Analysis of the characteristics of outpatient and emergency diseases in the department of otolaryngology during the “COVID-19” pandemic

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Abstract
The pandemic of “Corona Virus Disease 2019” (COVID-19) has changed the lives of people. There have been changes in common outpatient and emergency cases in otolaryngology, so an analysis of data pertaining to this was completed. This study is to evaluate the impact of viral infection disease in otolaryngological common disease. This study uses the data of common diseases in the outpatient and emergency department during the “COVID-19” pandemic (from February to April 2020) and the same period in the past 3 years from the Department of Otolaryngology. During the “COVID-19” period compared with the same period last year, the ranking of cases by diseases has changed. Diseases such as chronic pharyngitis, allergic rhinitis, sudden deafness, and tinnitus increased, meanwhile acute pharyngitis and acute laryngopharyngitis decreased (p < 0.05). The viral infection has impacted the mental behaviors of people, therefore mental-related disease cases of the department of Otolaryngology have increased indirectly. This study provides real data to illustrate mental-related diseases. It also provides experience and shows the importance of keeping and maintaining mental health.

Keywords
Acute disease, chronic disease, pandemics, COVID-19, otolaryngology

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Introduction

Corona Virus Disease 2019 (COVID-19) refers to pneumonia caused by the 2019-nCoV infection. On March 11, 2020, the World Health Organization considered the COVID-19 epidemic a global pandemic.

The global pandemic of COVID-19 not only endangers the overall health and lives of people but also seriously interrupts normal life. Both long-term and short-term effects cannot be ignored. Reviewing the data during the spread of the epidemic in China in 2020 from (the official website of the National Health Commission of the People’s Republic of China), the number of new cases increased significantly in February of that year. This reached its peak in early March, then declined in April. On May 1st, new confirmed cases were in the single digits every day. Shanghai, China comparatively had fewer cases of the virus. Nevertheless, it was still impacted by the epidemic. Otorhinolaryngologists found that the characteristics of outpatient and emergency diseases in the department of otorhinolaryngology also changed during the epidemic. Statistics were made on the data of outpatient and emergency patients from February to April 2020, based on a total number of patients, gender, age, and the number of cases of common diseases.

Comparing with the corresponding data of the same period in the previous years. This allows us to have a specific point of view to review the danger and harm brought by the pandemic. The results show that the virus itself will not only cause harm to the human body but also indirectly impact mental health and even increases the occurrence of mental health diseases. By providing real data related to mental and psychological health, this study shows the importance of maintaining mental and psychological health. It also provides some experiences for future epidemic prevention. It can also help to set up new medical methods suitable for some new situations.

Methods

Research objects and observation indicators

The data of outpatient and emergency patients in the Otolaryngology department of Shanghai Tongji Hospital from February to April in 2020 and the same period of 3 years prior to 2020 were used, including the total number of patients, gender, age, disease type, and the number of cases by disease.

Observation

1. Comparison of the top three diseases during the pandemic period: Analyze the top three diseases in outpatient and emergency departments from February to April 2020 and compare the differences in the past 3 years.
2. Comparison of the percentage (see lower spellings as well) of the seven diseases selected for this study is included: Analyzed the top 3 diseases
percentage in the outpatient and emergency department from February to April in 2020 and the mean percentage during the same period in the past 3 years. Besides the top 3 diseases, this study includes other diseases such as sudden deafness, tinnitus, chronic rhinitis, and epistaxis. It also shows percentage changes on these four diseases during the study period compared to the same period last 3 years.

3. Statistical analysis by gender and age of patients with seven diseases is included in this study.

Data analysis

The results were evaluated by using SPSS21.0. software program. Qualitative data were compared with groups using chi-square, significance level $\alpha = 0.05$. $P < 0.05$ indicates that the difference is statistically significant.

Our study was approved by the Ethics Committee of Shanghai Tongji Hospital and their Information Department. As our study only involves the number of outpatient patients, not specific cases and patients, there was no need to have patients consent signed.

