Common Acute Pediatric Illnesses
Laurette Dekat, MD, MPH
Clinical Assistant Professor
UT Southwestern Medical Center
Medical Director
Dept of Physician Assistant Studies

Lecture Objectives
• Integrate Clinical Practice Guidelines for the management of acute otitis media and otitis externa
• Identify various viral illnesses based on characteristic clinical presentations and exanthems
• Discuss the appropriate indications for antibiotic use in upper respiratory illnesses in children

Introduction
• Common respiratory pathogens
• Otitis media and externa
• Pharyngitis
  • Viral: PCP, HSV, EBV, Coxsackie
  • Bacterial: GAS, Diphtheria
• Epiglottitis
• Croup
• Pertussis
• Kawasaki Disease
• Varicella
• Measles
• Mumps
• Rubella
• SSSS
• Fifth's Disease
• Roseola
Classification Respiratory Illnesses

- Upper respiratory tract infection
  - Common cold (coryza)
  - Sore throat (pharyngitis, tonsillitis)
  - Acute otitis media
  - Sinusitis (uncommon)
- Laryngeal/tracheal infection
  - Viral laryngotracheitis, croup, epiglottitis, diphtheria
- Bronchiolitis
- Bronchitis
- Pneumonia

Respiratory Tract – Viral Pathogens

- 80-90% of childhood respiratory infections are VIRAL
- Respiratory syncytial virus (RSV)
- Rhinovirus (100 serotypes)
- Parainfluenza
- Influenza A and B
- Human Metapneumovirus (HMPV)
- Adenovirus
- Coxachie
- Herpes

Viral Upper Respiratory Tract Illnesses

- Typical presentation: sore throat, congestion, rhinorrhea, PND, hoarseness; fatigue, headache, body aches, fever
- Symptoms peak at Day 3-5, then start to improve with resolution 10-14 days
- Green discharge from nose ≠ need for antibiotics

http://reassuranceprovided.com/
Infectious Disease Society of America (IDSA) CPG: Rhinosinusitis

- CPG for Acute Bacterial Rhinosinusitis in Children and Adults, March 2012
- Initiate antibiotics if:
  - Persistent & not improving ≥ 10 days
  - Severe sx or fever ≥ 39°C (102°F) for ≥ 3-4 days; or
  - Worsening or “double-sickening” following typical 5-6 day URI
- Risk for resistance
  - Age <2 or > 65, daycare
  - Prior antibiotics within past month
  - Prior hospitalization past 5 days
  - Comorbidities
  - Immunocompromised

Empiric Therapy for ABRS in Children

- Initial therapy: Amoxicillin-clavulanate 25-40 mg/kg/d ÷ BID
- When to use high dose Amox/clav 90 mg/kg/d po ÷ BID for children (and adults)?
  - from geographic regions with high endemic rates (≥ 10%) of invasive penicillin-nonsusceptible S. pneumonia
  - severe infection, e.g. systemic toxicity, fever ≥ 39 (102) and threat suppurative complications;
  - Other high risk as noted above
- Empiric does not include coverage for S. Aureus
- Duration of antibiotic: 10-14 days for children if uncomplicated ABRS
- Intranasal corticosteroids as adjunct if also allergic component

Second-line Agents for ABRS

- Not macrolides (S. pneu resistance up to 30%)
- Not TMP/SMX (resistance rates 30-40% for S. pneu and H. influenzae)
- Not monotherapy with 2nd and 3rd gen oral cephalosporins;
- Can use combination 3rd gen (cefixime or cefpodoxime) plus clindamycin if Pen allergy or at risk geographic location
- Alternative agent if symptoms worsen after 48-72 hrs days of empiric or no improvement 3-5 days
Respiratory Tract – Bacterial Pathogens
- *Streptococcus pneumoniae* (pneumococcus)
- Other streptococci
- *Haemophilus influenzae*, type b and nontypeable
- *Bordetella pertussis*
- *Mycoplasma pneumoniae*
- *Mycobacterium tuberculosis*

