



Geriatric otorhinolaryngology: reasons for outpatient referrals from generalists to ENT specialists

Clara Serdoura Alves¹ · Mariline Santos¹ · Afonso Castro¹ · João Lino¹ · Susana Vaz Freitas^{1,2,3} · Cecília Almeida e Sousa¹ · Álvaro Moreira da Silva¹

Received: 16 October 2021 / Accepted: 25 November 2021

© The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2022

Abstract

Purpose To determine the main symptoms leading to referral of geriatric patients from primary care to otorhinolaryngology.

Methods Retrospective, observational study performed on patients aged 65 and older, referred from Primary Care to the Otorhinolaryngology and Head and Neck Surgery department of a tertiary centre during 2019 and 2020. Symptoms leading to otorhinolaryngological referral were categorized as “Oto-neurological symptoms”, “Nasal symptoms”, “Pharyngolaryngeal symptoms”, “Other Head and Neck symptoms” and “Other Reasons”. Data regarding age, gender and whether patients maintain follow-up or have been discharged was also collected.

Results The study population included a total of 1304 patients (697 female; 607 male). Oto-neurological symptoms were found to be the most prevalent symptoms, with 65% of patients reporting oto-neurological symptoms as at least one of the reasons for referral. Hearing loss was the most commonly reported symptom, with an association found between this symptom and age ($p < 0.001$). Results also showed an association between the female gender and vertigo/dizziness ($p < 0.001$) and tinnitus ($p = 0.007$). An association between the male gender and nasal symptoms was also found ($p = 0.018$), particularly nasal obstruction ($p = 0.003$) and epistaxis ($p = 0.028$). No statistically significant associations were found among the pharyngolaryngeal group.

Conclusions This retrospective observational study allowed for a better understanding of the type of otorhinolaryngological symptoms affecting elderly patients and driving otorhinolaryngology evaluation, cementing hearing loss as one of the major complaints among older adults and allowing for a better preparation by otorhinolaryngologists for the changing needs of this subset of the population.

Keywords Elderly · Aging · Geriatric otorhinolaryngology · Hearing loss

Introduction

Aging is a natural and complex process that affects a wide number of organic systems, including the ear, nose and throat, and their respective functions [1, 2].

During the past decades, the optimization of health care services and subsequent increase in life expectancy, as well as a decrease in fertility, have reflected themselves in a shift of the world’s demographics [2]. From 2010 to 2015, the world’s older adults’ population, defined as people aged 65 and older, increased from 524 to 608 million, with the number increasing by over 12 million people from 2005 to 2015 in the United States [3].

This same trend can be observed in Portugal. According to the *Instituto Nacional de Estatística*, the number of older adults increased by 175 thousand from 2014 to 2019, continuing the trend of the country’s demographic aging, with older adults now representing 22.1% of the population [4].

This changing demographic landscape will inevitably reflect itself in an increasing number of elderly patients seeking medical and surgical services [3], creating new and

✉ Clara Serdoura Alves
clara.serdoura@gmail.com

¹ Centro Hospitalar Universitário do Porto, Instituto de Ciências Biomédicas Abel Salazar, Universidade do Porto, Largo Professor Abel Salazar, 4100-099 Porto, Portugal

² Faculdade de Ciências da Saúde, Universidade Fernando Pessoa, Porto, Portugal

³ LIAAD, Laboratório de Inteligência Artificial e Apoio à Decisão, INESC TEC, Porto, Portugal

unique challenges to practicing physicians [2]. Older adults are not only physiologically different from their younger counterparts, but their treatment goals also vary, with preservation of functional abilities, autonomy and high quality of life as top priorities [5].

Otorhinolaryngology specialists are no exception to the rapid increase of elderly patients seeking their care [6]. As aging progresses, several sensory functions become increasingly impaired, with hearing loss and balance disturbances greatly impacting the day-to-day life of geriatric patients [2]. Similarly, a decline in voice quality affects communication ability and predisposes older adults to social withdrawal and introversion [7]. Rhinitis and Sinusitis are also common conditions affecting the elderly population, sometimes resulting in poor sleep quality, decreased productivity and depression [8].