Result

Comparison of the top three diseases during the study period

The top three diseases in the outpatient and emergency department from February to April 2020: Chronic pharyngitis, allergic rhinitis and acute laryngopharyngitis. While in the past 3 years the top one is always acute pharyngitis and laryngopharyngitis. In terms of case number ranking, there are significant changes in 2020 compared with the previous years. See Table 1 and Figure 1 for details.

Comparison of the percentage of the seven diseases to total patient numbers during the study period

The top 3 diseases (chronic pharyngitis, allergic rhinitis, acute laryngopharyngitis) and other 4 diseases (total 7) such as sudden deafness, tinnitus, chronic rhinitis, and epistaxis were analyzed from February to April 2020. The results show that, except epistaxis($p = 0.333$), the percentage of other six diseases has significant changes from the average percentage of the previous 3 years, See Table 2 and Figure 2 for details.

Comparison of the average age and gender of patients with seven diseases included in this study

There is no significant difference in gender (Table 3). Regarding age, except epistaxis and sudden deafness with no significant difference. The other five diseases have significant age differences (Table 4), but they are all in middle-aged and aged
Table 1. The top three diseases in outpatient and emergency department from February to April 2020 and compare with the past 3 years.

| Disease name                        | 2020 Proportion (%) | Rank | 2019 Proportion (%) | Rank | 2018 Proportion (%) | Rank | 2017 Proportion (%) | Rank | $\chi^2$  | $p$  |
|-------------------------------------|----------------------|------|----------------------|------|----------------------|------|----------------------|------|-----------|------|
| Chronic pharyngitis                | 771/5274 (14.62)     | 1    | 1006/14791 (6.8)     | 3    | 978/13986 (6.99)     | 2    | 969/14662 (6.61)     | 2    | 408.93    | 0.001|
| Allergic rhinitis                  | 644/5274 (12.21)     | 2    | 1020/14791 (8.11)    | 2    | 1075/13986 (7.67)    | 4    | 1224/14662 (8.35)    | 4    | 152.23    | <0.001|
| Acute pharyngitis, laryngitis      | 540/5274 (10.24)     | 3    | 2932/14791 (19.48)   | 1    | 2894/13986 (20.69)   | 1    | 2636/14662 (17.98)   | 1    | 303.35    | <0.001|
Therefore, we separated by age groups. Data shows there was no significant difference between 18 and 45 years age group, and the number of patients younger than 18 years old in 2020 decreased significantly compared with the previous 3 years. And age group from 45 to 75, patients increased significantly compared with the previous 3 years (Table 5).

**Discussion**

This “epidemic” has a huge psychological impact on people. The longer-lasting pandemic causes panic, anxiety,^{1,2} depression, and sleep disorder.

Our hospital is a municipal multi-function hospital, but during the COVID-19 period, the total number of cases has decreased significantly. This is due to the
temporary closure of outpatient clinics. Also, people tried to avoid risk exposure, so they cancelled or postponed hospital visits. The change in the number of cases for common diseases in the outpatient and emergency department of otolaryngology head and neck surgery also reflects the impact of viral infection diseases on human beings. This study takes data related to the seven common diseases in the ENT department during the “COVID-19 pandemic period from February to April 2020.” Detail is as follows:

(1) During the COVID-19 period, the largest number of cases is chronic pharyngitis (the largest number of cases in the same period in the past 3 years is acute laryngopharyngitis, $p = 0.001$):

During the COVID-19 period, the number of patients with “paresthesia pharynges” increased. “Paresthesia pharynges” must be diagnosed after investigation of other possible organic diseases. So, it is rarely diagnosed alone in clinical practice. Only after excluding diseases of adjacent organs such as thyroid and esophagus, it can be diagnosed as “chronic pharyngitis.” Data shows that during the COVID-19 period, the percentage of chronic pharyngitis has increased compared with the same period in previous years. We think “mental anxiety” has played an important role in it.

