General Pediatrics
Session 2

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Disclaimer

• I have no relevant financial relationships with the manufacturers of any commercial products or provider of commercial services discussed in this CME activity.
• I do not intend to discuss an unapproved/investigative use of a commercial product/device in my presentation.
• Special thanks to Dr’s. Abhay Dandekar (UCSF) and Joanne Cox (Boston Children’s) for the slides
Ears and Nose

At the end of this presentation, participants should be able to:

1. Identify the causes of otorrhea
2. Identify the etiologic agents of AOM
3. Formulate a treatment plan for AOM
4. List the predisposing factors for chronic OME
5. Develop a plan for OME
6. List the complications of OME
7. Recognize a cholesteatoma and plan its management
8. Recognize different age related audiological tests
9. Understand diagnosis and treatment of hearing loss
10. Recognize clinical findings of choanal atresia
11. Formulate a differential diagnosis of epistaxis
12. Understand diagnosis and treatment of nasal trauma or foreign body
External Ear

Preauricular sinuses and pits
- Most common congenital finding in head and neck
- Autosomal dominant
- More common in African Americans than Caucasians
- Can become infected
- Excision recommended

https://www.pediatriccareonline.org, chapter 255, figure 255-1
External and Middle Ear Malformations **

Associated with:

- Renal anomalies
- Craniofacial malformations
- Inner ear malformations
Definition of Terms **

• **Otitis externa**- infection of external auditory canal
• **Acute otitis media (AOM)**- the rapid onset of signs and symptoms of inflammation in the middle ear
• **Uncomplicated AOM**- AOM without otorrhea
• **Otitis media with Effusion (OME)**- inflammation of the middle ear with liquid without signs and symptoms of acute infection
• **Chronic OME**- effusion lasting 3 months
• **Chronic suppurative OM**- purulent otorrhea with perforation for 6 weeks despite treatment
• **Bullous myringitis**- blisters on TM
Otitis Externa (OE) Signs and Symptoms

**SYMPTOMS**
- Pain
- Ear discharge
- Difficulty chewing
- Decreased hearing

**SIGNS**
- Tenderness movement pinna or tragus
- Insertion of otoscope painful
- Boggy, inflamed ear canal

**Malignant OE**
Severe pain, headache, fever
Diabetes is a risk factor
Otitis Externa (OE)

- Caused by increased ear canal moisture with tissue breakdown
- Causes: Pseudomonas and Staph aureus**
- DDx: OM with perforation, foreign body, furunculosis**
- Treatment: Pain control, topical quinolones, patient positioning**
- Prevention: Ear plugs, solutions that decrease pH (acetic acid), hair dryers at low voltage
- Malignant OE-diabetic patients
Otorrhea-The Draining Ear**

• **Bloody otorrhea**
  – Trauma, granulation tissue, foreign body

• **Purulent otorrhea**
  – Perforated TM with AOM
  – Otitis externa
  – Tympanostomy tube: *S pneumo* and *H. flu*
  – Chronic Suppurative AOM: *P aeruginosa, S aureus*

• **Watery otorrhea-CSF**
  – Trauma (temporal bone fracture)
External Ear Foreign Body

Foreign Body

- Can be challenging to find when severe inflammation
- Most common children ages 2-4 years
- Pencils, crayons, erasers, beads
- Removal: irrigation, suction, instrumentation
- If TM perforation, ENT consultation is recommended
- Button batteries require emergent care
External Ear Hematoma

Hematoma (Cauliflower Ear) **

• Common in boxers or wrestlers
• Prevent cauliflower ear
• Ice packs and pressure initially
• Potential cartilage loss
• Needle Aspiration
Case

• 8 year old male presents to your office with acute onset otalgia and fever to 38 C. He has had a URI for the past few days. Mom wonders if he needs antibiotics...
Normal tympanic membrane

Photo courtesy, Dr. Henry Bernstein
Acute otitis media

Photo courtesy, Dr. Henry Bernstein
Epidemiology

• Seasonal peak in fall/winter

• 90% of children have at least 1 episode by 2 years of age

• Peak: 6-18 months of age
Microbiology of Acute Otitis Media**

• **Viral** (20-50% of middle ear cultures)
  – RSV, parainfluenza, influenza

• **Bacterial** (50-90%)
  – *Streptococcus pneumoniae*
  – Nontypeable *Haemophilus influenzae*
  – *Moraxella catarrhalis*
  – Group A *Streptococcus*

• **Sterile** or no organism (20-30%)
Bullous myringitis

Photo courtesy, Dr. Henry Bernstein
DEFINITION AND DIAGNOSIS OF AOM **

THREE CRITERIA NEEDED FOR DIAGNOSIS OF AOM:

• Recent, abrupt onset (<48 hours)
• Presence of middle ear effusion
• Presence of middle ear inflammation

AOM CANNOT BE DIAGNOSED WITHOUT MIDDLE EAR EFFUSION-A RED TM IS NOT ENOUGH
# Recommendations for initial management for uncomplicated AOM

<table>
<thead>
<tr>
<th>AGE</th>
<th>OTORRHEA WITH AOM</th>
<th>UNILATERAL OR BILATERAL AOM WITH SEVERE SYMPTOMS</th>
<th>BILATERAL AOM WITHOUT OTORRHEA</th>
<th>UNILATERAL AOM WITHOUT OTORRHEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months-2 years</td>
<td>Antibiotic therapy</td>
<td>Antibiotic therapy</td>
<td>Antibiotic therapy</td>
<td>Antibiotic therapy or additional observation</td>
</tr>
<tr>
<td>&gt;2 years</td>
<td>Antibiotic therapy</td>
<td>Antibiotic therapy</td>
<td>Antibiotic therapy or additional observation</td>
<td>Antibiotic therapy or additional observation</td>
</tr>
</tbody>
</table>

Which Antibiotics?**

- **Initial**: Amoxicillin 90 mg/kg/day ∗ BID

- **Penicillin allergic**
  - 2\textsuperscript{nd} or 3\textsuperscript{rd} generation Cephalosporins: cefuroxime cefdinir, cefpodoxime

- **Severe disease**
  - Amoxicillin-clavulanate (90 mg/kg/day of Amox; 6.4 mg/kg/day of clavulanate)
  - Ceftriaxone (50 mg/kg) 1-3 days
Treatment Failure**

- Amoxicillin-clavulanate 90 mg/kg/day

- Penicillin allergic
  - Clindamycin
  - 2nd or 3rd generation Cephalosporins: cefuroxime cefdinir, cefpodoxime
  - Ceftriaxone 3 days

- Severe disease
  - Ceftriaxone x 3 days, Clindamycin, or tympanocentesis
Indications for Tubes/ Tympanocentesis for AOM

1. AOM not responsive to third line treatment

2. Recurrent AOM: 3 episodes/6 months or 4 episodes/12 mos.

3. Immunocompromised, seriously ill

4. Anatomical (Eustachian tube dysfunction)
Otitis Media and Effusion

**Definition:** non-infected fluid in middle ear without other symptoms

Common ages: 6 months-3 years

**Associated conditions:**
- Allergic rhinitis
- Adenoidal hypertrophy
- Eustachian tube abnormalities
Chronic Otitis Media with Effusion

**Definition:** fluid which persists after AOM has resolved

**Predisposing factors for both OME and AOM:**

1. Daycare
2. Craniopharyngeal syndromes, cleft palate
3. Exposures to other children in home
4. Smoke exposure
5. Supine feeding
6. Short duration breastfeeding
7. Season of year
8. Early onset of AOM<2 years
9. Lower SES
10. Male gender
11. Bilateral disease
Goal of Treatment of Chronic OME

• Decrease long-term detrimental effects on speech and language development **

• Impact on language development in children < age 4 years

• Possible association with attention problems in children > 4 years
Treatment of Chronic OME

• Most effective therapy for OME is the surgical insertion of tympanostomy tubes **
• No role of antihistamines, tonsillectomy, steroids
• Use of antibiotics not effective*
• If OME is present 3 months after AOM, refer for audiologic testing. Language testing if hearing loss is present.
• Consider tympanostomy tubes if hearing loss > 20dB
• Adenoidectomy may be effective in select children
AAP OME practice guidelines:

• **Surgical candidates**
  – OME >4 months with persistent hearing loss or other signs & symptoms
  – Recurrent or persistent OME in at-risk children regardless of hearing status
  – OME & structural damage to TM or middle ear
Complications of Chronic OME **

1. EXTRATEMPORAL
2. INTRATEMPORAL
3. INTRACRANIAL
Extratemporal Complications of OME

1. Hearing loss, especially high frequency (>4,000 Hz)
2. Expressive language delay
3. Poor attention skills
4. Decreased ability to process binaural sounds
5. Poorer discrimination of short, similar sounds
# Intratemporal Complications OME**

1. **Chronic suppurative OM**
2. **Perforation**
3. **Tympanosclerosis**
4. Retracted TM and atelectasis
5. **Adhesive OM (glue-ear)**
6. **Mastoiditis**
7. **Bezold abscess** - in sternocleidomastoid muscle
8. **Petrositis** - infection temporal bone
9. **Facial Nerve Palsy**
10. **Cholesteatoma**
Cholesteatoma**

