Antibiotic Stewardship for Hospital Acquired Infection Prevention

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Objectives

• Review the elements of Antimicrobial Stewardship Program (ASP)
• Evaluate current state of ASP in California hospitals
• Review examples of ASP role in curbing HAIs
  – Carbapenem Resistant Enterobacteriaceae (CREs)
  – Clostridium difficile Infection (CDI)
Antimicrobial agents are unique: increased use leads to decreased utility secondary to selective pressure/resistance.

- Total use increased from 798 to 855 DOTs per 1000 patient days between 2002 to 2006 in US academic centers.

Cost of Treating Antimicrobial-resistance Infections

- Economic analysis of the Chicago Antimicrobial Resistant Project dataset.
- Goal was to measure the cost attributable to ARI in hospitalized patients.

<table>
<thead>
<tr>
<th></th>
<th>All patients N=1391</th>
<th>Patients with ARI N=188</th>
<th>Patients without ARI N=1203</th>
</tr>
</thead>
<tbody>
<tr>
<td>APACHE score</td>
<td>42.1</td>
<td>54.8*</td>
<td>40.1*</td>
</tr>
<tr>
<td>LOS (days)</td>
<td>10.2</td>
<td>24.2*</td>
<td>8*</td>
</tr>
<tr>
<td>Hosp acq infections (n)</td>
<td>260</td>
<td>135*</td>
<td>125*</td>
</tr>
<tr>
<td>Total cost ($)</td>
<td>19,267</td>
<td>58,029*</td>
<td>13,210*</td>
</tr>
<tr>
<td>Death [n (%)]</td>
<td>70</td>
<td>34 (18.1)*</td>
<td>36 (3)*</td>
</tr>
</tbody>
</table>

*p<0.001

Roberts RR, etal. CID 2009;49: 1175-1184
CA Regulation

• CAL.HSC. Code § 1288.8 requires General Acute Care Hospitals
  
  – ...develop a process for evaluating the judicious use of antibiotics...

Each CA acute care hospital must:
  
  Monitor and evaluate antimicrobial use
  
  Assemble a quality improvement committee to oversee antimicrobial use

Each hospital should have an Antimicrobial Stewardship Program

  Each hospital left to comply on its own
Goals for Antimicrobial Use Optimization

ASP is an intervention-based program to:

1. Improve patient safety and optimize clinical outcomes
2. Curb spread of antimicrobial resistance
3. Promote cost effectiveness
   - Unnecessary use, IV to PO conversion, broad spectrum to pathogen-directed therapy
Multifaceted approach to limit resistance

Key Players

- Infectious Diseases Pharmacists
- Infectious Diseases Physicians
- Microbiologist
- Information system specialist
- Infection control/Hospital epidemiologist

Antimicrobial Stewardship Program
CDPH HAI Advisory Committee
ASP Definition

BASIC
- Policy/procedure
- Physician-supervised multidisciplinary antimicrobial stewardship committee
- Program support from a trained physician or pharmacist
- Reporting of activities to hospital committees

INTERMEDIATE
- Annual antibiogram developed and disseminated
- Institutional guidelines for the management of common infection syndromes
- Monitoring of usage patterns of specific antibiotics
- Regular education of hospital staff/committees about ASP

ADVANCED
- Antimicrobial formulary that is reviewed annually
- Prospective audit with the intervention/feedback
- Formulary restriction with preauthorization
The State of ASP in California

• Voluntary survey of 422 general acute care hospitals during May 2010- Sept 2011
• Active ASP= dedicated personnel to oversee antimicrobial use and have specific ASP strategy
• 53% of hospitals responded
  – 73% community hospitals; 9% university or affiliated
  – 50% active program (n=49); 30% planning program

