

# Variability in Emergency Medicine (EM) Provider Decisions on Hospital Admission and Antibiotic (ABX) Treatment for Acute Bacterial Skin and Skin Structure Infections (ABSSSI)

Thursday  
Poster 696

Correspondence:  
Joseph L Kuti, PharmD  
Hartford Hospital  
80 Seymour Street  
Hartford, CT 06102  
Tel: (860) 972-3612  
Fax: (860) 545-3992  
Email: joseph.kuti@hhhealth.org

S.S. Almarzoky Abuhussain<sup>1,2</sup>, M. Krawczynski<sup>3</sup>, S. Tart<sup>4</sup>, G. Jacknin<sup>5</sup>, K.N. Kohman<sup>6</sup>, A.L.V. Hobbs<sup>7</sup>, D. Adams<sup>8</sup>, M.D. Nailor<sup>3,9</sup>, K.R. Keyloun<sup>10</sup>, D.P. Nicolau<sup>1</sup>, J.L. Kuti<sup>1</sup>  
<sup>1</sup> Ctr. for Anti-Infective Res. & Dev., Hartford Hospital, Hartford, CT; <sup>2</sup> Umm Al-Qura University, Makkah, Saudi Arabia; <sup>3</sup> Dept. of Pharmacy, Hartford Hospital, Hartford, CT; <sup>4</sup> Dept. of Pharmacy, Cape Fear Valley Health, Fayetteville, NC; <sup>5</sup> Dept. of Pharmacy, Univ. of Colorado Hospital, Aurora, CO; <sup>6</sup> Dept. of Pharmacy, Baylor Univ. Medical Center, Dallas, TX; <sup>7</sup> Dept. of Pharmacy, Baptist Memorial Hospital-Memphis, Memphis, TN; <sup>8</sup> Baystate Medical Center, Springfield, MA; <sup>9</sup> Univ. of Connecticut, School of Pharmacy, Storrs, CT; <sup>10</sup> Allergan plc, Jersey City, NJ

## ABSTRACT (modified)

**Background:** ABSSSI are a frequent cause of emergency room visits. Physicians (PHY) and Advanced Practice Providers (APP) have many decisions to make during the initial treatment of ABSSSI, including intravenous (IV) versus oral (PO) ABX, and hospital admission versus discharge home. There are limited data, however, on factors that influence the provider's decision for the treatment of ABSSSI.

**Methods:** An anonymous survey was offered to EM providers at 6 hospitals across the US. The survey presented patient cases with ABSSSI ≥ 75cm<sup>2</sup> and escalating clinical scenarios including relapse, controlled diabetes (DM), and SIRS. For each case, participants were queried on their decision for admission versus discharge, ABX therapy (IV, PO, or both), and to rank factors that influenced their ABX decision. Descriptive and inferential statistics were used for analyses.

**Results:** Across the 6 hospitals, 130 providers completed the survey; 85 (65.4%) were PHY and 45 (34.6%) were APP. Experience was evenly represented with 52 (40%) providers practicing for ≥5 years and 78 (60%) less than 5 years. For the first case with no relapse, DM, or SIRS, most providers selected PO ABX [121 (93.1%)] and discharge [125 (96.2%)]. In case 2, the presence of recurrence resulted in PO ABX for 63 (48.5%) and discharge in 67 (51.5%) of responses. In case 3, the presence of controlled DM resulted in PO ABX for 69 (53.5%) and discharge home in 81 (62.8%) of responses. Thirty four (40%) and 51 (60%) providers chose to give 1-2 IV doses followed by PO and discharge the relapsed and DM cases, respectively. Compared with APP, PHY more frequently prescribed only PO ABX for the DM case (60% versus 40%, p=0.06) and incorporated PO ABX into the treatment of the SIRS case (40.2% versus 22.7%, p=0.07); however, these differences were not statistically significant. The addition of SIRS criteria in case 4 resulted in initiation with IV ABX [122 (95.3%)] and admission [125 (96.1%)] in most responses. The highest ranked factors influencing ABX selection were infection severity and co-morbidities; the lowest were patient convenience, adverse events, and cost.

**Conclusions:** These data highlight factors influencing EM provider decisions in the treatment of ABSSSI. Variability in responses to patient cases suggests opportunities for education and the development of an ABSSSI clinical pathway to guide treatment, particularly for patients with relapse and underlying co-morbidities such as DM.