• Definition - a keratin producing squamous epithelial lesion
• Etiology: Chronic Eustachian tube dysfunction with OME or chronic suppurative OME
• Develops behind mid anterior quadrant of TM
• Dissolves soft tissue and bone and can provide access to CNS **
• Surgical management mandatory
• Recurrence rate high (up to 50%)
Cholesteotoma
Cholesteotoma with perforation
Intracranial Complications

• Meningitis

• Brain abscess

• Epidural abscess

• Thrombosis of lateral, transverse or sigmoid sinus
Hearing loss in Children

• You can’t tell by looking

• 1-3/1000 newborns

• Early intervention works
AAP Joint Committee on Infant Hearing-Universal Screening**

- Test all children by 1 month of age

- Identify those with hearing loss by 3 months of age

- Treat hearing-impaired children by 6 months of age
# Hearing evaluation**

<table>
<thead>
<tr>
<th>Method</th>
<th>Age Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditory brainstem response (ABR)</td>
<td>Birth to 9 months</td>
</tr>
<tr>
<td>Evoked otoacoustic emissions (OAE)</td>
<td>All ages</td>
</tr>
<tr>
<td>Behavioral observation audiometry</td>
<td>Birth to 6 months</td>
</tr>
<tr>
<td>Visual reinforcement audiometry</td>
<td>9 months to 2.5 years</td>
</tr>
<tr>
<td>Play audiometry</td>
<td>2.5 to 4 year</td>
</tr>
<tr>
<td>Conventional audiometry</td>
<td>4 years to adulthood</td>
</tr>
</tbody>
</table>
# Otoacoustic Emissions (OAE)

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective</td>
<td>Must be quiet</td>
</tr>
<tr>
<td>Ear specific</td>
<td>Affected by debris</td>
</tr>
<tr>
<td>Rapid (&lt;10 min)</td>
<td>No assessment of auditory neuropathy</td>
</tr>
<tr>
<td>Relatively inexpensive</td>
<td>No assessment of cortical processing of sound</td>
</tr>
</tbody>
</table>

Adapted from Gifford, 2009
# Auditory Brainstem Response (ABR): Screening or diagnostic

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective</td>
<td>Must be sleeping, may need sedation</td>
</tr>
<tr>
<td>Ear specific</td>
<td>Doesn’t assess cortical processing of sound</td>
</tr>
<tr>
<td>Debris minimally affects results</td>
<td>Screening: pass/fail Diagnosis needs audiologist</td>
</tr>
</tbody>
</table>

Adapted from Gifford, 2009
## Conventional audiometry

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ear specific</td>
<td>Requires cooperation</td>
</tr>
<tr>
<td>Assesses both function and perception</td>
<td></td>
</tr>
</tbody>
</table>
FREQUENCY IN HERTZ (Hz)

-10 0 10 20 30 40 50 60 70 80 90 100 110 120

125 250 500 1000 2000 4000 8000

NORMAL HEARING: -10 to 20 dB

MILD LOSS: 21 to 40 dB

MODERATE LOSS: 41 to 55 dB

MODERATE-SEVERE LOSS: 56 to 70 dB

SEVERE LOSS: 71 to 90 dB

PROFOUND LOSS: >90 dB
Risk Factors for Congenital, Delayed Onset or Progressive Hearing Loss

1. Caretaker concern
2. Genetics-Family History
3. Neonatal ICU of more than 5 days
4. In-utero infections (Toxo, CMV, Rubella)
5. Craniofacial abnormalities
6. Neurodegenerative disorders
7. Meningitis (culture positive)
8. Head Trauma
9. Chemotherapy
Hearing loss in children

• Congenital or acquired

• Conductive or sensorineural
Hearing loss in children

• Conductive**
  – Infection (AOM)
  – OME
  – Foreign body
  – Trauma (ossicle disruption, TM perforation)
Hearing loss in children

- **Sensorineural**
  - Family history
  - Ototoxic drugs (gentamicin, tobramycin)
  - Infection (in utero or bacterial meningitis)
  - Head trauma
  - Craniofacial abnormalities
  - Neonatal: severe hyperbilirubinemia, LBW, prolonged ventilation, neonatal depression
  - Neurodegenerative disorders, genetic syndromes
Hearing Screening Ages 2-5 years

**Goal**: detection of medically remediable oto-pathologic abnormalities, progressive hearing loss, or late-onset acquired hearing loss

