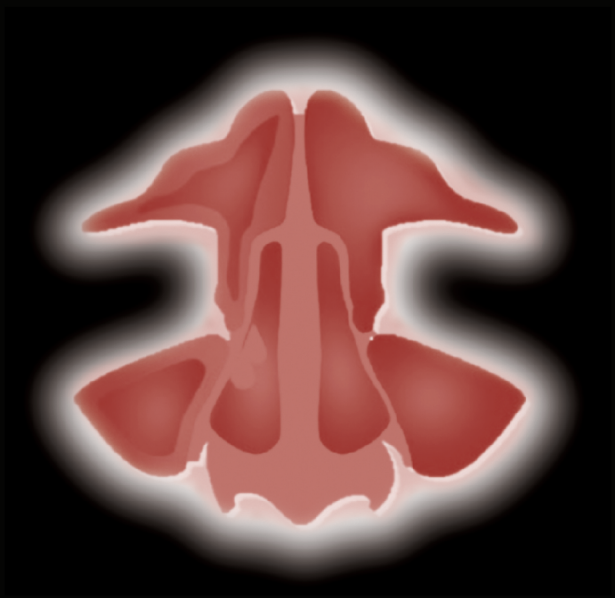
CLINICAL PRACTICE GUIDELINES

MOH/P/PAK/318.16(GU)

MANAGEMENT OF RHINOSINUSITIS IN ADOLESCENTS AND ADULTS



Ministry of Health Malaysia

Malaysian Society of Otorhinolaryngologist - Head & Neck Surgeons (MS)-HNS)

Academy of Medicine Malaysia

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STATEMENT OF INTENT

These clinical practice guidelines (CPG) are meant to be guides for clinical practice, based on the best available evidence at the time of development. Adherence to these guidelines may not necessarily guarantee the best outcome in every case. Every healthcare provider is responsible for the management of his/her unique patient based on the clinical picture presented by the patient and the management options available locally.

These guidelines were issued in 2016 and will be reviewed in 2020 or sooner if new evidence becomes available. When it is due for updating, the Chairman of the CPG or National Advisor of the related specialty will be informed about it. A discussion will be done on the need for a revision including the scope of the revised CPG. A multidisciplinary team will be formed and the latest systematic review methodology used by MaHTAS will be employed.

Every care is taken to ensure that this publication is correct in every detail at the time of publication. However, in the event of errors or omissions, corrections will be published in the web version of this document, which is the definitive version at all times. This version can be found on the websites mentioned above.

KEY RECOMMENDATIONS

The following recommendations are highlighted by the CPG Development Group as the key recommendations that answer the main questions addressed in the CPG and should be prioritised for implementation.

✓ DIAGNOSIS

- Anterior rhinoscopy should be performed as part of clinical assessment of suspected acute rhinosinusitis in primary care setting.
- Nasal endoscopy should be performed to diagnose rhinosinusitis at otorhinolaringology centre.

✓ LABORATORY TESTS

- Nasal swab should not be performed in rhinosinusitis.
- In otorhinolaryngology centres, culture and susceptibility test may be considered in patients who do not respond to antibiotic treatment after 72 hours in acute rhinosinusitis.
- Endoscopically-directed middle meatal culture may be used to obtain specimen for culture and susceptibility tests in diagnosing unresolved bacterial rhinosinusitis by otorhinolaryngologists.

✓ ANTIBIOTICS

- Antibiotic may be prescribed in acute bacterial rhinosinusitis after weighing benefits against potential side effects.
- Antibiotic should not be used routinely in chronic rhinosinusitis.

✓ CORTICOSTEROIDS

- Intranasal corticosteroids:
  - should be considered for 2 - 3 weeks in acute rhinosinusitis
  - should be given for 16 - 52 weeks in chronic rhinosinusitis

✓ NASAL SALINE IRRIGATION

- Saline irrigation should be used as an adjunct therapy in patients with rhinosinusitis.

✓ SURGERY

- Surgery should be considered in acute rhinosinusitis with orbital or intracranial complications.

TABLE OF CONTENTS

LEVELS OF EVIDENCE

Level	Study design
I	Evidence from at least one properly randomised controlled trial
II-1	Evidence obtained from well-designed controlled trials without randomisation
II-2	Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one centre or group
II-3	Evidence from multiple time series with or without intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence
III	Opinions of respected authorities based on clinical experience; descriptive studies and case reports; or reports of expert committees

SOURCE: US / CANADIAN PREVENTIVE SERVICES TASK FORCE 2001

In line with the current development in CPG methodology, the CPG Unit of MaHTAS is in the process of adapting **Grading Recommendations, Assessment, Development and Evaluation (GRADE)** in its work process. The quality of each retrieved evidence and its effect size are carefully assessed/reviewed by the CPG Development Group. In formulating the recommendations, overall balances of the following aspects are considered in determining the strength of the recommendations:-

- overall quality of evidence
- balance of benefits versus harms
- values and preferences
- resource implications
- equity, feasibility and acceptability

GUIDELINES DEVELOPMENT AND OBJECTIVES

GUIDELINES DEVELOPMENT

The members of the Development Group (DG) for these CPG were from the Ministry of Health (MoH) and Ministry of Education (MoE). There was active involvement of a multidisciplinary Review Committee (RC) during the process of the CPG development.

A systematic literature search was carried out using the following electronic databases/platform: Guidelines International Network (G-I-N), Medline via Ovid, Cochrane Database of Systemic Reviews (CDSR) and PubMed (refer to **Appendix 1** for **Example of Search Strategy**). The inclusion criteria are all adolescents and adults (age more than 12 years) with rhinosinusitis regardless of study design. The search was limited to literature published in the last ten years and on humans and in English. In addition, the reference lists of all retrieved literature and guidelines were searched and experts in the field contacted to identify relevant studies. All searches were conducted from 12 May 2014 to 12 June 2014. Literature search was repeated for all clinical questions at the end of the CPG development process allowing any relevant papers published before 28 February 2015 to be included. Future CPG updates will consider evidence published after this cut-off date. The details of the search strategy can be obtained upon request from the CPG Secretariat.

Reference was also made to European Position Paper on Rhinosinusitis and Nasal Polyps developed by International Rhinology Society in 2012. The CPG was evaluated using the Appraisal of Guidelines for Research and Evaluation (AGREE) II prior to it being used as reference.

A total of 24 clinical questions were developed under different sections. Members of the DG were assigned individual questions within these sections (refer to **Appendix 2** for **Clinical Questions**). The DG members met 25 times throughout the development of these guidelines. All literatures retrieved were appraised by at least two DG members using Critical Appraisal Skill Programme checklist, presented in evidence tables and further discussed in each DG meetings. All statements and recommendations formulated after that were agreed upon by both the DG and RC. Where evidence was insufficient, the recommendations were made by consensus of the DG and RC. Any differences in opinion are resolved consensually. The CPG was based largely on the findings of systematic reviews, meta-analyses and clinical trials, with local practices taken into consideration.

The literatures used in these guidelines were graded using the US/ Canadian Preventive Services Task Force Level of Evidence (2001)

while the grading of recommendation was done using the principles of GRADE (refer to the preceding page).

On completion, the draft CPG was reviewed by external reviewers. It was also posted on the MoH Malaysia official website for feedback from any interested parties. The draft was finally presented to the Technical Advisory Committee for CPG, and the HTA and CPG Council MoH Malaysia for review and approval.

OBJECTIVES

The objectives of the CPG are to provide evidence-based recommendations on the following:

a) early diagnosis
b) treatment
c) prevention

CLINICAL QUESTIONS

Refer to **Appendix 2**

TARGET POPULATION

All adolescents and adults (patients aged >12 years old) with rhinosinusitis (RS)

TARGET GROUP/USER

This CPG is intended to guide those involved in the management of RS in adolescents and adults either in primary or secondary/tertiary care namely:

i. Medical officers and specialists
ii. Allied health professionals
iii. Trainees and medical students
iv. Patients and their advocates
v. Professional societies

HEALTHCARE SETTINGS

Outpatient, inpatient and community settings

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The draft CPG was reviewed by a panel of experts from both public and private sectors. They were asked to comment primarily on the comprehensiveness and accuracy of the interpretation of evidence supporting the recommendations in the CPG.

