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Overview of Emergency Department Visits in Craniomaxillofacial and Oncological Clinic of Medical University in Lodz

Analiza zgłoszeń pacjentów na Oddział Ratunkowy Chirurgii Czaszkowo-Szczękowo-Twarzowej i Onkologicznej Szpitala Klinicznego Uniwersytetu Medycznego w Łodzi

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation;
D – writing the article; E – critical revision of the article; F – final approval of article

Abstract

Background. Knowledge about epidemiology of causes of admissions to Emergency Department is very important for a physician – it allows for the assessment of the functionality of the emergency system in maxillofacial surgery.

Objectives. The aim of this study was to characterize patients admitted to the Emergency Department of Craniomaxillofacial Clinic, and afterwards to determine the severity of the injury within the facial part of a skull, using a FISS scale. Additionally, the aim was to evaluate usefulness of this scale in medical practice.

Material and Methods. In this retrospective research we analyzed 512 patients. Data concerning age, sex, duration of hospitalization, cause of admission, and in case of patients with trauma – injury location, localisation of fractures and wounds, concomitant injuries and damages within the CNS – was collected.

Results. Among 211 women and 301 men (in average age 44.03 ± 18.98) the most common causes of Emergency Department visits were inflammations, suffered by 45.7% of the patients. Next, intraoral abscess was most frequent as it affected 16% of patients. The most prevailing cause of treatment and admission to hospital was assault. Mean FISS scale equal 3.5 ± 2.16 .

Conclusions. Males were admitted to the hospital more often than females. The most common reasons for admission were inflammations in case of women and traumas in case of men. The FISS scale is a useful tool in medical practice. It shows that patients after traffic accidents and those who have lost consciousness score highly in the scale. Men were admitted to the hospital more often and women were cured and released on the same day in more cases. Patients presenting extraoral abscesses were admitted to the hospital 100% of the time. The case was different with patients presenting intraoral abscesses in most cases required only one-day treatment (*Dent. Med. Probl.* 2016, 53, 2, 244–252).

Key words: inflammation, maxillofacial injuries, patient admission, trauma severity incides.

Słowa kluczowe: zapalenie, urazy twarzoczaszki, przyjęcia pacjentów, wskaźnik ciężkości urazów.

The most common causes of patient admission to the Maxillofacial Emergency Department are cranial fractures in the upper, middle and lower floor. Typically, there are mandibular fractures which are usually connected with wounds and in-

juries of soft tissues of the face [1, 2]. Fractures and wounds are often combined with other damages of skeletal bones or internal organs.

According to statistics, maxillofacial fractures more often affect males than females, and the

greatest incidence was observed in the age group between 20 and 41. Such cases accounted for 47.9% of all admissions to the Craniomaxillofacial Clinic. However, the main reasons of admission to the hospital are widely varied, and they depend on a particular region where the trauma incident takes place. In highly developed countries, the assaults amount up to 64.5 %, and traffic accidents only to 13.9%. A further place in the list is occupied by falls – 13%, sports accidents – 5.8% and accidents at work – 2.8%. Data dependency also concerns cities with more than 100,000 inhabitants. In those places assaults accounted for 69.4% and traffic accidents for 12.2%. Whereas in towns with a number of residents below 100.000, we are able to observe an insignificant change of this dependency, as assaults accounted there only for 48.2%, and traffic accidents for 19.4% maximum [3]. The reasons for such situation are: increased industrialization, urbanization and huge variability and progress of socio-cultural behaviors [3].

Severely injured patients can be qualified for treatment in special places like Trauma Centers. However, the patients must fulfill the baseline criteria, *i.e.* to experience at least two of the following anatomical injuries: penetrating head wounds, trunk or blunt injuries with signs of damages to the internal organs of the head, chest and abdomen, amputation extremity above knee or elbow, extensive limb fractures, spinal cord injury, limb fractures with vascular and nerve damage, fractures of at least two of proximal long bones or pelvis and at least two of the following parameters of physiological disorders: systolic blood pressure equal to or below 80 mmHg, pulse rate at least 120 per minute, respiratory rate below 10 or above 29 per minute, state of awareness in the Glasgow Coma Scale (GCS equal to or less than 8, arterial oxygen saturation equal to or less than 90%. It is worth mentioning there have been 14 Trauma Centers in Poland since 2006. For example, in the United States of America, where Trauma Centers have existed from 1980s, only 10.7% of all patients have a chance to qualify for that specialist treatment [4, 5].