All these, sometimes subtle, changes greatly impact the quality of life of the elderly, leading to an ever-growing number of geriatric patients seeking otorhinolaryngology specialists and, apart from pediatric subspecialists, most otorhinolaryngologists will inevitably manage older adults daily [6]. To better prepare for this influx of geriatric patients, it is important to recognize what drives older patients to seek otorhinolaryngological care and, although studies have been performed focusing on a providers' perspective and on the determination of the main otorhinolaryngological diagnosis among older patients, there's still no information regarding the patients' perspective and the symptoms leading to otorhinolaryngological referral.

The aim of this study is, therefore, to determine the main symptoms leading to the referral of geriatric patients from primary care to otorhinolaryngology. Not only may this allow for a better preparation and education of specialists to the profound differences in disease processes, personal goals and therapeutic choices for elderly patients, compared to younger adults, but it may also allow otorhinolaryngologists to provide optimal care to this growing portion of the population [6, 9].

Materials and methods

The present study was approved by the local ethical committee and patients' rights were protected in compliance with the ethical principles of the Declaration of Helsinki.

A total of 1304 patients aged 65 and older referred from Primary Care to the Otorhinolaryngology and Head and Neck Surgery department of a tertiary centre during 2019 and 2020 were enrolled in this retrospective observational study. Information regarding the symptoms leading to the request of otorhinolaryngological evaluation was collected from the referral file, as well as demographic data, such as age and gender. The symptoms leading to

otorhinolaryngological referral were categorized as "Oto-neurological symptoms", "Nasal symptoms", "Pharyngolaryngeal symptoms", "Other Head and Neck symptoms" and "Other Reasons". All symptoms cited by patients were considered equally significant, with some patients, therefore, being included in more than one symptomatic group. The patients' hospital records were also used to gather information on whether patients have since been discharged or maintain otorhinolaryngological follow-up.

Statistical analysis was performed using the SPSS version 24 software (IBM Corp., Armonk, NY), and *p* values below 0.05 were considered statistically significant. A descriptive analysis of patients' characteristics was performed considering frequencies (for categorical variables) and mean and standard deviation (SD) (for continuous variables). Normal distribution was assessed using the Shapiro-Wilks test and through analysis of the skewness and kurtosis. Differences among paired groups were evaluated with the use of chi-square test (for categorical variables) and independent sample *t* test or Mann-Whitney test (for continuous variables).

Results

Study population

During 2019 and 2020, a total of 10,266 referrals from Primary Care to the Otorhinolaryngology and Head and Neck Surgery department of a tertiary centre were placed, with 20% (*n* = 2084) regarding patients aged 65 and older. Of these referrals, 37% (*n* = 780) of patients were not evaluated by the specialty, with 75.2% (*n* = 587) of these patients referred back to primary care because of the need of complementary exams before otorhinolaryngology observation, 16.7% (*n* = 130) missed their appointment, 4.2% (*n* = 33) were already under otorhinolaryngology evaluation, 3.5% (*n* = 27) quit their appointment and 0.2% (*n* = 2) died before their appointment.

A total of 1304 patients was included in this study, of which 53% (*n* = 697) were female and 47% (*n* = 607) were male, with a mean age of 73.35 (SD = 6.42) and with ages ranging from 65 to 101 (Table 1). Of the 1304 patients included, 824 were referred during 2019 and 341 during 2020, with the highest number of referrals (*n* = 219)

Table 1 Study population

	Number of patients	Mean age
Female	697 (53%)	73.49 ± 6.68
Male	607 (47%)	73.18 ± 6.12
Total	1304 (100%)	73.35 ± 6.42

Table 2 Number of patients per symptom group

	Oto-neurological symptoms	Nasal symptoms	Pharyngolaryngeal symptoms	Other head and neck symptoms	Other
Oto-neurological symptoms	852	20	25	2	0
Nasal symptoms	–	167	36	3	2
Pharyngolaryngeal symptoms	–	–	342	5	0
Other head and neck symptoms	–	–	–	13	0
Other	–	–	–	–	19

Table 3 Percentage of referrals per symptom group and per year

	Oto-neurological symptoms	Nasal symptoms	Pharyngolaryngeal symptoms	Other head and neck symptoms	Other
2019	68%	11%	25%	1%	2%
2020	86%	23%	40%	2%	1%

happening during the third quarter of 2019 and the lowest number ($n = 76$) happening during the second quarter of 2020.

