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Antimicrobial Stewardship Education for Hospitalists

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Conflicts of Interest

Marsha Crader, PharmD has no relevant financial relationships with commercial interests to disclose.

Learning Objectives

1) Describe how to approach hospitalist education regarding antimicrobial stewardship
2) Discuss potential barriers and obstacles to hospitalist engagement with antimicrobial stewardship
3) Summarize common infectious diseases myths in hospital medicine

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Hospitalist Education:

How to Reach Hospitalists

Hospitalist Education Basics

- **What?**
  - Location of local resources
    - Antibiograms, order sets, sepsis requirements for CMS core measures
  - Current stewardship focus
    - Joint Commission requirements, hospital goals/initiatives, identified areas for improvement, clinical pearls
- **When?**
  - Repeat information through various avenues over multiple years
- **Where?**
  - Meet them where they are at – knowledge and physical location
    - Medical staff meetings, CMEs, “handshake” stewardship, competency requirements, provider-specific newsletters, physician lounge bulletin board, etc.

Hospitalist Education Basics

- **How?**
  - Communication, communication, communication
    - Repeat a few key points
    - Explain the “why,” “when,” and “how” of making prescribing changes…utilize case examples
    - Share ongoing goal progress…goals and progress need to be visible and audible
      - Peer comparison…generate light, not heat, with data
    - Consider generational and personality differences in communication
  - Change the culture and expectation
    - Have a shared vision with prescribers…committee involvement
    - Find out what prescribers want and need to know/understand
    - Utilize interprofessional rounding and peer champions to expand efforts
    - Make the right thing easy to try and to do…hardwire what you can
  - Be a physician partner
    - Do not just state the problem and how to fix it, but be a part of the solution

The "Why," "When," and "How" of Explaining Prescribing Changes

Why?

- Does antibiotic resistance data or antibiotic usage data drive more prescribing changes?
  - National antibiotic resistance data is good, but local data is better
  - Hospital/Joint Commission-required initiatives/goals

When?

- Which common scenarios provide an opportunity to change prescribing practices?

How?

- What are ways that the hospital is going to support improvements beyond educating prescribers?

Decrease Anti-Pseudomonal Antibiotics "Why, When, How" Example

Why

- Declining susceptibilities to anti-Pseudomonal antibiotics
  - Piperacillin/tazobactam (2018: x% and 2021: x%)
  - Cefepime (2018: x% and 2021: x%)
  - Meropenem (2018: x% and 2021: x%)

When

- Avoid anti-Pseudomonal agents empirically when unnecessary
  - Diabetic foot infection without history of *Pseudomonas* within previous 6 months or water "soaked" foot
  - Community-acquired, mild-to-moderate severity biliary and extra-biliary infections without the following: sepsis, ≥ 70 years, or immunocompromised
- Avoid collection of urine specimens from patients without signs and symptoms of UTI unless pregnant or undergoing urinary procedure
- De-escalate anti-Pseudomonal agents quickly when possible
  - If preliminary culture from MALDI-TOF NOT identified as *Pseudomonas*
  - If ESBL(+) UTI and susceptible to oral options
- Utilize appropriate durations of therapy

How

- Education to providers and pharmacists
- Maximization of clinical surveillance software
- Order set and microbiology PCR updates

Lipsky BA, et al. *Clin Infect Dis.* 2012;54(12):132-173. and Solomkin JS, et al. *Clin Infect Dis.* 2010;50:133-64.

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Hospitalist Engagement:

Key Strategies and Potential Barriers to Overcome

Engaging Hospitalists in Antimicrobial Stewardship: Lessons From a Multihospital Collaborative

- **Participants**
  - 1 community non-teaching hospital, 2 community teaching hospitals, and 2 academic medication centers in a collaborative with CDC and IHI which began with a kick-off in 2012
- **Key Strategies for Engagement**
  1) Improved documentation/visibility at points of care
     - Making antimicrobial indication, day of therapy, and anticipated durations transparent in the medical record
  2) Improved guideline clarity and accessibility
     - Enhancing availability of guidelines for frequently encountered infections and clarifying keys recommendations such as duration of therapy
  3) 72-hour time-out: collaborating with clinical pharmacists to assess 3 questions
     1) Does the condition require antimicrobials?
     2) Can the antimicrobial regimen be tailored based on culture data?
     3) What is the anticipated treatment duration?

