How to get in senior hospital and clinical engagement?

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AIIMS
2400 beds
30 ICUs
ANTIBIOTICS ADMINISTERED
AIIMS Study (n = 50)

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cefo+Sul</td>
<td>44</td>
</tr>
<tr>
<td>Azithro</td>
<td>42</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>22</td>
</tr>
<tr>
<td>Pip+Tazo</td>
<td>22</td>
</tr>
<tr>
<td>Amikacin</td>
<td>13</td>
</tr>
<tr>
<td>Amox+clav</td>
<td>13</td>
</tr>
<tr>
<td>Others:</td>
<td>14</td>
</tr>
<tr>
<td>Vancomycin:2</td>
<td></td>
</tr>
<tr>
<td>Tiecoplanin:2</td>
<td></td>
</tr>
<tr>
<td>Meropenem:2</td>
<td></td>
</tr>
<tr>
<td>Ceftrixone:1</td>
<td></td>
</tr>
</tbody>
</table>
Case scenario

- A 50 year old female
- Chronic beedi smoker with history of chulha smoke exposure with
- History suggestive of COAD for 8 years and on bronchodilators
- Presented to the emergency with 2-3 weeks H/o
  - Increased breathlessness
  - Cough with expectoration
  - Fever
At admission

- Tachycardia (PR- 140/min)
- Tachypnea (RR- 50/min)
- Cyanosis
- Hemodynamically stable
- TLC- 39,200/cumm
- Chest X-ray as in the next slide
Initial Management

- Diagnosed with acute exacerbation of COAD with LUL and LLL pneumonia
- Given non-invasive ventilation
- Started on cefoperazone+sulbactam (C+S), amikacin and azithromycin
- Sputum samples sent every day for Gram stain and cultures and AFB
- After some initial response, patient worsened again
- Antibiotics changed to meropenem, levofloxacin, vancomycin
First 5 sputum samples and first 5 tracheal aspirates did not grow any bacteria apart from contaminants.

- On day 15, non-bronchoscopic BAL microscopy showed AFB.

- ATT (HRZE) started, patient shifted out of the ICU, due to AFB positivity.

- By day 20, the chest X-ray showed cavitations, and tuberculosis became evident.
Day 20

- Fever continued to persist despite starting ATT
- Non-bronchoscopic BAL further revealed *Acinetobacter* in culture, sensitive only to cefoperazone+sulbactam (C+S) and piperacillin +tazobactam (P+Z)
- Vancomycin and meropenem stopped, C+S started
- Fever persisted and leucocytosis increased, C+S changed to P+Z
After 45 days of various antibiotic regimens given according to sensitivity reports...
What do you do if you face this?

<table>
<thead>
<tr>
<th>Antibiotic sensitivity</th>
<th>Imipenem</th>
<th>Meropenem</th>
<th>1&lt;sup&gt;st&lt;/sup&gt;/2&lt;sup&gt;nd&lt;/sup&gt; gen.</th>
<th>Cefotaxime</th>
<th>Ceftazidime</th>
<th>Amikacin</th>
<th>Netilmicin</th>
<th>Tigecycline</th>
<th>Ciprofloxacin</th>
<th>Amoxicillin+clavu</th>
<th>Piperacillin</th>
<th>Cefoperazone+clavul.</th>
<th>Ticarcillin+clavul.</th>
<th>Piperacillin+tazob</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organism grown</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudomonas species</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
<td>Resistant</td>
</tr>
</tbody>
</table>
Antibiotics administered to the patient

ATT
Colistin
Aztreonam
Cefepime
Metronidazole
Moxifloxacin
Linezolid
Teicoplanin
Piperacillin+tazo
Vancomycin
Levofloxacin
Meropenem
Azithromycin
Amikacin
Cefoperazone+sulb

Day of admission
0  10  20  30  40  50  60  65
Day 45

- Decision taken to use the lesser utilized antibiotics in the hospital to cover for highly resistant Pseudomonas and other Gram negative bacteria.
- A combination of cefepime, aztreonam and amikacin was administered.
- TLC fell but rose again, sensorium remained poor.
Antibiotics administered to the patient

- ATT
- Colistin
- Aztreonam
- Cefepime
- Metronidazole
- Moxifloxacin
- Linezolid
- Teicoplanin
- Piperacillin+tazo
- Vancomycin
- Levofloxacin
- Meropenem
- Azithromycin
- Amikacin
- Cefoperazone+sulb

Day of admission
0  10  20  30  40  50  60  65
Antibiotics administered to the patient