Oto-neurologic symptoms were cited the most as a cause of referral (65%, $n = 852$), followed by pharyngolaryngeal symptoms (17%, $n = 220$) and nasal symptoms (13%, $n = 167$) (Table 2). This order was observed for both 2019 and 2020, with 68% ($n = 560$) and 86% ($n = 292$) of referrals citing at least one oto-neurological symptom, 25% ($n = 206$) and 40% ($n = 137$) at least one pharyngolaryngeal symptom, and 11% ($n = 90$) and 22% ($n = 77$) at least one nasal symptom, respectively (Table 3).

After otorhinolaryngology evaluation, 65.8% ($n = 858$) of patients were discharged, with 32.9% ($n = 429$) maintaining Otolaryngological follow-up. 1.2% ($n = 15$) of patients died before their follow-up evaluation and 0.2% ($n = 2$) patients quit follow-up appointments.

Oto-neurological symptoms

All neurologic and ear related symptoms were included in this group (Table 4). A total of 852 patients presented with oto-neurological symptoms, of which 56% ($n = 474$) were female and 44% were male ($n = 378$), with a mean age of 73.82 (SD = 0.23) (Table 5).

Hearing Loss was the most cited symptom (69%, $n = 590$), followed by Tinnitus (36%, $n = 304$) and Vertigo/Dizziness (25%, $n = 213$) (Table 4), with hearing loss being more frequent in older patients ($p < 0.001$), and vertigo ($p < 0.001$) and tinnitus ($p = 0.007$) being more frequent in women. Hearing loss was also the most cited symptom overall, with 45% of all 1304 patients citing hearing loss as at least one of the reasons of referral (Table 4). Other

Table 4 Oto-neurological symptoms and respective frequency among symptom group and among all patients

	Patients n (% among oto-neurological symptoms)	% among all patients
Hearing loss	592 (69%)	45%
Tinnitus	304 (36%)	23%
Vertigo	213 (25%)	16%
OTalgia	30 (4%)	2%
Ear fullness	28 (3%)	2%
Ear discharge	25 (3%)	2%
Cerumen	22 (3%)	2%
Ear pruritus	14 (2%)	1%
Otitis	12 (1%)	1%
Auricle lesion	2 (0%)	0%

oto-neurological symptoms, namely, otalgia, ear fullness, ear discharge, cerumen, ear pruritus, otitis and auricle lesion were each cited by less than 10% of patients (Table 4).

Pharyngolaryngeal symptoms

All symptoms related to the pharynx and larynx were included in this group (Table 6). A total of 342 patients reported pharyngolaryngeal symptoms, of which 50% were female ($n = 172$) and 50% were male ($n = 171$), with a mean age of 72.37 (SD = 0.31) (Table 5).

Dysphonia was cited the most (54%, $n = 183$), followed by globus pharyngeus (19%, $n = 66$), throat clearing (14%, $n = 48$) and dysphagia (12%, $n = 41$) (Table 6). No statistically significant differences were found between genders in this symptom group ($p = 0.153$). Odynophagy, cough, choking, roncopathy, pharyngitis and dyspnea were each found in less than 10% of patients (Table 6).

Nasal symptoms

All nose-related symptoms were included in this group (Table 7). A total of 167 patients presented with nasal symptoms, of which 55% ($n = 92$) were male and 45% (n

Table 5 Gender distribution of patients presenting with oto-neurological, nasal and pharyngolaryngeal symptoms and *p* value between gender and each symptom group; Mean age of patients presenting

Main complaint	Gender			Age	
	Male (<i>n</i>)	Female (<i>n</i>)	<i>p</i>	Mean ± SD	<i>p</i>
Oto-neurological symptoms (<i>n</i> = 852)	378	474	0.03 ^a	73.82 ± 0.23	< 0.001 ^b
Pharyngolaryngeal symptoms (<i>n</i> = 343)	171	172	0.153 ^a	72.37 ± 0.31	0.004 ^b
Nasal symptoms (<i>n</i> = 167)	92	75	0.018 ^a	72.45 ± 0.46	0.067 ^b

