Successful Antimicrobial Stewardship in a Multihospital System: Tools You Can Use

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Disclosure

Relevant Financial Relationships:
• Receives financial compensation for serving in Allergan® Speaker Bureau
  • Dalvance® (dalbavancin)
  • Teflaro® (ceftaroline)
  • Avycaz® (ceftazidime/avibactam)
Goals

Pharmacist Objectives
- Identify key team members in an ideal Antimicrobial Stewardship Program (ASP)
- Identify barriers to establishing an ideal ASP
- Develop methods to tailor your ASP to your specific facility
- Develop methods and tools to optimize your current ASP model with limited resources

Pharmacy Technician Objectives
- Identify opportunities for technicians to get involved in ASPs
- Discover ways to spread educational tools for patients utilizing CDC Get Smart
- Understand the roles and responsibilities of members in an ideal ASP

Ideal ASP

Multidisciplinary Team Approach

Strubens et al. Curr Opin Infect Dis 2003
PHS ASP Team

Infectious Disease and Internal Medicine Associates

Enterprise Wide ASP Team

PHS Model

ASP Team

ASPECT EXTENSION TO ALL HOSPITALS
ASP Team: Small Hospital
ASP Team: Large Hospital

Where to start?

- Identify key stakeholders
  - Easier said than done....
- **Communicate!**
  - Include hospitalists, pulmonology etc. – Why ASP?
- Metrics - DOT/1000 patient days
  - Identify outliers/high utilization → perform MUE/DUE
  - Purchasing data?
- Preauthorization/restriction or prospective audit feedback?
  - PHS uses combination
- Develop clinical pathways and protocols
  - Don’t have any?
  - Have them available electronically – ASP can’t run 24/7
- Low hanging fruit
### Exploit Technology

| Room/Date | Anticipated Discharge Date | AHS Score | Biotech Score | Charge | DeFusion | Urology Reputation | Broad Spectrum | Antibiotics | LOS (Days) | React Ant | Chip PO | Bacte | Renal | Abx | Expe | Result | Final Result | 405y |
|-----------|---------------------------|-----------|---------------|--------|----------|-------------------|----------------|-------------|-----------|-----------|---------|--------|-------|------|------|------|-------|--------|---------|-------|
| 7I5746-01 | 3                         | 1         | % 3           |   4    | 1        |               |               |             |           |           |         |        |       |      |      |      |       |        |        |
| 7I5764-01 | 3                         | 1         | % 3           |   4    | 1        |               |               |             |           |           |         |        |       |      |      |      |       |        |        |
| 1275222-01| 3                         | 1         | % 3           |   4    | 1        |               |               |             |           |           |         |        |       |      |      |      |       |        |        |
| 3219021-01| 3                         | 1         | % 3           |   4    | 1        |               |               |             |           |           |         |        |       |      |      |      |       |        |        |
| 32190210-01| 3                      | 1         | % 3           |   4    | 1        |               |               |             |           |           |         |        |       |      |      |      |       |        |        |
| 7I5764-01 | 3                         | 1         | % 3           |   4    | 1        |               |               |             |           |           |         |        |       |      |      |      |       |        |        |
| 32190210-01| 3                      | 1         | % 3           |   4    | 1        |               |               |             |           |           |         |        |       |      |      |      |       |        |        |

### So you’re ready to work up cases?
Patient workup
You need the right approach!

ASP Tool- Patient Workup Template
### ASP Tool - Patient Workup Template

<table>
<thead>
<tr>
<th>Radiology</th>
<th>Patient Timeline</th>
</tr>
</thead>
</table>
| [Image of lung CT scans] | -$6/28$: Repeat CT scan w/o contrast: Multiple RLL, RML nodules/opacities and 2.0 cm right lower lobe cavitory nodule and a 1.9 cm right middle lobe area of developing cavitation/concentric consolidation. TTB: negative for *vegetations*.

*Obtained:* coccidioidomycosis; 1.3 Beta D glucan, *Aspergillus galactomannan*, and *histoplasma* urinary antigen.

**ALL ABX HLD**

*Blood on 6/28:* Negative

*Repeat blood bx 7/3:* 2 out 2 streptococcus balls.

7/4/2017: Bronchoscopy with BAL performed.

7/8/2017: Bone marrow biopsy and aspiration.

