

Skin infections in the emergency department: Opportunities for antimicrobial stewardship

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Introduction

Acute bacterial skin and skin structure infections (ABSSSI) are frequently managed in emergency departments (EDs). Vancomycin is a mainstay of ABSSSI therapy for methicillin-resistant *Staphylococcus aureus* (MRSA), but is not necessary in cases with low risk or when other medications, including clindamycin and sulfamethoxazole-trimethoprim, can be considered. Therefore, overuse of vancomycin for ABSSSI is a potential target for antimicrobial stewardship in EDs.

The objective of this study was to determine the appropriateness of antimicrobial therapy for ABSSSI in EDs, with particular attention to use of vancomycin. Secondary objectives were to describe the patient population, infection characteristics and disposition of patients treated for ABSSSI in EDs.

Methods

Study Design

This was an IRB approved retrospective cross-sectional study conducted at the Henry Ford Health System in metropolitan Detroit, Michigan, USA.

Study Population

The study population included patients seen at any emergency department facility in the health system from January 2015 through June 2015 who met the criteria below. Consecutive patients were screened to reach a convenient sample size of 80.

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> ABSSSI diagnosis according to the treating ED physician Presentation with at least 3 local signs and symptoms of ABSSSI including any of the following: <ul style="list-style-type: none"> Pain, tenderness, swelling, erythema, warmth, induration, drainage/discharge, lymph node swelling or tenderness 	<ul style="list-style-type: none"> < 18 years of age Non-removable source of infection, including retained IV catheters, invasive devices or prosthetic materials Concurrent osteomyelitis, endocarditis, pneumonia or other high-risk infection sites Open burn wound > 30% of total body surface area Life expectancy < 2 months Pregnant or nursing mothers

Data Collection

Clinical and microbiological data were collected from electronic medical records using a standardized case report form. Data collected included: patient demographics, severity of illness (via CREST classification), comorbid conditions, antimicrobial therapy, ED disposition. Microbiology data collected included all cultures from blood or skin during the index ED visit for ABSSSI. All species identification and susceptibility testing was completed by the Henry Ford Health System Clinical Microbiology Core Laboratory according to Clinical and Laboratory Standards Institute (CLSI) standards.

Key Definitions:

- Appropriate selection of antimicrobial therapy was based on recommendations of the Infectious Diseases Society of America according to infection severity (mild, moderate, severe) and presence of purulent drainage. [Stevens DL et al., *Clin Infect Dis* 2014; 59 (2):e10-52]
- Severity of illness was assessed according to CREST classification. Severe ABSSSI were defined as CREST class 3 or 4. [CRES Team, 2005, www.acutemed.co.uk/docs/Cellulitis guidelines, CREST, 05.pdf.]

