A Multidisciplinary Team Approach to Antibiotic Stewardship: Gathering and using data

Ghinwa Dumyati, MD
Christina Felsen, MPH
University of Rochester Medical Center
How do you decide where to start?

- Start small; core elements recommend you focus on one thing at a time
- Use data to help decide where to intervene first – data may come from multiple sources like pharmacy, quality, nursing, labs etc.
- Must decide what scope of intervention is possible based on your staffing, medical record system, availability of an in-house pharmacist, relationship with the microbiology lab etc.
You Can’t Do it Alone

- Who should be on your team?
- What do your team members need to be effective?
- Involve multiple people from the beginning to account for turn-over and other commitments
Team Members may Include:

- **Internal Members:**
  - Medical Director
  - Infection Preventionist: with dedicated time to collect data; difficult to engage staff with multiple jobs and priorities
  - Consultant pharmacist/in house dispensing pharmacist
  - DON
  - Nurse managers and educator
  - Nurse practitioner/physician assistant
  - Information Technology (IT)

- **External Members:**
  - Hospital-based pharmacists/physicians
Ways to Gather Facility-Wide Antibiotic Data

- **Medication Administration data**
  - Often not available electronically

- **Purchasing data**
  - Different from hospital as medications purchased in bulk
  - Can be difficult for dispensing from a central pharmacy location to many facilities

- **Dispensing data**
  - Does not insure the antibiotic was administered
  - Often the dispensing pharmacy is outside the facility

- **Manual collection**
  - Point prevalence
  - Antibiotic start
With many resources....

- You can obtain antibiotic dispensing data to get a complete picture of where to intervene:
  - May be obtained from in-house or dispensing pharmacies
  - Useful variables to ask for:
    - Unique number for each patient
    - Drug name and dose
    - Complete “Sig” (contains indication)
    - Start and end dates
    - Days of Therapy (DOT)
Summaries of Antibiotic Data will Determine Interventions

<table>
<thead>
<tr>
<th>Summary Data</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT by time period</td>
<td>• Gross amount of antibiotics in the facility</td>
</tr>
<tr>
<td></td>
<td>• Monitor progress over time</td>
</tr>
<tr>
<td>DOT by Indication</td>
<td>• Most common indications for which antibiotics are dispensed</td>
</tr>
<tr>
<td>DOT by Agent</td>
<td>• Shows most common antibiotic agents</td>
</tr>
<tr>
<td>Indication by number of residents</td>
<td>• Shows what most residents are being treated for</td>
</tr>
<tr>
<td></td>
<td>• Does not account for duration of therapy</td>
</tr>
<tr>
<td>Antibiotic Starts by Indication</td>
<td>• Shows how many residents are started on therapy for a new instance of an infection</td>
</tr>
<tr>
<td></td>
<td>• Commonly used in nursing homes to track antibiotic data</td>
</tr>
</tbody>
</table>
Examples – Antibiotic DOT by Indication

**Nursing Home 1 – Quarter 3**

- **UNKNOWN**
- **COPD EXACERBATION**
- **C. DIFF**
- **HEENT INFECTION**
- **PNEUMONIA**
- **SSTI**
- **BONE/JOINT INFECTION**
- **UTI**
- **PEMPHIGOID**
- **UTI PROPHYLAXIS**

**Nursing Home 2 – Quarter 3**

- **BRONCHITIS/UTI**
- **BRONCHITIS**
- **BLEPHARITIS**
- **AORTIC ENTERIC FISTULA**
- **LUNG ABSCESS**
- **BONE/JOINT INFECTION**
- **UNSPECIFIED ABSCESS**
- **UNSPECIFIED PROPHYLAXIS**
- **UTI**
- **SKIN/SOFT TISSUE INFECTION**
- **C. DIFF**
Example – Indication by Number of Residents

Nursing Home 1, Q3

Number of Residents
Example – Antibiotics Used for UTI Treatment

Nursing Home 1, Q3

- LEVOFLOXACIN
- AMOXICILLIN/CLAV
- DOXYCYCLINE
- CLINDAMYCIN
- CEFTRIAXONE
- NITROFURANTOIN
- AMOXICILLIN
- CEPFODOXIME
- CIPROFLOXACIN
- TMP/SMZ
- CEPHALEXIN
Antibiotics Used for UTI Treatment may Vary by Home and Unit Type

Nursing Home 3, Q3

- PENICILLIN VK
- DOXYCYCLINE
- CEPTRIAZONE
- AMOXICILLIN
- METRONIDAZOLE
- AMOXICILLIN/CLAVULANATE
- LEVOFLOXACIN
- TRIMETHOPRIM
- AMPICILLIN
- BACTRIM
- CEPHALEXIN
- NITROFURANTOIN
- CEPFODOXIME
- CIPROFLOXACIN

Days of Therapy

Long Term Care
Transitional Care
But this is not easy....