## Targets of ASP

<table>
<thead>
<tr>
<th>Criteria</th>
<th>National n=248</th>
<th>California n=49</th>
</tr>
</thead>
<tbody>
<tr>
<td>High potential for misuse</td>
<td>67%</td>
<td>41%</td>
</tr>
<tr>
<td>High cost antimicrobials</td>
<td>87%</td>
<td>35%</td>
</tr>
<tr>
<td>Broad spectrum antimicrobials</td>
<td>57%</td>
<td>33%</td>
</tr>
<tr>
<td>Specific resistance profiles</td>
<td>52%</td>
<td>34%</td>
</tr>
<tr>
<td>Abx with high potential for adverse effects</td>
<td>40%</td>
<td>28%</td>
</tr>
<tr>
<td>Novel agents</td>
<td>52%</td>
<td>-</td>
</tr>
<tr>
<td>Potential overlapping spectra</td>
<td>28%</td>
<td>-</td>
</tr>
<tr>
<td>Site of infection (eg bloodstream)</td>
<td>18%</td>
<td>-</td>
</tr>
<tr>
<td>Agents with potential IV → PO</td>
<td>52%</td>
<td>-</td>
</tr>
</tbody>
</table>

# Rank Order of Barriers to a Functional and Effective ASP

<table>
<thead>
<tr>
<th>Barrier</th>
<th>No ASP</th>
<th>Planned ASP</th>
<th>Current ASP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of funding or personnel</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Other higher priority clinical initiatives</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Administration not aware of value of ASP</td>
<td>3</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>Opposition from prescribers</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Lack of tech support</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other specialities antagonized by ASP</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Multiple ID grs within facility</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

## ASP Strategies in CA Hospitals

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Current/planned ASP (n=176)</th>
<th>No ASP (n=45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated pharmacist for oversight</td>
<td>52%</td>
<td>33%</td>
</tr>
<tr>
<td>ID consult available</td>
<td>90%</td>
<td>76%</td>
</tr>
<tr>
<td>ASP committee</td>
<td>77%*</td>
<td>53%*</td>
</tr>
<tr>
<td>No strategy</td>
<td>0*</td>
<td>11%*</td>
</tr>
<tr>
<td>Formulary restriction</td>
<td>44%</td>
<td>49%</td>
</tr>
<tr>
<td>Audit</td>
<td>62%*</td>
<td>27%*</td>
</tr>
<tr>
<td>Prior approval</td>
<td>54%</td>
<td>36%</td>
</tr>
<tr>
<td>Automatic stop orders</td>
<td>46%</td>
<td>45%</td>
</tr>
<tr>
<td>Verbal approval</td>
<td>28%</td>
<td>9%</td>
</tr>
<tr>
<td>Preauthorization</td>
<td>32%</td>
<td>20%</td>
</tr>
<tr>
<td>Postprescription review with feedback</td>
<td>26%*</td>
<td>11%*</td>
</tr>
<tr>
<td>Streamlining/de-escalation</td>
<td>28%*</td>
<td>4%*</td>
</tr>
<tr>
<td>Dose optimization/automatic dose adjustments</td>
<td>39%*</td>
<td>22%*</td>
</tr>
</tbody>
</table>


*p<0.05
The Role of “Prescribing Etiquette”

Quality improvement interventions need engagement with multidisciplinary staff and inclusion of local practice and knowledge to facilitate implementation and compliance

Rules of Antimicrobial Prescribing Etiquette

• Non-interference with prescribing decisions of colleagues
• Behavior of senior clinicians influence practice of junior doctors
  – Junior doctors are more likely to follow local policy and guidelines if supported by peers from own policy
• Accepted noncompliance of senior staff with local policy
  – Justified by recognition of experience and expertise

Outcomes data most useful in Supporting ASPs

## Outcomes Data for ASPs in CA

<table>
<thead>
<tr>
<th>Outcomes measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance patterns (39%)</td>
</tr>
<tr>
<td>Drug use (36%)</td>
</tr>
<tr>
<td>Drug costs (35%)</td>
</tr>
<tr>
<td>AEs (22%)</td>
</tr>
<tr>
<td>ASP recs accepted (18%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Positive outcomes observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved abx use (74%)</td>
</tr>
<tr>
<td>Decreased abx cost (63%)</td>
</tr>
<tr>
<td>Increased frequency of recommendation acceptance (58%)</td>
</tr>
<tr>
<td>Improved abx susceptibility patterns (47%)</td>
</tr>
</tbody>
</table>

Next Steps for ASP in CA

• Small hospitals and rural hospitals to facilitate ASP implementation
  – 40% higher rates of abx use than large academic center
  – Computerized decision support or other electronic tools

• Measure outcomes
  – Crucial to demonstrate value for continued admin support of ASP
  – Development of standardized performance measures on patient safety

ASP Target: Healthcare acquired infections

Carbapenem Resistant Enterobacteriaceae (CRE)

*C* difficile Infection (CDI)
Drug-resistant ‘superbugs’ discovered in 3 U.S. states

By Marilynn Marchione
The Associated Press

BOSTON — An infectious-disease nightmare is unfolding: Bacteria that have become resistant to nearly all antibiotics by an alarming new gene have sickened people in

ophotics are in development, said Dr. M. Lindsay Grayson, director of infectious diseases at the University of Melbourne in Austrailin.