## INTRODUCTION

- ABSSSI are frequent and challenging infections associated with an alarming increase in Emergency Department visits.
- Although ABSSSI do not produce a significant mortality burden, they are responsible for on average a 4.9 day hospital stay, \$8023 in hospital costs, as well as indirect costs due to productivity losses (1). As a result, hospitals are under pressure to reduce length of stay, or even divert admission, for this population.
- EM providers, including physicians (PHY) and advanced practice providers (APP), are the front line decision makers for patients presenting with ABSSSI. Among the challenges of proper diagnosis, providers must select the correct antibiotic, decide on administration route, and whether patients should be admitted to the hospital or can be safely discharged and treated at home.
- There are no known studies to date that describe factors affecting EM providers' decisions in treatment of ABSSSI.

## OBJECTIVES

- Determine EM PHY and APP preferences for intravenous (IV) versus oral (PO) ABX in the treatment of ABSSSI based on specific patient case characteristics
- Determine EM PHY and APP preferences for hospital admission versus discharge home in the treatment of ABSSSI based on specific patient case characteristics
- Rank specific patient and antibiotic factors that influence EM PHY and APP decisions when selecting ABSSSI treatment plan

## METHODS

- A 12-item, anonymous, voluntary survey was provided to EM PHY and APP at six participating hospitals in the United States.
- Approved by the IRB at each participating center
- Eligible providers included EM PHY, including MD/DO Attendings, Residents, or Fellows, as well as APP, including APRNs and Physician Assistants. Any students or other members of the clinical team (e.g., pharmacists, nurses, etc) were excluded; providers who previously participated were not permitted to retake the survey.
- The majority of survey questions were case-based and designed to assess treatment decisions based on escalating clinical scenarios (Table 1).
- Survey responses were analyzed and reported descriptively
- Responses to each case were analyzed by Provider Type (PHY versus APP) and Experience level (≤5 versus >5 years) using Chi-square or Fisher Exact test in Sigma Plot version 13 (Systat Software Inc, San Jose, CA).
- Factors influencing provider decision were ordered based on the mode rank listed by each provider; rank order was analyzed by type of provider and experience level.
- An *a priori* p-value of < 0.05 was defined as statistically significant.

Table 1. Case patient scenarios presented to EM providers for questions regarding decisions for ABX treatment and ED disposition

**Case 1. Simple cellulitis (ABSSSI)** - An adult patient presents to the Emergency Department (ED) with cellulitis on the lower leg, where the lesion size is ≥75 cm<sup>2</sup> (larger than the average cell phone). The patient is afebrile, has a normal white blood cell count, has no comorbidities, and this is their first ABSSSI presentation.

**Case 2. Recurrent ABSSSI** - After completing treatment as outlined above, the patient returns to the ED approximately 30 days later with a second ABSSSI episode at the same site.

**Case 3. ABSSSI with controlled diabetes mellitus (DM)** - The patient described in Case 1, presenting with first episode of ABSSSI, has insulin dependent but controlled diabetes.

**Case 4. Septic ABSSSI** - The patient described in Case 1 presents with tachycardia, fever, and a white blood cell count of 15,000 cells/microliter.

## RESULTS

- A total of 130 providers completed the survey: n=30 (Hartford, CT); n=19 (Cape Fear, NC); n=23 (Baylor, TX); n=15 (Univ. Colorado, CO); n=17 (Baptist-Memphis, TN); n=26 (Baystate, MA).
- All providers answered every survey question, except for Case 3 (n=129), Case 4 (n=128), and the question about engaging patients in antibiotic preference (n=125).
- Most respondents were PHY versus APP and had between 1 and 5 years of experience (**Table 2**).
- Variability in recommended treatment and disposition was observed for the recurrent ABSSSI and controlled DM cases (**Figure 1**); less variability was observed in the simple cellulitis and septic patient cases.
- Thirty-four (40%) and 51 (60%) providers chose to give 1-2 IV doses in the ED and discharge the patient on oral therapy for the recurrent ABSSSI and controlled DM cases, respectively.
- Compared with APP, PHY more frequently prescribed PO ABX for the DM case (60% versus 40.9%, p=0.028) versus full IV or 1-2 doses of IV followed by oral. PHY also more often incorporated PO ABX into the treatment of the septic case as either step down or full oral, although this difference was not statistically significant (p=0.06). No other differences by Provider Type or Experience was observed (**Table 3**).
- When asked how often providers ask patients about their antibiotic preference, 7 (5.6%), 36 (28.8%), 61 (48.8%), and 21 (16.8%) indicated Always, Frequently, Rarely, and Never, respectively.
- The rank order of the 8 factors influencing provider treatment decisions are provided in **Table 4**. Ranking did not differ based on by Provider Type or Experience.

