

# Patients' Profile of Chronic Rhinosinusitis

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## ABSTRACT

Chronic rhinosinusitis (CRS) is one of the health problems that impact the world community's socio-economic aspects, especially in Indonesia. CRS is defined as inflammation of the nasal mucosa of the nasal cavity as well as the paranasal sinuses characterized by two or more symptoms lasting  $\geq 12$  weeks. The main symptoms are nasal obstruction/congestion/discharge (anterior/posterior nasal drip), facial pain/pressure, and reduction or loss of smell. CRS cases commonly cause infection (virus, bacteria, and fungi). Besides this, the disease can be influenced by several factors, namely host factors (allergies, anatomical abnormalities, genetics) and environmental factors (smoking and working), so this disease is said to be multifactorial. The purpose of this study is to determine the CRS profile based on age, gender, occupation, main complaints, and additional complaints from CRS patients. This research is descriptive by using a retrospective study obtained from the patient's medical record as a variable parameter to be studied. In January-December 2018, there were 30 patients seeking treatment at UKI Hospital, with the most frequent distribution of patients aged  $>40$  years, around 14 people (46.7%). The largest gender was women, namely 17 people (56.7%), the occupations most often found were private employees and homemakers / do not have occupations around 11 people (36.7%), then the main complaint that was most often found was nasal congestion around 19 people (63.3%), while complaints the most common addition was headache around 14 people (46.7%). It can be concluded that CRS occurs mainly in adulthood, female sex, private employees, and homemakers / who do not have occupations as a job often encountered. The main complaint often felt is nasal congestion, and an additional complaint is a headache.

**Keywords:** Chronic rhinosinusitis, Profile, Criteria.

## INTRODUCTION

Rhinosinusitis, or sinusitis, is a public health problem that has a significant socio-economic impact, causing enormous health costs to the community [1; 2]. Chronic rhinosinusitis (CRS) is one of the most common chronic diseases worldwide, characterized by inflammation of the nasal cavity mucosa and paranasal sinuses lasting 12 weeks [2; 3; 4]. CRS (with or without nasal polyps) in adults is defined as the presence of two or more symptoms, one of which must be nasal blockage/obstruction/congestion/nasal discharge (anterior/posterior nasal drip), facial pain/pressure, reduction or loss of odor [5].

In general, the prevalence of CRS cases is increasing every year. Based on the GA2LEN study, it was concluded that the prevalence of CRS in 12 European countries was 10.9% (range 6.9-27.1).<sup>1</sup> While the prevalence in America reached around 10 million CRS sufferers, divided based on the presence or absence of nasal polyps. For the Asian region, most cases of SSR are in China and India. Studies in China report that about 107 million people are diagnosed with CRS. While in India, this disease affects about 134 million people [6; 7]. In 2003, the Ministry of Health of the Republic of Indonesia stated that nasal and sinus disease was ranked 25th out of 50 major disease

patterns or about 102,817 outpatients in hospital [8]. Data from the Rhinology Division of the ENT Department of the RSCM in January-August 2005 reported 300 patients (69%) suffering from CRS.

Data from the ENT-KL polyclinic, RSUP dr. Mohammad Hoesin Palembang reported that 73 patients had met the criteria for SSR from 140 cases. The data showed that male patients were the most common, with 43 cases (58.9%), and they were mostly found at the age of 46-52 years (19.2%), with the highest sinus location being maxillary rhinosinusitis (28, 8%), the primary symptom that patients often complain about is nasal congestion (69.9%), and the minor symptom is headache (87.8%) [9]. While the data from the ENT-KL polyclinic RSUP Dr. M. Djamil Padang stated that women (36 patients) suffer from CRS more than men (25 patients). Then for the age group, the most are the young to adult age group (15-49 years) [10].

Various factors that cause CRS, among others, are host factors and environmental factors. Host factors are divided into two, namely systemic host factors and local host factors. Systemic host factors include allergies, immunodeficiency, congenital abnormalities, and mucociliary dysfunction. At the same time, the local host factors are anatomical abnormalities. Then for environmental factors, for example, viral and bacterial infections and exposure to irritants [11].

So that this disease is said to be multifactorial and has a very complex disease course. CRS may occur depending on the virulence of the invading organism, the host's defenses, and the ability of the sinus ostium to drain exudate [12]. In a state of severe infection, this disease can cause damage in the form of complications of orbital abnormalities, intracranial, osteomyelitis and lung abnormalities so that it can endanger the patient [2].

