

STATISTICAL ANALYSIS OF DATA ON EMERGENCY MAXILLOFACIAL SURGERY

Markarov AE¹, Eremin DA², Martirosov AV^{1,2} ✉, Khandzratsyan AS¹, Orazvaliev AI¹, Bugayan SA², Khalifaev OI³¹ Inozemtsev Municipal Clinical Hospital, Moscow, Russia² Pirogov National State Medical University, Moscow, Russia³ Evdokimov Moscow State University of Medicine and Dentistry, Moscow, Russia

There are no actual statistical data on maxillofacial trauma, nor is there a published analysis addressing morbidity patterns, including cases requiring admission to maxillofacial surgery departments. Such data and the respective analysis could help to assess effectiveness of the maxillofacial trauma and diseases prevention and treatment measures, improve the emergency care approaches, identify problems in the medical aid system's maxillofacial surgery domain. This study aimed to analyze the aspects of emergency admission to hospitals for reasons requiring maxillofacial surgery. We processed hospital records of 15,227 patients admitted from 2018 through 2022. The analysis revealed the number of emergency maxillofacial cases to be at a fairly high level and show no downward trend. The majority of the patients are young, able-bodied men. Of all the admitted persons, 28.6% came to the hospital on their own; 22.9% were nonresidents and foreigners. The average hospital stay was 3.85 days, it did not change significantly during the studied period. The prevailing types of trauma were maxillofacial injuries and mandibular fractures. For 29.9% of patients with the latter type, the treatment method of choice was osteosynthesis. Up to 70% of all the patients needed to be followed-up by a maxillofacial surgeon after discharge. The mortality rate in maxillofacial surgery departments is extremely low; all such cases involved concomitant pathologies.

Keywords: trauma, wounds, face, maxillofacial surgery, statistics**Author contribution:** Markarov AE, Eremin DA — manuscript editing, preparation of the final version of the article; Martirosov AV, Khandzratsyan AS, Orazvaliev AI — study planning, data interpretation, manuscript drafting; Bugayan SA, Khalifaev OI — data collection, analysis. Authors claim to have contributed to the study equally.✉ **Correspondence should be addressed:** Aram V. Martirosov
Fortunatovskaya, 1, Moscow, 105187, Russia; dr.martirosov@mail.ru**Received:** 09.08.2023 **Accepted:** 06.09.2023 **Published online:** 23.10.2023**DOI:** 10.24075/brsmu.2023.038

СТАТИСТИЧЕСКИЙ АНАЛИЗ ДАННЫХ ПО НЕОТЛОЖНОЙ ЧЕЛЮСТНО-ЛИЦЕВОЙ ХИРУРГИИ

А. Э. Маркаров¹, Д. А. Еремин², А. В. Мартиросов^{1,2} ✉, А. С. Хандзрацян¹, А. И. Оразвалиев¹, С. А. Бугаян², О. И. Халифаев³¹ Городская клиническая больница имени Ф. И. Иноземцева, Москва, Россия² Российский национальный исследовательский медицинский университет имени Н. И. Пирогова, Москва, Россия³ Московский государственный медико-стоматологический университет имени А. И. Евдокимова, Москва, Россия

Актуальные статистические данные по травме ЧЛО (челюстно-лицевой области) с анализом структуры заболеваемости и по госпитализируемой заболеваемости в отделении челюстно-лицевой хирургии (ЧЛХ) отсутствуют. Анализ этих данных необходим для оценки результативности мер по профилактике и лечению заболеваний и травм ЧЛО, повышения эффективности оказания неотложной помощи пациентам, выявления проблем в системе оказания медицинской помощи по профилю «Челюстно-лицевая хирургия». Целью исследования было провести статистический анализ структуры госпитализации по профилю экстренной челюстно-лицевой хирургии. Проанализирована медицинская документация 15 227 пациентов, госпитализированных с 2018 по 2022 г. Было выявлено, что число пациентов с экстренной патологией челюстно-лицевой области сохраняется на достаточно высоком уровне без тенденции к снижению. Основная часть госпитализированных — мужчины молодого, трудоспособного возраста. Из числа всех госпитализированных 28,6% составили пациенты, обратившиеся в стационар самостоятельно, а 22,9% — иногородние и иностранцы. Средняя продолжительность госпитализации составила 3,85 суток и существенно не менялась за исследуемый период. В структуре травматизма преобладали раны ЧЛО и переломы нижней челюсти. Остеосинтез применяли при переломах нижней челюсти в 29,9% случаев. До 70% всех пациентов после выписки нуждались в динамическом наблюдении челюстно-лицевого хирурга. Летальность в отделении ЧЛХ крайне низкая и обусловлена наличием у пациентов тяжелой сопутствующей патологии.

