


Ear, Nose, and Throat Assessment in Children


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Disclosure Agreement:
We have no relevant financial or non-financial relationships to disclose.

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Overview

- I. **Nose and Sinus Assessment**
 - a. Anatomy of the Nose and Sinus Cavities
 - b. Common Diagnoses of the Nose and Sinuses
- II. **Mouth and Throat Assessment**
 - a. Anatomy of the Mouth and Throat
 - b. Common diagnoses of the Mouth and Throat
- III. **Ear Assessment**
 - a. Anatomy of the Ear
 - b. Common Diagnoses of the Ear
- IV. **Hearing loss**
 - a. Conductive vs. sensorineural
 - b. Music-induced hearing loss
 - c. Treatment



Nasal Anatomy

The nose serves as an entrance to the respiratory system; acting to filter, warm, and moisten inhaled air.

Normal Anatomy

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Common Diagnoses of the Nose and Sinuses

- Rhinitis
 - allergic and non-allergic
- Epistaxis
- Nasal fracture
- Foreign body in the nasal cavity
- Sinusitis

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Rhinitis

Irritation and inflammation of the nasal mucous membrane.

One or more of these symptoms present:

- Sneezing
- Rhinorrhea (anterior and/or posterior)
- Nasal congestion
- Nasal itching

Nonallergic Rhinitis

NONALLERGIC RHINITIS IS AN INFLAMMATION OF THE LINING OF THE NOSE DUE TO BACTERIAL AND VIRAL INFECTION OR SECONDARY TO IRRITANTS.

Treatment is geared towards the underlying cause.

Persistent rhinitis may lead to nasal polyps, sinusitis, ear infections, and upper respiratory infections.


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Allergic Rhinitis

- Present in 40 percent of children
- Symptoms:
 - "Allergic shiners"
 - "Allergic salute"
 - nasal itching/rubbing helps distinguish allergic rhinitis from most other forms
 - Watery rhinorrhea
 - Nasal congestion
 - Sneezing
 - Allergic conjunctivitis
 - 70 percent of cases
 - red, itchy, watery eyes

Common allergens

- Seasonal rhinitis
 - tree, grass, weed pollens, outdoor molds
- Perennial rhinitis
 - indoor allergens
 - house dust mites, cockroaches, allergens from household fur bearing pets, rodents, and fungi

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Allergic Rhinitis

"Allergic shiners"



"Allergic salute"





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Allergic Rhinitis

Normal Nasal Anatomy
Septum, turbinates



Allergic Rhinitis
Nasal mucosa classically appears edematous and pale



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Non-allergic Rhinitis


- Chronic presence of one or more of the following:
 - nasal congestion
 - rhinorrhea
 - postnasal drainage
- Diagnosis of exclusion
 - rule out immune deficiency, infectious diseases, structural abnormalities, etc.
- Nasal mucosa is usually normal in color

Clinically distinguished from allergic rhinitis by the following:

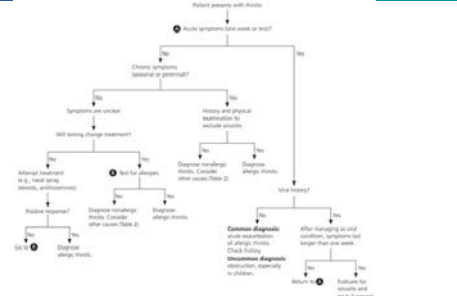

- Onset at a later age
- Absence of nasal/ocular itching and prominent sneezing
- Nasal congestion and postnasal drainage are prominent symptoms
- Symptoms are perennial

Typical triggers:

- irritant odors and strong fragrances (tobacco smoke, perfumes, diesel and car exhaust, cleaning products, newsprint)
- changes in temperature
- alcoholic beverages



Rhinitis Algorithm

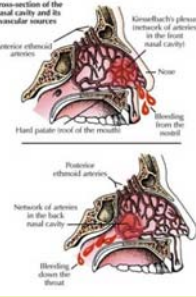



Epistaxis


Epistaxis (nosebleeds) occurs when the membranes and vessels of the nasal cavity are irritated.

