THE EGYPTIAN ORL SOCIETY

Clinical Practice *Guidelines*

The aim of this work is to provide Otolaryngologists with clear Evidence Based Guidelines. It is not intended to cover all topics of the specialty, but rather the most important, or common issues. This was done with the intention to help Clinicians translate best evidence into best practice.

The primary goals are to promote quality, reduce healthcare variations, improve diagnostic accuracy, promote effective therapy, and discourage ineffective or harmful interventions.

Developing guidelines is a long process and time consuming that requires multicenter collaboration and evidence- based practice. Adopting guidelines is a practice seen in many countries with similar circumstances.

The suggested sources of this document are mainly derived from highly credible and reputable worldwide organizations in UK, USA and Canada that are published in high rated medical journals, with the needed modifications to suit our local Egyptian conditions.

The board of the Egyptian ORL Society with its members from different affiliations, has the role to supervise the process of providing this CPG "Clinical Practice Guidelines" through integrated work with different universities and smaller societies with the end result of providing a foundation to build upon in the future.

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Keynote Principles

Guidelines are intended to reduce inappropriate variations in clinical care, to produce optimal health outcomes for patients, and to minimize harm. The evidence-based approach to guideline development requires that the evidence supporting a policy be identified, appraised, and summarized and that an explicit link between evidence and statements be defined. Evidence-based statements reflect both the quality of evidence and the balance of benefit and harm that are anticipated when the statement is followed. The definitions for evidence-based statements are listed in Tables 1 and 2.

Guidelines are never intended to supersede professional judgment; rather, they may be viewed as a relative constraint on individual clinician discretion in a particular clinical circumstance. Less frequent variation in practice is expected for a strong recommendation than might be expected with a recommendation. Options offer the most opportunity for practice variability. Clinicians should always act and decide in a way that they believe will best serve their individual patients' interests and needs, regardless of guideline recommendations. Guidelines represent the best judgment of a team of experienced clinicians and methodologists addressing the scientific evidence for a particular topic.

Making recommendations about health practices involves value judgments on the desirability of various outcomes associated with management options. Values applied to minimize harm, diminish unnecessary and inappropriate therapy, and reduce the unnecessary use of drugs. A major goal was to be transparent and explicit about how values were applied and to document the process.

Table1 Strength of Action Terms in Guideline Statements and Implied Levels of Obligation.

Strength	Definition	Implied Obligation
Strong Recommendation	A strong recommendation means the benefits of the recommended approach clearly exceed the harms (or, in the case of a strong negative recommendation, that the harms clearly exceed the benefits) and that the quality of the supporting evidence is high (Grade A or B).[a] In some clearly identified circumstances, strong recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits strongly outweigh the harms.	Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present.
Recommendation	A recommendation means the benefits exceed the harms (or, in the case of a negative recommendation, that the harms exceed the benefits), but the quality of evidence is not as high (Grade B or C).[a] In some clearly identified circumstances, recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits outweigh the harms.	Clinicians should also generally follow a recommendation but should remain alert to new information and sensitive to patient preferences.
Option	An option means that either the quality of evidence is suspect (Grade D)[a] or that well-done studies (Grade A, B, or C)[a] show little clear advantage to one approach vs another.	Clinicians should be flexible in their decision making regarding appropriate practice, although they may set bounds on alternatives; patient preference should have a substantial influencing role.

Table 2. Aggregate Grades of Evidence by Question Type.

Grade	Treatment	Diagnosis	Prognosis
A	Systematic review[b] of randomized trials	Systematic review[b] of cross-sectional studies with consistently applied reference standard and blinding	Systematic review[b] of inception cohort studies[c]
B	Randomized trials or observational studies with dramatic effects or highly consistent evidence	Cross-sectional studies with consistently applied reference standard and blinding	Inception cohort studies[c]
C	Nonrandomized or historically controlled studies, including case-control and observational studies	Nonconsecutive studies, case-control studies, or studies with poor, nonindependent, or inconsistently applied reference standards	Cohort study, control arm of a randomized trial, case series, or case-control studies; poor quality prognostic cohort study
D	Case reports, mechanism-based reasoning, or reasoning from first principles		
X	Exceptional situations where validating studies cannot be performed and there is a clear preponderance of benefit over harm		

SECTION ONE

Rhinology, Otology & General

Adult Sinusitis

The American Academy of Otolaryngology–Head and Neck Surgery Foundation

Rhinosinusitis may be classified by duration as acute rhinosinusitis (ARS) if less than 4 weeks' duration or as chronic rhinosinusitis (CRS) if lasting more than 12 weeks, with or without acute exacerbations. ARS may be classified further by presumed etiology, based on symptoms and time course (Key Action Statement 1), into acute bacterial rhinosinusitis (ABRS) or viral rhinosinusitis (VRS). Distinguishing presumed bacterial vs viral infection is important because antibiotic therapy is inappropriate for the latter. When patients have 4 or more annual episodes of rhinosinusitis, without persistent symptoms in between, the condition is termed recurrent ARS.

Nearly all authorities agree that CRS begins after 12 weeks' duration, but opinions about the duration of ARS vary, with some defining illness up to 12 weeks as ARS. We agree with other guideline groups that define ARS as up to 4 weeks' duration but recognize that this boundary is based more on consensus than research evidence. Moreover, very limited data are available on rhinosinusitis lasting 4 to 12 weeks, sometimes called subacute rhinosinusitis. We do not distinguish rhinosinusitis in this time frame as an explicit entity in the guideline, and decisions about whether such patients are more like ARS or CRS must therefore be individualized.

Key Action Statements:

1**A. Differential diagnosis:** Clinicians should distinguish presumed Acute Bacterial Rhinosinusitis (ABRS) from ARS caused by viral upper respiratory infections and noninfectious conditions. A clinician should diagnose ABRS when:

(a) symptoms or signs of ARS (purulent nasal drainage accompanied by nasal obstruction, facial pain-pressure fullness, or both) persist without evidence of improvement for at least 10 days beyond the onset of upper respiratory symptoms, or

(b) symptoms or signs of ARS worsen within 10 days after an initial improvement (double worsening). **Strong recommendation**

1B. Radiographic imaging and ARS: Clinicians should not obtain radiographic imaging for patients who meet diagnostic criteria for ARS, unless a complication or alternative diagnosis is suspected. **Recommendation (against imaging)**

2. Symptomatic relief of VRS: Clinicians may recommend analgesics, topical intranasal steroids, and/or nasal saline irrigation for symptomatic relief of VRS. **Option**

3. Symptomatic relief of ABRS: Clinicians may recommend analgesics, topical intranasal steroids, and/or nasal saline irrigation for symptomatic relief of ABRS. **Option**

4. Initial management of ABRS: Clinicians should either offer watchful waiting (without antibiotics) or prescribe initial antibiotic therapy for adults with uncomplicated ABRS. Watchful waiting should be offered only when there is assurance of follow-up, such that antibiotic therapy is started if the patient's condition fails to improve by 7 days after ABRS diagnosis or if it worsens at any time. **Recommendation**

5. Choice of antibiotic for ABRS: If a decision is made to treat ABRS with an antibiotic agent, the clinician should prescribe amoxicillin with or without clavulanate as first-line therapy for 5 to 10 days for most adults. **Recommendation**

6. Treatment failure for ABRS: If the patient worsens or fails to improve with the initial management option by 7 days after diagnosis or worsens during the initial management, the clinician should reassess the patient to confirm ABRS, exclude other causes of illness, and detect complications. If ABRS is confirmed in the patient initially managed with observation, the clinician should begin antibiotic therapy. If the patient was initially managed with an antibiotic, the clinician should change the antibiotic. **Recommendation**

7A. Diagnosis of CRS or recurrent ARS: Clinicians should distinguish CRS and recurrent ARS from isolated episodes of ABRS and other causes of sinonasal symptoms. **Recommendation**

7B. Objective confirmation of a diagnosis of CRS: The clinician should confirm a clinical diagnosis of CRS with objective documentation of sinonasal inflammation, which may be accomplished using anterior rhinoscopy, nasal endoscopy, or computed tomography. **Strong Recommendation**

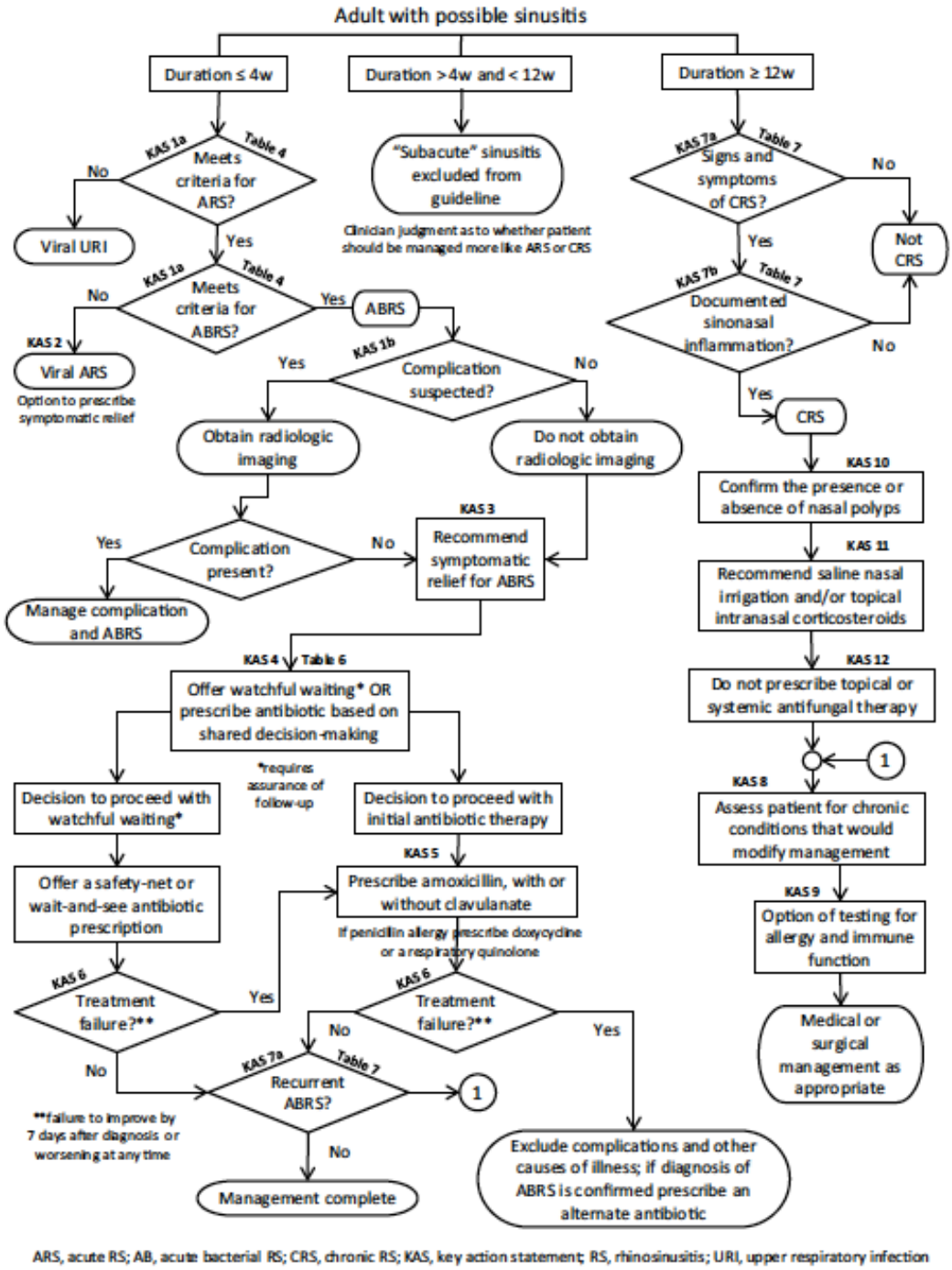
8. Modifying factors: Clinicians should assess the patient with CRS or recurrent ARS for multiple chronic conditions that would modify management, such as asthma, cystic fibrosis, immunocompromised state, and ciliary dyskinesia. **Recommendation**

9. Testing for allergy and immune function: The clinician may obtain testing for allergy and immune function in evaluating a patient with CRS or recurrent ARS. **Option**

10. CRS with polyps: The clinician should confirm the presence or absence of nasal polyps in a patient with CRS. **Recommendation**

11. Topical intranasal therapy for CRS: Clinicians should recommend saline nasal irrigation, topical intranasal corticosteroids, or both for symptom relief of CRS. **Recommendation**

12. Antifungal therapy for CRS: Clinicians should not prescribe topical or systemic antifungal therapy for patients with CRS. **Recommendation (Against therapy)**



ARS, acute RS; AB, acute bacterial RS; CRS, chronic RS; KAS, key action statement; RS, rhinosinusitis; URI, upper respiratory infection

Figure 1. Algorithm showing the interrelationship of guideline key action statements. ABRS, acute bacterial rhinosinusitis; ARS, acute rhinosinusitis; CRS, chronic rhinosinusitis; KAS, key action statement; URI, upper respiratory infection.

Term	Definition
Acute rhinosinusitis (ARS)	Up to 4 weeks of *purulent nasal drainage* (anterior, posterior, or both) accompanied by *nasal obstruction, facial pain-pressure-fullness*, or both:[a] *Purulent nasal discharge* is cloudy or colored, in contrast to the clear secretions that typically accompany viral upper respiratory infection, and may be reported by the patient or observed on physical examination. *Nasal obstruction* may be reported by the patient as nasal obstruction, congestion, blockage, or stuffiness, or may be diagnosed by physical examination. *Facial pain-pressure-fullness* may involve the anterior face, periorbital region, or manifest with headache that is localized or diffuse.
Viral rhinosinusitis (VRS)	Acute rhinosinusitis that is caused by, or is presumed to be caused by, viral infection. A clinician should diagnose VRS when: a. symptoms or signs of acute rhinosinusitis are present less than 10 days and the symptoms are not worsening
Acute bacterial rhinosinusitis (ABRS)	Acute rhinosinusitis that is caused by, or is presumed to be caused by, bacterial infection. A clinician should diagnose ABRS when: a. symptoms or signs of acute rhinosinusitis fail to improve within 10 days or more beyond the onset of upper respiratory symptoms, *or* b. symptoms or signs of acute rhinosinusitis worsen within 10 days after an initial improvement (double worsening)

[a]Facial pain-pressure-fullness in the absence of purulent nasal discharge is insufficient to establish a diagnosis of ARS.

Term	Definition
Chronic rhinosinusitis	Twelve weeks or longer of two or more of the following signs and symptoms: • mucopurulent drainage (anterior, posterior, or both), • nasal obstruction (congestion), • facial pain-pressure-fullness, or • decreased sense of smell. AND inflammation is documented by one or more of the following findings: • purulent (not clear) mucus or edema in the middle meatus or anterior ethmoid region, • polyps in nasal cavity or the middle meatus, and/or • radiographic imaging showing inflammation of the paranasal sinuses.
Recurrent acute rhinosinusitis	Four or more episodes per year of acute bacterial rhinosinusitis (ABRS) without signs or symptoms of rhinosinusitis between episodes: • each episode of ABRS should meet diagnostic criteria in **Table 4**

Epistaxis

The American Academy of Otolaryngology–Head and Neck Surgery Foundation

1. PROMPT MANAGEMENT: At the time of initial contact, the clinician should distinguish the nosebleed patient who requires prompt management from the patient who does not. **Recommendation**

2. NASAL COMPRESSION: The clinician should treat active bleeding for patients in need of prompt management with firm sustained compression to the lower third of the nose, with or without the assistance of the patient or caregiver, for 5 minutes or longer. **Recommendation**

3a: Nasal packing For patients in whom bleeding precludes identification of a bleeding site despite nasal compression: The clinician should treat ongoing active bleeding with nasal packing. **Recommendation**

3b: Nasal packing in patients with suspected increased bleeding risk: The clinician should use resorbable packing for patients with a suspected bleeding disorder or for patients who are using anticoagulation or antiplatelet medications. **Recommendation**

4: Nasal packing education: The clinician should educate the patient who undergoes nasal packing about the type of packing placed, timing of and plan for removal of packing (if not resorbable), postprocedure care, and any signs or symptoms that would warrant prompt reassessment. **Recommendation**

5: Risk factors: The clinician should document factors that increase the frequency or severity of bleeding for any patient with a nosebleed, including personal or family history of bleeding disorders, use of anticoagulant or antiplatelet medications, or intranasal drug use. **Recommendation**

6: Anterior rhinoscopy to identify location of bleeding: The clinician should perform anterior rhinoscopy to identify a source of bleeding after removal of any blood clot (if present) for patients with nosebleeds. **Recommendation**

7a: Examination using nasal endoscopy: The clinician should perform, or should refer to a clinician who can perform, nasal endoscopy to identify the site of bleeding and guide further management in patients with recurrent nasal bleeding, despite prior treatment with packing or cautery, or with recurrent unilateral nasal bleeding. **Recommendation**

7b: Examination of nasal cavity and nasopharynx using nasal endoscopy: The clinician may perform, or may refer to a clinician who can perform, nasal endoscopy to examine the nasal cavity and nasopharynx in patients with epistaxis that is difficult to control or when there is concern for unrecognized pathology contributing to epistaxis. **Option**

8: Appropriate interventions for identified bleeding site: The clinician should treat patients with an identified site of bleeding with an appropriate intervention, which may include 1 or more of the following: topical vasoconstrictors, nasal cautery, and moisturizing or lubricating agents. **Recommendation**

9: Nasal cautery: When nasal cautery is chosen for treatment, the clinician should anesthetize the bleeding site and restrict application of cautery only to the active or suspected site(s) of bleeding. **Recommendation**

10: Ligation and/or embolization for persistent nosebleeds.: The clinician should evaluate, or refer to a clinician who can evaluate, candidacy for surgical arterial ligation or endovascular embolization for patients with persistent or recurrent bleeding not controlled by packing or nasal cauterization. **Recommendation**

11: Management of patients using anticoagulation and antiplatelet medications: In the absence of life-threatening bleeding, the clinician should initiate first-line treatments prior to transfusion, reversal of anticoagulation, or withdrawal of anticoagulation/antiplatelet medications for patients using these medications. **Recommendation**

12: HHT identification: The clinician should assess, or refer to a specialist who can assess, the presence of nasal telangiectasias and/or oral mucosal telangiectasias in patients who have a history of recurrent bilateral nosebleeds or a family history of recurrent nosebleeds to diagnose hereditary hemorrhagic telangiectasia syndrome (HHT). **Recommendation**

13: Patient education and prevention: The clinician should educate patients with nosebleeds and their caregivers about preventive measures for nosebleeds, home treatment for nosebleeds, and indications to seek additional medical care. **Recommendation**

14: Nosebleed outcomes: The clinician or designee should document the outcome of intervention within 30 days or document transition of care in patients who had a nosebleed treated with nonresorbable packing, surgery, or arterial ligation/embolization. **Recommendation**

Allergic Rhinitis; Diagnosis

Classic symptoms and signs of allergic rhinitis

Symptoms:

1. Itching (nose and soft palate).
2. Sneezing (specific and non-specific stimulation).
3. Bilateral watery rhinorrhea.
4. Nasal congestion.

Signs:

A. External
    1. Bluish discoloration around the eyes (allergic shiners)
    2. Supratip crease (allergic salute)
    3. Open mouth (allergic gap)
B. Nasal:
    1. Pale blue mucosa
    2. May be nasal polyps

Certain types of non-allergic rhinitis may mimic the clinical presentation of allergic rhinitis. There 2 main types of non-allergic rhinitis that can be mistaken for allergic rhinitis: neurogenic (**vasomotor rhinitis**) and eosinophilic (**NARES**). Both can be triggered by non-specific stimuli like cold air, pungent odors, and many pollutants. Vasomotor rhinitis is the more common type.

The worldwide frequency of vasomotor and eosinophilic rhinitis is about 23%. It is expected that the incidence may be higher in Egypt because of environmental pollution.

There are some clinical clues to differentiate allergic rhinitis from vasomotor rhinitis. Pointers to allergic rhinitis include:

1. Early age of onset
2. Strong family history
3. Presence of ocular symptoms

Allergic and vasomotor rhinitis may exist together. This combination is called "**mixed allergic rhinitis**". In some patients IgE antibodies are detected in nasal secretions but not in blood. This is called "**local allergic rhinitis**". It is estimated that local allergic rhinitis may affect more than 45% of patients otherwise categorized as non-allergic rhinitis.

Summary of Guidelines Statements

Procedure	**Comment**	**Policy Level**
History taking	Clinical history is an essential part of the evaluation of patients with a suspected diagnosis of allergic rhinitis. History taking includes the type of symptoms experienced, timing and duration of symptoms, frequency of symptoms, any environmental exposures eliciting symptoms at home/work/school, and medications or other measures that relieve or exacerbate symptoms. Several guidelines suggest the diagnosis of AR be made when patients present with a history consistent with an allergic cause and 1 or more of the common symptoms.	Recommendation

Physical Examination	Physical examination alone is poorly predictive and more variable when compared to history taking in the diagnosis of allergic rhinitis. Most guidelines recommend a physical examination as part of the diagnosis of allergic rhinitis, despite a lack of high-level evidence.	Recommendation
Nasal Endoscopy	Diagnostic nasal endoscopy is an option for the evaluation of patients with suspected allergic rhinitis. Endoscopy may improve diagnosis with better visualization of turbinate and polyps.	Option
Radiology	Routine radiographic imaging is not recommended for the diagnosis of allergic rhinitis, although may be considered to rule in/out other conditions (ie, rhinosinusitis).	Recommendation against
Validated Clinical Outcome Questionnaires	Validated clinical outcome surveys and questionnaires may be used as precise clinical assessment instruments to evaluate patients with suspected AR. These include symptom severity surveys, such as the Total	Strong recommendation

	Nasal Symptom Score (TNSS) and health related QOL questionnaires, such as the RQLQ, VAS. The VAS score has be recommended recently to follow up patients with AR	
Skin Prick Test (SPT)	Skin testing is crucial to directing immunotherapy, and therefore, should be utilized in eligible patients when immunotherapy is being considered	Recommendation for eligible patients
Intradermal Test	If SPT is negative, there is limited clinical benefit to performing intradermal testing for confirmation.	Option
Total serum IgE (tIgE)	The evidence does not support a routine use of toral serum IgE.	Option
Serum antigen specific IgE (sIgE)	sIgE testing offers a safe and effective option for determining the presence of sensitization. Recommended for patients needing immunotherapy.	Recommendation
Nasal IgE	Nasal IgE is used to diagnose local allergic rhinitis	Option
Nasal Cytology	Nasal cytology may help to determine the type of rhinitis, e.g. eosinophilic or non-[eosinophilic	Option

Allergic Rhinitis; Treatment

Lines of treatment of allergic rhinitis:

- Avoidance (Prevention)
- Pharmacotherapy
- Immunotherapy
- Surgery

Pharmacotherapy for allergic rhinitis

The two main classes of treatment for AR are:

- H1-blockers/H1-antihistamines (oral, intranasal)
- Glucocorticoids (oral, intranasal)

Other less commonly used therapies are:

- Chromones
- Anti-leukotrienes (LTRA)
- Non-specific medications
- Immunotherapy

Antihistamines

Effective mainly on itching, sneezing, and rhinorrhea, less on congestion. Acts within 2-4 hours

Local corticosteroids

Acts on all symptoms of AR

Onset of action 6 -12 hours to give maximal effect after days

Systemic corticosteroids

Occasional use for a few days may be accepted

Cromoglycates

Mast cell stabilizers

Safe but weak. Prophylaxis only. Short duration

Antileukotrienes

Moderate efficacy but not more than antihistamines. Expensive

Non-specific (Symptomatic) Medications

Decongestants, Ipratropium bromide, Nasal douching

Immunotherapy

The only treatment modality that may affect the natural course of allergic rhinitis and it may also prevent the development of asthma

Classification of lines of medications used in patients with allergic rhinitis

T1 Nonsedating H1-antihistamine (oral, intranasal, and ocular),

leukotriene receptor antagonists, or cromones (intranasal and ocular)

T2 INCSs

T3 INCSs + intranasal azelastine

T4 Oral corticosteroid as a short course and an add-on treatment

T5 Consider referral to a specialist and allergen immunotherapy

Recommendations for pharmacotherapy for allergic rhinitis

- Oral or intranasal H1-antihistamines are less effective in controlling all rhinitis symptoms than intranasal corticosteroids (INCSs). However, they are effective in many patients with mild to moderate disease and many prefer oral medication.

- The comparisons between oral and intranasal H1-antihistamines differ in their results; no final conclusions have been drawn.

- In patients with severe rhinitis, INCSs are the first choice in treatment. Onset of action takes place after a few days.

- The concomitant use of an oral H1-antihistamine and an INCS does not provide better efficacy than INCSs alone, although this is a common practice worldwide.

- The efficacy of combined nasal H1-antihistamines and INCSs was found more effective than INCSs alone,

- The onset of action of INCSs takes a few hours to a few days. Intranasal H1-antihistamines are effective within minutes. The fixed combination of INCSs and intranasal H1-antihistamines is effective within minutes.

- MPAzeFlu, the fixed combination of intranasal FP and azelastine (Aze) in a nasal spray, is more effective than INCS or H1-antihistamine monotherapy and is indicated for patients in whom INCS monotherapy is considered inadequate, with severe AR or for patients who want a quick relief of symptoms. MPAzeFlu is superior to ICNSs which are superior to oral H1-antihistamines.

- Leukotriene antagonists are less potent than INCSs

-Oral H1-antihistamines of the first generation are sedating and should be avoided, as well as the prolonged use of nasal alpha-sympathomimetics (in vasoconstrictive nasal sprays).

- Depot corticosteroids i.m. are not indicated in allergic rhinitis. Intra-turbinate injection is contraindicated

- All recommended medications are considered safe in the usual dosage.

General recommendations for treatment of AR

- Recommendation 1A: In patients with SAR, either a combination of an INCS with an OAH or an INCS alone is suggested (conditional recommendation | low certainty of evidence).
- Recommendation 1B: In patients with PAR, an INCS alone rather than a combination of an INCS with an OAH is suggested (conditional recommendation | very low certainty of evidence).
- Recommendation 2A: In patients with SAR, either a combination of an INCS with an INAH or an INCS alone is suggested (conditional recommendation | moderate certainty of evidence).
- Recommendation 2B: In patients with PAR, either a combination of an INCS with an INAH or an INCS alone is suggested (conditional recommendation | very low certainty of evidence).
- Recommendation 3A: In patients with SAR, a combination of an INCS with an INAH rather than an INAH alone is suggested (conditional recommendation | low certainty of evidence).
- Recommendation 4A: In patients with SAR, either an LTRA or an OAH is suggested (conditional recommendation | moderate certainty of evidence).
- Recommendation 4B: In patients with PAR, we an OAH rather than a LTRA is suggested (conditional recommendation | low certainty of evidence).
- Recommendation 5A: In patients with SAR, an INCS rather than an INAH is suggested (conditional recommendation | moderate certainty of evidence).
- Recommendation 5B: In patients with PAR, an INCS rather than an INAH is suggested (conditional recommendation | low certainty of evidence).

- Recommendation 6A: In patients with SAR, either an INAH or OAH is suggested (conditional recommendation | low certainty of evidence).
- Recommendation 6B: In patients with PAR, either an INAH or OAH is suggested (conditional recommendation | very low certainty of evidence).

Conclusion:

1. In patients with seasonal AR, INCSs are recommended, or possibly a combination of INCSs + OAH. But the potential added benefit has not been proven.

2. In patients with persistent AR, INCSs alone are recommended rather than a combination of INCSs + OAH.

3. In patients with severe seasonal AR, a fixed combination of INCSs + INAH or INCSs alone is recommended; the choice of therapy also depends on the patient's preferences. At the beginning of treatment (in the first 2 weeks), a fixed combination of INCSs + INAH will work faster than INCSs alone.

4. In patients with PAR, either a combination of an INCS + an INAH or an INCS alone is recommended.

5. For the initial treatment of nasal symptoms of seasonal allergic rhinitis in patients ≥12 years, clinicians:

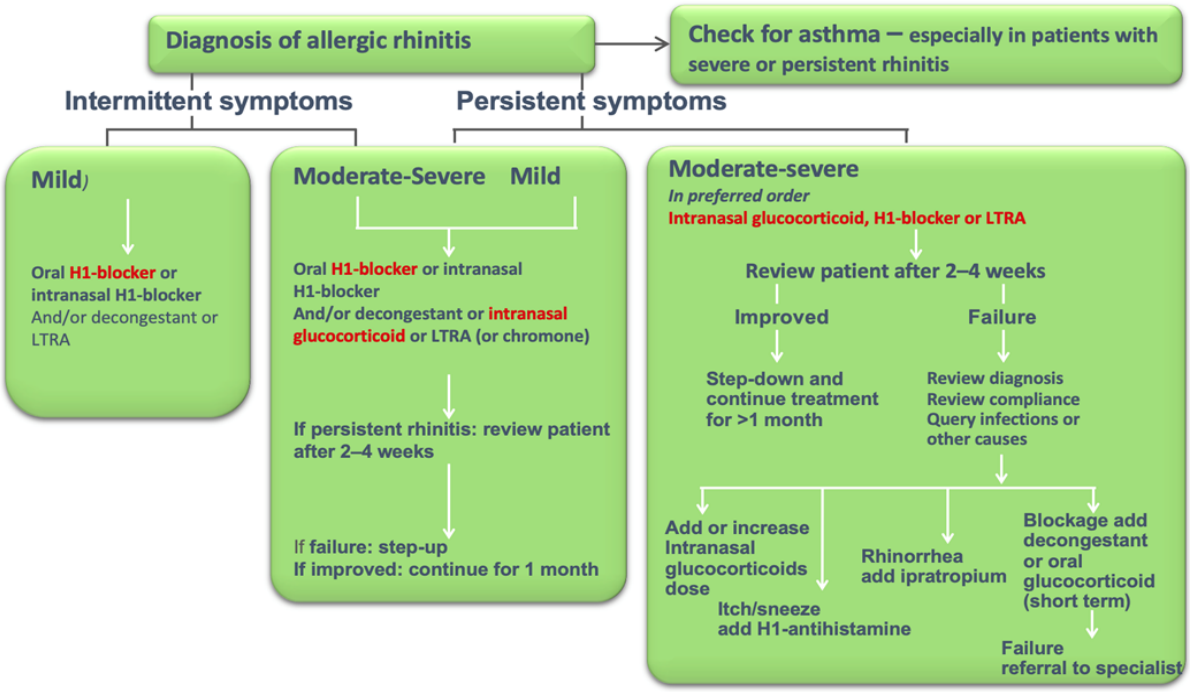
- should routinely prescribe monotherapy with an intranasal corticosteroid rather than a combination of an intranasal corticosteroid and an oral antihistamine,

- should recommend an intranasal corticosteroid over a leukotriene receptor antagonist (for ≥15 years of age),

- for moderate to severe symptoms, may recommend the combination of an intranasal corticosteroid and an intranasal antihistamine.

For all of these recommendations, the level of evidence is low or very Low

ARIA guideline treatment algorithm



• Allergen and irritant avoidance may also be appropriate

• The total dose of topical glucocorticoids should be considered if inhaled steroids are also being used for treatment of concomitant asthma.

