

Sinusitis, Evaluation, and Management in Primary Health Care: Literature Review

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Abstract

Background: Sinusitis is considered as a significant health concern nowadays. Sinusitis is responsible for complicating around 0.5% of all upper respiratory tract infections. It is the second most common infection encountered in primary health care and one of the commonest indications for prescribing antibiotics by general practitioners despite that viral infection is the commonest trigger. **Objective:** We aim to review the published literature that discussed sinusitis evaluation and management. **Method:** PubMed database was used for articles selection, and the following keys were used in the mesh (“sinusitis”[Mesh]) AND (“Management”[Mesh]) OR (“Evaluation”[Mesh])). **Conclusion:** Relying on the clinical findings alone can be misleading in diagnosis. The clinical findings in some cases should be supported by imaging or nasal endoscopy to make an appropriate diagnosis. Most of the patients receive antibacterial as treatment of sinusitis from general practitioners despite most cases including bacterial sinusitis resolve without the need for antibiotics. Nasal wash and humidification by saline have resulted in the reduction of sinusitis symptoms. Prescribing antibiotics should be only when a bacterial infection is suspected. Moreover, corticosteroids are effective therapy in chronic cases of sinusitis.

Keywords: Sinusitis, Evaluation, Diagnosis & Management

INTRODUCTION

Many factors contribute to health such as nutrition, physical activity, level of stress, personality, and behavior^[1, 2]. Sinusitis is considered as a significant health concern nowadays. The term sinusitis refers to the inflammation of sinuses but rhinosinusitis is a more accurate term to use because sinus passages are connected to the nasal passages. The infection occurs in the nasal passages as well as the paranasal sinuses^[3].

The incidence of acute sinusitis ranges from 15-40 episodes per 1000 patients yearly. Sinusitis is responsible for complicating around 0.5% of all upper respiratory tract infections. It occurs most commonly in adults and rarely in children despite their underdeveloped sinuses. It can be a significant concern for the patients leading them to take time off work and affecting their quality of life. Acute sinusitis is the second most common infection encountered in primary health care and one of the commonest indications for prescribing antibiotics by general practitioners^[4-7]. Therefore, we aim in this article to review the published literature that discussed sinusitis evaluation and management.

METHODS:

PubMed database was used for articles selection, and the following keys were used in the mesh (“sinusitis”[Mesh]) AND (“Management”[Mesh]) OR (“Evaluation”[Mesh])).

In regards to the inclusion criteria, the articles were selected based on the inclusion of one of the following topics: sinusitis, evaluation, and management.

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Exclusion criteria were all other articles that did not have one of these topics as their primary endpoint.

DISCUSSION:

The function of sinuses is very important for protecting the respiratory tract against different antigens. They work in filtering the pollutants and the dust out of the nasal cavity. The mucus membranes of the sinuses are lined with cilia that circulate and carry the mucus that traps the antigen. This mucus will eventually reach the oropharynx and the nasopharynx to be swallowed. Inflammation of the sinuses due to allergy or upper respiratory tract infection will lead to edema of the sinuses and thus dysfunction. Then, the bacteria and the antigens, in general, will stay in the sinuses and continue in growth.

Based on the onset and the timing, there are 4 classifications of sinusitis:

- Acute sinusitis: < 4 weeks.
- Subacute sinusitis: < 12 weeks.
- Recurrent acute sinusitis: ≥ 4 episodes of acute sinusitis that last for more than a week for 1 year.
- Chronic sinusitis: persistent sinusitis for ≥ 12 weeks.

Nevertheless, the causes of sinusitis vary based on the source and the trigger of the inflammation. The usual trigger in most cases of sinusitis is viral upper respiratory tract infection and only 2% can be complicated by bacterial sinusitis [8]. Allergic and non-allergic rhinitis can also trigger sinusitis. Anatomical variations, such as the presence of an abnormality in the osteomeatal complex or septal deviation can be significant risk factors for the development of sinusitis. Other factors include cigarette smoking, diabetes mellitus, and dental infections and procedures [9].

