ANTIBIOTIC PRESCRIBING FOR COMMON INFECTIONS PNEUMONIA/UTI

Raymond E. Pontzer, MD, FACP

INFECTIONS IN THE ELDERLY

- Primary cause of death > 65 y.o.
- 90% of pneumonia mortalities occur in elderly
- Elderly have three times the mortality from pneumonia and ten times the mortality from urinary tract infections


INFECTIONS IN THE ELDERLY

- Be cognizant that creatinine clearance is decreased
- Metabolism may be slowed
- There may be other meds that pose hazard for drug-drug interaction
- Start with doses significant enough to quickly establish therapeutic serum/tissue levels
- The rule “start low, go slow” is not appropriate with antibiotic treatment
- Whenever possible, monitor drug levels
- Always narrow antibiotic spectrum when possible
  - Decreases probability for development of C. difficile colitis

PNEUMONIA

“Pneumonia is the captain of the men of death”

Sir William Osler

PNEUMONIA CLASSIFICATION

- Community Acquired Pneumonia
- Healthcare Associated Pneumonia
- Ventilator Associated Pneumonia

HEALTHCARE ASSOCIATED PNEUMONIA DEFINITION

- IV Rx, wound care within the prior 30 days
- Residence in a nursing home or other LTC facility
- Hospitalization in an acute care hospital for ≥ 2 days within prior 90 days
- Hemodialysis at hospital or clinic within prior 30 days

Associated with higher risk of multidrug-resistant bacteria
There are >100 microbiologic causes for pneumonia.

In routine clinical practice, etiologic organism is isolated <10%.

Bartlett JG. Clin Infect Dis. 2011;52 Suppl 4:S296

PNEUMONIA INCIDENCE & ETIOLOGY

- CDC looked at 2488 adult cases
- Annual incidence 24.8 cases per 10,000 adults ≥ 18 years
- Annual incidence 63.0 cases per 10,000 adults age 65-79 years
- Annual incidence 164.3 cases per 10,000 adults age ≥ 80 years
- Despite extensive testing, pathogens detected in only 38% cases
  - 23% viral (rhinovirus 9% and influenza 6%)
  - 11% bacterial (S. pneumoniae 5%)


CAP – ETIOLOGY OUTPATIENT

- Streptococcus pneumoniae
- Mycoplasma pneumoniae
- Haemophilus influenzae
- Chlamydophila pneumoniae
- Respiratory viruses
  - Influenza A & B, adenovirus, RSV, parainfluenza, metapneumovirus

CAP – ETIOLOGY INPATIENT (NON-ICU)

- Streptococcus pneumoniae
- Mycoplasma pneumoniae
- Haemophilus influenzae
- Chlamydophila pneumoniae
- Legionella species
- Aspiration
- Respiratory viruses

CAP – ETIOLOGY INPATIENT (ICU)

- Streptococcus pneumoniae
- Staphylococcus aureus
- Legionella species
- Gram negative bacilli
- Haemophilus influenzae
**CAP – LAB TESTS**

- **Legionella urinary antigen**
  - Detects only Legionella serotype I
  - Responsible for 80-95% cases

- **Pneumococcal urinary antigen**
  - Sensitivity 50-80%, specificity >90%
  - Antigen tests are positive for several days following onset of antibiotic Rx

**INFLUENZA LAB TESTING**

- **NP Influenza rapid antigen test**
  - Sensitivity 50-70%, specificity near 100%

- **NP Influenza RT-PCR test**
  - Sensitivity >90%
  - Usually batched and ~24 hr turnaround at most institutions

- Do not wait on starting treatment until tests results are available

The desire to take medicine is perhaps the greatest feature which distinguishes man from animals.