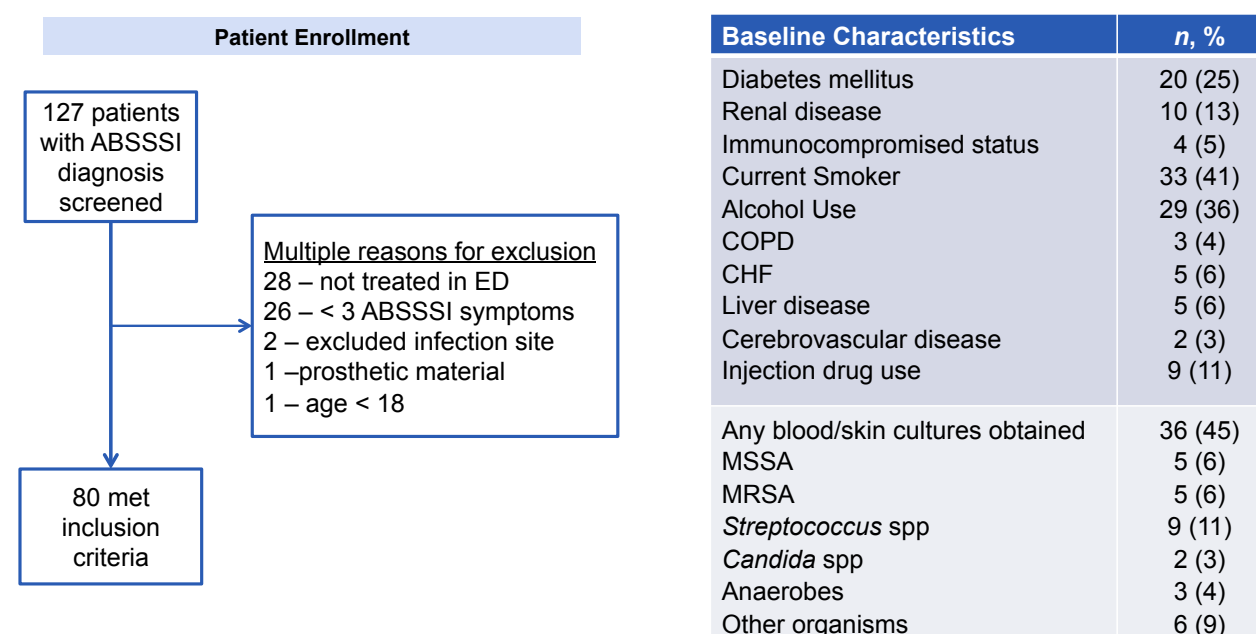
Statistical Analysis

Descriptive measures were used to evaluate appropriateness of antibiotic therapy. Bivariate analyses were performed using Pearson's Chi-square or Fisher's exact test to identify variables associated with vancomycin use. All tests were two-sided; a *P*-value of < 0.05 was considered significant. Statistical analyses were performed using SPSS version 23.0.

Disclosures: SLD has served as an advisory board member and received grant support from Merck and Actavis plc. The other investigators report no potential conflicts of interest related to this study.