Ключевые слова: травма, раны, лицо, челюстно-лицевая хирургия, статистика**Вклад авторов:** А. Э. Маркаров, Д. А. Еремин — внесение правок, подготовка финального варианта статьи; А. В. Мартиросов, А. С. Хандзрацян, А. И. Оразвалиев — планирование исследования, интерпретация данных, подготовка черновика рукописи; С. А. Бугаян, О. И. Халифаев — сбор, анализ данных. Авторы заявляют о равнозначности вклада каждого.✉ **Для корреспонденции:** Арам Вачаганович Мартиросов
ул. Fortunatovskaya, д. 1, г. Москва, 105187, Россия; dr.martirosov@mail.ru**Статья получена:** 09.08.2023 **Статья принята к печати:** 06.09.2023 **Опубликована онлайн:** 23.10.2023**DOI:** 10.24075/vrgmu.2023.038

Maxillofacial trauma is a problem both medical and socio-economical. Domestic and criminal violence, development of personal mobility devices and their growing availability, and road accidents condition the significant share of maxillofacial injuries in the overall number of trauma cases [1–4]. At the same time, despite the continued improvement of prevention programs as well as introduction of the new methods of diagnosis and treatment of maxillofacial diseases, the quantity of patients with purulent-inflammatory forms thereof does not grow down, and the percentage of those in whom the said diseases have progressed to severe stages grows up every year [5]. Both

the injured and the ill with these types of trauma/disorders and concomitant pathologies (coagulopathy, allergy to local anesthetics, central nervous system diseases, cardiovascular diseases, etc.), as well as pregnant women and limited mobility individuals, are admitted to maxillofacial surgery departments, since there are neither dental offices in multidisciplinary hospitals of Moscow that provide specialized care to such patients, nor a complex of therapeutic and preventive measures designed to render qualified dental care to the latter category of citizens [6].

Inozemtsev Moscow City Clinical Hospital has a maxillofacial surgery department (№ 1) and a purulent maxillofacial surgery

department (№ 2). As per the SanPiN regulations, there are two separate patient examination rooms in the emergency section (ER). Both departments are under the trauma unit of the hospital.

Since 2018, short-term stay section of Inozemtsev Moscow City Clinical Hospital has been performing planned maxillofacial surgery procedures. Maxillofacial surgeons of the department № 1 formed a visiting team, the only of its kind in Moscow, that gives round-the-clock consultations to patients with acute maxillofacial pathologies treated in Moscow hospitals. Large number of maxillofacial injury cases involving purulence and inflammation substantiated establishing department № 2 as a separate unit. Currently, it is the only such department in Russia.

There are up-to-date statistical data on purulent and inflammatory maxillofacial pathologies [5], but no reports covering maxillofacial trauma morbidity patterns nor study of reasons for admission to maxillofacial surgery departments. Such reports/studies could help to assess effectiveness of the maxillofacial trauma and diseases prevention and treatment measures, improve the emergency care approaches, identify problems in the medical aid system's maxillofacial surgery domain.

This study aimed to statistically analyze referrals and admissions to the maxillofacial surgery department № 1, one of the leading units rendering emergency medical assistance to patients with maxillofacial trauma and pathology in Moscow, operating 39 beds.

METHODS

The study was conducted at the premises of maxillofacial surgery department № 1 of F.I. Inozemtsev Moscow City Clinical Hospital. We analyzed medical records (discharge reports, form № 066/u-02, and universal discharge/postmortem summaries, form № 027/u) of 15,227 patients admitted from 2018 through 2022. These are all the patients that stayed in the maxillofacial surgery department № 1 during the said period. People admitted at a different time or to another department were excluded. Statistical data processing relied on the mean and the extensive indicator calculation methods.

RESULTS

General statistics

According to the admission department of Inozemtsev Moscow City Clinical Hospital, during the mentioned period of time, 27,571 cases were referred to the maxillofacial surgery department. The months when the number of patients peaks are May through August, and October; this pattern applies every year. The peaks are mainly due to the increasing incidence of maxillofacial trauma. From 2018 through 2022, 15,227 people were admitted to the maxillofacial surgery department (Table 1).

The reason behind the almost twofold decrease in the number of referrals in 2020 is the COVID-19 pandemic and

the associated self-isolation rules, admission plan revision, etc. With this fact factored in, the continuous year-over-year growth of the number of maxillofacial trauma cases is obvious. However, the rate of admissions remains stable, which indicates there are increasingly more outpatient cases (wounds, bruises, abrasions, hematomas).

