

## ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

# Otorhinolaryngology emergency department hospitalizations in a secondary medical center

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**Introduction/Objective** The overall number of emergency department visits, including otorhinolaryngology, has increased. Due to population growth, industry and traffic expansion, workload of the otorhinolaryngology emergency department is steadily on the rise.

The objective of this study was to determine most common indications for an emergency hospitalization in the otorhinolaryngology department in a secondary medical center. Also, we examined the course of diagnostics and treatment upon admittance, the outcome of hospitalization, and possible referral to a tertiary medical center.

**Methods** This retrospective study included patients who were urgently hospitalized at the Department of Otorhinolaryngology and Maxillofacial Surgery of the Đorđe Joanović General Hospital in Zrenjanin, Serbia, during a two-year period. The data were obtained by processing the patients' medical charts.

**Results** The study included 428 patients who were urgently hospitalized at the department of otorhinolaryngology of a secondary medical center during a two-year period. Of the total number, 245 (57.2%) were male and 183 (42.8%) were female, with the average age of 48.5 years. The patients were most frequently hospitalized due to tonsillopharyngitis and its complications, followed by head and neck trauma. Most of the patients were treated conservatively, with medication therapy (72%), and 28% underwent surgical or other invasive intervention. Twenty-seven (6.3%) patients were referred to a tertiary medical center, which correlated significantly with the number of comorbidities and consultative exams.

**Conclusion** Otorhinolaryngology inflammatory/infectious diseases are the most frequent indication for urgent hospital admission to a secondary medical center. Most of the patients were treated conservatively. Referral to a tertiary medical center significantly correlated with the number of comorbidities and consultative exams.

**Keywords:** otorhinolaryngology; emergency hospitalizations; secondary medical center

**INTRODUCTION**

The overall number of emergency department visits, including otorhinolaryngology, has increased [1]. Due to population growth, industry and traffic expansion, workload of otorhinolaryngology emergency departments is steadily on the rise. Facial, orofacial, and cervical trauma and various infections with complications are most frequent causes of emergency hospitalizations [2, 3]. Most otorhinolaryngology emergency cases are not life threatening, but a certain number of patients require hospitalization for further assessment and treatment. During hospitalization, quick and precise diagnosis of these disorders is important in order to preserve functioning organs and, in some cases, the life of the patient.

Some disorders require referral to a tertiary medical center due to the complexity of the disorder, the lack of qualified personnel with surgical expertise or medical equipment in secondary medical centers. Despite a rising need for emergency surgery services globally, there is wide variability in the human and physical

resources available. In addition, the number of surgeons, anesthesiologists, and operating theatres varies significantly by national income [4]. Inappropriate referrals result in an inefficient use of resources and financial burden, not to mention in delaying the diagnosis and potentially endangering the patient. A careful assessment must be made in deciding should a certain emergency disorder be managed in a secondary medical center.

The objective of this study was to determine most common indications for emergency hospitalization at an otorhinolaryngology department of a secondary medical center. In addition, we examined the course of diagnostics and treatment upon admittance, the outcome of hospitalization, and possible referrals to a tertiary medical center.

**METHODS**

This retrospective study included all the patients who were urgently hospitalized at the Department of Otorhinolaryngology and

**Received • Примљено:**

March 1, 2020

**Accepted • Прихваћено:**

October 19, 2020

**Online first:** November 4, 2020**Correspondence to:**

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Maxillofacial Surgery of the Đorđe Joanović General Hospital in Zrenjanin, Serbia, from January 1, 2017 to December 31, 2018. This study was approved by the institutional ethics committee (01-273/71/2019). The patients were first examined at the Otorhinolaryngology Emergency Department, and then hospitalized according to their disorder. The data were obtained by processing medical charts of the patients. We analyzed the demographic data (age, sex), diagnosis upon admittance, comorbidities, conducted diagnostic procedures and consultative exams, conducted treatment and invasive or surgical procedures, duration of the hospitalization and further referrals to a tertiary medical center. Patients older than 16 years were considered adults.