- May have to enter data manually into Excel
- Usually requires significant cleaning of the data in order to summarize with a pivot table
  - Standardize drug name
  - Assign drug type (antibiotic, antiviral)
  - Standardize indication
  - Calculate DOT if not provided
And it has limitations

- Dispensing data may not accurately reflect what residents actually receive
- Time consuming and labor intensive; may not be possible with hospital support
- Cannot differentiate between hospital and nursing home initiated antimicrobials
- DOT skewed by long antibiotic courses and long term prophylaxis
So start smaller instead
Starting Small

- Do you know what infection is the most common reason for antibiotic use?
  - Could determine this from antibiotic data or from infection logs
  - UTI is usually a common infection where antibiotic treatment is usually unnecessary
Starting Small Example: Infection Preventionist + Consultant Pharmacist

- Targeted one unit and perform an antibiotic review of residents treated for UTI
- IP collects initial data; consultant pharmacist adds treatment data and assesses what percentage of the treated residents fit the updated McGeer surveillance criteria
  - Looks at documentation of urinary symptoms
  - Looks at the culture and if there is bug-drug mismatch
Example

- Red fields filled out by IP; blue fields by consultant pharmacist

Residents without a catheter

<table>
<thead>
<tr>
<th>Date</th>
<th>Patient Name</th>
<th>Medication</th>
<th>DOT</th>
<th>Indication</th>
<th>Positive UA (Y/N)</th>
<th>Culture Sensitive</th>
<th>Dysuria (Y/N)</th>
<th>Fever (Y/N)</th>
<th>Other Symptoms (Urinary urgency, frequency, pain, hematuria, incontinence)</th>
<th>Allergies</th>
<th>Appropriate abx?</th>
<th>Appropriate DOT?</th>
<th>Appropriate Dose?</th>
</tr>
</thead>
</table>

Residents with catheter

<table>
<thead>
<tr>
<th>Date</th>
<th>Patient Name</th>
<th>Medication</th>
<th>DOT</th>
<th>Indication</th>
<th>Positive UA (Y/N)</th>
<th>Culture Sensitive</th>
<th>Symptoms (Fever, rigors, delirium, flank pain, hematuria, pelvic discomfort, lethargy, CVA tenderness)</th>
<th>Allergies</th>
<th>Appropriate abx?</th>
<th>Appropriate DOT?</th>
<th>Appropriate Dose</th>
</tr>
</thead>
</table>

