Overview

Community Acquired Pneumonia (CAP)
- Pneumonia developing outside the hospital
- But not HCAP

Healthcare Associated Pneumonia (HCAP)
- Pneumonia developing outside the hospital
- But the patient has been “touched” by the healthcare system
Community-Acquired Pneumonia

Care of the Hospitalized Patient

- Admission Decision (Predicting ICU Care)
- Etiologies and Etiologic Testing
- Antibiotic Therapy

Predicting the Need for ICU Care

Decades of Research Finds an Answer!

After years of research and millions of NIH dollars we are able to confidently say that single most important variable predictive of severe CAP requiring intensive care is...

The Need for Mechanical Ventilation

SMART-COP

A tool for predicting which patients with community-acquired pneumonia (CAP) are likely to require intravenous oxygenation or intravenous support (IVS).

CAP confirmed on CXR

- Systolic BP <90 mmHg (2 points)
- M Mobidity/CX & infection (1 point)
- A Arthritis (>2 g/dL) (1 point)
- R Respiratory rate - age-adjusted cut-offs
  - Age ≤ 24 years
  - ≥ 25 letters
  - ≥ 30 letters
- T Tachycardia >125 bpm (1 point)
- C Confusion (new onset) (1 point)
- D Oxygenation - age-adjusted cut-offs
  - PaO2/FiO2 ratio
  - PaO2/FiO2 ratio
  - PaO2/FiO2 ratio
  - PaO2/FiO2 ratio
- P Arterial pH <7.34 (2 points)

Total Score: __________ points
**Admission Decision**

**Predicting the Need for ICU Level Care**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMART COP</td>
<td>92%</td>
<td>62%</td>
</tr>
<tr>
<td>CURB-65</td>
<td>69%</td>
<td>67%</td>
</tr>
</tbody>
</table>

*For primary care physicians, results for albumin, arterial pH, and PaO2 can be overlooked and the following interpretation be used:

- 0 points: Very low risk of needing IRVS
- 1 point: Low risk (1 in 20) of needing IRVS
- 2 points: Moderate risk (1 in 3) of needing IRVS
- 3 points: High risk (1 in 3) of needing IRVS
- ≥4 points: Very high risk (2 in 3) of needing IRVS

---

**Community-Acquired Pneumonia**

**Care of the Hospitalized Patient**

- Admission Decision
- Etiologies and Etiologic Testing
- Antibiotic Therapy
Etiologies in CAP
(Mild-Moderate Dz)

Typical bacteria:
- S. Pneumo 40%
- H. Flu 20%
- S. Aureus 10%
- K. Pneumo 5%
- Other 15-20%

Atypical bacteria:
- Mycoplasma 65%
- Chlamydia 30%
- Legionella 5%

No Pathogen 40-50%
Atypicals 20-25%
Typicals 30-40%

Viral Pneumonia

193 patients with extensive testing for viral agents

Rank order of viruses (15%)
- Influenza (n=7)
- hMPV (n=7)
- RSV (n=5)
- Rhinovirus
- Parainfluenza
- Coronavirus
- Adenovirus

Viral vs. Bacterial
- Nothing reliable, but...
- Older
- More frail
- More cardiac disease
- Less leukocytosis (74% nl)
- Seasonal
- No difference in outcomes

CID, 2008
Viral vs. Bacterial
Older
More frail
More cardiac disease
Less leukocytosis (74% nl)
Seasonal
No difference in outcomes
CID, 2008
If you look like this then you have SWINE FLU anything else is just a cold.
Swine Origin Influenza A (H1N1) Virus (S-OIV): Severe Disease; 18 cases

**Clinical Presentation**
- Temp >38 100%
- Cough 100%
- Dyspnea 100%
- LDH abnl 100%
- Bilateral patchy basilar infiltrates 100%
- CPK abnl 63%
- Lymphopenia 61%
- Hypotension 50%
- Comorbidities 44%

**Clinical Course**
- ARDS / vent 67%
- ARDS in 24 hrs 55%
- Renal Failure 33%
- Bacterial Infxn <5%

**Death Associations**
- Pressors after fluids
- Intubation in 24 hrs
- Renal Failure
- APACHE / SOFA / P/F ratio
- NOT steroids