Tonsillectomy in Children

The American Academy of Otolaryngology–Head and Neck Surgery Foundation

1. **Watchful waiting for recurrent throat infection:** Clinicians should recommend watchful waiting for recurrent throat infection if there have been<7 episodes in the past year <5 episodes per year in the past 2 years, or<3 episodes per year in the past 3 years. **Strong Recommendation**

2. **Recurrent throat infection with documentation:** Clinicians may recommend tonsillectomy for recurrent throat infection with a frequency of at least 7 episodes in the past year, at least 5 episodes per year for 2 years, or at least 3 episodes per year for 3 years with documentation in the medical record for each episode of sore throat and ≥1 of the following: temperature .38.3°C, cervical adenopathy, tonsillar exudate, or positive test for group A beta-hemolytic streptococcus. **Option**

3. **Tonsillectomy for recurrent infection with modifying factors:** Clinicians should assess the child with recurrent throat infection who does not meet criteria in Key Action Statement 2 for modifying factors that may nonetheless favor tonsillectomy, which may include but are not limited to: multiple antibiotic allergies/intolerance, PFAPA (periodic fever, aphthous stomatitis, pharyngitis, and adenitis), or history of >1 peritonsillar abscess. **Recommendation**

4. **Tonsillectomy for obstructive sleep-disordered breathing (oSDB):** Clinicians should ask caregivers of children with obstructive sleep-disordered breathing (oSDB) and tonsillar hypertrophy about

comorbid conditions that may improve after tonsillectomy, including growth retardation, poor school performance, enuresis, asthma, and behavioral problems. **Recommendation**

5. **Indications for polysomnography:** Before performing tonsillectomy, the clinician should refer children with obstructive sleep-disordered breathing (oSDB) for polysomnography (PSG) if they are\2 years of age or if they exhibit any of the following: obesity, Down syndrome, craniofacial abnormalities, neuromuscular disorders, sickle cell disease, or mucopolysaccharidoses. **Recommendation**

6. **Additional recommendations for polysomnography:** Another indication for polysomnography is discordance between the physical examination and the reported severity of oSDB. **Recommendation**

7. **Tonsillectomy for obstructive sleep apnea:** Clinicians should recommend tonsillectomy for children with obstructive sleep apnea (OSA) documented by overnight polysomnography (PSG). **Recommendation**

8. **Education regarding persistent or recurrent obstructive sleep-disordered breathing:** Clinicians should counsel patients and caregivers and explain that obstructive sleep-disordered breathing (oSDB) may persist or recur after tonsillectomy and may require further management. **Recommendation**

9. **Perioperative pain counseling:** The clinician should counsel patients and caregivers regarding the importance of managing post tonsillectomy pain as part of the perioperative education process and should reinforce this counseling at the time of surgery with

reminders about the need to anticipate, reassess, and adequately treat pain after surgery. **Recommendation**

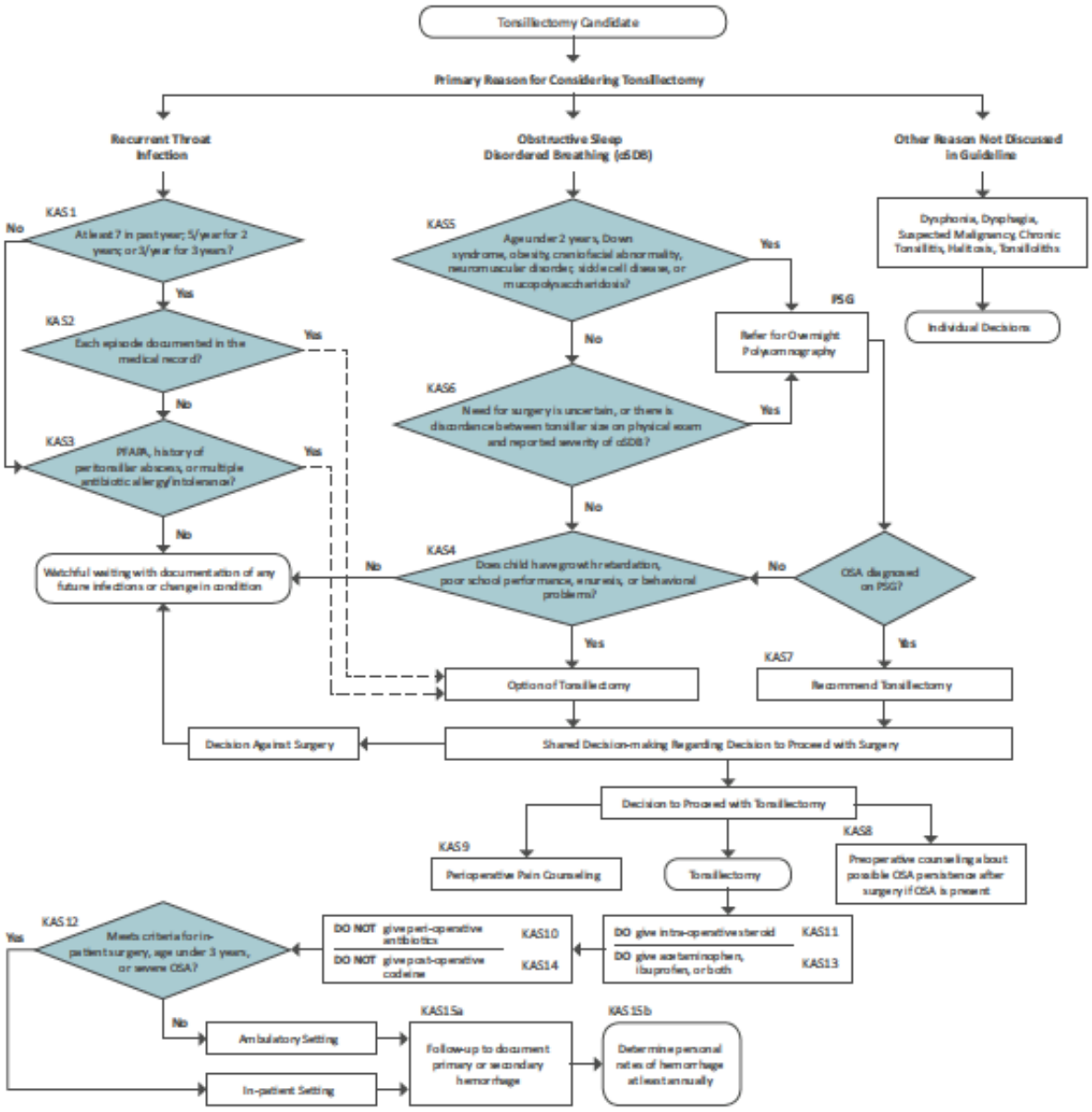
10. **Perioperative antibiotic**: Clinicians should not administer or prescribe perioperative antibiotics to children undergoing tonsillectomy. **Strong Recommendation against**

11. **Intraoperative steroids:** Clinicians should administer a single intraoperative dose of intravenous dexamethasone to children undergoing tonsillectomy. **Strong Recommendation**

12. **Inpatient monitoring for children after tonsillectomy:** Clinicians should arrange for overnight, inpatient monitoring of children after tonsillectomy if they are <3 years old or have severe obstructive sleep apnea (OSA; apnea-hypopnea index [AHI] ≥10 obstructive events/hour, oxygen saturation nadir <80%, or both). **Recommendation**

13. **Postoperative ibuprofen and acetaminophen:** Clinicians should recommend ibuprofen, acetaminophen, or both for pain control after tonsillectomy. **Strong Recommendation**

14. **Outcome Assessment for Bleeding:** Clinicians should follow up with patients and/or caregivers after tonsillectomy and document in the medical record the presence or absence of bleeding within 24 hours of surgery (primary bleeding) and bleeding occurring later than 24 hours after surgery (secondary bleeding). **Recommendation**


Tonsillectomy Candidate
Primary Reason for Considering Tonsillectomy
Recurrent Throat Infection
Obstructive Sleep Disordered Breathing (oSDB)
Other Reason Not Discussed in Guideline
KAS1
At least 7 in past year; 5/year for 2 years; or 3/year for 3 years?
No
Yes
KAS2
Each episode documented in the medical record?
Yes
No
KAS3
PFAPA, history of peritonsillar abscess, or multiple antibiotic allergy/intolerance?
Yes
No
Watchful waiting with documentation of any future infections or change in condition
KAS5
Age under 2 years, Down syndrome, obesity, craniofacial abnormality, neuromuscular disorder, sickle cell disease, or mucopolysaccharidosis?
Yes
No
PSG
Refer for Overnight Polysomnography
KAS6
Need for surgery is uncertain, or there is discordance between tonsillar size on physical exam and reported severity of oSDB?
Yes
No
KAS4
Does child have growth retardation, poor school performance, enuresis, or behavioral problems?
No
Yes
OSA diagnosed on PSG?
No
Yes
Dysphonia, Dysphagia, Suspected Malignancy, Chronic Tonsilitis, Halitosis, Tonsiloliths
Individual Decision
KAS7
Options of Tonsillectomy
Recommend Tonsillectomy
Decision Against Surgery
Shared Decision-making Regarding Decision to Proceed with Surgery
Decision to Proceed with Tonsillectomy
KAS9
Perioperative Pain Counseling
Tonsillectomy
KAS8
Preoperative counseling about possible OSA persistence after surgery if OSA is present
KAS12
Meets criteria for in-patient surgery, age under 3 years, or severe OSA?
Yes
No
DO NOT give peri-operative antibiotics KAS10
DO NOT give post-operative codeine KAS14
DO give intra-operative steroid KAS11
DO give acetaminophen, ibuprofen, or both KAS13
Ambulatory Setting
In-patient Setting
KAS15a
Follow-up to document primary or secondary hemorrhage
KAS 15b
Determine personal rates of hemorrhage at least annually

The Diagnosis and Management of Acute Otitis Media

The American Academy of Pediatrics

Glossary of Terms

AOM—the rapid onset of signs and symptoms of inflammation in the middle ear

Uncomplicated AOM—AOM without otorrhea

Severe AOM—AOM with the presence of moderate to severe otalgia or fever equal to or higher than 39°C

Nonsevere AOM—AOM with the presence of mild otalgia and a temperature below 39°C

Recurrent AOM—3 or more well documented and separate AOM episodes in the preceding 6 months or 4 or more episodes in the preceding 12 months with at least 1 episode in the past 6 months11,12

OME—inflammation of the middle ear with liquid collected in the middle ear; the signs and symptoms of acute infection are absent

MEE—liquid in the middle ear without reference to etiology, pathogenesis, pathology, or duration

Initial antibiotic therapy—treatment of AOM with antibiotics that are prescribed at the time of diagnosis with the intent of starting antibiotic therapy as soon as possible after the encounter

Initial observation—initial management of AOM limited to symptomatic relief, with commencement of antibiotic therapy only if the child's condition worsens at any time or does not show clinical improvement within 48 to 72 hours of diagnosis; a mechanism must be in place to ensure follow-up and initiation of antibiotics if the child fails observation

Key Action Statement 1A: Clinicians should diagnose acute otitis media (AOM) in children who present with moderate to severe bulging of the tympanic membrane (TM) or new onset of otorrhea not due to acute otitis externa.

Recommendation.

Key Action Statement 1B: Clinicians should diagnose AOM in children who present with mild bulging of the TM and recent (less than 48 hours) onset of ear pain (holding, tugging, rubbing of the ear in a nonverbal child) or intense erythema of the TM.

Recommendation.

Key Action Statement 1C: Clinicians should not diagnose AOM in children who do not have middle ear effusion (MEE) (based on pneumatic otoscopy and/or tympanometry).

Recommendation.

Key Action Statement 2: The management of AOM should include an assessment of pain. If pain is present, the clinician should recommend treatment to reduce pain.

Strong Recommendation.

The following table shows different Treatments for Otalgia in AOM

Treatment Modality	Comments
Acetaminophen, ibuprofen[65]	Effective analgesia for mild to moderate pain. Readily available. Mainstay of pain management for AOM.
Home remedies (no controlled studies that directly address effectiveness)	May have limited effectiveness.
Distraction	
External application of heat or cold	
Oil drops in external auditory canal	
Topical agents	
Benzocaine, procaine, lidocaine[65,67,70]	Additional, but brief, benefit over acetaminophen in patients older than 5 y.
Naturopathic agents[68]	Comparable to amethocaine/phenazone drops in patients older than 6 y.
Homeopathic agents[71,72]	No controlled studies that directly address pain.
Narcotic analgesia with codeine or analogs	Effective for moderate or severe pain. Requires prescription; risk of respiratory depression, altered mental status, gastrointestinal tract upset, and constipation.
Tympanostomy/myringotomy[73]	Requires skill and entails potential risk.

Key Action Statement 3A: Severe AOM: The clinician should prescribe antibiotic therapy for AOM (bilateral or unilateral) in children 6 months and older with severe signs or symptoms (i.e., moderate or severe otalgia or otalgia for at least 48 hours or temperature 39°C or higher).

Strong Recommendation.

Key Action Statement 3B: Nonsevere bilateral AOM in young children: The clinician should prescribe antibiotic therapy for bilateral AOM in children 6 months through 23 months of age without severe signs or symptoms (i.e., mild otalgia for less than 48 hours and temperature less than 39°C

Recommendation.

Key Action Statement 3C: Nonsevere unilateral AOM in young children: The clinician should either prescribe antibiotic therapy or offer observation with close follow-up based on joint decision making with the parent(s)/caregiver for unilateral AOM in children 6 months to 23 months of age without severe signs or symptoms (i.e., mild otalgia for less than 48 hours and temperature less than 39°C. When observation is used, a mechanism must be in place to ensure follow-up and begin antibiotic therapy if the child worsens or fails to improve within 48 to 72 hours of onset of symptoms.

Recommendation.

Key Action Statement 3D: Nonsevere AOM in older children: The clinician should either prescribe antibiotic therapy or offer observation with close follow-up based on joint decision-making with the parent(s)/ caregiver for AOM (bilateral or unilateral) in children 24 months or older without severe signs or symptoms (ie, mild otalgia for less than 48 hours and temperature less than 39°C [102.2°F]). When observation is used, a mechanism must be in place to ensure follow-up and begin antibiotic therapy if the child worsens or fails to improve within 48 to 72 hours of onset of symptoms.

Recommendation.

Key Action Statement 4A: Clinicians should prescribe amoxicillin for AOM when a decision to treat with antibiotics has been made and the child has not received amoxicillin in the past 30 days or the child does not have concurrent purulent conjunctivitis or the child is not allergic to penicillin

Recommendation.

Key Action Statement 4B: Clinicians should prescribe an antibiotic with additional β-lactamase coverage for AOM when a decision to treat with antibiotics has been made, and the child has received amoxicillin in the last 30 days or has concurrent purulent conjunctivitis or has a history of recurrent AOM unresponsive to amoxicillin.

Recommendation.

Key Action Statement 4C: Clinicians should reassess the patient if the caregiver reports that the child's symptoms have worsened or failed to respond to the initial antibiotic treatment within 48 to 72 hours and determine whether a change in therapy is needed.

Recommendation.

Initial Immediate or Delayed Antibiotic Treatment		Antibiotic Treatment After 48–72 h of Failure of Initial Antibiotic Treatment	
Recommended First-line Treatment	Alternative Treatment (if Penicillin Allergy)	Recommended First-line Treatment	Alternative Treatment
Amoxicillin (80–90 mg/ kg per day in 2 divided doses)	Cefdinir (14 mg/kg per day in 1 or 2 doses)	Amoxicillin-clavulanate[a] (90 mg/kg per day of amoxicillin, with 6.4 mg/kg per day of clavulanate in 2 divided doses)	Ceftriaxone, 3 d Clindamycin (30–40 mg/kg per day in 3 divided doses), with or without third-generation cephalosporin
or	Cefuroxime (30 mg/kg per day in 2 divided doses)	or	Failure of second antibiotic
Amoxicillin-clavulanate[a] (90 mg/kg per day of amoxicillin, with 6.4 mg/kg per day of clavulanate [amoxicillin to clavulanate ratio, 14:1] in 2 divided doses)	Cefpodoxime (10 mg/kg per day in 2 divided doses)	Ceftriaxone (50 mg IM or IV for 3 d)	Clindamycin (30–40 mg/kg per day in 3 divided doses) plus third-generation cephalosporin
	Ceftriaxone (50 mg IM or IV per day for 1 or 3 d)		Tympanocentesis[b] Consult specialist[b]

Key Action Statement 5A: Clinicians should not prescribe prophylactic antibiotics to reduce the frequency of episodes of AOM in children with recurrent AOM.

Recommendation.

Key Action Statement 5B: Clinicians may offer tympanostomy tubes for recurrent AOM (3 episodes in 6 months or 4 episodes in 1 year with 1 episode in the preceding 6 months).

Option.

Key Action Statement 6A: Clinicians should recommend pneumococcal conjugate vaccine to all children

Strong Recommendation.

Key Action Statement 6B: Clinicians should recommend annual influenza vaccine to all children

Recommendation.

Key Action Statement 6C: Clinicians should encourage exclusive breastfeeding for at least 6 months. Evidence

Recommendation.

Key Action Statement 6D: Clinicians should encourage avoidance of tobacco smoke exposure.

Recommendation.

Otitis Media with Effusion

American Academy of Otolaryngology—Head and Neck Surgery Foundation 2016

STATEMENT 1a. PNEUMATIC OTOSCOPY: The clinician should document the presence of middle ear effusion with pneumatic otoscopy when diagnosing OME in a child.

Strong recommendation

STATEMENT 1b. PNEUMATIC OTOSCOPY: The clinician should perform pneumatic otoscopy to assess for OME in a child with otalgia, hearing loss, or both.

Strong recommendation

STATEMENT 2. TYMPANOMETRY: Clinicians should obtain tympanometry in children with suspected OME for whom the diagnosis is uncertain after performing (or attempting) pneumatic otoscopy.

Strong recommendation

STATEMENT 3. FAILED NEWBORN HEARING SCREEN: Clinicians should document in the medical record counseling of parents of infants with OME who fail a newborn hearing screen regarding the importance of follow-up to ensure that hearing is normal when OME resolves and to exclude an underlying sensorineural hearing loss (SNHL).

Recommendation based on observational studies with a predominance of benefit over harm.

STATEMENT 4a. IDENTIFYING AT-RISK CHILDREN: Clinicians should determine if a child with OME is at increased risk for speech, language, or learning problems from middle ear effusion because of baseline sensory, physical, cognitive, or behavioral factors.

Recommendation based on observational studies with a preponderance of benefit over harm.

STATEMENT 4b. EVALUATING AT-RISK CHILDREN:

- Clinicians should evaluate at-risk children for OME at the time of diagnosis of an at-risk condition and at 12 to 18 months of age.
- (Recommendation based on observational studies with a preponderance of benefit over harm.

STATEMENT 5. SCREENING HEALTHY CHILDREN: Clinicians should not routinely screen children for OME who are not at risk and do not have symptoms that may be attributable to OME, such as hearing difficulties, balance (vestibular) problems, poor school performance, behavioral problems, or ear discomfort. Recommendation against based on RCTs and cohort studies with a preponderance of harm over benefit.

STATEMENT 6. PATIENT EDUCATION: Clinicians should educate families of children with OME regarding the natural history of OME, need for follow-up, and the possible sequelae. Recommendation based on observational studies and preponderance of benefit over harm.

STATEMENT 7. WATCHFUL WAITING: Clinicians should manage the child with OME who is not at risk with watchful waiting for 3 months from the date of effusion onset (if known) or 3 months from the date of diagnosis

(if onset is unknown). Strong recommendation based on systematic review of cohort studies and preponderance of benefit over harm.

STATEMENT 8a. STEROIDS: Clinicians should recommend against using intranasal steroids or systemic steroids for treating OME.

Strong recommendation against based on systematic review of RCTs and preponderance of harm over benefit.

STATEMENT 8b. ANTIBIOTICS: Clinicians should recommend against using systemic antibiotics for treating OME. Strong recommendation against based on systematic review of RCTs and preponderance of harm over benefit.

STATEMENT 8c. ANTIHISTAMINES OR DECONGESTANTS:

Clinicians should recommend against using antihistamines, decongestants, or both for treating OME. Strong recommendation against based on systematic review of RCTs and preponderance of harm over benefit.

STATEMENT 9. HEARING TEST: Clinicians should obtain an age-appropriate hearing test if OME persists for >3 months OR for OME of any duration in an at-risk child. Recommendation based on cohort studies and preponderance of benefit over harm.

STATEMENT 10. SPEECH AND LANGUAGE: Clinicians should counsel families of children with bilateral OME and documented hearing loss about the potential impact on speech and language development.

Recommendation based on observational studies and preponderance of benefit over harm.

STATEMENT 11. SURVEILLANCE OF CHRONIC OME: Clinicians should reevaluate, at 3- to 6-month intervals, children with chronic OME until the effusion is no longer present, significant hearing loss is identified, or structural abnormalities of the eardrum or middle ear are suspected. Recommendation based on observational studies with a preponderance of benefit over harm.

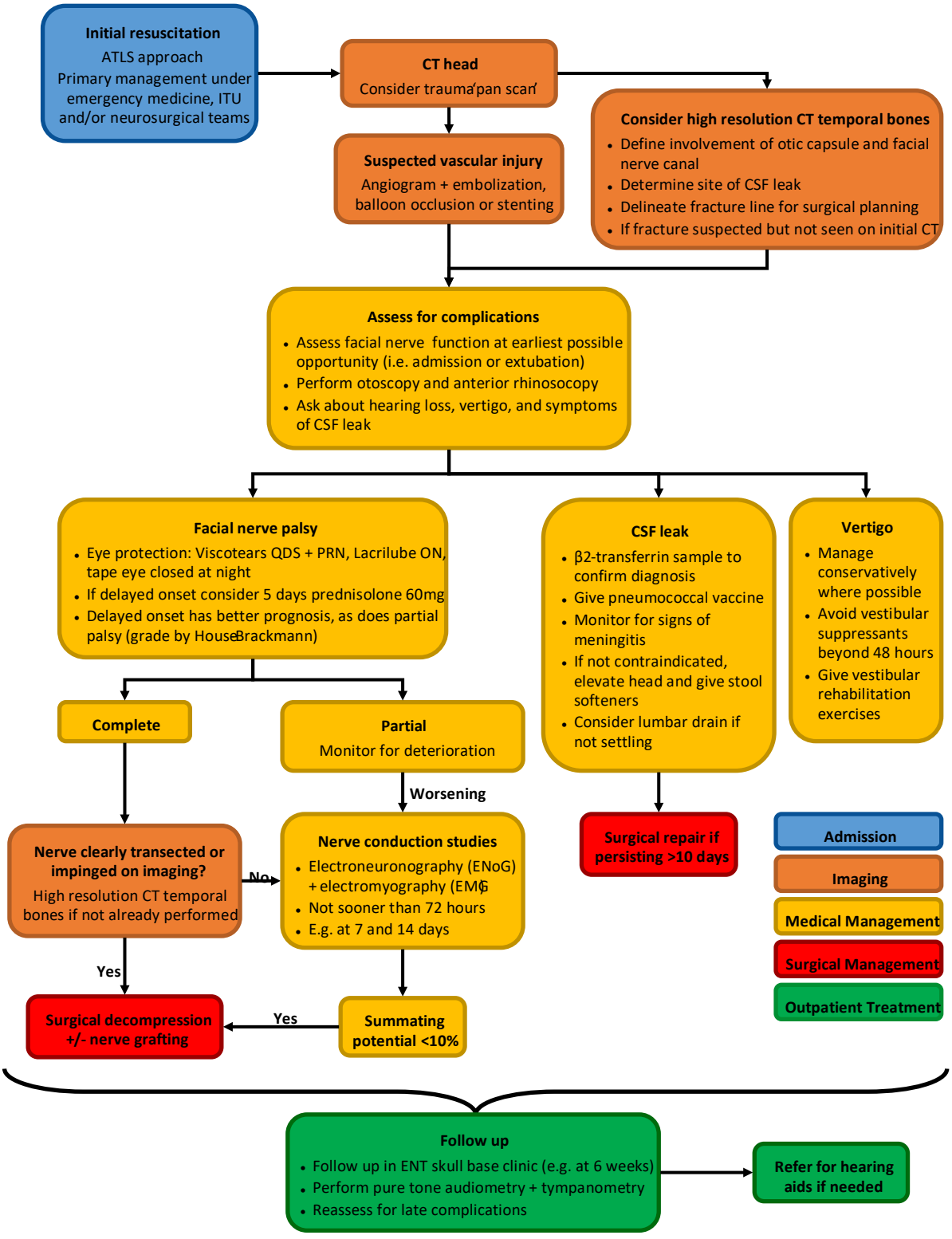
STATEMENT 12a. SURGERY FOR CHILDREN <4 YEARS OLD: Clinicians should recommend tympanostomy tubes when surgery is performed for OME in a child < 4 years old; adenoidectomy should not be performed unless a distinct indication (eg, nasal obstruction, chronic adenoiditis) exists other than OME.

Recommendation based on systematic reviews of RCTs with a preponderance of benefit over harm.

STATEMENT 12b. SURGERY FOR CHILDREN >4 YEARS OLD: Clinicians should recommend tympanostomy tubes, adenoidectomy, or both when surgery is performed for OME in a child 4 years old or older.

Recommendation based on systematic reviews of RCTs and observational studies with a preponderance of benefit over harm.

Acute management of temporal bone fractures guideline



Initial resuscitation

Patients with temporal bone fractures will have suffered a significant head injury in order to impart sufficient force to fracture this bone. Many will have significant intracranial injuries requiring neurosurgical intervention and these will take priority. Many such patients will require monitoring in a Level 2 or Level 3 setting. Overall management is beyond the scope of this guideline but should follow the Brain Trauma Foundation guidelines.

CT head

As per NICE guidelines, patients with any sign of basal skull fracture should have a CT head performed within 1 hour.

Suspected vascular injury

Vascular injury may be suspected clinically or by the involvement of the carotid canal on CT. CT angiography is specific but not sensitive in diagnosing blunt cerebrovascular injury and therefore conventional angiography is preferred.

Consider high resolution CT temporal bones

Helical CT as performed in a trauma setting will identify over 98% temporal bone fractures; high resolution dedicated CT of the temporal bones is indicated particularly where there are complications in order to precisely delineate the fracture line, or where a fracture is clinically suspected but not identified on initial helical CT. It is also useful after the acute period in diagnosis and surgical planning regarding ossicular dislocation and labyrinthitis ossificans.

Assess for complications

Complications of temporal bone fractures are common. Clinical examination should include the cranial nerves, otoscopy and anterior rhinoscopy.

Facial nerve palsy

The literature regarding management of traumatic facial nerve palsies remains inconclusive and large prospective studies are lacking. Modern high-resolution CT scans give excellent anatomic definition and can accurately predict the site of facial nerve injury in most cases; thus, if obvious nerve compromise is demonstrated at CT, early surgical intervention is warranted. Earlier surgery has better outcomes than late intervention and it is therefore important to identify surgical candidates in a timely matter. Nerve conduction studies are used to identify candidates for surgery. Electroneuronography, if available, is ideal but should be performed not sooner than 72 hours as it is unreliable before Wallerian degeneration has taken place. Timings will vary by local availability; the example of 7 and 14 days post-injury is performed at the authors' trust. The prognosis in the case of delayed onset palsy is excellent with conservative management and very few cases will require surgery. The evidence for prednisolone is weak.

CSF leak

Most traumatic CSF leaks will resolve with conservative management and therefore a period of bed rest with measures to reduce fluctuations in intracranial pressure is recommended. β2-transferrin is reliable in diagnosing the presence of cerebrospinal fluid. The use of prophylactic antibiotics is controversial, but generally not recommended as there is a low rate of meningitis in traumatic CSF leak.

Vertigo

Vertigo is common following temporal bone fractures. Vestibular suppressants impair adaption and should therefore be avoided or, if required, used for as short a period as possible. Vestibular rehabilitation is effective and should be offered early.

Follow up

Most patients have long term complications 12 months after temporal bone fractures, which significantly affect quality of life and are frequently disabling. Further management is beyond the scope of this acute guideline, but further elective surgery may include ossiculoplasty for dislocation, tympanotomy for perilymph fistula, or repair of persistent CSF leak.

Refer for hearing aids if needed

All patients with hearing loss affecting their ability or hear or communicate should be referred for hearing aids.

Acute mastoiditis

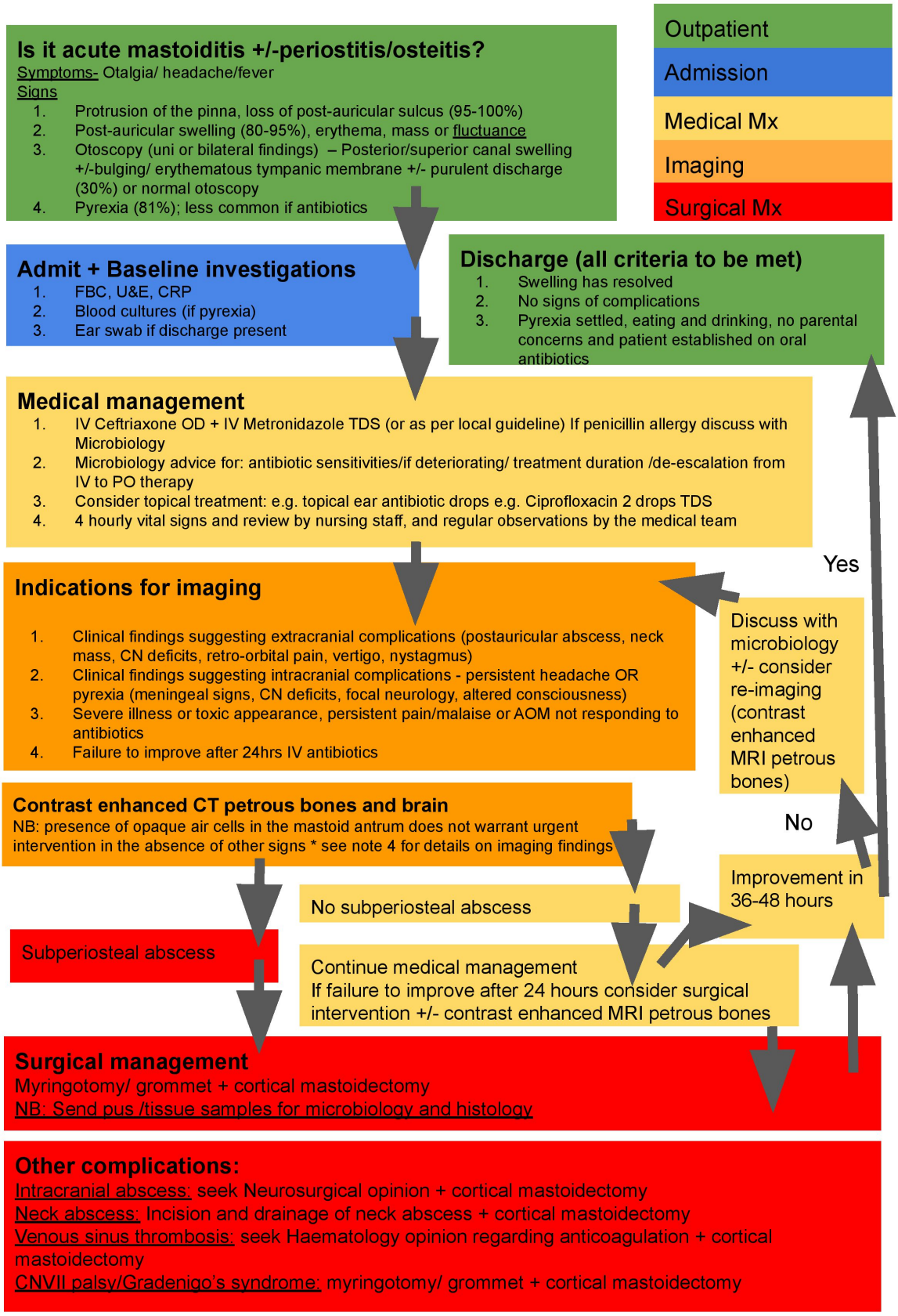
British Society of Otology

Definitions

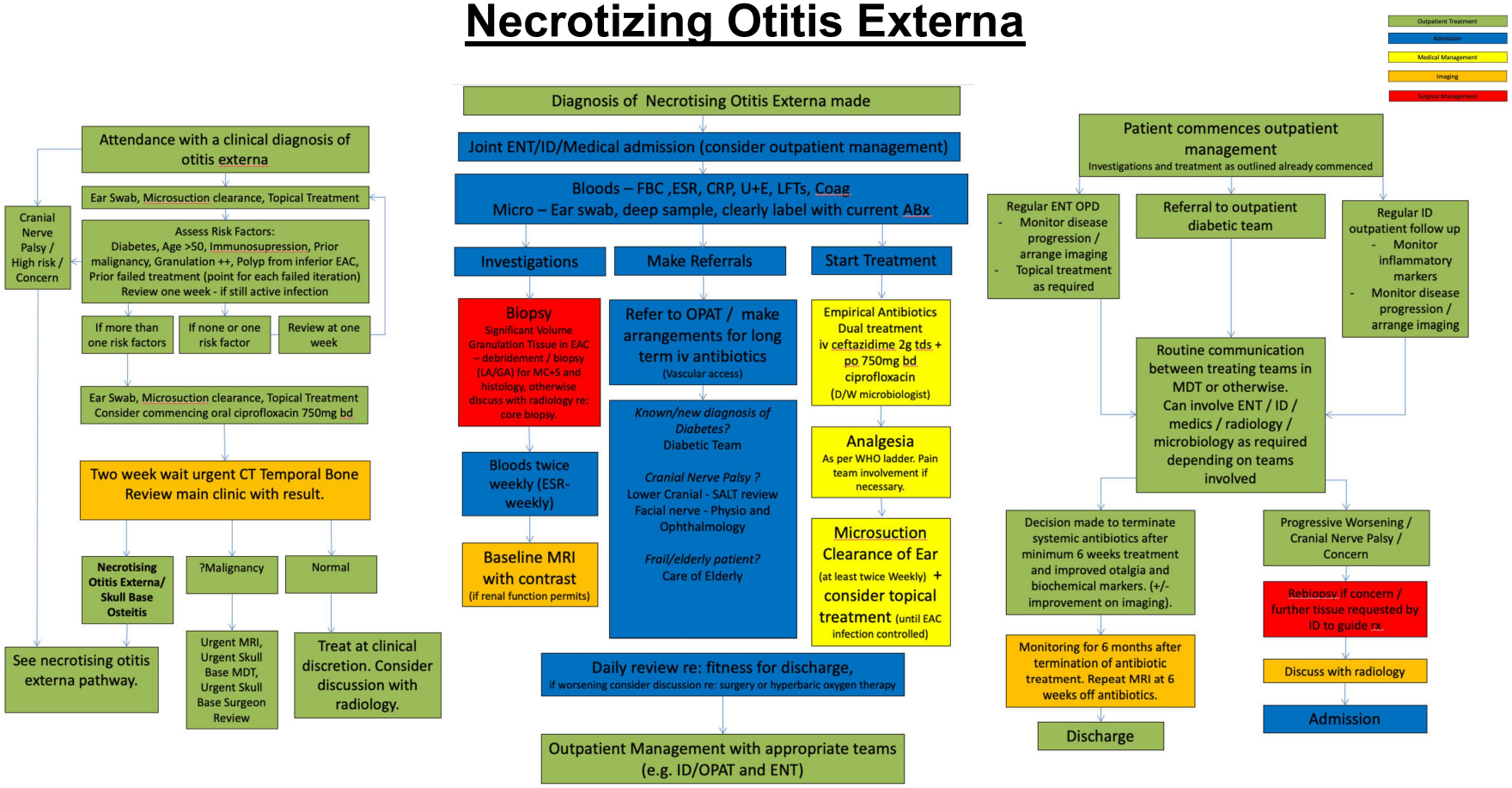
1. Acute mastoiditis: acute infection and inflammation in mastoid
2. Mastoiditis with periostitis: infection spreads from the mastoid to the periosteum by emissary veins. An abscess is not present, but the pinna pushed forward, loss of the post-auricular sulcus and erythematous or tender mastoid (also called incipient mastoiditis).
3. Acute mastoid osteitis: also called coalescent mastoiditis-thin bony septae between air cells are destroyed as the pressure of accumulating pus increases, abscess cavities form and pus dissects into adjacent areas, the most common being subperiosteal abscess. Other notable areas for abscesses to form: posterior belly of digastric (Citelli), sternocleidomastoid (Bezold) or temporalis muscle (Luc).
4. Masked mastoiditis: incompletely treated AOM after 10-14 days, may present with a persistent fever and otalgia but without other signs.