### ASP Tool - Patient Workup Template

<table>
<thead>
<tr>
<th>Labs:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[Graph of temperature (°F) over time]</td>
<td>[Graph of WBC count (in thousands) over time]</td>
</tr>
<tr>
<td>![Graph of temperature (°F) over time]</td>
<td></td>
</tr>
<tr>
<td>![Graph of WBC count (in thousands) over time]</td>
<td></td>
</tr>
<tr>
<td>![Table of laboratory values]</td>
<td></td>
</tr>
<tr>
<td>![Table of laboratory values]</td>
<td></td>
</tr>
</tbody>
</table>

**WBC Count**

<table>
<thead>
<tr>
<th>WBC (in thousands)</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>1.5</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Hgb**

<table>
<thead>
<tr>
<th>Hgb</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>1.50</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
</tbody>
</table>
Leukocytosis

**Normal Differential of WBCs**

- 50% – 70% polymorphonuclear neutrophils (PMNs, polys, segs) – mature WBCs that primarily defend against bacterial infections
- 0% – 5% bands (stabs) – immature WBCs that primarily defend against bacterial infections
- 20% – 40% lymphocytes – these are divided into T-cells (which provide defense against fungal and viral infections) and B-cells (which produce antibodies)
- 1% – 6% monocytes – present in lymph nodes, alveoli, spleen, liver, and bone marrow; mature into macrophages – (Pac-Man) to engulf foreign substances
- 1% – 5% eosinophils – involved in hypersensitivity/allergic reactions; primarily defend against parasitic infections
- 0% – 1% basophils – involved in hypersensitivity reactions

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Leukocytosis

<table>
<thead>
<tr>
<th>Infection with a Low or Normal WBC</th>
<th>Non-infectious Causes of Leukocytosis*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overwhelming sepsis</td>
<td>Malignancy, esp. lymphomas</td>
</tr>
<tr>
<td>Less acute infections</td>
<td>Inflammation</td>
</tr>
<tr>
<td></td>
<td>Physiologic stress, ex. MI</td>
</tr>
<tr>
<td></td>
<td>Medications: corticosteroids, epinephrine, lithium</td>
</tr>
</tbody>
</table>

* usually do not cause a left-shift
Fever

<table>
<thead>
<tr>
<th>Infection with a Low Body Temperature</th>
<th>Non-infectious Causes of Fever</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of antipyretics (suppress fever)</td>
<td>Malignancy</td>
</tr>
<tr>
<td>Sepsis (lack of acute phase response - poor prognosis with low body temperature)</td>
<td>Autoimmune disease: rheumatoid arthritis, systemic lupus erythematosus (SLE)</td>
</tr>
<tr>
<td></td>
<td>Thyroid storm</td>
</tr>
<tr>
<td></td>
<td>Transfusion of blood products</td>
</tr>
<tr>
<td></td>
<td>Pulmonary Embolism (PE) / Deep Vein Thrombosis (DVT)</td>
</tr>
<tr>
<td></td>
<td>Physiologic stress: post-MI, surgery (up to 4 days post-op), trauma</td>
</tr>
<tr>
<td></td>
<td>Medications = “drug fever”</td>
</tr>
</tbody>
</table>

Medications that cause drug fever

<table>
<thead>
<tr>
<th>More Common</th>
<th>Less Common</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillins</td>
<td>Allopurinol</td>
</tr>
<tr>
<td>Cephalosporins</td>
<td>Imipenem</td>
</tr>
<tr>
<td>Sulfonamides</td>
<td>Vancomycin</td>
</tr>
<tr>
<td>Phenytoin, phenobarbital, carbamazepine</td>
<td>NSAIDs</td>
</tr>
<tr>
<td>Amphotericin B</td>
<td>Cocaine, amphetamines</td>
</tr>
<tr>
<td>Salicylates</td>
<td>Antihistamines, atropine, TCAs (tricyclic antidepressants)</td>
</tr>
<tr>
<td>Antipsychotics: NMS (neuroleptic malignant syndrome)</td>
<td></td>
</tr>
</tbody>
</table>
SUMMARY OF DRUG FEVER

- Occurs in 10% of hospitalized patients
- Usually due to a hypersensitivity reaction
- May occur any time after initiation of therapy, but usually occurs after 1 to 2 weeks
- Patient appears "unusually well" and unaware that they have a fever
- Difficult to diagnose, as it is a diagnosis of exclusion (meaning that the fever goes away when the medication is taken away)
- Fever should resolve within 48 hrs of d/c drug
- If fever is associated with a rash, it will not subside until rash is gone
- Patient has relative bradycardia, meaning that the heart rate is too slow for the elevated temperature (normally when the body’s temperature is increased, it is in an increased metabolic state so that the heart rate is also increased)
- To determine if the patient has relative bradycardia, their T must be > 102°F, and they must not be on any meds that affect the pulse rate
- Calculate the appropriate pulse response = take last digit of temperature (in Fahrenheit) and decrease by 1; multiply this number by 10 and add this sum to 100

Example problem: What is the appropriate pulse response for a patient with a T = 103°F?
Answer: (3-1)*10 + 100 = 120 beats per minute is the appropriate pulse response
Interpretation: If the patient’s heart rate is LOWER than this number, they have relative bradycardia. This supports the diagnosis of drug fever.