NEJM 2009

CDC MMWR

Intensive-Care Patients With Severe Novel Influenza A (H1N1) Virus Infection — Michigan, June 2009
Swine Origin Influenza A (H1N1) Virus (S-OIV): Severe Disease; U of M

- 10 patients at U of M with severe H1N1 (S-OIV)
- All with ARDS (100% oscillatory vent / ECMO)
- 9 obese: BMI >30
- 7 extreme obesity BMI >40
- 50% with PE, 60% renal failure on CRRT
- 90% shock with pressors (0% bacterial infection)
- 60% CPK elevation (median 1000 IU/L)
- DFA negative, PCR positive
- Rapid tests only 40-60% sensitive

**Treatment**

- Oseltamivir (Tamiflu)
  - 150 mg p.o. bid x 10 days: critically ill / ICU
  - 75 mg p.o. bid x 5 days: non-ICU
- Zanamivir (Relenza)
  - 10 mg (2 oral inhalations) bid x 5 days
- Rimantadine (If seasonal flu circulating)
  - 100 mg p.o. bid x 7 days

MMWR 2009
Arch Intern Med. 2009
CA-MRSA

- Narrative review of published 12 studies / series

<table>
<thead>
<tr>
<th>Clinical Features</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flu Prodrome</td>
<td>30-75</td>
</tr>
<tr>
<td>Leucopenia</td>
<td>25-100</td>
</tr>
<tr>
<td>Shock</td>
<td>50-100</td>
</tr>
<tr>
<td>Multi-lobar</td>
<td>50-100</td>
</tr>
<tr>
<td>Necrotizing</td>
<td>33-100</td>
</tr>
<tr>
<td>PVL +</td>
<td>100</td>
</tr>
<tr>
<td>Mortality</td>
<td>30-100 (avg 40)</td>
</tr>
</tbody>
</table>

Lancet 2009

CA-MRSA

- Systematic review of 74 articles describing 114pts
- Estimated incidence of 0.51-0.64 per 100,000

Clinical Features Associated with Death

- Multiorgan Failure
- Mechanical Ventilation
- Shock
- ARDS
- ICU
- Flu-like symptoms
- Leucopenia
- DIC
- Rash

Eur Resp J 2009
CA-MRSA

- IDSA Emerging Infections Network Survey 2007
- 500 physicians across U.S.
- 30% treated 560 cases of *S. Aureus* CAP

% of pts: MRSA 72%, + Sputum Cx 77%, + Blood Cx 43%, Vanco Rx 73%

(Many CA-MRSA isolates are resistant to macrolides and fluoroquinolones)

CID: 2007

CA-MRSA

- Risk factors
  - Past skin infection (abscess)
  - IVDU
  - Influenza (concurrent with flu; resp sx 2-6 d prior to ED)
  - In sick patients with above risk factors consider empiric rx

Treatment:
  - Vancomycin or Linezolid (NOT Daptomycin)
  - Vanco troughs 15-20 mcg / ml
  - Controversial (NOT RECOMMENDED FOR ALL)
    - ?Clindamycin for anti-toxin effect? (rule out resistance first)
    - Avoid Beta-lactams (increase exotoxin production)
    - IVIG


Blood Cultures for CAP: QI Worthy?

- Systematic review of 15 studies on the utility of blood cultures
- 13 studies included; 3800 immunocompetent pts
- All studies observational, only 3 required cultures

True Positive Rate 0-14%
Antibiotic narrowing 0-3%
Antibiotic broadening 0-1%

Abshar, J Hosp Med, 2009
Predicting Bacteremia in CAP

Derived from 3116 patients
Prospectively validated

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>OR</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>No prior antibiotics</td>
<td>2.26</td>
<td>1</td>
</tr>
<tr>
<td>Liver disease</td>
<td>2.15</td>
<td>1</td>
</tr>
<tr>
<td>Pleuritic pain</td>
<td>2.03</td>
<td>1</td>
</tr>
<tr>
<td>Tachycardia (125)</td>
<td>1.90</td>
<td>1</td>
</tr>
<tr>
<td>Tachypnea (&gt;30)</td>
<td>1.78</td>
<td>1</td>
</tr>
<tr>
<td>Hypotension (&lt;90)</td>
<td>1.75</td>
<td>1</td>
</tr>
</tbody>
</table>

CID, 2009

Predicting Bacteremia in CAP

Etiologies / Diagnosis

Who has gram negative rods or pseudomonas?

