

Interactive Case-Based Antimicrobial Stewardship Education Program to Pharmacists at a Large Community Health-System

Ashley M. Wilde, PharmD, BCIDP¹, Elena A. Swingler, PharmD, MBA, BCIDP¹, Matthew Song, PharmD, BCIDP¹, Sarah E. Moore, PharmD, BCIDP¹

¹Norton Infectious Diseases Institute, Louisville, KY, USA

Corresponding Author

Ashley M. Wilde, PharmD, BCIDP
 Norton Infectious Diseases Institute
 4950 Norton Healthcare Blvd, Plaza 1, Louisville, KY 40241
 ashley.wilde@nortonhealthcare.org

ABSTRACT

Background: Education on antimicrobial stewardship (AMS) is one of the several elements outlined by the Center for Disease Control for hospital antibiotic stewardship programs. However, the Infectious Diseases Society of America guideline on implementing antimicrobial stewardship notes that passive education should not be a sole method for training as the effects are often short lived. AMS education strategies beyond didactic lectures and written material distribution are needed.

Objective: We sought to describe the implementation of an interactive, case-based AMS educational program targeting pharmacists across a multi-hospital community health-system licensed for over 1,500 beds. **Methods:** Each month, a custom patient case was drafted by a board certified infectious diseases trained pharmacist to highlight a common AMS principle encountered in practice. These topics were broadly categorized into appropriate empiric antibiotic selection, treatment plan modification, and identification of non-infectious clinical syndromes. A specific question with multiple choice answers was drafted. The case was disseminated to all hospital pharmacists via email using Microsoft Outlook. Pharmacists were prompted to use the voting buttons to select the correct answer (Figure 2). After a week, results of the survey was shared with the entire pharmacist staff along with information on the primary teaching point and detailed explanations for why each answer was correct or incorrect.

Results: A total of eleven AMS cases were disseminated to 88 hospital pharmacists involved with direct patient care. Average number of responses per case was 27 (31%), range 17-41 (19%-47%). Average percentage of correct responses for each case was 74%, range 26%-100%. The highest rates of correct responses came from cases focusing on empiric antibiotic selection (87%), followed by identification of non-infectious clinical syndromes (73%). The lowest rate of correct responses were found with treatment plan modification cases (65%).

Conclusion: This case-based AMS education program leveraged existing technology to provide engagement across a large and geographically diverse pharmacist staff, provided opportunity to apply stewardship concepts, and assessed staff pharmacist knowledge on general AMS principles.

INTRODUCTION

- The CDC Core Elements of Antimicrobial Stewardship state that case-based education is a key component of comprehensive efforts to improve antibiotic use.¹
- Passive education should complement other stewardship intervention because the benefits of education alone are non-sustainable.²
- Hospital systems require innovative methods to deliver competency based education to accommodate needs across geographically separated sites.
- The purpose of this project is to describe the implementation of an interactive, case-based AMS education program for pharmacists.

METHODS

- An AMS case was emailed to all inpatient pharmacists once a month (Figure 1).
- Pharmacists had one week to respond via voting buttons within Microsoft Outlook™ (Figure 2).
- Aggregate anonymous answers were shared with case answer and explanations (Figure 3).

Figure 1. Example Case to Inpatient Pharmacists

Case #8:
 An 85 year old female with a PMH of COPD, dementia, and hypertension was admitted from the ER with altered mental status. No review of systems was obtained due to the patient's mental status. The patient's family states that "she always gets like this when she has a UTI."

The patient's vitals were as follows: heart rate 86 bpm, respiratory rate 14 bpm, temp 98.4° F. Notable labs include: WBC 7,340 cells/mm³, Na+ 126 mEq/L, BUN 44 mg/dL, and Scr 2.54 mg/dL. The urinalysis obtained in the ED was notable for 25 WBC and +bacteria. The patient was admitted to a med/surg unit and the hospitalist started ceftriaxone 1 g IV Q24H. The urine culture resulted in *E. coli* >100,000 CFU/mL susceptible to cefazolin, gentamicin, and nitrofurantoin but resistant to ampicillin, TMP/SMX and ciprofloxacin. Which of the following options is most appropriate?

- Continue ceftriaxone
- Change to PO cephalixin
- Discontinue all antibiotics
- Change to PO nitrofurantoin

Remember, use the voting buttons at the top of this email to reply. You may change your answer at any time by replying to this email again.