Descriptive statistics were calculated for demographic characteristics and other followed parameters and presented as frequencies and proportions. For statistical analysis,  $\chi^2$  test, univariate, and multivariate logistic regression methods were used. All test variables with statistical significance of  $p < 0.05$  in the univariate model were included in the multivariate model. Statistical significance was considered at  $p < 0.05$ . Statistical analysis was performed using the IBM SPSS Statistics, Version 21.0 (IBM Corp., Armonk, NY, USA).

**Table 1.** Characteristics of the patients included in the study

Sex, n (%)	
Male	245 (57.2)
Female	183 (42.8)
Number of comorbidities, n (%)	
None	206 (48.1)
One	130 (30.4)
Two	74 (17.3)
Three or more	18 (4.2)
Additional diagnostics, n (%)	
Consultative examination	247 (57.7)
Radiography imaging	108 (25.2)
Ultrasound imaging	71 (16.6)
CT imaging	48 (11.2)
Number of consultative exams, n (%)	
None	181 (30.6)
One	141 (23.8)
Two	64 (10.8)
Three or more	42 (7.1)
Treatment, n (%)	
Medication treatment	308 (72)
Surgical treatment/intervention	120 (28)
Referral to a tertiary medical center, n (%)	
Yes	27 (6.3)
No	401 (93.7)

**Table 2.** Indications for hospitalization in patients  $\leq 16$  years old

Indication for hospitalization	n (%)
Tonsillopharyngitis and complications	9 (2.1)
Digestive tract foreign body	7 (1.6)
Acute suppurative rhinosinusitis without/with complications	5 (1.2)
Head and neck trauma	4 (0.9)
Acute suppurative otitis media without/with complications	4 (0.9)
Head and neck abscess	2 (0.5)
Bleeding after tonsillectomy	2 (0.5)
Allergic reaction to insect bite/medication	1 (0.2)
Total	34 (7.9)

## RESULTS

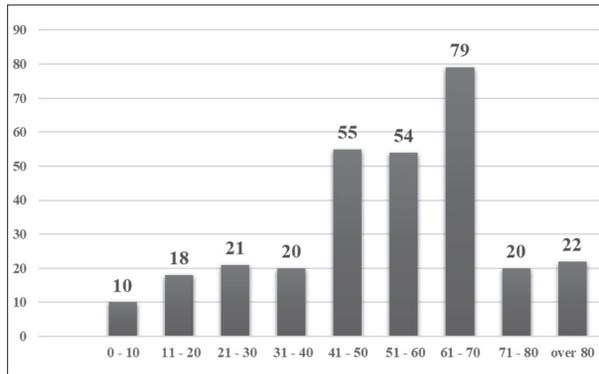
This retrospective study included 428 patients who were urgently hospitalized at the Department of Otorhinolaryngology and Maxillofacial Surgery of the Đorđe Joanović General Hospital in Zrenjanin during a two-year period; 245 (57.2%) patients were male and 183 (42.8%) were female, with the average age of 48.5 years ( $\pm 21.8$ ). Patients 40–70 years old were significantly more frequently admitted to the department ( $\chi^2$  test,  $p < 0.05$ ). Most of the patients had one, two or more comorbidities (222 patients, 51.9%). Considering additional diagnostics conducted during hospitalization, 51.9% had one or more consultative examinations, 25.2% underwent radiography imaging, 16.6% ultrasound imaging, and 11.2% computed tomography imaging. Twenty-seven patients (6.3%) were referred to a tertiary medical center for further treatment (Table 1). The average duration of hospitalization was 5.6 days ( $\pm 4.5$  days).

Children and adults were most frequently hospitalized because of tonsillopharyngitis and its complications (in 18.7% of cases). In children, foreign bodies of digestive system were also a frequent indication for hospitalization, followed by otogenic and sinusogenic complications (Table 2). Other frequent reasons for urgent hospitalization in adults were epistaxis, angioedema, head and neck trauma, and head and neck phlegmon or abscess formation (Table 3).

