Antibiotic Resistance in UTI

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Prevalence

- The most common bacterial infections in humans.
- Between age 1-50 Y/O, Predominantly see in women.
- 30 times more common in women
- The most neonatal cases of UTI occur in males.
Prevalence, cont…

- 25-35% women in age 20-40 Y/O have had UTI.
- Incidence in adult men is very low.
- The most common nosocomial infection.
Classification

- Lower UTI
- Upper UTI
Terminology

- **Lower UTI**
  - Cystitis, Urethritis, Prostitis, Epididymitis

- **Upper UTI**
  - Pyelonephritis
Types of UTI

- Uncomplicated

- Complicated
Uncomplicated UTI

- Most common
- Acute uncomplicated cystitis
- No underlying anatomic, or functional GU abnormalities
- Usually occur in otherwise healthy women
Uncomplicated UTI, Pathogens (always single pathogen)

- E.Coli (85%)
- Staph. Saprophyticus
- Klebsiella
- Proteus
- Pseudomonas
Complicated Factors

- Male sex
- Elderly
- Catheter
- Obstruction/stone
- Prostatic hypertrophy
- Pregnancy
- Diabetes
Complicated UTI, conti…

- Immunosuppression
- Childhood UTI
- Recent antibiotic use
- Symptoms for >7d
- Hospital acquired
Complicated UTI, Pathogens

- E.Coli <50%
- Enterobacteriaceae and other gram negative
- Staph aureos
- Enterococcus
- Pseudomononase
Pathophysiology

- Ascending
- Hematogenous
- Lymphatic
Pathophysiology

Blood stream

Hematogenous infection

Kidney

Ureter

Bladder

Ascending infection

Urethra
Uropathogenic *E. coli* (UPEC)

- **Aerobactin Iron Transport**
- **Flagella**
- **Capsule**
- **LPS**
- **Cytotoxins and Hemolysins**
- **Pap**
- **Type 1 Fimbriae**
- **Bind urethra and bladder**
- **Pyelonephritis associated pili**
- **Bind bladder and kidney**
Host Defense Mechanisms

- Low urine PH
- Extremes urine osmolality
- High urine urea conc.
- High organic acid conc.
- Prostatic secretions
- IG (IgA, IgG)
- Antiadherence (Glycosaminoglycan layer, Tamm-Horsfall protein)
Lower UTI: S&S

- Frequency
- Urgency
- Dysuria
- Nocturia
- Low back pain
- Acute onset
- Suprapubic heaviness
- Hematuria (+/-)
Upper UTI: S&S

- Fever
- Chills
- Flank pain
- CVA tenderness
- Abdominal pain
- N/V
- Malaise
S&S Notes

- Many elderly patients are asymptomatic

- Nonspecific symptoms in neonate and child < 2 Y/O
Risk Factors

- Intercourse may precede UTI onset
- Frequency of intercourse
- Spermicidal use
- Diaphragm use
- Fecal-vaginal contamination
- New sexual partner
- Recent antibiotic use
- Douching
- Clothing selection
- Tampon use
Diagnosis
URINALYSIS.

I'M PISSED.
UA

- Color
- Specific gravity
- pH
- Glucose
- Protein
- Leukocyte (Pyuria): $\geq 8$ WBC/ml urine
- WBC cast
- RBC
≥10^5 CFU bacteria/mL in a symptomatic female

≥10^3 CFU bacteria/mL in a symptomatic male

≥10^5 CFU bacteria/mL in asymptomatic individuals on two consecutive specimens

Any growth of bacteria on suprapubic catheterization in a symptomatic patient

≥10^2 CFU bacteria/mL in a catheterized patient
ASPs in UTI

- Optimal selection
- Dose
- Duration
- Fewest toxic effects and the lowest risk for subsequent resistance
Treatment issues?

- Empirical treatment

- Based on urine culture and susceptibility testing
Drug of Choice?

