in the proportion of fractures among adolescents [16].

Such differences with a high degree of probability are associated with the cancellation of school activities and prohibition of attending sports clubs and competitions, which is confirmed by isolated cases of injuries in April 2020 and the absence of school and sports injuries in May 2020. Single indices of school and sports injury in March and April 2020 are explained by the absence of strict restrictive measures during this period, when schoolchildren could still attend educational and sports institutions at the request of their legal representatives.

The frequency of traffic injuries has almost doubled in absolute terms and more than tripled in percentage terms. The proportion of home injuries (their share of the total number of visits) increased from 25% to 61% due to a more pronounced decrease in the frequency of other types of injury. In absolute terms, the number of home injuries decreased from 716 to 590 (–18%). The number of pediatric patients with street and sports injuries decreased by more than 5 times and with school injuries by about 15 times. In general, the number of those seeking medical care decreased by almost three times.

Some authors also noted in their studies a decrease or absence of school and sports injuries during the pandemic [1, 17]. Thus, Bram et al. reported that during the pandemic, there was an increase in the proportion of injuries occurring at home (57.8% *vs.* 32.5%, $p < 0.001$) or on bicycles (18.3% *vs.* 8.2%, $p < 0.001$), but the proportion of injuries related to sports (7.2% *vs.* 26.0%, $p < 0.001$) or playgrounds (5.2% *vs.* 9.0%, $p < 0.001$) decreased [16].

We noticed a decrease in the proportion of home injuries in May 2020 (66%) than in April 2020 (71.3%) and a simultaneous increase in the share of street injuries (24% in May 2020 *vs.* 20.3% in April 2020), which, most probably, could be caused by the more frequent presence of children outdoors due to the increase in air temperature.

Compared with the same period last year, street injuries decreased by 83%, whereas in its structure, the number of injuries sustained while riding scooters, roller skates, and skateboards decreased by only 30%. It was also revealed that of all street injuries in 2020, 28% resulted from riding scooters. In 2019, this figure was only 4% of all injuries sustained outdoors. Falls on roller skates and skateboards accounted for 22% of all street injuries (7.4% in 2019), and falls from a bicycle accounted for 5% (1% in 2019). It is noteworthy that during the period of restrictive measures in 2020,

these falls occurred mainly in May. That month, the weather was warm, and despite the prohibitions, children began to spend more time outdoors. We believe that an increase in the proportion of injuries due to falls from the above means was more probable to be associated with a decrease in safety skills, with a prohibition to visit playgrounds and a longer stay of children outdoors, including without supervision. In the range of external causes of injuries, there was a change in the number of injuries received on the street and associated with hooking, crushing, squeezing, or pinching between objects, and it decreased significantly and amounted to 4 cases in 2020 (64 injuries in 2019). At home, the opposite situation was noted, reporting 35 cases in the same period of 2020 and 1 case in 2019.

The analysis of the anamnesis of victims of transport accidents revealed that in 2020, most injuries were sustained while cycling, and two patients were injured while riding a motorcycle. Visits due to this matter occurred mainly in May (13 cases).

According to the results of the analysis of anamnestic data in 2020, there was a decrease in the number of injuries received when jumping on a trampoline and in the indicators of the causes of injuries received as a result of jumping on a trampoline. Thus, in 2020, there were 15 cases of injuries sustained while jumping on a trampoline, which is lower than the 48 cases in 2019. Moreover, all 15 injuries occurred when jumping on trampolines installed on garden plots. The decrease in the frequency of such a mechanism of damage in the period of a pandemic is also indicated by data from other researchers [17].

Despite the general decrease in the injury rate in the study period of 2020 and the range of injuries to the musculoskeletal system, the proportion of limb fractures was 35% and exceeded the same indicator in 2019 ($p = 0.004$, χ^2 test). The authors who analyzed injuries at the Level 1 Children's Trauma Hospital in Philadelphia also detected a 2.5-fold decrease in the incidence of fractures in pediatric patients during the COVID-19 pandemic (22.5 ± 9.1 *vs.* 9.6 ± 5.1 fractures per day; $p < 0.001$) [16].