Table 2: Provider Type and Experience (in years) for 130 survey participants

Provider Type	No. (%)
MD/DO Attending	51 (39.2)
MD/DO Resident/Fellow	34 (26.2)
APRN, Physician's Assistant	45 (34.6)
Provider Experience	
>10 years	36 (27.7)
>5 – 10 years	16 (12.3)
>1 – 5 years	58 (44.6)
Less than 1 year	20 (15.4)

Table 4: Factors influencing provider decisions for antibiotic choice, ranked by mode (1 = most important; 8 = least important)

Factor	Mode
Severity of Infection Presentation	1
Presence of Patient Co-morbidities	2
Microbiological Spectrum of Activity	3
Route of Administration	4
Patient Adherence	5
Adverse Event Profile	5
Antibiotic Treatment Schedule	6
Antibiotic Cost	8

Figure 1. Percentage of providers answering each question for the 4 escalating case scenarios

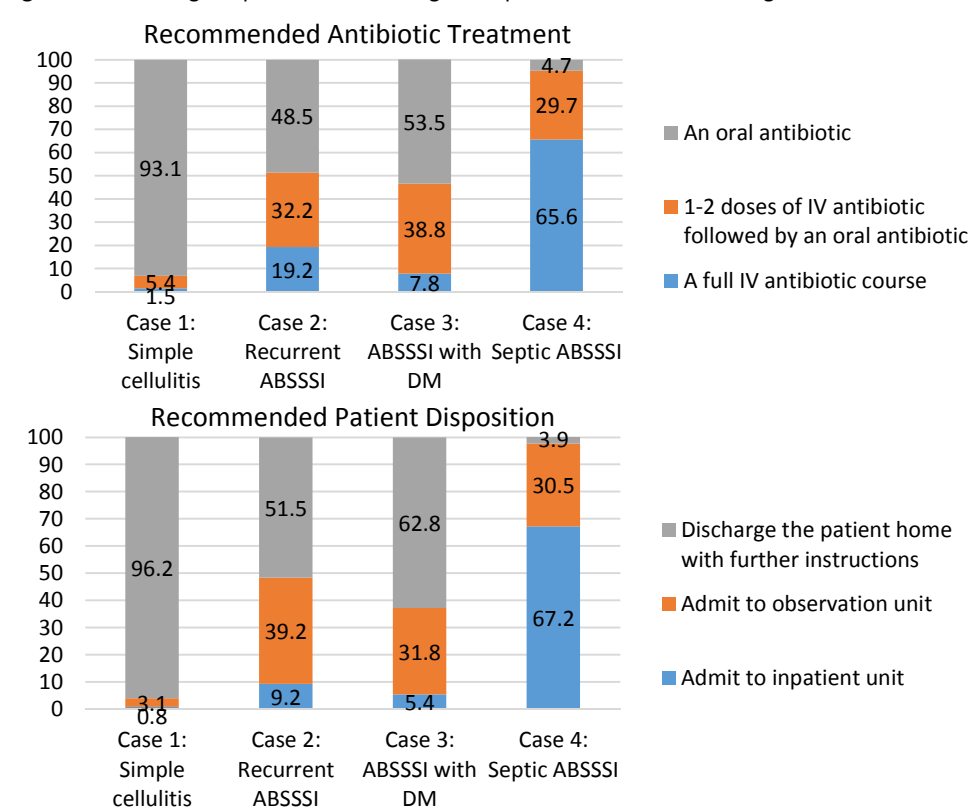


Table 3: Case scenario answers by EM Provider Type and Experience

	By EM Provider Type		By Experience		P-value
	PHY N=85	APP N=45	≤ 5 years N=78	> 5 years N=52	
<b>Case 1: Simple Cellulitis</b>					
<b>Recommended Treatment</b>					P=0.799
1-2 doses of intravenous (IV) antibiotic followed by an oral antibiotic	4 (4.7)	3 (6.7)	3 (3.8)	4 (7.7)	P=0.132
A full IV antibiotic course	1 (1.2)	1 (2.2)	0 (0)	2 (3.9)	
An oral antibiotic	80 (94.1)	41 (91.1)	75 (96.2)	46 (88.5)	
<b>Patient Disposition</b>					P=0.358
Admit to observation unit	3 (3.5)	1 (2.2)	3 (3.8)	1 (1.9)	P=0.392
Admit to inpatient unit	0 (0)	1 (2.2)	0 (0)	1 (1.9)	
Discharge the patient home with further instructions	82 (96.5)	43 (95.6)	75 (96.2)	50 (96.2)	
<b>Case 2: Recurrent ABSSSI</b>					
<b>Recommended Treatment</b>					P=0.624
1-2 doses of intravenous (IV) antibiotic followed by an oral antibiotic	25 (29.4)	17 (37.8)	29 (37.2)	13 (25.0)	P=0.226
A full IV antibiotic course	17 (20.0)	8 (17.8)	12 (15.4)	13 (25.0)	
An oral antibiotic	43 (50.6)	20 (44.4)	37 (47.4)	26 (50.0)	
<b>Patient Disposition</b>					P=0.385
Admit to observation unit	32 (37.7)	19 (42.2)	29 (37.2)	22 (42.3)	P=0.790
Admit to inpatient unit	10 (11.8)	2 (4.4)	8 (10.3)	4 (7.7)	
Discharge the patient home with further instructions	43 (50.6)	24 (53.3)	41 (52.6)	26 (50.0)	
<b>Case 3: Controlled Diabetes</b>					
<b>Recommended Treatment</b>					P=0.028
1-2 doses of intravenous (IV) antibiotic followed by an oral antibiotic	26 (30.6)	24 (54.6)	34 (43.6)	16 (31.4)	P=0.631
A full IV antibiotic course	8 (9.4)	2 (4.6)	7 (9.0)	3 (5.9)	
An oral antibiotic	51 (60.0)	18 (40.9)	37 (47.4)	32 (62.8)	