Dewi's research at the ENT-KL Polyclinic Sanglah Hospital, Denpasar Bali, in 2016 showed that the age group experiencing CRS was 46-60 years with 20 patients

(37.7%). Then for gender, there were more males than females, with as many as 32 sufferers (60.4%). Regarding work, 23 patients with SSR (43.4%) were private employees. Then the most frequent main complaint was nasal congestion in as many as 37 patients (69.8%), while additional complaints that were often experienced were headaches in as many as 13 patients (24.5%) [13].

This study aimed to determine the profile of chronic rhinosinusitis based on age, gender, occupation, chief complaint, and additional complaints. Starting from the background of the problems described above, the researchers are very interested in looking at the profiles of chronic rhinosinusitis patients at the UKI Hospital for the January-December 2018 period.

The formulation of the problem answered in this study is "What is the profile of chronic rhinosinusitis patients at UKI Hospital for the period January-December 2018?" with the aim of research to determine the profile of chronic rhinosinusitis patients at UKI Hospital for the January-December 2018 period. The results of this study are expected to add information about the epidemiological data of CRS sufferers as a reference source for further research and be able to add information and knowledge to the community so that the public can assist and assist family members who suffer from CRS for independent management to prevent complications.

## LITERATURE REVIEW

The nasal cavity is an irregular gap between the cranial base and the palate of the oral cavity. The composition of the cavity is an elongated wedge with a large base and a narrow top. The nasal cavity is separated by a nasal septum, which divides into two parts: the right nasal cavity and the syncytia nasal cavity. The entrance of the nasal cavity is the nares, and posteriorly it will enter the nasopharynx through the choana. Most parts of the nasal cavity are lined with mucosa except for the area of the nasal vestibule, which is covered by skin that

contains sebaceous glands, hair follicles, and hairs called vibrissae. The nasal cavity mucosa is attached to the periosteum and perichondrium of the bones that form the nasal cavity and cartilage of the nose [12; 14].

The inferior 2/3 of the nasal cavity mucosa is the respiratory area, and its superior 1/3 is the olfactory area. The respiratory area of the nasal cavity is mucosal lined by ciliated pseudostratified epithelium with many goblet cells. There are many seromucous glands in the lamina propria of the nasal mucosa. The secretions make the surface sticky so they can trap the particles in the air. The mucous membrane is continuously activated by ciliary action (mucociliary escalator) posterior to the nasopharynx at a rate of 6 mm per minute. When swallowing, the palate moves to bring mucus and particles trapped in the nasal mucosa to the oropharynx, but some enter the anterior nasal vestibule. Nasal mucosal secretions contain bactericidal lysozyme (a substance that kills bacteria), defensins, lactoferrin, and secretory immunoglobulin (IgA). The nasal cavity mucosa continues into the nasopharyngeal mucosa through the choana, to the conjunctiva through the nasolacrimal duct and lacrimal canaliculi, and the mucosa from the paranasal sinuses through its opening at the inferior nasal meatus.

The lateral wall of our nasal cavity is uneven, and this is due to the presence of inferior, middle, superior, and meatus conchae [14; 15]. The meatus is the space between the conchae. One of them is the middle meatus, which is between the middle and inferior turbinates and has an essential role in the course of rhinosinusitis because, through this meatus, the anterior sinus groups (frontal sinuses, maxillary sinuses, and anterior ethmoid sinuses) communicate with the nose. The inferior meatus is located between the inferior turbinate and the floor of the nasal cavity.

There are four pairs of paranasal sinuses, namely maxillary sinuses, frontal sinuses, ethmoid sinuses, and sphenoid sinuses. The sinus mucosa is lined by pseudostratified

respiratory epithelium consisting of four types of cells: ciliated columnar cells, non-ciliated columnar cells, goblet-type mucus cells, and basal cells. The ciliated mucous membrane expels mucus into the sinus ostium and joins the secretions from the nose. The ostium is the natural opening through which the sinuses drain into the nose. Based on clinical purposes, the sinuses are divided into two groups, namely anterior and posterior. The anterior sinus group consists of the frontal, maxillary, and anterior ethmoid sinuses that open into or near the infundibulum. At the same time, the posterior sinus group consists of the posterior ethmoid and sphenoid sinuses, which open above the middle turbinate. The primary function of the paranasal sinuses is to eliminate foreign bodies and as a defense against infection through three mechanisms, namely opening of COM, mucociliary transport, and average mucus production [16].