Nonetheless, most of the patients receive antibacterial thereby as treatment of sinusitis from general practitioners. However, most cases including bacterial sinusitis resolve without the need for antibiotics [10]. General practitioners sometimes misclassify viral sinusitis as bacterial leading them to unnecessary prescribing of antibiotics because the clinical pictures of acute bacterial sinusitis and prolonged viral upper respiratory tract infection have some sort of close similarity. Therefore, relying on the clinical findings alone can be misleading in diagnosing such cases [9].

The clinical findings should be supported by diagnostic imaging or nasal endoscopy to make an appropriate diagnosis. Nasal congestion or/and discharge indicate nasal or paranasal inflammation. The presence of at least one of them with or without an affected sense of smell and with or without facial pain in addition to one of endoscopic or imaging signs. Endoscopic signs include mucopurulent discharge or edema in the sinuses or the presence of nasal polyps. The imaging changes can be seen by CT and they include mucosal changes within the sinuses [11].

Regarding X-ray, the presence of air-fluid level is the hallmark of acute sinusitis. Nevertheless, the air-fluid levels in the X-ray may not accurately estimate the degree of inflammation in the sinuses [3]. Also, sinus X-ray may show non-specific mucosal thickening or opacification in the sinuses. However, the observer may not accurately elaborate on these findings because they may be because of an infection or a more serious disorder, such as polyp or tumor disease. Therefore, this interobserver variability makes the reliability of plain X-ray limited [12, 13].

Management:

Nasal wash and humidification by saline have resulted in the reduction of sinusitis symptoms [3]. Daily irrigation of the nose with hypertonic saline is recommended because it can decrease the severity of the symptoms and limit the use of medications in patients with recurrent sinusitis [14].

It is also possible to use nasal/oral decongestants, such as pseudoephedrine or oxymetazoline. These decongestants cause vasoconstriction, which reduces edema and congestion. Nevertheless, oxymetazoline can lead to rebound congestion if it was used for more than 3 days. In patients with hypertension, oral decongestants are not recommended [15].

Regarding antibiotics, they should be used only when a bacterial infection is suspected. The proper choice is dependent on the patterns of resistance in the community. However, the recommended first-line treatment is amoxicillin or amoxicillin-clavulanate for 10 days or 2 weeks. In cases of resistance or ineffectiveness, switching to second- or third-generation cephalosporins is next. To increase the anaerobic coverage, metronidazole can be added, especially in chronic and persistent cases [16].

The use of antihistamines in treating sinusitis is not supported in the literature. They have an anti-inflammatory effect which can be beneficial but their anticholinergic effect may worsen the edema and impair the clearance [17, 18].

The symptoms of mucosal edema can be reduced by topical corticosteroids like beclomethasone, particularly in chronic and allergic sinusitis. However, in acute sinusitis, the use of intranasal steroids have shown limited benefits in treating the symptoms and their severity [19]. Corticosteroid therapy in chronic cases limits the viability and the activation of eosinophils and subsequently reduces the inflammation [20, 21]. Corticosteroids also indirectly limit the chemotaxis process leading to a significant reduction in the release of the cytokines from the nasal mucosa and the polyp's epithelial cells [22]. Speaking of which, nasal polyps can be reduced in size by topical steroids use [23, 24]. In general, intranasal corticosteroids use is safe as it is not associated with fungal infection development nor serum cortisol level disturbance [25]. However, the patient may develop side effects, such as the dry nose, epistaxis, itching, and burning sensation in the nose, pharyngitis, and sinusitis [26].

In severe inflammation, systemic corticosteroids are introduced to control its severity and limit its burdensome manifestations [24]. Although they cannot be properly evaluated alone because they are usually given with other medications, oral steroids have shown to be highly effective in chronic sinusitis. Their use is associated with better outcome regarding symptoms and cytokines profiles [27, 28]. Moreover, the complete resolution of chronic sinusitis has been seen in some studies either with or without nasal polyps 8 weeks after the steroids use [29]. The most commonly used corticosteroids are prednisolone and methylprednisolone [30]. Despite that the evidence supports their use, long-term use of systemic corticosteroids with high doses is associated with unpleasant side effects, such as Cushing disease and diabetes [31].