- TMP/SMX or TMP alone in areas where prevalence of resistance to these drugs among E.Coli strains causing UTI is <20%
- Alternatives: FQs, Nitrofurantoin
Empiric treatment and resistance

- Between 1991-1999, use of broad-spectrum antibiotics increased from 24% to 48%
- Quinolone use for UTI treatment increased from 17% to 35%
- TMP-SMT resistance E.Coli: Doubled over 5 years (9-18%)
- Nitrofurantoin, Quinolones, AG resistance UTIs bacteria: 0-0.2%
Iran
### UTI- Kashan

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>No. of isolate</th>
<th>AMP%</th>
<th>SXT%</th>
<th>NIT%</th>
<th>NAL%</th>
<th>CIP%</th>
<th>CTN%</th>
<th>GEN%</th>
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<td>18.2</td>
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AMP=Ampicillin, SXT=Trimethoprim-Sulfamethoxazol, NIT=Nitrofurantoin, NAL=Nalidixic acid, CIP=Ciprofloxacin, CTN=Cephalothin, GEN=Gentamicin

### Resistance of leading Gram negative bacterial isolates

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<thead>
<tr>
<th></th>
<th>AMP</th>
<th>STX</th>
<th>CEF</th>
<th>GEN</th>
<th>AMK</th>
<th>NIT</th>
<th>NAL</th>
<th>KAN</th>
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<th>ZOX</th>
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**Abbreviations:** AMP, ampicillin; STX, trimethoprim-sulfamethoxazole; CEF, cephalothin; GEN, gentamicin; AMK, amikacin; NIT, nitrofurantoin; AL, nalidixic acid; KAN, kanamycin; CRO, ceftriaxone; ZOX, ceftizoxime; CAZ, ceftazidime; CFM, cefixime; TOB, tobramycin; CAR, carbenicillin.

*Data are given as percent.*
Resistances of leading Gram positive bacterial isolates

<table>
<thead>
<tr>
<th>Isolate</th>
<th>AMP</th>
<th>STX</th>
<th>CEF</th>
<th>GEN</th>
<th>AMK</th>
<th>NIT</th>
<th>NAL</th>
<th>CLI</th>
<th>CFZ</th>
<th>LEX</th>
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Abbreviations: AMP, ampicillin; STX, trimethoprim-sulfamethoxazole; CEF, cephalothin; GEN, gentamicin; AMK, amikacin; NIT, nitrofurantoin; NAL, nalidixic acid; CLI, clindamycin; CFZ, cefazolin; LEX, cephalexin; ERY, erythromycin; PEN, penicillin; VAN, vancomycin; OXA, oxacillin; CoNS, coagulase negative staphylococci; G. D. streptococci; group D streptococci.

* Data are given as percent.
Table 3: Antimicrobial resistance of *E. coli* to sulphamethoxazole-trimethoprim in community-acquired UTI

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Country/Location</th>
<th>% Resistant</th>
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<tr>
<td>Karlowsky(^{28}) (2001)</td>
<td>USA (Pennsylvania)</td>
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<td></td>
<td>USA (Iowa)</td>
<td>33.3</td>
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<tr>
<td>Ishihara(^{29}) (2002)</td>
<td>Japan (Gifu)</td>
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<tr>
<td>Karlmeter(^{30}) (2003)</td>
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<tr>
<td></td>
<td>Finland</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>Germany</td>
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</tr>
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<td></td>
<td>Portugal</td>
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<tr>
<td></td>
<td>Ireland</td>
<td>20.8</td>
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<tr>
<td>Jose(^{31}) (2003)</td>
<td>United Kingdom</td>
<td>12.2</td>
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<td>Matute(^{32}) (2004)</td>
<td>Brazil (Sao Paulo)</td>
<td>50.0</td>
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<td>Al-Tawfiq(^{33}) (2006)</td>
<td>Nicaragua (Leon)</td>
<td>64.0</td>
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<td>Stratchounski(^{34}) (2006)</td>
<td>Saudi Arabia (Dhahran)</td>
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<td>Akram(^{35}) (2007)</td>
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<td>Test</td>
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<td>Unit</td>
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<td>------------</td>
<td>--------</td>
<td>------</td>
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<tr>
<td>Urine Culture</td>
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</table>

**Antibiogram**

- **Microbe:**
  - NON HEMOLYIC STREPTOCOCC 10^5

- **Sensitive:**  (tick)  
- **Intermediate:**  (tick)  
  - VANCOMYCIN

- **Resistance:**  
  - SULFAMETHOXAZOL - GENTAMYCIN - AMIKacin - ERTIZOXIME - PENICILLIN - OXACILLIN - ERYTHROMYCIN - CLINDAMYCIN - CIPROFLOXACIN - CEFTIRAXON - CLOxacillin

**Dr. A. S. Hosseini**
ASPs in UTI

- Optimal selection
- Dose
- Duration
- Fewest toxic effects and the lowest risk for subsequent resistance
Duration of therapy