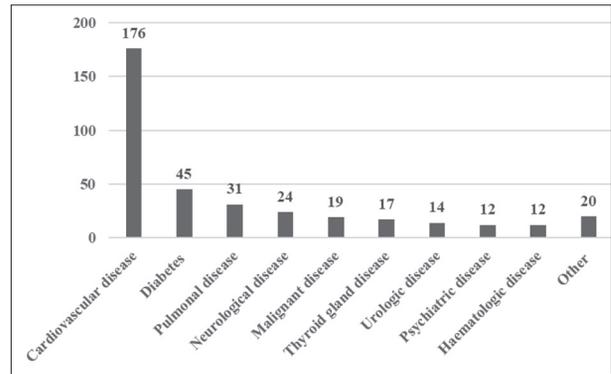
Considering comorbidities, most of the patients were treated for cardiovascular diseases (41.4%), followed by diabetes (10.5%), and pulmonal diseases (7.2%) (Figure 2).

**Table 3.** Indications for hospitalization in patients  $> 16$  years old

Indication for hospitalization	n (%)
Tonsillopharyngitis and complications	71 (16.6)
Epistaxis	36 (8.4)
Angioedema	36 (8.4)
Head and neck trauma	35 (8.2)
Head and neck abscess/phlegmon	34 (7.9)
Digestive tract foreign body	25 (5.8)
Allergic reaction to insect bite/medication	22 (5.1)
Acute suppurative otitis media without/with complications	21 (4.9)
Perichondritis	17 (4)
Acute suppurative rhinosinusitis without/with complications	16 (3.7)
Malignant head and neck tumors	16 (3.7)
Stridor	13 (3)
Acute laryngitis/laryngotracheitis	11 (2.6)
Dysphagia/aphagia	9 (2.1)
Acute epiglottitis	7 (1.6)
Vertigo	5 (1.2)
Sialoadenitis	5 (1.2)
Neck lymphadenitis	4 (0.9)
Acute idiopathic sensorineural hearing loss	3 (0.7)
Bleeding after tonsillectomy	2 (0.5)
Chemical ingestion	2 (0.5)
Respiratory tract foreign body	1 (0.2)
Other	3 (0.7)
Total	394 (92.1)



**Figure 1.** Age groups of patients included in the study



**Figure 2.** Comorbidities of the patients

**Table 4.** Surgical and other interventions

Interventions	n (%)
Abscess/hematoma incision and drainage	33 (7.7)
Anterior nasal packing	33 (7.7)
Directoscopy/esophagoscopy with foreign body extraction	26 (6.1)
Tracheotomy	7 (1.6)
Nasal reduction	7 (1.6)
Wound suture	4 (0.9)
Dental extraction	4 (0.9)
Posterior nasal packing	1 (0.2)
Surgical revision of bleeding	1 (0.2)
Other	4 (0.9)

**Table 5.** Diagnosis on referral to a tertiary medical center

Diagnosis for referral	n (%)
Head and neck malignancy	10 (2.3)
Head and neck trauma	5 (1.2)
Head and neck phlegmon	4 (0.9)
Mastoiditis	3 (0.7)
Failed esophageal foreign body extraction	3 (0.7)
Rhinosinusitis complications	2 (0.5)

**Table 6.** Univariate and multivariate logistic regression of factors related to the referral to a tertiary medical center

Referral	Univariate log regression			Multivariate log regression		
	Exp (B)	95% CI	p	Exp (B)	95% CI	p
Number of comorbidities	1.517	1.007–1.147	< 0.05	1.249	0.968–1.117	0.326
Number of consultative exams	1.673	1.012–2.275	< 0.01	1.040	0.801–1.948	0.282
Duration of hospitalization	1.075	1.163–2.407	< 0.05	1.445	0.962–2.170	0.76

Most of the patients were treated conservatively with medication therapy (72%), and 28% underwent surgical or other invasive interventions. Abscess or hematoma incision and drainage was most frequently done, as well as anterior nasal packing (in 7.7%). Directoscopy or esophagoscopy due to foreign body extraction was conducted in 6.1% (Table 4).