Acute Otitis Media per AAP CPG
- **MC age** 6-12 months
- **Should** diagnose AOM if
  - Moderate to severe bulging of TM or new otorrhea not due to acute otitis externa
- **May** diagnose AOM if
  - Mild bulging of TM and recent (<48 hrs) onset ear pain or intense erythema of the TM
  - No middle ear effusion based on pneumatic otoscopy or tympanogram
  - Include assessment of pain and treat if present

Acute Otitis Media
- **Pathogens:**
  - **Viral MC:** RSV, rhinovirus, coronavirus, parainfluenza, adenovirus, enterovirus
  - **Bacterial:** *Strep. pneumoniae*, nontypable *H. Influenzae*, *Moraxella catarrhalis*, Group A strep
- 80% resolve spontaneously; antibiotics may shorten duration of pain but do not reduce the risk of hearing loss
AAP/AAFP Guidelines

  - NNT for benefit with antibiotics: 7-20.
  - By 24 hrs, 61% of children have decreased sx w/ or w/o antibiotics.
  - By 7 days, 75% resolved in both groups.
  - Persistent MEE also no difference (45% @ 4-6 weeks; 25% @ 3 mo)
  - Note 16% of those treated have vomiting or diarrhea 2° antibacterial.

AAP/AAFP Clinical Practice Guidelines

Criteria for Antibacterial Treatment vs Observation in AOM

<table>
<thead>
<tr>
<th>Age</th>
<th>Certain Diagnosis</th>
<th>Uncertain Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6 mo</td>
<td>Antibacterial</td>
<td>Antibacterial</td>
</tr>
<tr>
<td>6 mo – 2 yr</td>
<td>Bilateral AOM: Antibacterial</td>
<td>If non-severe illness, observation</td>
</tr>
<tr>
<td></td>
<td>Unilateral AOM: antibacterial or observation</td>
<td>If severe illness, antibacterial</td>
</tr>
<tr>
<td>≥ 2 yr</td>
<td>If severe illness, antibacterial</td>
<td>Observation</td>
</tr>
<tr>
<td></td>
<td>In non-severe illness, observation</td>
<td></td>
</tr>
</tbody>
</table>

Severe illness: moderate-severe otalgia or otalgia ≥ 48 hours or fever ≥ 39°C (102.2°F)
Observation option: defer antibacterial for 48 to 72 hrs; limit management to symptomatic relief

AAP and AAFP Clinical Practice Guidelines; Diagnosis and Management of Acute Otitis Media; Pediatrics. May 2004

Treatment Examples for OM

- Treatment for 5-10 days if at all
- If no risk for antibiotic resistance, DOC is Amoxicillin
  - Amoxicillin 80-90 mg/kg/day +2 or 3 doses
- If risk of antibiotic resistance, common alternatives include addition of clavulanate or cephalosporin:
  - Amox/clavulanate (Augmentin): dose based on Amoxicillin component: 30-40 mg/kg/d divided 2 doses
  - Cefdinir (Omnicef): 14 mg/kg/d divided into 1 or 2 doses
  - Others options: next slide
- Reassess if fail to respond at 48-72 hours
Antibiotics for Otitis Media

- Amoxicillin (Amoxil)
- high dose amoxicillin
- Amoxicillin clavulanate (Augmentin)
- Cefdinir (Omnicef)
- Cefpodoxime (Vantin)
- Cefuroxime axetil (Ceftin)
- Ceftriaxone (Rocephin)
- Cefditoren (Cedax)
- Erythromycin/Sulfadiazole (Pedazole)
- Azithromycin (Zithromax)
- Clarithromycin (Biaxin)
- Trimethoprim/Sulfamethoxazole TMP/SMX (Bactrim, Septra)
- Loracarbef (Lorabid)
- Clindamycin

Recurrent Otitis Media

- Up to 20% of children
- > 3 in six months or >4 in twelve months
- Usually asymptomatic except possibly decreased hearing
- Offer tympanostomy tubes
- Prevention
  - Exclusive breast feeding for 6 months
  - Smoke free environment
  - Prophylactic antibiotics no longer indicated
  - Vaccines: Pneumococcal, Influenza