- Single Dose Therapy
- 3 Days (Short course) Therapy
- 7-14 Days Therapy
Single Dose Therapy

- Only for acute lower UTI in young adult female

  TMP-SMT 4-6 Tab
  TMP 400mg
  Amoxicillin 3g
  Ampicillin 3.5g
  Nitrofurantoin 200mg
  Ciprofloxacin 500mg
  Augmentin 625mg
Short Course Therapy

- 3-days regimen is effective as 10-days regimen
- 3-days is antibiotic class specific: TMP-SMX, Augmentin, FQs
- Inappropriate for: Complicated UTI, UTI with comorbidities, History of resistance/recurrence/no response
ASPs in UTI

- Optimal selection
- Dose
- Duration
- Fewest toxic effects and the lowest risk for subsequent resistance
TMP/SMT

- Most common ADRs:
  - Skin reactions (3-4%)
  - GI (3-8%)
- Efficacy: 90-95% for susceptible pathogens with 3-days therapy
Fluoroquinolones

- Most common ADRs:
  - Nausea: 3-8%
  - Headache: 2-6%
  - Diarrhea: 2-6%
  - Insomnia: 4%

- Efficacy: >95%
Nitrofurantoin

- Most common ADRs:
  - Nausea 8%
  - Headache 6%
- Efficacy 81-86%
Drugs and Pregnancy

- Nitrofurantoin  B
- FQ              C/D
- TMP             C
- SMX             C/D
- Beta-lactams    B
Symptomatic Treatment

- Urinary Analgesics: Phenazopyridine

- Urinary Antispasmodics: Oxybutinine HCL
ASYMPTOMATIC BACTERIURIA

- Finding of two consecutive urine cultures with more than $10^5$ organisms/mL of the same organism in the absence of urinary symptoms
- Most patients with asymptomatic bacteriuria are elderly and female.
- Pregnant women frequently presents with asymptomatic bacteriuria
- May develop pyelonephritis
ASYMPTOMATIC BACTERIURIJA

- In children, because of a greater risk of developing renal scarring and long-standing renal damage, treatment should consist of 10-14 days of therapy as that for symptomatic infection.
- In the nonpregnant female, therapy is controversial.

Asymptomatic bacteriuria occurs in 4% to 7% of pregnant patients.

Of these, 20% to 40% will develop acute symptomatic pyelonephritis during pregnancy.

Routine screening tests for bacteriuria should be performed at the initial visit and again at 28 weeks’ gestation.

In patients with significant bacteriuria, symptomatic or asymptomatic, treatment is recommended so as to avoid possible complications.
ASYMPTOMATIC BACTERIURIARIA-PREGNANCY

- 7 days
- The administration of a amoxicillin, amoxicillin/clavulanate, cephalexin, or nitrofurantoin is effective in 70% to 80% of patients.
- Sulfonamides should not be administered during the third trimester because of the possible development of hyperbilirubinemia.
- Fluoroquinolones should not be given because of their potential to inhibit cartilage and bone development in the newborn.
- A followup urine culture 1 to 2 weeks after completing therapy and then monthly until gestation is recommended.
Symptomatic Abacteriuria

- Symptoms of lower UTI
- No MO in Culture
Symptomatic Abacteriuria

- Urethritis (C. Trachomatis, N. Gonorrhoea, HSV)
- Vaginitis (Candida, Trichomonas)
Symptomatic Abacteriuria

- Single-dose or short-course therapy with trimethoprim-sulfamethoxazole has been used effectively.

- If single-dose or short-course therapy is ineffective, a culture should be obtained.

- If the patient reports recent sexual activity, therapy for *C. trachomatis* should be considered. Chlamydial treatment should consist of:
  - 1 g azithromycin or doxycycline 100 mg twice daily for 7 days.
Relapse

- Same MO

- Within 1-2W after the completion of therapy
Relapse Etiology

- Resistance
- Noncompliance
- Inappropriate choice of antibiotic
- Complicating factors
Relapse Treatment

- Same antibiotic or others?