Mack MR, et.al. *J Hosp Med*. 2016;11(8): 576-580.

Engaging Hospitalists in Antimicrobial Stewardship: Lessons From a Multihospital Collaborative

- **Barriers to documentation and optimization of therapy**
  1) **Schedule and practice variability**
     - Structure of antimicrobial documentation
     - "Prescribing etiquette"
     - Competing schedule demands
  2) **Skepticism of antimicrobial stewardship importance**
     - Perception that stewardship practices are time consuming
     - Competing quality improvement initiatives
     - Unclear leadership "buy-in"
  3) **Focusing too broadly** – large initial interventions/unrealistic expectations

Mack MR, et.al. *J Hosp Med*. 2016;11(8): 576-580.

Engaging Hospitalists in Antimicrobial Stewardship: Lessons From a Multihospital Collaborative

- **Facilitators to documentation and optimization of therapy**
  1) **Engage hospitalists**
     - Determine core group of stewardship "champions"
     - Speak one-on-one to colleagues
     - Establish leadership "buy-in"
     - Encourage multidisciplinary efforts
  2) **Collect real time data and feedback**
     - Give feedback often
     - Recognize and reward high performers
  3) **Limit scope**
     - Start with "low-hanging" fruit and easy integration into hospitalist workflow

Mack MR, et.al. *J Hosp Med*. 2016;11(8): 576-580.

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Hospitalist Education:

Common Antimicrobial Stewardship Topics

Hospitalist Learning Objective Ideas

General Infectious Diseases Topics

1) Summarize micro-organism susceptibility patterns from the local antibiogram(s)
2) Describe appropriate antibiotic options for common infections based on national guidelines and local antibiogram data
   - Sepsis
   - Skin and soft tissue infections & diabetic foot infections
   - Community-acquired pneumonia
   - Urinary tract infections/asymptomatic bacteriuria
   - *C. difficile*
3) Discuss when culture results could be colonization or contamination
4) Determine when certain beta-lactam antibiotics may be an option in patients with a penicillin allergy
5) Discuss evidence-based durations of antimicrobial therapy

Hospitalist Learning Objective Ideas

Choosing Empiric Therapy Wisely

1) Determine if meet sepsis criteria for CMS core measures
2) Assess if likely to have viral instead of bacterial infection
3) Order appropriate culture specimens and determine colonization, contamination, or infection
4) Review recent previous culture and susceptibility results
5) Utilize order sets/antibiogram
6) Collect true antibiotic allergy information

Hospitalist Learning Objective Ideas

Hospital and/or Joint Commission Antimicrobial Stewardship Goals

1) General Antibiotic Usage
   - How to decrease inappropriate anti-Pseudomonal usage
   - How to decrease inappropriate carbapenem usage
   - How to decrease inappropriate MRSA antibiotic usage
2) Appropriate Antibiotic Therapy Selection and Duration of Therapy (for Joint Commission)
   - Optimizing guideline and antibiogram-driven antibiotic selection and duration for common infections
   - Decreasing inappropriate treatment of asymptomatic bacteriuria
   - Improving surgical prophylaxis antibiotic selection and timing of antibiotic administration/duration

Top Myths of Diagnosis and Management of Infectious Diseases in Hospital Medicine

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#1 Antibiotics do no harm

#2 Antibiotic durations of 7, 14, 21 days are typically necessary

#3 If one drug is good, 2 (or more) must be better

#4 PO antibiotics are not as good as IV antibiotics in hospitalized patients

#5 Bacteria in the urine signifies a UTI and should be treated & cloudy or smelly urine indicates UTI

Johnson MD, et.al. *Am J Med*. 2022;135(7): 828-835.