Sir William Osler

**IDSA/ATS GUIDELINES ON THE MANAGEMENT OF COMMUNITY-ACQUIRED PNEUMONIA IN ADULTS**

Mandell, LA et al. CID 2007; 44: S27-72
CAP ANTIBIOTIC THERAPY

OUTPATIENTS – NO COMORBIDITY

- Macrolide (level I)
  - Azithromycin
  - Clarithromycin
  - Erythromycin
- If pneumococcus resistance is > 25%, macrolides should not be used as sole Rx
  - 24% erythromycin resistance at UPMC St. Margaret
- Doxycycline (level III)

OUTPATIENTS WITH COMORBIDITIES

- Increased probability of DRSP or GNR’s
- Respiratory quinolone (level I)
  - Levofloxacin, Moxifloxacin, Gemifloxacin
- β-lactam + macrolide (level I)
  - Amoxicillin, Amox/Clav, Cefepodoxime, Cefuroxime
- β-lactam + doxycycline (level II)

OUTPATIENTS WITH COMORBIDITIES

- Chronic heart, lung, liver or renal disease
- Alcoholism
- Malignancies
- Asplenia
- Immunosuppressing conditions or use of immunosuppressing drugs
- Use of antimicrobial drugs within past 3 mos
  - If so, use alternate class(es) of drug

CAP ANTIBIOTIC THERAPY

INPATIENTS – NON ICU

- β-lactam + macrolide (level I)
  - Ceftriaxone, Cefotaxime, Ampicillin, Ertapenem
- Respiratory quinolone (level I)
- β-lactam + doxycycline (level III)

CAP ANTIBIOTIC THERAPY

INPATIENTS

- β-lactam + macrolide (level I)
  - Ceftriaxone, Cefotaxime, Ampicillin, Ertapenem
- Respiratory quinolone (level I)
- β-lactam + doxycycline (level III)
CAP ANTIBIOTIC THERAPY INPATIENTS - ICU

- Antipseudomonal β-lactam plus ciprofloxacin or levofloxacin
  - piperacillin/tazobactam, cefepime, imipenem or meropenem
- Above β-lactam plus aminoglycoside and azithromycin
- Above β-lactam plus an aminoglycoside and cipro or levo
- Add vancomycin or linezolid when S. aureus infection is suspected

LINEZOLID V. VANCOMYCIN FOR MRSA PNEUMONIA

- Prospective randomized double blind comparing 448 pts treated for MRSA HAP with vancomycin versus linezolid

<table>
<thead>
<tr>
<th></th>
<th>Linezolid</th>
<th>Vancomycin</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical cure</td>
<td>58%</td>
<td>47%</td>
<td>.040</td>
</tr>
<tr>
<td>Microbiological cure</td>
<td>58%</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td>Mortality at 60 days</td>
<td>16%</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Renal failure</td>
<td>8%</td>
<td>18%</td>
<td></td>
</tr>
</tbody>
</table>

Wunderink RG et al. CID 2012; 54: 621-632

PNEUMONIA

CEFTAROLINE

- Cephalosporins with MRSA activity
- Ceftaroline (Teflaro®) approved for treatment of non-MRSA pneumonia
- Presently without FDA approval for MRSA pneumonia, but may have a place for treatment once more clinical data has been analyzed.

DAPTOMYCIN

SHOULD WE BE TREATING PNEUMONIA WITH STEROIDS?

“The philosophies of one age have become the absurdities of the next, and the foolishness of yesterday has become the wisdom of tomorrow”

Sir William Osler

- Meta-analysis of 13 randomized, placebo-controlled trials:
  - >2000 hospitalized CAP patients, median age in the 60’s
  - Doses ranged from 20-60 mg prednisone/day
- Steroid group improvements:
  - 5.3% vs. 7.9% in-hospital mortality
  - 0.4% vs. 3.0% ARDS
  - 3.1% vs. 5.7% mechanical ventilation
  - 7.4% vs 22.0% mortality only in subgroup with severe pneumonia
  - Shortened hospital stay by one day
- Hyperglycemia more common in steroid treated group
SHOULD WE BE TREATING PNEUMONIA WITH STEROIDS?

- This meta-analysis suggests that corticosteroid treatment may be a valuable adjunct in the treatment of hospitalized CAP patient.
- Consider a brief course (3-7 days) of daily moderate dose (20-60 mg prednisone or equivalent) corticosteroids in these patients.
- A large randomized trial, scheduled to complete in 2018, will hopefully help clarify dose and duration.