The maxillary sinus (Antrum of Highmore) is the most prominent paranasal sinus and is pyramidal in shape with a base formed by the lateral wall of the nasal cavity and its apex leading to the zygomatic process. In adults, the maxillary sinus capacity is 15 ml. It has a height of 33 mm, a depth of 35 mm, and a width of 25 mm [12; 17]. The frontal sinus is located between the inside and outside of the frontal bone. Shapes and sizes vary. So rarely found on imaging examinations. The two frontal sinuses are often asymmetrical and are separated by a thin bony septum.

The ethmoid sinuses are the first fully formed sinuses. The middle of this sinus has a complex anatomical structure. The ethmoid sinus consists of honeycomb-like cells inside the lateral ethmoid bone in the upper 1/3 of the lateral nasal wall and the medial orbital wall. Their number varies from 3 to 18. The ethmoid sinuses are divided into two groups based on their location: the anterior ethmoid sinus, which empties into the middle meatus, and the posterior ethmoid sinus, which empties into the superior meatus [12; 17; 18]. The

sphenoid sinus is a paranasal sinus located behind the posterior ethmoid sinus and is also the last to develop. Like the frontal sinus, the sphenoid sinus has two asymmetrical sides separated by a thin bony septum. In adults, the sinus's height, depth, and width are about 2 cm. The volume varies from 5 to 7.5 ml. In addition to the four sinuses above, other structures play an important role in cases of chronic rhinosinusitis, including the Ostiomeatal Complex and the Mucociliary System [12; 18; 19].

Many factors that affect CRS include infections (viruses, bacteria, fungi), dental infections, laryngopharyngeal reflux, fractures, tumors, and others. So this disease can be said to be idiopathic or multifactorial. In addition, various factors cause CRS, including host and environmental factors. Examples of host factors are allergies, anatomical abnormalities, and genetics. As for environmental factors, for example, smoking habits and patient work [5;15].

According to Benninger and Stokken, rhinosinusitis begins with a viral infection which then develops into a persistent bacterial infection. Viral rhinosinusitis usually lasts 7 to 10 days, whereas bacterial rhinosinusitis is more persistent (persistent). Some studies say the most common viruses that infect the human respiratory tract are rhinoviruses, coronaviruses, influenza viruses, and other causes are adenoviruses. Then for bacteria are *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Moraxella catarrhalis*, and other causes are *Staphylococcus aureus* and *Streptococcus pyogenes* [20]. In children, *Staphylococcus aureus* is one of the normal flora that can also cause CRS. It may be due to contamination during sinus puncture or endoscopic surgery.

There is a theory that says that in CRS, the immune system and mucociliary transport have been disrupted so that the sinus cavities have lost their sterility and are colonized by normal flora, so according to this theory, CRS may not be an infectious

process, but an abnormality or disorder in the regular anatomical system that is responsible for this. Responsible for drainage and damage to the nasal mucosa and sinus cavities [21].

The upper airway epithelium will produce various cytokines during acute inflammation, including IL-1, TNF- $\alpha$ , GM-CSF, ICAM-1, IL-8, and others [19; 20]. This condition causes hyperemia, fluid retention, the release of polymorphonuclear cells, and increased activity of the serous and mucous glands. CRS may occur depending on the organism's virulence, the host's defenses, and the ability of the sinus ostium to drain the exudate.

If the mucosa is irritated, the mucosal epithelial cells will secrete IL-8. The newly formed IL-8 stimulates the migration of neutrophils from the mucosa into the sinus fluid. Protease and superoxidase released by neutrophils will trigger the destruction of mucociliary function followed by retention of sinus fluid so that the overall inflammatory process will last a long time. Insufficient ventilation can cause a decrease in pH in the sinuses where this condition will have an impact on decreasing the frequency of cilia movement, and the resulting mucus becomes thicker so that the accumulation of secretions in the sinus ostium that does not dry out becomes a suitable medium for the proliferation of pathogens. Inflamed nasal mucosa will experience changes in mucosal pH levels to 5.5-6.5, and this causes a decrease in mucociliary transport function. The cilia's movement frequency will only work at normal pH conditions of 7-9 [19; 22]. In chronic infection, destruction and healing coincide so that the vicious cycle will continue.