Top Myths of Diagnosis and Management of Infectious Diseases in Hospital Medicine

#6 History of a penicillin allergy means the patient can never receive a beta-lactam antibiotic

#7 Antibiotics for surgical prophylaxis should typically be continued for at least 24 hours

#8 Antibiotics are necessary if drains are in place

#9 Nitrofurantoin can by used for UTIs only if CrCl > 60 mL/min

#10 Fluoroquinolones remain an excellent 1st-line option for most common infections

Johnson MD, et.al. *Am J Med*. 2022;135(7): 828-835.

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Hospitalist Education With and Without Prospective Audit with Feedback:

Literature Examples

Impact of Hospitalist-led Interdisciplinary Antimicrobial Stewardship (AS) Interventions at an Academic Medical Center

- **Design**
  - 3-arm pre-post study comparing September through December data in 2015 and 2016
- **Setting**
  - 3 adult internal medicine teaching services at urban academic hospital
- **Methods**
  - **Education bundle** (Ed-only)
  - **Educational bundle** + AS rounds bi-weekly with ID-trained pharmacist (Ed+IDPharmDx2)
  - **Educational bundle** + IM-trained pharmacist embedded in daily attending rounds Monday – Friday (Ed+IMPharmDx5)

Tang SJ, et.al. *Jt Comm J Qual Patient Saf*. 2019;45(3): 207-216.

Impact of Hospitalist-led Interdisciplinary Antimicrobial Stewardship Interventions at an Academic Medical Center

- **Results**
  - Total antibiotic usage decreased by
    - Ed-only: 16.8% ($p<0.001$), Ed+IDPharmDx2: 6.8% ($p=0.08$), Ed+IMPharmDx5: 33% ($p<0.001$)
  - Broad-spectrum antibiotic use decreased by
    - Ed-only: 26.2% ($p<0.001$), Ed+IDPharmDx2: 7.8% ($p=0.09$), Ed+IMPharmDx5: 32.4% ($p<0.001$)
  - Duration of inpatient antibiotic therapy decreased from
    - Ed+IMPharmDx5: 4 to 3 days ($p=0.01$)
  - Length of stay for patient receiving antibiotics decreased from
    - Ed-only: 9 to 7 days ($p<0.001$) and Ed+IMPharmDx5: 9 to 6 days ($p<0.001$)
  - 30-day readmissions to same facility, transfer to ICU, and in-hospital mortality
    - No significant change for any arm of the study

Tang SJ, et.al. *Jt Comm J Qual Patient Saf*. 2019;45(3): 207-216.

Impact of Hospitalist-led Interdisciplinary Antimicrobial Stewardship Interventions at an Academic Medical Center

- **Limitations**
  - Ed+IDPharmDx2 arm
    - Pre-intervention attending physicians included ID-trained attendings 50% of the time
    - Post-intervention patients included step-down patients not included in pre-intervention
- **Discussion**
  - "Champions" from hospital medicine, IM residency program, and pharmacy
  - Educational interventions streamlined into prescriber work flow
  - In-person rounds

Tang SJ, et.al. *Jt Comm J Qual Patient Saf*. 2019;45(3): 207-216.

Evaluation of multifaceted approach to antimicrobial stewardship (AS) education for medical residents

- **Design**
  - Retrospective cohort study with 295 patients meeting inclusion criteria
- **Setting**
  - Community teaching hospital from July 2016 through June 2017
- **Methods**
  - 3 medical teams received **baseline AS education and daily prescribing audit with feedback from clinical pharmacists**
    - Family medicine (FM) resident service, internal medicine (IM) resident service, and hospitalist control group
  - **FM resident service also received bi-weekly stewardship-focused rounds with antimicrobial stewardship program (ASP) physician and clinical pharmacist leadership**
  - Guideline-concordant prescribing was assessed based on institution's ASP guidelines for pneumonia, cellulitis, and UTIs

VanLangen KM, et.al. *ICHE*. 2019;40(11): 1236-1241.