The pharyngeal nerves are extremely complicated. The sensory and motor nerves mainly come from the pharyngeal plexus of the posterior pharyngeal wall, containing branches with the vagus nerve, glossopharyngeal nerve, accessory nerve, and parasympathetic nerve. In addition, the second branch of the trigeminal nerve and

![Figure 2. Average proportion of outpatient and emergency departments in 2020 and the first 3 years.](image)
### Table 3. Comparison of the gender of seven diseases in 2020 and the previous 3 years.

| Male/Female | Chronic pharyngitis (%) | Allergic rhinitis (%) | Acute pharyngitis, laryngitis (%) | Chronic rhinitis (%) | Epistaxis (%) | Sudden deafness (%) | Tinnitus (%) |
|-------------|-------------------------|-----------------------|-----------------------------------|----------------------|---------------|---------------------|-------------|
| **The previous 3 years** | | | | | | | | |
| Male        | 372 (37.8)              | 536 (48.4)            | 1194 (42.3)                       | 315 (51.6)           | 372 (52.6)    | 73 (52.0)           | 157 (42.2)  |
| Female      | 612 (62.2)              | 572 (51.6)            | 1626 (57.7)                       | 296 (48.4)           | 334 (47.4)    | 67 (48.0)           | 215 (57.8)  |
| **2020**    | 319 (41.1)              | 312 (40.7)            | 218 (40.4)                        | 166 (52.7)           | 151 (54.9)    | 42 (57.5)           | 103 (40.7)  |
| Male        | 452 (58.6)              | 332 (59.3)            | 322 (59.6)                        | 149 (47.3)           | 124 (45.1)    | 31 (42.5)           | 150 (59.3)  |
| Female      | 612 (62.2)              | 572 (51.6)            | 1626 (57.7)                       | 296 (48.4)           | 334 (47.4)    | 67 (48.0)           | 215 (57.8)  |
| **p**       | 0.129                   | 0.977                 | 0.396                             | 0.741                | 0.532         | 0.454               | 0.710       |

### Table 4. Analysis of the average age of the first 3 years and the age of patients in 2020.

|                      | Chronic pharyngitis | Allergic rhinitis | Acute pharyngitis, laryngitis | Chronic rhinitis | Epistaxis | Sudden deafness | Tinnitus |
|----------------------|---------------------|-------------------|--------------------------------|------------------|-----------|-----------------|----------|
| **The past 3 years** | 53.16 ± 16.28       | 57.57 ± 22.32     | 49.99 ± 17.19                  | 49.29 ± 21.88    | 49.29 ± 23.00 | 58.75 ± 14.53 | 57.89 ± 15.63 |
| **2020**             | 52.28 ± 15.06       | 46.96 ± 19.79     | 50.86 ± 15.46                  | 53.16 ± 19.04    | 45.65 ± 22.90 | 58.00 ± 14.18 | 55.14 ± 17.60 |
| **t**                | 10.687              | 19.53             | 20.037                         | 18.15            | 0.494      | 0.190           | 10.678   |
| **p**                | 0.001               | 0.000             | 0.000                          | 0.000            | 0.482      | 0.663           | 0.001    |
the glossopharyngeal nerve are directly around the pharynx, so the pharynx is extremely sensitive. Mental factors can stimulate these nerve ends, which will transmit to the brain through the nerve center, causing paresthesia pharynges. In addition, pressure or anxiety can cause muscle tension paresthesia pharynges in the pharynx. Ding and Fang\(^3\) did a meta-analysis of the etiology of paresthesia pharynges and found out that non-organic diseases related diseases but caused by mental issues the percentage is up to 17.7% (10.6%–27.49%) of the etiology. Fear, anxiety, and other emotions can cause excessive autonomic nerve tension, glandular secretion disorders, also aggravate the pathological excitement of the cerebral cortex. The above situation and other factors can aggravate the abnormal sensation of the pharynx.

(2) The second top disease is allergic rhinitis. The percentage of allergic rhinitis cases (12.2%) was higher than that of the mean data of the same period past 3 years (7.6%), and the difference was significant ($p < 0.001$). This is quite unexpected. Although this does not mean that the number of new cases has increased, this indicates that allergic rhinitis has a greater impact on the daily life of people. Even with the infection danger of the epidemic, people will still take risks to come to the hospital for medical treatment. Some studies have found similar results as ours. For example, the necessary lockdown ordered by the Italian government had negatively impacted patients with dust mite allergy history. SNOT-22 scores after COVID-19 lockdown were higher than the previous year.\(^4\) One of the possible explanations was that due to a longer time stayed at home, it increased contact with allergens such as dust mites. In addition, we think the mental factors played a big role in this.