The clinical definition of CRS in adults is inflammation of the nose and paranasal sinuses characterized by two or more symptoms lasting 12 weeks. The main symptoms should be a) nasal obstruction/obstruction/congestion/nasal discharge (anterior/posterior nasal drip); b) pain/fullness/ pressure in the face; and c)

hyposmia or anosmia.4, 30 the accompanying symptoms include pain or pressure in the ear, headache, fever, bad breath (halitosis), cough, fatigue (malaise), and sleep disturbances. If the cause is allergies, other symptoms are sneezing, runny nose, itchy nose, and itchy and watery eyes [5; 23].

CRS diagnosis can be established by combining the patient's subjective complaints with clinical findings from physical examination and investigations. Subjective complaints can be obtained from anamnesis information. Several examinations were performed, namely anterior rhinoscopy, nasendoscopy, nasal cytology, biopsy, bacteriology, sinus transillumination, and CT-Scan [24; 25].

The goals of rhinosinusitis treatment are to accelerate the healing process, prevent complications, prevent the course of the disease from becoming chronic (preventing worsening/relapse), and improve the patient's quality of life. The guideline for this treatment is to unblock the COM so that drainage of the paranasal sinuses is restored [26].

Complications that can occur in CRS include cellulitis or orbital abscess, optic neuritis, cavernous sinus thrombosis, meningitis, subdural abscess, brain abscess, and osteomyelitis of the frontal bone. If the patient complains of swelling or pain in the eyes and head, frequent feelings of drowsiness and confusion, vision changes, signs of neurological disturbances, and other disturbances of consciousness, the patient should be evaluated immediately [27].

**RESEARCH METHOD**

This type of research is a descriptive study with a retrospective study by taking secondary data from the medical records of chronic rhinosinusitis patients at the UKI Hospital for January-December 2018. This research was conducted in September 2020 at UKI Hospital, East Jakarta. The population in this study were all chronic rhinosinusitis patients seeking treatment at UKI Hospital from January-December

2018. The research sample used secondary data obtained from medical records of chronic rhinosinusitis patients at UKI Hospital for January-December 2018. The data used in this study is secondary data obtained from the medical records of patients with chronic rhinosinusitis at the UKI Hospital, collected from January to December 2018. The data were collected from the UKI Hospital's medical records after permission based on a cover letter for data collection to write Scientific Papers (KTI.) from the Faculty of Medicine, Christian University of Indonesia. Medical record files are collected and then recorded on the variables to be studied. The research data were processed using the SPSS (Statistical Product and Service Solution) computer application. Research data will be analyzed univariately to see a picture of the disease under study.

**Result and Discussion**

Respondents from this study were all Chronic Rhinosinusitis (RSK) patients who came for treatment at UKI Hospital in January-December 2018. The sample found by the researcher was 30 people using the total sampling method. The data assessed were age, gender, occupation, chief complaint, and additional complaints. The following table shows the frequency distribution of the variables to be assessed.

Table 1. Frequency Distribution of CRS Patients by Age

No.	Age	Frequency (n)	%
1.	< 12	0	0
2.	13-19	2	6,7
3.	20-26	5	16,7
4.	27-33	6	20,0
5.	34-40	3	10,0
6.	> 40	14	46,7

From the results of the data obtained, most CRS patients came from the age of >40 years, as many as 14 people (46.7%), while the lowest age was <12 years, as many as 0 people (0%).

Table 2. Frequency Distribution of CRS Patients by Gender

No.	Gender	Frequency (n)	%
1.	Male	13	43,3
2.	Female	17	56,7

From the data obtained, more female patients were found to be suffering from

CRS, as many as 17 people (56.7%), compared to male patients, which were 13 people (43.3%).

**Table 3. Frequency Distribution of CRS Patients by Occupation**

No.	Profession	Frequency (n)	%
1.	Student	5	16,7
2.	Civil Servant/TNI/POLRI	0	0
3.	Private employees	11	36,7
4.	Self-employed	1	3,3
5.	Retired	2	6,7
6.	Housewife/not working	11	36,7

From the data obtained, private employees and homemakers/not working are the most common professions/jobs found at UKI Hospital in 2018, with 11 people (36.7%). At the same time, the professions that were not found were Civil Servants/TNI/POLRI, with a total of 0 people (0%).