CAUSES:

- Dry air, nose picking, colds, allergies, hard nose blowing, injury, high altitude, dry heat and various other irritants.
- Less common: Tumors (Juvenile nasopharyngeal angiofibroma)




Anterior vs. posterior bleed



Epistaxis

MANAGEMENT:

1. Have the child sit up and lean forward
2. Pinch the nose firmly just below the nasal bones
 - 5 minutes for children
 - 10-15 minutes for teenagers/adults
3. Repeat step 2 if bleeding continues
4. Afrin administration
5. If all above measures fail → **Emergency room**



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Epistaxis

PREVENTION:

- Warm or cool mist humidifier at night
- OTC nasal saline spray
- Nasal ointments
- Gentle nose blowing
- No nose picking, trim nails
- Avoid rough play and contact sports
- Avoid NSAIDS with severe bleeding
- Do not put tissues, gauze, cotton, tampons etc. in nose

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Nasal Fracture



*Nasal fractures affect both the bones and cartilage of the nose.
Approximately 40% of all facial injuries each year.*

SYMPTOMS:

- Nose pain
- Swelling of the nose and face
- Crooked or bent appearance of the nose
- Possible nosebleed
- Nasal obstruction
- Bruised or blackened eyes

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Nasal Fracture


MANAGEMENT PRIOR TO CONSULT:

- Elevate nose, chin up
- Gently apply ice (cool gauze)
- Tylenol PRN pain (avoid motrin with bleeding)
- Call PCP or ORL for evaluation
 - ORL exam needs to be within 5-7 days d/t swelling
 - Closed reduction in clinic vs. in OR

Emergency room evaluation if:

- severe trauma/facial lacerations
- clear drainage from nares; concern for skull fracture/CSF leak
- excessive bleeding
- concern for septal hematoma →




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Foreign Body in Nasal Cavity

The most common objects:
food material, paper, small toys, beads, and rocks.


SYMPTOMS:

- Unilateral nasal drainage
- Pain in, or trouble breathing from, the affected side of the nose
- Anterior/posterior epistaxis
- Foul odor from the nose
- Infection



Emergency room evaluation if:

- 1) The object moves to the back of the throat causing choking or respiratory distress
- 2) Object contains chemicals (i.e. batteries)


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Foreign Body in Nasal Cavity



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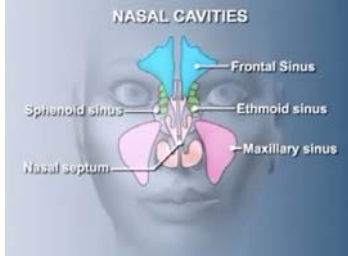
Foreign Body in Nasal Cavity



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Sinus Anatomy

Sinuses: a series of connected hollow cavities within the skull



Four sets of sinus cavities:

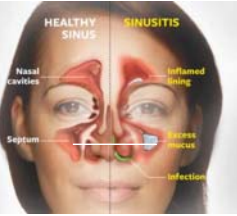
- maxillary sinuses
- ethmoid sinuses
- sphenoid sinuses
- frontal sinuses

Purpose:

- humidify and heat entering air
- cushion the skull in case of injury
- to enhance our voices

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Sinusitis



Definition:

- The inflammation of the mucosal lining of sinuses
- Infections cause the normally air-filled sacs to become filled with excess infected mucous
 - Bacterial, viral, fungal
 - Acute, chronic

Symptoms:

- Nasal congestion and discharge
- Cough
- Headaches (pressure-like pain in the general areas of the sinuses)
- Fever – variable
- Fatigue
- Facial swelling

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Sinusitis

Acute Bacterial Rhinosinusitis

Clinical presentation:

- Persistent symptoms
 - >10 days WITHOUT improvement
- Severe symptoms
 - fever >102.2
 - purulent nasal discharge x3 consecutive days
- Worsening symptoms
 - respiratory symptoms that worsen after initial improvement
 - onset of new fever or severe headache

Treatment:

- Augmentin (first line)
- Nasal saline spray/irrigations
- Increase fluids
- Rest
- Decongestants/intranasal corticosteroids
 - Recommended using with underlying allergy component

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Recommended regimens for acute bacterial rhinosinusitis in children