“It’s just a matter of time” until the gene spreads more widely person-to-person, he

The gene is carried by bacteria that can spread hand-to-mouth, which makes good hygiene very important.

It’s also why health officials are so concerned about where the threat is coming from, said Dr. Patrick Nordmann, a micro-

including “the last-resort class of antibiotics that physicians go to,” Limbago said.

She did not know how the three patients were treated, but all survived.

Doctors have tried treating some of these cases with combi-

Los Angeles Times

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CDC: Deadly, drug-defying CRE bacteria on rise in U.S. hospitals

March 05, 2013 | By Amina Khan

A deadly bacteria that’s practically impervious to antibiotics is on the rise and has appeared in medical facilities in 42 U.S. states, the Centers for Disease Control and Prevention reports.

The rate of infection from carbapenem-resistant Enterobacteriaceae, or CRE, might seem low -- 0.04% -- but it has risen fourfold in just the last decade. CRE is resistant even to last-resort drugs such as carbapenem and can potentially be very deadly. Up to half of patients who develop a bloodstream infection from CRE die, according to the CDC report.
## Blood Culture & Sensitivity Report

<table>
<thead>
<tr>
<th>K pneumoniae carbapenemase</th>
<th>MIC</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amikacin</td>
<td>&gt;32</td>
<td>R</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>&gt;16</td>
<td>R</td>
</tr>
<tr>
<td>Ampicillin/sulbactam</td>
<td>&gt;16/8</td>
<td>R</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>&gt;16</td>
<td>R</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>&gt;16</td>
<td>R</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>&gt;32</td>
<td>R</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>&gt;2</td>
<td>R</td>
</tr>
<tr>
<td>ESBL</td>
<td></td>
<td>POS</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>&gt;8</td>
<td>R</td>
</tr>
<tr>
<td>Imipenem/Meropenem</td>
<td>&gt;8</td>
<td>R</td>
</tr>
<tr>
<td>Pip/Tazo</td>
<td>&gt;64/4</td>
<td>R</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>&gt;8</td>
<td>R</td>
</tr>
<tr>
<td>Trim/Sulfa</td>
<td>&gt;2/38</td>
<td>R</td>
</tr>
</tbody>
</table>
CRE infections

• First identified in North Carolina in 1996
• CRE infections not specific to sites, organs, or tissues
• Associated with increased cost and length of stay, lead to frequent treatment failures and death\(^1\)
  – One study reported \(\geq 70\%\) mortality in bacteremic pts\(^2\)

ASP Strategies studied to decrease spread of CREs

1. **Limiting the duration of antibiotic treatment**
   - 3 Studies in VAP: rate of emergence of resistance and superinfection did not begin to climb until ~6 days
   - 2\textsuperscript{nd} study: implemented a clinical guideline/deescalation strategy for VAP \rightarrow improved appropriateness and cut average antibiotic exposure without leading to increase in mortality, but significant decrease in episodes of superinfection (24\% \rightarrow 7.7\%, p=0.03)

Kollef MH, Golan Y, Micek ST, Shorr AF, Restrepo MI. *Appraising contemporary strategies to combat multidrug resistant gram-negative bacterial infections--proceedings and data from the Gram-Negative Resistance Summit.* Clin Infect Dis. 2011 Sep;53
Stewardship and shorter duration of antibiotics

• Remains uncertain that limiting duration is important tool in combating resistance rates

• However benefits have been shown in prevention of *C. diff* colitis

• Other benefits: decreased pharmacy costs, resources

Kollef MH, Golan Y, Micek ST, Shorr AF, Restrepo MI. Clin Infect Dis. 2011 Sep;53
Strategies studied to decrease spread of CREs

