Antimicrobial Stewardship - Why We Must How We Can

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Some of Your Questions

- How can we improve antibiotic use in small hospitals where resources are even more limited than in other hospitals?
- What can and should we monitor to evaluate the effectiveness of our efforts?
My Answers (in brief)

- We need to “push” stewardship to the front lines so that everyone helps.
  - We need to focus on concrete interventions that front line clinicians will view as value added.
  - We need to engage other groups as leaders of stewardship efforts.
- Try to find a simple measure that works for you.
Stewardship on the Front Lines

- Currently, efforts to improve antibiotic use are perceived as the job of an “antibiotic stewardship program”
- A multi-disciplinary team of an ID clinician and an ID pharmacist (and others) who oversee antibiotic use.
The Original Model

Re-Thinking the Model

- The goal of the stewardship program is not to dictate antibiotic choices.
- It’s to ensure that there are systems and support to help every provider use antibiotics optimally.
- For this to work, every provider has to play a role in stewardship.
Problems With the Current Approach

- Formally staffed stewardship programs are beyond the reach of most hospitals
  - Just over half of HCA facilities had access to an ID clinician
  - Less than 5% had an ID pharmacist

- Even if money were no object, there are not enough ID clinicians and pharmacists to go around.

- When is money not an object?
Problems With the Current Approach

- Even a really good stewardship program can’t intervene on every patient getting antibiotics.
- We’ve created a perception that antibiotic stewardship is something that is done for you or, worse, to you.
Everyone’s Responsibility

- Think about how infection control used to be, and how much better it is now.
- We’ve moved to a model where the practitioners are taking responsibility for preventing infections.
- We need to do the same for stewardship.
Changing the Way We Think About Antibiotic Stewardship

• We need other groups to assume leadership roles in stewardship:
  – Hospitalists - pneumonia, urinary tract infections, skin and soft tissue infections
  – Intensivists - antibiotic use in critical care
  – Surgeons - surgical prophylaxis and surgical site infections

• Stewardship efforts are most effective when they are a partnership between the stewardship team and clinicians.
Why engage hospitalists?

• In the U.S., numbers of hospitalists are growing
  – > 30,000 in 2011

• Many hospitals have hospitalist programs
  – 2/3 of U.S. hospitals (over 90% if beds > 500)
  – Fewer places have ID docs and ID pharmacists

• In 2006 > 50% of all U.S. non-surgical Medicare discharges were cared for by hospitalists
Why Engage Hospitalists?

- Antimicrobial resistance and antibiotic complications (*C. difficile*) hit home
- Templates, guidelines and checklists are commonplace in hospital medicine
- Hospitalists must tackle issues with signouts, handoffs, and care transitions
  - Dr X comfortable stopping the drug Dr Y started
Why Engage Hospitalists?

• It works.
• CDC and the Institute for Healthcare Improvement did a pilot program with 5 hospitalist groups where the hospitalists developed and led stewardship interventions.
• All had support from pharmacy, some had support from ID, but the hospitalists were the leaders.
Interventions Hospitalists Chose

• Documentation/visibility at the point of care: antibiotic, day of therapy, indication and expected duration

• Appropriate length of treatment (based on GLs for treatment duration for the 3 most common dx in the hospitalists program)

• 72 hour antibiotic time out to facilitate: de-escalation/discontinuation of AB, as appropriate
CDC Guidance on Stewardship

- Important for CDC to have a formal and comprehensive recommendation on hospital antimicrobial stewardship.
  - Stewardship considered a core strategy to prevent resistance (key strategy as outlined in AR report)
- Currently, stewardship only mentioned as a supplemental strategy in the Guideline for Preventing Infections by Multi-Drug Resistant Organisms.
Goals of the Guidance

- To define “minimum expectations” for stewardship in all acute care facilities.
- To outline “beyond minimum” stewardship activities that will be useful as facilities advance stewardship work.
- To provide guidance on how facilities can implement stewardship interventions.
Key Recommendation

- CDC recommends that all hospitals take action to improve antibiotic use by implementing an antimicrobial stewardship program.
Essential Elements for Successful Stewardship

• Adequate resources and support from administration- staffing and information technology support.
• Implement at least one specific intervention to improve antibiotic use.
• Track antibiotic use and resistance.
Essential Elements for Successful Stewardship

• Appoint a single person to have responsibility as the leader for the program- most programs have appointed a physician to assume this role.