Courtesy of Brandi Van Valkenburg Pharm D, BCGP
## Examples

### Line list of Urines Obtained

<table>
<thead>
<tr>
<th>Name</th>
<th>Room</th>
<th>Date/Symptoms</th>
<th>U/A results</th>
<th>Culture results</th>
<th>Met Criteria</th>
<th>Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>134</td>
<td>12/14</td>
<td>Cough, fever (afebrile)</td>
<td>(+)</td>
<td>12/14&lt;br&gt;10⁵ E. Coli</td>
<td>No</td>
<td>Azithromycin for Bronchitis</td>
</tr>
<tr>
<td>116</td>
<td>12/20</td>
<td>Worsening CRPS (afebrile)</td>
<td>(+)</td>
<td>12/22&lt;br&gt;10⁵ Mixed Colonies</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>206</td>
<td>12/7</td>
<td>D× mental Status weakness, low grade T. (100.2)</td>
<td>(+)</td>
<td>12/12&lt;br&gt;10⁵ E. Coli</td>
<td>No</td>
<td>Cipro x 7 days</td>
</tr>
<tr>
<td>218</td>
<td>12/13</td>
<td>Vomiting, fever, T wbc&lt;br&gt;Urinary retention (afebrile)</td>
<td>(+)</td>
<td>12/13&lt;br&gt;10⁵ E. Coli</td>
<td>No</td>
<td>Cipro x 3 days</td>
</tr>
<tr>
<td>236</td>
<td>12/13</td>
<td>Wbc 2 Hyper of UTI's (afebrile)</td>
<td>(+)</td>
<td>12/28&lt;br&gt;10⁵ E. Coli</td>
<td>No</td>
<td>Ampicillin x 2 days</td>
</tr>
<tr>
<td>211</td>
<td>12/7</td>
<td>Fall, confusion (afebrile)</td>
<td>(-)</td>
<td>12/18&lt;br&gt;No Growth</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>336</td>
<td>12/7</td>
<td>Fluid, incontinence (afebrile)</td>
<td>(-)</td>
<td>12/17&lt;br&gt;10⁵ E. Coli</td>
<td>No</td>
<td>Cefoxitin x 5 days</td>
</tr>
<tr>
<td>326</td>
<td>12/9</td>
<td>Fall c. Yo, left sided pain (afebrile)</td>
<td>(-)</td>
<td>12/18&lt;br&gt;No done</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>429</td>
<td>12/23</td>
<td>T, lethargy, physical decline</td>
<td>(+)</td>
<td>12/23&lt;br&gt;10⁵ Proteus mirabilis</td>
<td>No</td>
<td>Cipro x 3 days</td>
</tr>
<tr>
<td>415</td>
<td>12/19</td>
<td>rigors, wheezing, crackles</td>
<td>(+)</td>
<td>12/26&lt;br&gt;59-100,000</td>
<td>No</td>
<td>None</td>
</tr>
</tbody>
</table>
Another “small” step

- Do you know if you all your antibiotic orders have an indication?
- Develop a system to ensure that all orders include:
  - Indication
  - Duration
- Although this intervention seems simple, it will likely require a coordinated effort between pharmacy, nursing and the providers
  - This is why it’s important to form a team first!
Tools for Starting Small
Obtaining Facility-Wide Antibiotic Data

- **Medication Administration data**
  - If available electronically, can ask IT to pull on a daily or weekly basis
- **Manual collection**
  - Point prevalence
  - Antibiotic start

Start on 1 unit and involve nursing and Infection Prevention
Antibiotic and Infection Tracking Sheet

- Excel tool with graphs built in so not as labor intensive
- Allows for monitoring of DOT and antibiotic starts over time
- Data can be obtained from morning report, infection log, chart review, MDS
- Expands on antibiotic data to also track culture results, symptoms, etc. to help measure appropriateness of antibiotics
- Using on even one unit will allow you to better understand the infection and antibiotic patterns in your home
- Tool available at: www.rochesterpatientsafety.com
Starting small – data feedback example

- Data should be monitored over time to measure trends
- Example of summary data for feedback and reporting
- Can be presented at quality and infection prevention meetings

<table>
<thead>
<tr>
<th></th>
<th>Number of urine cultures per month</th>
<th>Number of antibiotic starts for UTI</th>
<th>Patient days</th>
<th>Rate of urine cultures Per 1000 residents days</th>
<th>Rate of antibiotic starts Per 1000 residents days</th>
<th>C. Difficile rate per 1000 resident days</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>44</td>
<td>12</td>
<td>10133</td>
<td>4.3</td>
<td>1.2</td>
<td>2</td>
</tr>
<tr>
<td>July</td>
<td>37</td>
<td>10</td>
<td>10222</td>
<td>3.6</td>
<td>1.0</td>
<td>1</td>
</tr>
<tr>
<td>August</td>
<td>24</td>
<td>5</td>
<td>10450</td>
<td>2.3</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>September</td>
<td>27</td>
<td>7</td>
<td>11001</td>
<td>2.4</td>
<td>0.6</td>
<td>0</td>
</tr>
</tbody>
</table>
Tips for Success

• It’s not one size fits all
• Build processes into your daily routine so can be continued despite turnover and competing priorities
• Present results to medical director and at quality meetings to gain buy-in
• Initial data collection will determine interventions; can be pared down over time to be less labor intensive
• Hospital expertise can help initiate program, provide treatment guidelines and provide education on how to monitor data over time