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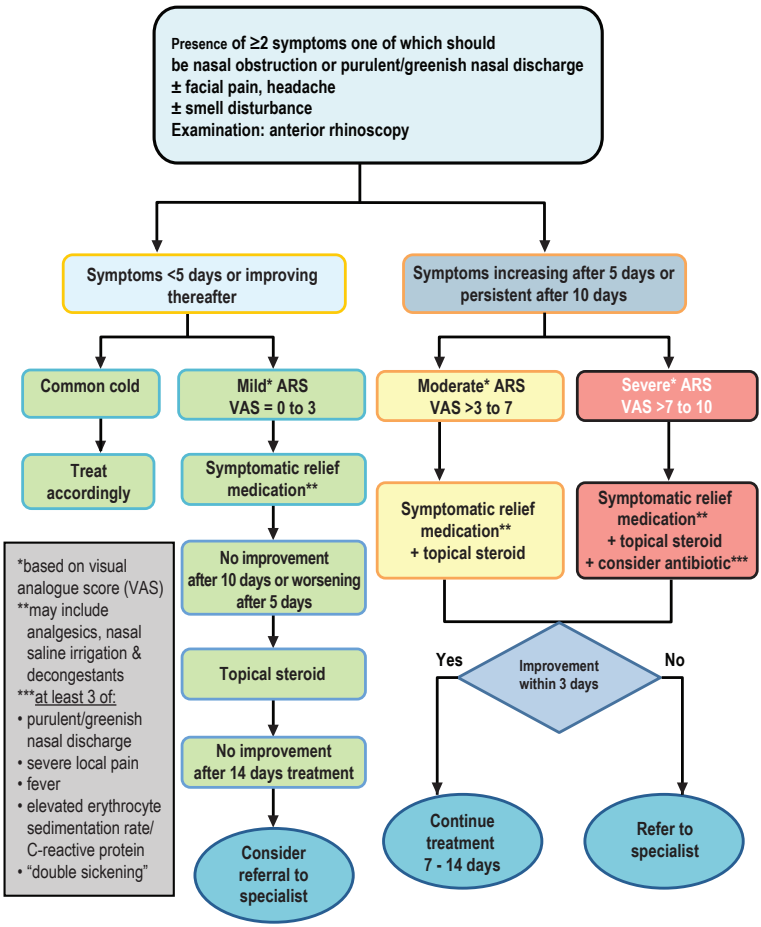
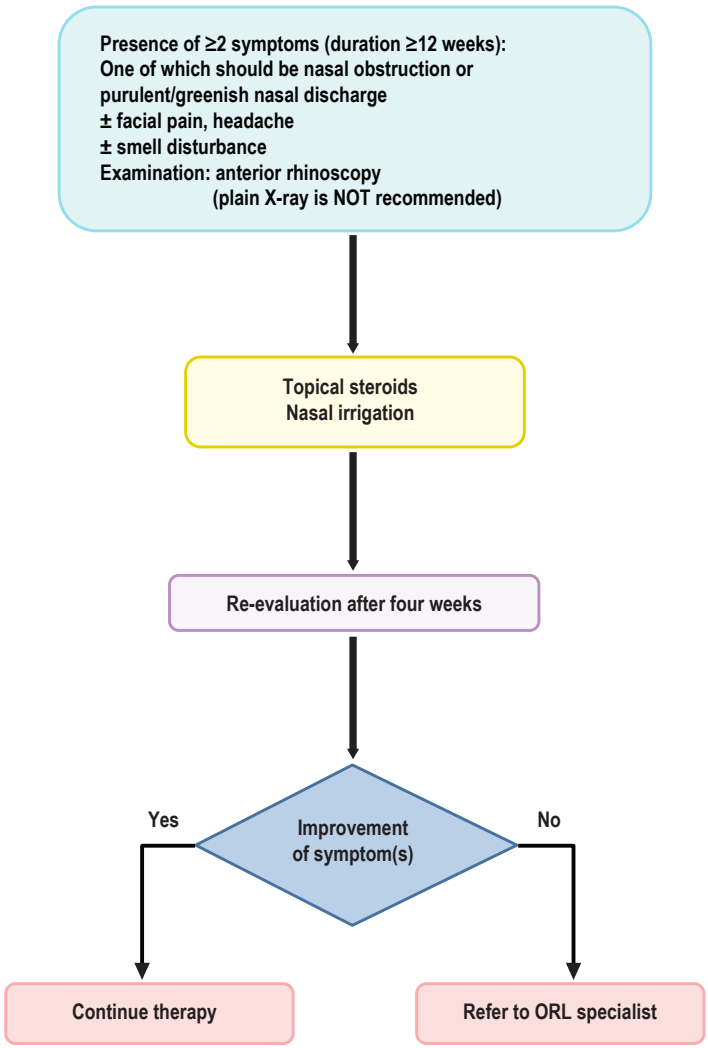
ALGORITHM 1
Management of Acute Rhinosinusitis for Primary Care and Non-Otorhinolaryngology (ORL) Centre



Modified: Fokkens WJ, Lund VJ, Mullol J, et al. EPOS 2012: European position paper on rhinosinusitis and nasal polyps 2012. A summary for otorhinolaryngologists. Rhinology. 2012 Mar;50(1):1-12

ALGORITHM 2
Management of Chronic Rhinosinusitis for Primary Care and Non-ORL Centre



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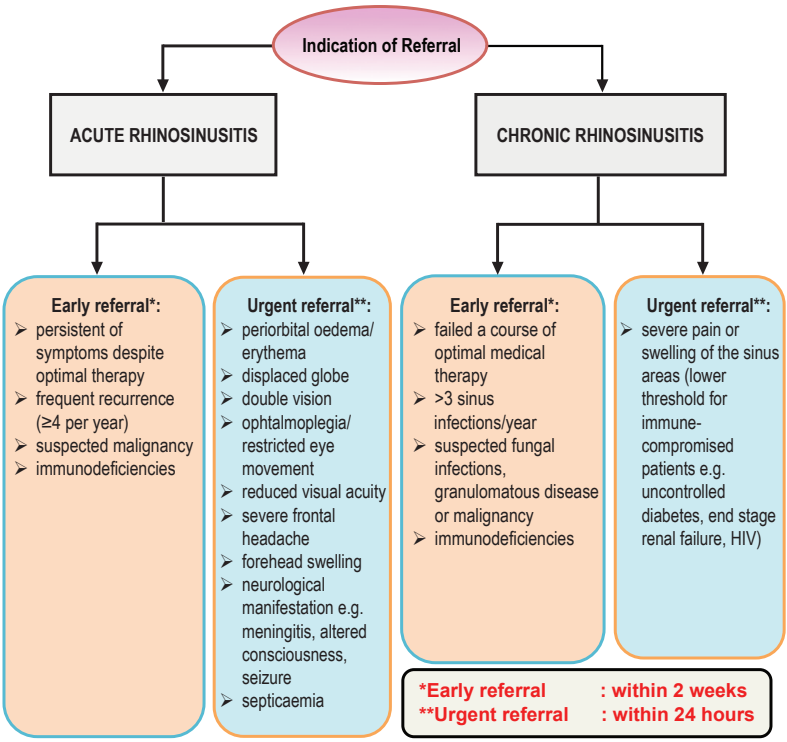
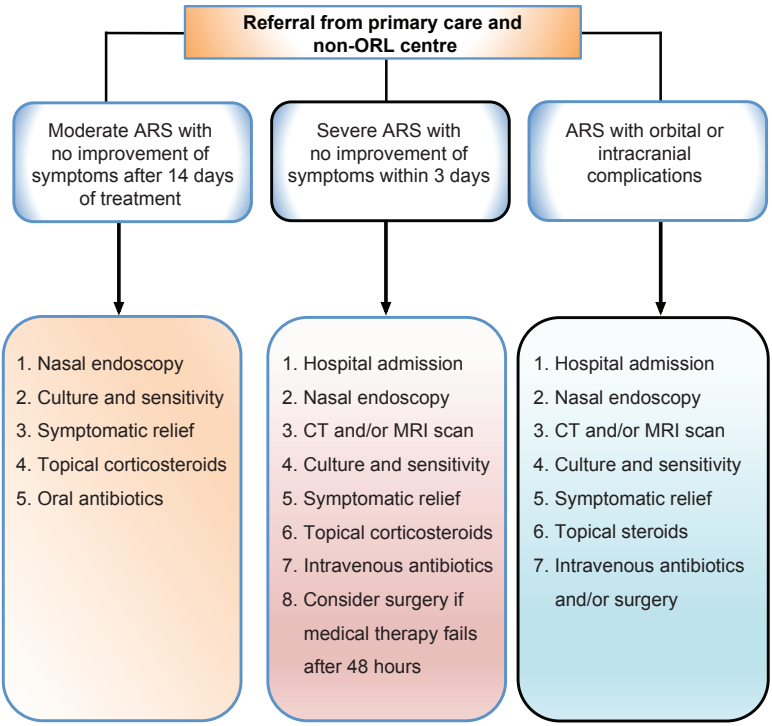
ALGORITHM 3
Indications of Referral to ORL Centre