^aChi-Square test^bMann–Whitney test**Table 6** Pharyngolaryngeal symptoms and respective frequency among symptom group and among all patients

	Patients <i>n</i> (% among pharyngolaryngeal symptoms)	% among all patients
Dysphonia	184 (54%)	14%
Globus pharyngeus	66 (19%)	5%
Throat clearing	48 (14%)	4%
Dysphagia	41 (12%)	3%
Odynophagy	30 (9%)	2%
Cough	28 (8%)	2%
Choking	19 (6%)	1%
Roncopathy	11 (3%)	1%
Pharyngitis	3 (1%)	0%
Dyspnea	1 (0%)	0%

Table 7 Nasal symptoms and respective frequency among symptom group and among all patients

	Patients <i>n</i> (% among nasal symptoms)	% among all patients
Nasal obstruction	94 (56%)	7%
Rhinorrhea	64 (38%)	5%
Epistaxis	32 (19%)	2%
Headache	29 (17%)	2%
Anosmia/hyposmia	12 (7%)	1%
Nasal polyposis	4 (2%)	0%
Dry Nose	1 (1%)	0%

= 75) were female, with a mean age of 72.45 (SD = 0.46) (Table 5).

Nasal obstruction was the most common nasal symptom (56%, *n* = 93), followed by rhinorrhea (38%, *n* = 64), epistaxis (19%, *n* = 32) and headache (17%, *n* = 29) (Table 7), with nasal symptoms being more common among male patients (*p* = 0.018) (Table 5), particularly nasal obstruction (*p* = 0.003) and epistaxis (*p* = 0.028).

with oto-neurological, nasal and pharyngolaryngeal symptoms and *p* value between age and each symptom group

Table 8 Other head and neck symptoms

	Patients <i>n</i>
Dysgeusia	3
Oral cavity hemorrhage	3
Xerostomia	3
Sialorrhea	2
Peripheral face palsy	1
Cervical swelling	1

Anosmia/Hyposmia, nasal polyposis and nose dryness were each cited by less than 10% of patients (Table 7).

Other head and neck symptoms

Symptoms non attributable to the ear, nose, pharynx or larynx were included in this group (Table 8), with 13 patients complaining of symptoms falling in this category, of which 77% (*n* = 10) were female and 23% (*n* = 3) were male, with a mean age of 75.31 (SD= 0.35). Dysgeusia (23%, *n* = 3), oral cavity hemorrhage (23%, *n* = 3) and xerostomia (23%, *n* = 3) were the main cited symptoms among this group, followed by sialorrhea (15%, *n* = 2), peripheral face palsy (8%, *n* = 1) and cervical swelling (8%, *n* = 1).

Other causes

People referred for causes other than symptoms were included in this group. From a total of 19 patients, 63% (*n* = 12) were referred because of findings in exams performed for non-otorhinolaryngological reasons, 21% (*n* = 4) because of a need for an otorhinolaryngologic report, 5% (*n* = 1) for evaluation of an external recommendation of otorhinolaryngological surgical intervention, 5% (*n* = 1) because of local tracheostomy alterations and 5% (*n* = 1) for loss of previous otorhinolaryngological follow-up.

Discussion

During the past decades, declining birth rates and increasing life expectancies have led to a marked increase of the world's older adults' population, with the geriatric age group now being the fastest growing segment of our society [5, 9].

These shifting demographics will inevitably increase health care demands, having a profound impact on medical and surgical specialties, with otorhinolaryngology being no exception [2, 9]. Even though the increase in geriatric patients is widely recognized, there is still limited information on what leads elderly patients to seek otorhinolaryngological care [10, 11]. To this end, the primary goal of our study was to identify the main symptoms leading to otorhinolaryngology referral of elderly patients.

Oto-neurological symptoms were found to be the most common symptoms among patients referred for otorhinolaryngology evaluation, with pharyngolaryngeal and nasal symptoms following.

This referral pattern was observed in both years from which data was collected, with 68% and 86% of patients citing at least one oto-neurological symptom among the causes for referral in 2019 and 2020, respectively. Although it would be of interest to extend data collection to other years, these findings consolidate oto-neurological symptoms as the main otorhinolaryngological complaint among older patients.

