JUDICIOUS USE OF ANTIBIOTICS IN TREATMENT OF ACUTE OTITIS MEDIA

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INTRODUCTION

> 80% of children will suffer from at least one episode of AOM by 3 years of age

40% will have > 6 recurrences by age 7 years

Most common diagnosis for which antibiotics are prescribed in children
AOM—Concerns

- May be associated with considerable distress:
  - otalgia, fever, malaise

- Persistent middle ear effusion can cause CHL
  - speech & language delay and behavioral changes

- WHO estimates 51K deaths/yr in children < 5 yrs attributable to intracranial complication
USE OF ANTIBIOTICS

- Role of antibiotics has become controversial over the last decade

- Some experts advocate initial observation
  - Most children (80%) with AOM recover spontaneously
  - Inappropriate antibiotic use recognized as key factor in development of antibiotic resistance
WHO GETS EAR INFECTIONS?

Age 6 months to 2-3 years
RELATIVE IMMUNODEFICIENCY

Thanks to Dr. Sorensen
HOW DOES IT GET TO THIS?
RISK FACTORS

- Age
- Daycare
- Environmental smoke & irritants
- Lack of breast feeding
- Supine feeding practices

- Use of pacifiers
- Family history
- Craniofacial abnormalities
- Immune deficiencies
- Gastro-esophageal reflux
ROLE OF THE EUSTACHIAN TUBE
Eustachian Tube Dysfunction

Eardrum bows inward due to lower middle ear pressure.

- Blocked eustachian tube
- Imbalanced air pressure

Throat
FREQUENT URI’S
DAYCARE
SECONDARY CIGARETTE SMOKE
PRESENCE OF ADENOIDs
OTOPATHOGENS

- *S. pneumoniae*
- *H. influenzae*
- *M. catarrhalis*

- *S. pyogenes*—less frequent & older age groups
Acute symptoms of infection
- Fever
- Irritability/malaise
- Otalgia

Evidence of middle ear inflammation

Effusion
Accuracy of Diagnosis

Diagnosis can be difficult due to overlap with signs and symptoms of other respiratory infections.

Relies on good visualization of tympanic membrane, clearance of cerumen, cooperation of child.

Functional testing—tympanometry, acoustic reflexometry may assist.
REASONS NOT TO TREAT

- Largely a self-limited condition—spontaneous resolution in approximately 80%
- Decline noted in suppurative complications in developed countries
- Increased awareness of link between Rx of antibiotics & resistance of bacteria
WHY DO WE TREAT?
POTENTIAL BENEFITS OF ANTIBIOTICS

- Decrease of duration of disease
- Alleviates symptoms after the first 24 hours
- Avoidance of suppurative complications
SUPPURATIVE COMPLICATIONS

- Mastoiditis
- Meningitis
- Bacterial sepsis
- Intracranial abscess
EPIDURAL ABSCESS
COMPLICATIONS OF AOM

- Suppurative complications
- Prolonged fever or irritability
- Persistent hearing loss
ADVERSE EFFECTS OF ANTIBIOTICS

- Rash
- GI—abdominal pain, diarrhea, vomiting
- Yeast infections
- Increased cost
- Multibacterial resistance
S. PNEUMONIAE RESISTANCE

developed through mutation of penicillin binding proteins
Between 15% and 50% (average 30%) of URT isolates of *S. pneumoniae* are not susceptible:
- Half are highly resistant MIC 2 ug/ml or higher
- Half are intermediate MIC between 0.1-1 ug/ml

Standard dosing of amoxicillin recommends:
- Prior to PCN resistance: 40-50 mg/kg/d
- After PCN resistance: 80-90 mg/kg/d
As susceptibility to penicillin decreases
  - Susceptibility to cephalosporins decreases
  - Susceptibility to macrolide & TMP-SMX decreases

Varies greatly according to geography
Approximately 50% of isolates of *H. flu* & 100% isolates of *M. catarrhalis* are beta-lactamase positive.
 WHAT IS THE ROLE OF VACCINES?

- Flu vaccine—targeting single viruses insufficient to reduce disease burden
- Substantial serotype specific efficacy achieved with pneumococcal conjugate vaccines
ROLE OF VACCINES IN AOM

Thanks to Dr Sorensen
Virtually all strains of *S. pneumoniae* have a polysaccharide capsule—basis for serotyping.

- 91 distinct serotypes have been identified.
- Globally 20 serotypes account for > 80% IPD.
- PCV-7 contains most prevalent serotypes causing invasive pneumococcal disease in young children—4, 6B, 9V, 14, 18C, 19F, 23F.
PREVNAR-7

- Introduced into routine immunization schedule in 2000
- Active immunization of infants & toddlers against invasive disease *S pneumoniae*
- Immunization scheduled at 2 mos, 4 mos, 6 mos, and 12-15 months
IMPACT OF PCV-7

- Since introduction: decline incidence
  - Pneumococcal meningitis
  - Pneumonia
  - Bacteremias
  - Otitis media
- Reduction in IPD due to vaccine serotypes
**EFFECTS OF VACCINE**

- Overall reduction of AOM by 6%
- Reduction in tympanostomy tubes 7%
- Supports reduction in pneumococcal resistance as well as use of antimicrobials
- Emergence of non-vaccine serotypes
- Development of 13-valent vaccine
H INFLUENZAE

- After introduction of PCV-7: increase in proportion of all AOM pathogens
- High prevalence makes it important pathogen

Risk of developing complications
  - Mastoiditis 0.3/1000 vs *S pyogenes* 11.6/1000
  - Persistent MEE 52% vs *S pneumoniae* 84%
H INFLUENZAE

- Increased potential of it being a pathogen—either as single organism or mixed infection:
  - Bilateral AOM
  - >3 previous episodes
  - Use of antibiotics during previous month

- More likely to be associated with recurrence and chronicity
ANTIBIOTICS OR OBSERVATION?
CLINICAL PRACTICE GUIDELINES

- Published in *PEDIATRICS* May 2004
- AAP & AAFP convened committee
- PCP & experts in ENT, epidemiology, & ID
- Diagnosis & management of AOM
- Evidence-based guidelines to recommend management of children age 2 mos to 12 yrs
INTENT OF GUIDELINES

- Evaluate published evidence of natural history & management of uncomplicated AOM
- Make recommendations based on evidence
- Scope: uncomplicated AOM (age 2 m-12 yrs)
- Applies only to otherwise healthy child
- Excludes CP, genetic issues (DS), immune issues, presence of cochlear implants
- Excludes recurrence within 30 days of AOM with underlying chronic OM with effusion
RECOMMENDATION #1—DIAGNOSIS

To diagnose AOM, clinician should confirm:

- Acute onset

- Middle ear effusion—documented by bulging or limited mobility of TM or presence of otorrhea

- Signs & symptoms of middle ear inflammation—otalgia with distinct erythema or purulence