- ATT
- Colistin
- Aztreonam
- Cefepime
- Metronidazole
- Moxifloxacin
- Linezolid
- Teicoplanin
- Piperacillin+tazo
- Vancomycin
- Levoﬂoxacin
- Meropenem
- Azithromycin
- Amikacin
- Cefoperazone+subl

Day of admission
0  10  20  30  40  50  60  65
Day 62 – On the Road to Recovery

- Patient afebrile
- TLC crashed from 23,000 to 15,000
- Patient cheerful, responding fully to commands
- Secretions minimal
- Bronchospasm absent
- Ventilatory mode switched to pressure support with PEEP
- Weaned from Mechanical ventilation
Antibiotic sensitivity pattern of *Psuedomonas spp* isolates

*Year 2000*

**ANTIBIOTIC SENSITIVITY**

**PSEUDOMONAS SPP**

![Antibiotic Sensitivity Bar Chart](chart.png)

**SENSITIVITY %**

- Ticar+clav: 100%
- Aztereonam: 80%
- Piper+Tazobactem: 60%
- Cenpiperazone: 40%
- Levoflox: 20%
- Meropenam: 0%

**ANTIBIOTICS**

- Amikacin
- Piperacil
- Ceftotaxi
- Ceftazidime
- Cefpirome
- Ceftazidime
- Ceftriax
- Cefotaxi
- Piperaci
- Amikacin
- Ticar+clav
- Aztereonam
- Cepiperazone+subact

*Year 2000*
Antibiogram of *Pseudomonas* Year 2005-6
Sensitivity pattern of *Acinetobacter* sp
Year 2011.
Pseudomonas aeruginosa showed maximum sensitivity to piperacillin-tazobactam (76%) followed by cefoperazone-sulbactam (71%).

<table>
<thead>
<tr>
<th>Pseudomonas spp.</th>
<th>2007-9 (%)</th>
<th>2001-3 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cefoperazone-sulbactam</td>
<td>71</td>
<td>64</td>
</tr>
<tr>
<td>Piperacillin-tazobactam</td>
<td>76</td>
<td>70</td>
</tr>
<tr>
<td>Meropenem</td>
<td>19</td>
<td>80</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>Amikacin</td>
<td>9</td>
<td>25</td>
</tr>
</tbody>
</table>
EVALUATION OF CURRENT MANAGEMENT OF HOSPITALIZED PATIENTS WITH COMMUNITY ACQUIRED PNEUMONIA

2002-2004

Department of Medicine, All India Institute of Medical Sciences, New Delhi

To define current management of hospitalized patients with Community Acquired Pneumonia at AIIMS with goal to define the proportion of patients that are managed in comparison with ATS guidelines
Cases

Number of cases : 163

Age : Mean 52.39 years S.D ± 20.89
Mode of Hospitalization

Emergency: 89%
Routine: 11%

Total: 145
Patient characteristics

- Patients admitted in ICU: 29 (17.8%)
- Criteria for ICU Stay: 95 (58.3%)
- Length of stay: Mean 9.65, S.D + 8.99, Median 7.00 (1-57)
- Number of patients intubated: 59 (36.2%)
OUTCOME

- ALIVE: 102 (62.6%)
- DEAD: 55 (33.7%)
- LAMA: 6 (3.7%)
<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Co-morbidity</th>
<th>Alive % N=102</th>
<th>Dead % N=55</th>
<th>P Value</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prior Admission for CAP within 1 year</td>
<td>6.9</td>
<td>1.8</td>
<td>0.262</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Suspicion of Aspiration</td>
<td>2</td>
<td>9.1</td>
<td>0.039</td>
<td>5.0</td>
</tr>
<tr>
<td>3</td>
<td>Neurological /Mental Illness</td>
<td>1</td>
<td>9.1</td>
<td>0.020</td>
<td>10.1</td>
</tr>
<tr>
<td>4</td>
<td>Immunosuppressive State</td>
<td>4.9</td>
<td>1.8</td>
<td>0.336</td>
<td></td>
</tr>
</tbody>
</table>
### Physical examination