- Duration: Usually 14 days
  If relapse after a second 2W course of therapy, treat for 6W,..... then 6-12M
Reinfection

- With different MO
- May occur at any time (during or after therapy, often >2W)
- 80% of recurrences
Reinfection Risk Factors

- Sexual intercourse
- Diaphragm/Spermicidal use
- History of recurrent UTI
- First UTI at <15Y/O
- Mother with history of UTI
- Reduced Level of estrogen
Reinfection Treatment

- Use narrow spectrum antibiotic
- FQ
- Nitrofurantoin
Consider in any patient with **two or more episode of UTI per year**

Duration: 6mo

- during which time urine cultures are followed monthly
Recurrent Infections

- In women who experience symptomatic reinfections *in association with sexual activity*:
  - voiding after intercourse
  - single-dose prophylactic therapy with trimethoprim-sulfamethoxazole taken after intercourse
Prophylactic Drugs

- Cephalexin 125-250mg/d
- Nitrofurantoin 50-100mg/d
- TMP/SMT 240mg/d
- TMP 100mg/d
URI

Rational Use of Antibiotics
Introduction

- Upper Respiratory Infections (URI) Include:
  - Common Cold
  - Otitis Media
  - Pharyngitis
  - Sinusitis
Common Cold

- A group of self-limiting diseases caused by members of several families of viruses
- The most frequent acute illness
- Mild upper respiratory viral illness:
  - Sneezing, nasal congestion and discharge, sore throat, cough, low grade fever, headache and malaise
Common Cold

- **2000-2001 in USA:**
  - About 500 million non-influenza viral respiratory infections
  - Direct costs: 1.7 billion $
  - Indirect costs: 22.5 billion $

- **Average incidence:**
  - Preschool: 5-7 episodes/year
  - Adults: 2-3 episodes/year
Virology

- Over 200 subtypes:
  - 30-50%: Rhinoviruses: more than 100 serotypes
  - 10-15%: coronaviruses
  - 5-15%: influenza
  - 5%: parainfluenza

- Influenza and parainfluenza cause more systemic responses
Virology

- It is not possible to determine likely viral pathogen on the basis of clinical illness
Transmission

- Hand contact:
  - viruses may remain viable in human skin for at least 2 hrs
- Small particle aerosols (droplet transmission): most common cause
- Large particles: direct hit from infected person
Clinical features

- Incubation period: 1-3 days
- Symptoms may be largely due to immune response rather than direct viral damage
Clinical features

• Symptoms vary from the patient to patient:
Clinical features

- Symptoms vary from the patient to patient:
  - Cough becomes troublesome on the 4\textsuperscript{th} or 5\textsuperscript{th} day, by which time the nasal symptoms are less severe
  - Nasal symptoms may appear purulent \textit{in the absence of a secondary bacterial infection}
- Usually persist for 3-7 days in the normal host
  - In 25\% last as long as 2 weeks
Common Cold

- Differential diagnosis:
  - Pharyngitis or tonsillitis (less nasal symptoms)
  - Acute bronchitis
  - Acute bacterial sinusitis (Facial pain and purulent nasal discharge)
  - Allergic rhinitis (No sore throat)
Complications

- Acute bacterial sinusitis in 0.5-2.5%
- Viral sinusitis more common
  - Radiographic sinusitis on day 7 was noted in 37% of adults with common cold
  - All patients recovered within 21 days without antibiotic and intranasal steroid use was of no benefit
Treatment

- Mainstay: **Symptomatic therapy**
- In the absence of evidence of secondary bacterial infections, **antibiotics are not effective in the treatment of the common cold and should not be prescribed**
Treatment

- NICE guidelines recommend that patients should:
  - Be advised of usual course (up to 1.5 weeks for a cold and up to 2 weeks in smokers)
  - Symptomatic management
  - **Be reassured that antibiotics are not needed and may have side effects**
  - Be advised to return for review if their condition worsens or exceeds the expected time
Treatment

- Ipratropium bromide:
  - For rhinorrhea and sneezing
  - 2 puff per nostril x 3-4 times
- Cromolyn sodium
- Antihistamines
- Antitussives: ACCP do not recommend codeine and dextromethorphan
- Expectorants: marginal benefit
- Decongestants: topical or systemic
- Intranasal steroids: No benefit
Treatment

- Zinc: a few investigations have reported a decrease in the duration of colds, specially if therapy was started within 1st 24 hrs
- Vit C:
  - Was not superior to placebo in decreasing cold severity
  - Was effective in preventing cold
- Echinacea: no benefit
Treatment

• **Antibiotic therapy:**
  - In uncomplicated URI is likely to cause more harm than benefit
  - A systemic review of RCTs in people with URI for less than 7 days found that *persistence of symptoms was same* for those who received antibiotics as for those who received placebo; however people who received antibiotics *had significantly greater risk of ADRs*  