2. Optimizing Pharmacokinetic/Pharmacodynamic parameters

• Extended or continuous infusion of beta-lactams
  – One prospective, randomized trial that compared extended infusion doripenem over 4 hours vs imipenem over 60min
    • Dori group was associated with reduction in development of resistance in \( P. \) aeruginosa isolates
  – Most extended infusion studies have focused on \( P. \) aeruginosa, and has limited evaluation on CREs.
3. Elimination of risk factors

- Studies from Israel and US have identified following risk factors:
  - Mechanical ventilation
  - Poor functional status
  - ICU stay
  - Transplantation
  - Prolonged hospitalization
  - Receipt of antibiotics

Risk factor: Receipt of antibiotics

• Is prior history of carbapenem exposure a risk factor?
  – Reports are mixed as to association
• In at least one study, found prior FQ, extended spectrum cephalosporins, and vancomycin as independently associated with infection or colonization with KPCs.

Is Antibiotic Restriction the Answer?

• Multiple antimicrobial classes have been identified as possible risk factors for infection or colonization with CRE
  – Overall decrease in antimicrobial use rather than targeting a specific antimicrobial class may be effective

• Carbapenem restriction has been associated with lower rates of carbapenem resistant *P. aeruginosa*, however more research is needed to clarify the effect on CRE
2012 CDC CRE Toolkit

- CRE prevention guidelines
- Israel decreased CRE infection rates in all 27 of hospitals by > 70% in one year with coordinated prevention program.
- Key: identification of cases and limiting transmission
  - Surveillance cultures (stool)
  - Identifying patients returning from endemic countries or those at increased risk within our health systems
Importance of Infection Control

- Intestinal colonization with NDM-1 *K. pneumoniae* can last up to 7 months\(^1\) and *E. coli* for 13 months in a hospitalized patient\(^2\)
- A multicenter study in Detroit found that over 30% of patients with recent LTAC exposure were colonized or infected with CRE\(^3\)
- Failure to recognize CRE infections when they first occur in a facility has resulted in missed opportunity to intervene before these organisms are transmitted more widely.

ASP activities targeting decrease in CDI
Greatest risk factors for acquiring CDI

- Recent exposure to healthcare
- **Exposure to antibiotics**
- Use of Proton Pump Inhibitors (PPI’s)
- Gastrointestinal Manipulation/Surgery
- Length of stay in healthcare facilities
- Serious underlying conditions
- Immunocompromised patients
- Advanced age

Hospital acquired CDI and ASP

- **Antimicrobial Stewardship**
- **Previous use of antibiotics**
- **Gastric acid suppressants**
- **Exposure to toxigenic strains**
- **Infection control**
- **Host factors: advanced age, comorbidities, poor host serum immunoglobulin levels**
- **Environmental Services**
### Costs Associated with Treating HA-CDI

#### Table 1. Estimates of Costs and LOS Attributed to the 5 Major Health Care–Associated Infections for the US Adult Inpatient Population at Acute Care Hospitals

<table>
<thead>
<tr>
<th>Health Care–Associated Infection Type</th>
<th>Cost, 2012 $US</th>
<th>LOS (as Total, ICU), d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical site infections</td>
<td>20 785 (18 902-22 667)</td>
<td>11.2 (10.5-11.9)</td>
</tr>
<tr>
<td>MRSA</td>
<td>42 300 (4005-82 670)</td>
<td>23.0 (14.3-31.7)</td>
</tr>
<tr>
<td>Central line-associated bloodstream infections</td>
<td>45 814 (30 919-65 245)</td>
<td>10.4, 6.9 (6.9-15.2, 3.5-9.6)</td>
</tr>
<tr>
<td>MRSA</td>
<td>58 614 (16 760-174 755)</td>
<td>15.7 (7.9-36.5)</td>
</tr>
<tr>
<td>Catheter-associated urinary tract infections</td>
<td>896 (603-1189)</td>
<td>NR</td>
</tr>
<tr>
<td>Ventilator-associated pneumonia</td>
<td>40 144 (36 286-44 220)</td>
<td>13.1, 8.4 (11.9-14.3, 7.8-9.0)</td>
</tr>
<tr>
<td><strong>Clostridium difficile</strong> infections</td>
<td>11 285 (9118-13 574)</td>
<td>3.3 (2.7-3.8)</td>
</tr>
</tbody>
</table>

Abbreviations: ICU, intensive care unit; LOS, length of hospital stay; MRSA, methicillin-resistant *Staphylococcus aureus*; NR, not reported.