Referral:

A referral is recommended in cases of severe pain, swelling of the face, swelling of the forehead, especially in immunocompromised patients like uncontrolled diabetics, patients with end-stage renal failure, or an HIV infection. Moreover, suspected malignancy, neurological manifestations, and orbital complications are indications for urgent referral [11].

Also, if the optimal medical course of treatment failed, referral to an otolaryngologist is recommended [11]. One of the possibilities behind persistent sinusitis is the presence of congested mucus of fungal elements due to allergic fungal sinusitis. Then, endoscopic sinus surgery is the treatment of choice in such cases [32].

Traditionally, open sinus procedures were used for chronic cases that did not respond to maximal medical therapy and have the potential to develop complications [7]. Nevertheless, they are now replaced by endoscopic sinus surgeries especially after the advancement in comprehending the normal anatomy and physiology of the sinuses and osteomeatal complex [9]. Endoscopic surgery aims to remove any tissue blocking the normal passage or drainage to restore sinus ventilation and mucociliary function [33]. After that, it is important to use intranasal steroids and saline wash to promote healing and prevent intranasal adhesions formation. In acute sinusitis, endoscopic surgery is not considered as a treating option unless there is a need for sinus wash to drain out the accumulated pus that is compressing the sinus mucosa. Then, topical saline spray and systemic antibiotics are advised to complement the intervention [9].

Complications:

Because of the location of paranasal sinuses being proximal to the anterior cranial fossa and orbit, the sinonasal disease is responsible for most of the orbital infections, primarily the ethmoid sinus [34]. Examples of orbital infections are orbital cellulitis, subperiosteal abscess, and intraorbital abscess. Untreated complicated cases may cause venous compression around the optic nerve leading to possible loss of vision. Pott's puffy tumor is osteomyelitis of the frontal bone and it

can be also caused by frontal sinusitis. Moreover, frontal sinusitis can lead to subdural and extradural empyema if the posterior wall of the sinus got damaged and destroyed. Meningitis and intracranial abscesses are also possible complications of sinusitis [9].

CONCLUSION:

Relying on the clinical findings alone can be misleading in diagnosis. The clinical findings in some cases should be supported by imaging or nasal endoscopy to make an appropriate diagnosis. Most of the patients receive antibacterial thereby as treatment of sinusitis from general practitioners despite most cases including bacterial sinusitis resolve without the need for antibiotics. Nasal wash and humidification by saline have resulted in the reduction of sinusitis symptoms. Prescribing antibiotics should be only when a bacterial infection is suspected.