• Appoint a pharmacy leader.

• Report information on antibiotic use and resistance back to the facility on a regular basis.
Some Thoughts on Getting This Done

• Start small
  – “Support” may initially only be “moral” support from leadership, but that can help.
  – Leaders don’t necessarily need to be on staff at the facility.

• Be specific
  – Choose concrete and focused interventions: “we’re going to improve duration of therapy for community acquired pneumonia”.
Key Moments for Antibiotic Stewardship

• There are certain moments when interventions are likely to be both well received by providers and helpful in improving patient outcomes.
• We should identify and take advantage of them.
Key Moments for Antibiotic Stewardship

- Patients with *C. difficile*
- Patients with positive blood cultures
- Patients being given IV antibiotics at discharge
- Patients being treated for:
  - Community acquired pneumonia (CAP)
  - Urinary tract infection (UTI)
  - Skin and soft tissue infections
- Patients who have gotten 3 days of therapy.
Antibiotics in Patients with C. diff

• Study in MN VA looked at 246 patients with new onset C. diff.
• 141 received non C. diff antibiotics within 30 days of completion of C. diff therapy.
• Receipt of non C. diff antibiotics increased the risk of recurrent disease, even after adjusting for other factors.

American Journal of Medicine 2011;124:1081
Antibiotics in Patients with C. diff

• Another study showed that receipt of non-C. diff antibiotics during or soon after C. diff therapy was associated with:
  • Lower cure rates
  • Prolonged diarrhea
  • Recurrent C. diff

Clin Infect Dis 2011;53:440
Inappropriate Antibiotics in Patients with *C. difficile*

- Study of 141 patients who got antibiotics following a new *C. difficile* infection.
  - *C difficile* treatment guidelines urge providers to stop unnecessary antibiotics.

- Of 2147 total antibiotic days:
  - 45% of the days included at least one unnecessary antibiotic
  - 36% of the days included only unnecessary antibiotics.

Infect Control Hosp Epidemiol 2013;34:109
Patients With Positive Blood Cultures

• An excellent target for stewardship interventions
  – Easy to find
  – Not too many (hopefully)

• Ensures patients with serious infections get proper therapy.

• Can reduce treatment of blood culture contaminants.
Stewardship at Discharge

- Cleveland Clinic implemented mandatory ID consult for planned IV antibiotics at discharge.
- Post discharge antibiotics were avoided in 28% of cases.
- No re-admits or ED visits among patients who did not get antibiotics.

ICHE 2012;33:354
Stewardship Opportunities in CAP

• Many patients who get an initial diagnosis of CAP, don’t have it- 20-30% in some studies.
• Antibiotics are often not tailored to culture results in patients with CAP.
• CAP is treated for too long.
CAP is Treated for Too Long

- Median length of stay: 5 days (range 2-31)
- Total median antibiotic duration = 11 days, median of 4 days as inpatient and 6 days as an outpatient
  - > 7 days in 88% of patients
  - > 10 days in 53% of patients
  - > 14 days in 15% of patients
- Immunocompetent patients had similar duration of therapy to those who were immunocompromised (median of 10.5 days vs. 11 days)
Stewardship in CAP

- Prospective intervention for patients being treated for CAP.
- Treatment duration reduced from 10 d to 7 d ($p<0.001$) with 148 fewer antibiotic days.
- Antibiotics more frequently narrowed based on culture results (67% v. 19%).
- Fewer patients got duplicate therapy (10% vs 45%).