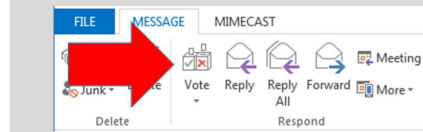
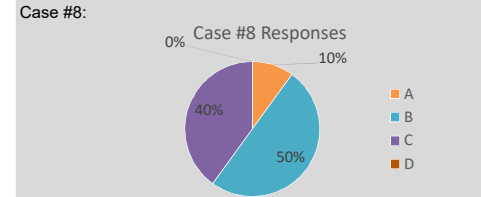


Figure 2. Example Voting Buttons



RESULTS

Figure 3. Example Results to Inpatient Pharmacists



Case #8 Explanations:
 Primary teaching point: This patient is presenting with asymptomatic bacteriuria. While altered mental status is often thought to be related to infection in elderly patients, there are many alternate explanations in this case including underlying dementia, possible dehydration, and hyponatremia. The IDSA guidelines recommend against screening for and treatment of asymptomatic bacteriuria in elderly patients with functional or cognitive impairment with bacteriuria and delirium without genitourinary symptoms (dysuria, urgency, frequency, or suprapubic pain) or system signs of infection (meeting SIRS criteria or hypotension). The presence of significant growth of bacteria (>100,000 CFU/mL) is also not an indication for treatment.

A. Continue ceftriaxone – Antibiotic therapy is not recommended per IDSA guidelines. Additionally, ceftriaxone use may increase risk of harms such as *C. difficile* infection. If this patient did present with symptoms, narrower spectrum and lower risk antibiotics are reasonable treatment options. Refer to the Norton de-escalation guideline for additional information.

B. Change to PO cephalixin – Antibiotic therapy is not recommended per IDSA guidelines. If the patient did present with symptoms, cephalixin would be a reasonable de-escalation recommendation.

C. Discontinue all antibiotics – Correct! Ceftriaxone use in this case of asymptomatic bacteriuria is inappropriate per IDSA recommendations and increases risk for harms such as *C. difficile* infection. The patient should be observed off of antibiotics and provided supportive care for other conditions as needed.

D. Change to PO nitrofurantoin – Antibiotic therapy is not recommended per IDSA guidelines. If the patient did present with symptoms, nitrofurantoin would be a reasonable de-escalation recommendation.

Table 1. Summary of Pharmacist Responses to Cases

	n=88
Average number of responses per case, n (%)	27 (31)
Range of number of responses per case, n (%)	17-41 (19-47)
Average percentage of correct responses, % (range)	74 (26-100)
Average percentage of correct responses by case topic	
Empiric antibiotic selection	87%
Non-infectious clinical syndromes	73%
Treatment plan modification	65%

Table 2. Pharmacist Responses by Case

Case Number	Case Topic	Number of Responses	Percent Correct Responses
1	Empiric antibiotic selection	38	79%
2	Treatment plan modification	41	27%
3	Non-infectious clinical syndrome	35	91%
4	Treatment plan modification	22	55%
5	Treatment plan modification	35	83%
6	Treatment plan modification	25	100%
7	Non-infectious clinical syndrome	17	88%
8	Non-infectious clinical syndrome	20	40%
9	Empiric antibiotic selection	18	83%
10	Treatment plan modification	19	63%
11	Empiric antibiotic selection	30	100%

CONCLUSIONS

- AMS education can leverage existing technology to deliver case-based education across multiple hospitals.
- Convenient delivery of real-world, case-based AMS education can remind pharmacists of the importance of stewardship and encourage integration of stewardship into daily workflows.
- Case-based education can help identify knowledge gaps and aid in development of more in-depth education.
- This approach can be applied to education on other topics and to other healthcare professionals.
- Long term benefit of this approach remains unknown.

REFERENCES

- CDC. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2019. Available at <https://www.cdc.gov/antibiotic-use/core-elements/hospital.html>
- Barlam TF, Cosgrove SE, Abbo LM, et al. Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. *Clin Infect Dis*. 2016; 62(10):e51-77.
- Nicole LE, Gupta K, Bradley SF, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America. *Clin Infect Dis*. 2019; 68(10):e83-e110

Disclosures: Ashley Wilde, Elena Swingler, Matthew Song, Sarah Moore: nothing to disclose