Treatment

- Heated humidified air: warm vapor inhalation can reduce symptoms
- Sore throat is best treated with mild analgesics such as aspirin and acetaminophen
Prevention

- Vit C
- Vit D: RCTs are needed to confirm
- Vit E: further studies needed
- Herbal products: no herbal products has been conclusively shown to significantly impact the incidence of the common cold
- Exercise:
Summary

• Symptomatic therapy remains the mainstay of common cold treatment:
  • Intranasal ipratropium or cromolyn or a topical or oral decongestant
  • Systemic treatment of cough: dextromethorphan or guaifenesin
  • Antihistamines especially 2nd gen for rhinorrhea
Summary

- In the absence of bacterial infection: no antibiotics
- Vit C, 200-500 mg/day for prevention of URI for people exposed to vigorous activity in extreme cold conditions
Pharyngitis
Pharyngitis

- **Definition:** Inflammation of the pharynx and surrounding lymphoid tissue

- **Microbiology**
  - **Viral** (rhinovirus, coronavirus): most of the cases
  - **Bacterial**
    - **GAS** (Streptococcus Group A) most common (15-30% of bacterial cases)
<table>
<thead>
<tr>
<th>Pathogen Category</th>
<th>Frequency, percent</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common bacterial pathogens</td>
<td>15</td>
<td>Group A streptococci</td>
</tr>
<tr>
<td></td>
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<td>Group C streptococci</td>
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<tr>
<td></td>
<td></td>
<td>Group G streptococci</td>
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<td>Less common bacterial pathogens</td>
<td>&lt;5</td>
<td>Chlamydomphilia pneumoniae</td>
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<td>Mycoplasma pneumoniae</td>
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<td>Archanobacterium haemolyticum</td>
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<td>Neisseria gonorrhae</td>
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<td>Viruses</td>
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<td>Epstein Barr virus</td>
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<td>Respiratory syncytial virus</td>
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<tr>
<td></td>
<td></td>
<td>Metapneumovirus</td>
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<tr>
<td>No pathogen isolated</td>
<td>30</td>
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</table>
Clinical Presentation

- **General**
  - A sore throat of sudden onset that is mostly self-limited.
  - Fever and constitutional symptoms resolving in about 3–5 days.
Clinical Presentation

- **Signs and symptoms**
  - Sore throat.
  - Pain on swallowing.
  - Fever.
  - Headache, nausea, vomiting, and abdominal pain (especially children).
  - Erythema/inflammation of the tonsils and pharynx with or without patchy exudates.
  - Enlarged, tender lymph nodes.
Clinical Presentation

- **Laboratory tests**
  - Throat swab and culture or rapid antigen detection testing
- Guidelines from the Infectious Disease Society of America, American Academy of Pediatrics, and the American Heart Association suggest that testing for Group A Streptococcus be done in all patients with signs and symptoms. Only those with a positive test for Group A Streptococcus require antibiotic treatment
Treatment

• Antimicrobial therapy should be limited to those who have clinical and epidemiologic features of Group A streptococcal pharyngitis with a positive laboratory test.

• As pain is often the primary reason for visiting a physician, emphasis on analgesics such as acetaminophen or NSAIDs
Treatment

- Either systemic or topical analgesics can be used, as well as antipyretics and other supportive care including rest, fluids, lozenges, and saltwater gargles.
- *Penicillin* is the drug of choice in the treatment of Group A streptococcal pharyngitis.
Treatment

- In patients allergic to penicillin, a macrolide such as *erythromycin* or a first-generation cephalosporin such as *cephalexin* (if the reaction is nonimmunoglobulin E–mediated hypersensitivity) can be used.

- Newer macrolides such as azithromycin and clarithromycin are *as effective as erythromycin* and cause fewer GI adverse effects.

- If patients are unable to take oral medications, intramuscular *benzathine penicillin* can be given.
Otitis Media
Otitis Media

- $3.8$ billion in expenditures
- Most common reason for visit to pediatrician
- Occurs in $>75\%$ of all children $\leq 2$yo
- Peaks between $6$mo-$3$yr; most likely due to eustchian tube obstruction
- Development of multidrug-resistant bacteria
Otitis Media - Definition

- Inflammation of the middle ear
Otitis Media - Classification

- Acute otitis media (AOM)
- Otitis media with effusion (OME)
- Chronic otitis media
- Recurrent otitis media
Acute Otitis Media – Sign & Symptoms

