

An Overview of Sinusitis Diagnosis and Management Approach in PHC

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Abstract

Sinusitis is the inflammation of the lining mucosa of the air sinuses. It is classified into chronic and acute rhinosinusitis. Symptoms of rhinosinusitis include facial pain, congestion, and headache. As this disease is widely common, the family physician should be aware of the updates in terms of diagnosis, treatment, and warning signs. The study aimed to review the literature reviewing rhinosinusitis, its etiology, risk factors, clinical presentation, diagnosis, and management of this disease. PubMed database was used for article selection, gathered papers undergone a thorough review. Rhinosinusitis relies on physician experience in establishing the diagnosis, where the history and examination form the ground of the process. Identifying the causative pathogen is as crucial as knowing the patient's comorbidities in order to set the optimum treatment plan and avoiding the unfortunate consequences.

Keywords: Sinusitis, Rhinosinusitis, Acute rhinosinusitis, Chronic rhinosinusitis, Viral rhinosinusitis, Bacterial rhinosinusitis

INTRODUCTION

Sinusitis is the inflammation of the sinuses, the air spaces seated in the skull and facial bones. The inflammation of the sinusitis is usually accompanied by nasal inflammation due to the nature of the continuous lining mucosa, thence the most accurate name is rhinosinusitis. This disease is widely common with a special increase around the winter and spring seasons [1]. Both chronic and acute rhinosinusitis have a high rate in the community and they can go as high as 4% and 9.7%, respectively [2, 3]. As its symptoms are usually mild, the patients affected are first encountered by family physicians who must be fully aware and knowledgeable about this condition and its risk factor exacerbation and management.

MATERIALS AND METHODS

PubMed database was used for the selection process of relevant articles, and the following keys were used in the mesh ((“Sinusitis”[Mesh] OR “Rhinosinusitis”[Mesh])) AND (“Diagnosis”[Mesh] OR “Management”[Mesh] OR “Risk factors”[Mesh])). For the inclusion criteria, the articles were selected based on including one of the following words: sinusitis, rhinosinusitis, risk factors, evaluation, management, or diagnosis. Exclusion criteria were all other articles that did not meet the criteria by not having any of the inclusion criteria results in their topic.

Review

There are 4 paired sinuses, each one is named after the bone in which they are located - ethmoid sphenoid, frontal, and maxillary. Rhinosinusitis can be classified into three subcategories according to the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) based on symptom duration. Acute rhinosinusitis (ARS): duration of fewer than 4 weeks; subacute: 4 - 12 weeks; and chronic (CRS): more than 12 weeks [4]. The acute rhinosinusitis is further divided into, viral, bacterial, and rarely fungal. Additionally, chronic rhinosinusitis can also be divided into chronic rhinosinusitis without nasal polyps (CRSsNP) and chronic rhinosinusitis with nasal polyps (CRSwNP).

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How to cite this article: Al-Thobaiti AD, Hamdi AM, Almalki MAO, Alghamdi WH, Albaz ME, Alshammari AM, et al. An Overview of Sinusitis Diagnosis and Management Approach in PHC. Arch Pharm Pract. 2021;12(1):59-62. <https://doi.org/10.51847/IOic1SQo98>

Etiology and Pathophysiology

Although rhinosinusitis can have similar symptoms, that does not imply they all have a similar course and etiological background. Viral upper respiratory infections are the most prevalent cause of rhinosinusitis where rhinovirus is the most common identifiable pathogen [5]. Other involved viruses are: respiratory syncytial virus, adenovirus, coronavirus, and influenza [6]. On the other hand, bacterial rhinosinusitis is usually manifest as a secondary superinfection on top of viral succeder. *H. influenzae*, *S. pneumoniae*, and *M. catarrhalis* are the major bacteria obtained from bacterial rhinosinusitis [7]. The pathophysiology behind it that when viral or allergic sinusitis occurs, it causes three key changes hinders the normal physiology of the sinuses system. Sinus mucosa becomes inflamed and oedemic, consequently, sinus ostium got obstructed and mucociliary activity got disturbed as well. Those three alterations deliver fertile ground for bacterial growth and multiplication [4]. Chronic rhinosinusitis used to be considered as a long-term complication of the acute episode. Moreover, its exact pathophysiology is unclear. Multiple hypotheses have been introduced in order to demonstrate a better understanding of the disease, which include but not limited to: fungal, bacteria-based, biofilm, microbiome, and immune barrier hypotheses [8].