Every kind of maxillofacial injury entails a number of serious complications, including life-threatening conditions such as airway obstruction, intracranial injuries, loss of vision or cosmetic and functional defects [6]. These patients require urgent and accurate diagnosis using appropriate imaging techniques such as conventional radiography, computed tomography, ultrasound, nuclear magnetic resonance, to make the best possible diagnosis. However, it is important to emphasize that due to the co-occurrence of other injuries (to the chest or abdomen), patients with head trauma

may need care in a specialized Trauma Center, or they may pose a challenge for medical teams in Craniomaxillofacial Departments.

A common problem is further inflammation occurring within facial soft tissues. It can be caused by endogenous or exogenous factors. However, the most frequent are those arising from a bacterial infection, and majority of them are caused by infections of dental origin. These include teeth with gangrene or purulent periodontitis. Frequent causes are also difficult eruptions of third molars, odontogenic cysts, a periodontal disease, tooth roots left in the bone [7].

Nonodontogenic causes include tonsillitis, inflammation of lymph nodes, salivary glands or the maxillary sinus. A common inflammation is also a necrosis of soft tissues and bones, which occurs in people with systemic diseases such as poorly treated diabetes, cardiac failure, bloodborne infections. The largest incidence is ascribed to extraoral abscesses, as they amount for almost 50.15%, intraoral abscesses – 23.3%, inflammatory infiltrates – 20.5% and phlegmon only 1.1%. In contrast, the most common problems are inflammatory infiltrates in third molars because they amount up to almost 77.9% [7].

The aim of this study was to characterize patients admitted to the Craniomaxillofacial Department between January 2014 and June 2014, according to several factors, including sex, age, cause and time of reporting, location within the cranial trauma, skull fractures, wounds of soft tissues, Central Nervous System (CNS) injury and other concomitant injuries. Secondly, we determined severity of the injury within the facial part of the skull using a special FISS scale (Facial Injury Severity Scale) [8].

Material and Methods

In our retrospective research we analyzed 512 patients admitted to the Maxillofacial Emergency Department in MU of Lodz between 01.01.2014 and 30.06.2014. 58.8% of patients were male in average age 41.66 ± 18.64 and 41.2% were female in average age 47.41 ± 18.95 . Data concerning age, sex, duration of hospitalization, cause of admission, and in case of patients with trauma – place and circumstances of the injury, localisation of fractures and wounds, alcohol consumption before the accident, concomitant injuries and damages within CNS was gathered. Demographic characteristics of the analysed group of patients were listed in Table 1. Afterwards, the FISS scale (Facial Injury Severity Scale) was used to evaluate the severity of facial injuries (Table 2). FISS is an innovative and modern scale. It allows us to deter-

Table 1. Patients data

	N	%	Mean age
All registered patients	512	100.0	44.03± 18.98
Men	301	58.8	41.66± 18.64
Women	211	41.2	47.41± 18.95

mine patients' conditions by assigning a numeric value to each patient, composed of a sum of individual fractures. We take into account not only the maxillofacial fractures but also the soft tissues injuries which are over ten centimeters long. The lowest score, which is possible to obtain is 0 and the highest exceeds 25 points [8].

Our study recorded all causes of patients' admissions. This research also comprises a group of patients, who were treated and released home at the same day.

Statistical Analysis

Epidemiological data was analyzed using a χ^2 test. We applied the Mann-Whitney test and the Kruskal-Wallis test for qualitative variables as well as Spearman's rank correlation analysis in case of quantitative variables to estimate any correlations between the analyzed variables and severity of the injury assessed according to the FISS scale. Therefore, as a level of significance $p < 0.05$ was determined.

Results

The research involved 512 patients. The major causes of admissions were inflammations that struck 45.7% of patients, afterwards we observed traumas – 41.2% and other causes followed: bleeding from the post-extraction wound, completion of extraction – stitching oro-antral fistula connection, TMJ dislocation alveolitis – 13.1%.

As we can see, inflammations more often affected females (135 of the 234 patients) than males (99 of the 234) and the p value equaled 0.001. Patients with intraoral abscesses were admitted most frequently – about 35% of all inflammation cases. Women affected by intraoral abscesses were 47 out of 82 patients (57%) and those with extraoral abscesses 36 of 69 patients (52%).