Evaluation of multifaceted approach to antimicrobial stewardship (AS) education for medical residents

- **Results**
  - No difference in empiric or definitive antibiotic selection but FM resident service was more likely to prescribe guideline-concordant duration of therapy across all diagnoses
    - Empiric: FM=87.5%, IM=87%, hospitalist=83.8%; p=0.702
    - Definitive: FM=92.4%, IM=89.1%, hospitalist=89.9%; p=0.746
    - Duration of therapy: FM=74%, IM=56.5%, hospitalist=44.6%; p<0.001
- **Limitations**
  - Limited to uncomplicated infections
  - High rate of emergency department prescriber guideline-concordance likely influenced empiric therapy selection of study groups

VanLangen KM, et.al. *ICHE*. 2019;40(11): 1236-1241.

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Educational Resources & Tips

Resources and Tips: Allergies and Durations of Therapy

- **Penicillin allergies**
  - https://www.cdc.gov/antibiotic-use/community/pdfs/penicillin-factsheet.pdf
  - Blumenthal KG, et al. *Lancet*. 2019;393(10167): 183-198.
  - Khan DA, et al. *J Allergy Clin Immunol*. 2022;150(6):1333-1393.
  - Blumenthal KG, et al. *Clin Infect Dis*. 2018;66(3):329-36.
  - Vorobeichik L, Weber EA, and Tarshis J. *Anesth Analg*. 2018;127(3):642-649.
- **Duration of therapy**
  - Davar K, et.al. *Open Forum Infect Dis*. 2022;10(1): ofac706.
    - Shorter therapy is just as efficacious as longer therapy
      - Cellulitis/wound/abscess: 5-6 days
      - CAP: 3-5 days
      - Complicated UTI/pyelonephritis: 5-7 days
  - Teshome BF, et.al. *Pharmacotherapy*. 2019;39(3): 261-270.
    - Increased risk of new resistance for each additional day of any anti-Pseudomonal beta-lactam antibiotic exposure
    - Cefepime and piperacillin-tazobactam: 8% for each additional day
    - Meropenem: 2% for each additional day

Resources and Tips:
UTIs – Duration of Therapy

- **Each medication's duration is different**

- **Uncomplicated cystitis**
  - Nitrofurantoin x 5 days (female) and x 7 days (male)
  - Cephalexin **four times daily** x 5 days
  - TMP/SMX x 3 days (female) and x 7 days (male)
  - Fosfomycin x 1 dose
- **Complicated cystitis/pyelonephritis**
  - TMX/SMX x 7 days
  - Ciprofloxacin and Levofloxacin x 5-7 days
  - Beta-lactams x 10-14 days

Gupta K, et al. *Clin Infect Dis*. 2011;52(5): e103-120.
Lexicomp (2023). Lexi-Clinical Suite (Version 7.7.3) [Mobile application software.]

Resources and Tips:
Skin and Soft Tissue Infections

- **Skin and soft tissue infections**
  - Non-purulent → *Streptococcus* unless severe, necrotizing infection
  - Purulent → *Staphylococcus* + incision and drainage

Stevens DL, et.al. *Clin Infect Dis*. 2014;59(2): e10-52.