Несмотря на общее снижение уровня травматизма в исследуемый период 2020 г., в структуре повреждений опорно-двигательного аппарата доля переломов костей конечностей составила 35 % и превышала аналогичный показатель 2019 г. ($p = 0{,}004$, критерий χ^2). Авторы, проводившие анализ травматизма в детской травматологической больнице первого уровня в Филадельфии, также выявили снижение частоты переломов у детей в 2,5 раза во время пандемии COVID-19 (22,5 ± 9,1 перелома в сутки против 9,6 ± 5,1; $p < 0{,}001$) [16].

CONCLUSION

Thus, during the COVID-19 pandemic, an overall decrease in the injury level was noted. The injury type also changed depending on the period and the intensification of restrictive measures, when the number of streets, sports, and school injuries decreased, whereas the share of home and traffic injuries increased.

A relationship was demonstrated between the outbreak of a pandemic and a decrease in the number of visits to the traumatology center of Children's City Hospital No. 2 and a change in the structure of injuries depending on its cause. Assessment of the immediate causes of these changes may be difficult, but it can be assumed that this is partly due to the introduction of various restrictions and distance learning in schools, the termination of organized sports events, and the decrease in the use of playgrounds.

This information can be useful in planning the work of public health authorities and allocating resources in pandemic situations that may arise in the future.

ADDITIONAL INFORMATION

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ОБ АВТОРАХ

***Ольга Анатольевна Купцова**;
адрес: Россия, 196603, Санкт-Петербург, Пушкин, ул. Парковая, д. 64–68;
ORCID: https://orcid.org/0000-0003-1060-1822;
Scopus Author ID: 57193275154; eLibrary SPIN: 5584-5654;
e-mail: kuptsovaoa2018@mail.ru

Анна Владимировна Залетина, канд. мед. наук;
ORCID: https://orcid.org/0000-0002-9838-2777;
Scopus Author ID: 57193254848; eLibrary SPIN: 4955-1830;
e-mail: omoturner@mail.ru

Сергей Валентинович Виссарионов, д-р мед. наук, профессор, чл.-корр. РАН;
ORCID: https://orcid.org/0000-0003-4235-5048;
Scopus Author ID: 6504128319; eLibrary SPIN: 7125-4930;
e-mail: vissarionovs@gmail.com

Алексей Георгиевич Баиндурашвили, д-р мед. наук, профессор, академик РАН, заслуженный врач РФ;
ORCID: https://orcid.org/0000-0001-8123-6944;
Scopus Author ID: 6603212551; eLibrary SPIN: 2153-9050;
e-mail: turner011@mail.ru

Автандил Георгиевич Микава;
ORCID: https://orcid.org/0000-0001-9998-6348;
e-mail: db2@zdrav.spb.ru

Сергей Владимирович Александров;
ORCID: https://orcid.org/0000-0002-4429-5723;
e-mail: serg-aleksandrov@yandex.ru

AUTHOR INFORMATION

***Olga A. Kuptsova**, MD;
address: 64-68 Parkovaya str., Pushkin, 196603, Saint Petersburg, Russia;
ORCID: https://orcid.org/0000-0003-1060-1822;
Scopus Author ID: 57193275154; eLibrary SPIN: 5584-5654;
e-mail: kuptsovaoa2018@mail.ru

Anna V. Zaletina, MD, PhD,
ORCID: https://orcid.org/0000-0002-9838-2777;
Scopus Author ID: 57193254848; eLibrary SPIN: 4955-1830;
e-mail: omoturner@mail.ru

Sergei V. Vissarionov, MD, PhD, D.Sc., Professor, Corresponding Member of RAS;
ORCID: https://orcid.org/0000-0003-4235-5048;
Scopus Author ID: 6504128319; eLibrary SPIN: 7125-4930;
e-mail: vissarionovs@gmail.com

Alexey G. Baindurashvili, MD, PhD, D.Sc., Professor, Member of RAS, Honored Doctor of the Russian Federation;
ORCID: https://orcid.org/0000-0001-8123-6944;
Scopus Author ID: 6603212551; eLibrary SPIN: 2153-9050;
e-mail: turner011@mail.ru

Avtandil G. Mikava, MD;
ORCID: https://orcid.org/0000-0001-9998-6348;
e-mail: db2@zdrav.spb.ru

Sergei V. Aleksandrov, MD;
ORCID: https://orcid.org/0000-0002-4429-5723;
e-mail: serg-aleksandrov@yandex.ru