**Table 4. Distribution of CRS Patients Frequency Based on Main Complaint**

No.	Main complaint	Frequency (n)	%
1.	Nasal congestion	19	63,3
2.	Rinore	3	10,0
3.	Pain or pressure on the face	7	23,3
4.	Anosmia/ Hyposmia	1	3,3

From the data obtained, nasal congestion is the main complaint often found in UKI Hospital, as many as 19 people (63.3%). Meanwhile, the least common chief complaint was anosmia/hyposmia in 1 person (3.3%).

**Table 5. Distribution of CRS Patients Frequency Based on Additional Complaints**

No.	Additional Complaints	Frequency (n)	%
1.	Fever	1	3,3
2.	Headache	14	46,7
3.	Pain or pressure in the ear	1	3,3
4.	Bad breath (halitosis)	2	6,7
5.	Etc	12	40,0

From the data obtained, the most common additional complaints found were headaches, which were 14 people (46.7%). Meanwhile, the slightest additional complaint found was pain or pressure in the ear in 1 person (3.3%).

Based on research that has been carried out using medical record data and adjusting the inclusion criteria of RSK patients at UKI Hospital in the January-December 2018

period, data regarding patient profiles are obtained as follows.

Table 1 shows that RSK cases at UKI Hospital in 2018 were mostly found at the age > 40, with a total of 14 people (46.7%). This study's results align with research conducted by Amelia et al. at Dr. RSUP. Mohammad Hoesin Palembang, where the most age group experiencing CRS is 45-52 years old, with 14 cases (19.2%). Similarly, Dewi, et al. did at Sanglah Hospital Denpasar in 2016, where the research results found that the most age who experienced CRS was 46-60 years, with a total of 20 patients (37.7%). It shows that adults are more susceptible to sinusitis because their airways tend to be dry due to age. In addition, the cartilage that supports the airway is getting weaker because of the decreased tolerance for air changes [9; 13].

Based on table 2, SSR cases were more experienced by women than men, namely 17 people (56.7%). The results of this study are the same as the research conducted by Lubis at Haji Adam Malik Hospital in Medan in 2013, which found 67 women (55.8%) who suffered more from CRS. However, the results of this study are different from the research which shows that male patients experienced more CRS than women, namely 52.1% [7; 28].

Table 3 explains that the most common jobs in SSR cases are private employees and homemakers/not working, totaling 11 people (36.7%). This study follows research conducted by Dewi et al. at Sanglah Hospital, Denpasar, in 2016, where patients with CRS were found primarily in private employees, as many as 23 patients (43.40%). Meanwhile, Lubis' research at Haji Adam Malik Hospital in Medan in 2013 stated that civil servants (PNS) were more likely to suffer from CRS as much as 24.2%. Several studies found many varied research results. It may be due to the difference in the number of samples studied by each researcher [13; 29].

In table 4, data were obtained from the main complaint CRS patients most often feel is nasal congestion with 19 people (63.3%).

The results of this study are similar to the results of research by Sitinjak et al. at Santa Elisabeth Hospital in 2011-2015, where nasal congestion was the most common complaint experienced by CRS sufferers in as many as 151 people (92.6%). Trihastuti et al. also researched ENT-KL Polyclinic RSUP DR.M. Djamil Padang, where the most common chief complaint was nasal congestion in 56 cases (88.89%) [8;10].

These symptoms can occur due to edema, usually caused by infection where the mucosa facing each other will stick to each other so that the cilia cannot move and trigger blockage of the ostium and also inhibition of sinus drainage. In addition, many causes can cause nasal congestion, including anatomical abnormalities [30; 31]. Based on table 5, the highest number of additional complaints in CRS patients was a headache, as many as 14 people (46.7%). The results of this study are the same as those of Amelia et al. at Dr. RSUP. Mohammad Hoesin Palembang, where the headache is an additional symptom that is often complained of and is the reason for CRS sufferers to come for treatment, as many as 87.7% [9].