CID 2012;54:1581-7
<table>
<thead>
<tr>
<th>Study</th>
<th>Patient Population</th>
<th>Lack of Adherence to Guidelines</th>
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</thead>
<tbody>
<tr>
<td>Dalen, 2005</td>
<td>Ottawa Hospital patients with catheter associated ASB</td>
<td>29</td>
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<tr>
<td></td>
<td></td>
<td>52% prescribed antimicrobials inappropriately</td>
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<tr>
<td>Gandhi, 2009</td>
<td>U Michigan patients with UTI diagnosed</td>
<td>49</td>
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<tr>
<td></td>
<td></td>
<td>32.6% did not meet criteria for UTI (most due to lack of symptoms)</td>
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<tr>
<td>Cope, 2009</td>
<td>Houston VA episodes of catheter associated ASB</td>
<td>164</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32% prescribed antimicrobials inappropriately</td>
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</tbody>
</table>

Skin and Soft Tissue Infections

- Have become common reasons for admission for antibiotics.
- Are overwhelmingly caused by gram positive pathogens.
- Despite this, patients are often treated with agents active against gram negatives and anaerobes.
Improving Treatment of Skin and Soft Tissue Infections (SSTI)

• Facility implemented a SSTI diagnosis and treatment guideline.

• Intervention resulted in:
  – 3 day reduction in antibiotic treatment (13 v 10d)
  – Less use of agents with gram negative and anaerobic activity
  – Better use of diagnostic studies and consults

Stewardship After Day Three

- Audit and Feedback to Reduce Broad Spectrum Antibiotic Use in an ICU.
- Gave providers feedback on antibiotics on days 3 and 10 of antibiotics.
- Mean monthly antibiotic use decreased from 644 DOT/1000 pt days to 503 (P<0.001).
- *C. difficile* decreased (11 cases to 4)
- Meropenem susceptibility increased.

ICHE 2012;33:354
Take an “Antibiotic Time Out”

- Antibiotics are almost always started when limited clinical data is available, including some of the most important data—culture results.
- After 72 hours, we’re in a much better position to assess the need for antibiotics.
Take an “Antibiotic Time Out”

• We should have a deliberate “time out” to critically re-assess antibiotic therapy.
• Does the patient actually need antibiotics?
• What’s the best antibiotic for the infection?
• How long do they need it for?
Measuring Antibiotic Use

- Measurement of antibiotic use remains one of the major challenges in stewardship.
  - You can’t improve something you can’t measure
- This is a challenge both at the facility level and at the regional and national level.
Addressing the Challenge

- As CDC began considering options for ways to improve the measurement of antibiotic use, we wanted something that would be useful to individual facilities wanting to assess the impact of stewardship intervention and would provide a bigger picture on antibiotic use.

- The Antibiotic Use Module of the National Healthcare Safety Network was the result.
NHSN Antibiotic Use Module

- Launched in 2012.
- Allows facilities to electronically submit data on antibiotic use to NHSN through their hospital pharmacy computer system.
  - House-wide and unit specific use
Flexibility of the AU Module

- The data can be used:
  - By facilities to monitor interventions on single units or facility wide
  - To collect aggregate information on antibiotic use at a regional and national level
  - Eventually, to create antibiotic use benchmarks.
## National Healthcare Safety Network

**Rate Table - All Submitted AU Data - Antimicrobial Utilization Rates by Location**

Rate per 1,000 Days Present

As of: February 3, 2012 at 3:52 PM
Date Range: All AU_RATESLOCATION

| Org ID=10846 CDC Location=IN:ACUTE:CC:M Location=INMEDCC |

<table>
<thead>
<tr>
<th>Summary Yr/Mon</th>
<th>Antimicrobial Category</th>
<th>Antimicrobial Class</th>
<th>Antimicrobial Days</th>
<th>Days Present</th>
<th>Rate per 1000 Days Present</th>
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</thead>
<tbody>
<tr>
<td>2011M01</td>
<td>Antibacterial</td>
<td>-- All --</td>
<td>90165</td>
<td>10000</td>
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<td>Aminoglycosides</td>
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<td>Carbapenems</td>
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<td>10000</td>
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<td>Antibacterial</td>
<td>Fluoroquinolones</td>
<td>12</td>
<td>10000</td>
<td>1.200</td>
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<td>2011M01</td>
<td>Antibacterial</td>
<td>Folate pathway inhibitors</td>
<td>6</td>
<td>10000</td>
<td>0.600</td>
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</table>