Indication	Initial Therapy	Second-line Therapy(s) ^a
Outpatient treatment		
Amoxicillin-clavulanate	Amoxicillin-clavulanate 45 mg/kg per day (divided into 2 doses) (maximum 4.5 g/day)	Amoxicillin-clavulanate 60 mg/kg per day (divided into 2 doses) (maximum 6 g/day)
Amoxicillin	Amoxicillin 90 mg/kg per day (divided into 3 doses) (maximum 3 g/day)	Amoxicillin 90 mg/kg per day (divided into 3 doses) (maximum 3 g/day)
Clindamycin	Clindamycin 30 mg/kg per day (divided into 3 doses) (maximum 3 g/day)	Clindamycin 30 mg/kg per day (divided into 3 doses) (maximum 3 g/day)
Trimethoprim-sulfamethoxazole	Trimethoprim-sulfamethoxazole 8 mg/kg per day (divided into 2 doses) (maximum 1 g/kg per day)	Trimethoprim-sulfamethoxazole 8 mg/kg per day (divided into 2 doses) (maximum 1 g/kg per day)
Severe disease or risk for antibiotic resistance^b		
Amoxicillin-clavulanate	Amoxicillin-clavulanate 60 mg/kg per day (divided into 2 doses) (maximum 6 g/day)	Amoxicillin-clavulanate 90 mg/kg per day (divided into 2 doses) (maximum 9 g/day)
Clindamycin	Clindamycin 30 mg/kg per day (divided into 3 doses) (maximum 3 g/day)	Clindamycin 30 mg/kg per day (divided into 3 doses) (maximum 3 g/day)
Trimethoprim-sulfamethoxazole	Trimethoprim-sulfamethoxazole 10 mg/kg per day (divided into 2 doses) (maximum 1.5 g/kg per day)	Trimethoprim-sulfamethoxazole 10 mg/kg per day (divided into 2 doses) (maximum 1.5 g/kg per day)
Resistant disease (outpatient)		
Amoxicillin-clavulanate	Amoxicillin-clavulanate 60 mg/kg per day (divided into 2 doses) (maximum 6 g/day)	Amoxicillin-clavulanate 90 mg/kg per day (divided into 2 doses) (maximum 9 g/day)
Clindamycin	Clindamycin 30 mg/kg per day (divided into 3 doses) (maximum 3 g/day)	Clindamycin 30 mg/kg per day (divided into 3 doses) (maximum 3 g/day)
Inpatient		
Amoxicillin-clavulanate	Amoxicillin-clavulanate 60 mg/kg per day (divided into 2 doses) (maximum 6 g/day)	Amoxicillin-clavulanate 90 mg/kg per day (divided into 2 doses) (maximum 9 g/day)
Clindamycin	Clindamycin 30 mg/kg per day (divided into 3 doses) (maximum 3 g/day)	Clindamycin 30 mg/kg per day (divided into 3 doses) (maximum 3 g/day)
MRSA coverage (outpatient)^c		
Doxycycline	Doxycycline 4 mg/kg per day (divided into 2 doses) (maximum 200 mg/day)	Doxycycline 4 mg/kg per day (divided into 2 doses) (maximum 200 mg/day)
Clindamycin	Clindamycin 30 mg/kg per day (divided into 3 doses) (maximum 3 g/day)	Clindamycin 30 mg/kg per day (divided into 3 doses) (maximum 3 g/day)
Trimethoprim-sulfamethoxazole	Trimethoprim-sulfamethoxazole 10 mg/kg per day (divided into 2 doses) (maximum 1.5 g/kg per day)	Trimethoprim-sulfamethoxazole 10 mg/kg per day (divided into 2 doses) (maximum 1.5 g/kg per day)
Ceftriaxone	Ceftriaxone 20 mg/kg per day (divided into 1 or 2 doses) (maximum 1 g/day)	Ceftriaxone 20 mg/kg per day (divided into 1 or 2 doses) (maximum 1 g/day)
Vancomycin	Vancomycin 10 mg/kg per day (divided into 2 doses) (maximum 400 mg/day)	Vancomycin 10 mg/kg per day (divided into 2 doses) (maximum 400 mg/day)

^a The above drugs are intended for patients with normal renal function. The doses of many of these agents must be adjusted in the setting of renal insufficiency, which in the majority of cases, drug dosing may be used for these adjustments.
^b Community-acquired MRSA (CA-MRSA) antibiotic susceptibility.
^c Respiratory therapy is indicated for patients who present with sinusitis in addition to other signs of initial therapy and in whom no pathogen is identified. If a pathogen is identified, antimicrobial therapy should be adjusted according to the organism.
^d In the absence of culture information, amoxicillin-clavulanate is preferred for treatment.
^e Based on amoxicillin component, either 250- or 400 mg/kg/day, maximum in 200- or 400 mg/kg/day maximum label or appropriate intravenous dose.
^f Alternative regimens may not cover resistant pathogens, as well as the suggested initial regimen.
^g Based on amoxicillin component, either 250- or 400 mg/kg/day, maximum in 200- or 400 mg/kg/day, maximum label or appropriate intravenous dose.
^h Clindamycin should be reserved for cases in which there is no other safe and effective alternative.
ⁱ In pediatric patients with renal insufficiency, use an appropriate renal dosing regimen when indicated.
^j Resistance may be warranted for amoxicillin coverage.