According to the results of the univariate logistic regression analysis (Table 6), referral to tertiary medical center was significantly related to duration of hospitalization,

number of comorbidities and number of consultative exams ( $p < 0.05$ ). Multivariate logistic regression indicated that none of the factors significantly correlated with referral to a tertiary medical center ( $p > 0.05$ ) (Table 6).

## DISCUSSION

Otorhinolaryngology emergencies visits are frequent in emergency units, but the number of patients requiring hospitalization is small. There are few published studies describing the structure of otorhinolaryngology emergency hospitalizations [2, 5, 6].

The most common disease responsible for hospital admittance was tonsillopharyngitis and its complications. This does not differ from data obtained from other studies. Multiple secondary medical centers with an otorhinolaryngology department are localized in cities that do not have otorhinolaryngology service at the primary care level. Any application of intravenous therapy is conducted through hospital stay. The lack of resources and logistics leads to attending to patients who would otherwise be treated by

their general practitioner. About 25–40% of the medical practice of a general practitioner consists of ear, nose, and throat diseases [3]. This data supports the fact that hospital health services are frequently used instead of primary care centers. Better training and education of general practitioners would allow secondary level health-care facilities to be more available and effective for more complex cases [7, 8, 9]. On the other hand, in children, admittance was done only in cases where surgical intervention was planned. Children who underwent conservative antibiotic treatment were admitted to the pediatric department.

In Serbia, otorhinolaryngologists also attends to cases of maxillofacial trauma in the emergency department, as the presence of the attending maxillofacial surgeon after working hours is extremely rare, except in tertiary university centers. This directly influences the number of admitted and referred patients, and makes head and neck trauma the second most common diagnosis in hospitalized patients.

One of the prominent data was that computed tomography (CT) diagnostics was done in only 11.2% of the

admitted patients. According to the literature data, CT use in the emergency department increased in the last few decades from 60% to 80% depending on the patients' age, sex, race, and diagnosis [10]. CT can identify patients who can benefit from hospital admission, and aid in determining appropriate disposition and risk assessment. This may be particularly relevant for patients who require major procedures and those with complex clinical presentations (elderly, patients with multiple chronic comorbidities) [11]. One of the main reasons for low percentage of CT use in our patients is poor organization and cooperation with the radiology department, as well as not firmly implemented diagnostics and treatment protocols.

Surgical or other invasive interventions were done in 28% of the cases. The most frequent intervention was abscess incision and drainage. This was also noted as the most frequent ears, nose, and throat surgical emergency in population-based estimates of the global burden [4]. The data was supported with other studies' results [2, 3, 5, 12].

Some authors estimate that less than 10% of emergency otorhinolaryngology cases require middle and high complexity resources in tertiary medical centers [3, 13]. Most common reason for referrals were advanced head and neck malignancies, with cardiovascular and pulmonary complications. Rhinosinusitis and otitis complications were referred when surgical treatment was needed. The lack of equipment and/or experienced surgeons who could treat those patients was also the main reason for referral of trauma patients in need of surgical reduction of facial fractures. Complex patients with advanced neck phlegmons requiring further surgical treatment and postoperative intensive care were also transferred to tertiary medical centers. Further dissemination of the infection such as mediastinitis and sepsis require extensive treatment, which cannot be fully provided in secondary medical centers.