Notes

1. The incidence of mastoiditis has remained stable despite decrease in prescriptions for AOM, with no difference noted in prior antibiotic use between those developing subperiosteal abscess or not.
2. Differential diagnosis includes lymphadenopathy, periauricular cellulitis, perichondritis, mumps, tumor. Rarely Granulomatosis with polyangiitis, cholesteatoma, leukemia and histiocytosis hence the need for tissue for histology at surgery.
3. The bacterial species implicated most often are Strep. Pneumoniae, Strep. Pyogenes, Staph. Aureus. P. Aeruginosa is common if recent recurrent AOM or recent antibiotic use and especially where a perforation is present, or in non-acute presentations.
4. Imaging findings: Fluid in middle ear and mastoid, loss of definition of the bony septae (coalescence), destruction or irregularity of mastoid cortex, periosteal thickening, and abscess formation. NB opacification of antrum /air cells without coalescence does not indicate acute mastoiditis or mastoid osteitis when present as an isolated finding.
5. Immunological evaluation may be warranted in children with recurrent episodes of AOM leading to mastoiditis.


Outpatient
Admission
Medical Mx
Imaging
Surgical Mx
Is it acute mastoiditis +/-periostitis/osteitis?
Symptoms- Otalgia/ headache/fever
Signs
1. Protrusion of the pinna, loss of post-auricular sulcus (95-100%)
2. Post-auricular swelling (80-95%), erythema, mass or fluctuance
3. Otoscopy (uni or bilateral findings) – Posterior/superior canal swelling +/-bulging/ erythematous tympanic membrane +/- purulent discharge (30%) or normal otoscopy
4. Pyrexia (81%); less common if antibiotics
Admit + Baseline investigations
1. FBC, U&E, CRP
2. Blood cultures (if pyrexia)
3. Ear swab if discharge present
Discharge (all criteria to be met)
1. Swelling has resolved
2. No signs of complications
3. Pyrexia settled, eating and drinking, no parental concerns and patient established on oral antibiotics
Medical management
1. IV Ceftriaxone OD + IV Metronidazole TDS (or as per local guideline) If penicillin allergy discuss with Microbiology
2. Microbiology advice for: antibiotic sensitivities/if deteriorating/ treatment duration /de-escalation from IV to PO therapy
3. Consider topical treatment: e.g. topical ear antibiotic drops e.g. Ciprofloxacin 2 drops TDS
4. 4 hourly vital signs and review by nursing staff, and regular observations by the medical team
Indications for imaging
1. Clinical findings suggesting extracranial complications (postauricular abscess, neck mass, CN deficits, retro-orbital pain, vertigo, nystagmus)
2. Clinical findings suggesting intracranial complications - persistent headache OR pyrexia (meningeal signs, CN deficits, focal neurology, altered consciousness)
3. Severe illness or toxic appearance, persistent pain/malaise or AOM not responding to antibiotics
4. Failure to improve after 24hrs IV antibiotics
Yes
Discuss with microbiology +/- consider re-imaging (contrast enhanced MRI petrous bones)
No
Improvement in 36-48 hours
Contrast enhanced CT petrous bones and brain
NB: presence of opaque air cells in the mastoid antrum does not warrant urgent intervention in the absence of other signs * see note 4 for details on imaging findings
No subperiosteal abscess
Subperiosteal abscess
Continue medical management
If failure to improve after 24 hours consider surgical intervention +/- contrast enhanced MRI petrous bones
Surgical management
Myringotomy/ grommet + cortical mastoidectomy
NB: Send pus /tissue samples for microbiology and histology
Other complications:
Intracranial abscess: seek Neurosurgical opinion + cortical mastoidectomy
Neck abscess: Incision and drainage of neck abscess + cortical mastoidectomy
Venous sinus thrombosis: seek Haematology opinion regarding anticoagulation + cortical mastoidectomy
CNVII palsy/Gradenigo's syndrome: myringotomy/ grommet + cortical mastoidectomy

Necrotizing Otitis Externa



References: 1.Mahdyoun P, Pulcini C, Gahide I, Raffaelli C, Savoldelli C, Castillo L, Guevara N. Necrotizing otitis externa: a systematic review. Otol Neurotol. 2013 Jun;34(4):620-9. 2. Courson AM, Vikram HR, Barrs DM. What are the criteria for terminating treatment for necrotizing (malignant) otitis externa? Laryngoscope. 2014 Feb;124(2):361-2. 3. Chawdhary G, Pankhania M, Douglas S, Bottrill I. Current management of necrotising otitis externa in the UK: survey of 221 UK otolaryngologists. Acta Otolaryngol. 2017 Aug;137(8):818-822. 4. Pankhania M, Bashyam A, Judd O, Jassar P. Antibiotic prescribing trends in necrotising otitis externa: a survey of 85 trusts in the United Kingdom: Our Experience. Clin Otolaryngol. 2016 Jun;41(3):293-6. 5. Phillips JS, Jones SE. Hyperbaric oxygen as an adjuvant treatment for malignant otitis externa. Cochrane Database Syst Rev. 2013 May 31;(5):CD004617. 6. Pulcini C, Mahdyoun P, Cua E, Gahide I, Castillo L, Guevara N. Antibiotic therapy in necrotising external otitis: case series of 32 patients and review of the literature. Eur J Clin Microbiol Infect Dis. 2012 Dec;31(12):3287-94. 7. Verim A, Naiboğlu B, Karaca Ç, Seneldir L, Külekçi S, Oysu Ç. Clinical outcome parameters for necrotizing otitis externa. Otol Neurotol. 2014 Feb;35(2):371-6. Authors: Robert Nash (GOSH), Sarah Logan (UCLH), Trupti Patel (Imperial), Sherif Khalil (RNTNE), Shakeel Saeed (UCL)

Benign Paroxysmal Positional Vertigo

The American Academy of Otolaryngology–Head and Neck Surgery Foundation

• Vertigo is defined as an illusory sensation of motion of either the self or the surroundings in the absence of true motion.

• Positional vertigo is defined as a spinning sensation produced by changes in head position relative to gravity.

• BPPV is defined as a disorder of the inner ear characterized by repeated episodes of positional vertigo (Table 1).

Traditionally, the terms “benign” and “paroxysmal” have been used to characterize this particular form of positional vertigo. In this context, the descriptor benign historically implies that BPPV was a form of positional vertigo not due to any serious central nervous system (CNS) disorder and that there was an overall favorable prognosis for recovery.

This favorable prognosis is based in part on the fact that BPPV can recover spontaneously in approximately 20% of patients by 1 month of follow-up and up to 50% at 3 months.

Table 1. Definitions of Common Terms.

Term	Definition
Vertigo	An illusory sensation of motion of either the self or the surroundings in the absence of true motion.
Nystagmus	A rapid, involuntary oscillatory movement of the eyeball.
Vestibular system/apparatus	The sensory system within the inner ear that, with the vestibular nerve and its connections in the brain, provides the fundamental input to the brain regarding balance and spatial orientation.
Positional vertigo	Vertigo produced by changes in the head position relative to gravity.
Benign paroxysmal positional vertigo (BPPV)	A disorder of the inner ear characterized by repeated episodes of positional vertigo.
Posterior canal BPPV	A form of BPPV in which dislodged inner ear particles in the posterior semicircular canal abnormally influence the balance system producing the vertigo, most commonly diagnosed with the Dix-Hallpike test.
Lateral canal BPPV	A form of BPPV in which dislodged inner ear particles in the lateral semicircular canal abnormally influence the balance system producing the vertigo, most commonly diagnosed by the supine roll test.
Canalithiasis	A theory for the pathogenesis of BPPV that proposes that there are free-floating particles (otoconia) that have moved from the utricle and collect near the cupula of the affected canal, causing forces in the canal leading to abnormal stimulation of the vestibular apparatus.
Cupulolithiasis	A theory for the pathogenesis of BPPV that proposes that otoconial debris attached to the cupula of the affected semicircular canal cause abnormal stimulation of the vestibular apparatus.
Canalith repositioning procedures (CRPs)	A group of procedures in which the patient moves through specific body positions designed to relocate dislodged particles within the inner ear for the purpose of relieving symptoms of BPPV. The specific CRP chosen relates to the type of BPPV diagnosed. These have also been termed *canalith repositioning maneuvers* or *canalith repositioning techniques*.

Key Action Statements:

1a. Diagnosis of posterior semicircular canal BPPV: Clinicians should diagnose posterior semicircular canal BPPV when vertigo associated with torsional, upbeating nystagmus is provoked by the Dix-Hallpike maneuver, performed by bringing the patient from an upright to supine position with the head turned 45° to one side and neck extended 20° with the affected ear down. The maneuver should be repeated with the opposite ear down if the initial maneuver is negative. **Strong Recommendation**

1b. Diagnosis of lateral (horizontal) semicircular canal BPPV: If the patient has a history compatible with BPPV and the Dix-Hallpike test exhibits horizontal or no nystagmus, the clinician should perform, or refer to a clinician who can perform, a supine roll test to assess for lateral semicircular canal BPPV. **Recommendation**

2a. Differential diagnosis: Clinicians should differentiate, or refer to a clinician who can differentiate, BPPV from other causes of imbalance, dizziness, and vertigo. **Recommendation**

2b. Modifying factors: Clinicians should assess patients with BPPV for factors that modify management, including impaired mobility or balance, central nervous system disorders, a lack of home support, and/or increased risk for falling. **Recommendation**

3a. Radiographic testing: Clinicians should not obtain radiographic imaging in a patient who meets diagnostic criteria for BPPV in the absence of additional signs and/or symptoms inconsistent with BPPV that warrant imaging. **Recommendation against**

3b. Vestibular testing: Clinicians should not order vestibular testing in a patient who meets diagnostic criteria for BPPV in the absence of additional vestibular signs and/or symptoms inconsistent with BPPV that warrant testing. **Recommendation against**

4a. Repositioning procedures as initial therapy: Clinicians should treat, or refer to a clinician who can treat, patients with posterior canal BPPV with a canalith repositioning procedure. **Strong Recommendation**

4b. Postprocedural restrictions: Clinicians should not recommend postprocedural postural restrictions after canalith repositioning procedure for posterior canal BPPV. **Strong Recommendation against**

4c. Observation as initial therapy: Clinicians may offer observation with follow up as initial management for patients with BPPV. **Option**

5. Vestibular rehabilitation: The clinician may offer vestibular rehabilitation, either self-administered or with a clinician, in the treatment of BPPV. **Option**

6. Medical therapy: Clinicians should not routinely treat BPPV with vestibular suppressant medications such as antihistamines and/or benzodiazepines. **Recommendation against**

7a. Outcome assessment: Clinicians should reassess patients within 1 month after an initial period of observation or treatment to document resolution or persistence of symptoms. **Recommendation**

7b. Evaluation of treatment failure: Clinicians should evaluate, or refer to a clinician who can evaluate, patients with persistent symptoms for unresolved BPPV and/or underlying peripheral vestibular or central nervous system disorders. **Recommendation**

8. Education: Clinicians should educate patients regarding the impact of BPPV on their safety, the potential for disease recurrence, and the importance of follow-up. **Recommendation**

Bell's Palsy

The American Academy of Otolaryngology–Head and Neck Surgery Foundation

- Bell's palsy is rapid in onset (<72 hours).
- Bell's palsy is diagnosed when no other medical etiology is identified as a cause of the facial weakness.
- Bilateral Bell's palsy is rare.
- Currently, no cause for Bell's palsy has been identified.
- Other conditions may cause facial paralysis, including stroke, brain tumors, tumors of the parotid gland or infratemporal fossa, cancer involving the facial nerve, and systemic and infectious diseases,
- including zoster, sarcoidosis, and Lyme disease.
- Bell's palsy is typically self-limited.
- Bell's palsy may occur in men, women, and children but is more common in those 15 to 45 years old; those with diabetes, upper respiratory ailments, or compromised immune systems; or during pregnancy

Key Action Statements:

1. Patient history and physical examination: Clinicians should assess the patient using history and physical examination to exclude identifiable causes of facial paresis or paralysis in patients presenting with acute-onset unilateral facial paresis or paralysis. **Strong Recommendation**

2. Laboratory testing: Clinicians should not obtain routine laboratory testing in patients with new-onset Bell's palsy. **Recommendation against**

3. Diagnostic imaging: Clinicians should not routinely perform diagnostic imaging for patients with new-onset Bell's palsy. **Recommendation against**

4. Oral steroids: Clinicians should prescribe oral steroids within 72 hours of symptom onset for Bell's palsy patients 16 years and older. **Strong Recommendation**

5A. Antiviral monotherapy: Clinicians should not prescribe oral antiviral therapy alone for patients with new-onset Bell's palsy. **Strong Recommendation against**

5B. Combination antiviral therapy: Clinicians may offer oral antiviral therapy in addition to oral steroids within 72 hours of symptom onset for patients with Bell's palsy. **Option**

6. Eye care: Clinicians should implement eye protection for Bell's palsy patients with impaired eye closure. **Strong Recommendation**

7A. Electrodiagnostic testing with incomplete paralysis: Clinicians should not perform electrodiagnostic testing in Bell's palsy patients with incomplete facial paralysis. **Recommendation against**

7B. Electrodiagnostic testing with complete paralysis: Clinicians may offer electrodiagnostic testing to Bell's palsy patients with complete facial paralysis. **Option**

8. Surgical decompression: No recommendation can be made regarding surgical decompression for Bell's palsy patients. **NO Recommendation**

9. Physical therapy: No recommendation can be made regarding the effect of physical therapy in Bell's palsy patients. **NO Recommendation**

10. Patient follow-up: Clinicians should reassess or refer to a facial nerve specialist those Bell's palsy patient with (1) new or worsening neurologic findings at any point, (2) ocular symptoms developing at any point, or (3) incomplete facial recovery 3 months after initial symptom onset. **NO Recommendation**

Tinnitus

The American Academy of Otolaryngology–Head and Neck Surgery Foundation

Tinnitus is the perception of sound without an external source. The prevalence among literature varies between 10% and 15% in adults. About 20% of them will require clinical intervention. Tinnitus is not a disease in and of itself, it is actually a symptom that can be associated with multiple causes and aggravating co-factors, in rare cases it can be a symptom of serious disease such as vascular tumor or vestibular schwannoma (VS).

Table 1. Abbreviations and Definitions of Common Terms.

Term	Definition
Tinnitus	The perception of sound when there is no external source of the sound
Primary tinnitus	Tinnitus that is idiopathic[a] and may or may not be associated with sensorineural hearing loss
Secondary tinnitus	Tinnitus that is associated with a specific underlying cause (other than sensorineural hearing loss) or an identifiable organic condition
Recent onset tinnitus	Less than 6 months in duration (as reported by the patient)
Persistent tinnitus	6 months or longer in duration
Bothersome tinnitus	Distressed patient, affected quality of life[b] and/or functional health status; patient is seeking active therapy and management strategies to alleviate tinnitus
Nonbothersome tinnitus	Tinnitus that does not have a significant effect on a patient's quality of life but may result in curiosity of the cause or concern about the natural history and how it might progress or change

[a]The word *idiopathic* is used here to indicate that a cause other than sensorineural hearing loss is not identifiable.
[b]*Quality of life* is the degree to which persons perceive themselves as able to function physically, emotionally, mentally, and/or socially.

Key Action Statements:

STATEMENT 1. PATIENT HISTORY AND PHYSICAL EXAMINATION: Clinicians should perform a targeted history and physical examination at the initial evaluation of a patient with presumed primary tinnitus to identify conditions that if promptly identified and managed may relieve tinnitus. *Recommendation*

Key Details of Medical History in the Tinnitus Patient

Key Issue	Significance	Implication
Unilateral tinnitus	Concern for focal auditory lesions, some serious, such as VS or vascular tumor	Referral for comprehensive audiologic assessment and an otologic evaluation; additional testing such as imaging where indicated
Pulsatile tinnitus	Concern for vascular lesion, systemic cardiovascular illness	Consider cardiovascular and general physical examination (hypertension, heart murmurs, carotid bruits, venous hums); examination of the head and neck for signs of vascular tumors or other lesions; comprehensive audiology; imaging and other testing where indicated
Hearing loss	Tinnitus is frequently associated with hearing loss, particularly SNHL; differentiate between conductive and SNHL, unilateral and bilateral; establish severity of hearing loss	Referral for comprehensive audiology; otologic evaluation to look for the wide range of pathologies that could cause hearing loss associated with tinnitus; consider hearing aid evaluation when indicated
Sudden onset of hearing loss with tinnitus	Sudden hearing loss requires prompt treatment to stabilize or improve hearing.	See sudden SNHL guideline[44]
New onset tinnitus	Tinnitus perception may diminish or disappear, and/or tinnitus reactions may be reduced.	Evaluation and treatment is based on severity, and presence and absence of other symptoms
Noise exposure	Tinnitus may be associated with prolonged noise exposure from occupational or recreational activities.	Counseling and education related to potential damaging effect of noise, acoustic trauma, and pertinent environmental exposures; referral for comprehensive audiologic assessment
Medications and potential ototoxic exposures	Some medications such as salicylates are associated with tinnitus; ototoxins can cause hearing loss and tinnitus. Interactions between medications have unknown effects and can exacerbate tinnitus symptoms.	Counseling regarding medication use, etiology of tinnitus is facilitated; patients can be provided list of known ototoxic medications as part of counseling; comprehensive audiologic assessment
Unilateral or asymmetric hearing loss	Possible presentation of serious lesion such as VS	Audiologic and otologic assessment; imaging where indicated
Vertigo or other balance malfunction	Possible cochlear, retrocochlear, or other central nervous system disorder (Ménière's disease, superior canal dehiscence, VS, other)	Audiologic, otologic, vestibular assessment; imaging and referral where indicated
Symptoms of depression and/or anxiety	Tinnitus is often accompanied by symptoms of depression and anxiety. The presence and severity of such symptoms will dictate the pace of evaluation and treatment as well as the need for referral to treat these issues.	Referral to mental health professionals for assessment and treatment of depression and/or anxiety; urgent referral for suicidal patients
Apparent cognitive impairments	Elderly patients at risk for tinnitus are also at risk for cognitive decline from dementia.	The presence of dementia will affect the results of tinnitus and audiologic assessments.

Abbreviations: SNHL, sensorineural hearing loss; VS, vestibular schwannoma.
[a]A definition of *comprehensive audiologic assessment* can be found in **Table 8**.

Key Details of Physical Examination in the Tinnitus Patient.

Key Issue	Significance	Implication
Objective tinnitus	Rarely, tinnitus can be heard by the clinician as well as the patient.	Objective tinnitus may be caused by identifiable diseases, such as vascular abnormalities and myoclonus.
Heart murmurs, carotid bruits, or vascular sounds	Cardiovascular disease and vascular lesions may cause tinnitus.	Treatment of the underlying disease may help tinnitus symptoms. Cardiovascular disease (carotid stenosis, heart murmurs, hypertension) can have morbidities more substantial than tinnitus and requires appropriate evaluation and treatment.
Focal neurologic signs	Tinnitus patients should undergo neurologic assessment. Any focal neurologic deficits will dictate additional evaluation and treatment.	Referral to appropriate specialists (neurologists, otologists/neurotologists, head and neck surgeons, etc) and for appropriate workup, which may include imaging of the central nervous system
Otorrhea	Sign of middle ear infection or otitis externa	Treatment of otitis media/externa may improve tinnitus as well as associated hearing difficulties.
Signs of other external or middle ear disease on examination and/or otoscopy	Simple problems such as cerumen impaction or otitis media can be detected. Cholesteatoma, glomus tumors, and other uncommon middle ear disorders can be detected by otoscopy.	Appropriate referral can be made for diagnosis and treatment of external auditory canal issues such as cerumen, and middle ear disease such as otitis media or middle ear masses. Imaging can be performed when indicated.
Head and neck masses	A head and neck mass associated with ipsilateral tinnitus requires prompt investigation.	Referral to appropriate specialists; imaging when indicated

STATEMENT 2A. PROMPT AUDIOLOGIC EXAMINATION: Clinicians should obtain a comprehensive audiologic examination in patients with tinnitus that is unilateral, associated with hearing difficulties, or persistent (≥ 6 months). Recommendation

Key Component	Pertinent Details
Thorough case history	See Key Action Statement 1
Otoscopy with removal of excessive or obstructive cerumen	See cerumen management guideline[46]
Current American National Standards Institute (ANSI) standards should be met regarding maximum allowable ambient noise levels in the test environment; calibration of the audiometer; audiogram documentation, including use of the proper aspect ratio; and symbols.	Ear-specific masked air and bone conduction thresholds, speech recognition threshold (SRT), and word recognition scores (WRS) should be obtained. Reliability and validity of test results should be documented. Air conduction (AC) thresholds should be measured at 250 to 8000 Hz. Additional mid-octave frequencies that may be helpful include 750, 1500, 3000, and 6000 Hz and should be measured if differences in thresholds at 500 and 1000 or 1000 and 2000 Hz are ≥ 20 dB hearing level (HL). Bone conduction (BC) thresholds should be measured at 250 to 4000 Hz.
Ear-specific SRT in dB HL should be measured using standardized spondee word lists (eg, CID W-1), preferably recorded, but monitored-live voice (MLV) is acceptable.	Agreement between pure tone average (PTA) and SRT is helpful in assessing accuracy of hearing assessment and reliability of responses.
Ear-specific masked WRS (in %) should be measured at a presentation level of a 30- to 40-dB sensation level in reference to SRT using recorded versions of monosyllabic word lists (ie, NU-6, W-22, etc) and different word lists for each ear.	The clinician managing the patient with tinnitus will of necessity rely on the results of serial audiometric evaluations. As such, there is a need for proper audiologic documentation, not only of AC and BC thresholds as well as SRT and WRS, but also of masking levels, reliability, validity, word lists used, method of presentation (MLV or recorded), and type of transducer, in order for ongoing comparisons to be useful.
Ear-specific immittance measurements may be completed on each ear using equipment calibrated to current ANSI standards.	Immittance measures may include ear-specific tympanograms, ear-specific contralateral acoustic reflex thresholds (dB HL) at 500 to 4000 Hz, ear-specific ipsilateral acoustic reflex thresholds (dB HL) at 500 to 4000 Hz, and/or ear-specific acoustic reflex decay (dB HL) at 500 and 1000 Hz.

STATEMENT 2B. ROUTINE AUDIOLOGIC EXAMINATION: Clinicians may obtain an initial comprehensive audiologic examination in patients who present with tinnitus (regardless of laterality, duration, or perceived hearing status). Option

STATEMENT 3. IMAGING STUDIES: Clinicians should not obtain imaging studies of the head and neck in patients with tinnitus, specifically to evaluate the tinnitus, unless they have 1 or more of the following: tinnitus that localizes to 1 ear, pulsatile tinnitus, focal neurological abnormalities, or asymmetric hearing loss. Strong recommendation (against)

STATEMENT 4. BOTHERSOME TINNITUS: Clinicians must distinguish patients with bothersome tinnitus from patients with nonbothersome tinnitus. Strong recommendation

Tinnitus, as currently understood, has 2 components: perception and reaction. Whereas a patient may complain of the perception (sound) of tinnitus, the clinician must also appreciate the significance of the patient's negative reaction (eg, anxiety and depression) to tinnitus. Clinicians should recognize and attempt to manage both components. A clinician may distinguish bothersome from nonbothersome tinnitus by:

- *Asking the patient if the tinnitus is bothersome, and if so, whether it is bothersome enough that the patient would like to pursue further intervention(s).*
- *Asking the patient if the tinnitus interferes with communication, concentration, sleep, or enjoyment of life.*
- *Asking the patient how much time and effort the patient has put into seeking treatments for the tinnitus.*
- *Administering 1 of several validated questionnaires/ surveys.*

STATEMENT 5. PERSISTENT TINNITUS: Clinicians should distinguish patients with bothersome tinnitus of recent onset from those with persistent symptoms (≥ 6 months) to prioritize intervention and facilitate discussions about natural history and follow-up care. Recommendation

STATEMENT 6. EDUCATION AND COUNSELING: Clinicians should educate patients with persistent, bothersome tinnitus about management strategies. Recommendation

The clinician can inform and educate tinnitus patients by:

- *Providing brochures.*
- *Suggesting self-help books.*
- *Describing counseling and sound therapy options.*
- *Discussing the availability, but also the lack of proven benefits, of pharmacologic and other medical therapies, as well as other options such as complementary and alternative medicine (CAM).*
- *Referral to other professionals.*
- *Referral to support organizations and member health professionals.*

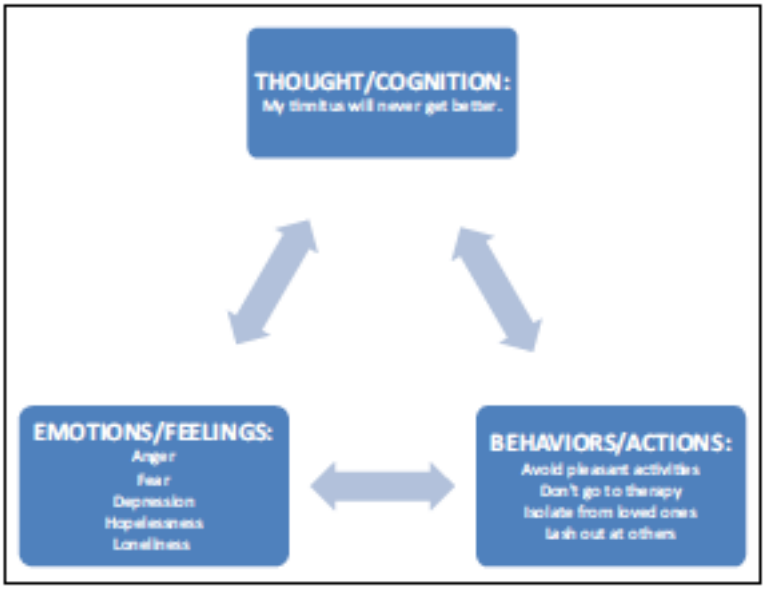
1. Definition of tinnitus	Tinnitus is sound that is created in the ears or in the head. It is a symptom and not a disease. People with chronic tinnitus usually hear it all or most of the time. For some people, tinnitus is intermittent.
2. Distinguishing tinnitus from transient ear noise (brief spontaneous tinnitus)	Transient ear noise is a sudden whistling sound accompanied by the perception of hearing loss. The event is unilateral and seems to occur completely at random without anything precipitating the sudden onset of symptoms. Often, the ear feels blocked during the episode. The symptoms generally dissipate within a period of about a minute. Transient ear noise, sometimes also called brief spontaneous tinnitus, is normal.
3. Assessment of tinnitus and associated hearing loss	Patients with tinnitus commonly attribute hearing problems to tinnitus. The clinician should determine how much of a patient's complaint is due to a hearing problem and how much is due specifically to the tinnitus. Such assessment may require an audiologic examination and appropriate questionnaires.
4. Tinnitus can be temporary	Exposure to loud noise can cause temporary threshold shift as well as temporary tinnitus. Tinnitus induced in this fashion will likely resolve within a few days following the insult. Repeated episodes of noise exposure increase the likelihood that the tinnitus will become permanent.
5. Drugs and tinnitus	Tinnitus can be induced by a number of medications and drug interactions. Such tinnitus is usually temporary (typically lasting 1 to 2 weeks postexposure) but can be permanent—especially with the use of aminoglycoside antibiotics or the cancer chemotherapeutic drug cisplatin. Aspirin is well known to cause temporary tinnitus, although the dosage generally has to be rather high to induce tinnitus. Other medications that can cause temporary tinnitus include nonsteroidal anti-inflammatory drugs, loop diuretics, and quinine. Drugs used to treat mental health and sleep conditions also may trigger or exacerbate tinnitus.
6. No cure for primary tinnitus	A cure for primary tinnitus does not yet exist, and despite claims to the contrary, no method has been proven to provide long-term suppression of tinnitus. We can help patients by relieving the functional effects of tinnitus, such as sleep disturbance, difficulty concentrating, problems with hearing, and difficulty relaxing. Patients need to be informed that although tinnitus cannot be cured, they can learn to manage their reactions to it, thereby improving their QOL. Health care professionals should be compassionate regarding patients' concerns and fears about tinnitus. A brief overview of the evidence-based interventions discussed later in this guideline can be presented.
7. Current theory on the pathophysiology of tinnitus	Research suggests that tinnitus results from the compensatory adaptation of the central auditory system to hearing loss. Clinical observations establish the near universal association of tinnitus with hearing loss. Hearing loss associated with tinnitus can range in severity from minimal to profound, and most people with hearing loss do not experience tinnitus. Changes in inhibitory and excitatory neurotransmitters occur throughout the auditory pathway in association with tinnitus.