The most commonly encountered intraoral abscess in both female and male group was buccal abscess, which struck 28 of 47 women and 29 of 35 men. This was the only type of abscess that occurred more frequently in males. Palatum duri abscess was found only in women, reaching 4.9% of them. We also distinguished fossa canine and oral cavity fundus abscesses in both groups, but with greater occurrence in women.

Treatment of intraoral abscesses included intraoral incision under local anaesthesia and mean hospital stay equalled 2.90 ± 3.31 days.

Extraoral abscesses struck 69 patients: 36 women and 33 men. In both cases the most common

Table 2. Facial Injury Severity Scale

Parameter		Points
Soft tissue injuries (facial laceration)	≤ 10 cm	0
	> 10 cm	1
Injuries of upper facial part of the cranium		
Fracture of orbital roof/rim		1
Fracture of frontal sinus/bone	displaced	5
	nondisplaced	1
Injuries of middle facial part of the cranium		
Maxillary fracture	Le Fort I	2
	Le Fort II	4
	Le Fort III	6
Half of points are given for unilateral maxillary fractures		
Dento-alveolar injury		1
Naso-orbital-ethmoid complex fractures		3
Zygomatico-maxillary complex fractures		1
Isolated nasal bone fracture		1
Injuries of lower facial part of the cranium		
Dento-alveolar injury of mandible		1
Fractures of mandible body, ramus/symphysis		number of fracture 2
Fracture of mandibular subcondyle, condyle or coronoid process		1

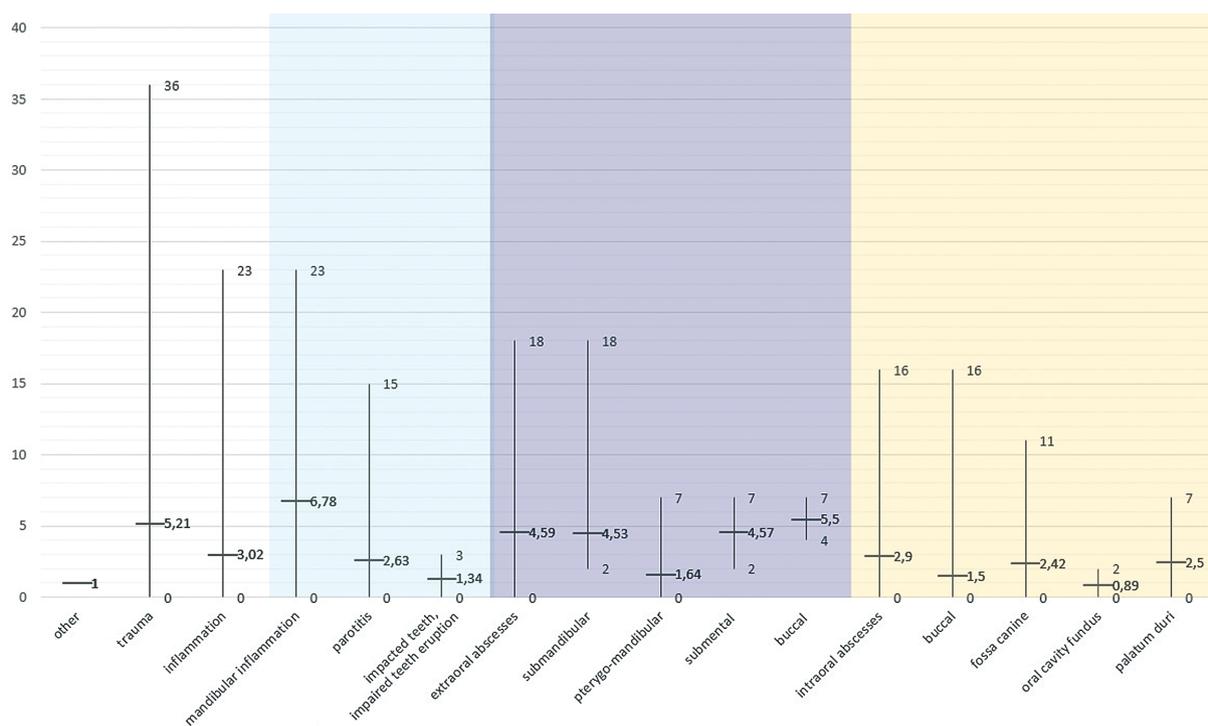


Fig. 1. Causes of emergency visits

were abscesses localized in the submandibular area. The abscesses occurring least often among women were: submental and pterygo-mandibular abscesses, and among men: submental and buccal abscesses.