Since the 1950s and 1960s, people have begun to study the relationship between allergic diseases and mental conditions. Allergic diseases are considered psychosomatic diseases.\(^5\) A large number of relevant studies have also confirmed that AR patients have a higher rate of concurrent anxiety, depression or sleep disorders than general patients, and anxiety and depression are the mental diseases most closely related to allergic diseases.\(^7\)
Wright et al.\textsuperscript{9} found that psychological stress can disrupt and destroy the signaling pathways related to allergic inflammation. And they believe that the imbalance of Th1/Th2 cell differentiation is the main cause of allergic diseases caused by psychological stress. The study by Kiecolt-Glaser et al.\textsuperscript{10} also suggests that stress and anxiety can strengthen the symptoms of allergic rhinitis and can prolong the duration of these symptoms. Children and adolescents with mental and psychological problems may be more likely to suffer from allergic diseases than those without these problems.\textsuperscript{11} Kimata\textsuperscript{12} also concluded that anxiety and agitation can promote allergic diseases and aggravate their symptoms. Regarding the mechanism of mental factors causing or strengthening allergic rhinitis, there are mainly the following aspects:\textsuperscript{13} Anxiety and tension cause disorders of the body’s neuroimmune system, which makes Th2-type immune response dominate and aggravates allergic inflammation;\textsuperscript{13} When the human body is under chronic stress for a long time, the hypothalamus-pituitary, adrenal axis, and sympathetic nervous system release glucocorticoids, and catecholamines, which directly inhibit many immune cells, and ultimately strengthen the symptoms of allergic rhinitis;\textsuperscript{13} Substance P is released in a large amount under stress and tension, which promotes and aggravates the inflammatory response of allergic rhinitis.\textsuperscript{14} Psychological factors may not directly lead to the occurrence of allergic diseases, but the neuroendocrine and immune dysfunction caused by this can increase the risk of disease in susceptible individuals. There is a consensus\textsuperscript{15} Clinicians pay more attention to mental and psychological problems of patients and give appropriate interventions will be a new trend in the treatment of allergic rhinitis in the future.

(3) Acute pharyngitis and acute laryngopharyngitis although the number of cases of acute pharyngitis and laryngitis ranked third from February to April 2020, the absolute number of cases decreased compared with the same period in previous years, and the difference was statistically significant.

In the same period in previous years, the number of patients with acute laryngopharyngitis was the highest, which is coherent as spring is the high season for upper respiratory tract infection diseases. However, the absolute number of cases in 2020 has declined. This shows that wearing a mask is an effective way to protect the viral infection of the upper respiratory tract; meanwhile, some patients with severe conditions and fever may bypass the clinic for fever treatment, while patients with mild conditions heal themselves at home without visiting a doctor.

(4) Tinnitus, sudden deafness: this study found that the number of patients with acute tinnitus and sudden deafness increased compared with the same period in previous years. It is possible that “COVID-19” makes people nervous, angry, and even in panicky, so these factors may cause tinnitus or sudden deafness for people with or without vascular disease.
Although the mechanism of tinnitus is not yet clear, mental, and psychological impact is considered one of the possible causes as well as anxiety and pressure are also considered causes of tinnitus. Patients with tinnitus often have different mental issues including inattention, anxiety, depression, and sleep disorders.\textsuperscript{16} The “COVID-19 pandemic” increases panic for people suffering already from anxiety and other mental issues. All these conditions may cause tinnitus. For patients having an existing condition of tinnitus, anxiety will aggravate their condition resulting in more visits of tinnitus than in previous years.