STATEMENT 7. HEARING AID EVALUATION: Clinicians should recommend a hearing aid evaluation for patients with hearing loss and persistent, bothersome tinnitus. Recommendation

STATEMENT 8. SOUND THERAPY: Clinicians may recommend sound therapy to patients with persistent, bothersome tinnitus. Option

Device	Example
Environmental enrichment devices	• Tabletop sound machines generate different types of nature and/or environmental sounds (eg, rain, wind, waterfall) • CD recordings or personal audio players generate music, nature sounds, and/or environmental sounds through speakers • Tabletop water fountains • Fans, TV, radio • Smartphones or tablets with apps specifically created to produce a variety of sounds that aid in tinnitus relief
Hearing aids (see KAS 7)	• Digital signal processing devices allow for flexibility in manipulating the acoustic signal based on the patient's hearing loss severity and audiometric configuration • Open-fit hearing aids permit normal entry of environmental sounds into the ear canal, promoting a masking/partial masking effect
Sound generators	• Ear-level sound generators that produce broadband noise(s) (eg, white noise, pink noise) are a choice for patients with normal or near-normal audiometric thresholds • Available in in-the-ear or behind-the-ear styles
Combination tinnitus instruments	• Contain hearing aid circuit and noise-producing circuit in the same device • Allow patients who have both hearing loss and tinnitus to use a single device • Hearing technology is now available that incorporates wireless, portable, audio-streaming devices that can be connected, via a mini-jack plug or Bluetooth, to a variety of audio sources (eg, MP3 player, smartphone, tablet)

STATEMENT 9. COGNITIVE BEHAVIORAL THERAPY: Clinicians should recommend CBT to patients with persistent, bothersome tinnitus. Recommendation



Baseline Thought	Alternate Thought	Technique
I have tinnitus; life is rotten.	I have tinnitus and parts of life are rotten and parts of life are good.	Identifying thought distortion—*discounting the positive*
I'll never get better.	I might get better; I might not.	Identifying thought distortion—*predicting the future*
Tinnitus never goes away; I can't shut it off.	Sometimes the tinnitus is not as loud.	Identifying thought distortion—*all or none thinking*
No one can be happy if they have tinnitus.	Some people have learned to be happy and still have tinnitus.	Identifying thought distortion—*focusing on negative*
Tinnitus makes my life miserable.	I have tinnitus and sometimes I am miserable, but not every minute of the day.	Identifying thought distortion—*all or none thinking*
I cannot stand this another minute.	I would prefer not to have this another minute, but I have been standing it and can continue to do so. I can also listen to some relaxing music or go fishing, and distract myself or enjoy myself a bit.	Identifying thought distortion—*predicting the future*
I can't cope with this; there is nothing I can do about it.	I have been coping with it, perhaps not so well; maybe I can learn some coping techniques if I go to therapy.	Identifying thought distortion—*predicting the future*
I can't escape from this; there is nothing I can do about this.	My tinnitus is present all the time but the volume fluctuates and sometimes it is not as noticeable, like when I am at the beach.	Identifying thought distortion—*all or none thinking*
This will drive me crazy; I will kill myself.	Right now, I feel like I am at my wits' end, but it has been intense for a while and I haven't killed myself yet. Perhaps therapy will help. I won't know if it will help if I don't try.	Identifying thought distortion—*catastrophizing*
I can't sleep; I won't be able to function tomorrow, and then I can't make a living.	I have had a rough night of sleep; however, I have been able to work many times in the past with little sleep. I am not as efficient with work when I have slept poorly, but it is unlikely I will get fired. If they keep X around, I feel confident I won't get fired. Even on my worst day, my work is better than that of X.	Identifying thought distortion—*catastrophizing*

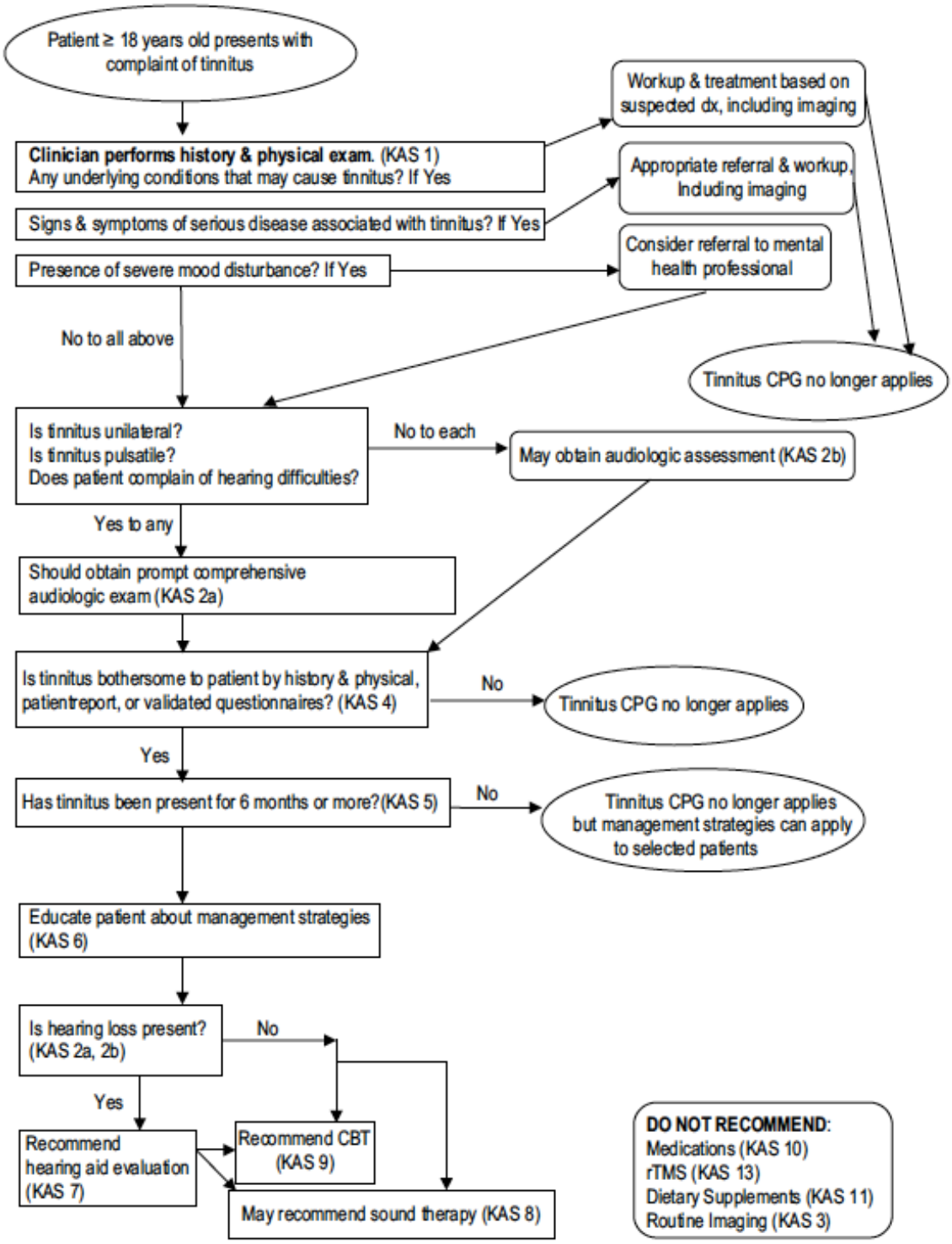
STATEMENT 10. MEDICAL THERAPY: Clinicians should not routinely recommend antidepressants, anticonvulsants, anxiolytics, or intratympanic medications for a primary indication of treating persistent, bothersome tinnitus. Recommendation (against)

STATEMENT 11. DIETARY SUPPLEMENTS: Clinicians should not recommend Ginkgo biloba, melatonin, zinc, or other dietary supplements for treating patients with persistent, bothersome tinnitus. Recommendation (against)

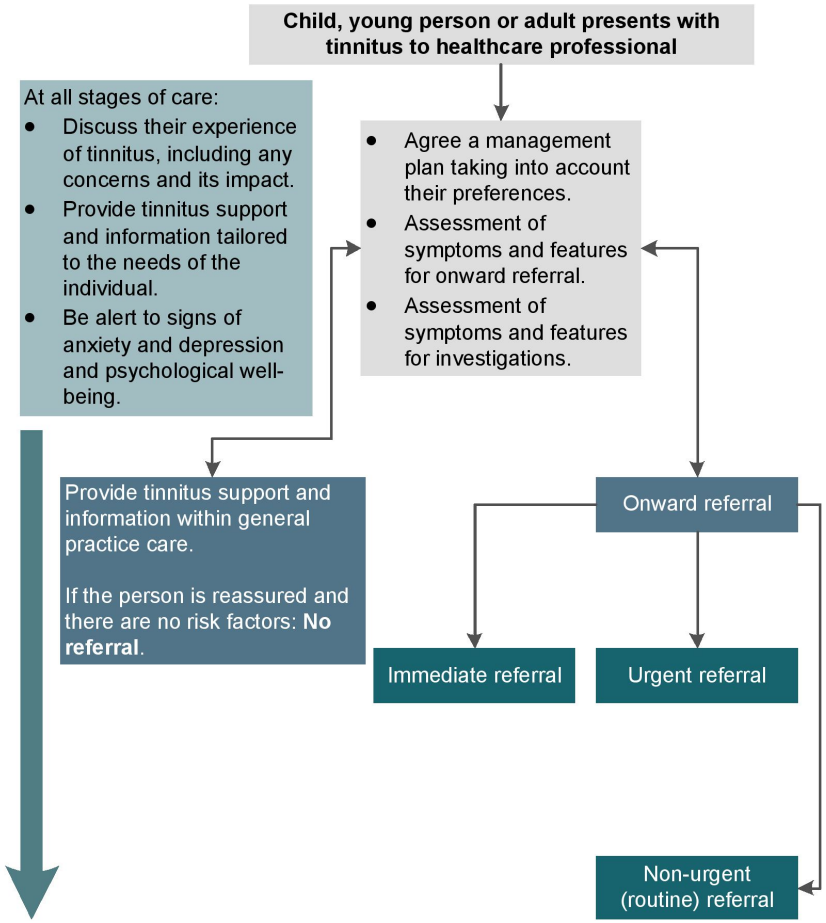
- *No dietary supplement or herb has been approved for the treatment of tinnitus, and none has been shown to cure tinnitus.*
- *Such supplements are readily available and, at present, do not need US Food and Drug Administration approval.*
- *Dietary supplements can cause side effects, especially when taken along with conventional medications or other supplements.*
- *Ginkgo biloba can interact with other blood thinners to cause serious bleeding and can worsen bleeding risk in patients with underlying clotting disorders.*
- *Patients with tinnitus should discuss use of dietary supplements with their physician or other health care practitioner to minimize the risk of side effects.*

STATEMENT 12. ACUPUNCTURE: No recommendation can be made regarding the effect of acupuncture in patients with persistent bothersome tinnitus. No recommendation

STATEMENT 13. TRANSCRANIAL MAGNETIC STIMULATION: Clinicians should not recommend TMS for the treatment of patients with persistent, bothersome tinnitus. Recommendation (against)


Patient ≥ 18 years old presents with complaint of tinnitus
Clinician performs history & physical exam. (KAS 1)
Any underlying conditions that may cause tinnitus? If Yes
Workup & treatment based on suspected dx, including imaging
Signs & symptoms of serious disease associated with tinnitus? If Yes
Appropriate referral & workup, including imaging
Presence of severe mood disturbance? If Yes
Consider referral to mental health professional
No to all above
Tinnitus CPG no longer applies
Is tinnitus unilateral?
Is tinnitus pulsatile?
Does patient complain of hearing difficulties?
No to each
May obtain audiologic assessment (KAS 2b)
Yes to any
Should obtain prompt comprehensive audiologic exam (KAS 2a)
Is tinnitus bothersome to patient by history & physical, patient report, or validated questionnaires? (KAS 4)
No
Tinnitus CPG no longer applies
Yes
Has tinnitus been present for 6 months or more? (KAS 5)
No
Tinnitus CPG no longer applies but management strategies can apply to selected patients
Educate patient about management strategies (KAS 6)
Is hearing loss present? (KAS 2a, 2b)
No
Yes
Recommend hearing aid evaluation (KAS 7)
Recommend CBT (KAS 9)
May recommend sound therapy (KAS 8)
DO NOT RECOMMEND:
Medications (KAS 10)
rTMS (KAS 13)
Dietary Supplements (KAS 11)
Routine Imaging (KAS 3)

Tinnitus: assessment and management



Note: This algorithm provides a visual overview of the clinical recommendations in this guideline and is not a clinical pathway. It does not cover every aspect of care for people with tinnitus.
Also refer to NICE guideline on hearing loss in adults (NG98).

Immediate referrals

Refer people immediately to a crisis mental health management team for assessment if they have tinnitus associated with a high risk of suicide. If needed, provide a safe place while waiting for the assessment.

Refer immediately, in line with the NICE guideline on suspected neurological conditions, people with tinnitus associated with:

- sudden onset of significant neurological symptoms or signs (for example, facial weakness), or
- acute uncontrolled vestibular symptoms (for example, vertigo), or
- suspected stroke (follow a local strokae referral pathway). For information about diagnosis and initial management of stroke, see the NICE guideline on stroke and transient ischaemic attack in over 16s.

Refer people to be seen within 24 hours, in line with the NICE guideline on hearing loss in adults, if they have tinnitus and have hearing loss that has developed suddenly (over a period of 3 days or less) in the past 30 days.

Recognise that assessment and management of the person's tinnitus may still need to continue following an immediate referral.

Urgent referrals

Refer people to be seen within 2 weeks for assessment and management if they have tinnitus associated with either of the following:

- Distress affecting mental wellbeing (for example, distress that prevents them carrying out their usual daily activities) even after receiving tinnitus support at first point of contact with a healthcare professional (see recommendation 1.1.1). Refer in line with local pathways.
- Hearing loss that developed suddenly more than 30 days ago or rapidly worsening hearing loss (over a period of 4 to 90 days). Refer in line with the NICE guideline on hearing loss in adults.

Non-urgent (routine) referrals

Refer people for tinnitus assessment and management in line with local pathways if they have any of the following:

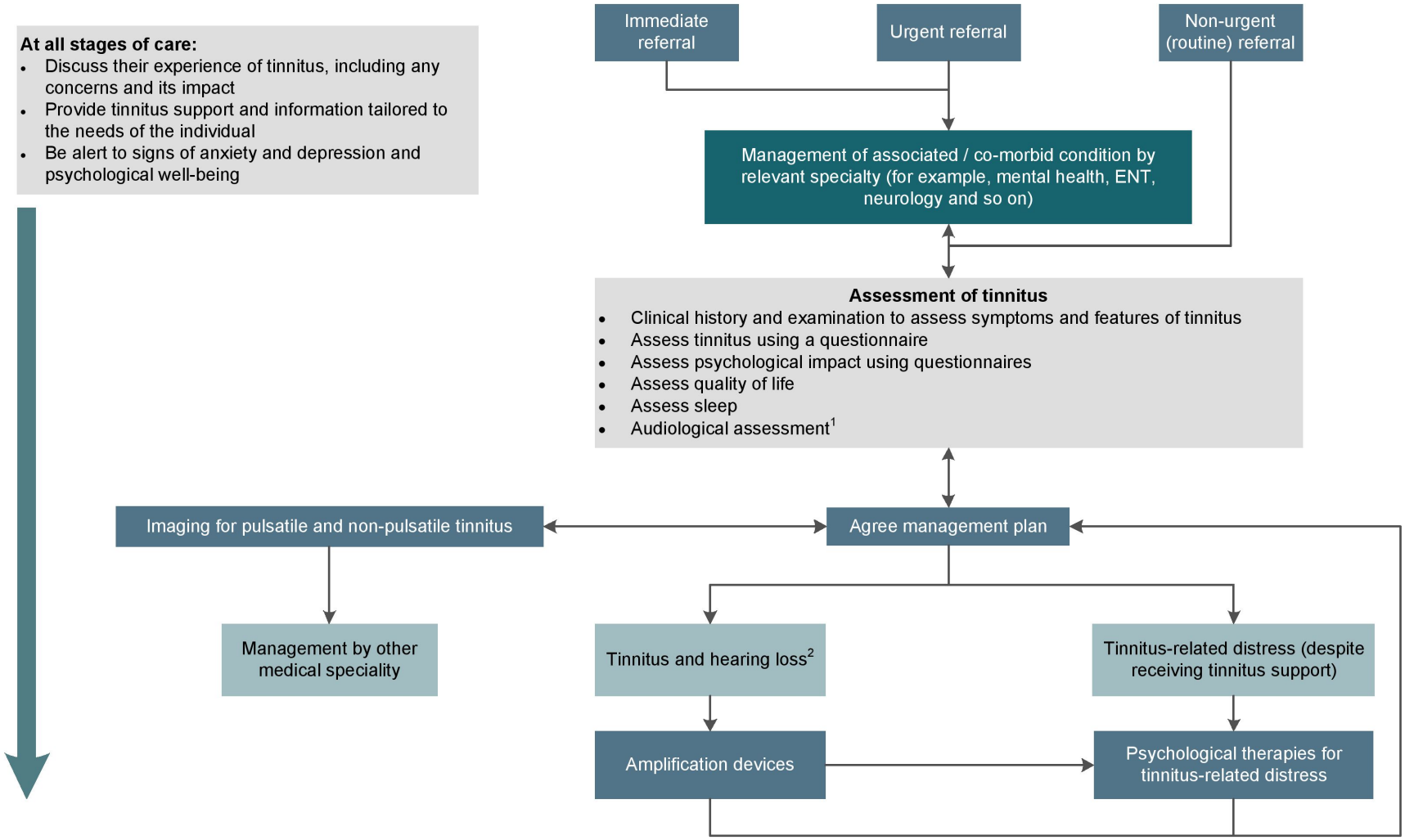
- Tinnitus that bothers them despite tinnitus support at first point of contact with a healthcare professional (see recommendation 1.1.1).
- Persistent objective tinnitus.
- Tinnitus associated with unilateral or asymmetric hearing loss.

Consider referral for tinnitus assessment and management, in line with the NICE guideline on hearing loss in adults, if they have any of the following:

- Persistent pulsatile tinnitus.
- Persistent unilateral tinnitus.

NICE National Institute for Health and Care Excellence

Tinnitus: assessment and management



NICE National Institute for Health and Care Excellence

Note: This algorithm provides a visual overview of the clinical recommendations in this guideline and is not a clinical pathway. It does not cover every aspect of care for people with tinnitus.

[1]This is a priority when a hearing loss is suspected.

[2]Also refer to NICE guideline on hearing loss in adults (NG98).

Sudden Hearing Loss

The American Academy of Otolaryngology–Head and Neck Surgery Foundation

Sudden hearing loss (SHL) is a frightening symptom that often prompts an urgent or visit to a physician. This guideline focuses on sudden sensorineural hearing loss (SSNHL), one of many causes of SHL, which, if recognized and managed promptly, may improve hearing recovery

and patient quality of life (QOL). Sudden sensorineural hearing loss affects 5 to 20 per 100,000 population.

Throughout this guideline, the following definitions are used:

- Sudden hearing loss is defined as a rapid onset, occurring over a 72-hour period, of a subjective sensation of hearing impairment in one or both ears.
- Sudden sensorineural hearing loss (SNHL) is a subset of SHL that (a) is sensorineural in nature and (b) meets certain audiometric criteria; the most frequently used audiometric criterion is a decrease in hearing of ≥30 decibels (dB), affecting at least 3 consecutive frequencies.
  Because premorbid audiometry is generally unavailable, hearing loss is defined as related to the opposite ear's thresholds.
- Idiopathic sudden sensorineural hearing loss (ISSNHL) is defined as SSNHL with no identifiable cause despite adequate investigation.

1. **<u>EXCLUSION OF CONDUCTIVE HEARING LOSS:</u>** Clinicians should distinguish sensorineural hearing loss (SNHL) from conductive hearing loss (CHL) in a patient presenting with sudden hearing loss. Strong recommendation

2. **<u>MODIFYING FACTORS:</u>** Clinicians should assess patients with presumptive sudden sensorineural hearing loss for bilateral sudden hearing loss, recurrent episodes of sudden hearing loss, or focal neurologic findings.
   Recommendation

   Checklist of Features Often Associated with Specific Disorders Underlying Hearing Loss

Sudden onset of bilateral hearing loss
Antecedent fluctuating hearing loss on one or both sides
Isolated low-frequency hearing trough suggesting Meniere disease
Concurrent onset of severe bilateral vestibular loss with oscillopsia
Accompanying focal weakness, dysarthria, hemiataxia, encephalopathy, severe headaches, diplopia
Downbeating or gaze-evoked nystagmus
Brain imaging indicating stroke or structural lesion likely to explain the hearing loss
Severe head trauma coincident with the hearing loss on one or both sides
Recent acoustic trauma
A history of concurrent or recent eye pain, redness, lacrimation, and photophobia

Selected Conditions That May Be Associated with Bilateral Sudden Hearing Loss

Cause	Other Features
Meningitis (infectious, inflammatory, neoplastic)	Headache, fever, abnormal cerebrospinal fluid (CSF) studies, possibly other cranial nerve palsies[211]
Autoimmune inner ear disease	Fluctuation of hearing may sometimes occur; vertigo may occur in some cases.[41]
Lyme disease	Erythema chronicum migrans, abnormal CSF, fluctuating bilateral audiovestibular symptoms[212]
Syphilis	Abnormal fluorescent treponemal antibody absorption (FTA-abs) test, bilateral fluctuating hearing loss, tabes dorsalis, multiorgan involvement [213]
Ototoxic medications	Vestibular loss, oscillopsia[214,215]
Trauma	Significant head trauma, barotrauma, temporal bone fractures[214]
Herpes zoster oticus (Ramsay-Hunt syndrome)	Otalgia, pinna and/or ear canal vesicles, facial nerve paresis, positive viral titers, positive viral cultures[216]
Human immunodeficiency virus (HIV) otitis	Positive HIV titers, altered T cell counts, and often other cranial neuropathies may be associated with mastoiditis out of proportion to clinical complaints.[217,218]
Lead poisoning	Learning disabilities, other stigmata of lead poisoning[219]
Genetic disorders	May be syndromic or nonsyndromic[220,221]
MELAS (metabolic encephalopathy, lactic acidosis and stroke-like episodes)	Periods of confusion, elevated serum lactic acid levels around times of attacks, stroke-like spells, magnetic resonance imaging (MRI) white matter signal changes, migraine-like headaches, seizures, diabetes, mitochondrial gene mutation (Mt-RNR1, Mt-TS1, POLG genes)[222,223]
Other mitochondrial disorders	Variable phenotypes[224]
Bilateral synchronous internal auditory artery occlusion associated with vertebrobasilar vascular disease	Vertigo, dysarthria, facial weakness, ataxia, nystagmus, unilateral numbness, abnormal computed tomography or magnetic resonance angiogram of the vertebrobasilar vasculature[48,50,225-227]
Cogan syndrome	Nonsyphilitic interstitial keratitis of the cornea, hearing loss, vertigo[40]
Neoplastic (neurofibromatosis II, bilateral vestibular schwannomas, intravascular lymphomatosis, others)	Abnormal brain MRI or cerebrovascular imaging study[228-230]
Sarcoidosis	Pulmonary symptoms, bilateral vestibular loss, elevated serum angiotensin-converting enzyme level or abnormal Gallium scan[231,232]
Hyperviscosity syndrome	Mucous membrane bleeding, neurologic and pulmonary symptoms, associated retinopathy[233]

3. **<u>COMPUTED TOMOGRAPHY:</u>** Clinicians should not order computerized tomography of the head/brain in the initial evaluation of a patient with presumptive SSNHL.
Strong recommendation against

The principal differential diagnosis in the patient with suspected SSNHL is an inner ear vs an audiovestibular nerve or brainstem abnormality. No imaging modality currently shows the fine details of the inner ear, so the concern becomes differentiating possible central etiologies. The MRI scan has long replaced CT, or CT with air contrast, as the study of choice for detecting cerebellopontine

angle tumors. Also, the CT scan does not have the resolution to detect brainstem infarcts in the early stages, and emergent MRI is preferred when the clinical situation warrants emergency imaging.

4. **AUDIOMETRIC CONFIRMATION OF ISSNHL:** Clinicians should diagnose presumptive ISSNHL if audiometry confirms a 30-dB hearing loss at 3 consecutive frequencies AND an underlying condition cannot be identified by history and physical examination.
   Recommendation

5. **LABORATORY TESTING:** Clinicians should not obtain routine laboratory tests in patients with ISSNHL.
   Strong recommendation against

6. **RETROCOCHLEAR PATHOLOGY:** Clinicians should evaluate patients with ISSNHL for retrocochlear pathology by obtaining an MRI, auditory brainstem response (ABR), or audiometric follow-up.
   Recommendation

7. **PATIENT EDUCATION:** Clinicians should educate patients with ISSNHL about the natural history of the condition, the benefits and risks of medical interventions, and the limitations of existing evidence regarding efficacy.
   Strong recommendation

Patient Education Discussion Points for Idiopathic Sudden Sensorineural Hearing Loss (ISSNHL)

1. The cause of sudden sensorineural hearing loss (SSNHL) is often not readily apparent and thus called idiopathic. It rarely affects both ears and can be associated with other symptoms such as tinnitus, vertigo, and fullness in the ear.
2. Approximately one-third to two-thirds of patients with ISSNHL may recover some percentage of their hearing within 2 weeks.[2] Those who recover half of their hearing in the first 2 weeks have a better prognosis.[234] Patients with minimal change within the first 2 weeks are unlikely to show significant recovery.
3. Early recognition of ISSNHL is important. Although there is a lack of evidence-based research, it is generally accepted that early intervention may increase recovery.
4. Many treatments have been proposed for ISSNHL, but research about their effects is limited by small sample size and varying experimental designs. The benefits of therapy may include more prompt and complete recovery of hearing, but side effects also must be considered when choosing among the available options.
5. Watchful waiting is an alternative to active treatment as between one-third and two-thirds of patients may recover hearing on their own and can be monitored with repeat hearing tests.
6. Sudden hearing loss can be frightening and may result in embarrassment, frustration, anxiety, insecurity, loneliness, depression, and social isolation. Individual or group counseling can be helpful in supporting patients with ISSNHL.
7. Audiologic rehabilitation needs to be addressed as soon as the hearing loss is identified. This includes counseling and discussion of nonsurgical and surgical amplification and hearing restoration options.
8. Financial concerns should be addressed to ensure appropriate follow-up and testing in an effort to attain the best possible outcome.

8. **<u>INITIAL CORTICOSTEROIDS:</u>** Clinicians may offer corticosteroids as initial therapy to patients with ISSNHL.
   Option

   General Guidelines for Corticosteroid Therapy for Idiopathic Sudden Sensorineural Hearing Loss (ISSNHL)

	Oral Corticosteroids	Intratympanic Corticosteroids
Timing of treatment	Immediate, ideally within first 14 days. Benefit has been reported up to 6 weeks following onset of sudden sensorineural hearing loss (SSNHL)	Immediate Salvage (rescue) after systemic treatment fails
Dose	Prednisone 1 mg/kg/d (usual maximal dose is 60 mg/d) or Methylprednisolone 48 mg/d or Dexamethasone 10 mg/d	Dexamethasone 24 mg/mL or 16 mg/mL (compounded), or 10 mg/mL (stock)Methylprednisolone 40 mg/mL or 30 mg/mL
Duration/frequency	Full dose for 7 to 14 days, then taper over similar time period	Inject 0.4 to 0.8 mL into middle ear space every 3 to 7 days for a total of 3 to 4 sessions
Technique	Do not divide doses	Anterosuperior myringotomy after topical anesthetic Inject solution into the posterior inferior quadrant via narrow-gauge spinal needle to fill middle ear space Keep head in otologic position (one side down, affected ear up) for 15 to 30 minutes
Monitoring	Audiogram at completion of treatment course and at delayed intervals	Audiogram before each subsequent injection, at completion of treatment course, and at delayed intervals Inspect tympanic membrane (TM) to ensure healing at completion of treatment course and at a delayed interval
Modifications	Medically treat significant adverse drug reactions, such as insomnia Monitor for hyperglycemia, hypertension in susceptible patients	May insert pressure-equalizing tube if planning multiple injections, but this increases risk of TM perforation May consider adding round window transport facilitator

9. **<u>HYPERBARIC OXYGEN THERAPY:</u>** Clinicians may offer hyperbaric oxygen therapy within 3 months of diagnosis of ISSNHL.
   Option

- Younger patients respond better to hyperbaric oxygen therapy (HBOT) than older patients (the age cutoffs varied from 50-60 years).
- Early HBOT is better than late HBOT (early is defined from 2 weeks to 3 months).

- Patients with moderate to severe hearing loss benefit more from HBOT than those with mild hearing loss (moderate hearing loss cutoff was usually at 60 dB).
- Results of studies detailing effectiveness of HBOT depend on the choice of outcome measures.

10. **OTHER PHARMACOLOGIC THERAPY:** Clinicians should not routinely prescribe antivirals, thrombolytics, vasodilators, vasoactive substances, or antioxidants to patients with ISSNHL.
    Recommendation against

11. **SALVAGE THERAPY:** Clinicians should offer IT steroid perfusion when patients have incomplete recovery from ISSNHL after failure of initial management.
    Recommendation

12. **OUTCOMES ASSESSMENT:** Clinicians should obtain follow-up audiometric evaluation within 6 months of diagnosis for patients with ISSNHL.
    Recommendation
    Definitions of Recovery:
    a. Complete: if the follow-up PTA (dB HL) or SRT (dB HL) improved to within 10 dB of pre–sudden hearing loss hearing levels
    b. Partial: improved to within 50%
    c. No recovery: less than 50% of recovery

13. **REHABILITATION:** Clinicians should counsel patients with incomplete recovery of hearing about the possible benefits of amplification and hearing assistive technology (HAT) and other supportive measures.
    Strong recommendation

Acute Otitis Externa

The American Academy of Otolaryngology–Head and Neck Surgery Foundation

1. Differential diagnosis: Clinicians should distinguish diffuse acute otitis externa (AOE) from other causes of otalgia, otorrhea, and inflammation of the external ear canal.

Recommendation

2. Modifying factors: Clinicians should assess the patient with diffuse AOE for factors that modify management (nonintact tympanic membrane, tympanostomy tube, diabetes, immunocompromised state, prior radiotherapy).

Recommendation

3. Pain management: The clinician should assess patients with AOE for pain and recommend analgesic treatment based on the severity of pain.

Strong recommendation

4. Systemic antimicrobials: Clinicians should not prescribe systemic

antimicrobials as initial therapy for diffuse, uncomplicated AOE unless there is extension outside the ear canal or the presence of specific host factors that would indicate a need for systemic therapy.

Strong recommendation

5. Topical therapy: Clinicians should use topical preparations for initial therapy of diffuse, uncomplicated AOE.

Recommendation

Patient information for topical therapy of acute otitis externa (AOE).