*Data is for example only*
Example Use of Data for a Hospital (AU Analysis Output Options): Risk-adjusted Benchmarking of Antimicrobial Use To Guide Stewardship

<table>
<thead>
<tr>
<th>Antimicrobial Class-Specific Usage Rates and Standardized Utilization Ratios (SURs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-MRSA Intravenous</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ABX Days</th>
<th>Observed</th>
<th>Predicted</th>
<th>SUR</th>
<th>Interpretation</th>
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<tr>
<td>MICU</td>
<td>4000</td>
<td>1000</td>
<td>4.0</td>
<td>Excessive</td>
</tr>
<tr>
<td>SICU</td>
<td>2000</td>
<td>2000</td>
<td>1.0</td>
<td>Consistent</td>
</tr>
<tr>
<td>Medical Ward</td>
<td>3000</td>
<td>4000</td>
<td>0.75</td>
<td>Lower Use</td>
</tr>
<tr>
<td>Surgical Ward</td>
<td>1000</td>
<td>3000</td>
<td>0.33</td>
<td>Much Lower</td>
</tr>
<tr>
<td>Hospital</td>
<td>170,250</td>
<td>171,000</td>
<td>0.99</td>
<td>Consistent</td>
</tr>
</tbody>
</table>

**Example Data Only:** SUR is a ratio of actual usage patterns compared to expected patterns given the patient population defined by the location (e.g., MICU, SICU, etc.)
Strengths of the AU Module

- Data submission is totally electronic.
- It uses the NHSN platform, which is now used by almost every acute care hospital in the country (and almost all dialysis facilities).
- Electronic submission requires that a facility have both electronic medication administration system AND a pharmacy system that can send data to NHSN.
- This is the future, but we’re not there yet.
If You are Interested Learning More . . .

- Send me an e-mail!
- We are talking with lots of places about working towards getting connected to the AU module.
- We’re happy to help you.
In the Meantime

- Many hospital pharmacies are able to track antibiotic use in some way—defined daily doses, purchasing data.
- A local measure doesn’t have to be perfect to be helpful, especially if you can follow it over time.
Focused Measurement

- Tailor your measurement approach to your intervention.
- If you are intervening on treatment of urinary tract infections, it makes more sense to monitor use of agents most commonly used to treat UTIs on the floors where you are intervening.
  - Measuring all antibiotic use might not show any impact.
Assessing “Appropriate” Antibiotic Use

- If our ultimate goal is to improve antibiotic use, we need some way to measure that.
- It can be very hard to determine if antibiotic use is “appropriate” or not.
  - Mostly done as part of research studies where they have ID clinicians review charts.
- We want something that would be more broadly applicable.
Assessing Appropriate Antibiotic Use

- CDC assembled a group of experts to develop and refine some forms that could be used by any clinician to assess the appropriateness of antibiotic use.

- Focused on a few conditions:
  - Community acquired pneumonia
  - Urinary tract infection
  - Use of agents for resistant gram positives
  - General antibiotic use
Assessing Appropriate Antibiotic Use

Forms focus on areas for potential improvement of antibiotic use that are mostly guideline driven and that can be assessed relatively easily.

For example:

- Does a patient being treated for a UTI have a positive urine culture AND symptoms?
- Does a patient being treated with an anti-MRSA agent have a culture that grew MRSA?
Goals of the Forms

- Not to be punitive
- To try and highlight areas where there might be room for improvement.
- To provide something that can be tracked over time to see if improvement interventions are effective.
Current Status of the Forms

- Several places are trying them out and we’re making edits based on their feedback.
- Please let me know if you would like to try them in your facility.
Conclusions

- We can improve antibiotic use in every hospital.
- We need to collaborate so that we can work together to learn how best to get this done.
  - Really glad to see the Great 8+ working on this-keep working together.
  - You’ll be getting a survey on stewardship from Gayle Allenback later this week. Her work will help better understand where we are in the Great 8+ on stewardship.
Conclusions

- Every hospital can have a stewardship program, but they will all look a little different.
- Start small, but start somewhere.
- Please let me know how we can help.