ALGORITHM 4
Management of ARS for ORL Centre



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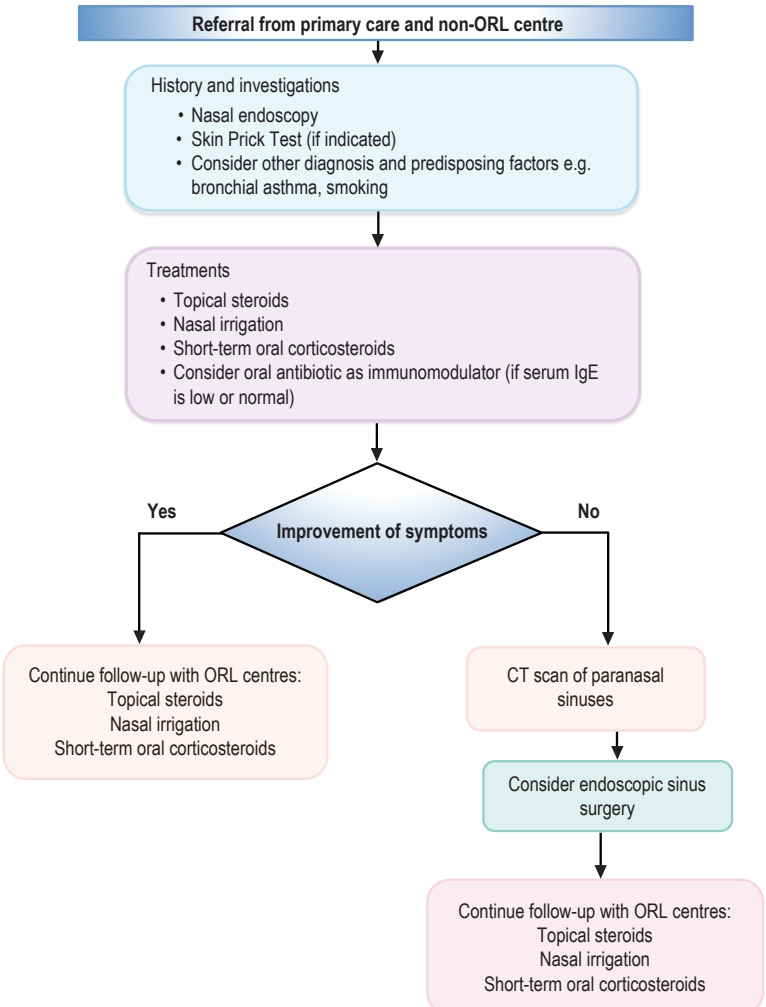
ALGORITHM 5
Management of CRS for ORL Centre



1. INTRODUCTION AND DEFINITION

Sinusitis is a common health problem characterised by mucosal inflammation of the paranasal sinuses. However, it often coexists with rhinitis in most patients. Hence the current accepted terminology is rhinosinusitis.

Rhinosinusitis (RS) can be divided into two subtypes: acute and chronic based on the duration of the symptoms. The clinical presentation includes nasal obstruction, rhinorrhea, headache, decreased sense of smell, postnasal drip, facial pressure or pain, fever, sore throat and cough. Predisposing factors for RS are multifactorial, which includes infection, allergies, and air pollution.

RS poses a major health problem. The disease and its effect on quality of life, productivity, and finances are substantial. Although it is a common illness, RS presents a number of diagnostic and management challenges to the practicing clinician.

The aim of this guideline is to help the healthcare providers in both government and private practice to manage RS and its subtypes, including acute rhinosinusitis (ARS) and chronic rhinosinusitis (CRS) with or without nasal polyposis.

2. EPIDEMIOLOGY

ARS is common disease worldwide with a reported prevalence rate ranging from 6 - 15%.[1, level III]

The prevalence rate of CRS, in Europe, United States of America and Brazil is between 5 - 15%.[1, level III] Meanwhile in the Asian region the prevalence rate reported in Korea, China and Singapore are 7%, 8% and 2.7% respectively.[2, level III]

3. PREDISPOSING/RISK FACTORS

Active smokers with concurrent allergic inflammation have an increased susceptibility to ARS compared to non-smokers. Both exposure to cigarette smoke and allergic inflammation has been shown to impair ciliary function.[1, level III]

There is a higher risk of CRS in patients with current and past exposure to second hand smoke (SHS) compared with no exposure (OR=2.33, 95% CI 1.02 to 5.34).[4, level II-2] A dose-response relationship is also demonstrated in SHS (OR=2.03, 95% CI 1.55 to 2.66).[3, level II-2]

Other significant risk or associated factors for CRS are:

- positive family history[4, level II-2]
- asthma (OR=3.47, 95% CI 3.20 to 3.76)[5, level III] especially with the presence of CRS with nasal polyps (CRSwNP)[6, level II-2]
- allergies, chronic bronchitis and emphysema[4, level II-2]
- ARS[6, level II-2]
- chronic rhinitis[6, level II-2]
- gastroesophageal reflux disease[6, level II-2]
- sleep apnoea[6, level II-2]
- adenotonsillitis[6, level II-2]

There is no evidence for a causal correlation between nasal anatomic variations in general and the incidence of CRS.[1, level III]

Smoking (active and passive), family history of chronic rhinosinusitis, asthma and gastroesophageal reflux disease are important risk factors for rhinosinusitis.

4. DIAGNOSIS

The diagnosis of RS is usually based on clinical symptoms supported by diagnostic imaging or nasal endoscopy.[1, level III]

4.1 Clinical Diagnosis

- Clinical definition of rhinosinusitis in adults is defined as:
  - Inflammation of the nose and the paranasal sinuses characterised by two or more symptoms, one of which should be either nasal blockage/obstruction/congestion or nasal discharge (anterior/posterior nasal drip):
    - ± facial pain/pressure
    - ± reduction or loss of smell

AND at least one of the following:

- Endoscopic signs of:
  - nasal polyps, and/or
  - mucopurulent discharge primarily from middle meatus and/or
  - oedema/mucosal obstruction primarily in middle meatus
- CT changes:
  - mucosal changes within the ostiomeatal complex and/or sinuses
- Past medical history of CRS (medically diagnosed)

Modified: Fokkens WJ, Lund VJ, Mullol J, et al. EPOS 2012: European position paper on rhinosinusitis and nasal polyps 2012. A summary for otorhinolaryngologists. Rhinology. 2012 Mar;50(1):1-12

4.1.1 Acute vs Chronic RS

ARS is defined as worsening of symptoms after five days or symptoms persist after 10 days and less than 12 weeks. If the duration of symptoms is less than five days, it is diagnosed as acute viral RS or commonly known as common cold (**Figure 1**).[1, level III]

Severity of RS can be divided into the following based on total severity visual analogue scale (VAS) score (0-10) cm:[1, level III]

- mild = 0 - 3
- moderate = >3 - 7
- severe = >7 - 10

In contrast, CRS is defined as symptoms persisting for more than 12 weeks.[8, level III]

Nasal endoscopy or computed tomography (CT) scan is one the requirement to diagnose RS, however both are not readily available in most primary healthcare (PHC) setting. Therefore, in PHC, obtaining a

past medical history of CRS is sufficient to make a diagnosis based on the following evidence:

- When symptoms criteria alone (mucopurulent drainage, nasal obstruction, facial pain and decreased sense of smell) are used to diagnose CRS with CT scan as the gold standard, the overall accuracy is only 42.8%. The accuracy improves to 69.1% when these criteria are combined with nasal endoscopic findings (clinical-based CRS diagnosis).[9, level III]
- Adding past medical history of CRS (medically-treated or doctor-diagnosed) to symptoms criteria of European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS212) improves the agreement between symptoms criteria and clinical-based CRS diagnosis (κ increases from 47.08 to 57.65).[10, level II-2] Most symptoms considered to be typical for CRS are non-specific.[11, level III]

- In acute rhinosinusitis, the duration is <12 weeks with complete resolution of symptoms while in chronic rhinosinusitis, the duration take ≥12 weeks without complete resolution of symptoms.[1, level III]

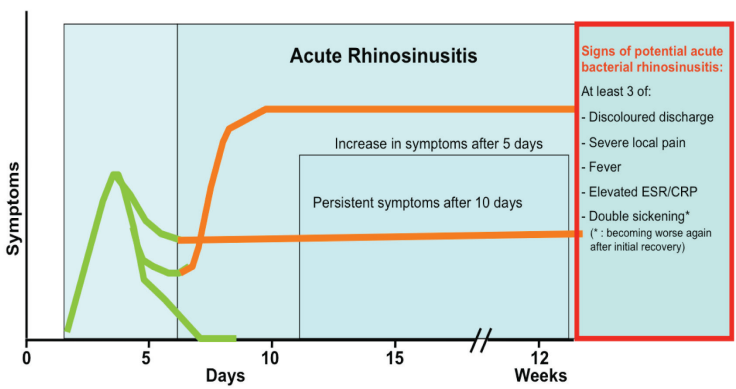


Figure 1. Definition of Acute Rhinosinusitis

Modified from: Fokkens WJ, Lund VJ, Mullol J et al. European Position Paper on Rhinosinusitis and Nasal Polyps 2012. Rhinol Suppl. 2012 Mar (23): 1-298

4.1.2 Viral vs Bacterial RS

Majority of ARS cases are viral in origin with only 0.5 - 2.0% complicated by bacterial infection.[1, level III] In clinical practice, it is difficult to differentiate whether RS is bacterial or viral in origin. This may lead to unnecessary antibiotic use for patients and increase the incidence of antibiotic resistance. Symptoms such as fever, facial pain, purulent nasal discharge and durations of symptoms have been used to differentiate bacterial from viral RS.