Among all extraoral abscesses, the submandibular and perimandibular abscesses were the most frequent (71.1%). The rarest was a buccal abscess (2.9%), and here the hospitalization was the longest and equaled 1.5 ± 5.5 days. The shortest stay in hospital was required in case of pterygo-mandibular abscess, as it was only 1.64 ± 2.14 days. All the data is presented in Fig. 1.

221 patients were admitted to the hospital because of a trauma. A number of patients suffering from soft tissue injuries amounted to 25 (11.3%) and patients with fractures to 196 (88.6%). Injuries accompanying to fractures struck 112 patients (50.7%). An overwhelming majority of patients (58.5%) suffered injuries from an assaults. Second, in terms of frequency, were falls (14.6%), then sport (11.8%), traffic accidents (11.3%), accidents at work (2.4%) and dog bites (1.4%).

Patients with soft tissue injuries amounted to 11.3% (25 patients) from all individuals admitted to the hospital. 48% of that number were women and 52% were men. The first place, in terms of occurrence, was taken by open wounds of the lip and oral cavity which affected 7 patients (among this 5 women and 2 men). This injury occurred more often in women ($p = 0.0015$). What is more, 7 patients were admitted with a tooth dislocation. Nu-

merous open head wounds were recorded only in men. Open wounds of cheek and temporomandibular area affected 1 female and 2 males. Bruises on the eyelids and around the eyes occurred in the case of 2 men and 3 women of all the 5 patients, which also shows higher incidence in case of women ($p = 0.0015$).

Soft tissue injuries accompanying fractures affected 112 patients (50.7%). Wounds smaller than 10 cm were recorded in the case of 17 patients (15.2%) and wounds over 10 cm in 95 patients (84.8%).

The total number of patients with fractures was 196 in the average age of 42 ± 54 , significantly more men (82.1%) than women (17.9%), ($p = 0.0005$). When comparing women and men, we see that both these groups experienced mandibular fractures frequently. However, there were significantly more men 49.5% than women 9.2% ($p < 0.0015$). On the other hand, the rarest were orbital floor fractures (frequency of this type of trauma was 7.7% in men and 2.0% in women). In the scope of multiple fractures of skull and facial bones diagnosed in 22 patients, the most common was double mandible fracture and the rarest was Le Fort III maxillary fracture (Fig. 2-4).

The number of patients after alcohol consumption before the accident was equal to 65.6%. It was mostly those who were admitted with mandibular fractures (62%), fracture of the zygomatic bone and mandible (18.6%), orbital floor frac-