REFERENCES

- Hanawi, S A, Saat, N Z M, Zulkafly, M, Hazlenah, H, Taibukahn, N H, Yoganathan, D et al. Impact of a Healthy Lifestyle on the Psychological Well-being of University Students. *Int. J. Pharm. Res. Allied sci.* 2020;9(2):1-7
- Algahtani F D. Healthy Lifestyle among Ha'il University Students, Saudi Arabia. *Int. J. Pharm. Res. Allied sci.* 2020;9(1):160-7.
- Masood A, Moumoulidis I, Panesar J. Acute rhinosinusitis in adults: an update on current management. *Postgraduate medical journal.* 2007 Jun 1;83(980):402-8. <https://doi.org/10.1136/pgmj.2006.054767>.
- Worrall G. Acute sinusitis. *Canadian Family Physician.* 2011 May 1;57(5):565-7.
- Aitken M, Taylor JA. Prevalence of clinical sinusitis in young children followed up by primary care pediatricians. *Archives of pediatrics & adolescent medicine.* 1998 Mar 1;152(3):244-8. <https://doi.org/10.1001/archpedi.152.3.244>.
- Ghasem Abedi, Asghar Nadighara, Ehsan Abedini, Bahram Tahmasbi, Mohammad Ghanbari, Farideh Rostami. Analysis of patients' satisfaction through implementing the urban family physician program in Babol County. *J Adv Pharm Edu Res.* 2018;8(4):67-72.
- Fauziah F, Surachman E, Muhtadi A. Integration of service quality and quality function deployment as an effort of pharmaceutical service improvement on outpatient in a referral Hospital, Karawang, Indonesia. *J. Adv. Pharm. Edu. Res.* 2019;9(2):13-23.
- Diagnosis and Treatment of Acute Bacterial Rhinosinusitis: Summary. Rockville, MD: Agency for Health Care Policy and Research, 1999.
- Ah-See KW, Evans AS. Sinusitis and its management. *Bmj.* 2007 Feb 15;334(7589):358-61. <https://doi.org/10.1136/bmj.39092.679722.be>.
- Scheid DC, Hamm RM. Acute bacterial rhinosinusitis in adults: part I. Evaluation. *American family physician.* 2004 Nov 1;70(9):1685-92.
- Husain, S., Amilia, H. H., Rosli, M. N., Zahedi, F. D., Sachlin, I. S., & Development Group Clinical Practice Guidelines Management of Rhinosinusitis in Adolescents & Adults. Management of rhinosinusitis in adults in primary care. *Malaysian family physician : the official journal of the Academy of Family Physicians of Malaysia*, 2018; 13(1), 28–33.
- Iinuma T, Hirota Y, Kase Y. Radio-opacity of the paranasal sinuses. Conventional views and CT. *Rhinology.* 1994 Sep 1;32(3):134-6.
- Jonas, I, Mann, W. Die Kieferhöhlenasymmetrie als Ursache der röntgenologischen Fehldiagnose einer Sinusitis. [Misleading x-ray diagnosis due to maxillary sinus asymmetries (author's transl)]. *Laryngologie, Rhinologie, Otologie*, 1976; 55(11): 905-13.
- Rabago D, Zgierska A, Mundt M, Barrett B, Bobula J, Maberry R. Efficacy of daily hypertonic saline nasal irrigation among patients with sinusitis: a randomized controlled trial. *Journal of Family Practice.* 2002 Dec 1;51(12):1049-55.
- Mulvey CL, Kiell EP, Rizzi MD, Buzi A. The microbiology of complicated acute sinusitis among pediatric patients: a case series.