<table>
<thead>
<tr>
<th>Physical finding</th>
<th>Alive % N=102</th>
<th>Dead % N=55</th>
<th>pValue</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respiratory Rate &gt; 30/min</strong></td>
<td>30.4</td>
<td>61.1</td>
<td>0.000</td>
<td>3.599</td>
</tr>
<tr>
<td><strong>Diastolic Blood Pressure &lt; 60mm/Hg</strong></td>
<td>15.7</td>
<td>43.6</td>
<td>0.000</td>
<td>4.161</td>
</tr>
<tr>
<td><strong>Systolic Blood Pressure &lt; 90mm/Hg</strong></td>
<td>16.7</td>
<td>41.8</td>
<td>0.001</td>
<td>3.594</td>
</tr>
<tr>
<td><strong>Extra pulmonary site infection</strong></td>
<td>1</td>
<td>1.8</td>
<td>0.655</td>
<td></td>
</tr>
<tr>
<td><strong>Altered Mental Status</strong></td>
<td>16.7</td>
<td>45.5</td>
<td>0.000</td>
<td>4.167</td>
</tr>
</tbody>
</table>
## Investigation

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>Alive % N=102</th>
<th>Dead % N=55</th>
<th>P Value</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC &lt; 4,000 cell/µl</td>
<td>6.0</td>
<td>6.7</td>
<td>0.878</td>
<td></td>
</tr>
<tr>
<td>WBC &gt; 20,000 cell/µl</td>
<td>16.8</td>
<td>18.2</td>
<td>0.845</td>
<td></td>
</tr>
<tr>
<td>Serum Creatinine &gt; 1.2mg/dl</td>
<td>37.6</td>
<td>65.6</td>
<td>0.005</td>
<td>3.165</td>
</tr>
<tr>
<td>BUN &gt; 30 mg/dl</td>
<td>24.8</td>
<td>61.4</td>
<td>0.000</td>
<td>4.828</td>
</tr>
<tr>
<td>Hemoglobin &lt; 9gm/dl</td>
<td>20.0</td>
<td>31.8</td>
<td>0.124</td>
<td></td>
</tr>
<tr>
<td>Albumin &lt; 2.6g/dl</td>
<td>11.9</td>
<td>43.8</td>
<td>0.000</td>
<td>5.769</td>
</tr>
<tr>
<td>Platelet Count &lt; 10^5 cell/µl</td>
<td>14.1</td>
<td>30.8</td>
<td>0.024</td>
<td>2.698</td>
</tr>
<tr>
<td>Sodium &lt; 130 mmol/L</td>
<td>11.8</td>
<td>18.2</td>
<td>0.301</td>
<td></td>
</tr>
<tr>
<td>RBS &gt;250 mg/dl</td>
<td>6</td>
<td>17.5</td>
<td>0.034</td>
<td>3.323</td>
</tr>
<tr>
<td>Phosphorus mg/dl *</td>
<td>3.2(1.1)</td>
<td>4.5(2.1)</td>
<td>0.002</td>
<td></td>
</tr>
</tbody>
</table>
### Investigation

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>Alive %N=102</th>
<th>Dead %N=55</th>
<th>pValue</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>PaO2 &lt; 60 mmHg on Room Air or PaO2/FIO2 &lt; 300</td>
<td>26.4</td>
<td>52.3</td>
<td>0.005</td>
<td>3.055</td>
</tr>
<tr>
<td>PCO2 &gt; 50 mmHg</td>
<td>20.8</td>
<td>17.8</td>
<td>0.686</td>
<td></td>
</tr>
<tr>
<td>Arterial pH &lt; 7.35</td>
<td>37</td>
<td>67.4</td>
<td>0.001</td>
<td>3.521</td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td>14.7</td>
<td>43.6</td>
<td>0.000</td>
<td>4.490</td>
</tr>
<tr>
<td>Bacteremia</td>
<td>1.9</td>
<td>1.9</td>
<td>0.635</td>
<td></td>
</tr>
<tr>
<td>Multiple Lobe Involvement</td>
<td>34.3</td>
<td>56.4</td>
<td>0.008</td>
<td>2.473</td>
</tr>
<tr>
<td>Presence of a Cavity</td>
<td>2.9</td>
<td>3.6</td>
<td>0.813</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Alive(S.D)</td>
<td>Dead(S.D)</td>
<td>P Value</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td><strong>Uric acid mg/dl</strong> ¥</td>
<td>5.6(3.1)</td>
<td>9.3(5.9)</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td>Sodium mmol/l</td>
<td>137(7.9)</td>
<td>138(7.9)</td>
<td>0.596</td>
<td></td>
</tr>
<tr>
<td>Potassium mmol/l</td>
<td>4.2(0.8)</td>
<td>4.2(0.9)</td>
<td>0.773</td>
<td></td>
</tr>
<tr>
<td><strong>Bilirubin (mg/dl)</strong> ¥</td>
<td>0.7(1)</td>
<td>0.7(2.8)</td>
<td>0.189</td>
<td></td>
</tr>
<tr>
<td>Total protein g/dl</td>
<td>6.5(0.9)</td>
<td>5.9(1.2)</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>Albumin g/dl</td>
<td>3.2(0.6)</td>
<td>2.5(0.8)</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td><strong>AST (I.U)</strong> ¥</td>
<td>41.5(210)</td>
<td>80(560)</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td><strong>ALT (I.U)</strong> ¥</td>
<td>28.5(218)</td>
<td>36(490)</td>
<td>0.182</td>
<td></td>
</tr>
<tr>
<td><strong>SAP (I.U)</strong> ¥</td>
<td>139(139)</td>
<td>209(309)</td>
<td>0.022</td>
<td></td>
</tr>
</tbody>
</table>
Adherence to guidelines in 99/163 (60.7%)