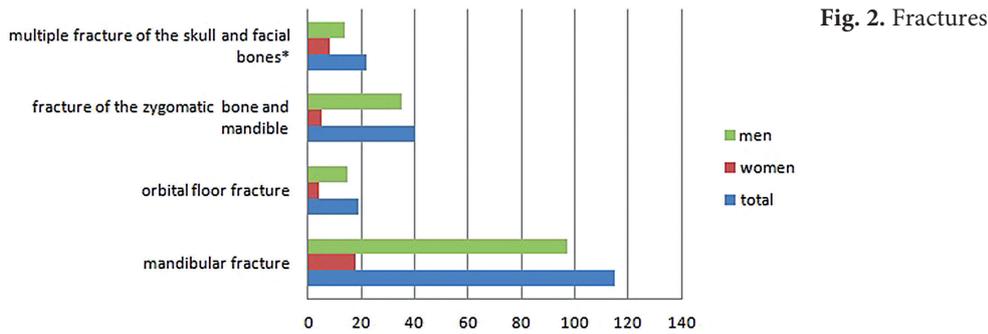


Fig. 2. Fractures

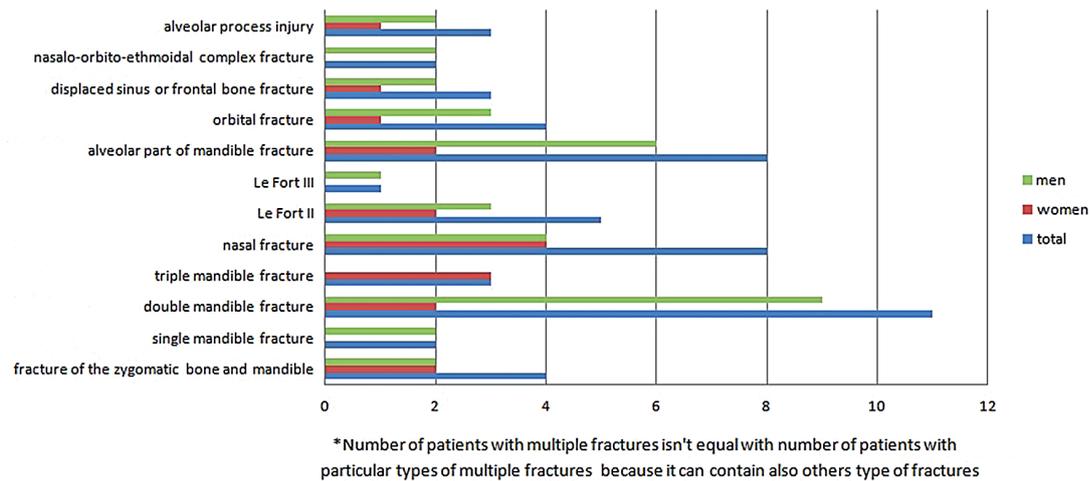


Fig. 3. Multiple fracture of the skull and facial bones

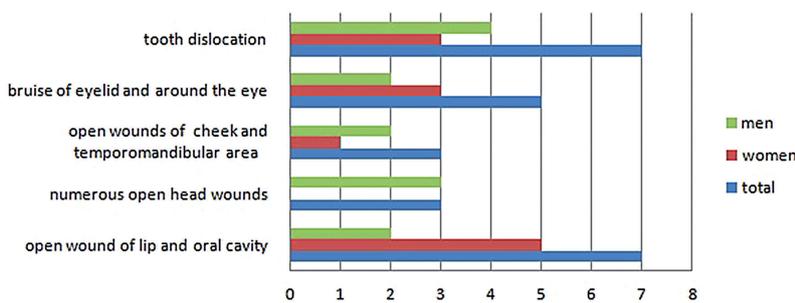


Fig. 4. Soft tissue injuries

tures (8.3%) or multiple fractures of skull and facial bones (3.4%) as well as patients with open wounds of face and head (2%). Only patients diagnosed with tooth dislocation had not been under alcohol influence before the accident.

After evaluating each patient according to the FISS scale, we drew the following observation: average scoring was 3.5 ± 2.16 . After the analysis there were no correlations between the score in FISS scale and age ($p = 0.0659$), sex ($p = 0.4766$), duration of hospitalization ($p = 0.3711$) or alcohol consumption ($p = 0.6866$). A certain correlation was observed between brain concussion ($p = 0.0114$) and cause of injury ($p = < 0.0001$), which is also significant and shows that patients after traffic accidents achieved higher scores in the FISS scale. Data is shown in Fig. 5.

Length of hospitalization was largely dependent on the cause of admission. Patients with bleeding from the post-extraction wounds, post extraction oro-antral communications or TMJ dislocations were treated and released on the same day, contrary to patients with trauma fractures who were admitted to the hospital in 100%. Although some differences appeared among patients, who suffered from inflammations or soft tissue injuries. We can notice an important correlation between the length of hospitalization and sex, cause of admission and type of abscess, where p is < 0.0001 . Women were significantly more often treated and released on the same day than men ($p < 0.0001$), and patients with inflammations were more often treated and released than trauma patients ($p < 0.0001$). All data is presented in Fig. 6.