## CONCLUSION

Based on the results of the data and discussion, the following conclusions can be drawn: a) The age of the most patients experiencing CRS at the UKI Hospital in the January-December 2018 period was age > 40 years, which were found to be 14 people (46.7%); b) The gender of the most patients experiencing CRS at UKI Hospital in the January-December 2018 period was female, namely 17 people (56.7%), compared to male patients, which were 13 people (43.3%); c) The most common occupations found in RSK patients at UKI Hospital are private employees and homemakers/not working as many as 11 people (36.7%); d) The main complaint most frequently felt by RSK patients at UKI Hospital was nasal congestion as many as 19 people (63.3%); and e) The most

common additional complaint was a headache, as many as 14 people (46.7%).

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## REFERENCES

1. Bachert, Claus, Ruby Pawankar, Luo Zhang, Chaweewan Bunnag, Wytse J. Fokkens, Daniel L. Hamilos, Orathai Jirapongsananuruk et al. "ICON: chronic rhinosinusitis." *World Allergy Organization Journal* 7, no. 1 (2014): 1-28.
2. Kim, Ji Hoon, Changil Cho, Eun Jung Lee, Yun Suk Suh, Byeong Ii Choi, and Kyung-Su Kim. "Prevalence and risk factors of chronic rhinosinusitis in South Korea according to diagnostic criteria." *Rhinology* 54, no. 4 (2016): 329-335.
3. Avdeeva, Klementina, and Wytse Fokkens. "Precision medicine in chronic rhinosinusitis with nasal polyps." *Current allergy and asthma reports* 18, no. 4 (2018): 1-8.
4. Fokkens, Wytse J., Valerie J. Lund, Claire Hopkins, Peter Hellings, Robert Kern, Seitze Reitsma, Sanna Toppila-Salmi et al. "European position paper on rhinosinusitis and nasal polyps 2020." *Rhinology* 58 (2020): 1-464.
5. Fokkens, W., V. Lund, Claus Bachert, P. Clement, P. Hellings, M. Holmstrom, N. Jones et al. "European position paper on rhinosinusitis and nasal polyps." *Rhinology* 23, no. 23 (2005): 1-87.
6. Shi, Jianbo B., Q. L. Fu, H. Zhang, L. Cheng, Y. J. Wang, D. D. Zhu, W. Lv et al. "Epidemiology of chronic rhinosinusitis: results from a cross-sectional survey in seven Chinese cities." *Allergy* 70, no. 5 (2015): 533-539.
7. Michael, Rajiv C., Joy S. Michael, Ruth H. Ashbee, and Mary S. Mathews. "Mycological profile of fungal sinusitis: An audit of specimens over a 7-year period in a tertiary care hospital in Tamil Nadu." *Indian Journal of Pathology and Microbiology* 51, no. 4 (2008): 493.
8. Putra, Teuku Romi Imansyah, Teuku Husni TR, Hesti Anandini Sariningrum, and Dhiatama Endalif. "Characteristics of