References:
 1. Olive M, Barnog M, Brink L, et al. 2010 Clinical Practice Guidelines for Acute Bacterial Rhinosinusitis in Children and Adults. *Clin Infect Dis* 2012;54:103-110.
 2. Olsson M, Schleier G. Committee on Infectious Diseases. The role of systemic and topical beta-lactams. *Pediatrics* 2014;134:1265.

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EAR, NOSE & THROAT

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Mouth and Throat Anatomy

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Common Diagnoses of the Mouth and Throat in Children

Pharyngitis

Adenoiditis

Tonsillitis

Peritonsillar Abscess

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Pharyngitis

Definition: Inflammation of the pharynx, 'sore throat'

Symptoms

- Painful swallowing
- Redness in the throat
- Fever
- Headache
- Enlarged tonsils

COMMON CAUSES:

- Viral
 - Adenoviruses, coxsackie A viruses, influenza
 - Treatment: supportive measures
- Bacterial
 - Group A streptococcus (+ rapid strep)
 - Treatment: antibiotics
- Life threatening
 - Epiglottitis
 - Peritonsillar abscess

→ **Emergency Room**


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Tonsillitis

Definition: inflammation of the tonsils

SYMPTOMS:

- Sore throat
- Tonsillar exudate
- Difficulty swallowing
- Fever and chills
- Ear pain
- Headache
- Tenderness of jaw and throat
- Cervical adenopathy



◆ Treatment depends on culture results

◆ Tonsillectomy considered for chronic infections

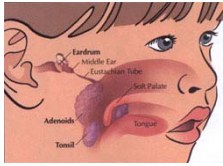
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Adenoiditis

Definition: inflammation and swelling of the adenoids when they become overwhelmed by either bacterial or viral infections.

Symptoms include:

- Sore throat
- Swollen glands in the neck
- Nasal congestion
- Mouth breathing
- Nasal speech
- Difficulty sleeping, snoring, or sleep apnea
- Eustachian tube dysfunction
- Otitis (ear pain)



◆ Treatment: antibiotics

◆ Adenoidectomy considered for chronic infections

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Obstructive Sleep Apnea (OSA)

Major risk factors

- Tonsil/adenoid hypertrophy
 - Influenced by genetic factors, infection, and inflammation
- Moderate- severe obesity
- Conditions that reduce upper airway size
 - CP, Down Syndrome, Craniofacial anomalies, Neuromuscular disorders, etc.

Evaluation

- Exam (oral- tonsils, nasal endoscopy- adenoids)
- History
- Sleep study
 - Assesses breathing pauses, leg movement, oxygen, EEG

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Obstructive Sleep Apnea (OSA)

Tonsillar hypertrophy

0 Surgically removed tonsils 1 Tonsils hidden within tonsil pillars 2 Tonsils extending to the pillars
 3 Tonsils are beyond the pillars 4 Tonsils extend to midline

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Obstructive Sleep Apnea (OSA)

Symptoms

<p>Nocturnal</p> <ul style="list-style-type: none"> • Apnea • Snoring • Pauses in breathing at night • Frequent awakenings • Restless sleep • Nightmares • Nocturnal enuresis • Nocturnal diaphoresis • Cyanosis • Near SIDS 	<p>Daytime</p> <ul style="list-style-type: none"> • Excessive daytime sleepiness • Poor school performance, learning issues • Aggression • Hyperactivity • Discipline problems • Short attention span • Morning headaches • Mouth breathing • Weight issues (FTT or obesity) • Frequent URIs • Chronic Rhinorrhea • Dysphagia or feeding difficulties
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Symptoms may be more than snoring!