A major cause of sudden deafness is stress and pressure. As early as 1981, Dohse et al.\textsuperscript{17} discovered that patients having sudden deafness were in poor psychological and emotional stability. In 2009, cases of sudden psychogenic deafness related to mental conditions were reported.\textsuperscript{18} Contrera et al.\textsuperscript{19} found out that sudden deafness with moderate or severe conditions is related to the mood of elderly people and these patients also had different conditions of “Somatosensory impairment.” Long-term anxiety, depression and other mental issues may cause the autonomic nervous system to release more neurotransmitters such as norepinephrine and serotonin that lead to vasoconstriction, platelet activation, and blood viscosity increasing. These reactions will cause microthrombosis and changes of physiological state, resulting in the inner ear microcirculation disorder, leading to sudden deafness by degeneration of the organ of Corti due to hypoxia.\textsuperscript{20,21} Regarding all the cases in this study, the patients were not infected by COVID-19, but related research was reported\textsuperscript{22–27} with sudden deafness caused by COVID-19. The virus can directly infect the auditory center, cochlea, and auditory nerve. It can also indirectly trigger to release of cytokines, resulting in hearing loss.

One of the interesting points was that some studies found that the occurrence of sudden deafness is lower than before,\textsuperscript{28} and the author thinks it is difficult to explain the situation. We think that people may be worried about getting infected by COVID-19 during their visits to hospitals. The hearing loss in one ear does not have a huge lifelong impact, and the diagnosis of sudden deafness must rely on audiological examination. Telephone consultations or telemedicine cannot result in an accurate audiometry.

In addition, there is no difference in the number of cases of “epistaxis” compared with the same period, which indicates that illness of acute bleeding disease is relatively stable, and the epidemic has not impacted patients’ visits. The percentage of “chronic rhinitis” has decreased compared with the same period in previous years, and the difference is statistically significant, which indicates that the epidemic has affected patients’ behaviors. Patients will not visit the doctor if they can still endure their condition.

Finally, we conducted a statistical analysis on the gender and age of the patients included in this study, and there was no significant difference in gender; but after analysis of age range, we discover that there was no significant difference in patients between 18 and 45 years old in the past 4 years, which indicates that these seven diseases are common among young and middle-aged people. In 2020, the number of patients younger than 18 years old decreased compared with the previous 3 years,
and the number of patients aged 45–75 increased. With the significant difference, we believe that children and teenagers have fewer cases of acute upper respiratory tract infections due to the temporary closure of schools during the epidemic. Also, there are fewer mental issues related to children and teenagers, so the number of cases has decreased compared with previous years. Middle-aged and elderly people have more mental-related issues, which causes an increase in the number of medical visits during the epidemic.

This study focuses on the number of cases of common diseases that changed during the pandemic in outpatient and emergency departments of otorhinolaryngology. It also briefly discusses some of the anti-epidemic experiences as otolaryngologists who are facing the risk of cross-infection and occupational exposure. Outpatient and emergency departments treat patients with different protocols. Patients with fever should go to the fever clinic first. Doctors must be equipped with PPE to admit patients. We distribute PPE items daily and record inventory to make sure the doctors are well protected, but meanwhile, limit waste. All windows of the consultation area, patient’s treatment rooms, and dressing rooms are open to ensure proper ventilation. Ultraviolet lamps are used to sanitize twice per day. We request each patient report their history of epidemiology. Patients with endoscopic examinations, such as electronic laryngoscope, will have their temperature tested again before examination. For those whose temperature is more than 37.3°C, the examination will be postponed.