Meta-analysis of randomised controlled trials (RCT) found that most common signs and symptoms (such as previous common cold, purulent nasal discharge, unilateral facial pain, toothache, pain on bending or chewing, purulent discharge in the pharynx) do not help to distinguish a bacterial from a viral infection. Duration of symptoms of >10 days were not significantly associated with bacterial RS.[12, level I]

A systematic review assessing symptoms of fever and dental pain in RS also showed non-significant association with bacterial infection. Although the risk of acute bacterial rhinosinusitis (ABRS) in patients presenting with purulent nasal discharge was increased in one study (OR=2.69, 95% CI 1.39 to 5.18), there was insufficient evidence to support purulent nasal discharge in distinguishing a viral from bacterial infection.[13, level III]

Despite the lack of evidence, the CPG DG and RC have adapted the clinical features of ABRS from European Position Paper on Rhinosinusitis and Nasal Polyps developed by International Rhinology Society as shown in the following box.[1, level III]

- Acute bacterial rhinosinusitis is suggested when there are at least three symptoms/signs of:
  - discoloured discharge (with unilateral predominance) and purulent secretion in the nasal cavity
  - severe local pain (with unilateral predominance)
  - fever (>38ºC)
  - elevated erythrocyte sedimentation rate/C-reactive protein
  - deterioration of symptoms and signs

4.2 Anterior Rhinoscopy and Nasal Endoscopy

4.2.1 Anterior Rhinoscopy

Anterior rhinoscopy should be performed as part of clinical assessment of suspected ARS in primary care setting, albeit a rather limited role. It may reveal findings such as mucosal oedema, nasal inflammation, purulent nasal discharge, polyps and anatomical abnormalities.[1, level III]

Anterior rhinoscopy has a limited value in diagnosing CRS as opposed to nasal endoscopy which provides better visualisation of nasal pathologies including anatomical variations, mucosal inflammation, polyps and nasal discharge.[1, level III]

4.2.2 Nasal Endoscopy

Two types of nasal endoscope are available, rigid and flexible nasal endoscope (**Figure 2 and 3**). There is no current evidence comparing

the two types of endoscope. However the rigid nasal endoscope is preferred by local otorhinolaringologists because it provides superior image clarity and better patients' comfort. In addition, it facilitates culture and tissues sampling and enables the endoscopist to perform procedures such as nasal toileting.

Nasal endoscopy is not required in diagnosing ARS in primary care.[1, level III] However it is necessary to be performed in ORL setting as part of clinical examination of RS.

In the diagnosis of ABRS, the sensitivity and specificity of flexible nasal endoscopy in reference of sinus radiograph are 97.7% (95% CI 72.41 to 92.97) and 67.3% (95% CI 54.56 to 80.06) respectively.[14, level III]

The diagnostic values of nasal endoscopy in CRS compared with CT scan as a gold standard are:

- sensitivity and specificity of 29 to 38% and 93 to 95% respectively[15, level III]
- accuracy of positive symptoms at 69.1%[9, level III]
- PPV ranging from 0.56 to 0.89 and NPV ranging from 0.30 to 0.76[15, level III; 16, level I]

Nasal endoscopy is an operator dependant procedure (**Figure 4**). The agreement between different endoscopists is substantial for nasal polyps (κ=0.693, $p<0.001$) and fair to moderate for the other signs. [17, level III]

Types of endoscope and its use

Figure 2. Rigid Nasal Endoscope

Figure 3. Flexible Nasal Endoscope

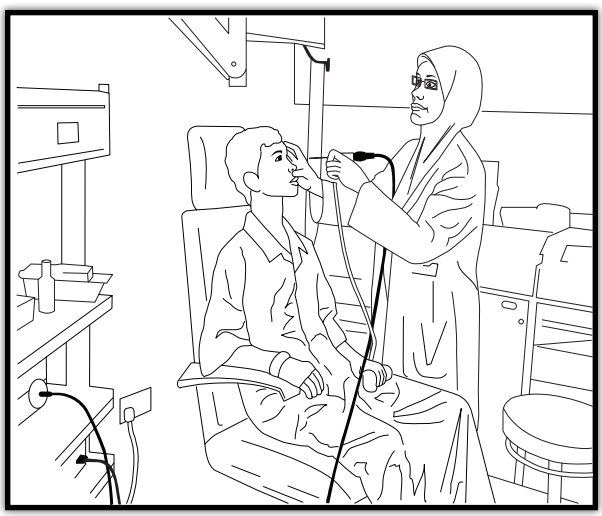


Figure 4. Nasal Endoscopic Examination

Endoscopic Findings

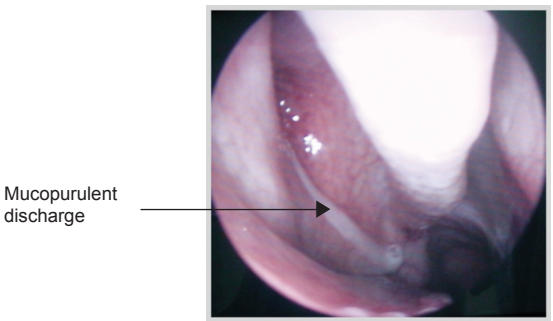


Figure 5. Acute Rhinosinusitis
Endoscopic view of right nasal cavity shows mucopurulent discharge trickling down from middle meatus.

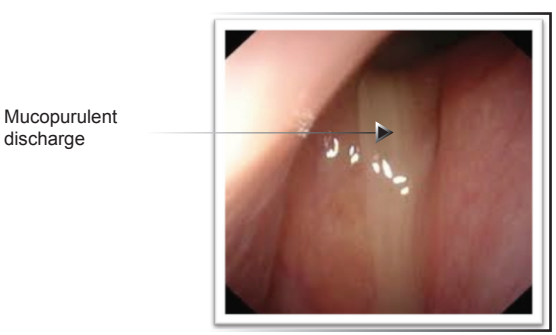


Figure 6. Chronic Rhinosinusits without Nasal Polyposis (CRSsNP)
Endoscopic view of left nasal cavity shows mucopurulent discharge in the middle meatus.

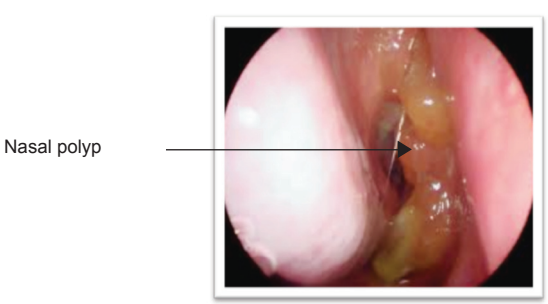


Figure 7. Chronic Rhinosinusitis with Nasal Polyposis (CRSwNP)
Endoscopic view of right nasal cavity shows nasal polyps arising from middle meatus extending to the floor of the nose (Grade III nasal polyps).

Recommendation 1
- Anterior rhinoscopy should be performed as part of clinical assessment of suspected acute rhinosinusitis in primary care setting.
- Nasal endoscopy should be performed to diagnose rhinosinusitis at otorhinolaringology centre.

4.3 Imaging

Imaging modalities for the paranasal sinuses include plain radiography, CT scan and magnetic resonance imaging (MRI).

Plain radiography has no role in the routine management of rhinosinusitis.[18, level III]

CT scan is the gold standard for radiographic evaluation of the paranasal sinuses[19, level III] and had been used in many studies as a reference in diagnosing bacterial rhinosinusitis.[20 - 21, level III] It can quantify the extent of inflammatory disease based on opacification of the paranasal sinuses.

Indications for CT scan in RS are:[18, level III]
- failed medical therapy
- planned for surgery
- atypical or severe disease, i.e. unilateral symptoms, blood-stained discharge, displacement of the eye and severe pain

MRI may be useful in cases of diagnostic uncertainty or when intracranial complications are suspected.[1, level III]

Recommendation 2
- Plain radiography is not recommended in the management of rhinosinusitis.
- Computed tomography scan of the paranasal sinuses should be considered in rhinosinusitis when:
  - medical therapy fails
  - surgery is planned
  - complications are suspected

4.4 Laboratory Tests

Laboratory culture and antibiotic susceptibility (C&S) tests aim to document bacterial infection and resistance pattern in bacterial RS. It is important to ensure these tests have appropriate indications and sampling methods.