Risk Factors

The predisposing factors of rhinosinusitis can be easily categorized into host factors and environmental factors. Genetic diseases such as cystic fibrosis, primary immunodeficiencies, and primary ciliary dyskinesia are all predetermined risk factors for developing rhinosinusitis [9]. Gastroesophageal reflux and asthma also exhibit an association with developing chronic rhinosinusitis [10, 11]. In spite of the common belief that the atopic status of the patient is directly related to having CRS, studies still cannot explain the exact involvement if any, even though physicians still include antiallergic drugs in the treatment plan of rhinosinusitis as they show efficacy [8]. For the environmental factors, smoking, whether first or second hand, has a positive correlation with CRS [12, 13].

Clinical Presentation

The acute rhinosinusitis symptoms include a history of recent upper respiratory tract infection rhinorrhea, cough, facial pain, postnasal drip, fever, congestion, and mucopurulent discharge. Facial pain is usually exacerbated by leaning forward. Moreover, the site of the pain can be suggestive of which sinus is affected. Chronic rhinosinusitis shares almost the same symptoms but with less specificity. Headache is very common in CRS patients, with a pattern that tends to wear off after its peak around three to four hours since waking up [14].

Collection of signs are expected to be found in patients with rhinosinusitis. Decreased nasal airflow with injected hyperemic mucosa is to be found in both acute and chronic variants. Polyposis can be present in case of prolonged

chronic rhinosinusitis, but its absence does not exclude the disease. In a general practitioner's setting, the use of thudichum (nasal) speculum can provide a very limited view. If further visualizing is indicated, rhinoscopy with a rigid or flexible endoscope provides a more thorough examination. If any anatomical changes, such as deviation of the nasal septum, hypertrophic turbinates, septal spurs, or nasal polyps are found, it should be documented as it would influence the treatment option of the current patient [14].

Diagnosis

Both patient history and examination are part of making the diagnosis of rhinosinusitis. **Table 1** enlists the criteria for chronic and acute rhinosinusitis [15]. Keeping documentation as a family physician of all similar episodes is important in planning the upcoming step [14]. Laboratory tests are usually not recommended neither radiological, in case of need for such investigation a referral to otorhinolaryngologists should be made. In that specialized setting, endoscopically-directed middle meatal culture and CT scan of the paranasal sinuses would be carried accordingly [16].

Table 1. Academy of Otolaryngology-Head and Neck Surgery criteria for rhinosinusitis

Type	Criteria of Diagnosis
Acute rhinosinusitis (ARS)	<p>≥ 4 weeks of purulent nasal drainage (posterior, anterior, or both) and facial pain-pressure-fullness, nasal obstruction, or both</p> <p>Purulent nasal discharge is colored or cloudy, in contrast to clear</p> <p>Secretions in viral upper respiratory infections, either reported or found upon examination</p> <p>Nasal obstruction may be reported by the patient as nasal stuffiness, blockage, congestion, or obstruction, or found upon examination</p> <p>Facial fullness-pressure-pain may involve the periorbital region, anterior face, or manifest with a diffuse or localized headache</p>
Viral rhinosinusitis (VRS)	<p>Presumption of viral rhinosinusitis to be made when signs or symptoms of acute rhinosinusitis are present ≤10 days and are not worsening</p>
Acute bacterial rhinosinusitis (ABRS)	<p>Presumption of bacterial rhinosinusitis to be made when either:</p> <p>a) signs or symptoms of acute rhinosinusitis fail to improve within ≥10 days</p> <p>b) signs or symptoms of acute rhinosinusitis worsen within 10 days after an initial improvement (double worsening)</p>
Chronic rhinosinusitis (CRS)	<p>≥ 12 weeks of ≥2 of the following symptoms and signs:</p> <ul style="list-style-type: none"> • mucopurulent drainage (posterior, anterior, or both), • nasal obstruction/congestion, • facial pain/pressure/fullness, or • decreased sense of smell. <p>AND inflammation is demonstrated by ≥1 of the following:</p> <ul style="list-style-type: none"> • purulent mucus or edema in the anterior ethmoid region or middle meatus,