In our study, the number of comorbidities, duration of hospitalization, and the number of consultative exams was proven to be significantly correlated with patients' referral to the tertiary medical center. More than half of the patients had comorbidities (51.9%), cardiovascular diseases and diabetes being the most frequent ones. One or more comorbidities were detected in 21.5% of the patients. Chronic diseases like chronic obstructive pulmonary disease, asthma, cancer, chronic heart failure, liver disease are significantly more frequent in patients who visit the emergency department [14]. There are reports suggesting that infection or trauma could worsen chronic illnesses such as

chronic heart disease and chronic obstructive pulmonary disease. These patients are at a greater risk of developing infectious complications and be admitted to hospital care settings [15, 16, 17]. In our study, complications of oropharyngeal infections and neck phlegmons were frequent indications for hospitalization and surgical treatment. Head and neck phlegmons are accompanied by an endogenous intoxication that leads to homeostasis disturbance and vital organs' disorder. In these patients, concomitant pathologies such as cardiovascular insufficiency, diabetes, hepatic and kidney disease significantly influenced the course of the infection and the progression of the disease [18]. Frequent comorbidities in patients result in multidisciplinary approach to a patient's treatment and higher hospitalization rate. The percentage of physician consultations for emergency department patients varies 20–40% [19, 20]. In our study, the number of patients who underwent one or more consultative exams was 247 (57.7%) and was significantly higher compared to the literature data. Complex patients require more consultative examinations and diagnostic procedures, especially if surgical treatment is considered. Higher number of consultative exams was significantly correlated with referrals to a tertiary medical center.

Limitations of the study are those that the data were obtained retrospectively from only one secondary medical center. Multi-centric studies are required to obtain data from other secondary medical centers. The need for precise diagnostic and treatment protocols and their implementation is apparent, in order to define required diagnostics, possible treatment options, and terms of referrals to tertiary centers.

## CONCLUSION

The data from this study concluded that otorhinolaryngology inflammatory/infectious diseases are the most frequent indication for urgent hospital admission to a secondary medical center. Most of the patients were treated conservatively. Referral to a tertiary medical center was significantly correlated to the number of comorbidities and consultative exams. Further research is needed to address any need and possible areas of improvement in emergency services in secondary medical centers and in patterns in treatment and referrals to tertiary medical centers.

**Conflict of interest:** None to declare.

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## Ургентна стања у оториноларингологији у секундарној здравственој установи

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### САЖЕТАК

**Увод/Циљ** Свакодневно се у лекарској пракси сусрећемо са хитним стањима из области оториноларингологије. Са порастом броја инфекција респираторног тракта и њихових компликација, као и повреда у саобраћају и индустрији, ургентна стања у оториноларингологији постају све чешћа на секундарном нивоу здравствене заштите.

Циљ рада је био испитати структуру и даљи третман свих хитних пријема обављених у поменутом периоду испитивања у односу на пол, старост, пријемну дијагнозу, обављену интервенцију и третман, упућивање у установу терцијарног ранга, коморбидитете, обављену допунску дијагностику и консултативне прегледе из осталих специјалистичких области.

**Метод** Ретроспективна студија је обухватила све болеснике који су као хитни случајеви хоспитализовани на Одељењу за оториноларингологију и максилотоцијалну хирургију Опште болнице Зрењанин у двогодишњем периоду. Подаци су добијени анализом медицинских историја болесника и адекватном статистичком обрадом.

**Резултати** Студија је обухватила 245 (57,2%) болесника мушког пола и 183 (42,8%) женског пола просечне старости 48,5 година. Најчешћа пријемна дијагноза је била тонзилофарингитис и његове компликације, потом траума главе и врата. У 72% случајева спроведена је медикаментозна терапија, док је у 28% спроведена хируршка интервенција. У установе терцијарног нивоа упућено је 27 (6,3%) болесника, што је највише зависило од броја коморбидитета и спроведених консултативних прегледа.

**Закључак** Инфекције и инфламације су најчешће индикације за хитну хоспитализацију у оториноларингологији на секундарном нивоу здравствене заштите. Већина болесника је лечена конзервативно, а упућивање у терцијарну здравствену установу је значајно зависило од броја коморбидитета, броја консултативних прегледа и дужине хоспитализације.

**Кључне речи:** хитни приједи; оториноларингологија; секундарна здравствена установа