Tonsillectomy and Adenoidectomy

Two most common reasons for T&A:

- 1) Enlarged tonsils and/or adenoids causing sleep apnea
- 2) Chronic tonsillitis and/or adenoiditis

Other reasons:

- Poor weight gain/PO intake
- Dysphagia
- Tonsillar bleeding
- Tumor/abscess
- PFAPA syndrome

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Tonsillectomy and Adenoidectomy

Surgical Recovery

<p>Tonsillectomy:</p> <ul style="list-style-type: none"> • The recovery period is 14 days. • Post-operative symptoms include: <ul style="list-style-type: none"> ○ Throat pain x2 weeks ○ Painful swallowing ○ Bad breath due to scabbing ○ Ear pain ○ Low grade fever (less than 101.5°F) ○ Cough ○ Nausea or vomiting (due to anesthesia) 	<p>Adenoidectomy:</p> <ul style="list-style-type: none"> • The recovery period is 3-5 days. • Post-operative symptoms include: <ul style="list-style-type: none"> ○ Possible throat pain x3-5 days ○ Bad breath due to scabbing ○ Low grade fever (less than 101.5°F) ○ Cough ○ Neck discomfort ○ Mild changes to the tone of child's voice (hyponasal) ○ Rhinorrhea x2 weeks ○ Nausea or vomiting (due to anesthesia)
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Tonsillectomy and Adenoidectomy

Parents are instructed to seek medical attention if:

- Bleeding from mouth or nose
 → **Emergency room**
- Temperature over 101.5°F
- Dehydration
 - Poor PO intake
 - Decreased urine output
 - Persistent vomiting
- Decreased neck ROM
- Changes in child's mental status or alertness

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Tonsillectomy vs. Tonsillotomy

Tonsillectomy

- Removal of the entire palatine tonsil *and the surrounding capsule*

Tonsillotomy

- Typically done for diagnosis of sleep-disordered breathing, not recurrent infections.
- Devices are used to debulk the obstructing portions of the tonsil
- Some evidence suggests:
 - More rapid recovery compared with traditional tonsillectomy
 - Reduces the risk of postoperative hemorrhage
 - Disadvantages: there is a (small) risk of tonsillar regrowth


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Peritonsillar Abscess (PTA)

Definition: collection of pus located between the capsule of the palatine tonsil and the pharyngeal muscles.

SYMPTOMS:

- Sore throat (may be severe and one-sided)
- Tender glands of jaw and throat
- Difficulty opening mouth (trismus)
- Difficulty swallowing (dysphagia)
- Fever and chills
- Headache
- Drooling or facial swelling
- Ear pain



TREATMENT:

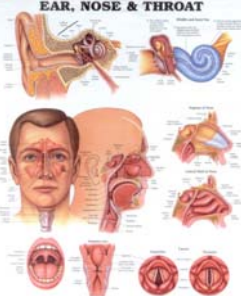
- Antibiotics (IV or PO)
- Surgical drainage

If left untreated, PTA could lead to airway obstruction or cellulitis of jaw, neck, or chest.

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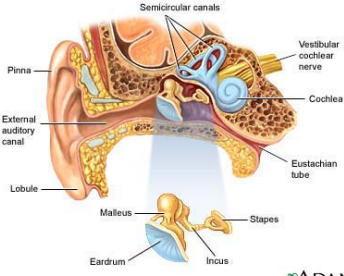
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Ear Anatomy

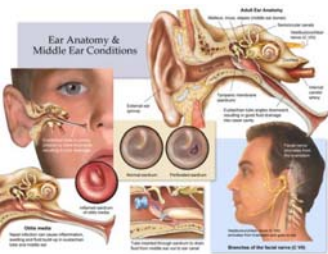


Key Features of the Ear:

- External Auditory Canal
- Tympanic Membrane
- Middle Ear Space
 - Malleus
 - Incus
 - Stapes Bones
- Inner Ear Space
 - Cochlea
 - Semicircular Canals
- Eustachian tube

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Common Diagnoses of the Ear in Children



Ear Anatomy & Middle Ear Conditions

- Otitis Media
- Otitis Media with Effusion
- Otitis Externa
- Perforated Tympanic Membrane
- Mastoiditis
- Foreign Body in the Ear

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Otitis Media (OM)

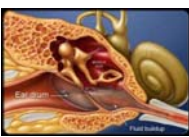
The most common ear-related illness affecting children.