In ABRS, patients who do not respond to first- and second-line antibiotics, sinus or meatal culture for pathogen-specific therapy is recommended.[22, level III]

Nasal swab cultures are of little predictive value in diagnosing ABRS and CRS. When necessary, bacterial cultures in CRS should be performed either via endoscopic culture of the middle meatus or maxillary tap but not by simple nasal swab.[23, level III]

Maxillary Sinus Taps (MST) for sinus puncture and aspiration is the goal standard method in determining the aetiology of ABRS but is rarely performed due to its invasive nature. Endoscopically-directed middle meatal culture (EDMMC) is less invasive in obtaining specimen when compared with MST. In two meta-analyses, EDMMC was as accurate as MST:

- The pooled accuracy calculated per culture and per isolate was comparable at 73%, (95% CI 50 to 88) and 82% (95% CI 65 to 92) respectively in acute and chronic RS.[24,level III]
- An accuracy of 87.0% (95% CI 81.3 to 92.8) was obtained when detecting main pathogenic bacteria *(Streptococcus pneumoniae, Haemophilus influenzae and Moraxella catarrhalis)* in ABRS. However, the accuracy reduced in the detection of all bacteria (76.3%, 95% CI 69.1 to 83.6).[25, level III]

EDMMC has comparable performance with sinus CT scan as gold standard in the diagnosis of bacterial RS (sensitivity of 92.8%, specificity of 80.0% and accuracy of 90.2%).[21, level III]

- In rhinosinusitis,[23, level III]
  - two main causative infectious bacteria implicated in acute bacterial rhinosinusitis (ABRS) are *Streptococcus pneumoniae and Haemophilus influenzae*.
  - *Moraxella catarrhalis* is infrequently isolated from the adult population, but is more common in children.
  - bacteriology of chronic rhinosinusitis is different from that of ABRS.
  - the main pathogens recovered in chronic sinusitis include *Staphylococcus aureus, Enterobacteriaceae spp* and *Pseudomonas spp*.
  - anaerobic organisms are predominant in acute sinusitis with dental origin.

Recommendation 3

- Nasal swab should not be performed in rhinosinusitis.
- Culture and susceptibility test may be considered in patients who do not respond to antibiotic treatment after 72 hours in acute rhinosinusitis.
- Endoscopically-directed middle meatal culture may be used to obtain specimen for culture and susceptibility tests in diagnosing unresolved bacterial rhinosinusitis by otorhinolaryngologists.

5. DIFFERENTIAL DIAGNOSIS

The following are clinical features to differentiate between rhinosinusitis with other ORL condition with similar presentation.

	Allergic Rhinitis	Rhinosinusitis	Allergic Fungal Rhinosinusitis
Nasal discharge	**clear**	**mucopurulent**	**mucin**
Facial pain	**-**	**+ (acute)**	**±**
Nasal itchiness	**+**	**-**	**±**
Sneezing	**+**	**-**	**±**
Nasal obstruction	**+**	**+**	**+**
Smell disturbance	**±**	**±**	**±**
Fever	**-**	**+ (acute)**	**-**

(+) yes (-) no (±) possible

6. REFERRAL

There is no specific criteria for referral based on current available evidence. This chapter is written based on other guidelines and expert opinion of the CPG DG and RC.

6.1 Acute Rhinosinusitis

Indications for early referral (within one week) are:[1, level III; 23, level III]

- persistent symptoms despite optimal therapy in particular immunocompromised patients such as uncontrolled diabetes, end-stage renal failure, patient with human immunodeficiency virus (HIV)
- frequent recurrence (≥4 episodes per year)
- anatomical defects causing obstruction
- suspected malignancy

Urgent referral (within 24 hours) is required in the presence of:[1, level III; 23, level III]

- orbital complications **(Figure 8)**
  - periorbital oedema/erythema
  - displaced globe
  - double vision
  - ophtalmoplegia/restricted eye movement
  - reduced visual acuity
- severe frontal/retro-orbital headache
- forehead swelling (subperiosteal abscess)
- neurological manifestations e.g. meningitis, altered consciousness, seizure
- septicaemia

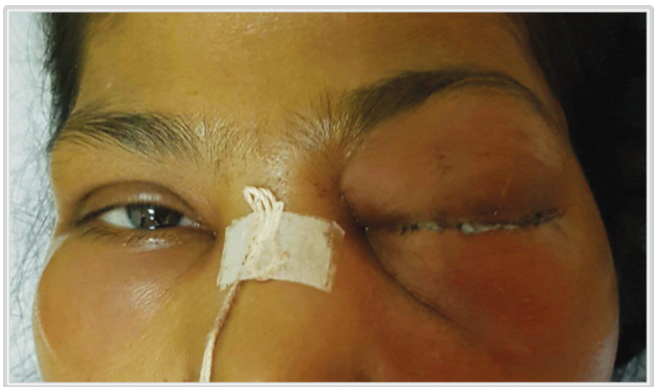


Figure 8. ARS with Orbital Complication

6.2 Chronic Rhinosinusitis

Indications for early referral (within one week) are:[1, level III; 23, level III]

- failed a course of optimal medical therapy
- >3 sinus infections/year
- suspected fungal infections, granulomatous disease or malignancy

Indications for urgent referral (within 24 hours):[1, level III; 23, level III]

- severe pain or swelling of the sinus areas in particular immunocompromised patients such as uncontrolled diabetes, end-stage renal failure, patient with human immunodeficiency virus (HIV)

7. MANAGEMENT

Acute RS, either viral or bacterial in origin, is usually treated medically. Viral RS is a self-limiting disease that is managed symptomatically with analgesic or antipyretic. The use of antibiotic in ABRS will be discussed in the next section.

Surgical options may be offered in the following conditions:
- ARS with complications such as orbital or intracranial involvement
- failed optimal medical treatment in acute and chronic rhinosinusitis

7.1 Pharmacological Treatment

The aims of pharmacotherapy in RS are to reduce severity of symptoms and to prevent complications. Medications used among others may include antibiotics, corticosteroids and nasal saline irrigation.

7.1.1 Antibiotics

a. ARS

The use of antibiotics in ARS provide minimal to moderate benefits:
- A 2009 Cochrane meta-analysis reported a reduced risk of treatment failure in antibiotics comparing to placebo by 34% within 7 to 15 days (RR=0.66, 95% CI 0.44 to 0.98). However 80% of cases resolved without antibiotics.[26, level I]
- In a more recent Cochrane meta-analysis, a favourable overall treatment effect of antibiotics against placebo was shown (OR=1.25, 95% CI 1.02 to 1.53; NNT=18).[27, level I]
- A large prospective cohort study also demonstrated a reduced risk of treatment failure in patients treated with antibiotics vs without antibiotics (HR=0.3, 95% CI 0.21 to 0.42). Patients with poor oro-dental condition and those with previous use of antibiotics in the past two months benefited most from this (HR of 0.04 and 0.09 respectively).[28, level II-2]

Antibiotics have higher incidence of adverse events compared with placebo; gastrointestinal upsets being the most common (OR=2.10, 95% CI 1.60 to 2.77; NNH=9).[27, level I]

In Europe, antibiotics overuse has been reported to have directly resulted in an increased prevalence of antimicrobial resistance in the region.[1, level III] Although there are no available data for the Asian region, antimicrobial resistance due to overuse of antibiotics is an international health issue.

Based on the National Surveillance of Antibiotic Resistance (NSAR) Report by Ministry of Health, Malaysia, both *Streptococcus pneumoniae and Haemophilus influenzae* (two of the most common causative

pathogens of ARS have shown an increase in antibiotic resistance from 2010 to 2014 (**Table 1** and **2**).

Table 1. Antibiotic Resistance for *Streptococcus pneumoniae* from 2010 to 2014

Antibiotic	Percentage of Resistance	
	2010[i]	**2014**[ii]
Erythromycin	30.9	35.7
Tetracycline	35.1	39.3
Trimethoprim/Sulfamethoxazole	39.3	40.7
Chloramphenicol	6.1	12.0
Clindamycin	15.5	17.5
Penicillin	N/A	1.4

Source:
i. National Surveillance of Antibiotic Resistance (NSAR) Report, MoH Malaysia, 2010[29]
ii. NSAR Report, MoH Malaysia, 2014[30]

Table 2. Antibiotic Resistance for *Haemophilus influenzae* from 2011 to 2014

Antibiotic	Percentage of Resistance	
	2011[iii]	**2014**[ii]
Ampicillin	18.4	23.2
Amoxicillin/Clavulanate	12.2	9.6
Cefotaxime	3.8	2.8
Cefuroxime	8.0	2.5
Chloramphenicol	5.4	14.7
Trimethoprim/Sulfamethoxazole	41.7	45.5

Source:
ii. NSAR Report, MoH Malaysia, 2014[30]
iii. NSAR Report, MoH Malaysia, 2011[31]

There is no significant difference in efficacy between different antibiotics in ARS.[26, level I] In National Antibiotics Guidelines Second Edition 2014, the preferred antibiotics are amoxicillin and amoxicillin/clavulanate.[30, level III]

Duration of antibiotic therapy should be as short as possible to reduce possible side effects. A meta-analysis showed that a shorter course of antibiotics (three to seven days) was as efficacious as a longer one (six to 10 days).[32, level I]

b. CRS

A 2011 Cochrane systematic review of one study reported improvement in subjective and objective outcomes in patients with CRS on antibiotic (i.e. roxithromycin, a macrolide) compared with those on placebo.[33, level I]

- Mean reduction of patient response scale score at 12 weeks=0.73 points; 95% CI 0.32 to 1.14.
- Mean change in SNOT-20* score from baseline at 12 weeks=0.46 points; 95% CI 0.36 to 0.56.