(560 non-immunosuppressed pts with CAP)

<table>
<thead>
<tr>
<th>Gram negative predictors</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspiration</td>
<td>2.3 (1.02-5.2)</td>
</tr>
<tr>
<td>Prior admit*</td>
<td>3.5 (1.7-7.1)</td>
</tr>
<tr>
<td>Prior antibiotics**</td>
<td>1.9 (1.01-3.7)</td>
</tr>
<tr>
<td>Pulmonary comorbidity</td>
<td>2.8 (1.5-5.3)</td>
</tr>
<tr>
<td>1 of the above factors</td>
<td>4.2 (1.4-16.7)</td>
</tr>
<tr>
<td>2 of the above factors</td>
<td>9.1 (2.8-37.2)</td>
</tr>
<tr>
<td>3 of the above factors</td>
<td>39.3 (9.3-188.3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pseudomonas predictors</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary comorbidity</td>
<td>5.8 (2.2-15.3)</td>
</tr>
<tr>
<td>Prior admit</td>
<td>3.8 (1.8-8.3)</td>
</tr>
</tbody>
</table>

(*48 hrs in last month, **any in past month)

Archives Int Med. 2003
Community-Acquired Pneumonia

Care of the Hospitalized Patient

• Admission Decision
• Etiologies and Etiologic Testing
• Antibiotic Therapy

Antibiotic Regimens and Outcomes

<table>
<thead>
<tr>
<th>Study</th>
<th>Patients</th>
<th>Design</th>
<th>RX vs. BL Mono</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gleason 00'</td>
<td>13,000</td>
<td>Retrospec</td>
<td>BL+macro: HR=.74 fluoro: HR=.64</td>
</tr>
<tr>
<td>Dudas 00'</td>
<td>3000</td>
<td>Retrospec</td>
<td>BL+macro: lower 30d mortality and LOS</td>
</tr>
<tr>
<td>Houck 01'</td>
<td>10,000</td>
<td>Retrospec</td>
<td>BL+macro: lower 30d mortality</td>
</tr>
<tr>
<td>Brown 03'</td>
<td>45,000</td>
<td>Retrospec</td>
<td>BL+macro: lower 30 d mortality</td>
</tr>
<tr>
<td>Flanders 03'</td>
<td>340</td>
<td>Retrospec</td>
<td>BL+doxy: lower 30 d mortality</td>
</tr>
<tr>
<td>Morten 04'/06';420 / 700</td>
<td>Retrospec</td>
<td>Guideline concordant rx: lower 48h mortality</td>
<td></td>
</tr>
<tr>
<td>Bratzler 09'</td>
<td>27,730</td>
<td>Retrospec</td>
<td>BL + macro: HR=0.7 fluoro: HR=0.7</td>
</tr>
</tbody>
</table>

Antibiotic Therapy

Is it the Atypical Coverage that is Important?

• Shefet D, et al. Cochrane 2005 (Updated 2008)
  – Meta-analysis of 24 RCTs; atypical coverage vs. not
  – Hospitalized patients; 11/24 “Severe Pneumonia”
  – 18/24 identified trial were pharma sponsored
  – Atypical drugs: 19 fluoro; 4 macrolide; 1 both

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>1.1 (0.8-1.5)</td>
</tr>
<tr>
<td>Clinical failure</td>
<td>.92 (0.8-1.1)</td>
</tr>
<tr>
<td>Clinical Failure Subset</td>
<td></td>
</tr>
<tr>
<td>Atypical orgs</td>
<td>0.5 (0.2-1.1)</td>
</tr>
<tr>
<td>Legionella</td>
<td>0.2 (0.1-0.8) (only 43 cases)</td>
</tr>
</tbody>
</table>
Following the Guidelines

  - Retrospective study, 113 hospitals, 54,000 pts > 18 yo
  - Compared GL rx (ATS / IDSA 2007) vs. discordant rx
  - Adjusted for severity, comorbidities, vaccination, etc.