Otitis Media with Effusion (OME)

- AKA serous otitis media or glue ear
- Persistent fluid, no infection
- Primarily first 2 years of life, peaks at one year
- TM dull, retracted, often with fluid level or bubbles
- Tympanogram – ↓ membrane mobility
- May last weeks to months, usually resolves spontaneously
- If persists > 3-6 months → audiogram to ck hearing
- If hearing loss, can interfere with speech development
  - Myringotomy and ventilation tubes
Indications for Surgery

- Moderate hearing loss > 40db
- Behavior problems, balance/motor problems
- Recurrent AOM
- Comorbidities: autism, speech/language delay, visual impairment, cleft lip/palate, developmental delay
- Adenoidectomy if nasal symptoms (recurrent sinusitis, recalcitrant rhinorrhea)

Otitis Media: Complications

- Perforation
- Mastoiditis
- Language delay
- Hearing loss
- Cholesteotoma
- Intracranial abscess
Otitis Externa (AOE) – Risk Factors

- "Swimmer’s ear"
- Absence of cerumen
- Break in skin surface of canal: dry skin, eczema, seborrheic dermatitis; vigorous ear cleaning with cotton-tipped applicators; inserting foreign objects like bobby pins or paper clips into the ear
- AOM perforation with drainage

http://dxline.info/diseases/otitis-externa-swimmers-ear

Otitis Externa – Clinical Presentation

- Rapid onset of signs and symptoms with symptoms ear canal inflammation
  - Otalgia (70%), itching (60%), fullness (22%), hearing loss (32%), ear canal pain on chewing
  - Hallmark: tenderness of tragus (when pushed) and/or pinna (when pulled)
  - Diffuse ear canal edema, erythema with/without otorrhea or debris in the canal
  - Regional lymphadenitis or cellulitis may be present

AOE Pathogens

- 90% bacterial
  - *Pseudomonas*, *Enterobacteriaceae*, *Proteus* species,
- 10% fungal (90% *Aspergillus* spp., 10% *Candida* spp.)
  - May be higher in hot climates, peak summer months
Otitis Externa Treatment

- Treatment: Topical eardrops x 7-10 days
- Use wick for severe cases
  - Polymyxin B/neomycin/hydrocortisone
  - Ciprofloxacin
  - TMP/SMX
- Prevention if recurrent problem:
  Rinse canal with solution of acetic acid: alcohol 1:1 ratio; use ear plugs when swimming or in shower

Pharyngitis – Viral MC Etiology

- Adenoviruses, enteroviruses, rhinoviruses
- Coxsackie virus
  - Ulcerative pharyngitis
- Herpes simplex virus
  - Gingivostomatitis
- EBV (Epstein-Barr virus), CMV (cytomegalovirus)
  - Mononucleosis
- Echovirus

Pharyngoconjunctival Fever

- Adenovirus: 35 serotypes
- Incubation 5-12 days (ave 8)
- Fever 100-104°F, pharyngitis, acute follicular conjunctivitis
- Regional lymphoid hyperplasia with tender, enlarged preauricular adenopathy
- Myalgia, malaise, and GI disturbances
- Supportive care, including cold compresses, liquid tears prn
Hand-Foot-Mouth Disease

- Coxasie virus
- Incubation 3 - 6 days
- Symptoms
  - Low-grade fever, URI symptoms, ± abdominal pain
  - Ulcerative pharyngitis (herpangina)
  - Vesicular/pustular lesions on palms, soles
- Treatment: supportive

Herpes Simplex Stomatitis

- Primarily herpes simplex type 1 (HSV1)
- Common viral infection of children; most adults have HSV1 antibodies
- Signs/symptoms: fever, body aches, oral ulcers involving lips, gums, buccal mucosa (not pharynx)
- Treatment supportive to avoid dehydration:
  - acetaminophen for pain relief
  - popsicles, smoothies, etc.
  - cocktail of Maalox:Benadryl:Lidocaine 1:1:1 5-15 cc up to 4 times/day