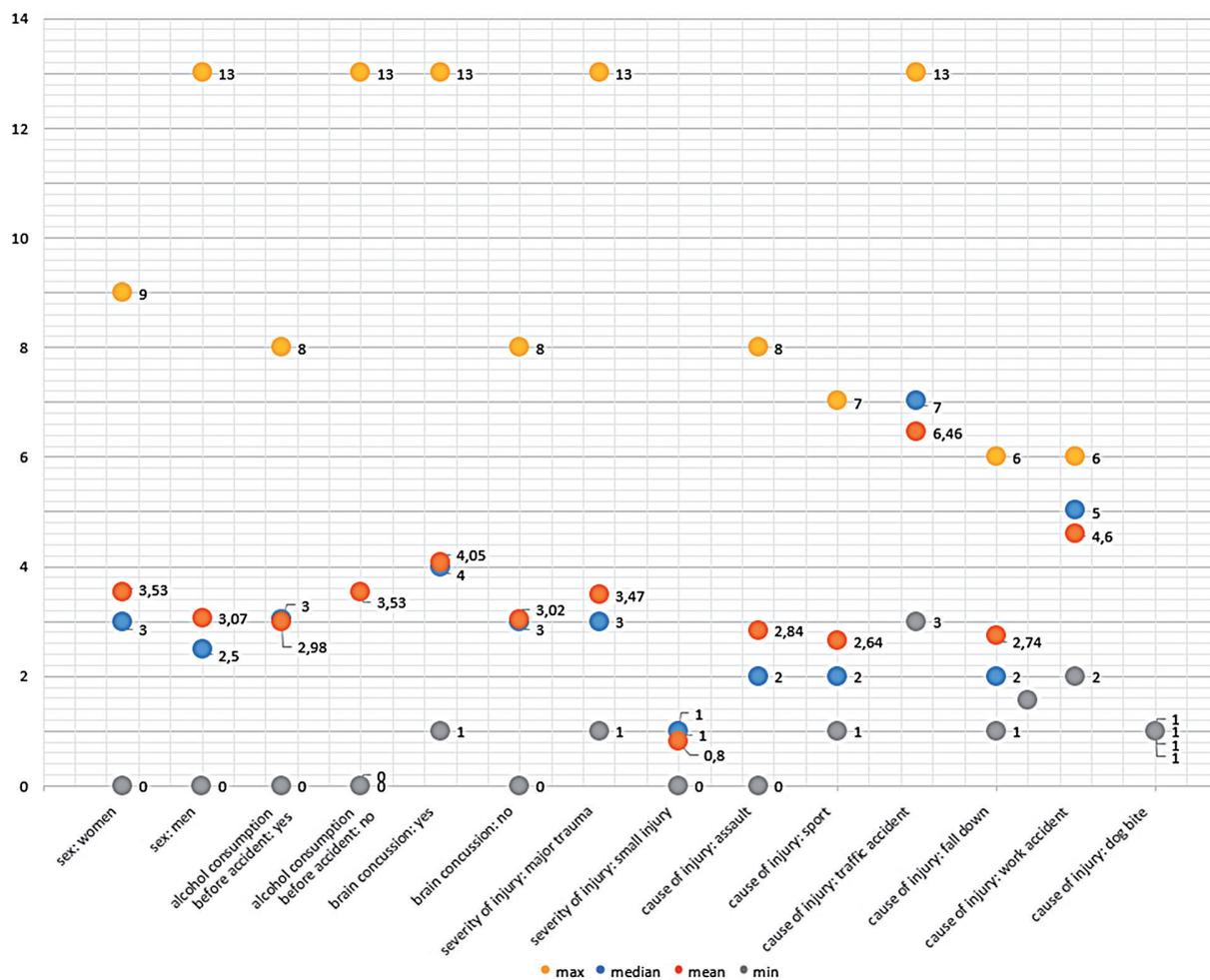


Fig. 5. Correlation between FISS scale and analysed variables

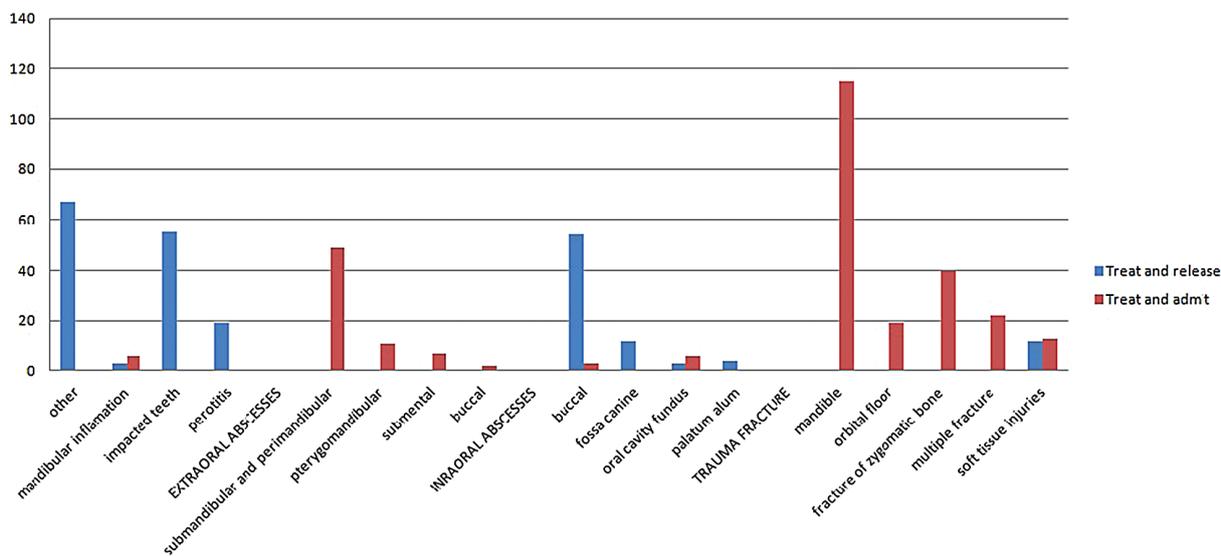


Fig. 6. Treat and release and treat and admit patients

Discussion

Our research, unique on a Polish scale, includes overall assessment of patients admissions to the Craniomaxillofacial Emergency Depart-

ment, as it contains all causes of admissions to the hospital, not only focused on a single issue like fractures or inflammations separately. Both the knowledge and assessment of patients with trauma according to the FISS scale turn out to be high-

ly useful in daily medical practice. It allows us to make a right diagnosis and commence appropriate treatment faster, which ensures that the patients have the best possible medical care. We would like to point out the usefulness of the FISS scale and firmly state that it should be applied in daily practice among other known scales used to evaluate craniofacial injuries.

The most frequent cases of Emergency Department visits were inflammations which most commonly afflicted women. The most frequent were intraoral (16% patients) and extraoral abscesses (13.5% patients), which is also confirmed in other research, which proved that both are dominating but in an inversed proportion: Lewandowski and Cubera [7] have observed intraoral abscesses affected 23% and extraoral abscess 50% of patients. An abscess is a painful accumulation of pus in the tissues, most frequently caused by assorted infections, however, with a predominance of anaerobic bacteria, such as Gram negative bacilliform and Gram positive coccus [9]. We can distinguish the following intraoral abscesses: buccal, fossa canine, oral cavity fundus and palatum duri. Our research shows that women (57%) were more often affected by intraoral abscess than men (43%), which is a different result than that shown in another study, where this type of abscess struck more men (53%) than women (47%). Buccal abscess was the most frequently appearing intraoral kind of inflammation among men and women. The least common abscess in our study was palatum duri among women and oral cavity fundus equally frequent to fossa canine among men. Contrarily, in another research, the least frequent abscess among women and men was oral cavity fundus [7].