<b>Patient Disposition</b>					P=0.511
Admit to observation unit	26 (30.6)	15 (34.1)	26 (33.8)	15 (28.9)	P=0.631
Admit to inpatient unit	6 (7.1)	1 (2.3)	5 (6.5)	2 (3.9)	
Discharge the patient home with further instructions	53 (62.4)	28 (63.6)	46 (59.7)	35 (67.3)	
<b>Case 4: Septic Patient</b>					
<b>Recommended Treatment</b>					P=0.060
1-2 doses of intravenous (IV) antibiotic followed by an oral antibiotic	28 (33.3)	10 (22.7)	20 (26.3)	18 (34.6)	P=0.198
A full IV antibiotic course	50 (59.5)	34 (77.3)	54 (71.1)	30 (57.7)	
An oral antibiotic	6 (7.1)	0 (0)	2 (2.6)	4 (7.7)	
<b>Patient Disposition</b>					P=0.070
Admit to observation unit	27 (31.8)	12 (26.7)	20 (25.6)	19 (36.5)	P=0.222
Admit to inpatient unit	54 (63.5)	32 (71.1)	56 (71.8)	30 (57.7)	
Discharge the patient home with further instructions	4 (4.7)	1 (2.2)	2 (2.6)	3 (5.8)	

## DISCUSSION and CONCLUSION

- Our results are the first to describe EM provider decisions in the treatment of ABSSSI and factors that influence decisions across multiple institutions.**
- We observed consistent decisions regarding ABX treatment route and ED disposition for simple ABSSSI in stable patients, yet variability in decisions for the more severe ABSSSI patient cases.**
- In the context of decision variability, many providers selected 1-2 IV doses in the ED, followed by discharge home on oral for cases featuring recurrent ABSSSI or presence of controlled diabetes, suggesting comfort with using oral antibiotics after IV administered in the ED.**
- PHY were significantly more likely compared with APP to select an oral antibiotic for the controlled diabetes case, but no other significant differences were observed in treatment decisions by Provider Type or Experience level.**
- Clinical factors such as severity of infection on presentation and underlying comorbidities were the main factors influencing treatment decisions, in contrast to antibiotic adverse events, adherence, number of doses per day and cost.**
- These data highlight variability in responses to patient cases and suggests opportunities for education and the development of an ABSSSI clinical pathway to guide treatment, particularly for patients with recurrent infection and underlying co-morbidities such as DM.**

## REFERENCES

- Pollack Jr., CV et al. Acute bacterial skin and skin structure infections (ABSSSI): practice guidelines for management of care transitions in the emergency department and hospital. J Emerg Med 2015;48:508-19.