  - Retrospective internatl. study, 43 hospitals, 1650 pts > 65
  - Compared GL rx vs "undertreatment" and "overtreatment"
  - Adjusted for severity, process measures

Mortality for GL Concordant vs. Discordant Rx

- OR=0.70 (0.63-0.77)
- Also
- Less sepsis, renal failure
- Earlier oral therapy

Drug Classes Associated with Mortality

- Worse: Cephalosporins, Aminoglycosides, Carbapenems, Vanco
- Better: Macrolides, Fluoro

Mortality for Guideline Concordant Treatment

vs. Undertreatment
HR=0.62 (0.43-0.89)

vs. Overtreatment
HR=0.51 (0.33-0.79)

Confounding By Indication

• Given these studies, if there is “an unrecognized or unmeasured confounder with an impact as large as...a 20-40% reduction in mortality, it is difficult to imagine what such a confounder must be.”

Sharpe, Arch Intern Med, 2009

1. What variable might lead a doctor to give patients (who are not going to do as well) guideline discordant treatment? OR...

2. Is there something different about doctors and hospitals that follow guideline that might lead to improved outcomes?

Confounding By Indication

• Given these studies, if there is “an unrecognized or unmeasured confounder with an impact as large as...a 20-40% reduction in mortality, it is difficult to imagine what such a confounder must be.”

Sharpe, Arch Intern Med, 2009

1. What variable might lead a doctor to give patients (who are not going to do as well) guideline discordant treatment? OR... How about physician judgment?

2. Is there something different about doctors and hospitals that follow guidelines that might lead to improved outcomes? I expect they do all sorts of things better.
Antibiotic Therapy

The Guidelines: Inpatient

- **IDSA / ATS 2007**
  - β-lactam + macrolide (or doxycycline)
  - Respiratory fluoroquinolone
  - ICU: β-lactam + macrolide, or β-lactam + fluoroquinolone
  - Anti-pseudomonal (many options) or CA-MRSA Rx (Vancomycin or Linezolid) if risk factors: independent of ICU status

Antibiotic Treatment

**A Role for Procalcitonin?**

- Multicenter, randomized controlled trial
- 6 Swiss emergency departments
- 1360 patients presenting with LRTI's
- 70% CAP, 15% COPD, 10% Acute Bronchitis
- 93% hospitalized
- 50% PSI risk classes IV and V
- Randomized to "usual care" vs PCT based rx
- Override allowed: ICU / severe instability, legionella

PCT Algorithm for Antibiotic Treatment

JAMA 2009
Antibiotic Exposure

- Abx Exposure: 7d vs. 11d
- Adverse effects: 23% vs. 33%
- No effect on death, ICU admit, readmission, or complications

Antibiotic Therapy

Short Course Therapy
Am J Med, 2007; Meta-Analysis: 15 RCTs
< 7 days vs. > 7 days

Clinical Failure
OR = 0.89 (0.78-1.02)

Adverse Events
OR = 0.86 (0.71-1.04)

Mortality
OR = 0.81 (0.45-1.43)
Antibiotic Therapy

Stopping Antibiotics

- Pts should be afebrile for 48-72 hours
- Have no more than 1 CAP-associated instability*
- Usually this is after 5 days of therapy

*HR<100
SBP>90
RR<24
Temp <37.8
O2 Sat >90
Mental status at baseline
Taking orals

Overview

Community Acquired Pneumonia (CAP)
- Pneumonia developing outside the hospital
- But not HCAP

Healthcare Associated Pneumonia (HCAP)
- Pneumonia developing outside the hospital
- But the patient has been “touched” by the healthcare system

Healthcare Associated Infections

- Home Therapy
  - IV
  - Wound Care
  - Nursing care through health agency
- Hospital or Dialysis Clinic in past 30 days for
  - Dialysis / Any IV therapy
- Hospitalized ≥ 2 days in past 90? days
- Nursing Home or Long-Term Care Facility
MDR Pathogens

- *Pseudomonas aeruginosa*
- Drug resistant gram negatives
  - ESBL producing Klebsiella
  - Enterobacter
  - Serratia
- *Acinetobacter spp.*
- MRSA