Treatment of the most frequently occurring abscess consist of intraoral incision under local anaesthesia and draining. Most of the people presented came to the hospital with their problems too late, often already with a high level of pain. They neglected regular visits and came only when it was necessary. Moreover, they often neglected root canal treatment. Faster diagnosis made by a dentist or an increased level of awareness among patients would allow us to reduce the number of such patients in the emergency department. All patients presenting extraoral abscesses were admitted to the hospital, and they spent there more than one day, contrary to the patients with intraoral abscesses like fossa canine and palatum duri, who were treated and released on the same day. Although patients with the most frequent type of this abscess – which is buccal, were released in 95% and admitted to the hospital in 5%, while 33% of patients with oral cavity fundus spent there only one day and 67% were admitted.

Generally, on the basis of available research concerning inflammations and the prevalence of abscesses, it can be observed that they affected men more often. Especially extraoral abscesses are more frequently observed in men, which can be a result of the fact that they are believed to devote less care to hygiene and health [10]. However, in our research inflammations affected women more frequently, which may be the result of prevalence of women in the study.

According to our research extraoral abscess affected more often women (52.0%) than men (48.0%). In opposition to the research conducted in Regional Specialist Hospital in Rzeszow, 56.3% of patients of that hospital, with this type of abscess, were men and 43.7% were women. Only one observed difference between the two studies was the most frequent abscess among women. In our study, it were submandibular and perimandibular and in the other research it was buccal abscess, which did not appear among our female patients.

A major cause of admissions to the hospital were assaults (58.5%), thus overtaking traffic accidents, which took the fourth place – 11.3%. This changing dependence was also confirmed by the article written by Bogusiak and Arkuszewski [3].

