Common Pediatric ID Case #1

2 1/2 yr old otherwise healthy boy presents w/ 2 days of runny nose, low-grade fever and acute onset of right ear pain last night.
- He is in daycare
- His older sister and his dad also have colds
- He has not had any ear infections in the last 3 mos.
- NKDA

PE: T = 38.0, other VS wrl for age
- Well appearing, NAD

How would you manage this patient?

1. IM Ceftriaxone
2. High dose amoxicillin
3. Amoxicillin/clavulanic acid
4. Azithromycin
5. SNAP – Safety net Abx Prescription & otalgia tx

Definition of AOM

A diagnosis of AOM requires 1) a history of acute onset of signs and symptoms, 2) the presence of MEE, and 3) signs and symptoms of middle-ear inflammation.

Elements of the definition of AOM are all of the following:
1. Recent, usually abrupt, onset of signs and symptoms of middle-ear inflammation and MEE
2. The presence of MEE that is indicated by any of the following:
   a. Bulging of the tympanic membrane
   b. Limited or absent mobility of the tympanic membrane
   c. Air-fluid level behind the tympanic membrane
   d. Otoscopy
3. Signs or symptoms of middle-ear inflammation as indicated by either:
   a. Distinct erythema of the tympanic membrane
   b. Discoloration clearly visible to the ear
   c. Disturbance in language ability
   d. Deficit in normal activity

SNAP

Safety-net Antibiotic Prescription (SNAP)
- Write Rx for pt., but only fill if sx are not resolved in 48 hours
- Provide supportive otalgia treatment (NSAIDS, topical agents – benzocaine)

Common in parts of Europe, 1st introduced & studied by Cates in England
- 1st US study published in Sep. 2003
- Supported by AAP/AAP AOM guidelines in May 2004
- 70-90% of AOM resolves spontaneously
- Saves an additional visit and expense for parents

Siegel, et al, Pediatrics, Sep 2003
Treatment vs. Observation?

Other SNAP exclusion criteria
- T > 101.5°F (38.2°C)
- Sax > 48 hours
- Toxic appearing child
- Perforated TM
- Underlying chronic condition
- Recent AOM within last 3 mos
- Sax of impending perforation
- Coexisting bacterial infection
- Family unable to return for medical care if worsens
- Parent/guardian doesn’t understand the protocol

Management of AOM in Children

Based on what you are treating:

- Pathogens:
  - Viral (~20-40%)
  - S. pneumoniae (25-50%)
  - M. catarrhalis (10-15%)
  - H. influenzae (non-typeable) (20-50%)

- Amino-PCN: Amoxicillin, Ampicillin
  - 1st line drug of choice for AOM
  - 80-90 mg/kg/day (max adult dose 3 g/day)
  - 10d for children ≤ 5yo & severe disease
  - 5-7d for mild-moderate disease in children ≥ 6yo

- ~5% of AOM presents with TM perforation – Topical otic drops + pro abx are recommended

AOM case (cont)

- You wrote a Rx for high dose Amox, and his parent ended up filling it after 2 more days because he continued to c/o ear pain and his fever got higher
- What do you do if he comes back 3 days after starting Amox with persistent fever and left ear pain?
Take home points

- Dx of AOM requires 3 criteria: acute onset, middle ear effusion, sx of ME inflammation
- SNAP = pediatric compromise for watchful waiting, if uncomplicated, child > 2-5 yo
- High dose (80-90mg/kg) amoxicillin is still tx of choice
- Duration can be 5-7 d instead of 10 if >=6 yo

Common Peds ID Case #2

- 15 yo F presents with cough times 2-1/2 weeks
  - She has had no fevers > 101.5
  - Started with cold symptoms initially, with some rhinorrhea & sneezing, and the cough has gradually gotten worse
  - Her coughing is so frequent and severe that she usually can’t talk on her cell phone for longer than 5” without excusing herself to cough
  - There does not seem to be a change in her coughing based on time of day or night, usually nonproductive
  - Once or twice her coughing has been so severe she has thrown up

Additional PMH, SH, etc.-Case #2

- She does remember being at a slumber party a little over a week ago where the host was coughing
- History of wheezing as an infant, + family hx of asthma
- Denies smoking cigarettes or other substances

Physical Exam – Case #2

- Afebrile, VS wnl including nl RR
- Has several coughing episodes during your history/exam requiring both of you to stop what you are doing
- HEENT exam wnl, no sinus tenderness, nares unremarkable
- Lungs are CTA B. No wheezes, good AE bilat.
- Exam is otherwise unremarkable
Her differential dx includes all of the following **except**:

1. Cough variant asthma
2. Viral URI
3. Sinusitis
4. Pertussis
5. Bacterial bronchitis

**What is pertussis?**

- A respiratory disease caused by infection with a bacterium called *Bordetella pertussis*
- AKA “whooping cough”
- Outbreaks first described in 16th century
- *Bordetella pertussis* isolated in 1906

**What are the symptoms?**

3 stages:
- **Catarrhal (runny nose)** stage: Typically 1-2 weeks
  - Similar to common cold
  - Runny nose, low-grade fever, mild cough, +/- sneezing
  - Cough usually gradually gets worse.
- **Paroxysmal** stage: 1-6 weeks (up to 10 weeks)
  - Coughing spasms
  - Classically followed by a high-pitched whoop
  - Other manifestations include turning blue, vomiting after coughing, and apnea (not breathing for 15-20s)
- **Convalescent** stage: Weeks to months
  - Gradual improvement in symptoms

**Symptoms (continued)**

- **Convalescent** stage:
  - Gradual improvement in symptoms
- **Key differences by age**:
  - Young infants and adults may not have classic whoop or paroxysms
  - Adolescents and adults usually have much milder symptoms
  - Young infants are at higher risk for complications

**What are some complications?**

- Secondary bacterial pneumonia
- Seizures (convulsions)
- Encephalopathy (a diffuse disorder of the brain)
- Less common:
  - Pulmonary hypertension (high blood pressure in the lungs), sweating attacks, syncope (fainting), mechanical problems
- Less serious:
  - Ear infections, poor appetite, and dehydration

**How is it diagnosed?**

- Generally a clinical diagnosis
  - Cough lasting > 2 weeks with 1 or more of the following: paroxysms, inspiratory “whoop,” vomiting after cough, and no other diagnosis
- **Testing for B. pertussis** is not very reliable
  - Culture
  - Polymerase Chain Reaction
  - DFA
  - Serology
**Why is it underdiagnosed?**

- Among teens and adults, the disease is less "typical."
- Lots of other causes of "chronic cough" in teens and adults.

**National trends by age**

![Graph showing number of reported pertussis cases by year and age group.](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5450a3.htm)

**How is pertussis treated?**

- **Macrolides** are the drug of choice:
  - Erythromycin for 14 days
  - Treatment dose and length = for prophylaxis
  - Decreases shedding and if started early enough (during catarrhal phase) may decrease length of illness
  - Erythromycin may cause diarrhea as a side effect
  - Azithromycin or clarithromycin have also been used with less side effects. Some data suggest these alternates are as effective (> 6 mos old)
  - Higher tissue half-life and longer half-life
  - Trimethoprim-Sulfamethoxazole (Bactrim, Septra, co-trimoxazole)
  - May be used as an alternative in erythromycin allergic cases or contacts (> 2 mos old)
  - PCNS & 1st/2nd generation cephalosporins are NOT effective.

**A couple other tidbits she adds:**

- I also babysit my 3 mos old niece after school and on the weekends.

**Report to public health**

- Pertussis is on the list of legally notifiable diseases.
- Prophylaxis should be recommended and provided to close contacts.
  - Especially those at highest risk...infants, immunocompromised.

**Data on complications by age**

![Table showing number of hospitalizations and complications by age group.](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5104a1.htm)

- Younger age, higher proportion of hospitalizations and complications as noted above.
- In 2000, total of 17 deaths in 12 states. All deaths were in infants <4 months old.
How does it spread?

- "respiratory droplets"
- Contact with respiratory secretions (saliva, runny noses, sneeze, mucus)
- Non-immune household contacts are at highest risk of catching it from an ill patient
- Incubation period is ~7-10 d, up to 21 d
- Most infectious from the time symptoms start until 2-3 weeks after the cough starts
  - Or up until 3 days after antibiotics have started

How can we prevent pertussis infections?

- Good hand and respiratory “hygiene”
- VACCINE!
- Secondary prevention:
  - Prophylaxis of close and high-risk contacts to cases

Tdap

- 2 new vaccines licensed in 2005 for single dose booster
  - BOOSTRIX (GSK) for 10-18 yo
  - ADACEL (Sanofi pasteur) 11-64 yo
- June 2005: ACIP recommendation for 11-18yo booster (to replace Td)
  - Preferred age 11-12yo
- October 2005 ACIP recommendation for adults 19-64 yo booster (also to replace Td)
  - The ACIP also recommended Tdap for adults who have close contact with infants <12 months of age.
- On December 15, 2006 the MMWR published the ACIP recommendations.