- polyps in the middle meatus or nasal cavity, and/or
- radiographic image displaying paranasal sinus inflammation

Management

The treatment plan for rhinosinusitis covers both the symptoms and underlying cause. In ARS combination of decongestion, nasal corticosteroid, and antibiotic, if a bacterial variant is suspected, is the mainstay of treatment. Decongestion comes in form of an oral or topical nasal spray. The topical formula provides faster relief and a more potent effect in comparison to the oral one, however, prolonged use (>10 days) may lead to tachyphylaxis and a rebound swelling of the nasal mucosa (rhinitis medicamentosa). Consequently, the oral form is preferred when long term usage is considered. Nasal corticosteroid (fluticasone propionate) is recommended to be used in the early stages of upper respiratory tract infection, as it tends to prevent paranasal sinusitis, especially in rhinovirus-positive subjects. The usage of nasal corticosteroid to be between 14 - 21 days. Finally, antibiotics should be only prescribed for ABRs, the preferred regimen and drug are: Amoxicillin 500 mg every 8 h for 5 - 7 days OR Amoxicillin/Clavulanate 625 mg every 8 h for 5 - 7 days. Other options to be considered are antihistamine, mucolytic agents, and nasal saline irrigation. In chronic rhinosinusitis, prolonged treatment with nasal corticosteroid is usually carried with the limited use of antibiotics to acute evident bacterial exacerbation [16, 17].

One important practice to be mastered in family medicine is a referral. **Table 2** highlights the indication of early and urgent referral for both acute and chronic rhinosinusitis. Otorhinolaryngologists may consider surgery after the failure of more vigorous medical management [16].

Table 2. referral criteria for chronic and acute rhinosinusitis

	Referral Time	Indications for referral
Acute rhinosinusitis (ARS)	Early referral (within one week)	Persistent symptoms despite optimal therapy, in particular immunocompromised patients
		Frequent recurrence (>4 episodes per year)
	Urgent referral (within 24 h)	Anatomical defects causing obstruction
		Suspected malignancy
Chronic rhinosinusitis (CRS)	Early referral (within 1 week)	Orbital complications
		Severe retro-orbital/frontal headache
	Urgent referral (within 24 h)	Forehead swelling
		Neurological manifestations (meningitis) Septicemia

Chronic rhinosinusitis (CRS)	Early referral (within 1 week)	Failed course of optimal medical therapy >3 sinus infections/year Suspected fungal infections, granulomatous disease, or malignancy
	Urgent referral (within 24 hours)	severe pain or swelling of the sinus areas, in particular in immunocompromised patients

Complication

Complications of rhinosinusitis can be very fatal, thence a rapid detection of their manifestation should be done. They resulted either by direct erosion of the walls of the sinuses next to the orbit and the cranium or through hematogenous spread. Those symptoms and signs include orbital and neurological indicators; symptoms and signs to look for include inflammatory edema of the eyelids with or without orbital involvement, ophthalmoplegia, reduced visual acuity, displaced globe, focal neurological signs, signs of meningitis, frontal swelling, or severe frontal headache. Box 1 summarizes the possible serious complications of acute rhinosinusitis [17].

Box 1: Complications of acute rhinosinusitis

Orbital

Preseptal cellulitis
Orbital cellulitis/abscess
Osteomyelitis
Subperiosteal orbital abscess

Intracranial

Subdural empyema
Epidural empyema

Meningitis

Brain abscess
Cortical thrombophlebitis
Cavernous sinus thrombosis

CONCLUSION

Rhinosinusitis is a prevalent disease found in primary care clinics. Full history and proper examination would identify the variant and underlying etiology. The most common virus involved is rhinovirus while the most common bacterium is *S. pneumoniae*. Treatment is composed of symptoms management and underlying etiology eradication if applicable. Surgical interventions are preserved in persistent cases with the possibility of developing serious complications.