ASP Tool- Patient Workup Template

- Acute phase reactants: CRP: - ESR: - Platelets:
- Other: SGR: C-E:
  Albumin:
  CN:
  AST/ALT:
  Alk Phos:
  TBI:
  
- Cultures: Were abs given prior to ex (y/n)?
- Blood:
  UTI:
  CSE:
  Tissue:
  Bone:
- Serology/Other:

- Antimicrobial Medication(s) | Start Date | Stop date | Indication

<table>
<thead>
<tr>
<th>Antimicrobial Medication(s)</th>
<th>Start Date</th>
<th>Stop date</th>
<th>Indication</th>
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- Assessment/Recommendation

- ID Physician Input:
The Art of An Intervention

- Know Your Audience!!
- Know Your Patient
- Timing
- Clinical vs Interpersonal Skills
- First Impression Crucial

Document, Document, Document

Over 4,300 Patient Cases Reviewed
656 ASP Interventions (99% Acceptance Rate)
$100,000 Antimicrobial Cost Avoidance
Example Linezolid – Regionals

Additional Tools/Ideas to Help

1.) Under apps store search “Castbox”
2.) Install Castbox onto device
3.) In main menu select the “Search podcast”
4.) Type “Infectious disease”
5.) Select the plus symbol to subscribe
Additional Tools/Ideas to Help

- IDSA Guidelines- Implementing ASP
- Telemedicine
  - ID physician contracting for ASP rounds/training?
  - ECHO program
- SIDP/MAD ID ASP Training
  - Acceptable entry level ASP
  - Suboptimal for high level functions
- Webinars/Conferences
  - ID week
  - SIDP
  - MAD-ID

Conclusion: Remember it’s easy!

What can we do?

- Ensure
  - RIGHT antibiotic
  - RIGHT time
  - RIGHT dose
  - RIGHT duration
References

- Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Disease Society of America and the Society of Healthcare Epidemiology of America
  - https://academic.oup.com/cid/article-lookup/62/10/e51


- Core Elements of Hospital Stewardship Programs from the Centers for Disease Control
  - www.cdc.gov/getsmart/healthcare/pdfs/checklist.pdf

Antimicrobial Stewardship Outreach

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Disclosure

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Disclosure:

No relevant financial or nonfinancial relationships to disclose

Objectives

Identify challenges to antimicrobial stewardship activities

Explain how the Centers for Disease Control (CDC) can help raise antibiotic awareness

Discover tools you can use to promote your own antimicrobial stewardship activities
Importance of Stewardship

According to the CDC, over 2 million people per year are infected with a resistant bacterial organism

At least 23,000 will die due to those infections

Resistant organisms, such as Carbapenem-resistant Enterobacteriaceae are increasing in prevalence

The CDC works to highlight these global concerns by providing educational tools on the safe and proper use of antibiotics


Antimicrobial Stewardship Challenges

Lack of engagement

Too much time/energy to maintain

Patient and provider educational challenges

Not enough trained or specialized personnel

CDC: Get Smart About Antibiotics Week

November 13 – 19, 2017

A week designed to raise antibiotic awareness, and provide tools for long-lasting antimicrobial stewardship success

Involve your local pharmacists, pharmacy technicians, practitioners, and patients!

SAVE MONEY WITH ANTIBIOTIC STEWARDSHIP

Antibiotic stewardship programs and interventions help ensure that patients get the right antibiotics at the right time for the right duration. Recent studies have shown how effective antimicrobial stewardship programs can improve care and save costs. Antimicrobial stewardship programs have consistently demonstrated reduced expenditures to hospitals and other healthcare facilities of $250-1,000 per patient per antibiotic episode.

Return on Investment

Did You Know?
1. Antibiotic resistance is one of the world's most pressing public health threats.
2. Antibiotics are overprescribed. Important but rare, we have a need to reduce unnecessary antibiotic use.
3. Antibiotics are costly, important but rare. We have a need to reduce unnecessary antibiotic use.
4. Antibiotics, healthcare providers, hospital administrators, and public health authorities must work together to improve strategies for improving antibiotic use.