During the studied period, 4,359 (28.6%) inpatients were self-referrals. There were 3,494 nonresidents and foreigners, which accounted for 22.9% of all those admitted. The prevailing types of injuries were maxillofacial, including mandibular fractures (33.7%), midface fractures (16.5%), wounds (12.4%). The majority of inpatients, 10,354, were male (68%), and 7,665 (74%) of them had maxillofacial trauma. The pattern persists through the years, only the ratio changes (1 : 2, 1 : 3) (Fig. 1).

Maxillary sinusitis, periodontitis, bleeding after tooth extraction, teething pathologies are more common in women (Fig. 2).

Analysis of age of the patients has shown that most of them are young and able-bodied, 18 through 44 years old. All in all, during the studied period, there were admitted 9,759 (64.1%) young, 2,497 (16.4%) middle-aged, 1,822 (12%) senior, 995 (6.5%) elderly and 154 (1.0%) senile people (Table 2).

An average hospital stay lasted 3.85 days. During the studied period, this value was changing unevenly: 4.22 b/d (bed-days) in 2018, 3.33 — in 2019, 3.67 — in 2020, 3.86 — in 2021 and 4.38 — in 2022.

The longest hospital stays were associated with combined mandibular and midface fractures (7.3 b/d), multiple mandibular fractures (6.7 b/d), and zygomatic complex fractures (5.87 b/d), the shortest stays — with post-extraction bleeding (1.9 b/d) and periodontitis (1.6 c/d) (Table 3).

There are interesting specifics about average bed-days in maxillary fracture cases: the figure is rather small for severe Le Fort II and III fractures because the patients therewith are admitted with a combined TBI (traumatic brain injury), and, after examination by an interdisciplinary team, forwarded to the neurosurgical resuscitation department for comprehensive treatment, and only once their condition is stabilized, they are transferred to the maxillofacial surgery department [7–9]. During the studied period, seven people died in the department (five in 2019, two in 2020). In all cases, the cause of death was decompensation of a severe concomitant pathology.

Inozemtsev Moscow City Clinical Hospital has an outreach team of maxillofacial surgeons that provide medical assistance to patients with acute maxillofacial pathology treated in other hospitals of Moscow without a maxillofacial surgery department. During the studied period, the team attended to 4,729 cases, including 566 trips to infectious diseases departments to patients with COVID-19 (707 in 2018, 994 in 2019, 722 in 2020, 1,135 in 2021 and 1,171 in 2022).

The department has a rehabilitation room for patients with maxillofacial pathology, where they are followed-up after discharge with the aim to adjust treatment plan as necessary or continue as outpatients (removal and/or adjustment of splints, rubber rods, removal of sutures, bandages, etc.). Through the

Table 1. ER referrals admitted with maxillofacial pathology

	2018	2019	2020	2021	2022
Maxillofacial surgery department referrals	5757	5886	3057	6286	6485
Admitted to the maxillofacial surgery department	2757	3509	2791	3416	2754
Brought by an ambulance	1144	1522	1757	1726	1348
Self-referrals	873	1255	672	770	789
Admitted nonresidents/foreigners	632	806	696	696	664