- Mean change at three months post-treatment, both groups were not statistically significant=0.27 points; 95% CI -0.24 to 0.78.

However, this systematic review used only one small RCT with high risk of bias.
*Refer to **Appendix 3** for **Sino-Nasal Outcome Test (SNOT-22)**.

There are some studies which report improvement in symptoms and reduction in inflammatory markers using long-term macrolides such as azithromycin, clarithromycin and erythromycin at low doses in CRS. However, those studies are not placebo-controlled.[1, level III]

There is insufficient strong evidence to support the routine use of antibiotics in CRS. However macrolides have been prescribed by ORL specialists in CRS for its anti-inflammatory properties.

Recommendations 4
- Antibiotics may be prescribed in acute bacterial rhinosinusitis after weighing benefits against potential side effects.
  - The preferred antibiotics is amoxicillin 500 mg 8-hourly for five to seven days or amoxicillin/clavulanate 625 mg 8-hourly for five to seven days.
- Antibiotics should not be used routinely in chronic rhinosinusitis.

7.1.2 Corticosteroids

Corticosteroids especially intranasal corticosteroids (INS) are commonly used in RS. It reduces the inflammation and oedema of the nasal mucous membrane rendering resolution of RS symptoms.

a. Intranasal Corticosteroids

ARS

Two good meta-analyses showed that INS significantly improved symptoms of acute rhinosinusitis compared with placebo in 14 - 21 days. However, the effects were small. Higher doses of mometasone furoate led to better improvement of symptoms. The side effects were mild to moderate.[34 - 35, level I]

CRS

Two meta-analyses found that INS given between 16 and 52 weeks duration was more efficacious than placebo in CRS with the following outcomes:
- reduction in polyp size with a mean difference of 0.43 (95% CI 0.25 to 0.61)[36, level I]
- improvement of symptoms, SMD= - 0.37 (95% CI - 0.60 to - 0.13)[37, level I]
- there was no difference in side effect between the INS group and placebo[37, level I]

However, there was no difference in endoscopic score between the two groups (SMD= -0.37, 95% CI -0.84 to 0.11).[37, level I]

b. Oral Corticosteroids

ARS

In ARS, oral steroids (30 mg/day for seven days) is significantly more effective than placebo in improvement of symptoms up to 12 days. Side effects of oral steroids are limited and mild.[38 - 39, level I] In local practice, oral steroids are not given due to the possibility of exacerbation of bacterial infection.

CRS

Short-term oral steroids (25mg/day for two weeks) are significantly more effective than placebo in reduction of nasal polyp size and hyposmia score up to 10 weeks. Oral steroid caused transient suppression of adrenal function and increase bone turnover.[40, level I] In local practice, oral steroids are only prescribed in ORL centres.

Recommendation 5

- Intranasal corticosteroids:
  - should be considered for 14 - 21 days in acute rhinosinusitis
  - should be given for 16 - 52 weeks in chronic rhinosinusitis
- Short-term oral corticosteroids should ONLY be given in chronic rhinosinusitis at Otorhinolaryngology centre.

Refer to **Appendix 4** on **Proper Use of Nasal Spray**.

7.1.3 Nasal Saline Irrigation

Buffered saline irrigation facilitates mechanical removal of mucus, infective agents and inflammatory mediators. It also decreases crusting in the nasal cavity and increases mucociliary clearance (MCC).

Nasal saline irrigation is recommended to be used in ARS.[1, level III] Refer to **Figure 9** on its application.

A recent Cochrane systematic review reported that saline irrigation was efficacious as a treatment adjunct for managing the symptoms of CRS (SMD=1.42, 95% CI 1.01 to 1.84). There was no difference in the efficacy between isotonic and hypertonic saline irrigation (p= 0.14).[41, level I] Adverse events of saline irrigation are minor. These include nasal burning, irritation and nausea.[41, level I]

Recommendation 6

- Saline irrigation should be used as an adjunct therapy in patients with rhinosinusitis.

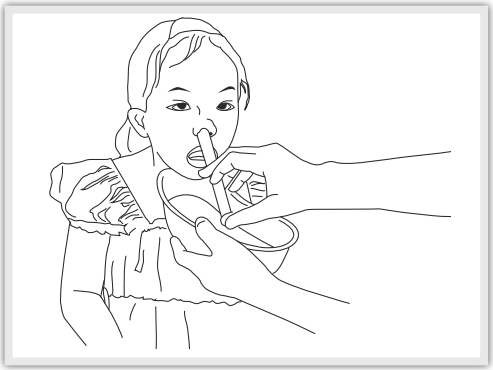


Figure 9. Nasal Saline Irrigation

7.1.4 Anti-histamine

There is an increase prevalence of allergic rhinitis (AR) in patients with CRS, although the role of allergy in the development of CRS remains unclear.[23, level III] Antihistamine controls sinusitis symptoms in AR. There is improvement in sneezing after 14 days (p=0.003) and nasal obstruction after 28 days of treatment (p=0.002).[42, level I]

Current data yields insufficient evidence to recommend antihistamines for treatment of CRS in non-allergic rhinitis patients.[1, level III; 23, level III; 42, level I]

Recommendation 7

- Antihistamines should be prescribed in rhinosinusitis with associated symptoms suggestive of allergic rhinitis (sneezing, nasal itchiness, nasal obstruction and rhinorrhoea).

7.1.5 Other Medications

There is insufficient recent evidence on the following treatment in rhinosinusitis described below.

a. Analgesics

Analgesics like paracetamol or non-steroidal anti-inflammatory drugs may provide symptomatic relief in both viral and bacterial infections of the upper respiratory passages in RS.[23, level III] The selection of analgesics should be based on the severity of pain.[43, level III]

b. Decongestants

The nasal MCC is significantly slower in patients with ABRS than normal subjects (p<0.05). MCC improves significantly with oxymetazoline after 20 minutes.[44, level II-2] Topical or systemic decongestants may offer additional symptomatic relief in VRS. However their ability to prevent

ABRS is unproven.[19, level III] In local context, decongestants is prescribed in ARS.

- Topical decongestants should not be prescribed for more than two weeks due to rebound phenomenon. Oral decongestants should be cautiously prescribed in those with medical conditions such as diabetes mellitus, cardiovascular diseases, glaucoma and benign prostate hyperplasia.

c. Mucolytics

There is no evidence to support the use of mucolytics in RS.[1, level III]

d. Antiviral Agents

There is no evidence of antiviral agents in treating patients with RS.

Pharmacological treatment for patients with RS is summarised in **Table 3** below.

Table 3. Treatment and Recommendations for Adults with RS

Therapy	Relevance	
	ARS	CRS
Antibiotic	Yes	Consider in low or normal IgE level
Topical corticosteroids	Yes	Yes
Addition of topical corticosteroids to antibiotics	Yes	Yes
Addition of oral corticosteroids to antibiotics	Yes	Yes
Saline irrigation	Yes	Yes
Antihistamine, analgesic & decongestant combination	Yes	No
Oral antihistamine added in allergic patients	Yes	Yes
Paracetamol	Yes	No
Decongestants	Yes	No
Mucolytics	No	No

Modified: Fokkens WJ, Lund VJ, Mullol J, et al. EPOS 2012: European position paper on rhinosinusitis and nasal polyps 2012. A summary for otorhinolaryngologists. Rhinology. 2012 Mar; 50(1):1-12

Refer to **Appendix 5** for **Medication Dosage, Indications and Special Precautions in RS**.

7.2 Surgical Interventions

Functional endoscopic sinus surgery (FESS) is the most common surgical treatment in CRS. It is a minimally invasive technique that uses an endoscope to enlarge the drainage pathways resulting in improvement of ventilation and restoration of nasal cavity and paranasal sinuses physiological function.

Surgical intervention is considered when optimum medical therapy fails in CRS or ARS with orbital or intracranial complications, despite the absence of high level evidence due to ethical concerns in RCTs on surgical procedures.

Indications for surgery in ARS are presence of orbital or intracranial abscess on CT scan or no clinical improvement after 24 - 48 hours of intravenous antibiotics.[1, level III]

A high quality Health Technology Assessment (HTA) found that clinical symptoms improve following FESS compared with conventional procedures (simple polypectomy, intranasal ethmoidectomy and Caldwell-Luc procedure) in CRS. There were relatively few complications with FESS. However, there were some methodological limitations in the evidence. There is a clear need for quality-controlled trials to assess the effectiveness of FESS.[45, level I]

FESS significantly reduces nasal obstruction, loss of smell and polyp size compared with medical treatment in CRSwNP.[46, level I] Apart from nasal obstruction, FESS also improves postnasal drip and headache significantly in CRSwNP.[47, level II-3] Patients with CRSwNP have better quality of life post-operatively compared with those without polyps (p=0.044).[48, level II-3]

Optimal medical therapy is as equally effective as FESS in CRSsNP.[49, level I]

A Cochrane systematic review and a HTA showed that FESS is a safe surgical procedure with minor complications ranging from 1.1 to 20.8%.[45, level I; 49, level I]

Recommendation 8
- Surgery should be considered in acute rhinosinusitis with orbital or intracranial complications.
- Functional endoscopic sinus surgery should be offered in patients with chronic rhinosinusitis who fail optimal medical treatment.