Antibiotic stewardship in your facility will:

- Increase good patient outcomes
- Decrease antibiotic resistance
- Decrease C. difficile infections
- Decrease costs

Promote Best Practices

1. Order recommended cultures before administering any antibiotic prophylaxis.
2. Make sure indication, dose, and expected duration are specified in the patient record.
3. Reassess within 48 hours of starting antibiotics.

Provide your administration with the facts about the benefits of antimicrobial stewardship.

Highlight the benefits of antimicrobial stewardship.

Educational Material

The CDC provides free educational resources for patients and healthcare providers


Viruses or Bacteria

What's got you sick?

Antibiotics only treat bacterial infections. Viral illnesses cannot be treated with antibiotics. When an antibiotic is not prescribed, ask your healthcare professional for tips on how to relieve symptoms and feel better.

Global Action to Slow Resistance

- Improved laboratory practice
- Continue or restrict use of antibiotics
- Improved education and awareness
- Improved antibiotic stewardship
- Better healthcare quality improvement
- Improved education and awareness
- Antimicrobial stewardship
- Innovative approaches to new bacterial threats

CDC's Impact on a Global Threat

- Improved antimicrobial stewardship
- Improved surveillance
- Improved diagnostic testing
- Improved research
Preventing and Treating Bronchitis

**Coughing or wheezing?**

**Treatment:**
- **Antibiotics:** Antibiotics are usually prescribed to treat acute bronchitis. However, it is important to note that antibiotics will not help if the infection is caused by a virus.
- **Rest:** Getting plenty of rest is important to recover.
- **Hydration:** Drinking plenty of fluids helps to thin mucus and ease breathing.
- **Cough Suppression:** Cough suppressants can be helpful in reducing coughing.

**Prevention:**
- **Avoiding Contact:** Avoid close contact with people who have respiratory infections.
- **Sanitizing:** Sanitizing hands frequently can help prevent the spread of germs.
- **Staying Hydrated:** Staying hydrated can help to thin mucus and ease breathing.

**Symptoms:**
- **Cough:** A cough is a common symptom of bronchitis. It can be dry or productive.
- **Wheeze:** Wheezing is a high-pitched whistling sound that occurs when air flows through narrowed airways.
- **Runny nose:** A runny nose can occur as bronchitis can sometimes be accompanied by a cold or flu-like illness.
- **Tiredness:** Tiredness is a common symptom of bronchitis.

**When to Seek Medical Care:**
- If you experience any of the following symptoms, seek medical attention:
  - Fever over 100°F
  - Cough that persists for more than 3 weeks
  - Difficulty breathing
  - Worsening of the illness

**Caution:**
- Avoiding second-hand smoke is important to prevent bronchitis.
- Wearing a mask or a face covering in public places can help prevent the spread of germs.
- Sanitizing hands frequently can help prevent the spread of germs.

**Understanding Inappropriate Antibiotic Use:**

**Inappropriate antibiotic use can refer to two types of antibiotic misuse:**
- **Unnecessary Use/Overuse:**
  - Antibiotics are prescribed unnecessarily, even though the infection is not caused by bacteria.
  - Antibiotics are not prescribed when the infection is caused by a virus.
- **Misuse/Incorrect Prescription:**
  - Antibiotics are prescribed for a viral infection that does not require antibiotics.
  - Antibiotics are prescribed for a bacterial infection for too long.

**Example:**
- **Unnecessary Use/Overuse:** A 40-year-old woman is diagnosed with bronchitis and prescribed an antibiotic, even though the infection was caused by a virus.
- **Misuse/Incorrect Prescription:** An 8-year-old boy is diagnosed with strep throat and needs an antibiotic to treat it, but the antibiotic prescribed is the wrong one, or the dose is too low, or the duration is too long.

**Prevention:**
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Activity Ideas For Your Institution

Provide educational material to patients

Post social media messages

Distribute tools and guidelines to healthcare professionals

Use engaging activities to highlight stewardship initiatives

Create fun, short videos that highlight your mission


Kids Health Fair
Creating Lasting Effects

Use the CDC Get Smart About Antibiotics Week to promote your antimicrobial stewardship activities

Continue that momentum by engaging with your pharmacists, practitioners, and patients

Get involved!
Summary

Employ CDC strategies and resources

Promote your Antimicrobial Stewardship activities throughout your organization

Ask other institutions for ideas

Thank you for your time and attention

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