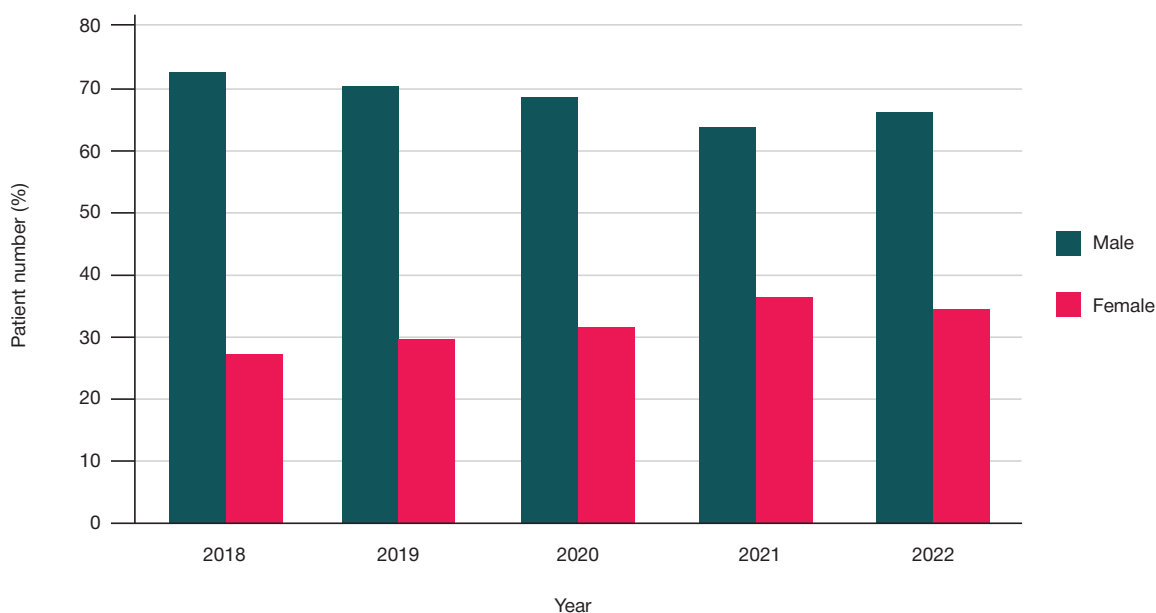


Fig. 1. Distribution of patients by gender

studied period, 10,275 patients applied to the rehabilitation room for reexamination (2,401 in 2018, 2,262 in 2019, 1,853 in 2020, 2,233 in 2021 and 1,526 in 2022), which accounted for 67.5% of all the admitted persons.

Private statistics

Patients with chronic and aggravated periodontitis accounted for 12.6% of the admitted, and 67.5% of them were women. Indications for hospitalization with this pathology were:

- 1) Pregnancy.
- 2) Polyvalent allergy to local anesthetics.
- 3) Coagulopathy, primarily associated with the use of anticoagulants.
- 4) Severe general somatic pathology (primarily cardiovascular by nature).
- 5) Limited mobility of patients.

During the studied period, 962 people were admitted with post-extraction bleeding, the majority of such patients over 60 years old (63%). Among other conditions necessitating admission were incomplete tooth extraction (87 cases), maxillary sinus perforation, including with a foreign body, such as tooth root and implant (161), dislocation of tooth root into soft tissues during extraction (12).

Neoplasm in the maxillofacial area caused hospitalization of 202 (1.3%) patients, 58.9% of them male and 41.1% — female, predominantly young (40.1% — young, 27.7% — middle-aged, 26.2% — senior, 7.4% — elderly and 0.5% — senile). These patients were admitted under the plan (not emergency cases).

Gunshot wounds were extremely rare: 8 cases (three of them with damaged facial bones, five with damage only to the jaw's soft tissues); traumatic tooth luxation — 23 cases; painful TMJ (temporomandibular joint) dysfunction — 11 cases; fractures of the anterior wall of maxillary sinus and zygomaticomaxillary complex — 8 and 17 cases, respectively.

The majority of the admitted patients had maxillofacial trauma; most of them were male, aged 18 through 44.

In 10.85% of cases, maxillofacial injury was combined with CTBI (closed traumatic brain injury) and BC (brain concussion), the latter most often diagnosed concomitant with maxillary fractures and combined mandibular and midface fractures

(88.8% and 36.15%, respectively). Only 5% of mandibular fractures were associated with BC.

Patients with injuries of soft tissues in the maxillofacial area accounted for 12.4% (1,889) of the total number of the admitted. Among such injuries, most were wounds (80.6%), hematomas (9.9%) and bruises (9.5%). All patients with bite wounds underwent rabies and tetanus vaccination. Some patients admitted with soft tissue damage also exhibited moderate to severe alcohol intoxication, extensive damage areas, traumatic brain injury, general somatic pathology.

Midface fractures

Patients with zygomatic bone and arch fractures accounted for 20.2% of the total number of those admitted with facial bone fractures. In 72% of such cases, bone fragments were displaced; in 92.3% of cases, they were reduced under general anesthesia using the Limberg technique, and in the remaining 8.7% of cases, the method of choice was osteosynthesis, mainly enabled by metallic pins (Makienko technique).

Orbital fractures and zygomaticomaxillary complex fractures accounted for 6.4% and 18.0% of all midface fractures, the former treated surgically in 23.1% of cases, the latter — in 67.9% of cases.

Four percent of all the admitted had maxillary fractures. Patients with Le Fort I fractures and alveolar bone fractures accounted for 2.5%, Le Fort II fractures — 1.37%, Le Fort III fractures — 0.1%.

Isolated nose fractures are treated by otorhinolaryngologists, however, if there is damage to soft tissues, patients are referred to maxillofacial surgeons. During the studied period, there were 90 such cases.

Paranasal sinus wall fractures were extremely rare and did not require surgical intervention.

Mandibular fractures

Mandibular fractures were the most common among facial bone fractures (65.2%), their unilateral variety registered somewhat more often (54.7% of the total number of mandibular fractures), predominantly — jaw angle fractures (50.7%). Bilateral mandibular fractures were less common (43.1%) (Table 4).