Among oto-neurological symptoms, hearing loss was found to be the main symptom driving otorhinolaryngological referral, with this also being true overall. Among senses impaired by aging, hearing is the most commonly affected [12] and it represents the fifth most prevalent chronic condition among Portuguese elders [13], with rates of this symptom increasing with age [14], with the association between age and hearing loss corroborated by this study. These findings, paired with the great impact this symptom has in the quality of life of the elderly, and the association with depression and cognitive decline [12, 14], enhance the importance of better understanding the management of patients complaining of hearing loss by otorhinolaryngology specialists, minimizing the stigma associated with hearing aids and promoting the patients' adherence to hearing rehabilitation.

Vertigo/Dizziness were the second most cited symptom by elderly patients with oto-neurological symptoms. Vertigo and dizziness are closely related to fall risk and disability in the elderly, with rates increasing with age [15, 16] and with 73% of Portuguese elders reporting a fall [13]. Vertigo and dizziness are more common in women [16], something also observed among older patients in this study. Considering that an older patient presents to the

emergency room every 11 s for a fall and that an older patient dies every 19 min because of a fall [15], a correct assessment and differential diagnosis of this symptoms gains increased importance when evaluating older patients, aiming to diminish fall risk as much as possible. This is particularly important when considering the insufficient attention given to fall prevention in Portugal and the direct affects this has on hospitalization and incapacity costs [13].

The prevalence of bothersome tinnitus increases with age until the age of 70 years, with studies showing both an increase and decrease afterward [14]. Prevalence in men and women is similar [17], although a statistically significant relation between the female gender and tinnitus was found in this study.

Between all pharyngolaryngeal symptoms, dysphonia was the most common symptom reported. Prevalence of dysphonia in the elderly ranges between 12 and 47% [7], with 14% of all geriatric patients in this study reporting dysphonia. With aging, loss of muscle mass and changes in the makeup of vocal cords result in impaired fonation [7, 18]. Although voice changes are still associated with social withdrawal, anxiety and depression, growing evidence shows that the negative impact of dysphonia can be inhibited and improved [7, 18], highlighting the importance of educating otolaryngologists on treatment options for elderly patients presenting with dysphonia.

Globus pharyngeus was the second most cited pharyngolaryngeal symptom. This symptom seems to be equally prevalent among men and women [19], as found in this study, representing about 4% of all new referrals to otolaryngology [19], with this symptom being reported by 5% of elderly patients in this study.

Rhinitis and sinusitis, two conditions frequently associated, represent some of the most common medical conditions among the elderly, with sinusitis being the sixth most common chronic condition among this group [8, 20].

Apart from epistaxis, the nasal symptom group was mainly constituted of symptoms typically associated with sinusitis and rhinosinusitis. Nasal obstruction was the most cited symptom, with an association being found between the symptom and the male gender, an association already described among patients with chronic rhinosinusitis [21]. Considering the prevalence of sinusitis among the elderly, the symptoms cited by older patients in this study and, being referred from primary care, the likeliness of symptoms to have a longer duration, it can be hypothesized that chronic rhinosinusitis would be a common diagnosis upon otorhinolaryngological evaluation. This could, eventually, also explain the association found between the male gender and nasal symptoms in this group: chronic rhinosinusitis can be divided into chronic rhinosinusitis with nasal polyps (CRSwNP) and chronic rhinosinusitis without nasal polyps

(CRSsNP), with the former being more frequent among elderly and male patients [21, 22]. Previous studies found CRSwNP to be associated with a higher disease severity [22], so it is possible that patients with CRSwNP are more symptomatic and thus referred the most for otorhinolaryngological evaluation. This could potentially explain the association between nasal symptoms and the male gender, although further studies would be needed to further clarify this relation.

Epistaxis is a frequently encountered condition by otorhinolaryngologists, with its prevalence peaking during the sixth decade of life, in patients aged 70 and older [23–25]. It is also more common among male patients [25], something also observed in this study. Cardiovascular comorbidities and the use of medications altering coagulation have been found to be associated with epistaxis occurrence [26], with these factors also being potential explanations for the relation between the male gender and epistaxis, as men present a higher cardiovascular risk, higher number of cardiovascular events and higher usage of secondary prevention treatments [27].