Mononucleosis

- Epstein-Barr virus (EBV);
  - Cytomegalovirus (CMV) rarely; adenovirus, HH6, influenza
- Fever, malaise, fatigue
- Tonsillitis, lymphadenopathy (anterior and posterior cervical, supraclavicular, epitrochlear), hepatosplenomegaly, hepatitis, atypical lymphocytosis
- Symptoms persist 1-3 months; viral shedding ongoing
- 5% comorbid infection with Group A strep – avoid amoxicillin or ampicillin (risk maculopapular rash)
EBV Diagnostic Tests

• **Monospot**
  - test for IgM heterophile antibodies produced in increased quantities in people with mono
  - present 5 day – 2 weeks; can last longer

• **EBV specific serum antibody titers:**
  - antibody to viral capsid antigen (VCA)
    - VCA IgM present 7 days to 3 months
    - VCA IgG appears 7 days; persists for life
  - early antigen (EA) IgG appears @ 7 days; usually disappears 2 wks; if present @ 2 yrs after acute infection, may indicate chronic EBV syndrome
  - EBV nuclear antigen (EBNA) IgG
    - anti EBNA appears at 3 wks, persists for life

Summary Serum EBV Antibodies

<table>
<thead>
<tr>
<th>Infection</th>
<th>VCA IgM</th>
<th>VCA IgG</th>
<th>EA - IgG</th>
<th>EBNA - IgG</th>
</tr>
</thead>
<tbody>
<tr>
<td>No previous</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Acute Infection</td>
<td>+</td>
<td>+</td>
<td>+/-</td>
<td>-</td>
</tr>
<tr>
<td>Recent Infection</td>
<td>+/-</td>
<td>+</td>
<td>+/-</td>
<td>+/-</td>
</tr>
<tr>
<td>Past Infection</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

- VCA IgM= IgM class antibody to viral capsid antigen
- VCA IgG = IgG class antibody to viral capsid antigen
- EA = early antigen
- EBNA = EBV nuclear antigen

Pharyngitis – Bacterial

• **Group A β Hemolytic strep** most common bacterial etiology; uncommon under age 3 yrs

• **Other**: Group C and G β hemolytic 1-5% (don’t cause rheumatic fever); diphtheria; *N. gonorrhoea*

• Symptoms/signs: fever, sore throat, abdominal pain; petechiae on soft palate

• Culture is gold standard; rapid in office tests are specific but sensitivity dependent on good sample
Strep Pharyngitis (cont)

Treatment:
- Pen VK 20–50 mg/kg/d + BID or Amoxicillin 40–50 mg/kg/d + BID x 10 days
- Alt: Cephalixin (Keflex) 40–50 mg/kg/d + BID, Clindamycin, macrolide

Complications
- Upper airway obstruction
- Peritonsillar abscess
- Acute rheumatic fever
- Post strep glomerulonephritis (PSGN)
- Guttate psoriasis

Scarlet Fever (Scarletina)

Pastia's lines: confluent petechiae in skin creases antecubital, axilla, groin

Features of peritonsillar abscess

Diphtheria

Etiology: diphtheria toxin from Corynebacterium diphtheriae or C. ulcerans

Sx: low grade fever; membranous pharyngitis (called pseudo-membrane); enlarged anterior cervical lymph nodes and edema (“bull neck”); cutaneous lesions

Complications: respiratory obstruction from pseudomembrane; toxin can cause paralysis or heart failure
Epiglottitis
- Acute life threatening emergency
- Caused by H. influenzae type B (rare because of vaccine)
- Usually age 1-6 yrs
- Toxic appearance, high fever, muffled voice, breathing difficulty, unable to swallow saliva; tripod stance
- X-ray lateral neck - thumb sign
- Tx: controlled intubation with anesthesia on emergency basis
- IV Antibiotics : 3rd generation cephalosporin (cefotaxime, ceftriaxone)