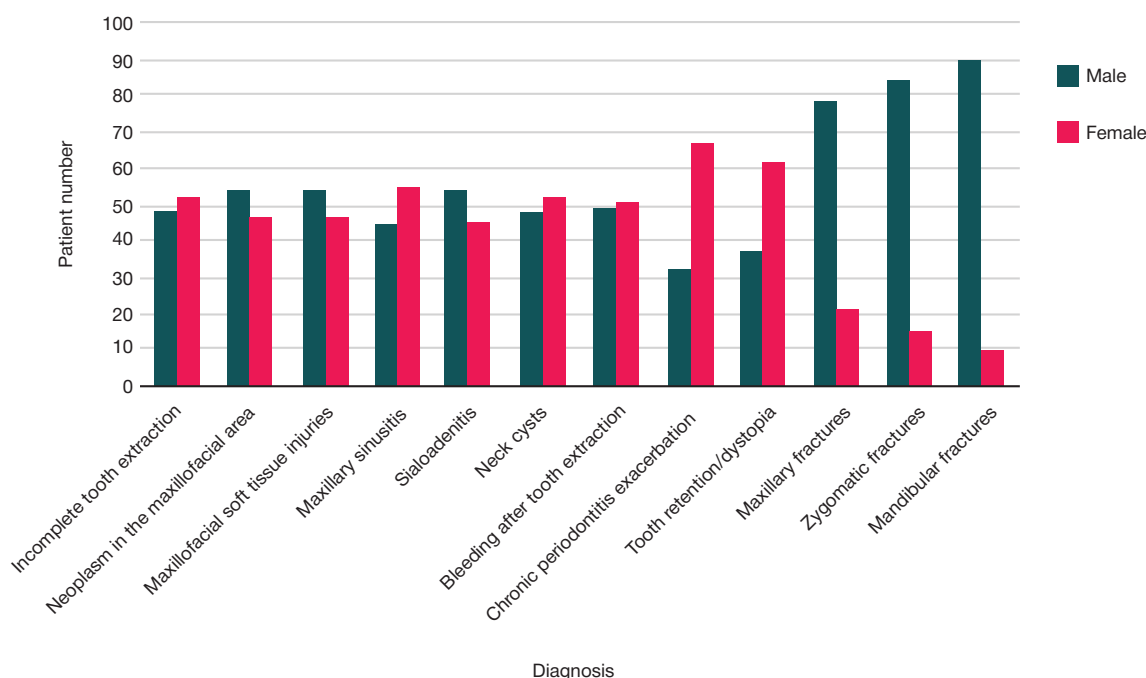


Fig. 2. Distribution of patients by nosology and gender

Teeth affected by the fracture were extracted in 5% of cases when the body of the lower jaw was damaged, and in 16.5% of cases when the fractured part was the jaw's angle.

Multiple mandibular fractures accounted for 1.75%. Most often, the combination included angle, body and articular process (73%).

Combined trauma — mandibular and midface fractures — was rare: only 2.73% of the total number of facial bones fractures.

For 29.9% of patients with mandibular fractures, the treatment method of choice was osteosynthesis. Other patients had the mandible immobilized with a two-jaw splint.

DISCUSSION

Many Russian and foreign authors describe the problem of general spread of individual mobility devices [1–3]. The injury rate associated with them is high, with the key reasons therefor being neglect of their operation instructions and traffic laws. Other authors highlight the problem of extremely low availability of outpatient dental care to people with limited mobility, which translates into greater load on the maxillofacial surgery departments. [6]. The number of patients with maxillofacial trauma has been steadily growing since 1970s [10], the situation acknowledged such in all regions by all the authors exploring the subject [10–15]. Also, all authors underscore domination of men in the sample, and decreasing average bed-day value [10–15].

Clinical experience described by the colleagues has mandibular fractures prevailing overall, but the reported percentage varies: 92% [12], 70–85% [13], 67–87% [14], 73.5–80.5% [15]. The data we have processed suggests that

the share of mandibular fractures is slightly lower: 65.2%. The reasons for such a significant difference may be sample size, timing and region of the respective research.

Our study confirms that unilateral fractures around mandibular's angle are more common than other varieties. Shares of unilateral and bilateral fractures in different studies: 54.7% and 43.1% — our study, 60% and 40% [14], 49% and 49% [12], 61.1 and 38.9% [13].

Previous studies also present statistical assessment of the causes of fractures: road accidents (43.9%) and assaults (26.7%). Another source puts household trauma on the first place (82.7%), and road accidents on the second (11.8%) [14]. In countries with aging population, household injuries, including falls, prevail, while in those with younger population the predominant reasons for such injuries are road-related [16]. The conclusion is indirectly confirmed by other foreign authors [4]. In our study, we did not consider this criterion, because patients frequently refuse to disclose the true causes of their injuries.