MDR = Multidrug-resistant

Risk Factors for MDR Infections

- Antimicrobial rx in past 90 days
- Current hospitalization > 5 days
- High rates of resistance in community or ward
- Risk factors for HCAP
  - Home Therapy
  - Hospital or Dialysis Clinic in past 30 days
  - Hospitalized a 2 days in past 90 days
  - Nursing Home or Long-Term Care Facility
- Family member with multidrug resistant pathogen
- Immunosuppressive disease or therapy

MDR = Multidrug-resistant

Etiologies

(HEALTH CARE ASSOCIATED PNEUMONIA)
(Culture + CAP at an Academic Medical Center)

<table>
<thead>
<tr>
<th></th>
<th>CAP</th>
<th>HCAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>208 (33%)</td>
<td>431 (67%)</td>
</tr>
<tr>
<td>S. Pneumo</td>
<td>41%</td>
<td>10%</td>
</tr>
<tr>
<td>MRSA</td>
<td>12%</td>
<td>30%</td>
</tr>
<tr>
<td>Psuedomonas</td>
<td>4%</td>
<td>25%</td>
</tr>
<tr>
<td>Other GNR</td>
<td>2%</td>
<td>10%</td>
</tr>
<tr>
<td>Inapprop. RX</td>
<td>13%</td>
<td>30%</td>
</tr>
<tr>
<td>Mortality</td>
<td>9%</td>
<td>25%</td>
</tr>
</tbody>
</table>

(HCAP: 70% hospitalized in past 90 days; 20% in past 180d)

“As of 2005 CMS excludes HCAP from CAP GL Recs”
HCAP Outcomes

- Prospective cohort study
- 55 Italian hospitals
- 2 active 1 week surveillance periods
- HCAP:
  - Dialysis or hospital clinic in past 30 days
  - Chemo in past 30 days
  - 2 days of hospitalization in past 6 months
  - Nursing home or long term care

Annals Intern Med 2009

<table>
<thead>
<tr>
<th></th>
<th>CAP</th>
<th>HCAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>223 (62%)</td>
<td>90 (25%)</td>
</tr>
<tr>
<td>Recent Hosp (6 months)</td>
<td>0%</td>
<td>80%</td>
</tr>
<tr>
<td>Antacids</td>
<td>23%</td>
<td>53%</td>
</tr>
<tr>
<td>Bilat Infiltrate</td>
<td>20%</td>
<td>34%</td>
</tr>
<tr>
<td>GL Adherent</td>
<td>59%</td>
<td>27%</td>
</tr>
<tr>
<td>Hosp Mortality</td>
<td>6.7%</td>
<td>17.8%</td>
</tr>
</tbody>
</table>

(Death assoc with low consciousness, leucopenia, no GL rx)

Annals Intern Med 2009

Antimicrobial Therapy

Treatment for Patients at Risk for MDR Organisms

- Anti-pseudomonal beta-lactam
  +
- Aminoglycoside or Fluoroquinolone
  +
- Vancomycin or Linezolid

IDSA/ATS 2005
Kubel CJD 2008
Treating HCAP by the Guidelines

- Survey of 1300 faculty, Hospitalists, Pulm/Crit Care, ED
- 9 clinical case questions
- Also asked:
  - “Are you familiar with the HCAP guidelines?”
  - “Do you agree with the HCAP guidelines?”

Why Did They (we) Fail?
1. Single Agent for GNRs
2. No MRSA coverage

Seymann, et al. CID, In Press

Predicting MDR Infections

- Retrospective review
- 640 culture + pneumonia pts

<table>
<thead>
<tr>
<th>MDR Variables</th>
<th>OR</th>
<th>MDR Risk</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recent Hosp</td>
<td>4.2</td>
<td>NH or LTC</td>
<td>2.8</td>
</tr>
<tr>
<td>Dialysis</td>
<td>2.1</td>
<td>ICU</td>
<td>1.6</td>
</tr>
<tr>
<td>MRSA Risk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recent Hosp</td>
<td>2.4</td>
<td>NH</td>
<td>1.9</td>
</tr>
<tr>
<td>ICU</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(For all patients with HCAP criteria only 50% had MDR organisms)