Something of note in this article was the drop in the number of referrals between 2019 and 2020, with the latter presenting less than half the number of referrals from 2019. This can potentially be attributed to the COVID-19 pandemic, and it would be of importance to determine the impact the pandemic had on otorhinolaryngology referrals, for how long this impact was felt and the effect this had on elderly patients' health.

Also worth noting is that most elderly patients referred for otorhinolaryngological evaluation have since been discharged. This could potentially indicate that most diagnosis done after otorhinolaryngological evaluation are manageable by primary care physicians and thus did not require long term otorhinolaryngological follow-up.

There are some limitations to the present study. First, this is a retrospective observational study, being more susceptible to confounding factors and misclassification bias. Second, it would be of interest to compare this study findings to those in younger populations, eventually cementing differences between younger and elderly patients. Second, all symptoms reported by patients were considered equally relevant and it would be of importance in future studies to stratify different symptoms according to their impact in the quality of life of elderly patients. Finally, the aforementioned symptoms groups were based on symptoms as reported by elderly patients, something that results on the groups having a broad nature, particularly the pharyngolaryngeal group. It might be of interest for future studies to further divide the symptoms groups and create different symptoms groups from the ones mentioned in this study.

Nevertheless, to the best of our knowledge, the present study is the first to assess otorhinolaryngology referrals

of elderly patients based on symptomatic complaints and not diagnosis, as done in previous studies, focusing on a patients' perspective instead of a providers' perspective. This allows for a better understanding of the type of symptoms, opposed to diagnosis, that drive older patients to seek otorhinolaryngological care. This might be useful in guiding otorhinolaryngologists to better prepare for evaluation of elderly patients, keeping an open mind to all differential diagnosis that each symptom implies.

In the future, we aim to determine the main diagnosis obtained after otorhinolaryngological evaluation, relating them to the symptoms first presented by patients.

Conclusions

Older adults represent a growing subset of patients encountered by otorhinolaryngologists. This retrospective observational study allowed for a better understanding of the type of otorhinolaryngological symptoms affecting elderly patients and driving specialist evaluation, cementing hearing loss as one of the major complaints among older adults, possibly allowing for a better preparation by otorhinolaryngologists for the changing needs of this subset of the population.

Funding The authors declare that they have no financial disclosure to declare.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

References

- Colloca G, Di Capua B, Bellieni A et al (2020) Biological and functional biomarkers of aging: definition, characteristics, and how they can impact everyday cancer treatment. *Curr Oncol Rep* 22(11):115. <https://doi.org/10.1007/s11912-020-00977-w>
- Mirza N, Lee JY (2018) Geriatric Otolaryngology. *Otolaryngol Clin N Am* 51(4):xvii–xviii. <https://doi.org/10.1016/j.otc.2018.04.002>
- Chiu BL, Pinto JM (2018) Aging in the United States: opportunities and challenges for otolaryngology-head and neck surgery. *Otolaryngol Clin N Am* 51(4):697–704. <https://doi.org/10.1016/j.otc.2018.03.001>