8. COMPLEMENTARY AND ALTERNATIVE MEDICINES

There is limited evidence of herbal medications use as adjunct treatment in ARS.[50, level I]

Acupuncture shows no significant improvement in symptoms score, quality of life and CT scan findings compared with conventional treatment in chronic rhinosinusitis.[51, level I]

- There is insufficient evidence to support the use of complementary alternative medicines in rhinosinusitis.

9. IMPLEMENTING THE GUIDELINES

Implementation of CPG is important as it helps in providing quality healthcare services based on best available evidence applied to local scenario and expertise. Various factors and resource implications should be considered for the success of the uptake in the CPG recommendations.

9.1 Facilitating and Limiting Factors

The facilitating factors in implementing the CPG are:

- availability of CPG to healthcare providers (hardcopies and softcopies)
- conferences and updates on management of RS

Limiting factors in the CPG implementation include:

- limited awareness in managing and referrals of RS among healthcare providers
- inadequate RS training at all levels of healthcare providers
- variation in RS treatment at different levels of care due to administrative and financial constraints
- lacking continuum of RS care at all levels of healthcare, both in public and private settings

9.2 Potential Resource Implications

To implement the CPG, there must be strong commitments to:

- ensure widespread distribution of CPG to healthcare providers via printed copies and easy online accessibility
- reinforce training of healthcare providers via regular seminars and workshops
- develop a multidisciplinary team in all levels of health care

To assist in the implementation of the CPG, the following are proposed as clinical audit indicators for quality management:

$$\text{Percentage of CRS patients treated with corticosteroids (intranasal or oral)} = \frac{\text{Number of CRS patients treated with corticosteroids in a period}}{\text{Number of patients diagnosed with CRS in the same period}} \times 100\%$$

$$\text{Percentage of RS patients treated with saline irrigation as an adjunct therapy} = \frac{\text{Number of RS patients treated with saline irrigation as an adjunct therapy in a period}}{\text{Number of patients diagnosed with RS in the same period}} \times 100\%$$

Implementation strategies will be developed following the approval of the CPG by MoH which include Quick Reference and Training Module.

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Appendix 1

EXAMPLE OF SEARCH STRATEGY

The following MeSH terms or free text terms were used either singly or in combination, search was limit to English, human and last 10 years:

1. Sinusitis/
2. sinusiti*.tw.
3. Ethmoid Sinusitis/
4. (ethmoid* adj1 rhiniti*).tw.
5. Frontal Sinusitis/
6. (frontal adj1 sinusiti*).tw.
7. Maxillary Sinusitis/
8. (maxillary adj1 sinusiti*).tw.
9. Sphenoid Sinusitis/
10. (sphenoid* adj1 sinusiti*).tw.
11. Rhinitis/
12. rhiniti*.tw.
13. (nasal adj1 catarrh*).tw.
14. Rhinitis, Allergic, Perennial/
15. (rhinitis, allergic adj (perennial or nonseasonal)).tw.
16. Rhinitis, Allergic, Seasonal/
17. (seasonal adj1 (allergic rhiniti* or rhinit* allergic)).tw.
18. (seasonal allergic adj rhiniti*).tw.
19. (pollen adj1 allerg*).tw.
20. pollinos*.tw.
21. (hay adj1 fever).tw.
22. hayfever.tw.
23. Rhinitis, Atrophic/
24. (atrophic adj1 rhiniti*).tw.
25. ozena*.tw.
26. Rhinitis, Vasomotor/
27. (vasomotor adj1 rhiniti*).tw.
28. /or 1 - 27
29. Anti-Bacterial Agents/
30. (agent* adj1 (anti-bacterial or antibacterial or anti bacterial or anti-mycobacterial or antimycobacterial or anti mycobacterial or bacteriocidal)).tw.
31. antibiotic*.tw.
32. bacteriocides.tw.
33. 29 or 30 or 31 or 32
34. 28 and 33

Appendix 2

CLINICAL QUESTIONS

1. What are the diagnostic criteria for acute/chronic rhinosinusitis?
2. What are the diagnostic criteria to differentiate between acute viral and bacterial rhinosinusitis?
3. What are the risk/predisposing factors in diagnosing rhinosinusitis?
4. Is anterior rhinoscopy/nasal endoscopic examination accurate in diagnosing rhinosinusitis?
5. What are the indications for culture and sensitivity in diagnosing rhinosinusitis?
6. What are the reliable methods in obtaining specimens for culture and sensitivity in diagnosing rhinosinusitis?
7. What are the accurate imaging modalities in diagnosing rhinosinusitis?
8. What are the indications for referral to ORL service in rhinosinusitis?
9. When is antibiotic indicated in treating acute rhinosinusitis?
10. Is empirical or second-line antibiotic safe and effective in treating acute rhinosinusitis?
11. What is the duration of antibiotic in acute rhinosinusitis?
12. When is antibiotic is indicated in chronic rhinosinusitis?
13. Is antibiotic safe and effective in chronic rhinosinusitis?
14. What is the duration of antibiotic in chronic rhinosinusitis?
15. Is intranasal/oral corticosteroid safe and effective in rhinosinusitis?
16. Is analgesic safe and effective in rhinosinusitis?
17. Is decongestant safe and effective in rhinosinusitis?
18. Is mucolytic safe and effective in rhinosinusitis?
19. Is antihistamine safe and effective in rhinosinusitis?
20. Is saline irrigation safe and effective in rhinosinusitis?
21. Is anti-viral safe and effective in acute rhinosinusitis?
22. When is surgery indicated for rhinosinusitis?
23. Is surgery safe and effective in chronic rhinosinusitis?
24. Is traditional complementary medicine/alternative safe and effective in rhinosinusitis?

Appendix 3

SINO-NASAL OUTCOME TEST (SNOT-22)

I.D:_____ DATE:_____

Below you will find a list of symptoms and social/emotional consequences of your rhinosinusitis. We would like to know more about these problems and would appreciate your answering the following questions to the best your ability. There is no right or wrong answers, and only you can provide us with this information. Please rate your problems as they have been over the past two weeks. Thank you for your participation. Do not hesitate to ask for assistance if necessary.

1. Considering how severe the problem is when you experience it and how often it happens, please rate each item below on how "bad" it is by circling the number that corresponds with how you feel using this scale : →	No Problem	Very Mild Problem	Mild or slight Problem	Moderate Problem	Severe Problem	Problem as bad as it can be		5 Most Important Items
1. Need to blow nose	0	1	2	3	4	5		○
2. Nasal Blockage	0	1	2	3	4	5		○
3. Sneezing	0	1	2	3	4	5		○
4. Runny nose	0	1	2	3	4	5		○
5. Cough	0	1	2	3	4	5		○
6. Post-nasal discharge	0	1	2	3	4	5		○
7. Thick nasal discharge	0	1	2	3	4	5		○
8. Ear fullness	0	1	2	3	4	5		○
9. Dizziness	0	1	2	3	4	5		○
10. Ear pain	0	1	2	3	4	5		○
11. Facial pain/pressure	0	1	2	3	4	5		○
12. Decreased Sense of Smell/Taste	0	1	2	3	4	5		○
13. Difficulty falling asleep	0	1	2	3	4	5		○
14. Wake up at night	0	1	2	3	4	5		○
15. Lack of a good night's sleep	0	1	2	3	4	5		○
16. Wake up tired	0	1	2	3	4	5		○
17. Fatigue	0	1	2	3	4	5		○
18. Reduced productivity	0	1	2	3	4	5		○
19. Reduced concentration	0	1	2	3	4	5		○
20. Frustrated/restless/irritable	0	1	2	3	4	5		○
21. Sad	0	1	2	3	4	5		○
22. Embarrassed	0	1	2	3	4	5		○

2. Please mark the most important items affecting your health (maximum of 5 items)_____

SNOT-22 Developed from modification of SNOT-20 by National Comparative Audit of Surgery for Nasal Polyposis and Rhinosinusitis

Source: Reproduced with permission from Washington University (available at http://www.canvasc.ca/pdf/SNOT22.pdf)

Appendix 4

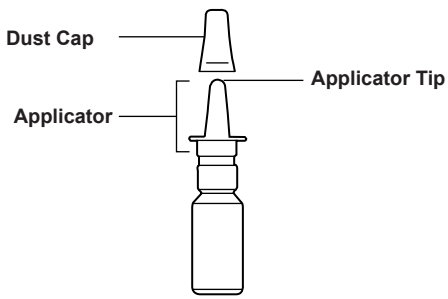
PROPER USE OF NASAL SPRAY

Introduction

Nasal spray is used to treat symptoms rhinosinusitis and allergic rhinitis.