Croup
- Laryngotracheobronchitis
- Older infants and toddlers
  - 6 mo – 6 yr with peak 2nd year
- Autumn
- Etiology
  - parainfluenza virus MC
    - RSV, human metapneumovirus (HMPV), influenza less common
  - allergy (spasmodic)
- Mucosal inflammation, increased secretions with edema, especially subglottic area

Croup Symptoms/Evaluation
- Manifestations
  - URI prodrome
  - Low grade fever
  - Cough: SEAL-LIKE BARK
  - Rarely respiratory distress
- Evaluation
  - History & Exam
  - AP x-ray of neck - steeple sign
Croup Treatment

- Mild illness: manage at home
- Cool mist (tent may increase anxiety and interfere with observation)
- Hydration, minimal disturbance
- Systemic steroids (dexamethasone 0.3 – 0.6 mg/kg IM or PO x 1 dose; or prednisone/prednisolone for several days)
- Racemic epinephrine for severe croup - every 1-2 hours
  - Observe for minimum 2-4 hours
  - Hospitalize if more than 1 treatment needed

Pertussis

- Whooping Cough
- Etiology: *Bordetella pertussis*
- All ages; peak < 4 mos
- Stages
  - Catarrhal (1-2 weeks) – nonspecific URI
  - Paroxysmal (3-6 weeks) – paroxysms of cough, followed by whoop, post-tussive emesis; apnea in infants
  - Convalescent (1-2 weeks) – gradual resolution; cough may persist for months

Pertussis (cont)

- Tx: erythromycin, azithromycin, clarithromycin
  - Azithromycin (Zithromax): 10mg/kg x 1 dose, then 5 mg/kg/day once a day x 10-14 days
  - decreases symptoms only if started catarrhal phase; contacts should be treated
- Complications
  - Pneumonia, seizures, otitis, epistaxis, brain damage (hypoxia), cerebral hemorrhage, intellectual disability, apnea, death
- Prevention: DPT series, Tdap booster
Kawasaki Disease

- Primarily affects age 6 mo – 4 yrs (peak ~ 12 mo)
- Etiology unknown, possibly a bacterial toxin
- Vasculitis affecting small and medium sized vessels
  - Coronary arteries in 1/3 within 6 weeks; can → aneurysms
  - Can lead to narrowing of vessels and MI; mortality 1-2%
- Diagnosis based on fever > 5 days plus any four:
  - conjunctival injection
  - red mucous membranes (e.g. red, cracked lips)
  - cervical lymphadenopathy
  - rash (morbilliform, maculopapular, or scarlatiniform
  - swelling of hands & feet with red and edematous palms & soles
  - peeling of fingers and toes (usually 11-25 days after sx onset)

Kawasaki Disease: Clinical Findings

Kawasaki Disease: Treatment

- Supplemental criteria: anemia, albumin ≤ 3.0 g/dL, WBC ≥ 15,000; ↑AST, plts after 7d ≥ 450,000; urine ≥ 10 WBC/HPF
- Echocardiogram to assess for coronary aneurysms initially and throughout treatment
- Treatment:
  - IV immunoglobulin within the 1st 10 days of illness can ↓ risk coronary aneurysms:
    - single dose IVIG 2 g/kg over 10-12 hours
  - Aspirin as anti-inflammatory and antiplatelet to ↓ risk thrombosis
Varicella (Chickenpox)

- Incubation 14 (10-21) days
- Symptoms
  - Fever
  - Rash spreads face/scalp → trunk/extremities
  - New lesions 7-10 days
  - Pox in various stages
    - Papules, vesicles ("dew drop on rose petal"), crusts
- Complications
  - Pneumonia, encephalitis, Reye syndrome
  - Superinfection with staph and strep
  - Dehydration