Surgeries will also be managed by different levels of protocol. Chronic diseases with elective surgery such as nasal polyps, vocal cord polyps, and chronic otitis media will be postponed. Patients are managed by telephone for appointments and follow-up. A large amount of medicine is dispensed at one time to reduce their visits to the hospital for a refill. Some studies show non-surgical treatment strategies are efficient when the situation is safe. Even some emergency operations such as acute appendicitis can postpone surgery with telemedicine and conservative drug treatment. Non-cancer surgery should be carefully considered for cancellation. Emergency surgeries, such as severe trauma, foreign bodies in the esophagus or airway, and laryngeal obstruction requiring tracheotomy, should be performed after a rapid COVID-19 nucleic acid has a negative test and chest CT has a negative result. For any emergency cases such as dyspnea caused by foreign bodies in the respiratory tract or larynx obstruction of the third degree or above as time will not allow to complete the COVID-19 screening, level 3 protocol needs to be followed. All these cases will be reported to the COVID-19 hospital experts evaluation team for telephone record. According to the protocol, patient screening will be completed in time after surgery. These actions correspond to recommendations of other reports. Also, some reports emphasize the importance of grading surgery and ensuring PPE. Letting senior and experienced doctors perform surgery can reduce time, reduce the risk of exposure and improve the efficiency of rescue. Deepening anesthesia reducing the operation of electrocoagulation and other actions will help to prevent or reduce the production of aerosols during surgery. Some authors’ reports conclude that exploratory laparotomy can avoid the production of
For operations with possible splatter such as tracheoscopy, esophagoscope, and tracheotomy, the surgeon should be equipped with PPE with level 2 protection. Using PPE does hinder the doctor’s diagnosis and treatment for outpatient, emergency patients, and operations. Goggles and face shields can produce fog, isolation gowns protective clothing are stuffy and can easily cause fatigue. These are the improvement points for PPE in the future.

For malignant tumors of the head and neck, surgery is needed as soon as possible. They can be operated on after a COVID-19 nucleic acid test and chest CT examination. If the cancer is in a late stage, there is no significant reason for patients to have surgery. After communication with the patient’s relatives, we will treat patients with non-surgical methods (radiotherapy, chemotherapy, and biotherapy). It is reported that during the epidemic of COVID-19, patients with head and neck tumors can be managed with telemedicine online and telephone consultation. An author from a tertiary referral center in southern Italy also introduced the management experience of patients with head and neck tumors during the epidemic. They believe that the COVID-19 pandemic has undoubtedly accelerated the change for future health care systems. Telemedicine, artificial intelligence, and mobile apps will be used more frequently.

### Conclusion

Novel Coronavirus causes sickness, it also affects peoples’ emotional and mental health. It is important to keep up with mental health, especially during the pandemic, as it is very hard to avoid anxiety and fear. We need to self-manage to learn how to mentally keep positive. The Otorhinolaryngology Head and Neck surgery department is considered a high-risk department during the epidemic of COVID-19. The management and improvement of PPE can prevent both patients and doctors from getting infections. In the future medical system, we will see more advantages as telemedicine, artificial intelligence and mobile applications will increasingly appear.

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### Ethics approval

Our study was approved by the Ethics Committee of Shanghai Tongji Hospital and the Information Department.
Informed consent

This study only involves the number of outpatient patients, not specific case and patient, so there was no need to have patients consent signed.