COMMON CAUSES:

- Primary eustachian tube dysfunction (due to age)
- Eustachian tube dysfunction secondary to:
 - Craniofacial abnormalities
 - Allergies
 - Reflux

SYMPTOMS:


- Signs of an acute infection
 - Fever,
 - Otolgia (ear pain)
 - Irritability
 - Trouble sleeping
- Red, bulging tympanic membrane
- Middle ear effusion and/or drainage




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Otitis Media (OM)

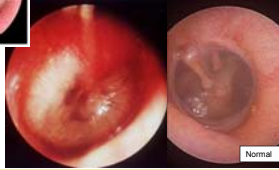
• Otoscopy



Normal



Red, bulging tympanic membrane




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Otitis Media (OM)

Initial Management of Acute Otitis Media

- Antibiotic Therapy vs. Observation
 - The choice of strategy depends upon the age of the child and the laterality and severity of illness:
 - Children <2 years with AOM are treated immediately with antibiotics
 - Children >2 years who appear toxic; have persistent otalgia for more than 48 hours; have temperature $\geq 102.2^{\circ}$ F (39° C) in the past 48 hours; have bilateral AOM or otorrhea; or have uncertain access to follow-up be immediately treated with an appropriate antibiotic.
 - For children >2 years who are normal hosts (eg, immune competent, without craniofacial abnormalities) and have unilateral AOM with mild symptoms and no otorrhea, initial observation may be appropriate if the caretakers understand the risks and benefits of such an approach.


Long Term Management for Chronic Infections → Tympanostomy Tubes




Otitis Media with Effusion (OME)

Otitis media with effusion occurs when the middle ear space is filled with fluid, but the fluid is **not infected**. It can follow an episode of OM or a URI.


Normal ear




Otitis Media with effusion



Acute Otitis Media





- Symptoms do NOT usually include pain or fever, but symptoms DO include mild hearing loss and a feeling of fullness.
- Unlike OM, OME **does not respond to antibiotic treatment!**
 - Children typically observed x3 months, as OME will often resolve itself.
 - If after 3-4 months fluid remains and there is evidence of hearing loss, a tympanostomy tube placement, adenoidectomy, or myringotomy may be considered.




Otitis Media with Effusion (OME)

- Otoscopy







Normal



Tympanostomy Tubes

Tympanostomy tubes are small tubes that are surgically placed into the eardrum to allow for drainage of fluid from, and the passage of air to, the middle ear space.




A small incision is made in the tympanic membrane Tube inserted to drain fluid

INDICATIONS:

- Eustachian tube dysfunction
- Chronic OM
- OME causing hearing loss or speech delay


Some complications include:

- Infection with drainage
- Persistent eardrum perforations after tubes fall out
- Eardrum scarring
- Cholesteatoma

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Tympanostomy Tube Insertion


[Tube Insertion Video](#)

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Otorrhea with Tympanostomy Tubes

- The ear is draining now what?
 - Call PCP or ORL to report
 - Start ear drops (floxin, ciprodex, etc)
 - Does not need to be on oral antibiotics unless the drainage is persistent despite drops
 - Can be bloody!



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Otitis Externa (OE)

Otitis externa, more often referred to as "Swimmer's Ear", is the inflammation of the external ear canal.

Symptoms include:



- Red, itchy, painful, or swollen outer ears
- Drainage from the ear canal
- Swollen glands in the neck
- Conductive hearing loss

TREATMENT:

- Ear drops
- Debridement
- Wick placement
- Oral antibiotic
 - Rare

CAUSES:

- Bacterial or fungal infection
 - Increased exposure to water
 - Warm humid areas
 - Harsh cleaning
 - Trauma
 - Foreign body in the ear canal

Perforated Tympanic Membrane

CAUSES:



- Severe otitis media
- Acoustic trauma
- Barotrauma
- Foreign objects in the ear
- Injury

SYMPTOMS:

- Drainage from ear
- Hearing loss (mild or severe)
- Ear pain or discomfort
- Relief of significant ear pain during acute ear infection

TREATMENT:

- Ear drum will often heal itself.
- If the eardrum does not heal itself, myringoplasty or tympanoplasty may be necessary.
- Other treatment options for a perforated tympanic membrane are geared towards relieving pain and preventing infection.
- Perforations after ear tubes fall out is nonurgent, usually heals on its own within 2 months

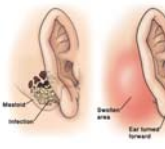




Mastoiditis

Mastoiditis is an infection of the mastoid bone of the skull, often caused by the spread of untreated otitis media infections.