(Rel: dx.doi.org/10.7326/M15-0715)
(Rel: dx.doi.org/10.7326/M15-1805)

TREATMENT OF COMPLICATED UTI

- Presently at UPMC Presbyterian Hospital 28% of all E. coli isolates are resistant to ciprofloxacin. 31% at UPMC St. Margaret.
- A higher proportion of urinary isolates obtained from patients coming from skilled nursing facilities are ciprofloxacin-resistant.
- Therefore, do not rely on empiric fluoroquinolone treatment as a sole agent prior to availability of culture results in this population.
- Suggest initial treatment with broad-spectrum beta lactam and/or aminoglycoside in this population until culture results are known.
- Be sure to streamline treatment once cultures become available.

IDSA GUIDELINES FOR DX AND RX OF ASYMPTOMATIC BACTERURIA IN ADULTS

- Indications for screening for ASB in adults includes:
  - Pregnancy
  - Prior to urologic procedures where mucosal bleeding is anticipated.

  No other adults with ASB should be treated

CID. 2005;40:643-54

IDSA GUIDELINES FOR DX AND RX OF ASYMPTOMATIC BACTERURIA IN YOUNG WOMEN

- The Role of Asymptomatic Bacteruria in Young Women With Recurrent Urinary Tract Infections: To Treat or Not to Treat?

- 673 young women with ASB
  - 312 not treated, 361 treated
  - 13.1% not treated had recurrence at 12 mos
  - 46.8% treated group had recurrence at 12 mos.
  - Higher % of multidrug resistant pathogens

### IDSA Guidelines for DX and RX of Asymptomatic Bacteruria in Adults

<table>
<thead>
<tr>
<th>Population</th>
<th>Prevalence, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elderly persons in the community</td>
<td></td>
</tr>
<tr>
<td>Woman</td>
<td>10.8 - 18</td>
</tr>
<tr>
<td>Man</td>
<td>3.4 - 19</td>
</tr>
<tr>
<td>Elderly persons in a long-term care facility</td>
<td></td>
</tr>
<tr>
<td>Woman</td>
<td>25 - 50</td>
</tr>
<tr>
<td>Man</td>
<td>15 - 40</td>
</tr>
<tr>
<td>Patients undergoing hemodialysis</td>
<td>28</td>
</tr>
<tr>
<td>Patients with indwelling catheter use</td>
<td></td>
</tr>
<tr>
<td>Short-term</td>
<td>9 - 23</td>
</tr>
<tr>
<td>Long-term</td>
<td>100</td>
</tr>
</tbody>
</table>

### Asymptomatic Bacteruria in Adults and Depressed Mental Status
- Patients in nursing homes are frequently evaluated for lethargy/stupor
- These patients frequently have ASB
- In the absence of fever and/or leukocytosis, the depressed mental status is seldom due to UTI. Many other factors, including dehydration, medications and metabolic factors are common causes.

### Asymptomatic Bacteruria in Adults and Depressed Mental Status
- The downside for treatment of ASB include:
  - C. diff
  - Colonization/infection with multidrug-resistant bacteria in both the index patient and those patients surrounding him/her.
  - Other adverse drug reactions
- If your patient is afebrile and hemodynamically stable, recommend in most cases refrain from antibiotic treatment for ASB until other potential etiologies have been excluded.

### Nosocomial UTI
- 80 - 90% associated with catheters
- 10% following urologic procedure

### Catheter Bacteruria Organisms
- Providencia stuartii
- Proteus
- E. coli
- Pseudomonas
- Enterococcus
- Morganella
- Klebsiella
- Coagulase-neg staph
- Yeast
- Others

Scanning EM of bacterial biofilm within lumen of Foley catheter.
NOSOCOMIAL UTI TREATMENT OPTIONS

• Higher incidence of resistant pathogens
• Suggest combination therapy for severely ill patients
  • betalactam + aminoglycoside
  • betalactam + quinolone
• Avoid quinolone (cipro, levo) as empiric sole agent in view of high level of resistant organisms

CATHETER BACTERIURIA PREVENTION

CAUTI IDSA GUIDELINES
CLIN INF DIS 2010; 50: 625-663

• Maintain closed system
• Minimize duration
  • Use automated orders and nurse-driven protocols to remove catheters
• Avoid insertion
  • Silver/antibiotic coated catheters may be beneficial in short-term catheterization
• Long-term antibiotic administration is not helpful

“Humanity has but three great enemies: fever, famine and war; of these by far the greatest, by far the most terrible, is fever”

Sir William Osler