Pertussis Take Home Points

- Keep it in your differential for cough > 2 weeks
- Testing has improved but it still is primarily a clinical dx
- Report suspected or confirmed cases to your local health department
- Consider who needs prophylaxis – infants are at highest risk for severe disease
- Get Tdap booster if you haven’t already!

Common Pediatric ID Case #3

- You receive a call from your patient Ms. A at 8:00 am.
- She went into her 20-month-old daughter’s room this morning and saw a bat flying in the room.
- She picked up her daughter immediately, carried her out and closed the door.
- Ms. A wants to know what to do. Is there any medical reason to be worried?

Questions to ask:

- What other humans or animals were also in that room?
- Has she called Animal Care and Control?
- Was the bedroom door closed overnight, or open?
- What portals of entry to the bedroom from the outside are there?

- Their family dog, Fido, sleeps faithfully at her daughter’s bedside every night. No other siblings or humans sleep in the same room.
- No, the bat is presumably still in the room and you are the 1st place she has called.
- The bedroom door was closed, but the window was cracked open.
Questions to Consider:

- Is her daughter at risk for rabies? Are any other household members at risk for rabies?
- Should you report this exposure to the health department?
- If she is at risk, how can she get post-exposure prophylaxis?

Which animal poses the highest risk of rabies infection?

1. Dogs
2. Cats
3. Skunks
4. Ferrets
5. Bats

Shift in Human Rabies source in the US

![Graph showing the shift in human rabies source](Messenger SL, CID, 2002:35:738)

Human Rabies in the US

- **1958-2000:**
  - Total of 57 cases
  - 35 human cases from indigenous sources
  - 32/35 (91.4%) bat variant
  - Including 26/28 cases with no bite history
    - Of these 26, over 1/2 no bite noted
    - 4 reported bats in the home
    - 12 reported physical contact with bats

- **1990-2003:**
  - Total of 38 human cases
  - 31 from domestic sources
  - 29/31 (93%) bat variant
  - Only 3 reported a known bite

Reported Rabies by County and Species, CA, 1993-2002

![Map showing reported rabies cases](http://www.dhs.ca.gov/ps/dcdc/disb/pdf/CA%20Rabies%20Data%201993-2002.pdf)
Human Rabies closer to home

- CA case 2000
  - 49 yo M his wife later remembered he removed a bat from their home 2-3 months prior to sx, but no known bite exposure
- CA case March 2002
  - 32 yo M in Glenn county, killed bat in house 8 days prior to sx, no known bite exposure
- CA case September 2003
  - 66 yo M in Shasta/Trinity county, bat bit his finger ~1 month prior to sx
  - Alameda County – November-Dec 2006
    - 11 yo bitten by dog in Philippines 2 y prior
- Last SF case - 1987
  - Dog bite exposure in the Philippines
  - 2001 CA - Same exposure history

Rabies Transmission

Rabies virus is transmitted in saliva or nervous system tissue from an infected animal to another animal or human via:

- Bite exposures--teeth penetrate skin
- Non-bite exposures--saliva or nervous system tissue of rabid animal contaminates
  - Open skin cuts, wounds, abrasions, scratches
  - Mucous membranes

Risk for rabies, following an exposure

- Type of exposure: Bite vs. non-bite
  - often difficult to determine, especially with bats
- Provoked vs. non-provoked
  - animals behaving strangely
- Mammal responsible for the exposure

Who to call in San Francisco

To report an animal bite only:
- Contact Animal care and control:
  - 554-9422
  - (After hours - 24 hour line: 554-9400)

To report a possible rabies exposure or discuss the need for PEP:
- Contact CDCU
  - 554-2830 (press 1 for on call MD after hours)

http://www.sfdph.org/cdcp

Role of public health

- Interview the case; evaluate for rabies exposure and make recommendations for post-exposure prophylaxis (PEP)
- Work with Animal Care and Control to:
  - Facilitate isolation & vaccination of biting dogs, cats & other animals
  - Facilitate acquisition & preservation of animal tissue for rabies testing
- Work with the Public Health Lab to facilitate rabies testing of animal specimens

Rabies PEP: HRIG

- Passive immunization with HRIG (Human Rabies Immune Globulin)
  - Given once w/1st rabies PEP vaccination to those who have not received pre-exposure rabies vaccination
  - Can be given up to 7 days after 1st dose of rabies PEP vaccine
  - Recommended dose: 20 IU/kg, infiltrated into & around wound (as much as possible). Remainder given IM, distant from vaccination site.
Rabies PEP: Vaccine
- 3 types of killed rabies vaccine licensed for use in the US
- All 3 can be used with HRIG
- Five doses - Days 0, 3, 7, 14 and 28
- Very important to adhere to schedule
- Given IM
  - in adults/adolescents: deltoid area
  - in ped: anterolateral thigh-- (NOT gluteal)