- 20% to 30% of hearing loss in children up to age 18 is acquired or progressive hearing loss
- Use behavioral screening or OAE
Treatment of hearing loss**

- Multidisciplinary team: physician, otolaryngologist, early intervention services, audiologists, speech therapists

- External devices to amplify sound
  - Hearing aids
  - FM devices

- Cochlear implants
Nose

Problems

• Deviated nasal septum
• Polyps
• Rhinitis
• Epistaxis
• Fractures
Epistaxis

- **Incidence** peaks ages 3-8 years

- **Causes:**
  - **Common:** Trauma, URI, allergies, dry environment, foreign body, drug/medication use
  
  - **Less common:** bleeding disorders, tumors, telangiectesia, polyps, structural abnormality, leukemia
Epistaxis

Physical Exam
- Nasal mucosa for points of bleeding
- Foreign bodies or masses
- Vascular abnormalities
- Skin for pallor, petechiae
- Lymphadenopathy, hepatosplenomegaly

Amount of bleeding guides laboratory evaluation (coagulation profile, CBC)
Nasal Polyps

• Etiology- chronic inflammation from allergies, asthma, chronic disease (cystic fibrosis)
• Polypoid masses arising from mucosa of nose and sinuses
• Uncommon in young children **
• Clinical findings: chronic nasal congestion, rhinorrhea and loss of smell **
• Management intranasal steroid, followed by surgical removal if necessary
Upper Respiratory Tract Infection

• Epidemiology: Fall to spring, preschool children have 6-10 URI/year
• **Causes:** Rhinovirus (most common), Adenovirus, Influenza, RSV, Parainfluenza, Human metapneumovirus, etc.
• **OTC cough and cold meds not used for children <6 years.** Side effects: seizures, agitation, dysrhythmia
• Treatment is supportive
• Consider honey for cough >12 months of age, saline washes
• Frequent asthma trigger
Nasal Foreign Body

• Clinical findings- unilateral foul smelling nasal discharge **

• Common during holidays

• Beads, small toy parts, erasers, etc.
Nasal Trauma

• Examine nasal bones for crepitus, indentation
• Epistaxis often present
• Uncomplicated fracture- pain medication, ice, elevation of head
• Displaced fracture- reduce between day 5-10
• Septal hematoma- collection of blood between cartilage and percondrium
• Septal hematoma must be aspirated or incised to prevent infection **
Choanal Atresia

- Unilateral/incomplete- chronic mucoid discharge, chronic mouth breather, recurrent infections**
- Bilateral-nasal obstruction such that the newborn is blue, cannot feed, etc. Pinks when cries. **
- Associated anomalies in 50% of cases (CHARGE, Treacher-Collins syndrome-craniofacial abnormalities)**
- Evaluation- inability to pass 6-French catheter through nares into the oropharynx
- Remember the “snuffles” (cong. syphilis)
CHARGE Syndrome

- Coloboma
- Heart disease
- Atresia nasal choanae
- Retardation of growth or development
- Genito-urinary tract anomalies
- Ear anomalies
Cleft Lip /Palate/Pierre Robin Sequence

- Sub mucosal cleft- bifid uvula
- OME invariably present
- Increased risk of recurrent OM or chronic OM
- For C Palate, frequent hearing evaluations a must
- Associated abnormalities (eye, craniofacial, skeletal) and syndromes (Catch 22, Trisomy 13, Stickler)
- Maternal use of anticonvulsants/familial
- Upper airway obstruction with PR
Complications of Cleft Lip and Palate

• Feeding difficulties and failure to thrive
• Recurrent ear infections
• Speech and Language delays
• Dental problems
• Psychological stress disorders
Changes in Practice

After this presentation, I plan to:

1. No longer treat bullous myringitis with a macrolide antibiotic

2. Consider observation and no antibiotic treatment in patients with unilateral AOM and no otorrhea

3. No longer recommend OTC cold medications for children under 6
References


Appendix 2

• Audiometric testing by age chart

• Treatment of hearing loss

• Upper respiratory infection

• Balance disturbances
Appendix General Pediatrics 2
## Audiometric Testing by Age **

<table>
<thead>
<tr>
<th>Test</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral observation audiometry</td>
<td>0-5 months</td>
</tr>
<tr>
<td>Visual reinforced audiometry</td>
<td>5-24 months</td>
</tr>
<tr>
<td>Play audiometry</td>
<td>2-5 years</td>
</tr>
<tr>
<td>Screening audiometry</td>
<td>&gt; 4 years</td>
</tr>
<tr>
<td>Otoacoustic Emission (OAE)</td>
<td>Any</td>
</tr>
<tr>
<td>Auditory Brainstem Response (ABR)</td>
<td>Any</td>
</tr>
</tbody>
</table>
# Treatment of Hearing Loss with Cochlear Implant