* Data are reported as mean (95% CI) values.
* Estimates obtained from literature and 100 000-trial Monte Carlo simulations using triangular distribution.
* Estimates obtained from literature and 100 000-trial Monte Carlo simulations, using general distribution.
Success of ASP targeted at CDI Reduction

## ASP interventions targeted at CDI

<table>
<thead>
<tr>
<th>Setting</th>
<th>Intervention</th>
<th>Impact</th>
</tr>
</thead>
</table>
| 683-bed secondary/tertiary care hospital Canada | • Development of guidelines  
  • Educational materials  
  • Shorter tx durations | CDI decreased 60% and overall decrease in targeted abx consumption by 54%                   |
| 834-bed tertiary care urban teaching hospital Pittsburgh | • Education material for providers  
  • Active surveillance for CDI  
  • Expanded infection control measures  
  • Targeted abx restriction (clindamycin, ceftriaxone, levofloxacin, other broad spectrum) | Targeted abx use decreased by 41%. Decrease in CDI from 7.2/1000 discharges to 3/1000          |
| 1200-bed tertiary care teaching hospital London | • Narrow spectrum abx policy  
  • Prospective feedback on CDI and MRSA infection every 8-12 wks | Significant reduction in targeted abx use. Decrease in CDI IRR 0.35 (0.17, 0.73)              |
| 174-bed community teaching hospital Boston | • Multidisciplinary-prospective abx monitoring (inappropriate use)  
  • Program use guidelines  
  • Pharmacy restrictions  
  • Abx detailing with individual prescriber education | 22% decrease in use of broad spectrum abx  
Decrease in CDI 2.2/1000 pt days to 1.4/1000 pt days (p=0.002)  
Same trend in nosocomial MDR gram negative infections |
## Empiric Antibiotic Recommendations 2013

These are the agents generally preferred for initial empiric therapy at LAC-USC Department of Emergency Medicine. Circumstances of individual cases may dictate different antibiotic choices.

### Indication

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Likely Pathogens</th>
<th>Outpatient empiric treatment</th>
<th>Inpatient empiric treatment</th>
<th>Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spontaneous bacterial peritonitis (paracentesis WBC &gt; 500 or PMNs &gt; 250)</td>
<td><em>Enterobacteriaceae</em></td>
<td>N/A</td>
<td><em>option 1:</em> ceftriaxone 2g iv q24h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>option 2:</em> cefotaxime* 2g iv q8h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>option 3 (severe PCN allergy):</em> ciprofloxacin* 400mg iv q12h</td>
<td></td>
</tr>
<tr>
<td>Localized abdominal infection (e.g., localized appendicitis)</td>
<td><em>Enterobacteriaceae Anaerobes</em></td>
<td>N/A</td>
<td><em>option 1:</em> ceftriaxone 2g iv q24h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>option 2:</em> metronidazole 500mg iv q8h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>option 2 (severe PCN allergy):</em> metronidazole 500mg iv q8h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>option 3 (severe PCN allergy):</em> metronidazole 500mg iv q8h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>option 2:</em> ciprofloxacin* 400mg iv q12h</td>
<td></td>
</tr>
<tr>
<td>Perforated appendicitis (gangrenous, contained and ruptured abscess)</td>
<td><em>Enterobacteriaceae Anaerobes</em></td>
<td>N/A</td>
<td><em>option 1:</em> ceftriaxone 2g iv q24h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>option 2:</em> metronidazole 500mg iv q8h</td>
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</tr>
<tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>option 2:</em> ciprofloxacin* 400mg iv q12h</td>
<td></td>
</tr>
<tr>
<td>Intra-abdominal sepsis – peritonitis, shock</td>
<td><em>Enterobacteriaceae Anaerobes</em></td>
<td>N/A</td>
<td><em>option 1:</em> piperacillin/tazobactam* 3.375g iv q6h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>option 2 (severe PCN allergy):</em> metronidazole 500mg iv q8h</td>
<td></td>
</tr>
<tr>
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<td><em>option 2 (severe PCN allergy):</em> metronidazole 500mg iv q8h</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td><em>option 2:</em> ciprofloxacin* 400mg iv q12h</td>
<td></td>
</tr>
</tbody>
</table>