Resources and Tips:
Skin and Diabetic Foot Infections

- **Diabetic foot infections**
  - Cover for *Staphylococcus* and *Streptococcus*
  - Cover for Gram (-) bacilli
    - Recent antibiotic exposure in mild severity
    - All scenarios in moderate or severe severity
    - *Pseudomonas* only a concern if grown from wound within previous few weeks or wound "water soaked"
  - Cover for anaerobes with ischemic, necrotic, and gas-forming wounds

Senneville E, et al. *Clin Infect Dis*. 2023; Oct 2. (online ahead of print)

Resources and Tips: Community-acquired Pneumonia

- **Community-acquired pneumonia**
  - Avoid fluoroquinolones unless necessary (see last slide for MedWatch warnings)
  - **Outpatient**
    - Without co-morbidities → *Streptococcus pneumoniae*
    - With co-morbidities → *Strep pneumoniae*, *H. flu*, *M. cat*, and atypicals
    - Is azithromycin a viable option for *Strep pneumo* based on antibiogram?
  - **Inpatient**
    - All patients → *Strep pneumoniae*, *H. flu*, *M. cat*, and atypicals
    - History of MRSA from respiratory specimen within last year → add MRSA
      - Discontinue MRSA coverage if MRSA PCR nasal screen negative
    - History of *Pseudomonas* from respiratory specimen within last year → add *Pseudomonas*
    - Hospitalization + IV antibiotics + locally validated risk factors → add MRSA and/or *Pseudomonas* in severe CAP empiric therapy

Metlay JP, et.al. *Am J Respir Crit Care Med*. 2019;200(7): e45-67.

Resources and Tips: Urinary Tract Infections (UTI)

- **Asymptomatic bacteriuria**
  - Avoid collecting urine specimens from any patients without signs/symptoms of UTI
    - Continue to collect and treat patients with bacteriuria who are pregnant or undergoing an invasive genitourinary procedure
  - Prevalence of bacteriuria in patients with a long-term urinary catheter is 100%
  - Avoid assumption that confusion and falls in the elderly are always due to a UTI
    - Could it be a stroke, polypharmacy, dehydration, etc.?
- **Urinary tract infections**
  - Positive UA in patients with chronic urinary catheters are not as useful since pyuria and hematuria may be present without UTI
  - Review previous culture results for empiric therapy because extended-spectrum beta-lactamases (ESBLs) are on the rise
  - Nitrofurantoin and fosfomycin only treat cystitis

Gupta K, et al. *Clin Infect Dis*. 2011;52(5): e103-120.
Tamma PD, et.al. *Clin Infect Dis*. 2023 (in press).
https://www.idsociety.org/practice-guideline/amr-guidance/#null
Nicolle LE, et.al. *Clin Infect Dis*. 2019; 68(10): e83-75.

Resources and Tips
Avoid Fluoroquinolones

- *"FDA has determined that **fluoroquinolones should be reserved for use in patients who have no other treatment options** for acute bacterial sinusitis, acute exacerbation of chronic bronchitis, and uncomplicated urinary tract infections because the **risk of these serious side effects generally outweighs the benefits** in these patients."*
- Multiple MedWatch Warnings identified
  - CNS → peripheral neuropathy (potentially permanent)
  - Heart → arrhythmias, aortic aneurysm
  - Hypoglycemia
  - Tendinitis/tendon rupture
- FYI: local antibiogram susceptibilities may not optimal for empiric usage in many common inpatient and outpatient infections

https://www.drugs.com/fda-alerts/1457-0.html

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Questions?

Question #1
Select All That Apply

Antimicrobial stewardship education for hospitalists can be accomplished through which of the following methods?

- ☐ Continuing medical education (CME)
- ☐ Medical/hospitalist staff meetings
- ☐ “Handshake” stewardship
- ☐ Joint Commission competency requirements

Question #2
Multiple Choice

Which of the following is/are potential barrier(s) to hospitalist antimicrobial stewardship engagement?

A. Inconsistent structure and visibility of antibiotic documentation
B. Clear hospital leadership support
C. Limiting scope of antimicrobial stewardship initiatives
D. All of the above
E. None of the above

Question #3
Multiple Choice

Which of the following is/are myth(s) regarding infectious diseases?

A. Bacteria in the urine should always be treated
B. Patients with penicillin allergies should never receive a beta-lactam antibiotic
C. Antibiotics do no harm
D. Antibiotic duration of therapy with at least 7 days is always necessary
E. All of the above
F. None of the above