1. ***Are eardrops alone sufficient to treat my infection or do I also need to take an antibiotic by mouth?***

- *Eardrops alone are the most effective treatment for AOE and may contain antibiotics, antiseptics, steroids, or a combination. Antibiotics taken by mouth do not kill most germs that cause AOE and should be used only when infection spreads beyond the ear canal, eardrops cannot get into the ear, or the immune system is weak.*

2. ***Which eardrop is best for treating my ear infection?***

- *All eardrops approved for treating AOE are highly effective, with no consistent advantage shown for any one specific drug.*

3. ***If all eardrops are equally effective, why do doctors prescribe different ones?***

- *Your doctor will discuss with you the reasoning behind his or her eardrop recommendation, but some of the factors considered include cost, dosing frequency, status of the eardrum, and the doctor's experience. Your opinion and preferences should also factor into this decision.*

4. ***Is there anything I should be sure to tell my doctor that might help in deciding which eardrop is best?***

- *Let your doctor know if you had any prior ear surgery, if there is an opening (hole or perforation) of the eardrum, or if an ear tube is in place. If 1 or more of these conditions apply, then your doctor will need to use an eardrop that is approved for use in the middle ear, just in case some of it gets past the eardrum. Also let your doctor know if you have recently used other ear products or medications or if you have had a reaction in the past to a particular eardrop or antibiotic. Last, tell your doctor if you have, or are suspected to have, diabetes, since this could alter management.*

5. ***Once I start using the eardrops, how long should it take until I feel better?***

- *Most people feel better within 48 to 72 hours and have minimal or no symptoms by 7 days. Notify your doctor if your pain or other symptoms fail to respond within this time frame.*

6. ***If it usually takes at least 48 hours to feel better from the eardrops, what should I do for earlier relief?***

- *Pain medicine is especially important to use for relief in the first few days, until the eardrops begin working. Discuss with your doctor which pain medicines are best for you. Pain-relieving (anesthetic) eardrops are not recommended because they are not intended for use during an active ear canal infection and can mask symptoms of a delayed response to therapy.*

7. ***For how long will I need to use the eardrops?***

- *Eardrops should be used for at least 7 days, even if you feel better sooner, to prevent relapse of infection. If symptoms persist beyond 7 days, you should notify your doctor and continue the drops until the symptoms resolve for a maximum of 7 additional days.*

8. ***Are there any activity restrictions or special precautions that will help my ear recover faster?***

- *Avoid scratching or touching the ear, and do not insert anything into the ear canal, including cotton-tipped swabs. Cover the opening of ear canal with an earplug or cotton (with petroleum jelly) prior to showering or hair washing to minimize water entry. Check with your doctor regarding swimming or other water activities that may take place during, or soon after, your infection.*

9. ***Do eardrops have side effects that I should be aware of?***

- *Eardrops are, in general, very safe, and well tolerated. Some people report local rash, itching, irritation, or discomfort, but it is rarely bad enough to require stopping the medication. If you taste the eardrops, it means there is likely a hole or perforation of the eardrum, so inform your doctor (if you have not already done so). Also call your doctor if the drops become painful or you develop unexpected symptoms*.

6. Drug delivery: Clinicians should inform patients how to administer topical drops and should enhance delivery of topical drops when the ear canal is obstructed by performing aural toilet, placing a wick, or both.

Recommendation

Instructions for patients

• If possible, get someone to put the drops in the ear canal for you.

• Lie down with the affected ear up. Put enough drops in the ear canal to fill it up.

• Once the drops are in place, stay in this position for 3 to 5 minutes. Use a timer to help measure the time. It is important to allow

adequate time for the drops to penetrate into the ear canal.

• A gentle to-and-fro movement of the ear will sometimes help in getting the drops to their intended destination. An alternate method is

to press with an in/out movement on the small piece of cartilage (tragus) in front of the ear.

• You may then get up and resume your normal activities. Wipe off any excess drops.

• Keeping the ear dry is generally a good idea while using ear drops.

• Try not to clean the ear yourself as the ear is very tender and you could possibly damage the ear canal or even the eardrum.

• If the drops do not easily run into the ear canal, you may need to have the ear canal cleaned by your clinician or have a wick placed in

the ear canal to help in getting the drops into the ear canal.

• If you do have a wick placed, it may fall out on its own. This is a good sign as it means the inflammation is clearing and the infection

subsiding.

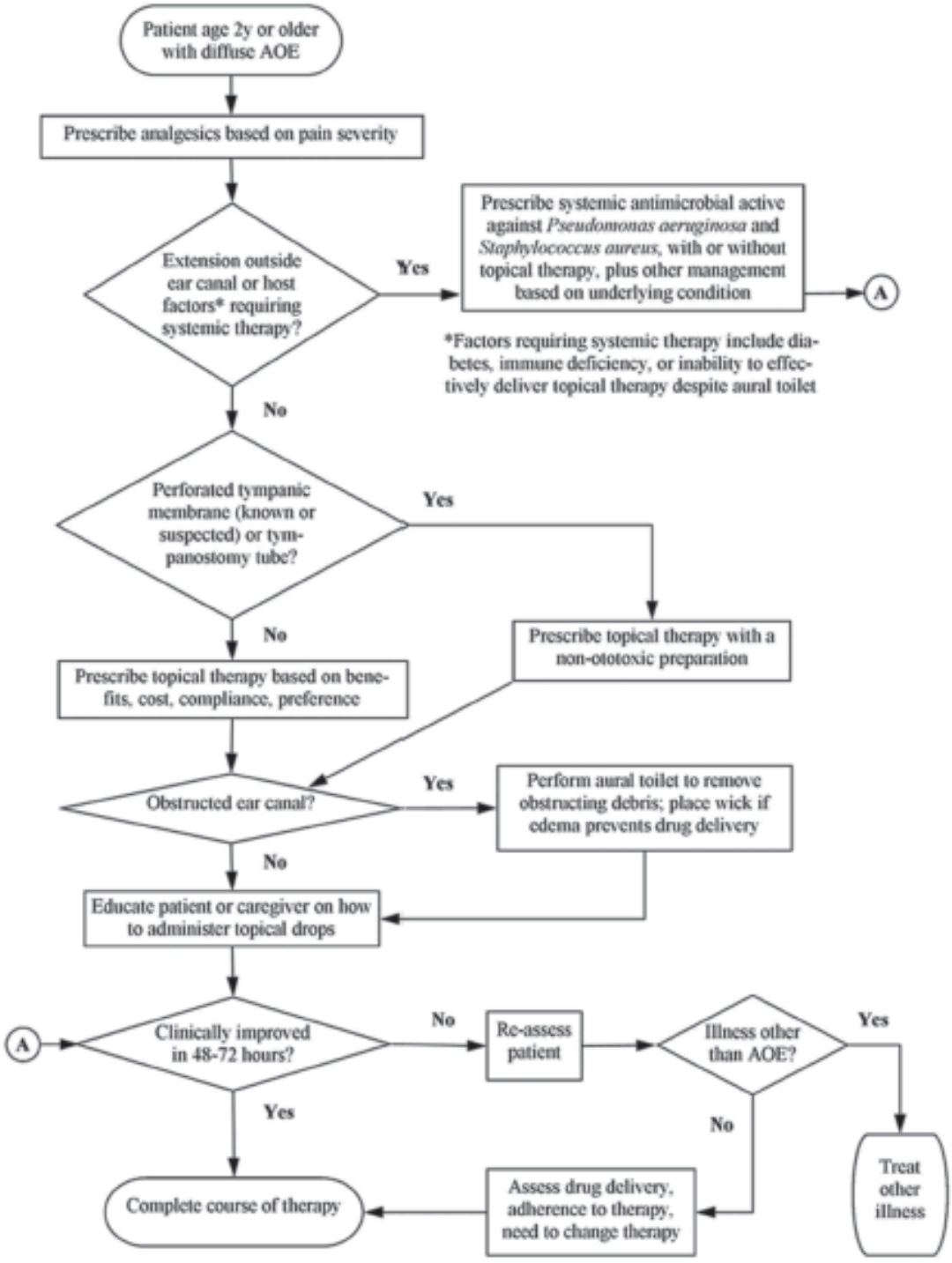
• Do not remove the wick yourself unless instructed to do so.

7. Nonintact tympanic membrane: When the patient has a known or suspected perforation of the tympanic membrane, including a tympanostomy tube, the clinician should recommend a non-ototoxic topical preparation.

Recommendation

8. Outcome assessment: If the patient fails to respond to the initial therapeutic option within 48 to 72 hours, the clinician should reassess the patient to confirm the diagnosis of diffuse AOE and to exclude other causes of illness.

Recommendation


Patient age 2y or older with diffuse AOE
Prescribe analgesics based on pain severity
Extension outside ear canal or host factors* requiring systemic therapy?
Yes
Prescribe systemic antimicrobial active against *Pseudomonas aeruginosa* and *Staphylococcus aureus*, with or without topical therapy, plus other management based on underlying condition
A
*Factors requiring systemic therapy include diabetes, immune deficiency, or inability to effectively deliver topical therapy despite aural toilet
No
Perforated tympanic membrane (known or suspected) or tympanostomy tube?
Yes
No
Prescribe topical therapy based on benefits, cost, compliance, preference
Prescribe topical therapy with a non-ototoxic preparation
Obstructed ear canal?
Yes
Perform aural toilet to remove obstructing debris; place wick if edema prevents drug delivery
No
Educate patient or caregiver on how to administer topical drops
A
Clinically improved in 48-72 hours?
No
Re-assess patient
Illness other than AOE?
Yes
Yes
No
Treat other illness
Complete course of therapy
Assess drug delivery, adherence to therapy, need to change therapy

Antimicrobial prophylaxis in surgery

(Guideline Developer(s) Surgical Infection Society, Society for Healthcare, Epidemiology of America Infectious Diseases Society of America, American Society of Health-System Pharmacists)

Recommendations

Major Recommendations

Adult and pediatric dosages are included in Table 1. Recommendations for the selection of prophylactic antimicrobials for various surgical procedures are provided in Table 2.

Summary of Key Updates

Preoperative-dose Timing

The optimal time for administration of preoperative doses is within 60 minutes before surgical incision. This is a more-specific time frame than the previously recommended time, which was "at induction of anesthesia." Some agents, such as fluoroquinolones and vancomycin, require administration over one to two hours; therefore, the administration of these agents should begin within 120 minutes before surgical incision.

Selection and Dosing

Information is included regarding the approach to weight-based dosing in obese patients and the need for repeat doses during prolonged procedures. Obesity has been linked to an increased risk for surgical-site infection (SSI). The pharmacokinetics of drugs may be altered in obese patients, so dosage adjustments based on body weight may be warranted in these patients. For all patients, intraoperative redosing is

needed to ensure adequate serum and tissue concentrations of the antimicrobial if the duration of the procedure exceeds two half-lives of the drug or there is excessive blood loss during the procedure (Table 1). Recommendations for selection of antimicrobial agents for specific surgical procedures and alternative agents (e.g., for patients with allergies to β-lactam antimicrobials) are provided in Table 2.

Duration of Prophylaxis

New recommendations for a shortened post-operative course of antimicrobials involving a single dose or continuation for less than 24 hours are provided. Further clarity on the lack of need for postoperative antimicrobial prophylaxis based on the presence of indwelling drains and intravascular catheters is included.

Common Principles

A section addressing concepts that apply to all types of surgical procedures has been added. Expanded and new recommendations are provided for plastic, urology, cardiac, and thoracic procedures, as well as clarity on prophylaxis when implantable devices are inserted. The latest information on the use of mupirocin and on the role of vancomycin in surgical prophylaxis is summarized in these updated guidelines. See the original guideline document for a discussion of common principles; common surgical pathogens; drug administration; topical administration of irrigations, pastes, and washes; pre-operative screening and decolonization.

Head and Neck Procedures

Clean Procedures

Antimicrobial prophylaxis is not required in patients undergoing clean surgical procedures of the head and neck. If there is placement of prosthetic material, a preoperative dose of cefazolin or cefuroxime is reasonable, though there are few data supporting the efficacy of prophylaxis in this setting. A reasonable alternative for patients with β-lactam allergies is clindamycin.

(Strength of evidence against prophylaxis without prosthesis placement = B; Strength of evidence for prophylaxis with prosthesis placement = C.)

Clean-contaminated Procedures

Antimicrobial prophylaxis has not been shown to benefit patients undergoing tonsillectomy or functional endoscopic sinus procedures. The preferred regimens for patients undergoing other clean-contaminated head and neck procedures are (1) cefazolin or cefuroxime plus metronidazole and (2) ampicillin–sulbactam. Clindamycin is a reasonable alternative in patients with a documented β-lactam allergy. The addition of an aminoglycoside to clindamycin may be appropriate when there is an increased likelihood of gram-negative contamination of the surgical site.

(Strength of evidence for prophylaxis in cancer surgery patients = A; Strength of evidence for prophylaxis for other clean-contaminated procedures except tonsillectomy and functional endoscopic sinus procedures = B.)

Neurosurgery Procedures

A single dose of cefazolin is recommended for patients undergoing clean neurosurgical procedures, cerebrospinal fluid (CSF)-shunting procedures, or intrathecal pump placement (see Table 2). Clindamycin or vancomycin should be reserved as an alternative agent for patients with a documented β-lactam allergy (vancomycin for MRSA-colonized patients.

Table 1.

Recommended Doses and Redosing Intervals for Commonly Used Antimicrobials for Surgical Prophylaxis

Antimicrobial	Recommended Dose		Half-life in Adults With Normal Renal Function, hr[19]	Recommended Redosing Interval (From Initiation of Preoperative Dose), hr[c]
	Adults[a]	Pediatrics[b]		
Ampicillin–sulbactam	3 g (ampicillin 2 g/ sulbactam 1 g)	50 mg/kg of the ampicillin component	0.8–1.3	2
Ampicillin	2 g	50 mg/kg	1–1.9	2
Aztreonam	2 g	30 mg/kg	1.3–2.4	4
Cefazolin	2 g, 3 g for pts weighing ≥120 kg	30 mg/kg	1.2–2.2	4
Cefuroxime	1.5 g	50 mg/kg	1–2	4
Cefotaxime	1 g[d]	50 mg/kg	0.9–1.7	3
Cefoxitin	2 g	40 mg/kg	0.7–1.1	2
Cefotetan	2 g	40 mg/kg	2.8–4.6	6
Ceftriaxone	2 g[e]	50–75 mg/kg	5.4–10.9	NA
Ciprofloxacin[f]	400 mg	10 mg/kg	3–7	NA
Clindamycin	900 mg	10 mg/kg	2–4	6
Ertapenem	1 g	15 mg/kg	3–5	NA
Fluconazole	400 mg	6 mg/kg	30	NA
Gentamicin[g]	5 mg/kg based on dosing weight (single dose)	2.5 mg/kg based on dosing weight	2–3	NA
Levofloxacin[f]	500 mg	10 mg/kg	6–8	NA
Metronidazole	500 mg	15 mg/kg Neonates weighing <1200 g should receive a single 7.5-mg/kg dose	6–8	NA
Moxifloxacin[f]	400 mg	10 mg/kg	8–15	NA
Piperacillin–tazobactam	3.375 g	Infants 2–9 mo: 80 mg/ kg of the piperacillin component Children >9 mo and ≤40 kg: 100 mg/kg of the piperacillin component	0.7–1.2	2
Vancomycin	15 mg/kg	15 mg/kg	4–8	NA
Oral antibiotics for colorectal surgery prophylaxis (used in conjunction with a mechanical bowel preparation)				
Erythromycin base	1 g	20 mg/kg	0.8–3	NA
Metronidazole	1 g	15 mg/kg	6–10	NA
Neomycin	1 g	15 mg/kg	2–3 (3% absorbed under normal gastrointestinal conditions)	NA

Table 2.

Recommendations for Surgical Antimicrobial Prophylaxis

Type of Procedure	Recommended Agents[a,b]	Alternative Agents in Patients with β-Lactam Allergy	Strength of Evidence[c]
Cardiac			
Coronary artery bypass	Cefazolin, cefuroxime	Clindamycin,[d] vancomycin[d]	A
Cardiac device insertion procedures (e.g., pacemaker implantation)	Cefazolin, cefuroxime	Clindamycin, vancomycin	A
Ventricular assist devices	Cefazolin, cefuroxime	Clindamycin, vancomycin	C
Thoracic			
Noncardiac procedures, including lobectomy, pneumonectomy, lung resection, and thoracotomy	Cefazolin, ampicillin–sulbactam	Clindamycin,[d] vancomycin[d]	A
Video-assisted thoracoscopic surgery	Cefazolin, ampicillin–sulbactam	Clindamycin,[d] vancomycin[d]	C
Gastroduodenale			
Procedures involving entry into lumen of gastrointestinal tract (bariatric, pancreaticoduodenectomy[f])	Cefazolin	Clindamycin or vancomycin + aminoglycoside[g] or aztreonam or fluoroquinolone[h,i]	A
Procedures without entry into gastrointestinal tract (antireflux, highly selective vagotomy) for high-risk patients	Cefazolin	Clindamycin or vancomycin + aminoglycoside[g] or aztreonam or fluoroquinolone[h,i]	A
Biliary tract			
Open procedure	Cefazolin, cefoxitin, cefotetan, ceftriaxone,[k] ampicillin–sulbactam[k]	Clindamycin or vancomycin + aminoglycoside[g] or aztreonam or fluoroquinolone[h,i] Metronidazole + aminoglycoside[g] or fluoroquinolone[h,i]	A
Laparoscopic procedure			
Elective, low-risk[j]	None	None	A
Elective, high-risk[j]	Cefazolin, cefoxitin, cefotetan, ceftriaxone,[k] ampicillin–sulbactam[k]	Clindamycin or vancomycin + aminoglycoside[g] or aztreonam or fluoroquinolone[h,i] Metronidazole + aminoglycoside[g] or fluoroquinolone[h,i]	A
Appendectomy for uncomplicated appendicitis	Cefoxitin, cefotetan, cefazolin + metronidazole	Clindamycin + aminoglycoside[g] or aztreonam or fluoroquinolone[h,i] Metronidazole + aminoglycoside[g] or fluoroquinolone[h,i]	A
Small intestine			
Nonobstructed	Cefazolin	Clindamycin + aminoglycoside[g] or aztreonam or fluoroquinolone[h,i]	C
Obstructed	Cefazolin + metronidazole, cefoxitin, cefotetan	Metronidazole + aminoglycoside[g] or fluoroquinolone[h,i]	C
Hernia repair (hernioplasty and herniorrhaphy)	Cefazolin	Clindamycin, vancomycin	A

PET imaging in head and neck cancer

(PUBLISHED BY Program in Evidence-based Care)

Recommendations:

Diagnosis/Staging

- Positron emission tomography (PET) is recommended in the M and bilateral nodal staging of all patients with head and neck squamous cell carcinoma where conventional imaging is equivocal, or where treatment may be significantly modified.
- PET is recommended in all patients after conventional imaging and in addition to, or prior to, diagnostic panendoscopy where the primary site is unknown.
- PET is recommended for staging and assessment of recurrence of patients with nasopharyngeal carcinoma if conventional imaging is equivocal.

Recurrence/Restaging

PET is recommended for restaging patients who are being considered for major salvage treatment, including neck dissection.

Salivary gland stones

Salivary gland stones are diagnosed by clinical manifestations:

- Recurrent salivary gland swelling (submandibular or parotid) exaggerated by meals
- Floor of mouth edema & swelling (submandibular)
- Purulent or muco-purulent discharge from intraoral duct opening (in inner cheek stensen's parotid duct or under the tongue wharton's submandibular duct).

- Clinical examination should include glandular palpation for tenderness and enlargement as well as stone palpation "if present or not".

- Main investigations ordered should include one or more of the following:
  - Salivary gland ultrasonography (us) as a screening modality for presence or absence of stones.
  - Non-contrast salivary gland computed tomography (ct) scan for estimation of salivary stone characteristics: site, size, shape, number and configuration.
  - Magnetic resonance (MR) sialography for assessment of salivary duct morphology regarding filling defects, strictures, stenosis, sialocele formation.
  - Older diagnostic methods including plain x-ray "low diagnostic capabilities" and conventional sialography "inherent invasive complications" should be avoided in routine work-up for these cases.

- Sialolithiasis treatment is mainly surgical and should focus on extraction of the obstructing stone rather than surgical extirpation of the involved salivary gland.

- Choice of method for surgical extraction depends on the involved gland, stone characteristics as well as salivary duct morphology as follows:
  - Small stones <4mm are better extracted using sialendoscopy with basket stone extraction.
  - Intermediate stones 4-8 mm need endoscopic fragmentation first either by laser 'if available' or micro burr treatment prior to extraction via sialendoscopy.
  - Large stones >8mm usually require combined approaches for extraction either by combined intraoral microscopic/sialendoscopy technique for submandibular and distal ductal parotid stones "distal to masseteric angle" or via external/sialendoscopy technique for proximal ductal & intraparenchymal parotid stones.

- Salivary gland resection in cases of sialolithiasis should only be performed in:
  - Failed sialendoscopy extraction with persistent patient symptoms.
  - Chronically infected gland with recurrent abscess formation +/- discharging external salivary fistula.
  - Endoscopically unreachable stones trapped in large sialoceles with severe chronically inflamed glands.

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Obstructive Sleep Apnea

Introduction:

Obstructive sleep apnea (OSA) is characterized by episodes of partial (hypopnea) or complete (apnea) obstruction of the upper airway during sleep, producing fragmented uncomfortable sleep.[1] OSA is the second disease in order of frequency among the different respiratory disorders, surpassed only by asthma.[2] Although OSA is a relatively common medical condition, it is believed that more than 85% of patients with clinically significant OSA have never been diagnosed.[3] OSA has role in the development of type 2 Diabetes Mellitus,[4] and glaucomatous optic neuropathy.[5] Moreover, it predisposes to poor control of bronchial asthma.[6] When severe, it is associated with a reduced quality of life and major complications (cardio- and cerebrovascular disease). Furthermore, the OSA is an independent factor for hypertension,[7] atherosclerosis,[8] myocardial infarction[9], stroke[10] and even death.[10]

Diagnosis of OSA

History is an essential requirement for a correct diagnosis of OSA (tonsillectomy/adenoidectomy in childhood, alcohol intake, the use of muscle relaxant drugs, obesity, family history of OSA. etc). It is also important to establish the profession of the patient, since in some professions OSA constitutes a medical emergency. [11]

A proper ENT examination is required with exploration of the upper airway (nasal passages, oropharynx and hypopharynx, and larynx).[12]

The gold standard for diagnosis is a polysomnogram (PSG) or sleep study.[13] PSG calculates the number of obstructive airway events per hour of sleep, known as the apnea-hypopnea index (AHI).

An AHI < 5 is considered normal or simple snorer.

An AHI between 5 and 15 is mild OSA

AHI from 15 to 30 is moderate OSA

AHI > 30 indicates severe OSA.[13]

Although PSG is the gold standard for the diagnosis of OSA, it does not provide information as regard to the location of obstruction. Although fiberoptic nasopharyngoscopy (with Muller maneuver) is the main diagnostic technique to identify sites of obstruction, it is usually carried out in awake patients in a clinic setting that is different from the spontaneous sleep situations in which apneas normally occur.[14]

Drug-induced sedation endoscopy (DISE) has been introduced to overcome the limits of the awake nasopharyngeal endoscopy. It consists of an endoscopy carried out during different steps of sedation obtained by different sedative agents. Evidence is emerging that certain DISE findings are related to treatment outcome, and that DISE is a valuable selection tool in treatment advice.[15-17]

Main treatment options of OSA:

1. Behavioral modifications: Adoption of a regular sleep schedule, ensuring a good environment for adequate sleep, not lying down without the need to sleep, and the avoidance of too much time in bed.[2] Alcohol consumption and smoking should be avoided.

In this context, smoking increases inflammation of the upper airway and implies a greater risk of snoring and OSA.[18] Alcohol consumption in turn is associated with exacerbation of the number and duration of apneas, arterial desaturation and sleep fragmentation.[12]

2. CPAP is currently considered the first-line treatment for OSA in adults.[19] However, although CPAP is very effective, many patients cannot tolerate it every night for life; its acceptance is therefore rather low.[20]

3. Oral appliances: The American Association of Sleep Disorders[21] has proposed the use of oral appliances (OA) in order to eliminate snoring or sleep apnea, classifying them as follows: mandible advancement appliances, lingual retainers, appliances that act upon the soft palate, and combined advancement and positive pressure appliances. Mandible advancement appliances are mostly manufactured with an advance of 80% of maximum protrusion.[22] However,

comparison of these appliances with continuous positive airway pressure (CPAP) shows them to be less effective in reducing AHI.[23]

4. Surgery may be used as a primary treatment option in selected patients who have identifiable anatomical problems (e.g., enlarged tonsils) or it may be used as a “salvage” treatment option for patients who are not compliant with CPAP. Despite a variable cure rate, surgery has been shown to routinely decrease OSA severity and increase subjective quality of life.[24, 25] The anatomical cause of OSA is generally heterogeneous, with multiple potential levels of airway obstruction; therefore many different surgical procedures have been developed for the treatment of OSA.[26, 27]

A meta-analysis of drug-induced sleep endoscopy (DISE) done in OSA patients revealed that soft palate is obstructed in most OSA patients with different degrees and collapse patterns.[28]

Uvulopalatopharyngoplasty (UPPP) and Laser-Assisted Uvuloplatoplasty (LAUP) were the most common surgical procedures at the soft palate level to manage OSA cases in Egypt.[29]

Their primary mechanism was to shorten the soft palate by trimming its free edge. However, UPPP papers' analysis revealed its success rate is less than 50%, similar to CPAP effectiveness when considering patient adherence[30] The concept of palatopharyngoplasty was shifted from destructive UPPP techniques to more reconstructive techniques.[31]

lateral pharyngoplasty were first proposed by Cahali et al. They started to work on the lateral pharyngeal wall to widen the pharynx and splint the soft palate rather than resection redundant tissues.[32,33]

Expansion Sphincter Pharyngoplasty was described by Pang & Woodson (ESP) to make the lateral pharyngoplasty less invasive but based on a similar idea.[34]

A multicenter study of palate surgery's long-term complications in 217 patients concluded newer palatoplasty techniques had been shown to have fewer complications compared to old ones.[35]

Barbed Reposition Pharyngoplasty (BRP) was introduced by Vicini and colleagues to overcome ESP limits. [35]

Tongue base hypertrophy is an obstructive condition in many if not most cases of obstructive sleep apnea–hypopnea syndrome (OSAHS).[36] It was found that about 30% of cases had obstruction at the level of hypopharynx (tongue base) and larynx. Multiple surgical measures aimed at improvement of tongue-base obstruction exist. These can be broadly classified as 1 of 3 approaches: tongue reduction, suspension or stimulation.[37]

In recent times, reasonable success has been achieved through the use of radiofrequency base-of-tongue reduction (RFBOT) transorally[38, 39] or ultra-sound guided transcervically [40, 41], however radiofrequency surgery can be successfully used in cases of moderate tongue base hypertrophy,[42] but it is absolutely inadequate for severe-to-huge obstructions. [43] In December 2009, the FDA approved using the da Vinci Surgical Robot to perform TORS for selected malignant lesions (T1-T2) of

the throat as well as all benign diseases. [44] The first TORS for OSA was carried out in May 2008 as reported by Vicini et.al.[43] Since 2008 till 2014, more than 100 cases were published in 7 single center reports in Literature.[37, 45, 46] In 2014, the first multicenter study about TORS in which a cohort of 243 cases from 7 groups in 5 different countries was available.[47]

The mandible and the tongue are major determinants of the airway dimension. Anterior positioning of these structures has been shown to improve OSA. The genioglossus advancement (GGA) procedure is limited to moving the geniotubercle with the genioglussus insertion forward without moving the mandible.[48] This advancement places tension on the tongue musculature, and thus limits the posterior displacement during sleep. The hyoid bone is in intimate relationship with the tongue base and pharyngeal musculatures, and thus is an integral aspect of the upper airway anatomy. The hyoid bone may be surgically repositioned anteriorly, by attaching it to the thyroid cartilage to expand the airway.[48, 49] Hyoid suspension (HS) is usually performed in conjunction with GGA to improve OSA;[50-52]

Maxillomandibular advancement (also known as Bimaxillary advancement operation “Bi-max”) expands the skeletal framework that encircles the airway, thus enlarging the entire airway, including the nasal, pharyngeal, and hypopharyngeal airway. MMA is the most effective surgical procedure currently available for OSA. The success rate is usually between 75% to 100%[50, 53-56], with a long-term success approaching 90%.[57, 58]

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SECTION TWO

Multidisciplinary Guidelines for Head and Neck Cancer

Multidisciplinary Guidelines for Head and Neck Cancer

United Kingdom National Multidisciplinary Guidelines for Head and Neck Cancer.

Endorsed by seven medical specialty organizations involved in head and neck cancer care in the UK: British Association of Endocrine and Thyroid Surgeons, British Association of Head and Neck Oncologists, British Association of Oral and Maxillofacial Surgeons, British Association of Otorhinolaryngology-Head and Neck Surgery, British Association of Plastic, Reconstructive and Aesthetic Surgeons, The Royal College of Pathologists and The Royal College of Radiologists (Faculty of Clinical Oncology).

All evidence-based recommendations in this edition are indicated by '(R)' and where the multidisciplinary team of authors consider a recommendation to be based on clinical experience, it is denoted by '(G)' as a good practice point.