Rabies Vaccine Adverse Reactions
- Local reactions in 30 – 74%; pain, erythema, swelling, and/or itching at injection site
- Systemic reactions in 5 – 40%; headache, nausea, abdominal pain, muscle aches, dizziness
- Rare Guillain-Barre-like syndrome: 3 reported cases in past 20 years
  - Symptoms resolved within 12 weeks
  - No neurologic sequelae

Prevention
- Vaccinating domestic animals against rabies
- Vaccinating persons with occupational or recreational risks
- Public education:
  - Teach children (and adults) NEVER to handle or provoke wild animals, ESPECIALLY sick or dead bats
  - Immediately wash all animal bites
  - Home bat exclusion

Rabies take-home points
- Is the mammal at high risk for rabies infection?
  - CA - bats, bats, bats
  - US - raccoons > skunks > bats > other carnivores
  - Developing countries - dogs still a source
- How significant was the exposure?
  - Bites worse than non-bites; facial bites worst
  - Determining bat exposure is tricky, hx of bite not necessary—err on side of giving PEP, especially if nonverbal individual could have been exposed, or unconscious/sleeping person could have been exposed

Rabies take-home points
- Report the bite to Animal Care & Control so animal can be tested or quarantined
- Call local public health for questions about PEP

Common Pediatric ID Case #4
- 5 yo previously healthy M was seen by his PMD 2 days ago with URI sx and Dx with AOM.
  - Rx Amoxicillin x 10 days
- Now he comes into your office with fever to 39, mom says he complained of a headache, and now is lethargic
- PE: Toxic appearing, lethargic child in no resp. distress. T 39.5, HR 170, RR 22, BP 90/60
  - Nuchal rigidity difficult to assess with lethargy
  - No unusual rashes

Modified slide courtesy of Sandra Huang, MD - SFDPH
Clinical hx/LABS - Case #4

- You immediately tx him to ED for labs and admission. You empirically give him IM CTX because your office is half an hour from the nearest ED.
- Peripheral WBC 16, 90% pmns, 3% bands, nl hct, pltts 180. Nl pt/pttt
- Bld & urine cxss were sent from ED. LP initially was attempted a few hours after adx...unsuccessfully
- Pt’s condition and MS deteriorated, and he was intubated and txed to ICU

Would you recommend post-exposure prophylaxis (PEP) for contacts?

1. Yes – for H. flus
2. Yes - for Syp. Pneumos
3. Yes – for meningococcal disease
4. No – she had no purpura/petechiae, no DIC, thus PEP for mening, not indicated.
5. No – it was likely viral

Clinical course – Case #4 cont.

- Repeat LP attempt 24 hours later showed:
  - CSF: gss: wbcswbcs but no org. seen
  - WBC 115 90% polys, 3% lymphs
  - RBC 3
  - Glucose 18
  - Protein 80
- Blood, urine, and CSF cxss all remained negative
- What is the most likely etiology of his clinical status and CSF findings?
  - His immunizations are UTD for age
  - Born in US – no risk Fs for TB

N. meningitidis

- Gram negative, aerobic, diplococcus
- Serotypes: A, B, C, Y, W-135
- Incubation period
  - 1-10 days, usually < 4 days
- Infectious period
  - from onset of symptoms
  - typically considered infectious until 24 hours of antibiotics
- Transmission
  - via respiratory droplets
  - up to 20% of people are carriers
Epidemiology

- Leading cause of bacterial meningitis and sepsis in US
  - 0.8-1.5 per 100,000/year
  - 2500-3000 cases/year
- California
  - 0.9-1.3 per 100,000/year
  - 300-400 cases/year

Risk factors

- Age:
  - infants (5.6/100K)
  - adolescents/young adults (1.6-1.8) increasing
- Lower SES
- African-American (1.3)
- Tobacco smoke exposure
- Immune deficiencies:
  - HIV
  - no spleen (function or anatomic)
  - complement deficiency
- Settings
  - outbreaks (2-5% of cases)
  - school contacts 2X > risk
  - household contacts 400-800X higher
  - crowded conditions
  - freshman dormitories (3.1/100,000, new military recruits)

CDHS, Meningococcal Disease Prevention Plan Sep 2002
Take home points – Case #4

- All meningitis is reportable to public health department
- Absence of petechiae/purpura are not reasons to rule out meningococcal disease
- Begin thinking about close contacts – public health department will do thorough investigation but consider initiating PEP for highest risk contacts