- Otolaryngology–Head and Neck Surgery. 2019 Apr;160(4):712-9. <https://doi.org/10.1177/0194599818815109>.
16. Pouwels KB, Hopkins S, Llewelyn MJ, Walker AS, McNulty CA, Robotham JV. Duration of antibiotic treatment for common infections in English primary care: cross sectional analysis and comparison with guidelines. *bmj*. 2019 Feb 27;364. <https://doi.org/10.1136/bmj.l440>.
 17. Benninger MS, Anon J, Mabry RL. The medical management of rhinosinusitis. *Otolaryngology–Head and Neck Surgery*. 1997 Sep;117(3_suppl):S41-9. [https://doi.org/10.1016/s0194-5998\(97\)70006-8](https://doi.org/10.1016/s0194-5998(97)70006-8).
 18. Sisson JH, Yonkers AJ, Waldman RH. Effects of guaifenesin on nasal mucociliary clearance and ciliary beat frequency in healthy volunteers. *Chest*. 1995 Mar 1;107(3):747-51. <https://doi.org/10.1378/chest.107.3.747>.
 19. Qvarnberg Y, Valtonen H, Laurikainen K. Intranasal beclomethasone dipropionate in the treatment of common cold. *Rhinology*. 2001 Mar;39(1):9.
 20. Xaubet A, Mullol J, Lopez E, Roca-Ferrer J, Rozman M, CARRIÖN T, Fabra JM, Picado C. Comparison of the role of nasal polyp and normal nasal mucosal epithelial cells on in vitro eosinophil survival. Mediation by GM-CSF and inhibition by dexamethasone. *Clinical & Experimental Allergy*. 1994 Apr;24(4):307-17. <https://doi.org/10.1111/j.1365-2222.1994.tb00240.x>.
 21. Mullol J, Xaubet A, Lopez E, Roca-Ferrer J, Picado C. Comparative study of the effects of different glucocorticosteroids on eosinophil survival primed by cultured epithelial cell supernatants obtained from nasal mucosa and nasal polyps. *Thorax*. 1995 Mar 1;50(3):270-4. <https://doi.org/10.1136/thx.50.3.270>.
 22. Mullou J, Xaubet A, Gaya A, Roca-Ferrer J, Lopez E, Fernandez JC, Fernandez MD, Picado C. Cytokine gene expression and release from epithelial cells. A comparison study between healthy nasal mucosa and nasal polyps. *Clinical & Experimental Allergy*. 1995 Jul;25(7):607-15. <https://doi.org/10.1111/j.1365-2222.1995.tb01108.x>.
 23. Fokkens WJ, Lund VJ, Hopkins C, Hellings PW, Kern R, Reitsma S, Toppila-Salmi S, Bernal-Sprekelsen M, Mullol J, Alobid I, Anselmo-Lima WT. European position paper on rhinosinusitis and nasal polyps 2020. *Rhinology*. 2020;58(Supplement 29):1-464. <https://doi.org/10.4193/rhin20.600>.
 24. Pirochchai P, Kasemsiri P, Laohasiriwong S, Thanaviratananich S. Chronic rhinosinusitis and emerging treatment options. *International journal of general medicine*. 2013;6:453. <https://doi.org/10.2147/ijgm.s29977>.
 25. Lund VJ, Black JH, Szabó LZ, Schrewelius C, Akerlund A. Efficacy and tolerability of budesonide aqueous nasal spray in chronic rhinosinusitis patients. *Rhinology*. 2004 Jun 1;42(2):57-62.
 26. Giger R, Pasche P, Cheseaux C, Cantini L, Rossetti A, Landis B, Lacroix J. Comparison of once-versus twice-daily use of beclomethasone dipropionate aqueous nasal spray in the treatment of allergic and non-allergic chronic rhinosinusitis. *European archives of oto-rhino-laryngology*. 2003 Mar 1;260(3):135-40. <https://doi.org/10.1007/s00405-002-0543-1>.
 27. Tosca MA, Cosentino C, Pallestrini E, Riccio AM, Milanese M, Canonica GW, Ciprandi G. Medical treatment reverses cytokine pattern in allergic and nonallergic chronic rhinosinusitis in asthmatic children. *Pediatric allergy and immunology*. 2003 Jun;14(3):238-41. <https://doi.org/10.1034/j.1399-3038.2003.00029.x>.
 28. Subramanian HN, Schechtman KB, Hamilos DL. A retrospective analysis of treatment outcomes and time to relapse after intensive medical treatment for chronic sinusitis. *American journal of rhinology*. 2002 Nov;16(6):303-12. <https://doi.org/10.1177/194589240201600605>.
 29. Lal D, Scianna JM, Stankiewicz JA. Efficacy of targeted medical therapy in chronic rhinosinusitis, and predictors of failure. *American journal of rhinology & allergy*. 2009 Jul;23(4):396-400. <https://doi.org/10.2500/ajra.2009.23.3334>.
 30. Martinez-Devesa, Pablo, Shalini, P. Oral Steroids for Nasal Polyps. *Cochrane Database of Systematic Reviews*, 2011. <https://doi.org/10.1002/14651858.cd005232.pub3>.
 31. Rupa V, Jacob M, Mathews MS, Seshadri MS. A prospective, randomised, placebo-controlled trial of postoperative oral steroid in allergic fungal sinusitis. *European archives of oto-rhino-laryngology*. 2010 Feb 1;267(2):233. <https://doi.org/10.1007/s00405-009-1075-8>.
 32. Plonk DP, Luong A. Current understanding of allergic fungal rhinosinusitis and treatment implications. *Current Opinion in Otolaryngology & Head and Neck Surgery*. 2014 Jun 1;22(3):221-6. <https://doi.org/10.1097/moo.0000000000000043>.
 33. Messerklinger W. Role of the lateral nasal wall in the pathogenesis, diagnosis and therapy of recurrent and chronic rhinosinusitis. *Laryngologie, Rhinologie, Otologie*. 1987 Jun 1;66(6):293-9.
 34. Friedman DP, Rao VM, Flanders AE. Lesions causing a mass in the medial canthus of the orbit: CT and MR features. *AJR. American journal of roentgenology*. 1993 May;160(5):1095-9. <https://doi.org/10.2214/ajr.160.5.8470584>.