Pre-treatment clinical assessment in head and neck cancer

Recommendations:

• Comorbidity data should be collected as it is important in the analysis of survival, quality of life and functional outcomes after treatment as well as for comparing results of different treatment regimens and different centers. (R)

• Patients with hypertension of over 180/110 or associated target organ damage, should have antihypertensive medication started pre-operatively as per British Hypertension Society guidelines. (R)

• Rapidly correcting pre-operative hypertension with beta blockade appears to cause higher mortality due to stroke and hypotension and should not be used. (R)

• Patients with poorly controlled or unstable ischaemic heart disease should be referred for cardiology assessment pre-operatively. (G)

• Patients within one year of drug eluting stents should be discussed with the cardiologist who was responsible for their percutaneous coronary intervention pre-operatively with regard to cessation of antiplatelet medication due to risk of stent thrombosis. (G)

• Patients with multiple recent stents should be managed in a centre with access to interventional cardiology. (G)

• Surgery after myocardial infarction should be delayed if possible to reduce mortality risk. (R)

• Patients with critical aortic stenosis (AS) should be considered for pre-operative intervention. (G)

•Clopidogrel should be discontinued 7 days pre-operatively; warfarin should be discontinued 5 days pre-operatively. (R)

• Patients with thromboembolic disease or artificial heart valves require heparin therapy to bridge peri-operative warfarin cessation, this should start 2 days after last warfarin dose. (R)

• Cardiac drugs other than angotensin-converting enzyme inhibitors and angiotensin II antagonists should be continued including on the day of surgery. (R)

• Angotensin-converting enzyme inhibitors and angiotensin II antagonists should be withheld on the day of surgery unless they are for the treatment of heart failure. (R)

• Post-operative care in a critical care area should be considered for patients with heart failure or significant diastolic dysfunction. (R)

• Patients with respiratory disease should have their peri-operative respiratory failure risk assessed and critical care booked accordingly. (G)

• Patients with severe lung disease should be assessed for right heart disease pre-operatively. (G)

• Patients with pulmonary hypertension and right heart failure will be at extraordinarily high risk and should have the need for surgery re-evaluated. (G)

• Perioperative glucose readings should be kept within 4–12 mmol/l. (R)

• Patients with a high HbA1C facing urgent surgery should have their diabetes management assessed by a diabetes specialist. (G)

• Insulin-dependent diabetic patients must not omit insulin for more than one missed meal and will therefore require an insulin replacement regime. (R)

• Patients taking more than 5 mg of prednisolone daily should have steroid replacement in the peri-operative period. (R)

• Consider proton pump therapy for patients taking steroids in the peri-operative phase if they fit higher risk criteria. (R)

• Surgery within three months of stroke carries high risk of further stroke and should be delayed if possible. (R)

• Patients with rheumatoid arthritis should have flexion/extension views assessed by a senior radiologist pre-operatively. (R)

•Patients at risk of post-operative cognitive dysfunction and delirium should be highlighted at pre-operative assessment. (G)

• Patients with Parkinson's disease (PD) must have enteral access so drugs can be given intra-operatively. Liaison with a specialist in PD is essential. (R)

• Intravenous iron should be considered for anaemia in the urgent head and neck cancer patient. (G)

• Preoperative blood transfusion should be avoided where possible. (R)

• Where pre-operative transfusion is essential it should be completed 24–48 hours pre-operatively. (R)

• An accurate alcohol intake assessment should be completed for all patients. (G)

• Patients considered to have a high level of alcohol dependency should be considered for active in-patient withdrawal at least 48 hours pre-operatively in liaison with relevant specialists. (R)

• Parenteral B vitamins should be given routinely on admission to alcohol-dependent patients. (R)

• Smoking cessation, commenced preferably six weeks before surgery, decreases the incidence of post-operative complications. (R)

• Antibiotics are necessary for clean-contaminated head and neck surgery, but unnecessary for clean surgery. (R)

• Antibiotics should be administered up to 60 minutes before skin incision, as close to the time of incision as possible. (R)

• Antibiotic regimes longer than 24 hours have no additional benefit in clean-contaminated head and neck

surgery. (R)

• Repeat intra-operative antibiotic dosing should be considered for longer surgeries or where there is major blood loss. (R)

• Local antibiotic policies should be developed and adhered to due to local resistance patterns. (G)

• Individual assessment for venous thromboembolism (VTE) risk and bleeding risk should occur on admission and be reassessed throughout the patients' stay. (G)

• Mechanical prophylaxis for VTE is recommended for all patients with one or more risk factors for VTE. (R)

• Patients with additional risk factors of VTE and low bleeding risk should have low molecular weight heparin at prophylactic dose or unfractionated heparin if they have severe renal impairment. (R)

Nutritional management in head and neck cancer

Recommendations:

• A specialist dietitian should be part of the multidisciplinary team for treating head and neck cancer patients throughout the continuum of care as frequent dietetic contact has been shown to have enhanced outcomes. (R)

• Patients with head and neck cancer should be nutritionally screened using a validated screening tool at diagnosis and then repeated at intervals through each stage of treatment. (R)

• Patients at high risk should be referred to the dietitian for early intervention. (R)

• Offer treatment for malnutrition and appropriate nutrition support without delay given the adverse impact on clinical, patient reported and financial outcomes. (R)

• Use a validated nutrition assessment tool (e.g. scored Patient Generated–Subjective Global Assessment or Subjective Global Assessment) to assess nutritional status. (R)

• Offer pre-treatment assessment prior to any treatment as intervention aims to improve, maintain or reduce decline in nutritional status of head and neck cancer patients who have malnutrition or are at risk of malnutrition. (G)

• Patients identified as well-nourished at baseline but whose treatment may impact on their future nutritional status should receive dietetic assessment and intervention at any stage of the pathway. (G)

• Aim for energy intakes of at least 30 kcal/kg/day. As energy requirements may be elevated post-operatively, monitor weight and adjust intake as required. (R)

• Aim for energy and protein intakes of at least 30 kcal/kg/day and 1.2 g protein/kg/day in patients receiving radiotherapy or chemoradiotherapy. Patients should have their weight and nutritional intake monitored regularly to determine whether their energy requirements are being met. (R)

• Perform nutritional assessment of cancer patients frequently. (G)

• Initiate nutritional intervention early when deficits are detected. (G)

• Integrate measures to modulate cancer cachexia changes into the nutritional management. (G)

• Start nutritional therapy if undernutrition already exists or if it is anticipated that the patient will be unable to eat for more than 7 days. Enteral nutrition should also be started if an inadequate food intake (60 per cent of estimated energy expenditure) is anticipated for more than 10 days. (R)

• Use standard polymeric feed. (G)

• Consider gastrostomy insertion if long-term tube feeding is necessary (greater than four weeks). (R)

• Monitor nutritional parameters regularly throughout the patient's cancer journey. (G)

• Pre-operative:

Patients with severe nutritional risk should receive nutrition support for 10–14 days prior to major surgery even if surgery has to be delayed. (R)

Consider carbohydrate loading in patients undergoing head and neck surgery. (R)

• Post-operative:

Initiate tube feeding within 24 hours of surgery. (R)

Consider early oral feeding after primary laryngectomy. (R)

• Chyle Leak:

Confirm chyle leak by analysis of drainage fluid for triglycerides and chylomicrons. (R)

Commence nutritional intervention with fat free or medium chain triglyceride nutritional supplements either orally or via a feeding tube. (R)

Consider parenteral nutrition in severe cases when drainage volume is consistently high. (G)

•Weekly dietetic intervention is offered for all patients undergoing radiotherapy treatment to prevent weight loss, increase intake and reduce treatments interruptions. (R)

• Offer prophylactic tube feeding as part of locally agreed guidelines, where oral nutrition is inadequate. (R)

• Offer nutritional intervention (dietary counselling and/or supplements) for up to three months after treatment. (R)

• Patients who have completed their rehabilitation and are disease free should be offered healthy eating advice as part of a health and wellbeing clinic. (G)

• Quality of life parameters including nutritional and swallowing, should be measured at diagnosis and at regular intervals post-treatment. (G)

Speech and swallow rehabilitation in head and neck cancer

Recommendations:

• All multidisciplinary teams should have rehabilitation patient pathways covering all stages of the patient's journey including multidisciplinary and pre-treatment clinics. (G)

• All head and neck cancer patients should have a pre-treatment assessment of speech and swallowing. (G)

• A programme of prophylactic exercises and the teaching of swallowing maneuvers can reduce impairments, maintain function, and enable a speedier recovery. (R)

• Continued speech and language therapist input is important in maintaining voice and safe and effective swallow function following head and neck cancer treatment. (R)

• Disease recurrence must be ruled out in the management of stricture and/or stenosis. (R)

• Continuous radial expansion balloons offer a safe, effective dilation method with advantages over gum elastic bougies. (R)

• Site, length, and completeness of strictures as well as whether they are in the presence of the larynx or not, need to be assessed when establishing the likelihood of surgically improved outcome. (G)

• Primary surgical voice restoration should be offered to all patients undergoing laryngectomy. (R)

• Attention to surgical detail and long-term speech and language therapist input is required to optimize speech and swallowing after laryngectomy. (G)

• Patients should commence wearing heat and moisture exchange devices as soon as possible after

laryngectomy. (R)

Laryngeal cancer

The aim of any clinician involved in the treatment of laryngeal squamous cell carcinoma should be to cure the disease whilst maintaining maximal laryngeal function. Early-stage tumours of the glottis present with hoarseness, whilst tumours of the supraglottis and more advanced glottic tumours may present with pain, odynophagia and/or dysphagia, a neck lump or even airway compromise.

Meticulous endoscopic inspection of the tumour under general anaesthetic and imaging of the head, neck and thorax is needed for staging.

Definitive diagnosis is achieved by histological examination of a tissue biopsy, obtained usually at the time of a general anaesthetic endoscopic examination of the larynx, pharynx and upper oesophagus. The examination under anaesthesia is extremely important for staging and should routinely involve inspection with rigid (plane 0° and angled 30° and/or 70°) fiberoptic endoscopes. The aggregate information provided by the imaging and the endoscopic examination facilitates the staging of the tumour according to the tumour–node–metastasis (TNM) system outlined below (Table I). It is by recourse to the TNM stage of the tumour, in addition to the general fitness of the patient, that treatment decisions are ultimately made.

TNM STAGING SYSTEM FOR LARYNGEAL CANCER	
Supraglottis	
T1	Tumour limited to one subsite of supraglottis with normal vocal fold mobility
T2	Tumour invades mucosa of more than one adjacent subsite of supraglottis or glottis or region outside the supraglottis (e.g. mucosa of base of tongue, vallecula, medial wall of piriform sinus) without fixation of the larynx
T3	Tumour limited to larynx with vocal fold fixation and/or invades any of the following: post-cricoid area, pre-epiglottic tissues, paraglottic space, and/or with minor thyroid cartilage erosion (e.g. inner cortex)
T4a	Tumour invades through the thyroid cartilage and/or invades tissues beyond the larynx, e.g. trachea, soft tissues of neck, including deep/extrinsic muscle of tongue (e.g. genioglossus, hyoglossus, palatoglossus and styloglossus), strap muscles, thyroid and oesophagus
T4b	Tumour invades pre-vertebral space, mediastinal structures or encases carotid artery
Glottis	
T1	Tumour limited to vocal fold(s) (may involve anterior or posterior commissure) with normal mobility T1a. Tumour limited to one vocal fold T1b. Tumour involves both vocal folds
T2	T2a. Tumour extends to supraglottis and/or subglottis with normal vocal fold mobility T2b. Tumour extends to supraglottis and/or subglottis with impaired vocal fold mobility
T3	Tumour limited to larynx with vocal fold fixation and/or invades paraglottic space, and/or with minor thyroid cartilage erosion (e.g. inner cortex)
T4a	Tumour invades through the thyroid cartilage or invades tissues beyond the larynx, e.g. trachea, soft tissues of neck, including deep/extrinsic muscle of tongue (genioglossus, hyoglossus, palatoglossus and styloglossus), strap muscles, thyroid and oesophagus
T4b	Tumour invades prevertebral space, mediastinal structures or encases carotid artery
Subglottis	
T1	Tumour limited to subglottis
T2	Tumour extends to vocal fold(s) with normal or impaired mobility
T3	Tumour limited to larynx with vocal fold fixation
T4a	Tumour invades through cricoid or thyroid cartilage and/or invades tissues beyond the larynx, e.g., trachea, soft tissues of neck including deep/extrinsic muscle of tongue (genioglossus, hyoglossus, palatoglossus and styloglossus), strap muscles, thyroid and oesophagus
T4b	Tumour invades prevertebral space, mediastinal structures or encases carotid artery

Recommendations:

• Radiotherapy (RT) and transoral laser microsurgery (TLM) are accepted treatment options for T1a–T2a glottic carcinoma. (R)

• Open partial surgery may have a role in the management of selected tumours. (R)

• Radiotherapy, TLM and transoral robotic surgery are reasonable treatment options for T1–T2 supraglottic carcinoma. (R)

• Supraglottic laryngectomy may have a role in the management of selected tumours. (R)

• Most patients with T2b–T3 glottic cancers are suitable for non-surgical larynx preservation therapies. (R)

• Concurrent chemoradiotherapy should be regarded as the standard of care for non-surgical management. (R)

• Subject to the availability of appropriate surgical expertise and multi-disciplinary rehabilitation services, TLM or open partial surgical procedures ± post-operative RT, may be also be appropriate in selected cases. (R)

• In the absence of clinical or radiological evidence of nodal disease, elective treatment (RT or surgery ± postoperative RT) is recommended to at least lymph node levels II, III and IV bilaterally. In node positive disease, it is recommended that lymph node levels II–V should be treated on the involved side. If level II nodes are involved, then elective irradiation of ipsilateral level Ib nodes may be considered. (R)

• Most patients with T3 supraglottic cancers are suitable for non-surgical larynx preservation therapies. (R)

• Concurrent chemoradiotherapy should be regarded as the standard of care for non-surgical management. (R)

• Subject to the availability of appropriate surgical expertise and multi-disciplinary rehabilitation services, TLM or open partial surgical procedures ± post-operative RT, may also be appropriate in selected cases. (R)

• In the absence of clinical or radiological evidence of nodal disease, elective treatment (RT or surgery ± postoperative RT) is recommended to at least lymph node levels II, III and IV bilaterally. In node positive disease, lymph node levels II–V should be treated on the involved side. (R)

• As per the PET-Neck clinical trial, patients with N2 or N3 neck disease who undergo treatment with chemoradiotherapy to their laryngeal primary and experience a complete response with a subsequent negative post-treatment positron emission tomography combined with computed tomography (PET–CT) scan do not require an elective neck dissection. In contrast, patients who have a partial response to treatment or have increased uptake on a post-treatment PET–CT scan should have a neck dissection. (R)

• Larynx preservation with concurrent chemoradiotherapy should be considered for T4 tumours, unless there is tumour invasion through cartilage into the soft tissues of the neck, in which case total laryngectomy yields better outcomes. (R)

• In the absence of clinical or radiological evidence of nodal disease, elective treatment (RT or surgery ± postoperative RT) is recommended to bilateral lymph node levels II, III, IV, V and VI. (R)

Oral cavity and lip cancer

Introduction:

In order of decreasing frequency, malignant tumours of the oral cavity affect the anterior two-thirds of the tongue, floor of mouth, buccal mucosa, retromolar trigone, hard palate and gingivae. Tumours of the lip require separate consideration as their natural history differs from oral cavity disease. The overwhelming majority of oral cavity cancers are squamous cell carcinomas (SCCs). Non-squamous cell tumours are predominantly of salivary gland origin and are discussed elsewhere in these guidelines. The heterogeneous nature of oral cavity tumours, the functional and cosmetic sequelae of their management and the frequent medical co-morbidities that co-exist in this patient group demand that treatment options should be considered by a multidisciplinary team before reaching a final plan through consensus with the patient and carers. The overall treatment intention, whether curative or palliative, should be clearly communicated at the outset.

The majority of malignant tumours of the oral cavity are squamous cell carcinomas. The clinical behavior of lip cancer is akin to skin cancer While tobacco and alcohol are the main carcinogens implicated in oral cavity cancer, a small but significant role for human papilloma virus is recognized.

Elective neck management is indicated for any tumour when the risk of occult nodal involvement is >20 per cent.

Several reconstructive options exist to repair soft tissue and bony defects after tumour resection. Tumour thickness, positive margins and extra-capsular spread of nodal metastasis and pattern of invasion.

Recommendations:

• Surgery remains the mainstay of management for oral cavity tumours. (R)

• Tumour resection should be performed with a clinical clearance of 1 cm vital structures permitting. (R)

• Elective neck treatment should be offered for all oral cavity tumours. (R)

• Adjuvant radiochemotherapy in the presence of advanced neck disease or positive margins improves control rates. (R)

• Early-stage lip cancer can be treated equally well by surgery or radiation therapy. (R)

T STAGING FOR ORAL CAVITY TUMOURS	
TX	Primary tumour cannot be assessed
T0	No evidence of primary tumour
Tis	Carcinoma in situ
T1	Tumour 2 cm or smaller in greatest dimension
T2	Tumour larger than 2 cm but 4 cm or smaller in greatest dimension
T3	Tumour larger than 4 cm in greatest dimension
T4a	Tumour invades the larynx, deep/extrinsic muscle of tongue, medial pterygoid, hard palate or mandible
T4b	Tumour invades lateral pterygoid muscle, pterygoid plates, lateral nasopharynx or skull base or encases carotid artery

Oropharyngeal cancer

Introduction and epidemiology:

The incidence of oropharyngeal squamous cell carcinoma (OPSCC) is increasing significantly in developed countries. The increasing incidence of OPSCC is due to human papilloma virus (HPV) infection, with HPV-16 being the predominant subtype responsible. The proportion of cases with evidence of HPV infection has risen rapidly and HPV is now responsible for over 70 per cent of OPSCCs in Europe and the USA. The rise in HPV-related OPSCC has been called an 'epidemic' and is expected to continue.

Patients often present with a painless neck lump, with few other symptoms. They may also complain of a sore throat or tongue, otalgia, pain and/or difficulty swallowing and/or a change in voice quality (hot potato voice).

TNM STAGING FOR OROPHARYNGEAL SQUAMOUS CELL CARCINOMA

- TX: Primary tumour cannot be assessed
- T0: No evidence of primary tumour
- Tis: Carcinoma in situ
- T1: Tumour 2 cm or less in greatest dimension
- T2: Tumour larger than 2 cm but 4 cm or less in greatest dimension
- T3: Tumour larger than 4 cm in greatest dimension or extension to lingual surface of epiglottis
- T4a: Tumour invades the larynx, deep/extrinsic muscle of tongue, medial pterygoid, hard palate or mandible
- T4b: Tumour invades lateral pterygoid muscle, pterygoid plates, lateral nasopharynx, or skull base or encases carotid artery

Recommendations:

• Cross-sectional imaging is required in all cases to complete assessment and staging. (R)

• Magnetic resonance imaging is recommended for primary site and computed tomography scan for neck and chest. (R)

• Positron emission tomography combined with computed tomography scanning is recommended for the assessment of response after chemoradiotherapy, and has a role in assessing recurrence. (R)

• Examination under anaesthetic is strongly recommended, but not mandatory. (R)

• Histological diagnosis is mandatory in most cases, especially for patients receiving treatment with curative intent. (R)

• Oropharyngeal carcinoma histopathology reports should be prepared according to The Royal College of Pathologists Guidelines. (G)

• Human papilloma virus (HPV) testing should be carried out for all oropharyngeal squamous cell carcinomas as recommended in The Royal College of Pathologists Guidelines. (R)

• Human papilloma virus testing for oropharyngeal cancer should be performed within a diagnostic service where the laboratory procedures and reporting standards are quality assured. (G)

• Treatment options for T1–T2 N0 oropharyngeal squamous cell carcinoma include radical radiotherapy or transoral surgery and neck dissection (with post-operative (chemo)radiotherapy if there are adverse pathological features on histological examination). (R)

• Transoral surgery is preferable to open techniques and is associated with good functional outcomes in retrospective series. (R)

• If treated surgically, neck dissection should include levels II–IV and possibly level I. Level IIb can be omitted if there is no disease in level IIa. (R)

• If treated with radiotherapy, levels II–IV should be included, and possibly level Ib in selected cases. (R)

• Altering the modalities of treatment according to HPV status is currently controversial and should be undertaken only in clinical trials. (R)

• Where possible, patients should be offered the opportunity to enrol in clinical trials in the field. (G)

Nasopharyngeal carcinoma

Introduction:

Nasopharyngeal carcinoma (NPC) is a squamous cell carcinoma (SCC) arising from the mucosal surface of the nasopharynx. The most common site is the fossa of Rosenmüller. The Epstein–Barr virus (EBV) and consumption of salted fish containing dimethylnitrosamine have been implicated in its aetiology. Genetic alterations include deletion of chromosomal regions at 1p, 14q, 16p and amplification of 4q and 12q.

Nasopharyngeal carcinoma is more common in men than in women (3:1), with a median age at presentation of 50 years.

The most common symptoms are:

- *Nasal obstruction*
- *Epistaxis*
- *Conductive hearing loss secondary to otitis media with effusion (OME) due to eustachian tube orifice obstruction*
- *Cranial nerve neuropathies secondary to skull base invasion (cranial nerves III, IV, V and VI)*
- *Neck lumps and swellings due to cervical lymph node metastasis, which is usually in the upper levels of the neck and often bilateral due to the midline lymphatic drainage of the tumour.*

PRIMARY TUMOUR (T)	
T1	Tumour confined to nasopharynx or extends to oropharynx and/or nasal cavity
T2	Tumour with parapharyngeal extension
T3	Tumour invades bony structures and/or paranasal sinuses
T4	Tumour with intracranial extension and/or involvement of cranial nerves, infratemporal fossa, hypopharynx, orbit or masticator space

Recommendations:

- Patients with nasopharyngeal carcinoma (NPC) should be assessed with rigid and fibre-optic nasendoscopy. (R)
- Nasopharyngeal biopsies should be preferably carried out endoscopically. (R)
- Multislice computed tomographic (CT) scan of head, neck and chest should be carried out in all patients and magnetic resonance imaging (MRI) where appropriate to optimise staging. (R)

• Radiotherapy (RT) is the mainstay for the radical treatment for NPC. (R)

• Concurrent chemoradiotherapy offers significant improvement in overall survival in stage III and IV diseases. (R)

• Surgery should only be used to obtain tissue for diagnosis and to deal with otitis media with effusion. (R)

• Radiation therapy is the treatment of choice for stage I and II disease. (R)

• Intensity modulated radiation therapy techniques should be employed. (R)

• Concurrent chemotherapy with radiation therapy is the treatment of choice for stage III and IV disease. (R)

• Patients with NPC should be followed-up and assessed with rigid and/or fibre-optic nasendoscopy. (G)

• Positron emission tomography–computed tomography (PET–CT), CT or MRI scan should be carried out at three months from completion of treatment to assess response. (R)

• Multislice CT scan of head, neck and chest should be carried out in all patients and MRI scan whenever possible and specially in advanced cases with suspected recurrence. (R)

• Surgery in form of nasopharyngectomy should be considered as a first line treatment of residual or recurrent disease at the primary site. (R)

• Neck dissection remains the treatment of choice for residual or metastatic neck disease whenever possible. (R)

• Re-irradiation should be considered as a second line of treatment in recurrent disease. (R)

Hypopharyngeal cancer

Introduction:

The hypopharynx is subdivided into the piriform sinuses, the posterior pharyngeal wall and the postcricoid area. The majority of cancers arise in the piriform sinuses (65–85 per cent), 10–20 per cent arise from the posterior pharyngeal wall and 5–15 per cent from the post-cricoid area. As is the case at other sites in the head and neck, the overwhelming majority (95 per cent) of cancers are squamous cell carcinomas (SCCs).

T STAGING FOR HYPOPHARYNGEAL TUMOURS	
Tx	Primary tumour cannot be assessed
T0	No evidence of primary tumour
Tis	Carcinoma in situ
T1	Tumour limited to one subsite of the hypopharynx and 2 cm or less in greatest dimension
T2	Tumour invades more than one subsite of the hypopharynx or an adjacent site, or measures more than 2 cm but 4 cm or less in greatest diameter without fixation of hemilarynx
T3	Tumour measures more than 4 cm in greatest dimension or with fixation of hemilarynx
T4a	Tumour invades thyroid/cricoid cartilage, hyoid bone, thyroid gland, oesophagus or central compartment soft tissue, which includes pre-laryngeal strap muscles and subcutaneous fat
T4b	Tumour invades pre-vertebral fascia, encases carotid artery or involves mediastinal structures

Recommendations:

• Cross-sectional imaging with computed tomography of the head, neck and chest is necessary for all patients; magnetic resonance imaging of the primary site is useful particularly in advanced disease; and computed tomography and positron emission tomography to look for distant disease. (R)

• Careful evaluation of the upper and lower extents of the disease is necessary, which may require contrast swallow or computed tomography and positron emission tomography imaging. (R)

• Formal rigid endoscopic assessment under general anaesthetic should be performed. (R)

• Nutritional status should be proactively managed. (R)

• Full and unbiased discussion of treatment options should take place to allow informed patient choice. (G)

• Early stage disease can be treated equally effectively with surgery or radiotherapy. (R)

• Endoscopic resection can be considered for early well localised lesions. (R)

• Bulky advanced tumours require circumferential or non-circumferential resection with wide margins to account for submucosal spread. (R)

• Offer primary surgical treatment in the setting of a compromised larynx or significant dysphagia. (R)

• Midline lesions require bilateral neck dissections. (R)

• Consider management of silent nodal areas usually not addressed for other primary sites. (G)

• Reconstruction needs to be individualised to the patients' needs and based on the experience of the unit with different reconstructive techniques. (G)

• Consider tumour bulk reduction with induction chemotherapy prior to definitive radiotherapy. (R)

• Consider intensity modulated radiation therapy where possible to limit the consequences of wide field irradiation to a large volume. (R)

• Use concomitant chemotherapy in patients who are fit enough and consider epidermal growth factor receptor blockers for those who are less fit. (R)

Nose and paranasal sinus tumours

Introduction:

Tumours in the sinonasal region are rare, affecting less than 1 in 100 000 people per year.[1] They are histologically a diverse group of tumours and potentially pose significant management problems due to their close proximity to the orbit and intracranial cavity.

Squamous cell carcinoma (SCC) is the most common malignant tumour, but tumours of every histological type can occur. The commoner epithelial tumours include adenocarcinoma, olfactory neuroblastoma, malignant melanoma and adenoid cystic carcinoma. Sarcomas, e.g. chondrosarcoma and rhabdomyosarcoma and haemoproliferative tumours, e.g. lymphoma may also occur.

Benign tumours include inverted papilloma (IP), osteoma, juvenile angiofibroma (JA), haemangiopericytoma, haemangioma, schwannoma, pleomorphic adenoma and meningioma. All areas of the nasal cavity and paranasal sinuses can be affected, but the lateral wall, ethmoids and maxillary sinus are the most common primary sites. The frontal and sphenoid sinuses are rare primary sites for reasons that are unknown.

T STAGING FOR NASAL AND PARANASAL SINUS TUMOURS (EXCEPT SINONASAL MALIGNANT MELANOMA)	
Maxillary sinus	
T1	Tumour limited to the mucosa with no erosion or destruction of bone
T2	Tumour causing bone erosion or destruction, including extension into hard palate and/or middle nasal meatus, except extension to posterior wall of maxillary sinus and pterygoid plates
T3	Tumour invades any of the following: bone of posterior wall of maxillary sinus, subcutaneous tissues, floor or medial wall of orbit, pterygoid fossa, ethmoid sinuses
T4a	Tumour invades any of the following: anterior orbital contents, skin of cheek, pterygoid plates, infratemporal fossa, cribriform plate, sphenoid or frontal sinuses
T4b	Tumour invades any of the following: orbital apex, dura, brain, middle cranial fossa, cranial nerves other than maxillary division of trigeminal nerve V2, nasopharynx, clivus
Nasal cavity and ethmoid sinus	
T1	Tumour restricted to one subsite of nasal cavity or ethmoid sinus, with or without bony invasion
T2	Tumour involves two subsites in a single site or extends to involve an adjacent site within the nasoethmoidal complex, with or without bony invasion
T3	Tumour extends to invade the medial wall or floor of the orbit, maxillary sinus, palate or cribriform plate
T4a	Tumour invades any of the following: anterior orbital contents, skin of nose or cheek, minimal extension to anterior cranial fossa, pterygoid plates, sphenoid or frontal sinuses
T4b	Tumour invades any of the following: orbital apex, dura, brain, middle cranial fossa, cranial nerves other than V2, nasopharynx, clivus

Recommendations:

• Sinonasal tumours are best treated de novo and unusual polyps should be imaged and biopsied prior to definitive surgery. (G)

• Treatment of sinonasal malignancy should be carefully planned and discussed at a specialist skull base multidisciplinary team meeting with all relevant expertise. (G)

• Complete surgical resection is the mainstay of treatment for inverted papilloma and juvenile angiofibroma. (R)

• Essential equipment is necessary and must be available prior to commencing endonasal resection of skull base malignancy. (G)

• Endoscopic skull base surgery may be facilitated by two surgeons working simultaneously, utilizing both sides of the nose. (G)

• To ensure the optimum oncological results, the primary tumour must be completely removed, and margins checked by frozen section if necessary. (G)

• The most common management approach is surgery followed by post-operative radiotherapy, ideally within six weeks. (R)

• Radiation is given first if a response to radiation may lead to organ preservation. (G)

• Radiotherapy should be delivered within an accredited department using megavoltage photons from a linear accelerator (typical energies 4–6 MV) as an unbroken course. (R)

Salivary Gland Tumours

Introduction:

Salivary gland malignancies are rare, and the understanding of this disease is mostly based on clinical series rather than randomized evidence which is unlikely to emerge for these tumours. Although, overall, tumours are more common in the parotid, the incidence of malignancy is higher in the submandibular and minor salivary glands.[2] Salivary tumours are uncommon in children, but a greater proportion (20–30 per cent) of them are malignant (usually low-grade mucoepidermoid carcinomas).

Salivary gland tumours present a diverse range of histological and clinical behaviors. The rarity of these tumours combined with the diverse histology means that there is a lack of studies that can be used to provide strong recommendations for each individual histologic subtype of salivary tumour.

T-STAGING FOR SALIVARY GLAND TUMOURS	
Tx	Primary tumour cannot be assessed
T0	No evidence of primary tumour
T1	Tumour ≤2 cm in greatest dimension without extraparenchymal extension*
T2	Tumour >2 cm but ≤4 cm in greatest dimension without extraparenchymal extension*
T3	Tumour >4 cm and/or tumour having extraparenchymal extension*
T4a	Tumour invades skin, mandible, ear canal and/or facial nerve
T4b	Tumour invades skull base and/or pterygoid plates and/or encases carotid artery

*Extraparenchymal extension is clinical or macroscopic evidence of invasion of soft tissues. Microscopic evidence alone does not constitute extraparenchymal extension for classification purposes.