SYMPTOMS:


- Drainage from ear, accompanied by ear pain or discomfort
- Fever
- Redness
- Warmth
- Swelling behind the ear
- Hearing loss
- Dizziness

Diagnostics: CT scan (rare), tympanocentesis for culture

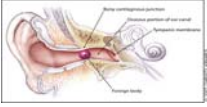
Treatment: IV antibiotics (ceftriaxone), mastoidectomy for severe infections

***Send for ED evaluation as likely will need IV antibiotics**




Foreign Body in Ear

- May cause injury to ear canal or tympanic membrane.
- Some of the common objects found include: insects, food items, beads, toys, etc.
- Symptoms: pain otorrhea, infection



While most objects can be removed easily or by the child's PCP or Otolaryngologist, **some objects do require urgent removal or a trip to the emergency room, such as:**

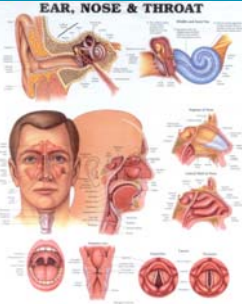
- Small batteries
- Food materials that may swell when moistened
- If an object is causing severe pain or bleeding



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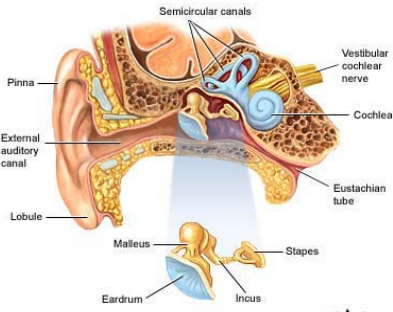
Overview

- I. **Nose and Sinus Assessment**
 - a. Anatomy of the Nose and Sinus Cavities
 - b. Common Diagnoses of the Nose and Sinuses
- II. **Mouth and Throat Assessment**
 - a. Anatomy of the Mouth and Throat
 - b. Common diagnoses of the Mouth and Throat
- III. **Ear Assessment**
 - a. Anatomy of the Ear
 - b. Common Diagnoses of the Ear
- IV. **Hearing loss**
 - a. Conductive vs. sensorineural
 - b. Music-induced hearing loss
 - c. Treatment



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Hearing Pathway



Children's Hospital **ADAM**

Hearing Screens

- Newborn hearing screens
- MA screening regulation: 200.500:
 - (C) The school committee or board of health shall cause the hearing of each student in the public schools to be screened in the year of school entry and annually through grade 3 (or by age nine in the case of ungraded classrooms), once in grades 6 through 8 (ages 12 through 14 in the case of ungraded classrooms), and once in grades 9 through 12 (ages 15 through 18 in the case of ungraded classrooms). The hearing of each student shall be tested by means of some form of discrete frequency hearing test such as the Massachusetts Hearing Test or comparable method approved by the Department of Public Health.
 - (D) Screenings of sight and hearing shall be performed by teachers, physicians, optometrists, nurses or others approved by the Department for this purpose, in accordance with guidelines of the Department.
 - (E) For any student who does not pass a vision or hearing screening, a written plan shall be developed by the school nurse, in consultation to the extent possible with a student's parent or legal guardian, for appropriate follow up of the student. With the consent of the parent or legal guardian, the student's primary care provider shall be furnished with a copy of the record of screening tests performed in the school.

Hearing Loss


- CONDUCTIVE — Conductive losses imply a mechanical problem in the outer or middle ear: the pinna, external canal, tympanic membrane, or ossicles.

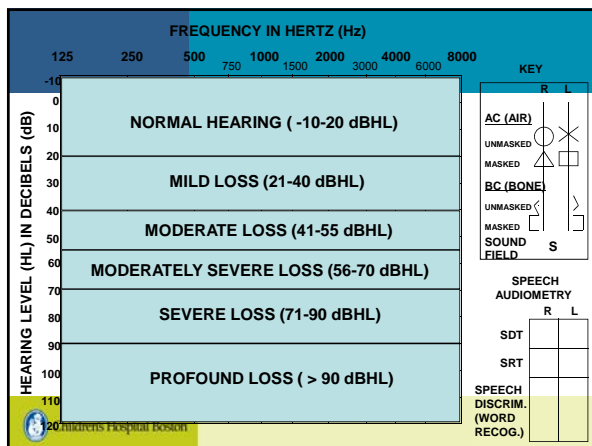
CAUSES:

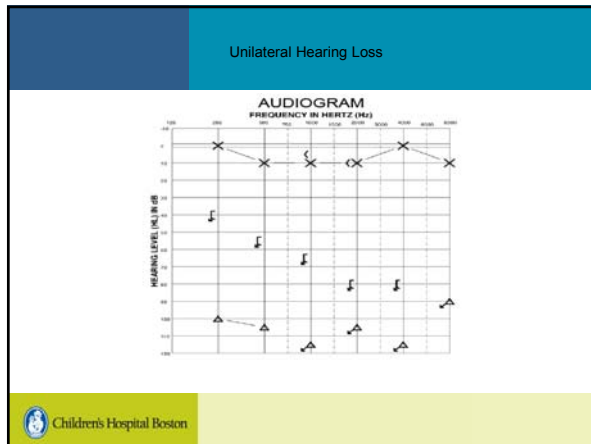
 - Outer ear — Congenital anomalies, cerumen impaction, infections, and trauma.
 - Middle ear — Infection, middle ear fluid, congenital anomalies, ossicular chain fixation, tympanic membrane perforation, or tumors.
- SENSORINEURAL — Disorders of the inner ear. Problems may occur at the level of the cochlea, eighth nerve, internal auditory canal, or brain.

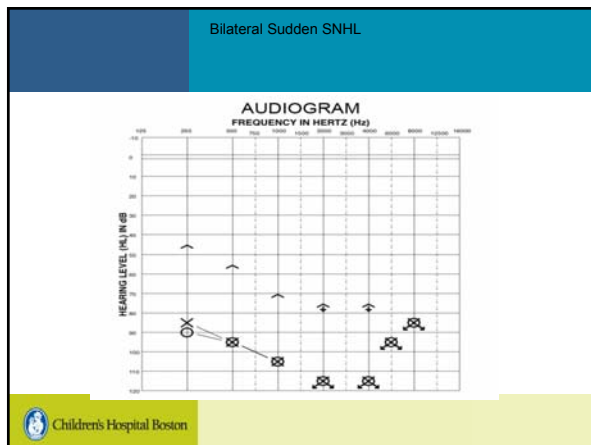
CAUSES:

 - Congenital vs acquired
 - Genetic
 - Ototoxic drugs
 - CMV
 - Noise exposure
 - Structural abnormalities









Risk for Music-Induced Hearing Loss

Hearing loss due to noise exposure can dislodge ossicles or permanently damage the hair cells that transmit sound in the cochlea.

Noise-induced hearing loss is cumulative - gradual and painless.

Signs a child may be developing hearing loss:

- Difficulty hearing or responding to commands
- Raising voice unnecessarily when talking
- Saying "what" frequently
- Complaints of muffled sounds
- Pain or tinnitus, especially after exposure to loud noise

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Unit: 889-5210 or 5210


Preventing Music-Induced Hearing Loss

Hearing loss can be prevented by actively educating children and families!

Avoiding loud noises, utilizing hearing protection such as earplugs or earmuffs, and lowering the sound of appliances whenever possible.

Recommendations



- Limit listening level to 60% of maximum volume
- Limit listening time to 1 hour a day
- Because in-ear earphones are 7-9 dB higher than over-the-ear at the same setting, shorter time use or lower level volume is necessary.



Hearing loss in children: Treatment



Hearing aids

- Provide sound amplification
- 3 components: microphone, amplifier and speaker
- BTE – most appropriate for younger children
- CROS Aid

Hearing loss in children: Treatment

- FM Systems
 - Designed to improve hearing perception, especially in noisy environments. They consist of a microphone for the speaker, a frequency modulated (FM) transmitter, and a receiver worn by the listener.
 - Improves signal to noise ratio by eliminating background noise.
 - Most FM assistive devices are used for educational purposes, but they can also help in other listening situations.
 - Soundfield FM systems

Hearing loss in children: Management

Bone conduction hearing devices




- Device directly transmits sounds through the skull
- Indications:
 - Congenital ear canal atresia
 - Allergic reaction to standard hearing aid
 - Chronic infections of middle/outer ear




Hearing loss in children: Management

Cochlear implants

- Surgically-implanted prosthetic devices that electrically stimulate the cochlear nerve to provide hearing.
 - Battery-powered external processor (that looks like a hearing aid), a receiver coil implanted below the scalp, and an electrode inserted directly into the cochlea through a surgical opening.
- Indications:
 - Severe to profound bilateral sensorineural hearing loss (SNHL)
 - Little or no benefit from hearing aid use after six months
 - Need to consider inner ear anatomy (imaging is needed)




ORL Urgencies



Refer to Emergency Room for:

- Uncontrolled epistaxis
- Nasal septal hematoma after fracture
- Foreign body
 - Battery
 - Airway occlusion
- Orbital cellulitis
- T&A post-operative bleeding
- Peritonsillar abscess
- Mastoiditis
- Sudden hearing loss



Any questions?
Thank you!

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<http://www.childrenshospital.org/oto>