Our research revealed that patients after alcohol consumption prevailed in the group of trauma cases and achieved fewer scores in the FISS scale – 0–8 than sober patients which amounted to 76 individuals and achieved 0–13 points. Patients under influence of alcohol are hospitalized for a shorter time – 2.98 ± 1.72 than sober patients 3.52 ± 2.79 . This did not correspond with conclusions from the other research on the effect of alcohol consumption on the severity of injuries, which shows that patients who had drunk alcohol before the accident experienced more severe head injuries. However, it confirms that < 230 mg/dl blood level of alcohol had a positive impact on recovery and a lower rate of possible further complications, which were also associated with a shorter hospital stay, in contrast to patients whose blood level of alcohol was > 230 mg/dl, which had a negative impact on mortality rate [11].

The most significant problem for us was how specific aspects affected the FISS scale, because we do not have any research in our native language concerned with this topic. The lowest score which is possible to obtain in this scale is 0 and the highest is over 25 points. The largest score noted in our research was 13 and it is the same like the largest score ever observed [8]. We know that the FISS scale reflects severity of injuries so we decided to explore which factors exert influence on that matter (severity of injury). Foreign studies put emphasis on connections between the FISS and operat-

ing room charges, and length of hospitalization as well [8].

In our study, the received scores had a strong connection with brain concussions ($p = 0.0114$). Patients who lost consciousness reached the FISS scoring ranging from 1 to 13 points. Also patients after traffic accidents received higher FISS rating, *i.e.* 3–13 points, than those who were injured as a result of an assault – 0–8 points, sport – 1–7 points, work accidents – 2–6 points, fall – 1–6 points or dog bites – only 1 point.

Average received score in the FISS scale, according to Bagheri et al. [8] was equal to 4.4, and according to Kesuma et al. [12] to 3.37 ± 1.9 and in our research it was 3.5 ± 2.16 . The research reminds above patients after motorcycle accidents, who obtained a high score in the FISS scale, although it ranged from 1 to 9 points [12].

In our research, we came to the following conclusions which indicate that males had higher overall rate of visits than females. Major causes of admissions were inflammations, but trauma cases appeared comparatively often. Women suffered from inflammations quite frequently. Assaults began to be the main cause of admission, which confirms that men often suffered from traumas. Among fractures the most frequent cases were mandible fractures, and among multiple fractures the most frequent were also double mandible fractures. The higher score in the FISS scale was obtained by patients after traffic accidents (from 3 to 13). A high FISS score was also received by patients who lost consciousness during the accident. Nevertheless, this scale did not prove to be a good predictor to assess the length of hospitalization. The FISS scale is simple, quick to count and also useful as a routine tool to evaluate severity of injuries. This aspect should be confirmed in further research.

Men were admitted to the hospital more often, and women were frequently treated and released on the same day. Patients with bleeding from the

post-extraction wounds, completing of extraction – stitching oro-antral fistula connections, TMJ dislocations, impacted teeth, parotitis, fossa canine and palatum duri abscesses required only one-day treatment without having to be admitted to the hospital. This shows that the majority of them could be treated also by dentists in their private or public practices and, therefore, relieve the hospital's Emergency Department.

The most common cause of admission were inflammations which affected more women than men. The most frequent one was intraoral abscess localized in the buccal area. Fractures most often affected men and that most frequently observed was mandibular fracture. Average result of FISS scale was 3.5 ± 2.16 . Treated and released patients most frequently suffered from bleeding from the post-extraction wounds, post extraction oro-antral communications or TMJ dislocations. To sum up, after the conducted research we can see that today the major cause of admission to Emergency Department of our Clinic are assaults. Males had a higher overall rate of visits and more often suffered from fractures. On the other hand, the most common cause of admission to the hospital were inflammations which affected more women than men. Among these the most frequent was intraoral abscess localized in the buccal area. Among facial fractures the most commonly observed were mandibular fractures. Average score of FISS scale in this study was 3.5 ± 2.16 . Length of hospitalization differed and depended on the cause of admission: intraoral abscess required 2.90 ± 3.31 days, extraoral abscess about 4.59 ± 2.40 days and traumas about 5.21 ± 4.99 days of hospital stay. Among soft tissue injuries first place for the frequency rate was taken by open wounds of the lip and oral cavity and tooth dislocation. Treated and released patients suffered from bleeding from the post-extraction wounds, post extraction oro-antral communications or TMJ dislocations.

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