Mandibular fractures are combined with midface fractures in 2.4% of cases, and midface fractures account for 13.9% through 20% of the total number of fractures of facial bones, and this figure tends to grow annually [14, 15]. The amount of midface fractures has been growing rapidly from 2000 through 2007, and afterwards the growth turned uniform [10]. Our data confirm conclusions of the authors of that study. The share of combined injuries has increased to 2.73%, and that of midface fractures — to 25.85%.

As for the combinations of facial trauma and TBI, different authors present different data: from 21.3% to 46% [7], and 13.92% [8]. Mandibular fractures are much less often

Table 2. Dynamics of distribution of patients by age

Age	2018	2019	2020	2021	2022
18–44	67.6	63.5	71.4	63.5	61.7
45–59	14.6	18	15.4	17.6	15.3
60–74	10.3	12.1	8.4	12.1	14.9
75–89	6.65	6.3	4.3	6.5	7.5
90+	0.66	0.4	0.3	0.3	0.6

Table 3. Average hospital stay at maxillofacial surgery department by nosology (bed-days)

Diagnosis	Average bed-days				
	2018	2019	2020	2021	2022
Incomplete tooth extraction	1.6	1.5	2.5	2	2.4
Neoplasm in the maxillofacial area	2.6	1.9	2.6	2.3	3.3
Maxillofacial soft tissue injuries	2.87	2.1	2.3	1.75	2.4
Maxillary sinusitis	4.9	4.2	5.0	4.8	4.7
Sialoadenitis	4.8	3.5	5.4	4.9	4.56
Neck cysts	4.5	4.75	3.6	3.6	2.5
Bleeding after tooth extraction	1.92	1.98	1.6	1.9	1.8
Periodontitis	1.8	1.5	1.6	1.7	1.6
Tooth retention/dystopia	1.8	2.1	2.1	2.7	2.1
Zygomatic fractures	5.4	5.3	4.87	4.95	4.6
Unilateral mandibular fractures	4.7	3.9	4.6	4.6	5.2
Bilateral mandibular fractures	5.75	4.9	5.2	5.5	6.1
Multiple mandibular fractures	6.5	5.45	5.0	6.9	5.1
Cheekbone complex fractures	10.7	9.5	9.5	7	6
Combined fractures (mandibular and midface)	10.8	11.0	9.2	6.1	8.7
Le Fort I fracture	3.9	2.7	3.1	3.0	3.2
Le Fort II fracture	5.3	4.7	5.4	5	5.8
Le Fort III fracture	0	9	5.7	5	4

combined with TBI (3.2 – 3.83%) [7] than midface fractures, which is confirmed by our data. On average, the hospital stay of patients with TBI and BC is 59.7% longer [8].

According to some authors, a rehabilitation (follow-up care) room in the maxillofacial surgery department improves the results of treatment by 31.6 — 50%, under various criteria, and the efficiency of work — by 16.7 — 21.9% [17]. The data we processed in the context of this study confirm the need for further treatment in the vast majority of cases. One of the solutions for the rehabilitation availability and effectiveness problem, according to our colleagues, is telemedicine [6].

None of the research reports mention mortality from maxillofacial injuries, which indirectly confirms our conclusion that there are no such cases.

CONCLUSIONS

The number of emergency calls related to maxillofacial trauma and pathology increases every year, but the amount of cases requiring hospitalization remains stable, which means a large number of patients are treated in the emergency room. Up to 70% of all patients need follow-up monitoring by a maxillofacial surgeon after discharge. Maxillofacial surgery departments

receive emergency patients with concomitant general somatic pathologies, pregnant women and low-mobility patients when the hospital does not have an inpatient dental department, A maxillofacial surgeon in the outpatient unit could reduce the load on hospitals' emergency rooms as well as make post-discharge rehabilitation more easily accessible, and setting up emergency dental care departments could lessen the burden of maxillofacial surgery departments and improve the quality of dental care provided. It is also necessary to reinforce dental diseases prevention measures designed for the limited mobility patients. Patients with maxillofacial trauma dominate among those needing hospital stay for treatment. Every year, the number of injuries peaks summertime. This fact should be taken into account when planning preventive measures to reduce household, street and road traffic injuries. Every year, up to 71.4% of those admitted to the hospitals are young, able-bodied men, 18-44 years old. The most common injuries are mandibular fractures, more often unilateral (54.7%), in the area of the jaw's angle (50.7%). For 29.9% of patients with mandibular fractures, the treatment method of choice was osteosynthesis. Patients with injuries of soft tissues in the maxillofacial area accounted for 12.4% of the total number of the admitted. Among such injuries, most were wounds