ACKNOWLEDGMENTS: None

CONFLICT OF INTEREST: None

FINANCIAL SUPPORT: None

ETHICS STATEMENT: None

REFERENCES

1. Kuiper JR, Hirsch AG, Bandeen-Roche K, Sundaresan AS, Tan BK, Schleimer RP, et al. Prevalence, severity, and risk factors for acute exacerbations of nasal and sinus symptoms by chronic rhinosinusitis status. *Allergy*. 2018;73(6):1244-53. doi:10.1111/all.13409
2. Worrall G. Acute sinusitis. *Can Fam Physician*. 2011;57(5):565-7.
3. Shi JB, Fu QL, Zhang H, Cheng L, Wang YJ, Zhu DD, et al. Epidemiology of chronic rhinosinusitis: results from a cross-sectional survey in seven Chinese cities. *Allergy*. 2015;70(5):533-9. doi:10.1111/all.12577
4. Aring AM, Chan MM. Current concepts in adult acute rhinosinusitis. *Am Fam Physician*. 2016;94(2):97-105.
5. DeMuri GP, Gern JE, Moyer SC, Lindstrom MJ, Lynch SV, Wald ER. Clinical features, virus identification, and sinusitis as a complication of upper respiratory tract illness in children ages 4-7 years. *J Pediatr*. 2016;171:133-9. doi:10.1016/j.jpeds.2015.12.034
6. DeMuri GP, Eickhoff JC, Gern JC, Wald ER. Clinical and Virological Characteristics of Acute Sinusitis in Children. *Clin Infect Dis*. 2019;69(10):1764-70. doi:10.1093/cid/ciz023
7. Marom T, Alvarez-Fernandez PE, Jennings K, Patel JA, McCormick DP, Chonmaitree T. Acute bacterial sinusitis complicating viral upper respiratory tract infection in young children. *Pediatr Infect Dis J*. 2014;33(8):803. doi:10.1097/INF.0000000000000278
8. Lam K, Schleimer R, Kern RC. The etiology and pathogenesis of chronic rhinosinusitis: a review of current hypotheses. *Curr Allergy Asthma Rep*. 2015;15(7):41. doi:10.1007/s11882-015-0540-2
9. Ryan MW. Diseases associated with chronic rhinosinusitis: what is the significance?. *Curr Opin Otolaryngol Head Neck Surg*. 2008;16(3):231-6. doi:10.1097/MOO.0b013e3282fdc3c5
10. Wong IW, Omari TI, Myers JC, Rees G, Nair SB, Jamieson GG, et al. Nasopharyngeal pH monitoring in chronic sinusitis patients using a novel four channel probe. *Laryngoscope*. 2004;114(9):1582-5. doi:10.1097/00005537-200409000-00015
11. Jarvis D, Newson R, Lotvall J, Hastan D, Tomassen PE, Keil T, et al. Asthma in adults and its association with chronic rhinosinusitis: the GA2LEN survey in Europe. *Allergy*. 2012;67(1):91-8. doi:10.1111/j.1398-9995.2011.02709.x
12. Tammemagi CM, Davis RM, Benninger MS, Holm AL, Krajenta R. Secondhand smoke as a potential cause of chronic rhinosinusitis: a case-control study. *Arch Otolaryngol Head Neck Surg*. 2010;136(4):327-34. doi:10.1001/archoto.2010.43
13. Thilising T, Rasmussen J, Lange B, Kjeldsen AD, Al-Kalemji A, Baelum J. Chronic rhinosinusitis and occupational risk factors among 20-to 75-year-old Danes—A GA2LEN-based study. *Am J Ind Med*. 2012;55(11):1037-43. doi:10.1002/ajim.22074
14. Evans KL. Diagnosis and management of sinusitis. *BMJ Br Med J*. 1994;309(6966):1415. doi:10.1136/BMJ.309.6966.1415
15. Rosenfeld RM, Piccirillo JF, Chandrasekhar SS, Brook I, Ashok Kumar K, Kramper M, et al. Clinical practice guideline (update): adult sinusitis. *Otolaryngol-Head Neck Surg*. 2015;152(2_suppl):S1-39. doi:10.1177/0194599815572097
16. Husain S, Amilia HH, Rosli MN, Zahedi FD, Sachlin IS. Management of rhinosinusitis in adults in primary care. *Malays Fam Physician*. 2018;13(1):28-33. Available from: <https://pubmed.ncbi.nlm.nih.gov/29796207>
17. Masood A, Moumoulidis I, Panesar J. Acute rhinosinusitis in adults: an update on current management. *Postgrad Med J*. 2007;83(980):402-8. doi:10.1136/pgmj.2006.054767