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References

1. Jiang X, Deng L, Zhu Y, et al. Psychological crisis intervention during the outbreak period of new coronavirus pneumonia from experience in Shanghai. Psychiatry Res 2020; 286: 112903.
2. Wang C, Horby PW, Hayden FG, et al. A novel coronavirus outbreak of global health concern. Lancet 2020; 395: 470–473.
3. Ding HL and Fang P. Meta-analysis common causes of paraesthesia pharyngis in China. J Clin Otorhinolaryngol Head Neck Surg 2016; 30(17): 1394–1396.
4. Gelardi M, Trecca EMC, Fortunato F, et al. COVID-19: when dust mites and lockdown create the perfect storm. Laryngoscope Invest Otolaryngol 2020; 5(5): 788–790.
5. Satish U, Streufert S, Dewan M, et al. Improvements in simulated real-world relevant performance for patients with seasonal allergic rhinitis: impact of desloratadine. Allergy 2004; 59(4): 415–420.
6. Marshall GD Jr. Stress and allergic diseases—still under recognized and undertreated. Ann Allergy Asthma Immunol 2014; 112(4): 275.
7. Timonen M, Jokelainen J, Silvennoinen-Kassinen S, et al. Association between skin test diagnosed atopy and professionally diagnosed depression: a Northern Finland 1966 Birth Cohort study. Biol Psychiatry 2002; 52(4): 349–355.
8. Postolache TT, Komarow H and Tonelli LH. Allergy: a risk factor for suicide? Curr Treat Options Neurol 2008; 10(5): 363–376.
9. Wright RJ, Cohen RT and Cohen S. The impact of stress on the development and expression of atopy. Curr Opin Allergy Clin Immunol 2005; 5(1): 23–29.
10. Kiecolt-Glaser JK, Heffner KL, Glaser R, et al. How stress and anxiety can alter immediate and late phase skin test responses in allergic rhinitis. Psychoneuroendocrinology 2009; 34(5): 670–680.
11. Infante M, Slattery MJ, Klein MH, et al. Association of internalizing disorders and allergies in a child and adolescent psychiatry clinical sample. J Clin Psychiatry 2007; 68(9): 1419–1425.
12. Kimata H. Enhancement of allergic skin wheal responses in patients with atopic eczema/dermatitis syndrome by playing video games or by a frequently ringing mobile phone. Eur J Clin Invest 2003; 33(6): 513–517.
13. Yuqin D and Zezhang T. Relationship between allergic rhinitis and psychological factors. Int J Otolaryngol Head Neck Surg 2009; 33(2): 81–83.
14. Joachim RA, Cifuentes LB, Sagach V, et al. Stress induces substance P in vagal sensory neurons innervating the mouse airways. Clin Exp Allergy 2006; 36(8): 1001–1010.
15. Lu XF and Zhang L. Allergic rhinitis and psychosomatic disorders. Int J Otolaryngol Head Neck Surg 2010; 34(2): 97–99.
16. García Callejo FJ, Ramírez Sabio JB, Conill Tobias N, et al. Inmunomediación o hiperviscosidad en la hipoausia neurosensorial rápidamente progresiva. Una aproximación terapéutica. *Acta Otorrinolaringol Esp* 2006; 57(5): 204–209.

17. Dohse J, Lehrl S and Berg M. Personality system and sudden deafness: a comparative psychological study. *Adv Otorhinolaryngol* 1981; 27: 110–113.

18. Oishi N, Kanzaki S, Kataoka C, et al. Acute-onset unilateral psychogenic hearing loss in adults: report of six cases and diagnostic pitfalls. *J Otorhinolaryngol Relat Spec* 2009; 71(5): 279–283.

19. Contrera KJ, Betz J, Deal JA, et al. Association of hearing impairment and emotional vitality in older adults. *J Gerontol B Psychol Sci Soc Sci* 2016; 71(3): 400–404.

20. Huiqin A, Mingli G, Xiaoli H, et al. Analysis of mental health status of patients with sudden deafness. *J Audiol Speech Pathol* 2013; 21(3): 294–296.

21. Chen X, Fu YY and Zhang TY. Role of viral infection in sudden hearing loss. *J Int Med Res* 2019; 47(7): 2865–2872.

22. Gelardi M, Iannuzzi L, Trecca EMC, et al. COVID-19: what happened to all of the otolaryngology emergencies? *Eur Arch Otorhinolaryngol* 2020; 277(11): 3231–3232.

23. Di Saverio S, Khan M, Pata F, et al. Coronavirus pandemic and colorectal surgery: a practical algorithm from a hub tertiary teaching hospital in Northern Lombardy, Italy. *J Trauma Acute Care Surg* 2020; 88(6): 715–718.
35. Yánez Benítez C, Güemes A, Aranda J, et al. Impact of personal protective equipment on surgical performance during the COVID-19 pandemic. *World J Surg* 2020; 44(9): 2842–2847.

36. Magaldi L, Salzo AE, Trecca EMC, et al. The importance of head and neck counselling in the COVID-19 era. *Acta Otorhinolaryngol Ital* 2021; 41(2): 192–194.

37. Longo F, Trecca EMC, D’Ecclesia A, et al. Managing head and neck cancer patients during the COVID-19 pandemic: the experience of a tertiary referral center in southern Italy. *Infect Agents Cancer* 2021; 16(1): 9.

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