WHO CLASSIFICATION OF SALIVARY GLAND TUMOURS 2005[3]
Malignant epithelial tumours
Acinic cell carcinoma
Mucoepidermoid carcinoma
Adenoid cystic carcinoma
Polymorphous low-grade adenocarcinoma
Epithelial myoepithelial carcinoma
Clear cell carcinoma, not otherwise specified
Basal cell adenocarcinoma
Sebaceous carcinoma
Sebaceous lymphadenocarcinoma
Cystadenocarcinoma
Low-grade cribriform cystadenocarcinoma
Mucinous adenocarcinoma
Oncocytic carcinoma
Salivary duct carcinoma
Squamous cell carcinoma
Undifferentiated carcinoma
Small cell carcinoma
Large cell carcinoma
Lymphoepithelial carcinoma
Adenocarcinoma, not otherwise specified
Carcinoma ex pleomorphic adenoma malignant mixed tumour
Myoepithelial carcinoma
Soft tissue tumours
Haemangioma
Haematolymphoid tumours
Hodgkin lymphoma
Metastasising pleomorphic adenoma
Diffuse large B-cell lymphoma
Extranodal marginal zone B cell lymphoma
Secondary tumours
Soft tissue
Haematopoetic
Benign epithelial tumours
Pleomorphic adenoma
Myoepithelioma
Basal cell adenoma
Warthin's tumour (adenolymphoma)
Oncocytoma
Cystadenoma
Papillary cystadenoma
Mucinous cystadenoma
Keratocystoma
Canalicular adenoma
Sialadenoma papilliferum
Sebaceous adenoma
Sialoblastoma
Lymphadenoma
Benign papilloma (intraductal/inverted ductal/ductal)

WHO = World Health Organization

Recommendations:

• Ultrasound guided fine needle aspiration cytology is recommended for all salivary tumours and cytology should be reported by an expert histopathologist. (R)

• Adjuvant radiotherapy (RT) following surgery is recommended for all malignant submandibular tumours except in cases of small, low-grade tumours that have been completely excised. (R)

• For benign parotid tumours complete excision of the tumour should be performed and offers good cure rates. (R)

• In the event of intra-operative tumour spillage, most cases need long-term follow-up for clinical observation only. These should be raised in the multidisciplinary team to discuss the merits of adjuvant RT. (G)

• As a general principle, if the facial nerve function is normal pre-operatively then every attempt to preserve facial nerve function should be made during parotidectomy and if the facial nerve is divided intra-operatively then immediate microsurgical repair (with an interposition nerve graft if required) should be considered. (G)

• Neck dissection is recommended in all cases of malignant parotid tumours except for low-grade small tumours. (R)

• Where malignant parotid tumours lie in close proximity to the facial nerve there should be a low threshold for adjuvant RT. (G)

• Adjuvant RT should be considered in high grade or large tumours or in cases where there is incomplete or close resection margin. (R)

• Adjuvant RT should be prescribed on the basis of clinical factors in addition to histology and grade, e.g. stage, pre-operative facial weakness, positive margins, peri-neural invasion and extracapsular spread. (R)

Thyroid cancer

Recommendations:

• Ultrasound scanning (USS) of the nodule or goitre is a crucial investigation in guiding the need for fine needle aspiration cytology (FNAC). (R)

• FNAC should be considered for all nodules with suspicious ultrasound features (U3–U5). If a nodule is smaller than 10 mm in diameter, USS guided FNAC is not recommended unless clinically suspicious lymph nodes on USS are also present. (R)

• Cytological analysis and categorisation should be reported according to the current British Thyroid Association Guidance. (R)

• Ultrasound scanning assessment of cervical nodes should be done in FNAC-proven cancer. (R)

• Magnetic resonance imaging (MRI) or computed tomography (CT) should be done in suspected cases of retrosternal extension, fixed tumours (local invasion with or without vocal cord paralysis) or when haemoptysis is reported. When CT with contrast is used pre-operatively, there should be a two-month delay between the use of iodinated contrast media and subsequent radioactive iodine (I_{131}) therapy. (R)

• Fluoro-deoxy-glucose positron emission tomography imaging is not recommended for routine evaluation. (G)

• In patients with thyroid cancer, assessment of extrathyroidal extension and lymph node disease in the central and lateral neck compartments should be undertaken pre-operatively by USS and cross-sectional imaging (CT or MRI) if indicated. (R)

• For patients with Thy 3f or Thy 4 FNAC a diagnostic hemithyroidectomy is recommended. (R)

• Total thyroidectomy is recommended for patients with tumours greater than 4 cm in diameter or tumours of any size in association with any of the following characteristics: multifocal disease, bilateral disease, extrathyroidal spread (pT3 and pT4a), familial disease and those with clinically or radiologically involved nodes and/or

distant metastases. (R)

• Subtotal thyroidectomy should not be used in the management of thyroid cancer. (G)

• Central compartment neck dissection is not routinely recommended for patients with papillary thyroid cancer without clinical or radiological evidence of lymph node involvement, provided they meet all of the following criteria: classical type papillary thyroid cancer, patient less than 45 years old, unifocal tumour, less than 4 cm, no extrathyroidal extension on ultrasound. (R)

• Patients with metastases in the lateral compartment should undergo therapeutic lateral and central compartment neck dissection. (R)

• Patients with follicular cancer with greater than 4 cm tumours should be treated with total thyroidectomy. (R)

• I_{131} ablation should be carried out only in centres with appropriate facilities. (R)

• Serum thyroglobulin (Tg) should be checked in all post-operative patients with differentiated thyroid cancer (DTC), but not sooner than six weeks after surgery. (R)

• Patients who have undergone total or near total thyroidectomy should be started on levothyroxine 2 µg per kg or liothyronine 20 mcg tds after surgery. (R)

• The majority of patients with a tumour more than 1 cm in diameter, who have undergone total or near-total thyroidectomy, should have I_{131} ablation. (R)

• A post-ablation scan should be performed 3–10 days after I_{131} ablation. (R)

• Post-therapy dynamic risk stratification at 9–12 months is used to guide further management. (G)

• Potentially resectable recurrent or persistent disease should be managed with surgery whenever possible. (R)

• Distant metastases and sites not amenable to surgery which are iodine avid should be treated with I_{131} therapy. (R)

• Long-term follow-up for patients with differentiated thyroid cancer (DTC) is recommended. (G)

• Follow-up should be based on clinical examination, serum Tg and thyroid-stimulating hormone assessments. (R)

• Patients with suspected medullary thyroid cancer (MTC) should be investigated with calcitonin and carcinoembryonic antigen levels (CEA), 24 hour catecholamine and nor metanephrine urine estimation (or plasma free nor metanephrine estimation), serum calcium and parathyroid hormone. (R)

• Relevant imaging studies are advisable to guide the extent of surgery. (R)

• RET (Proto-oncogene tyrosine-protein kinase receptor) proto-oncogene analysis should be performed after surgery. (R)

• All patients with known or suspected MTC should have serum calcitonin and biochemical screening for phaeochromocytoma pre-operatively. (R)

• All patients with proven MTC greater than 5 mm should undergo total thyroidectomy and central compartment neck dissection. (R)

• Patients with MTC with lateral nodal involvement should undergo selective neck dissection (IIa–Vb). (R)

• Patients with MTC with central node metastases should undergo ipsilateral prophylactic lateral node dissection. (R)

• Prophylactic thyroidectomy should be offered to RET-positive family members. (R)

• All patients with proven MTC should have genetic screening. (R)

• Radiotherapy may be useful in controlling local symptoms in patients with inoperable disease. (R)

• Chemotherapy with tyrosine kinase inhibitors may help in controlling local symptoms. (R)

• For individuals with anaplastic thyroid carcinoma, initial assessment should focus on identifying the small proportion of patients with localised disease and good performance status, which may benefit from surgical resection and other adjuvant therapies. (G)

• The surgical intent should be gross tumour resection and not merely an attempt at debulking. (G)

TABLE I
U GRADING OF THYROID NODULES

U1 normal	U2 benign	U3 indeterminate/ equivocal	U4 suspicious	U5 malignant
Normal thyroid tissue	Halo Iso-echoic or mildly hyper-echoic Cystic change ± ring down sign Micro-cystic/spongiform Peripheral egg shell calcification Peripheral vascularity	Homogeneous Hyper-echoic Solid, halo (follicular lesion) Equivocal echogenic foci Cystic change mixed/central vascularity	Solid Hypo-echoic or very hypo-echoic Disrupted peripheral calcification Lobulated outline	Solid Hypo-echoic Lobulated or irregular outline Micro-calcification Globular calcification Intra-nodular vascularity Shape (taller >wide) Characteristic associated lymphadenopathy
No follow-up required	No follow-up required – routine FNAC not recommended, unless high level of clinical suspicion of thyroid cancer	FNAC	FNAC	FNAC

FNAC = fine needle aspiration cytology

TABLE II
THYROID FNAC DIAGNOSTIC CATEGORIES

Thy 1	Thy 2	Thy 3		Thy 4	Thy 5
		Thy 3F	Thy 3A		
Non-diagnostic	Non-neoplastic, e.g. colloid nodule or thyroiditis	Follicular lesion	Atypia present	Suspicious of thyroid cancer	Diagnostic of thyroid cancer
Repeat FNAC	No follow-up if no suspicious US features and no clinical suspicion of thyroid cancer	Diagnostic hemithyroidectomy* Consider total thyroidectomy in lesions >4 cm where incidence of malignancy is higher	Repeat ultrasound and FNAC If second Thy 3A cytology obtained, discuss at MDT and consider diagnostic hemithyroidectomy*	Discuss at MDT Diagnostic hemithyroidectomy*	Discuss at MDT Appropriate further investigations for staging where indicated Total thyroidectomy ± central node clearance in appropriate high risk patients

*Hemithyroidectomy consists of removal of a thyroid lobe and the isthmus

TABLE III

TUMOUR, NODES AND METASTASES 7TH EDITION STAGING SYSTEM FOR DIFFERENTIATED THYROID CANCER

T stage – primary tumour	TX primary tumour cannot be assessed T0 no evidence of primary tumour T1 tumour ≤2 cm in greatest dimension limited to the thyroid T1a tumour ≤1 cm, limited to the thyroid T1b tumour >1 cm but ≤2 cm in greatest dimension, limited to the thyroid T2 tumour >2 cm but ≤4 cm in greatest dimension, limited to the thyroid T3 tumour >4 cm in greatest dimension limited to the thyroid or any tumour with minimal extrathyroidal extension (e.g. extension to sternothyroid muscle or peri-thyroid soft tissues) T4 tumour of any size extending beyond the thyroid capsule T4a tumour invades subcutaneous soft tissues, larynx, trachea, oesophagus or recurrent laryngeal nerve T4b tumour invades pre-vertebral fascia or encases carotid artery or mediastinal vessel
N stage – regional lymph nodes (cervical or upper mediastinal)	NX regional lymph nodes cannot be assessed N0 no regional lymph node metastasis N1 regional lymph node metastasis N1a metastases to level VI (pretracheal, paratracheal and prelaryngeal/Delphian lymph nodes) N1b metastases to unilateral, bilateral, or contralateral cervical (levels I–IV or V) or retropharyngeal or superior mediastinal lymph nodes (level VII)
M stage – distant metastases	MX distant metastases cannot be assessed M0 no distant metastasis M1 distant metastasis
R stage – residual disease	RX cannot assess presence of residual primary tumour R0 no residual primary tumour R1 microscopic residual primary tumour R2 macroscopic residual primary tumour

MDT = multidisciplinary team

TABLE IV

GROUP STAGING AND SURVIVAL FOR DIFFERENTIATED THYROID CANCER

Stage	Age <45 years	Age >45 years	10-year survival (%)
I	Any T, any N, M0	T1, N0, M0	98.5
II	Any T, any N, M1	T2, N0, M0	98.8
III		T3, N0, M0 or T1–3, N1a, M0	99.0
*IVA		T4a, any N, M0 or T1–3, N1b, M0	75.9
IVB		T4b, any N, M0	62.5
IVC		Any T, any N, M1	63.0

*Undifferentiated or anaplastic carcinomas are all stage IV

TABLE V
INITIAL SURGERY FOR PAPILLARY THYROID CARCINOMA

	Tumour <4 cm	Tumours >/=4 cm	T3 and T4 tumours +N1 level VI nodes, M1
Recommendation	With no other clinical features such as age >45 years, extrathyroidal spread, nodal involvement, angioinvasion, multifocality, distant metastases	Papillary cancer diagnosed following hemithyroidectomy, multifocal disease, thyroid radiation in childhood, familial disease (first degree relative)	Treat all above tumours as high risk
Hemithyroidectomy	Yes	No	No
Total thyroidectomy	Discuss at MDT	Completion total thyroidectomy	Yes
Prophylactic level VI nodal dissection	No	Personalised decision making	Yes
Therapeutic level VI nodal dissection (clinically involved)	Yes	Yes	Yes

TABLE VI
INITIAL SURGERY FOR FOLLICULAR THYROID CANCER

	Clinical details	
Recommendation	Low-risk patient (with all of following) <45 years >1–≤4 cm Minimally invasive No angioinvasion No extracapsular invasion No extrathyroidal spread	High-risk patient (one or more of the following) >45 years Tumour >4 cm Extra-capsular invasion Extrathyroidal disease Widely invasive Angioinvasion Hurthle cell tumours
Hemithyroidectomy	Yes	No
Total thyroidectomy	No	Yes
Level VI nodal dissection	No	Only where clinically involved nodes present

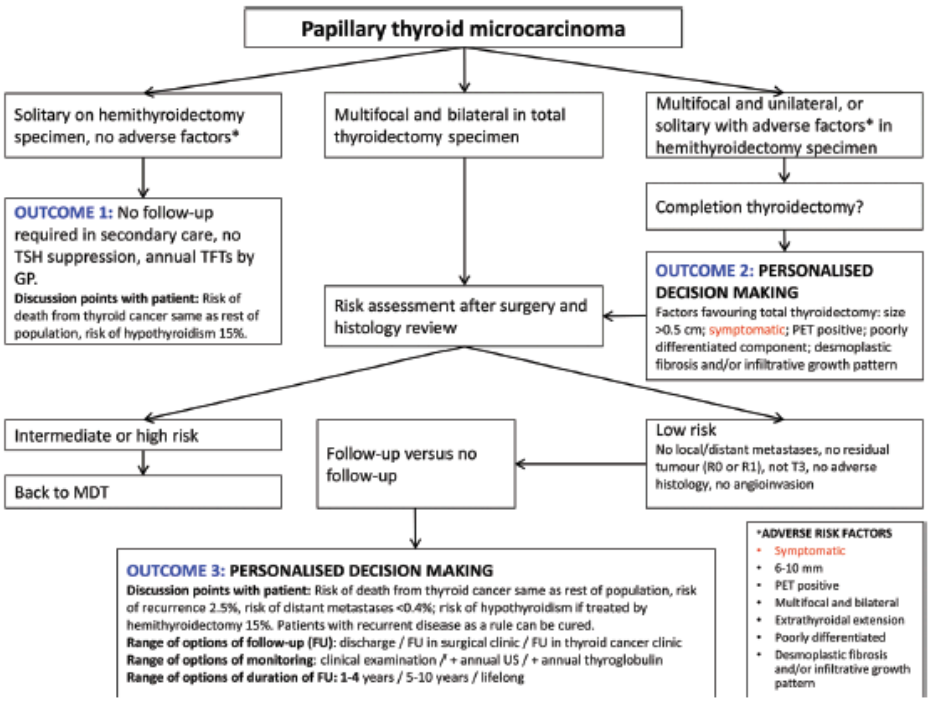


FIG. 1

Flow diagram outlining management of papillary microcarcinomas. Multiple risk factors may tip the balance in favour of total thyroidectomy.

TABLE VII

INDICATIONS FOR I^{131} ABLATION FOLLOWING TOTAL THYROIDECTOMY FOR DIFFERENTIATED THYROID CANCER

Recommendation	Clinical details
Definite I^{131} ablation	Tumour >4 cm Any tumour size with gross extrathyroidal extension Distant metastases present Risk factors indicating higher risk of recurrence where I^{131} should be considered include: Large tumour size Extrathyroidal extension
Probable I^{131} ablation Consider on individual case merit (MDT)	Unfavourable cell type (tall cell, columnar or diffuse sclerosing papillary cancer, poorly differentiated elements) Widely invasive histology Multiple lymph node involvement, large size of involved lymph nodes, high ratio of positive-to-negative nodes, extracapsular nodal involvement
No I^{131} ablation (all criteria must be met)	Tumour <1 cm unifocal or multifocal Histology classical papillary or follicular variant of papillary carcinoma, or follicular carcinoma Minimally invasive without angioinvasion No invasion of thyroid capsule (extrathyroidal extension)

TABLE VIII

DYNAMIC RISK STRATIFICATION FOLLOWING TREATMENT FOR DTC AND TSH SUPPRESSION TARGETS FOR PATIENTS TREATED WITH TOTAL THYROIDECTOMY AND I^{131} ABLATION WITH R0 RESECTION

Excellent response	Indeterminate response	Incomplete response
All the following: Suppressed and stimulated Tg < 1 lg/l* Neck US without evidence of disease Cross-sectional and/or nuclear medicine imaging negative (if performed)	Any of the following: Suppressed Tg < 1 lg/l* and stimulated Tg ≥ 1 and < 10 lg/l* Neck US with non-specific changes or stable sub centimetre lymph nodes Cross-sectional and/or nuclear medicine imaging with non-specific changes, although not completely normal	Any of the following: Suppressed Tg ≥ 1 lg/l* or stimulated Tg ≥ 10 lg/l* Rising Tg values Persistent or newly identified disease on cross-sectional and/or nuclear medicine imaging
Low risk Maintain TSH 0.3–2.0 mIU/l	Intermediate risk Suppress TSH 0.1–0.5 mIU/l for 5–10 years then reassess	High risk Suppress TSH < 0.1 mIU/l indefinitely

*Assumes the absence of interference in the Tg assay. Tg = thyroglobulin; TSH = thyroid stimulating hormone; US = ultrasound

Management of neck metastases in head and neck cancer

Recommendations:

• Computed tomographic or magnetic resonance imaging is mandatory for staging neck disease, with choice of modality dependant on imaging modality used for the primary site, local availability and expertise. (R)

• Patients with a clinically N0 neck, with more than 15–20 per cent risk of occult nodal metastases, should be offered prophylactic treatment of the neck. (R)

• The treatment choice of for the N0 and N+ neck should be guided by the treatment to the primary site. (G)

• If observation is planned for the N0 neck, this should be supplemented by regular ultrasonograms to ensure early detection. (R)

• All patients with T1 and T2 oral cavity cancer and N0 neck should receive prophylactic neck treatment. (R)

• Selective neck dissection (SND) is as effective as modified radical neck dissection for controlling regional disease in N0 necks for all primary sites. (R)

• SND alone is adequate treatment for pN1 neck disease without adverse histological features. (R)

• Post-operative radiation for adverse histologic features following SND confers control rates comparable with more extensive procedures. (R)

• Adjuvant radiation following surgery for patientswith adverse histological features improves regional control rates. (R)

• Post-operative chemoradiation improves regional control in patients with extracapsular spread and/or microscopically involved surgical margins. (R)

• Following chemoradiation therapy, complete responders who do not show evidence of active disease on co-registered positron emission tomography–computed tomography (PET–CT) scans performed at 10–12 weeks, do not need salvage neck dissection. (R)

• Salvage surgery should be considered for those with incomplete or equivocal response of nodal disease on PET–CT. (R)

TABLE I

LYMPH NODE LEVELS, SUBLEVELS AND BOUNDARIES

Level	Clinical location	Surgical boundaries	Radiological boundaries
Ia	Submental triangle	S: Symphysis of mandible I: Hyoid bone A (M): Left anterior belly of digastric P (L): Right anterior belly of digastric	Nodes above the level of lower body of hyoid bone, below mylohyoid muscles and anterior to a transverse line drawn through the posterior edge of submandibular gland on an axial image
Ib	Submandibular triangle	S: Body of mandible I: Posterior belly of digastric A (M): Anterior belly of digastric P (L): Stylohyoid muscle	
IIa	Upper jugular	S: Lower level of bony margin of jugular fossa I: Level of lower body of hyoid bone A (M): Stylohyoid muscle P (L): Vertical plane defined by accessory nerve	Superior and inferior limits as described under surgical boundaries Nodes posterior to a transverse plane defined by the posterior surface of submandibular gland and anterior to a transverse line drawn along the posterior border of the sternomastoid. NOTE: Nodes lying medial to the carotids are retropharyngeal and not level II
IIb	Upper jugular	S: Lower level of bony margin of jugular fossa I: Level of lower body of hyoid bone A (M): Vertical plane defined by accessory nerve P (L): Posterior border of sternomastoid muscle	
III	Mid Jugular	S: Level of lower body of hyoid bone I: Horizontal plane along inferior border of anterior cricoid arch A (M): Lateral border of sternohyoid muscle P (L): Posterior border of sternocleidomastoid muscle or sensory branches of the cervical plexus	Superior and inferior limits as described under surgical boundaries Nodes anterior to a transverse line drawn on each axial scan through the posterior edge of the SCM and lateral to the medial margin of the common carotid arteries
IV	Lower jugular	S: Horizontal plane along inferior border of anterior cricoid arch I: Clavicle A (M): Lateral border of sternohyoid muscle P (L): Posterior border of sternocleidomastoid muscle or sensory branches of the cervical plexus	Superior and inferior limits as described under surgical boundaries Nodes anterior to a transverse line drawn on each axial scan through the posterior edge of the SCM and lateral to the medial margin of the common carotid arteries
Va	Posterior triangle	S: Convergence of SCM and trapezius muscles I: Horizontal plane along inferior border of anterior cricoid arch A (M): Posterior border of sternocleidomastoid muscle or sensory branches of the cervical plexus P (L): Anterior border of trapezius muscle	Nodes posterior to a transverse line drawn on each axial scan through the posterior edge of the SCM
Vb	Posterior triangle (supraclavicular)	S: Horizontal plane along inferior border of anterior cricoid arch I: Clavicle A (M): Posterior border of sternocleidomastoid muscle or sensory branches of the cervical plexus. P (L): Anterior border of trapezius muscle	
VI	Anterior compartment	S: Hyoid bone I: Sternal notch A (M): Common carotid artery P (L): Common carotid artery	
VII	Superior mediastinum	S: Sternal notch I: Innominate artery A (M): Common carotid artery P (L): Common carotid artery	

S = superior; I = inferior, A = anterior; P = posterior, L = lateral; M = medial; SCM = sternocleidomastoid

TABLE II

TUMOUR–NODE–METASTASIS CLASSIFICATION OF REGIONAL NODES

N_x	Regional lymph nodes cannot be assessed
N_0	No regional lymph node metastases
N_1	Metastasis in a single ipsilateral lymph node 3 cm or less in greatest dimension
N_2	Metastasis in a single ipsilateral lymph node, more than 3 cm but not more than 6 cm in greatest dimension, or in multiple ipsilateral lymph nodes none more than 6 cm in greatest dimension, or in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension
N_{2a}	Metastasis in a single ipsilateral lymph node, more than 3 cm but not more than 6 cm in greatest dimension
N_{2b}	Metastasis in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension
N_{2c}	Metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension
N_3	Metastasis in a lymph node more than 6 cm in greatest dimension

Note: Midline nodes are considered to be ipsilateral nodes

TABLE III

CLASSIFICATION OF NECK DISSECTION TECHNIQUES

Radical neck dissection (RND)	Removal of levels I–V, accessory nerve, internal jugular vein and sternomastoid muscle
Modified radical neck dissection	Removal of levels I–V dissected; preservation of one or more of the accessory nerve, internal jugular vein or sternomastoid muscle (types I, II, III, respectively)
Selective neck dissection	Preservation of one or more levels of lymph nodes
Extended radical neck dissection	Removal of one or more additional lymphatic and/or non-lymphatic structures(s) relative to a RND, e.g. level VII, retropharyngeal lymph nodes, hypoglossal nerve

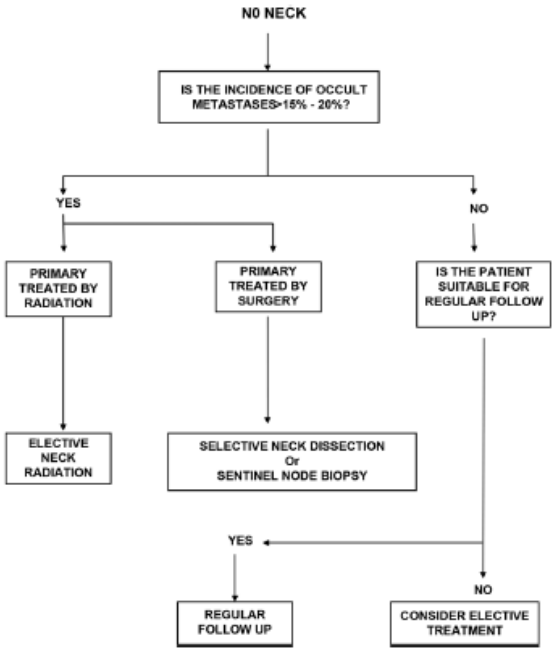


FIG. 1

Algorithm for management of the N0 neck.

TABLE IV

RECOMMENDED NECK LEVELS TO BE DISSECTED FOR OCCULT NECK DISEASE BASED ON PRIMARY SITE

Oral cavity	I–III including IIb
Oropharynx	I–III including IIb; recognise significant chance of contralateral disease
Supraglottis	IIa–III; IIb and IV can be spared. Contralateral SND not indicated for lateralised tumours
Glottis	IIa–III; IIb can be spared. Include IV for T3 and T4 primaries
Subgottis	II–IV, VI
Hypopharynx	II–IV

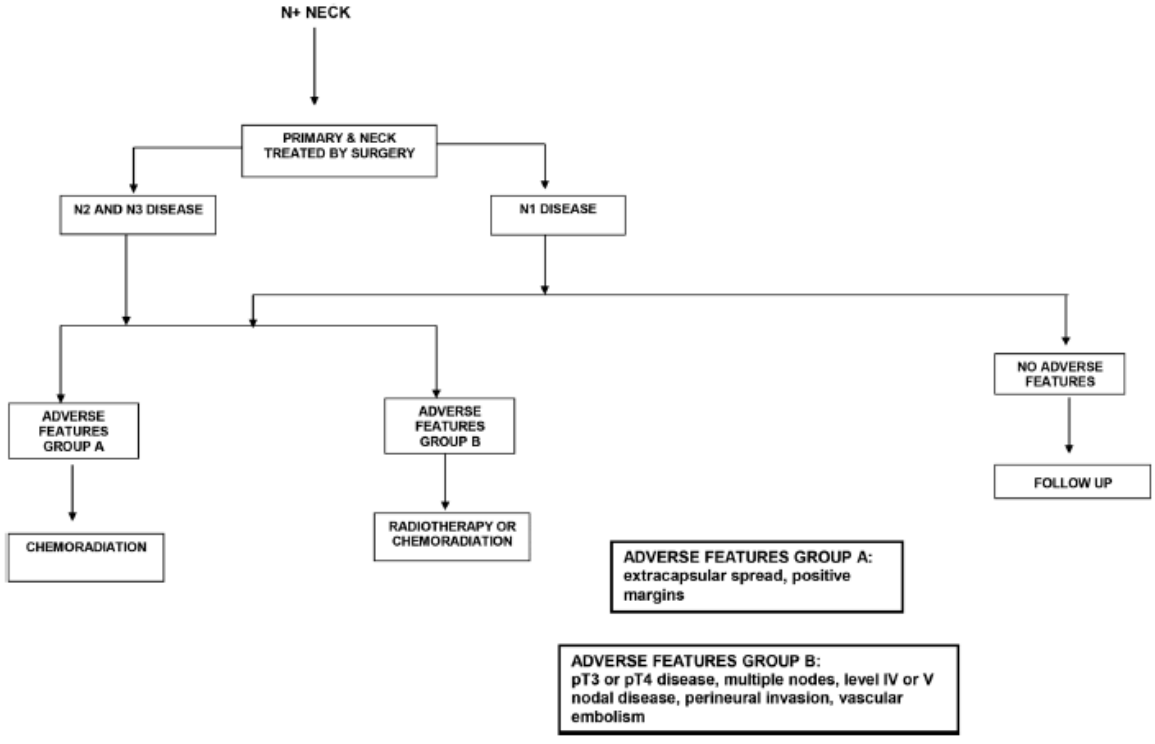


FIG. 2

Algorithm for management of the N+ neck when surgery is the primary modality.

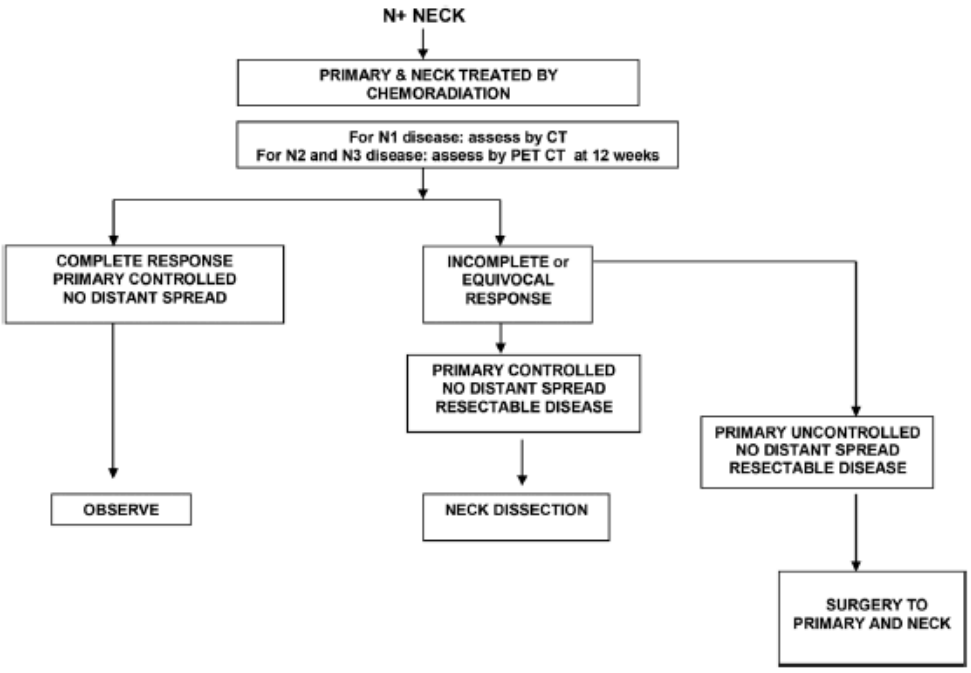


FIG. 3

Algorithm for management of the N+ neck when chemoradiation is the primary modality.

Investigation and management of the unknown primary with metastatic neck disease

Introduction:

An unknown primary is defined as a squamous cell carcinoma (SCC) presenting in a lymph node or nodes in the neck with no primary index site in the head and neck having been identified. The first echelon lymph node or nodes, which are involved in SCC can act as an indicator for the potential origin of the index primary are shown in the following Table.
It should be also noted that patients presenting with supraclavicular lymphadenopathy may represent a different clinical entity,[2] due to the potential for association with infraclavicular neoplasms, such as lung cancer.

FIRST ECHELON LYMPH NODES FOR VARIOUS PRIMARY SITES
Level 1 Oral cavity, oropharynx
Level 2 Oral cavity, oropharynx, larynx, nose, hypopharynx, parotid, nasopharynx
Level 3 Oral cavity, oropharynx, larynx, hypopharynx, thyroid, nasopharynx
Level 4 Larynx, thyroid, hypopharynx, oesophagus
Level 5 Nasopharynx, hypopharynx, thyroid, oropharynx
Level 6 Thyroid, larynx, hypopharynx, cervical oesophagus

Recommendations:

• All patients presenting with confirmed cervical lymph node metastatic squamous cell carcinoma and no apparent primary site should undergo:

Positron emission tomography-computed tomography whole-body scan. (R)

Panendoscopy and directed biopsies. (R)

Bilateral tonsillectomy. (R)

• Tongue base mucosectomy can be offered if facilities and expertise exist. (G)

The aim of the treatment of the majority of patients with a 'true' unknown primary tumour in the head and neck should be curative with the least morbidity to the upper aerodigestive tract possible.

Surgery on its own may be sufficient treatment for N1 necks demonstrating no extracapsular spread, but in all other scenarios, needs to be supplemented by adjuvant (chemo) radiation (Following Table).

For more advanced neck disease intensive combined treatment is required. This could be either a combination of neck dissection and RT or initial (chemo)-radiotherapy followed by planned neck dissection if a complete response is not evident on imaging. Both of these approaches appear to be equally effective. Of emerging significance is the question of HPV 16 and 18 positivity and the effect it has on treatment recommendations.

Given the apparent good clinical response to HPV-positive lymph nodes then the question arises as to the advisability of surgical clearance of the neck with or without adjuvant (chemo) radiotherapy or whether primary RT should be considered as the only treatment modality in this specific group.

TREATMENT RECOMMENDATIONS

Stage	Surgery	Radiotherapy	Chemotherapy
T0N1 (no ECS)	SND or MRND	No unless for mucosal sites	No
T0N1 (ECS)	SND or MRND	Yes – either involved lymph nodes or ipsilateral neck and boost to involved lymph nodes	Should be considered
T0N2a, N2b, N2c	SND or MRND± contralateral SND or MRND	Yes – ipsilateral but bilateral should be considered	Should be considered
T0N3	Radical or type I MRND	Yes – ipsilateral but bilateral should be considered	Should be considered

SND = selective neck dissection; MRND = modified radical neck dissection

ECS = extracapsular spread

Recommendations:

• Concomitant chemotherapy with radiation should be considered in patients with an unknown primary. (R)

• Concomitant chemotherapy with radiation should be offered to suitable patients in the post-operative setting, where indicated. (R)

• Neo-adjuvant chemotherapy can be used in gross ‘unresectable’ disease. (R)

• Patients should be followed up at least two months in the first two years and three to six months in the subsequent years. (G)

• Patients should be followed up to a minimum of five years with a prolonged follow up for selected patients. (G)

• Positron emission tomography–computed tomography scan at three to four months after treatment is a useful follow-up strategy for patients treated by chemoradiation therapy. (R)

SECTION THREE

Guidelines Tips

GUIDELINES TIPS

Nine Things Clinicians and Patients Should Question in Pediatric Otolaryngology

Canadian Society of Otolaryngology–Head & Neck Surgery
Pediatric Otolaryngology Subspecialty Interest Group

1. **Don't routinely order a plain film x-ray in the evaluation of pediatric nasal fractures.**

Nasal fractures are one of the most common facial fractures in the pediatric population. The decision to perform a closed reduction procedure in the operating room is based on factors such as breathing difficulty and external deformity, which are not assessed effectively by x-ray. Plain film x-rays are unable to accurately evaluate nasal fractures given its low sensitivity and specificity, at 72% and 73% respectively. Physical examination is often sufficient to make a diagnosis for children with displaced nasal fractures. Overall, x-rays do not add value to the diagnosis or treatment plan for children with nasal fractures and should not be ordered to avoid their associated costs and radiation exposure.

2. **Don't order imaging to distinguish acute bacterial sinusitis from an upper respiratory infection.**

Acute bacterial sinusitis (ABS) is a diagnosis that is made based on clinical criteria and has a low prevalence amongst children presenting with respiratory symptoms. Although a normal radiograph, CT, or MRI can help to rule out ABS, an abnormal result does not confirm the diagnosis. Given that many children will have abnormal imaging due to a viral upper

respiratory infection during certain times of the year, combined with the potential for exposure to radiation, routine imaging is not recommended. Instances in which imaging would be warranted include if the child is immunocompromised, or if orbital, central nervous system, or other suppurative complications are present.

The American Academy of Pediatrics recommends diagnosing pediatric ABS when (1) cough, nasal discharge or both are persistent for >10 days without improvement; (2) there is worsening or new onset of cough, nasal discharge, or fever; or (3) there is a severe onset, with a fever greater ≥39℃, concurrently with purulent nasal discharge for at least 3 consecutive days.

3. **Don't place tympanostomy tubes in most children for a single episode of uncomplicated otitis media with effusion of less than 3 months' duration.**

Although tympanostomy tube insertion can be associated with short-term quality of life improvements, the natural history of otitis media with effusion (OME) is sufficiently favorable and most OME in children will spontaneously resolve within 3 months. Cases of OME which last longer than 3 months are typically chronic in nature, and less likely to resolve without intervention. Limited data exists regarding the efficacy of tympanostomy tube insertion in children with OME for less than 3 months. By delaying the consideration for tympanostomy tube insertion, potentially unnecessary procedures are avoided, along with the associated risks, tube related side effects, and costs. Children excluded from this recommendation include those who have risk factors for developmental difficulties such as trisomy 21, Autism-spectrum disorder, blindness, and permanent hearing loss independent of OME.