Arch Intern Med, 2008

Nursing Home Acquired Pneumonia

Non-Severe Pneumonia

- Loeb, et al JAMA 2006
  - RCT 20 Nursing Homes; Pneumonia pathway vs. Usual care
  - 350 patients in each arm, mean age 85
  - Pathway: if po, HR <100, RR<30, SBP>90, sat > 90% then po Levo

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Admission</th>
<th>Hosp days / pt</th>
<th>Mortality</th>
<th>Costs / resident</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10%</td>
<td>0.8</td>
<td>3%</td>
<td>$1200</td>
</tr>
<tr>
<td>Usual Care</td>
<td>20%</td>
<td>1.8</td>
<td>6%</td>
<td>$2200</td>
</tr>
</tbody>
</table>

(p=0.001)
(p=0.004)
(p=0.23)
(p< 0.05)
Nursing Home Acquired Pneumonia (NHAP)
Predictors of Drug Resistant Bacteria

- 135 nursing home patients admitted to ICU
- Antibiotic use > 48 hrs in past 6 months
- Poor functional status (ADL score > 12.5)*
- Both positive: 90% MDRs
- Both negative: 0% MDRs

ADL Score: 6 components, score each
1 point = independent, 2 = partial, 3 = dependent

El Solh CID 2004

Nursing Home Acquired Pneumonia (NHAP)
Effect of Guidelines on NHAP outcomes

- 334 non-ICU patients admitted with CAP from NH
- 77% treated per 2003 GL (no HCAP coverage)
- 23% treated per 2005 GL (HCAP rx)
- Propensity score and process measure adjusted
  No difference in in-hospital or 30 d mortality
  Longer “time to orals” and LOS with 2005 GL rx

El Solh, 2009

In an audo, the judge agreed with the defense attorneys that making elderly nursing-home residents NAP for the blood-pressure medication was futile. The judge said that many of the residents in question were relieved, but a few continued their daily afternoon rounds; some left the house, others called for help.
HCAP Treatment Algorithm

- Indwelling Devices (PICC, urinary Catheter, feeding tube)
- Advanced Respiratory Disease (Severe COPD, Bronchiectasis)

Prevention

PPIs and Hospital Acquired Pneumonia (HAP)
- All adult admits for > 3d; AMC in Boston: 2004-07
- Excluded ICU pts
- 52% received acid suppressive rx (83% were PPIs)
- Propensity matched risk assessment of PPI use

<table>
<thead>
<tr>
<th>Condition</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAP</td>
<td>1.3</td>
</tr>
<tr>
<td>Aspiration pneumonia</td>
<td>1.4</td>
</tr>
<tr>
<td>Non-aspiration pneumonia</td>
<td>1.5</td>
</tr>
</tbody>
</table>

(180,000 excess HAP cases and 33,000 deaths /yr)
Preventing HCAP / HAP

• Hand hygiene
• Elevate HOB > 45 degrees
• Minimize feeding tubes
• Avoid contributing drugs (PPI, Sedatives)
• Oral hygiene
  – Brushing q 8 hrs
  – Chlorhexidine mouth wash
  – Oropharyngeal decontamination

   (Tobra, Colistin, Ampho B; 30 d mortality OR 0.86 (.74-.99)

CAP / HCAP

Key Points

• START
  – CAP: Risk stratifying for CA-MRSA, Pseudomonas and consider rx
  – CAP: Considering SO-H1N1 as a possible etiology
  – HCAP: Risk stratifying for MDR pathogens
  – HCAP: Treating those at low risk with narrow spectrum abx
  – HCAP: Treating those at high risk with broad spectrum abx

• STOP
  – CAP: Routinely treating beyond 7 days
  – CAP: Doing blood cultures in everyone
  – HCAP: Treating all NHAP with broad spectrum abx
  – HCAP: Routinely treating beyond 8 days

CAP / HCAP

Key Points

• CONSIDER
  – CAP: SMART-COP to risk stratify for ICU admissions
  – CAP: Atypical coverage may not be adding much
  – CAP: Procalcitonin may be coming soon
  – CAP/HCAP: Avoiding / Stopping unnecessary PPIs, antipsychotics
  – HCAP / HAP: oral hygiene