**12 to 24 Months**
- Profound sensorineural hearing loss (SNHL) in both ears
- Lack of progress in development of auditory skills with binaural hearing aids
- High motivation and realistic expectations from the family
- Other medical conditions do not interfere with cochlear implant procedure

**25 Months to 17 Years 11 months**
- Severe-to-profound SNHL in both ears
- Receives little or no benefit from hearing aids (speech scores of 30% or less in best-aided condition)
- Lack of progress in development of auditory skills
- High motivation and realistic expectations from family
- No medical contraindications
Dental Caries and Gingivitis

• Dental Caries continue to be common in children
• Infectious communicable disease- streptococcus mutans and other bacteria **
• Caries start with demineralization, followed by pits and larger areas of enamel loss
• Gingivitis becomes common in adolescence- redness, bluish swelling, easy gum bleeding. Cause plaque buildup **

Demineralized enamel

Healthy teeth without noticeable demineralized enamel

Demineralized areas of enamel along gingival margins (chalky appearance)

Very early cavitation (brown)

Photo courtesy of Dr. Joanna Douglass
Dental Caries Prevention **

- No night-time bottle use and ad-lib bottle or sippy cup containing anything other than water
- No juice or soda in bottle or sippy cup
- Encourage parent to use cup at an early age
- Limit frequency of starchy/sweet snacks or drinks
- Limit juice and sweets to mealtimes
- Fluoride!

100% Natural Juice = 100% Sugar
# Caries Risk Assessment

for 0-3 Year Olds (For MDs and Others)

<table>
<thead>
<tr>
<th>Factors</th>
<th>High Risk</th>
<th>Moderate Risk</th>
<th>Protective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biological</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Mother/primary caregiver has cavities</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent/caregiver has low socioeconomics status</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child has &gt;3 between meal sugar-containing snacks or beverages per day</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child is put to bed with bottle containing natural or added sugar</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Child has special health care needs</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Child is a recent immigrant</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Protective</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Child receives optimally fluoridated drinking water or fluoride supplements</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>*Child has teeth brushed daily with fluoridated toothpaste</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Child receives topical fluoride from health professional</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>*Child has dental home/regular dental care</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Clinical Findings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child has white spot lesions or enamel defects</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child has visible cavities or fillings</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child has plaque on teeth</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

American Academy of Pediatric Dentistry Caries-risk Assessment Form for 0-3 Year Olds

(For physicians and other non-dental health care providers)
Upper Respiratory Track Infection

• Main cause of unnecessary antibiotic prescriptions
• Rhinovirus
• Clear rhinorrhea, cough, +/- fever
• Mucopurulent rhinorrhea often develops after several days **
• If symptoms persist 10-14 days, consider sinusitis
Balance Disturbances

Otitis media and/or eustachian tube dysfunction is most common cause of balance disturbance in children **
# Balance Disturbances

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Episodic Vertigo</td>
<td>Most common in children. Associated with inner ear disease. No hearing loss</td>
</tr>
<tr>
<td>Benign paroxysmal positional vertigo</td>
<td>Migraine variant, most common in adults</td>
</tr>
<tr>
<td>Benign paroxysmal torticollis of infancy</td>
<td>Resolves by age 2 years. Episodes of recurrent head tilt for hours or days,</td>
</tr>
<tr>
<td></td>
<td>often associated with vomiting, agitation, pallor, and ataxia</td>
</tr>
<tr>
<td>Ménière disease</td>
<td>Rare in children ≤ 11 years. Tinnitus, fluctuating hearing loss.</td>
</tr>
<tr>
<td>Acute febrile vertigo</td>
<td>Vomiting, associated with AOM.</td>
</tr>
<tr>
<td>Traumatic vertigo</td>
<td>Requires MRI</td>
</tr>
</tbody>
</table>
Benign Paroxysmal Vertigo of Childhood **

**Symptoms:** sensation of spinning, rotation, whirling

**Epidemiology:**
- Seen in children < 5 years but not common

**PMH:** Motion sickness

**History:**
- Sudden onset of extreme unsteadiness and inability to stand, nystagmus and sometimes vomiting
- Episodes last seconds to minutes
- Family history of migraines; many develop typical migraines later in life.
Benign Paroxysmal Vertigo

Diagnosis

• History

• Dix-Hallpike test. Patient is brought from sitting to a supine position, with the head turned 45 degrees to one side and extended about 20 degrees backward. A positive Dix-Hallpike tests consists of a burst of nystagmus.