4. **Don’t routinely prescribe intranasal/systemic steroids, antihistamines or decongestants for children with uncomplicated otitis media with effusion.**

In most cases, medical treatment using antihistamines, decongestants, systemic antibiotics, and steroids have shown little to no effect on the long-term outcomes of uncomplicated otitis media with effusion (OME) in children. Because of this, and the costs and potential side effects, it is not recommended to prescribe these medical treatments for children with uncomplicated OME. The exception to this would be for children with coexisting conditions in which these medications are indicated for primary management.

5. **Don’t prescribe oral antibiotics for children with uncomplicated tympanostomy tube otorrhea or uncomplicated acute otitis externa.**

The use of oral antibiotics where they are not necessary can promote antibiotic resistance and increase the risk of opportunistic infections. Topical antibiotics achieve higher concentrations in the ear canal, demonstrate improved patient satisfaction, are associated with fewer adverse events, and are shown to have equal efficacy for treatment of acute tympanostomy tube otorrhea (TTO) and acute otitis externa (AOE) when compared to oral antibiotics. For these reasons, topical antibiotics rather than oral antibiotics should be prescribed as first line treatment for acute uncomplicated TTO and uncomplicated AOE.

6. **Don’t prescribe codeine for post-tonsillectomy/adenoidectomy pain relief in children.**

Codeine has been associated with a high rate of adverse drug reactions in children. This includes life-threatening respiratory depression. Appropriate dosing of codeine is challenging due to the genetic heterogeneity amongst patients for the CYP2D6 enzyme, which is responsible for codeine metabolism. Genetic screening of CYP2D6 is not routinely performed and cannot reliably identify variations in codeine metabolism rates amongst patients. As such, children who are ultra-fast metabolizers of codeine are placed at increased risk of severe adverse drug reactions. Alternative analgesia should be used post-tonsillectomy/adenoidectomy.

7. **Don’t administer perioperative antibiotics for elective tonsillectomy in children.**

Administration of perioperative antibiotics for children undergoing tonsillectomy shows no significant benefits in regard to common post-tonsillectomy morbidities. Overuse of systemic antibiotics increases bacterial resistance and the risk of adverse drug events unnecessarily. These concerns outweigh the reduction in postoperative fever which is the only potential benefit of perioperative antibiotic administration for elective tonsillectomy. Therefore, perioperative antibiotics are not indicated for children undergoing elective tonsillectomy, unless specific indications are present (e.g., cardiac conditions or those with a peritonsillar abscess or acute infection).

8. **Don’t perform tonsillectomy for children with uncomplicated recurrent throat infections if there have been fewer than 7 episodes in the past year, 5 episodes in each of the past 2 years, or 3 episodes in each of the last 3 years.**

For children who have a lower number of recurrent throat infections, tonsillectomy has significantly less benefits when compared to those with more frequent infections, and many children with recurrent throat infections naturally improve without intervention. Therefore, where safely possible, avoidance of tonsillectomy for children with lower numbers of acute infections is recommended. This avoids unnecessary tonsillectomy and the costs and complications associated with the procedure (i.e., bleeding, pain, infection). If tonsillectomy is not indicated, children should be closely monitored and reconsidered for tonsillectomy if the infection frequency increases, as they would be less likely to naturally improve, and more likely to benefit from tonsillectomy. Families should be counselled on the limited benefits and potential harms of performing tonsillectomy for children and adolescents with low rates of recurrent throat infections. Shared decision making is of importance when considering tonsillectomy as individual patient and family factors can impact the decision.

9. **Don’t perform endoscopic sinus surgery for uncomplicated pediatric chronic rhinosinusitis prior to failure of maximal medical therapy and adenoidectomy.**

While endoscopic sinus surgery (ESS) has been found to be an effective therapy in children with chronic rhinosinusitis, comparable outcomes can be achieved with medical therapy and adenoidectomy. A stepwise approach of medical therapy, progressing to adenoidectomy, then to ESS allows children to be treated with a less invasive and more cost-effective interventions as initial therapy, while saving ESS for those who are

refractory to primary interventions. Maximal medical therapy should be exhausted prior to surgical intervention for uncomplicated patients. In cases with complications such as orbital or skull base involvement, ESS can be employed more readily.

Five Things Physicians and Patients Should Question in Otolaryngology - Rhinology

Canadian Society of Otolaryngology - Head & Neck Surgery
Rhinology Subspecialty Group

1. **Don't prescribe antibiotics to patients with acute sinusitis who do not meet the diagnostic criteria for acute bacterial rhinosinusitis.**

The prevalence of a bacterial infection during acute rhinosinusitis is estimated to be 2%–10%, whereas viral causes account for 90%–98%. Management of viral rhinosinusitis is primarily focused on symptomatic relief, which may include use of intranasal corticosteroids, analgesics, nasal saline rinses, oral or topical decongestants, and mucolytics. Antibiotics are ineffective for viral illness and do not provide direct symptom relief. Despite this, 82% of Canadian patients diagnosed with acute sinusitis received a prescription for antibiotics. Differentiating viral rhinosinusitis from acute bacterial rhinosinusitis (ABRS) is challenging because the symptoms are overlapping but is critical to avoid inappropriate antibiotic prescriptions.

The "**PODS**" clinical criteria suggest ABRS with two or more of facial **P**ain/pressure/fullness, nasal **O**bstruction, nasal purulence/discolored postnasal **D**ischarge, decreased/absent **S**mell that persist for more than 7-10 days (*Canadian Clinical Practice Guidelines for Acute and Chronic Rhinosinusitis* for full details). A bacterial infection is

so unlikely prior to this timeframe that antibiotics generally should be avoided unless symptoms have persisted for at least 7 days.

In patients who meet the criteria for ABRS with mild or moderate symptoms, intranasal corticosteroids alone are often sufficient. Antibiotics can be considered for patients with severe symptoms or those who fail a 72-hour trial of intranasal corticosteroids after the diagnosis of ABRS* has been made.

2. Don’t order a CT scan for uncomplicated acute rhinosinusitis

Radiographic imaging for patients presenting with uncomplicated acute rhinosinusitis to distinguish acute bacterial rhinosinusitis (ABRS) from viral rhinosinusitis is not recommended unless a complication or alternative diagnosis is suspected. A sinus CT scan is a highly sensitive test for rhinosinusitis, and a normal study confidently rules out active sinusitis of any etiology. However, abnormal sinus CT imaging findings, including air-fluid levels, mucosal thickening, and complete sinus opacification, are nonspecific and can be seen with both bacterial and viral sinusitis, as well as in up to 42% of asymptomatic healthy individuals. In a prospective study of healthy young adults experiencing a new cold, CT scans showed that 87% of the subjects had significant abnormalities of their maxillary sinuses. Therefore, in acute rhinosinusitis, a CT scan has minimal utility because its findings are not specific to a diagnosis of acute rhinosinusitis and does not help guide the need for antibiotics since it cannot reliably distinguish viral from bacterial rhinosinusitis. Consider CT imaging of the sinuses when a complication of ABRS is suspected based on severe headache, altered mental status, facial swelling, cranial nerve palsies, proptosis of the eye, or other clinical findings.

3. Don’t order plain film sinus x-rays

Plain film x-rays of the sinuses should not be ordered in the work-up of sinusitis. Plain films have poor sensitivity and specificity, and they cannot be relied upon to confirm or reject the diagnosis of either acute or chronic sinusitis. Findings such as air-fluid levels and complete sinus opacification are not reliably present in rhinosinusitis and cannot differentiate between viral and bacterial etiologies. The complicated anatomy of the ethmoid sinuses and critical sinus drainage pathways are not delineated effectively with plain films and are inadequate for operative planning. Given that the findings of a sinus x-ray cannot be relied upon to diagnose rhinosinusitis, guide antibiotic prescribing, or plan surgery, they do not provide value in patient care and should be avoided.

4. Don’t swab the nasal cavity as part of the work up for rhinosinusitis

Acute bacterial rhinosinusitis is a clinical diagnosis that does not require proof of a culture-identified pathogen. When patients meet criteria for uncomplicated ABRS, empiric antibiotic selection should be based on typical causative pathogens (i.e. Streptococcus pneumoniae, Hemophilus influenza, Moraxella catarrhalis, and Staphylococcus aureus), local bacterial resistance patterns, and patient factors. Nasal swabs are contaminated by normal nasal flora and results correlate poorly with causative pathogens in rhinosinusitis. In many hospitals, a nasal swab will only be processed to report on the presence or absence of S. aureus, rather than a full culture for speciation. In situations where cultures are required, such as intraorbital or intracranial complications, endoscopically-guided culture of the middle meatus or a maxillary sinus aspirate are the preferred methods for obtaining samples of the causative pathogen.

5. **Don’t order a plain film X-ray in the evaluation of nasal fractures**

Plain film x-rays should not be ordered as part of the management of nasal fractures. The decision to reduce a nasal fracture depends on numerous factors including patient preference, external deformity, and breathing difficulty, none of which are effectively assessed by an x-ray. They have a very low sensitivity and specificity, with 63.3% and 55.7% respectively. As such, plain x-rays are unable to accurately diagnose occult fractures. Despite being commonly ordered for medicolegal documentation of nasal fractures, the poor sensitivity and specificity brings into question their value in medicolegal proceedings. In studied cohorts, no unsuspected facial fractures were identified solely on nasal x-rays, and no negative effects on management occurred when an institution instituted a “no nasal x-ray policy”. Overall, nasal x-rays do not contribute to diagnosis, documentation, or management decisions, and should not be ordered.

Three Things Physicians and Patients Should Question in Otolaryngology - Head and Neck Surgery

Canadian Society of Otolaryngology - Head & Neck Surgery
Canadian Association of Head and Neck Surgical Oncologists

1. **Don't order imaging - computer tomography (CT) or magnetic resonance imaging (MRI) - as the initial investigation for patients presenting with a chief complaint of hoarseness.**

Many patients presenting with hoarseness do not have an underlying head and neck malignancy. Hence, ordering imaging initially does not help to make a diagnosis. Persistent hoarseness, lasting greater than 6

weeks, can be one of the first signs of malignancy of the larynx or voice box. This is particularly true in current or ex-smokers and individuals with a current or previous history of alcohol abuse. Laryngoscopy as part of a thorough physical examination is the best initial investigation of persistent hoarseness. If the laryngoscopy demonstrates a vocal cord paralysis or a mass/lesion of the larynx, imaging to further evaluate is evidence-based

2. **Don't perform open biopsy or excision of a neck mass without having first considered a fine needle aspiration (FNA) biopsy.**

A fine needle aspiration biopsy (FNA) is the gold standard for initial work up for a neck mass and has numerous advantages over an open neck biopsy. FNA holds less risk and avoids the chance of seeding cancer cells in the neck and making subsequent treatment of a confirmed malignancy more challenging. It is also inexpensive, quickly obtained without a general anaesthetic, and can be performed with or without the use of imaging to assist with the placement of the needle depending on the location of the neck mass, particularly if it is partially cystic or near vital structures. Open neck biopsies should only be considered for a neck mass if the result of a FNA biopsy is non-diagnostic and no primary carcinoma is identified upon a complete head and neck examination. If there is a strong suspicion of lymphoma (previous history of lymphoma, night sweats, weight loss, wide spread lymphadenopathy) an open or core biopsy can be considered in lieu of a FNA.

3. **Don't order neck ultrasound to investigate odynophagia (discomfort or pain with swallowing) or globus sensation.**

Odynophagia and globus sensation are common symptoms and the differential diagnosis can be extensive, including inflammatory,

infectious, neoplastic, autoimmune and traumatic causes. Odynophagia and globus sensation are infrequently due to an underlying neck mass, and if so, the underlying lesion is usually quite apparent on physical examination. Neck or thyroid ultrasonography ordered to investigate patients with odynophagia and globus sensation are more likely to detect other entities such as benign thyroid nodules, rather than confirming a diagnosis that explains the patient's symptoms and can lead to a cascade of other unnecessary tests that can be harmful to patients. Unfortunately, using tests to exclude conditions, can sometimes identify other diseases such as thyroid nodules, leading to further testing such as a FNA or repeat ultrasounds and in some cases treatment in the form of a thyroidectomy that may be unnecessary or harmful to patients.

Five Things Physicians and Patients Should Question in Otolaryngology - Otology/Neurotology

Canadian Society of Otolaryngology - Head & Neck Surgery

1. **Don't order specialized audiometric and vestibular neurodiagnostic tests in an attempt to screen for peripheral vestibular disease.**

The diagnosis of the dizzy patient should be guided by the presenting symptoms and office examination. Tests such as ABR (auditory brainstem response), ECOG (electrocochleography), ENG/VNG (electronystagmography/ videonystagmography), VEMP (vestibular evoked myogenic potential), vHIT (video head impulse test), CDP (computerized dynamic posturography) and RCT (rotational chair testing) should only be ordered if clinically indicated. In general, advanced balance tests should be ordered and interpreted by otolaryngologists with specialized training in the diagnosis and

treatment of vestibular disorders (otologists/neurotologists). Clinical indications for testing can include: side localization and stage of progression for Meniere's disease, assessment of central compensation for acute vestibular loss and confirmation of superior semicircular canal dehiscence syndrome. Specialized tests are rarely indicated in the management of benign paroxysmal positional vertigo.

2. **Don't perform computed tomography or blood work in the evaluation of a patient with sudden sensorineural hearing loss (SSNHL) given its presumed viral etiology.**

Blood work which typically would consist of a CBC, differential and electrolytes along with an autoimmune panel are often normal and would not change initial clinical management if abnormal. The CT scan which is done to rule out central causes is not sensitive enough to pick up most cases of retrocochlear pathology. MRI scans should be considered instead. If verified to be sensorineural with audiometric testing, urgent treatment with steroid therapy can be initiated. There is no role for antiviral treatment, thrombolytics or vasoactive substances.

3. **Don't perform auditory brainstem responses (ABR) in patients with asymmetrical hearing loss. Asymmetrical hearing loss is defined as bone conduction threshold difference of: (a) 20 dB threshold difference at a single frequency, (b) 15 dB threshold difference at 2 frequencies, (c) 10 db threshold difference at 3 frequencies.**

If there is no obvious cause of the asymmetry such as unilateral trauma or unilateral noise exposure like gun blasts, a MRI should be ordered. MRI scans are superior in sensitivity for detecting retrocochlear pathologies such as vestibular schwannoma when compared to ABR testing.

SECTION FOUR

Audiology

Newborn Hearing Screening

Joint Committee on Infant Hearing (JCIH) and Washington State Department of Health

It is recommended that all infants be screened for hearing loss prior to 1 month of age according to the following protocol. The purpose of a screening test is to identify those infants at risk for hearing loss who need further testing. A screening test is not a diagnosis.

1. Initial Hearing Screening

- The initial screening should be performed using Evoked Otoacoustic Emissions (EOAE, OAE, TEOAE, DPOAE), Auditory Brainstem Response (ABR, AABR, BAER, ABAER), or a combination of both.

- The initial screening should be performed as close to discharge as possible, preferably 12 hours or more after birth. The screening may be performed sooner if needed; however, a higher referral rate may occur due to residual birthing debris in the ear canal.

- Both ears should be screened individually.

- The initial screening should consist of 2 attempts maximum on each ear.

- It is recommended but not required that an infant be referred for a rescreening (step 2) if s/he does not pass the initial screening or results cannot be obtained in one or both ears. (If a second screening is not utilized, then a referral to diagnostic evaluation is appropriate. Skip to step 3.)

2. Re-screening

- The re-screening should be performed using Evoked Otoacoustic Emissions (EOAE, OAE, TEOAE, DPOAE), Auditory Brainstem Response (ABR, AABR, BAER, ABAER) or a combination of both measures.
- It is recommended that the re-screening be performed after discharge. The re-screening should occur prior to 1 month of age.
- Both ears should be screened individually.
- The re-screening should consist of 2 attempts maximum on each ear at the time of screening.
- If an infant does not pass the re-screening or if results cannot be obtained in one or both ears, s/he shall be referred for diagnostic audiological evaluation.

3. Referrals for Diagnostic Audiological Evaluation

- An infant should be referred for a diagnostic audiological evaluation after failure to pass a maximum of 2 hearing screenings.
- The diagnostic evaluations should be performed by an audiologist trained in infant diagnostic audiological evaluation
- The referral for diagnostic evaluation should be coordinated by the infant's primary care physician.
- The diagnostic evaluation should occur prior to 3 months of age.

4. Documentation and Communication of Screening Results

- Screening results should be recorded in the infant's medical record.

- Screening results should be communicated to the parents of the infant verbally and in writing.

- Screening results should be communicated to the infant's primary care physician in writing.

- Screening results should be reported to the Department of health per stated protocol.

- Families should be provided with information about the hearing screening, risk factors for hearing loss, normal language development and resources for more information.

- Families of infants who refer on the hearing screening will be provided with information about why their baby may not have passed the hearing screening, the importance of follow-up, and how to schedule a diagnostic audiology appointment.

- Parents will be provided with information in their native language or preferred communication mode.

5. Quality Assurance

- A referral rate no higher than 8% for the initial screening should be maintained within 3 months of program initiation.

- If a re-screening prior to discharge is utilized, a referral rate no higher than 4% should be maintained within 3 months of program initiation.

- Within 6 months of program initiation a minimum of 95% of infants should be screened prior to discharge or before 1 month of age.

- A tracking system should be in place to monitor referral rates and follow-up on those infants referred for a re-screening or diagnostic evaluation.

• Free technical assistance in newborn hearing screening program planning and development can be obtained from Children's Hospital & Regional Medical Center Newborn Hearing Screening Project

Team.

6. Screener Requirements

• Screeners should have adequate skills in soothing and calming newborns.

• Screeners should be trained by an audiologist or by a similarly trained individual in screening techniques.

• Screeners should be trained in sensitive communication of screening results. It is recommended to laminate examples of proper terminology and language and keep with screening equipment for

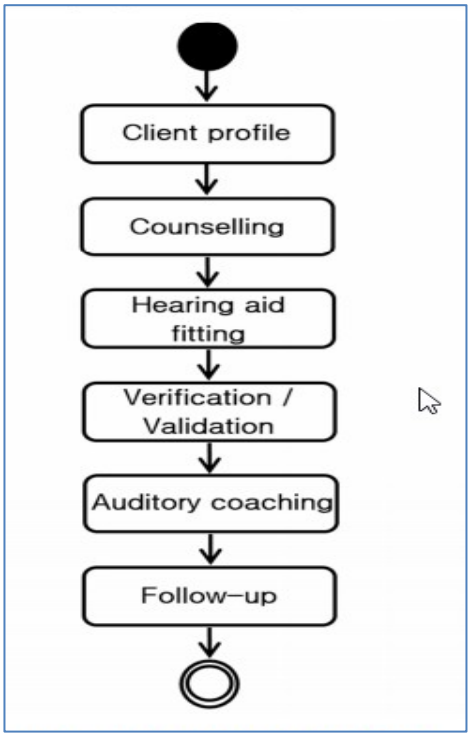
screeners to reference.

• Screeners should be equipped to handle parent questions and know where to refer if unable to answer questions.

Guidelines for Hearing Aid Selection, Fitting and Verification

Aim:

1. Client profile: general assessment and Comprehensive audiological assessment.
2. Treatment planning
3. Hearing aid selection.
4. Verification.
5. Haring aid orientation.
6. Validation.



Client profile:

1. **General assessment:**
   a. Self-reported type, degree, and history of the hearing impairment.
   b. Communication and hearingchallenges, social consequences.
   c. Relevant living conditions, and the need for assistive listening devices, hearing expectations and individualhearing situations.
   d. Relevant medical history including allergies and medication.
   e. Finemotor skill, visual capabilities, or other challenges.
   f. Tinnitus, dizziness and hyperacusis.
   g. Previous use of hearing aid and other assistive devices.

2. **Comprehensive audiologic assessment.**
   a. Audiological assessment:
      - A comprehensive case history.
      - Otoscopic inspection.
      - Pure tone audiometry: Identification of type and extent of hearing loss
      - Other audiometric tests:
        1. Subjective audiometric procedures like uncomfortable loudness level (UCL) at relevant frequencies, most comfortable loudness

(MCL), comfortable speech level (CSL), acceptable noise level (ANL), loudness scaling.

2. Objective audiometric procedures like tympanometry, ABR, OAE etc.

b. Determination of candidacy and motivation for audiologic rehabilitation.

c. Determination of need for medical/ surgical treatment and/or referral to a licensed physician

d. Speech discrimination: The speech signal may be presented monaurally through earphones or binaurally in a sound field. Speech presented in a background of competing noise may be used.

e. Counseling: Provision of audiometric results and recommendations through appropriate client and family/caregiver counseling.

This documentation should be organized and reported in a manner that allows for later retrieval and easy communication of information to the client other audiologists, and professionals

f. Candidacy and Rehabilitation Assessment

- Determine from the patient's point of view the effects of the impairment at both the personal activity level and/or social role level.

1. Communication Profile of Hearing Impaired (CPHI; Demorest & Erdman, 1986; Walden, Demorest, & Hepler, 1984),
2. Hearing Performance Inventory (HPI; Giolas, Owens, Lamb, & Schubert, 1979), the
3. Handicap Inventory for the Elderly (HHIE; Ventry & Weinstein, 1982; Weinstein, Spritzer, & Ventry, 1986),
4. Hearing Handicap Inventory for Adults (HHIA, Newman, Weinstein, Jacobson, & Hug, 1990).

- Some tools are specifically designed for evaluating function both with and without amplification, such as:

1. Abbreviated Profile of Hearing Aid Benefit (APHAB; Cox & Alexander, 1995) and the
2. Client Oriented Scale of Improvement (COSI; Dillon, James, & Ginis, 1997).

- In addition to assessing the impact of an auditory impairment on the everyday listening situation, additional information regarding the client’s unique circumstances should be considered before designing a treatment program.

- General areas requiring consideration (Lesner & Kricos, 1995) include the client's physical status (craniofacial status, general health, visual status, manual dexterity), psychological status (cognitive and mental status, motivation, attitude), sociological status (employment, social and physical environments), and communication status (auditory speech perception, auditory-visual speech perception, conversational fluency).

Treatment planning:

a. Findings are revised by the audiologist, client, and family/caregivers need to identify areas of difficulty and need.
b. Specify goals of intervention.
c. The sequencing of rehabilitative strategies is established, including when and how benefit derived from treatment is to be evaluated.
d. The fitting of hearing aids will be incorporated as an early component of the management plan.
e. Before initiating the fitting of hearing aids, it is important for the client and family/ caregiver to develop a realistic understanding of the potential benefits, limitations, and costs associated with procuring amplification.

Hearing aid selection:

a. Electroacoustic Characteristics:
   - Decisions is made on frequency-gain characteristics, maximum output sound pressure level (OSPL90), and input-output characteristics.
   - When the hearing aid fitting is binaural, the prescribed gain for each ear should be reduced by 3–6 dB to compensate for binaural summation
   - The hearing loss is conductive or mixed, the prescribed gain for each ear needs to be increased by approximately 20–25% of the air-bone gap
   - Output Sound Pressure Level With a 90 dB Input (OSPL90). The maximum output of the hearing aid in the 2 cm3 coupler (OSPL90) should not exceed the targets developed from the TD made during the assessment stage.
   - If suprathreshold loudness measurements are not available, then the desired OSPL90 should be calculated using a predictive method
   - Custom corrections based on the individual's real-ear coupler difference (RECD) may be used for deriving the 2 cm3 coupler target values for OSPL90.
   - Input-Output Characteristics:

1. For hearing aids with linear signal processing, the calculation of the desired frequency/gain characteristics and OSPL90 explicitly defines the input-output characteristics; that is, for a10 dB change in the input there is a corresponding 10 dB change in the output until the maximum output is reached.
2. In nonlinear signal processing it is necessary to define the desired static compression characteristics (compression threshold and ratio) or gain for multiple inputs in one or multiple frequency bands.

b. Non electroacoustic Characteristics

- Decisions about the non-electroacoustic characteristics of the hearing aid (style, features, options, etc.) should be based on the management plan/needs assessment and the ongoing interaction with the client. Specifically, these factors should be considered:
    a. Binaural or monaural fitting.
    b. Hearing aid style (e.g., BTE, ITE, ITC, or CIC).
    c. Earmold/shell selection and configuration.
    d. Number and size of user controls.
    e. Directional/multiple microphones.
    f. Volume control preference (yes/no, raised, screw-set, etc.).
    g. Telecoil and telecoil sensitivity.
    h. Compatibility with assistive listening devices, personal FM systems (ASHA, 1994a) and direct audio input.
    i. Programmable options.
    j. Remote control.
    k. Multiple memories.
    l. Color/shape of hearing aid.
    m. Additional system features

Verification:

a. Quality Control: Electroacoustic measurements should be performed according to the ANSI-S3.22 (ANSI S3.22-1996b or current standard) to

determine whether the hearing aids meet their intended design parameters.

b. Physical Fit: The physical fit of the earmolds or hearing aids should be determined by assessing cosmetic appeal, physical comfort, absence of feedback, ease of insertion and removal, security of fit, microphone(s) location, and ease of hearing aid control operation.
c. Performance: real-ear measures, when applicable, as the primary method of verifying the performance of hearing aids

Hearing aid orientation:

a. Hearing Aid Use and Care: All individuals fitted with hearing aids should receive appropriate training, counseling, and referrals during a trial period
    - Battery management/safety
    - Instrument features and landmarks
    - Use and routine maintenance
    - Working knowledge of hearing aid components
        1. Assistive listening device coupling
        2. Telephone use
        3. Storage
        4. Usage patterns/adjustment
    - Insertion and removal of instruments
b. Expectations for Performance:
    - Appropriately fit amplification systems should be free from unwanted feedback.
    - In addition, the audiologist should strive to minimize the occlusion effect by appropriate venting, tone control adjustment, and/or insertion depth modification.
    - Hearing in noise may continue to be problematic for the user; improved hearing typically means hearing more noise.
    - The user can realistically expect:
        1. Some degree of visibility (from any style of hearing aid)
        2. Physical comfort
        3. Improved, but not perfect, communication
        4. More benefit in quiet than noise

Validation:

Validation measures are necessary to determine the impact of the intervention. A number of tools have been suggested to be administered during the trial period, including the

a. Abbreviated Profile of Hearing Aid Benefit (APHAB); Cox & Alexander, 1995) as a measure of disability.
b. Hearing Handicap Inventory for Adults
c. Hearing Handicap Inventory for the Elderly
d. The Client Oriented Scale of Improvement (COSI).
e. Measures of speech perception can be obtained using either objective or subjective methods. A number of speech tests are available and can be used to assess aided versus unaided speech perception ability.
    - The audiologist needs to consider stimulus (phonemes, nonsense syllables, words, and sentences), presentation level(s), noise type, and signal-to-noise ratio.
    - Equally important is allowing sufficient time to test with enough items to get an accurate assessment.
    - Alternately, an estimation of aided audibility can be obtained

Follow-up:

a. Periodic verification/validation of technical and auditory aspects and further support to optimize hearing aid system benefit.
b. Follow-up visits shall also be scheduled when clients experience situations where the hearing system is not performing as expected.

Guidelines for CI program

Aim:

1. Provide optimal care to patients, and provide positive measurable outcomes, cochlear implantation
2. Determining candidacy for cochlear implantation

1. Optimal care to CI patient:

a. Facilities

Cochlear implant programs should have facilities available to conduct the following:

1. Pure tone audiometry
2. Sound field audiometry
3. Tympanometry
4. Otoacoustic emissions
5. Evoked response audiometry
6. Hearing aid testing (probe tube measures and/or aided thresholds) and hearing aid fitting
7. Speech perception testing
    a. In quiet
    b. In noise
8. Access to balance function testing
9. Access to MRI/CT or X-ray imaging

All audiological equipment must be calibrated annually to ANSI Standards.

b. The Cochlear Implant Device

- There are different manufacturers currently supplying cochlear implants in Egypt.
- Information regarding the technical specifications of these different devices should be made available to patients.

c. Timing of Cochlear Implantation

- Pediatrics: according to FDA, less than 2 years (9-24 months)
- Adults: Once cochlear implant candidates are assessed as suitable, they are put on a waiting list.
- Urgent implantation is required in severe to profound hearing losses caused by specific diseases, e.g.Meningitis

d. Pre-operative work up:

i. History:

1. Clinical history
2. Full Audiological history, including Hearing Aid / Amplification history
3. Most recent audiograms

ii. Pre-operative assessment

- <u>Otolaryngology:</u>
  - Preoperative counseling (setting expectations).
  - Explanation and demonstration of the used device.
  - Otological history of the patient.

- Family history and associated medical conditions.
- Radiological evaluation of the temporal bone and auditory nerve is performed with a combination of CT scan and MRI.

- Audiology: The audiological assessment must include:
  - Preoperative counseling (setting expectations).
  - Otoscopic examination.
  - Detection of unaided and aided hearing thresholds and speech discrimination bilaterally using pure tone audiometry and speech audiometry.
  - Assessment of middle ear function using tympanometry.
  - Hearing Aid Evaluation: Patients fitted with hearing aids requires access to a structured program of auditory rehabilitation for a period that may extend to several months (3-6 months).
  - Aided Speech perception testing in quiet and where possible, in noise with optimally fitted hearing aids
  - Assessment of higher centers function and exclusion of retro-cochlear lesion (e.g. ANSD) is done using the appropriate electrically evoked response audiometry and/ or otoacoustic emissions.

- Speech Pathology:
  - Overview of the patient's mode of communication, verbal, non-verbal or total communication. Lip reading skills.

- Assessment of the expressive and receptive language skills.
- Assessment of language skills in all communication modes.
- Assessment of comprehension of spoken language.
- Intelligibility, voice and speech sound system

- Psychology:
  - Assessment of the candidate's mental health, learning ability, personality and motivation, adaptation to their deafness, or unrealistic expectations about cochlear implantation.
  - Family members supporting the client may require a counseling session with the psychologist.
  - Exclusion or documentation of other handicaps (subnormal mentality autism, ADHD or else..)
- Other Services and Agencies:
  - The cochlear implant team members should meet on a regular basis to ensure effective communication thereby and ensure a quality service for each patient.
  - Contact must be maintained with the referring agent and local professionals.
  - The cochlear implant program should liaise as appropriate with other agencies including the following:
    - Other hospital departments.

- Audiology, radiology, medical physics, wards, ambulatory care etc.
- Social services.
- Local/national support groups.
- Community services.
- Educational services

- Contact with support services should only be made with the permission of the patient and at the discretion of the cochlear implant team.
- If the outcome of the assessment demonstrates that the patient would not benefit from a cochlear implant, the report to the referring agent will include:
  - Possible reasons.
  - Recommendations for future management, and referral for other equipment and /or services for deafened patient if appropriate.

2. Determining candidacy for cochlear implantation: FDA criteria

a. Adults:

1. Bilateral postlingual sensorineural hearing loss with pure tone audiometry hearing threshold ≤ 70 dB HL (average 500-4000 Hz) and speech recognition ability for the intensity of the stimulus 65 dB of ≤ 50% of words in the ear to be implanted or ≤ 60% in the binaural best-aided condition.

2. For electroacoustic stimulation: Bilateral profound hearing loss for high frequency with good hearing for low frequency, in the absence of the benefits of hearing aids (unilateral aided word scores ≤ 60%).

3. Some cases of asymmetric or unilateral hearing loss with intensive tinnitus in the deaf ear.

b. Pediatric:

1. Children under 2 years (9 to 24 months) of age to have profound (>90 dB HL) bilateral SNHL with little to no benefit with appropriately fitted hearing aids.

2. Children 2 to 17 to have severe-to-profound bilateral SNHL with little to no benefit with appropriately fitted hearing aids.

3. Children 5 years and older who have SSD or asymmetric hearing loss with extremely poor word recognition (< 5%) in the affected ear.

4. Cochlear anomalies, ossification, cochlear nerve deficiency and cognitive or developmental delay should not be viewed as an absolute contraindication for CI in children each case is management individually.

5.

Consent

Adult patient or care giver of the child should sign a consent form to indicate that they have been fully informed of the cochlear implant procedure and expectations in terms of outcomes and risks involved.