Table 4. Mandibular fractures statistics

Fracture in the area of	%	Displacement (%)	TBI (%)
Unilateral			
Angle	50.7	58.1	3.3
Body	17.75	49.4	4
Articular process	28.7	66.0	4.4
Branch	2.7	61.2	7.5
Bilateral			
Body and angle	48.7	72.4	5
Body and articular process	38.3	74.3	7.9
Angle and articular process	9.0	75.5	6.2
Body and branch	4.0	74.4	6.4

(80.6%), hematomas (9.9%) and bruises (9.5%). Patients with maxillofacial trauma combined with TBI stay in the hospitals longer. Midface fractures are much more common mandibular

fractures; they are combined with TBI of varying severity. The mortality rate in maxillofacial surgery departments is extremely low; all such cases involve concomitant pathologies.

References

1. Aksenova EI, Podchernina AM. The main trends in the increase in the share of injuries of muscovites based on medical statistics. *Current problems of health care and medical statistics*. 2021; 2: 403–16. Russian.
2. Grechuhin IV. The condition of traumatism problem according to data of official statistics and scientific foundation for its control. *Manager of health care*. 2017; 7: 41–9. Russian.
3. Baranchikova MV. Individuals driving personal mobility aids as subjects and victims in criminal road accidents. *Victimology*. 2022; 9 (4): 408–16. Russian.
4. Mohammadi H, Roochi MM, Heidar H, Garajei A, Dallband M, Sadeghi M, et al. A meta-analysis to evaluate the prevalence of maxillofacial trauma caused by various etiologies among children and adolescents. *Dent Traumatol*. 2023; 39 (5): 403–17. DOI: 10.1111/edt.12845. PMID: 37073864.
5. Markarov AE, Eremin DA, Martirosov AV, Orazvaliev AI, Krasnov NM, Shen PA, et al. The statistical analysis of purulent-inflammatory diseases of the maxillo-facial region. *Medical alphabet*. 2022; 7: 40–6. Russian.
6. Lebedev MV, Kerimova KI, Zakharova IYu, Bakhturin NA. System of rendering medical assistance to population in the profile "oral and maxillofacial surgery" in the territory of the Russian Federation. *Current problems of health care and medical statistics*. 2020; 1: 383–402. Russian.
7. McCarty JC, Kiwanuka E, Gadkaree SK, Siu JM, Caterson EJ. Traumatic brain injury in trauma patients with isolated facial fractures. *Journal of Craniofacial Surgery*. 2020; 31 (5): 1182–5.
8. Yuchen Y, Romero J, Diaz G, Evans R. Concurrent traumatic brain injury with craniofacial trauma: a 10-year analysis of a Single Institution's Trauma Registry. *Trauma Care*. 2023; 3: 108–13.
9. Lucke-Wold B, Pierre K, Aghili-Mehrzi S, Murad GJA. Facial fractures: independent prediction of neurosurgical intervention. *Asian Journal of Neurosurgery*. 2022; 17: 17–22.
10. Kopetski IS, Pritiko AG, Polunina NV, Nasibullin AM. Traumatism of maxillofacial region (during 50 years). *Bulletin of RSMU*. 2010; 2: 31–4. Russian.
11. Dregalkina AA, Kostina IN. The structure of diseases of the maxillofacial region among residents of Sverdlovsk Region. *Actual problems in dentistry*. 2018; 14 (2): 68–73. Russian.
12. Bakhteeva GR, Kuzmin AS. Statistical research of maxillofacial injuries. *Bulletin of Medical Internet Conferences*. 2012; 2 (11): 930. Russian.
13. Shashkov VA, Gaivoronsky IV, Gaivoronskaya MG, Iordaniashvili AK, Rodionov AA, Nichiporuk GI. Prevalence of different types of lower jaw fractures in adults. *Medical Newsletter of Vyatka*. 2021; 1 (69): 41–7. Russian.
14. Chzhan Sh, Petruk PS, Medvedev YuA. Fractures of the mandible at the body and angle region: patterns, epidemiology, diagnostic principles. Part I. *Russian Journal of Dentistry*. 2017; 21 (2): 100–3. Russian.
15. Romeo I, Sobrero F, Rocca F, Dolan S, Laverick S, Carlaw K, et al. A multicentric, prospective study on oral and maxillofacial trauma in the female population around the world. *Dent Traumatol*. 2022; 38 (3): 196–205. DOI: 10.1111/edt.12750. PMID: 35390219.
16. Romeo I, Sobrero F, Rocca F, Dolan S, Laverick S, Carlaw K, et al. A multicentric, prospective study on oral and maxillofacial trauma in the female population around the world. *Dent Traumatol*. 2022; 38 (3): 196–205. DOI: 10.1111/edt.12750. PMID: 35390219.
17. Goncharova AV. Use of stationary substituting technologies in rehabilitation of patients with inflammatory diseases of the maxillofacial region. *Bulletin of RSMU*. 2011; 5: 76–9. Russian.