4. INE (2020) Estatísticas demográficas 2019. INE, Instituto Nacional de Estatística, Lisboa
5. Kost KM, Parham K (2017) Introducing the geriatric otolaryngology clinic. *Ear Nose Throat J* 96(1):10–14. <https://doi.org/10.1177/014556131709600108>
6. Eibling D, Kost K (2018) The emerging field of geriatric otolaryngology. *Otolaryngol Clin N Am* 51(4):847–852. <https://doi.org/10.1016/j.otc.2018.03.011>
7. Rapoport SK, Menier J, Grant N (2018) voice changes in the elderly. *Otolaryngol Clin North Am* 51(4):759–768. <https://doi.org/10.1016/j.otc.2018.03.012>
8. Hsu DW, Suh JD (2018) Rhinitis and sinusitis in the geriatric population. *Otolaryngol Clin North Am* 51(4):803–813. <https://doi.org/10.1016/j.otc.2018.03.008>
9. Kost KM (2018) Geriatric otolaryngology: why it matters. *Clin Geriatr Med* 34(2):ix–x. <https://doi.org/10.1016/j.cger.2018.02.001>
10. Creighton FX Jr, Poliashenko SM, Statham MM et al (2013) The growing geriatric otolaryngology patient population: a study of 131,700 new patient encounters. *Laryngoscope* 123(1):97–102. <https://doi.org/10.1002/lary.23476>
11. Özler GS, Yengil E (2016) Why do geriatric patients visit otorhinolaryngology? *Ear Nose Throat J* 95(6):224–229
12. Patel R, McKinnon BJ (2018) Hearing loss in the elderly. *Clin Geriatr Med* 34(2):163–174. <https://doi.org/10.1016/j.cger.2018.01.001>
13. Oliveira A, Nossa P, Mota-Pinto A (2019) Assessing functional capacity and factors determining functional decline in the elderly: a cross-sectional study. *Acta Med Port* 32(10):654–660. <https://doi.org/10.20344/amp.11974>
14. Vaisbuch Y, Santa Maria PL (2018) Age-related hearing loss: innovations in hearing augmentation. *Otolaryngol Clin North Am* 51(4):705–723. <https://doi.org/10.1016/j.otc.2018.03.002>
15. Alyono JC (2018) Vertigo and dizziness: understanding and managing fall risk. *Otolaryngol Clin North Am* 51(4):725–740. <https://doi.org/10.1016/j.otc.2018.03.003>
16. Neuhauser HK (2016) The epidemiology of dizziness and vertigo. *Handb Clin Neurol* 137:67–82. <https://doi.org/10.1016/B978-0-444-63437-5.00005-4>
17. Baguley D, McFerran D, Hall D (2013) Tinnitus. *Lancet* 382(9904):1600–1607. [https://doi.org/10.1016/S0140-6736\(13\)60142-7](https://doi.org/10.1016/S0140-6736(13)60142-7)
18. Santos M, Freitas SV, Dias D et al (2021) Presbylarynx: does body muscle mass correlate with vocal atrophy? A Prospective Case Control Study *Laryngoscope* 131(1):E226–E230. <https://doi.org/10.1002/lary.28685>
19. Järvenpää P, Arkkila P, Aaltonen LM (2018) Globus pharyngeus: a review of etiology, diagnostics, and treatment. *Eur Arch Otorhinolaryngol* 275(8):1945–1953. <https://doi.org/10.1007/s00405-018-5041-1>
20. DelGaudio JM, Panella NJ (2016) Presbynasalis. *Int Forum Allergy Rhinol*. 6(10):1083–1087. <https://doi.org/10.1002/alr.21787>
21. Busaba NY, Sin HJ, Salman SD (2008) Impact of gender on clinical presentation of chronic rhinosinusitis with and without polyposis. *J Laryngol Otol* 122(11):1180–1184. <https://doi.org/10.1017/S0022215107001302>
22. Fokkens WJ, Lund VJ, Hopkins C et al (2020) European position paper on rhinosinusitis and nasal polyps 2020. *Rhinology* 58(Suppl S29):1–464. <https://doi.org/10.4193/Rhin20.600>
23. Benjamin MR, Stevens WW, Li N et al (2019) Clinical characteristics of patients with chronic rhinosinusitis without nasal polyps in an academic setting. *J Allergy Clin Immunol Pract* 7(3):1010–1016. <https://doi.org/10.1016/j.jaip.2018.10.014>
24. Krulewicz NA, Fix ML (2019) Epistaxis. *Emerg Med Clin N Am* 37(1):29–39. <https://doi.org/10.1016/j.emc.2018.09.005>
25. Sharma S, Qureshi S, Jadia S et al (2020) Epistaxis: revisited. *Indian J Otolaryngol Head Neck Surg* 72(4):480–483. <https://doi.org/10.1007/s12070-020-01930-w>
26. Côrte FC, Orfao T, Dias CC et al (2018) Risk factors for the occurrence of epistaxis: prospective study. *Auris Nasus Larynx* 45(3):471–475. <https://doi.org/10.1016/j.anl.2017.07.021>
27. Walli-Attai M, Joseph P, Rosengren A et al (2020) Variations between women and men in risk factors, treatments, cardiovascular disease incidence, and death in 27 high-income, middle-income, and low-income countries (PURE): a prospective cohort study. *Lancet* 396(10244):97–109. [https://doi.org/10.1016/S0140-6736\(20\)30543-2](https://doi.org/10.1016/S0140-6736(20)30543-2)

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.