<table>
<thead>
<tr>
<th></th>
<th>Alive</th>
<th>Dead</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adherence</td>
<td>73/102 (71.6%)</td>
<td>21/55 (38.18%)</td>
<td>4.076</td>
</tr>
</tbody>
</table>

p = 0.000
In hospital survival

Length of stay

Cum Survival

Guideline
- yes
- yes-censored
- no
- no-censored

P = 0.000

P Value = 0.000

(Adherence to Guidelines)
Survival Functions

Cum Survival

Length of stay

atypical cover
- Yes
- Yes-censored
- No
- No-censored

P Value = 0.000
Conclusions of the study

- More than half of the patients had severe CAP
- Mortality rate in the present study was 33.7%
- Adherence to ATS for empiric antibiotic therapy was 60.7%
- There was 4 fold increase in risk of death in cases not following ATS guideline
- Not covering for atypical organism associated with 13 fold increased risk of death
ASP
Some Stakeholders Do Not Align

- Pharmacy director, physician, and hospital goals should align on patient safety and efficacy of treatments.
- However, they approach that mutual goal from different points of view.

A Collaborative Approach to Treatment Algorithms and Align Stakeholders’ Goals
Craft Your Message

Physicians
- Discuss how these activities can optimize patient care and safety
- Individual patient examples helpful
- Emphasize common goals and teamwork

Administration
- Discuss cost reduction and reduced length of stay
- Emphasize patient safety
- Regulatory compliance
- Improve patient outcomes
Elements for developing a comprehensive antimicrobial stewardship program

Multidisciplinary team
- Physician champion
- Clinical pharmacist (with ID training)
  Both compensated for their time
- Additional
  - clinical microbiology
  - Information systems specialist
  - Infection prevention professional/ hospital epidemiologist

Medical Staff function

Clin Infect Dis 2007;44:159-177
Physician Champion

- Basic knowledge of antibiotics*
- Must show interest in taking a leadership role in the local community
- Respected by his or her peers
- Good interpersonal skills
- Good team player
- Basic understanding of human factors and culture transformation

*Does not need to be an infectious disease specialist.
What can the individual physician do?

- Obtain appropriate cultures **before** starting antibiotics

- Review antibiotic use in past 48-72 hours – Do they need to be continued?

- Stop antibiotic in patients with alternative noninfectious diagnosis

- Optimize dosing and duration of antibiotic therapy

- Avoid unnecessary use, especially viral URIs (75%)*

*Must implement across the continuum of care community wide
Key Elements for Successful ASP

- Establish compelling need and goals for ASP
- Senior leadership support
- Effective local physician champion
- Adequate resources (pharmacy, infection preventionist [IP], microbiology, information technology [IT])
- Primary objectives: optimize clinical outcomes and reduce adverse events, not reduce costs
- Good teamwork
- Agreed upon process and outcome measures
Antimicrobial Stewardship Team

Multidisciplinary Team Approach to Optimizing Clinical Outcomes*

- Hospital Epidemiologist
- Hospital and Nurse Administration
- Infectious Diseases
- Director, Quality
- Chairman, P&T Committee
- Infection Prevention
- Medical Information Systems
- Microbiology Laboratory
- Clinical Pharmacy Specialists
- Decentralized Pharmacy Specialist
- Partners in Optimizing Antimicrobial Use such as ED, hospitalists, intensivists and surgeons

AMP Directors
- Cl. Pharmacist
- Physician Champion

*based on local resources

Modified: Dellit et al. CID 2007;44:159-177.
Physician writes order for “restricted drug”.

Order arrives in pharmacy; pharmacist informs physician that drug is “restricted”/“not part of the pathway”/“nonformulary”.

Prescribing physician and the “GATE KEEPER” converse, approval or alternative antibiotic selected.

Has not been possible to implement in most Indian settings.
Thank You