### Recommended first line antibiotics

- *Ceftriaxone* 2g iv q24h
- *Cefotaxime* 2g iv q8h
- *Ciprofloxacin* 400mg iv q12h
- *Metronidazole* 500mg iv q8h
- *Piperacillin/Tazobactam* 3.375g iv q6h
- *Peritonitis* x 2

---

**LAC-USC MEDICAL CENTER**
**DEPARTMENT OF EMERGENCY MEDICINE**

**Empiric Antibiotic Recommendations 2013**

These are the agents generally preferred for initial empiric therapy at LAC-USC Department of Emergency Medicine. Circumstances of individual cases may dictate different antibiotic choices.
### Indication

**Recommended first line antibiotics**

#### LABS
- Perform Sepsis Panel
- Glucose POCT
- Blood gas with Electrolytes/w
  - ABG or VBG
- PT with INR and PTT

#### FLUIDS
- Indicate mL bolus IV
- Other:

#### IV FLUIDS
- If patient is not responsive to fluid resuscitation, initiate vasopressor (see “Adult Vasoactive Continuous Infusion Order Set”).

#### ANTIBIOTICS
- To be Given After Blood Cultures are drawn:
- Discontinue All Previous Antibiotics Except these Antibiotics:

#### Infection Source
- Unknown Source
- Pneumonia: Community Acquired
- Pneumonia: Health Care Associated (with or without Pseudomonas Risk)
- Urosepsis
- Abdominal/Pelvic Infection
- Severe Soft Tissue Infection

#### Primary Therapy
- Vancomycin 1000 mg OR [ ] [ ] mg IVPB [ ] q12h OR [ ] [ ] h
- Ceftriaxone 2 gm IVPB [ ] q24h OR [ ] [ ] h
- Metronidazole 500 mg IVPB q8h

#### β-Lactam Allergy
- Vancomycin 1000 mg OR [ ] [ ] mg IVPB [ ] q12h OR [ ] [ ] h
- Levofoxacin 750 mg IVPB [ ] q24h OR [ ] [ ] h
- Metronidazole 500 mg IVPB q8h

#### Additional Information
- For diabetic patients: Piperacillin/Tazobactam 4.5 gm (4 gm Pip) IVPB q6h OR [ ] [ ] h
- Clindamycin 900 mg IVPB q8h (for suspected necrotizing fasciitis)

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**Note:** This is a medical document and should be reviewed by a healthcare professional.
Summary

First steps of Developing an ASP

• Get buy-in from key stakeholders to support ASP
• Go after “Low-hanging fruit”
  - *Interventions that can be implemented with limited resources*
    - IV to PO conversions
    - Batching of IV antimicrobials
    - Therapeutic substitution
    - Formulary restriction
    - Reducing readmission rates
• Target interventions for problem areas at your institution
• Select strategies that are the most impactful to gain support from your administration
• Education and training is an important component of ASP

Implementing ASP

Q

• Do you have recommendations about how to create a sense of urgency for change within a hospital so that pharmacists and physicians will want to implement aspects of ASP that can lead to the reduction of CDI?

A

• Data: patient outcomes
• Cost savings
Buy-in

Q
• Do you have suggestions on how IPs can call attention to the need for antibiotic stewardship?

A
• Create a tangible list
• Medication Use Evaluations
Metrics

Q
• What antibiotic metrics would you recommend be reported through QI committees?

A
• Review data already being collected
• Use the elements that would make the most impact
Barriers

Q

• In the hospitals where you have seen successful ASP implemented, what was used to motivate the physicians to agree to antibiotic restrictions and/or clinical review of specific antibiotics?

A

• Show them data
• Support of executive leadership
Common elements of High Performing ASPs

• Active pharmacy director
• Good communication between pharmacy and MD’s
• Designated ASP committee
• Written policies or protocols
• MD support
• All pharmacists involved in antimicrobial stewardship
Questions?