A correct technique is essential for effective delivery of the medicines. Different nasal spray requires slightly different techniques (for example, priming technique or holding position). Hence, it is very important to follow the instructions from your healthcare providers and refer to the product labels.

Nasal sprays are only intended for use in the nose. Do not spray it into any other parts of the body.



Usage of Nasal Spray for the First Time (Priming)

1. Remove the dust cap **(Picture A)**.
2. Shake the nasal spray bottle.
3. **Picture B** shows how to hold nasal spray correctly. Press down a few times until you see a fine mist of spray comes out (You might need to press 3 - 5 times depending on the nasal spray). This process is called Priming.
4. Priming is only done once for every nasal spray. However, if the nasal spray has not been used for more than 1 - 2 weeks, the priming step has to be repeated.

Picture A

Picture B

Usage of Nasal Spray after Priming

1. Gently blow your nose to clear the mucous (**Picture C**).
2. Remove the dust cap.
3. Close one nostril with your finger. Bend your head slightly forward. Carefully insert the applicator tip ¼ or ½ inch into the other nostril (point the applicator tip slightly outwards, away from the centre of the nose) (**Picture D**).
4. Press down the nasal spray once and at the same time breathe in slowly through your nostril. (**Picture E**)
5. Repeat step 4 in the other nostril.
6. Do not tilt your head backwards to prevent backflow into your throat.
7. If the medicine drips into your throat, you will feel a slightly bitter sensation in your mouth. This is normal.
8. Once you are done using the nasal spray, wipe the applicator tip with a clean tissue or cloth and put on the dust cap.
9. Try not to sneeze or blow your nose immediately after using the nasal spray.

Picture C

Picture D

Picture E

Tips While Using the Nasal Spray

1. Do not breathe in strongly and quickly to prevent the medication from going into your throat.
2. If the nasal spray is used correctly, the medicine will not drip from your nose nor will it drip into your oral cavity.
3. Please use the nasal spray as directed by your healthcare providers.
4. If you experience any nosebleed following the used of nasal sprays, stop using the nasal spray and seek medical attention.

Keep the nasal spray away from direct sunlight and children.

Source: Adapted from Malaysian Official Portal MyHealth, available at: http://www.myhealth.gov.my/en/how-to-use-nasal-spray/

MEDICATION DOSAGE, INDICATIONS AND SPECIAL PRECAUTIONS IN ARS

a. Antibiotics

Generic Drug Name	Recommended Dosage	Special precautions
Amoxicillin	250 - 500 mg PO q8hr x 5 - 10 days *or* 500 - 875 mg PO q12hr x 5 - 10 days	• **Preferred antibiotics** in ABRS • Penicillin allergy, infectious mononucleosis, renal impairment, pregnancy and lactation
Amoxicillin and Clavulanic acid	500/125 mg PO q8hr x 5 - 7 days *or* 875/125 mg PO q12hr x 5 - 7 days	• **Preferred antibiotics** in ABRS • Allergy to beta-lactam antibiotics, mononucleosis, renal and hepatic impairment, pregnancy and lactation
Cefuroxime axetil	250 - 500 mg PO q12hr x 5 - 10 days	• Penicillin allergy, gastrointestinal disease (particularly colitis), renal impairment, pregnancy and lactation
Azithromycin	500 mg PO q24hr x 3 days	• May increase the risk of torsades de pointes and fatal heart arrhythmias in patients with prolonged QT interval, low K or Mg blood levels, slow heart rate and medication treating abnormal heart rhythms. Impaired hepatic and renal function. Pregnancy and lactation
Clarithromycin	250 - 500 mg PO q12hr x 7 - 14 days	• Patient with coronary artery disease, severe cardiac insufficiency, hypomagnesaemia, bradycardia (<50 bpm). May exacerbate symptoms of myasthenia gravis. Renal and hepatic impairment. Pregnancy and lactation.
Ciprofloxacin (Use with caution)	500 - 750 mg PO q12hr x 7 - 14 days	• Patient with epilepsy, history of CNS disorders, G6PD deficiency, known prolongation of QT interval, with risk factors for QT interval prolongation or torsades de pointes (e.g. congenital long QT syndrome, uncorrected electrolyte imbalance, cardiac disease). May exacerbate myasthenia gravis symptoms. Kidney, heart or lung transplant recipients. Hepatic and renal impairment. Pregnancy and lactation.
Levofloxacin (Use with caution)	500 mg PO q24hr x 10 - 14 days	• Patient with known or suspected CNS disorders (e.g. severe cerebral arteriosclerosis, epilepsy) or other risk factors that predispose to seizures or lower the seizure threshold, history of psychiatric disease and tendon disorder, history of prolonged QT interval, uncorrected electrolyte disorders (e.g. hypokalaemia), latent or actual defects in G6PD, DM. Kidney, heart or lung transplant recipients. May exacerbate myasthenia gravis. Renal impairment. Pregnancy and lactation.
Moxifloxacin (Use with caution)	400 mg PO q24hr x 5 - 21 days	• Patient with previous tendon disorders (e.g. rheumatoid arthritis), significant bradycardia or acute myocardial ischaemia, heart failure with reduced LVEF, known history of symptomatic arrhythmias, known or suspected CNS disorders (e.g. severe cerebral arteriosclerosis, epilepsy) or other risk factors that predispose to seizures; diabetes. Kidney, heart or lung transplant recipients. Hepatic impairment. Pregnancy and lactation.

b. Corticosteroids

Oral steroids (prednisolone): 30 mg daily for 7 days in ARS and 25 mg daily for 14 days in CRS

Intranasal corticosteroids:

Generic Drug Name	Indications	Dosage
Budesonide 64 mcg/dose nasal spray	• Seasonal and perennial allergic rhinitis and nasal polyposis • Treatment and prevention of nasal polyps	Adults and children 6 years and older: • **Rhinitis:** 2 sprays into each nostril once daily in the morning or 1 spray into each nostril twice daily • **Nasal polyps:** 2 sprays twice daily
Fluticasone propionate 50 mcg/dose nasal spray	• Prophylaxis and treatment of seasonal and perennial allergic rhinitis • Management of associated sinus pain and pressure	• Adults/adolescents (≥12 years): 2 sprays in each nostril once daily • Maximum daily dose 4 sprays in each nostril
Mometasone furoate 50 mcg/dose aqueous nasal spray	• Symptomatic treatment associated with acute rhinosinusitis and treatment of nasal polyps	**Allergic Rhinitis** Adults and children over 12 years: • 100 mcg/day (2 sprays) to each nostril once daily • Maximum 200 mcg (4 sprays) once daily • Reduce to 50 mcg (1 spray) once daily when control achieved **Acute Rhinosinusitis** • 2 sprays in each nostril twice daily (total 400 mcg/day) **Nasal polyphosis** • 2 sprays in each nostril twice daily (total 400 mcg/day), reduced to 2 sprays each nostril once daily when symptoms are adequately controlled

Source: Ministry of Health Medicines Formulary - 3/2015
(available at http://www.pharmacy.gov.my/v2/sites/default/files/document-upload/ministry-health-medicines-formulary-1-2015.pdf)

LIST OF ABBREVIATIONS

ABRS	acute bacterial rhinosinusitis
AR	allergy rhinitis
ARS	acute rhinosinusitis
C&S	culture and susceptibility
CAM	complementary and alternative medicine
CI	confidence interval
CPG	clinical practice guidelines
CRP	c-reactive protein
CRS	chronic rhinosinusitis
CRSsNP	chronic rhinosinusitis without nasal polyps
CRSwNP	chronic rhinosinusitis with nasal polyps
CT	computerised tomography
DG	development group
EDMMC	endoscopically-directed middle meatal cultures
ESR	erythrocyte sedimentation rate
EPOS	European Position Paper on Rhinosinusitis and Nasal Polyps
FESS	functional endoscopic sinus surgery
HIV	human immunodeficiency virus
HR	hazard ratio
HTA	health technology assessment
Ig	immunoglobulin
INS	intranasal corticosteroids
MaHTAS	Malaysia Health Technology Assessment Section
MCC	mucociliary clearance
MoE	Ministry of Education
MoH	Ministry of Health
MRI	magnetic resonance imaging
MSA	maxillary sinus aspirate
MST	maxillary sinus taps
NSAR	National Surveillance of Antibiotic Resistance
NNT	number to treat
NPV	negative predictive value
NSAIDs	non-steroidal anti-inflammatory drug(s)
OR	odds ratio
PHC	primary healthcare
PPV	positive predictive value
RC	review committee
RCT(s)	randomised controlled trial(s)
RR	relative risk
RS	rhinosinusitis
SMD	standardised mean difference
SHS	second-hand smoke
VAS	visual analogue score
VRS	viral rhinosinusitis
vs	versus

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