Литература

1. Аксенова Е. И., Подчернина А. М. Основные тенденции в увеличении доли травматизма москвичей на основе данных медицинской статистики. *Современные проблемы здравоохранения и медицинской статистики*. 2021; 2: 403–16.
2. Гречухин И. В. Состояние проблемы травматизма по данным официальной статистики и научное обоснование совершенствования его учета. *Менеджер здравоохранения*. 2017; 7: 41–9.
3. Баранчикова М. В. Лица, управляющие средствами индивидуальной мобильности как субъекты и потерпевшие в криминальных дорожно-транспортных происшествиях. *Виктимология*. 2022; 9 (4): 408–16.
4. Mohammadi H, Roochi MM, Heidar H, Garajei A, Dallband M, Sadeghi M, et al. A meta-analysis to evaluate the prevalence of maxillofacial trauma caused by various etiologies among children and adolescents. *Dent Traumatol*. 2023; 39 (5): 403–17. DOI: 10.1111/edt.12845. PMID: 37073864.
5. Маркаров А. Э., Еремин Д. А., Оразвалиев А. И., Мартиросов А. В., Краснов Н. М., Шень П. А. и др. Статистический анализ гнойно-воспалительных заболеваний челюстно-лицевой области. *Медицинский алфавит*. 2022; 7: 40–6.
6. Лебедев М. В., Керимова К. И., Захарова И. Ю., Бахтурин Н. А. Система оказания медицинской помощи населению по профилю «челюстно-лицевая хирургия» на территории Российской Федерации. *Современные проблемы здравоохранения и медицинской статистики*. 2020; 1: 383–402.
7. McCarty JC, Kiwanuka E, Gadkaree SK, Siu JM, Caterson EJ. Traumatic brain injury in trauma patients with isolated facial fractures. *Journal of Craniofacial Surgery*. 2020; 31 (5): 1182–5.
8. Yuchen Y, Romero J, Diaz G, Evans R. Concurrent traumatic brain injury with craniofacial trauma: a 10-year analysis of a Single Institution's Trauma Registry. *Trauma Care*. 2023; 3: 108–13.
9. Lucke-Wold B, Pierre K, Aghili-Mehrzi S, Murad GJA. Facial fractures: independent prediction of neurosurgical intervention. *Asian Journal of Neurosurgery*. 2022; 17: 17–22.
10. Колецкий И. С., Притыко А. Г., Полунина Н. В., Насибуллин А. М. Травматизм челюстно-лицевой области (опыт 50-летнего наблюдения). *Вестник РГМУ*. 2010; 2: 31–4.
11. Дрегалкина А. А., Костина А. Н. Структура заболеваний челюстно-лицевой области среди жителей Свердловской области. *Проблемы стоматологии*. 2018; 14 (2): 68–73.
12. Бахтеева Г. Р., Кузьмин А. С. Статистическое исследование травм челюстно-лицевой области. *Bulletin of Medical Internet Conferences*. 2012; 2 (11): 930.
13. Шашков В. А., Гайворонский И. В., Гайворонская М. Г., Иорданишвили А. К., Родионов А. А., Ничипорук Г. И. Распространенность различных видов переломов нижней челюсти у взрослых. *Вятский медицинский вестник*. 2021; 1 (69): 41–7.
14. Чжан Ш., Петрук П. С., Медведев Ю. А. Переломы нижней челюсти в области тела и угла: структура, эпидемиология, принципы диагностики. Часть I. *Российский стоматологический журнал*. 2017; 21 (2): 100–3.
15. Фокас Н. Н., Левенец А. А., Горбач Н. А. Характеристика повреждений челюстно-лицевой области у взрослого населения и анализ деятельности отделения челюстно-лицевой хирургии по материалам КГБУЗ ККБ (г. Красноярск).

- Сибирское медицинское обозрение. 2014; 3: 44–8.
16. Romeo I, Sobrero F, Roccia F, Dolan S, Laverick S, Carlaw K, et al. A multicentric, prospective study on oral and maxillofacial trauma in the female population around the world. *Dent Traumatol.* 2022; 38 (3): 196–205. DOI: 10.1111/edt.12750. PMID: 35390219.
17. Гончарова А. В. Роль стационарзамещающих технологий в реабилитации больных с воспалительными заболеваниями челюстно-лицевой области. *Вестник РГМУ,* 2011; 5: 76–9.