- Chronic Sinusitis Based on Non-Contrast CT Scan at the ENT-Head and Neck Surgery Polyclinic of Regional General Hospital Dr. Zainoel Abidin Banda Aceh." *Indonesian Journal of Tropical and Infectious Disease* 10, no. 1 (2022): 55-61.
9. Amelia, Nurul Lintang, Puspa Zuleika, and Denny Satria Utama. "Chronic rhinosinusitis prevalence at Dr. Mohammad Hoesin Hospital Palembang." *Sriwijaya Medical Magazine* 49, no. 2 (2017): 75-82.
  10. Trihastuti, Hesty, Bestari Jaka Budiman, and Edison Edison. "Profile of Chronic Rhinosinusitis Patients at the ENT-KL Polyclinic RSUP DR. M. Djamil Padang." *Andalas Health Journal* 4, no. 3 (2015).
  11. Benninger, Michael S., Berrylin J. Ferguson, James A. Hadley, Daniel L. Hamilos, Michael Jacobs, David W. Kennedy, Donald C. Lanza et al. "Adult chronic rhinosinusitis: definitions, diagnosis, epidemiology, and pathophysiology." *Otolaryngology-Head and Neck Surgery* 129, no. 3 (2003): S1-S32.
  12. Dhingra, P. L., and Shruti Dhingra. *Diseases of Ear, Nose and Throat-EBook*. Elsevier Health Sciences, 2017.
  13. Dewi, Putu Krisna Yama, Eka Putra Setiawan, and Sari Wulan Dwi Sutanegara. "Characteristics of patients with chronic rhinosinusitis who were outpatients at the ENT-KL Polyclinic, Sanglah Hospital, Denpasar in 2016." *E-Jurnal Medika Udayana* 7, no. 12 (2018): 1-10.
  14. Moore, Keith L., Arthur F. Dalley, and M. R. Agur. "Clinically oriented anatomy. 7. izdanje." (2014).
  15. Susan, Standring. "Gray's anatomy: the anatomical basis of clinical practice." (2015).
  16. Ballenger, John Jacob, and James Byron Snow. *Ballenger's otorhinolaryngology: head and neck surgery*. Pmph-usa, 2003.
  17. Ballenger, John Jacob, and James Byron Snow. *Ballenger's otorhinolaryngology: head and neck surgery*. Pmph-usa, 2003.
  18. Bailey, Byron J., and Jonas T. Johnson. *Bailey's head and neck surgery-otolaryngology*. Wolters Kluwer Health/Lippincott Williams & Wilkins, 2014.
  19. Soepardi, Efiaty Arsyad, and Nurbaiti Iskandar. "Textbook Of Health Science: Ears, nose, throat, head and neck." (2001).
  20. Lucia, Cojocari, and Sandul Alexandru. "Fungal rhinosinusitis: pathophysiology, diagnosis and treatment." *The Moldovan Medical Journal* 61, no. 2 (2018): 43-50.
  21. Bennett, John E., Raphael Dolin, and Martin J. Blaser. *Mandell, douglas, and bennett's principles and practice of infectious diseases E-book*. Elsevier Health Sciences, 2019.
  22. Cho, Seong Ho, Dae Woo Kim, and Philippe Gevaert. "Chronic rhinosinusitis without nasal polyps." *The Journal of Allergy and Clinical Immunology: In Practice* 4, no. 4 (2016): 575-582.
  23. Stevens, Whitney W., Robert P. Schleimer, and Robert C. Kern. "Chronic rhinosinusitis with nasal polyps." *The journal of allergy and clinical immunology: In practice* 4, no. 4 (2016): 565-572.
  24. Chow, Anthony W., Michael S. Benninger, Itzhak Brook, Jan L. Brozek, Ellie JC Goldstein, Lauri A. Hicks, George A. Pankey et al. "IDSA clinical practice guideline for acute bacterial rhinosinusitis in children and adults." *Clinical infectious diseases* 54, no. 8 (2012): e72-e112.
  25. Swartz, Mark H., ed. *Textbook of physical diagnosis: history and examination*. Beijing da xue yi xue chu ban she, 2018.
  26. Scadding, Glenis K. "Medical management of chronic rhinosinusitis." *Immunology and Allergy Clinics* 24, no. 1 (2004): 103-118.
  27. Abrute, Vilija, Tracian Kelly Hershoshin, and Debra J. Hain. "Common Neurologic Disorders Encountered in the Primary Care Setting." *Textbook of Adult-Gerontology Primary Care Nursing: Evidence-Based Patient Care for Adolescents to Older Adults* (2022): 273.
  28. Gultom, Julikrianto M. "Characteristics of Rhinosinusitis Patients in Dr. Pirngadi Hospital, Medan in 2012." (2014).
  29. Kim, Jong-Yeup, Inseok Ko, Myoung Suk Kim, Dae Woo Kim, Bum-Joo Cho, and Dong-Kyu Kim. "Relationship of chronic rhinosinusitis with asthma, myocardial infarction, stroke, anxiety, and depression." *The Journal of Allergy and Clinical Immunology: In Practice* 8, no. 2 (2020): 721-727.
  30. Galluzzi, Francesca, Werner Garavello, Gianluca Dalfino, Paolo Castelnuovo, and Mario Turri-Zanoni. "Congenital bony nasal cavity stenosis: a review of current trends in diagnosis and treatment." *International*



- Journal of Pediatric Otorhinolaryngology* 144 (2021): 110670.
31. Bernichi, J. V., V. L. Rizzo, J. F. Villa, R. F. Santos, and F. A. Caparroz. "Rhinogenic and sinus headache—Literature review." *American Journal of Otolaryngology* 42, no. 6 (2021): 103113.

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