- Otalgia (discomfort referable to the ears)
- Irritability
- With or without fever
- Pts may experience nasal congestion, coughing, loss of appetite, vomiting, discharge from the ear
Acute Otitis Media - Diagnosis

1) Recent, usually abrupt onset of S&S
2) bulging, limited or absence motility of TM, otorrhea
3) S&S of middle ear inflammation including:
   erythema of TM, otalgia (discomfort referable to the ears and interference with normal activity or sleep)
Examination of tympanic membrane

- Redness or opacity
- Absence of light reflection
- Bulging
- Otorrhea

Healthy TM

Otitis Media
Chronic otitis media

- Chronic otitis media = lasting > 3mo
- Can present with S&S similar to those of AOM or with subtle changes in balance, lack of speech development, hearing loss
- Previously thought sterile
- 30-50% grow in culture
- over 75% PCR
- Usual organisms
Recurrent otitis media

- 3 episodes of AOM within 6mo period or ≥4 episodes within 1yr
OM - Breast-feeding

- Decreases incidence of URI and GI disease
- Inverse relationship between incidence of OM and duration of breast-feeding
- Protective factor in breast-milk?
OM - smoke exposure

- Induces changes in respiratory tract

- Increased otorrhea, chronic and recurrent AOM in children with hx of parental smoking
Microbiology

- Up to 50% of AOM due to viruses

**Bacteria**

- *S. pneumoniae* - 30-35%
- *H. influenzae* - 20-25%
- *M. catarrhalis* - 10-15%
- Group A strep - 2-4%
- Infants with higher incidence of gram negative bacilli (esp *E. coli*)
<table>
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<tr>
<th>Age</th>
<th>Certain Diagnosis</th>
<th>Uncertain Diagnosis</th>
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<tbody>
<tr>
<td>&lt;6m0</td>
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<td>Antibacterial therapy</td>
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<td>Antibacterial therapy if severe wait &amp; see (nonsevere)</td>
</tr>
<tr>
<td>&gt;2yo</td>
<td>Antibacterial therapy if severe wait &amp; see (nonsevere)</td>
<td>wait &amp; see</td>
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AOM-Treatment in low-risk children

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<thead>
<tr>
<th></th>
<th>Recommended</th>
<th>Alternative</th>
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</thead>
<tbody>
<tr>
<td>First line</td>
<td>Standard-dose amoxicillin</td>
<td>TMP-SMX</td>
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<tr>
<td></td>
<td></td>
<td>Azithromycin</td>
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<tr>
<td>Clinical failure</td>
<td>High-dose amoxicillin or co-amoxi</td>
<td>Cefdinir</td>
</tr>
<tr>
<td>after 48-72h</td>
<td></td>
<td>Cefpodoxime</td>
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<tr>
<td></td>
<td></td>
<td>Cefuroxime</td>
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### AOM-Treatment in high-risk children

<table>
<thead>
<tr>
<th>First line</th>
<th>Recommended</th>
<th>Alternative</th>
</tr>
</thead>
</table>
| high-dose amoxicillin | | Cefdinir  
Cefpodoxime  
Cefuroxime  
Cefixime  
IM ceftriaxone |

| Clinical failure after 48-72h | High-dose co-amoxi | Cefdinir(14mg/kg/d qd-bd)  
Cefpodoxime(10mg/kg/d bd)  
Cefuroxime(40mg/kg/d bd)  
Cefixime(8mg/kg/d qd,bd)  
IM ceftriaxone(50mg/kg/d) |
AOM-Treatment duration

- 10-14 days
- Ceftriaxone 3 days
Chronic OM-Treatment

- Another course of antimicrobial therapy
- Not ceftriaxone
- Some persons add oral corticosteroids
- Surgical placement of tympanostomy tube
Adjunctive Therapy

- Analgesics and antipyretics
  - Acetaminophen: 10-15mg/kg/dose Q4-6h
  - Ibuprofen: 5-10mg/kg/dose Q6-8h, esp at night
- Decongestants/ Antihistamines?
Complications

- The most common complication *is hearing loss*
- Meningitis
- Encephalitis
Prophylaxis

- For recurrent OM
- Begin immediately after completion of antibiotic therapy
- Continue for up to 3 mo
- Amoxi at $\frac{1}{2}$ standard daily dose
New Frontiers

- Prevention more cost effective than treatment
- Even slight decrease would have profound economic impact
  - Vaccines
Vaccines

- Pneumococcal vaccine
- H. influenzae
- Influenzae virus vaccine
Thanks for your attention