Skin Rashes: Diseases 1-6

<table>
<thead>
<tr>
<th>Number</th>
<th>Other Names</th>
<th>Etiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Measles, Rubella, Hard measles, 14-day Measles</td>
<td>Measles virus</td>
</tr>
<tr>
<td>Second</td>
<td>Scarlet Fever, Scarletina</td>
<td>S. pyogenes</td>
</tr>
<tr>
<td>Third</td>
<td>Rubella, German measles, 3-day measles</td>
<td>Rubella virus</td>
</tr>
<tr>
<td>Fourth</td>
<td>Filatov-Dukes' Disease. Staphylococcal Scalded Skin Syndrome, Ritter's Disease,</td>
<td>? Pathogen for F.D S. aureus (epidermolytic toxin)</td>
</tr>
<tr>
<td>Fifth</td>
<td>Erythema infectiosum</td>
<td>Parvovirus B9</td>
</tr>
<tr>
<td>Sixth</td>
<td>Exanthem subitum, Rosela infantum, &quot;Sudden Rash&quot;, rose rash of infants, 3-day fever</td>
<td>Human Herpes Virus (HHV) 6B or HHV 7</td>
</tr>
</tbody>
</table>

Measles (Rubeola)

- Incubation 10 – 15 days
- Symptoms
  - cough, coryza (acute rhinitis), fever, conjunctivitis, koplick spots, rash on 3rd day of illness
  - Erythematous mac/papular rash around neck, face and ears, descends quickly to arms/chest, then to lower extremities on 2nd day and feet by 3rd
- Complications
  - pneumonia, otitis media, encephalitis
Mumps

- Incubation 15-24 days
- 30% subclinical
- Fever, malaise, parotitis
- Initially unilateral, becomes bilateral over next few days
- Assoc with ear pain or pain with eating/drinking
- Can cause meningitis, encephalitis, orchitis (uncommon prepubertal)

Rubella (German Measles)

- Incubation 14 – 21 days
- Symptoms
  - Mild URI, low grade fever
  - Mac/papular rash on Day 1: forehead to face, trunk, extremities, faded Day 2-3
  - Post auricular, post cervical, and occipital nodes
  - Arthralgia
- Congenital Infection
  - “Blueberry Muffin” baby
  - Congenital cataracts
  - Microcephaly

Staphylococcal Scalded Skin Syndrome (SSSS)

- AKA Ritter disease
- Acute epidermolysis caused by 2 exotoxins (ETA, ETB) spread hematogeneously
- MC in infants and children < 5
- Fever, generalized erythema, vesicles and bullae with large areas of desquamation
  - Slight rubbing of the skin cause exfoliation of the outmost layer (Nikolsky’s sign)
  - Cleavage site intraepidermal (granular layer) vs full epidermal (basement membrane) in toxic epidermal necrolysis (TEN)

http://www.nbclosangeles.com
http://www.riversideonline.com
http://intranet.tdmu.edu.ua
http://www.aap.org
SSSS (cont)
- Lab: CBC; Cultures of skin, throat, nose and blood; Electrolytes; PCR for toxin
- Complications
  - Dehydration/electrolyte disturbance
  - Cellulitis
  - Sepsis
- Treatment
  - IVF, local burn/wound care and IV Nafcillin, 1st gen Cephalosporin; consider Clindamycin or Vancomycin if CA-MRSA suspected

Fifth Disease (erythema infectiosum)
- AKA "slapped cheek syndrome"
- Parvovirus B9
- Incubation 4-14 days
- Year round, altho more common spring
- Symptoms (can be asymptomatic)
  - mild URI, low grade fever, headache
  - 1 week later: "slapped cheeks" and lacy reticular rash on neck, trunk and extremities
- Complications
  - arthritis, anemia, hydrops fetalis

Roseola (exanthem subitum)
- Incubation 5-15 days
- Usually by age 2
- Human herpesvirus (HHV) 6 and 7
- Symptoms
  - High fever for 3-4 days
  - After defervescence, rash occurs: small pink blanchable mac/papules on trunk and neck
  - Avoid error in diagnosing allergic reaction if antibiotics given when febrile
- Complications - febrile seizures
References