Results

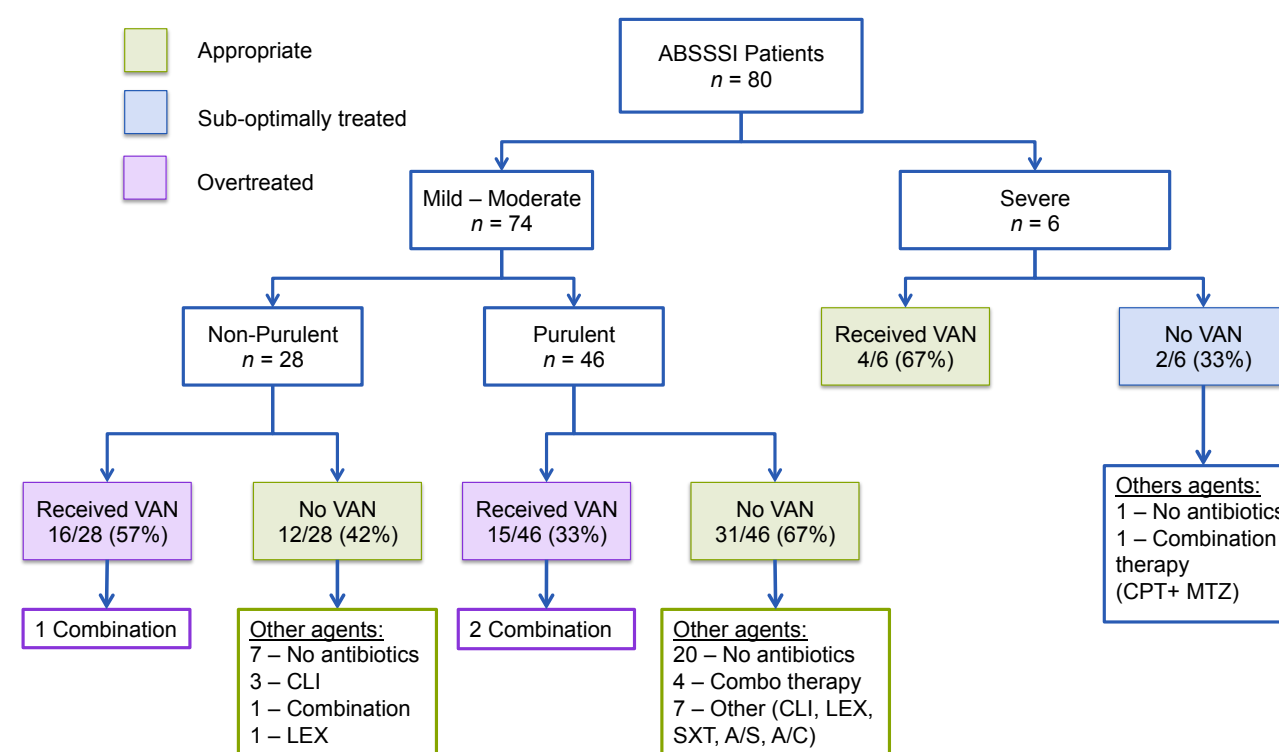
Patient Characteristics



Association of Patient & Infection Characteristics with Vancomycin Use

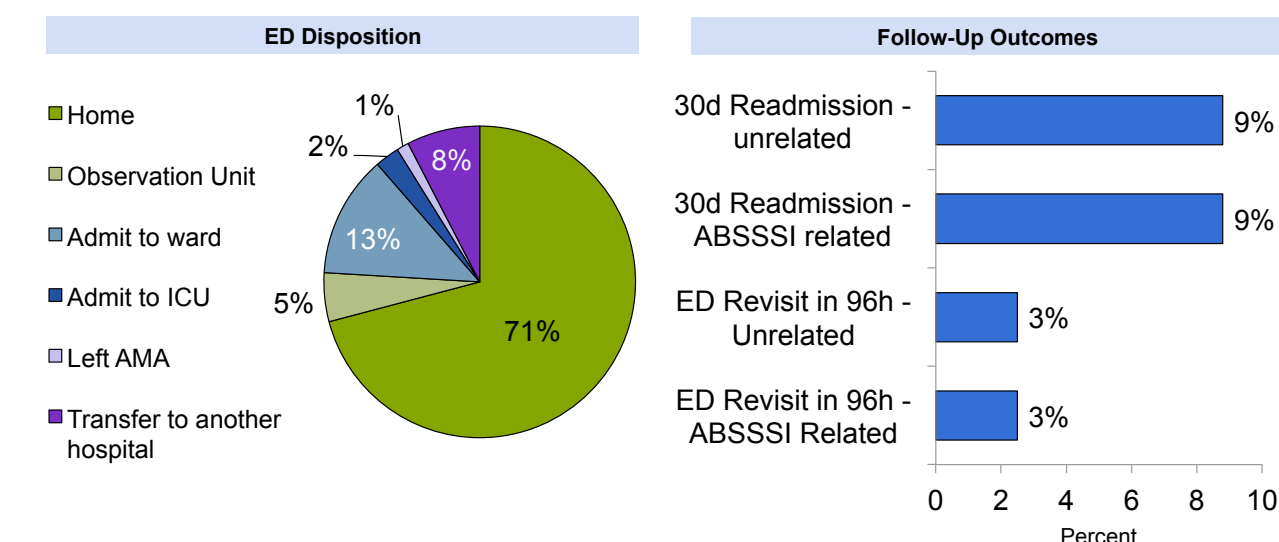
Variable	Crude OR (95% CI)
Blood cultures taken in ED	17.5 (5.4–56.4)
Admission to Hospital floor	15.2 (1.8–127.2)
Injection drug use	13.0 (1.54–110.74)
Medicare insurance	11 (1.30–94.2)
White blood cell count \geq 12,000/mm ³	10.5 (2.74–40.46)
X-ray of infected area	6.0 (1.91–18.9)
Type of ABSSSI: cellulitis	2.9 (1.14–7.42)
Liver disease	1.17 (1.02–1.3)
Debridement of ABSSSI	1.13 (1.02–1.27)
Purulent ABSSSI	0.34 (0.14–0.88)
Disposition: Home	0.15 (0.049–0.43)
No cultures taken in ED	0.13 (0.05–0.35)

Antimicrobial Therapy: Appropriateness based on Severity and Purulence



Key: A/S: ampicillin/sulbactam; A/C: amoxicillin/clavulanate; CLI: clindamycin; CEP: cefepime; CPT: ceftazidime; ETP: ertapenem; LEX: cephalexin; MTZ: metronidazole; SXT: trimethoprim/sulfamethoxazole; VAN: vancomycin

Disposition and Outcomes



Summary

- The majority of ABSSSI encountered in ED are mild to moderate in severity
- Vancomycin was used in nearly half of all ABSSSI patients in the emergency department, however MRSA was isolated in only 6% of cases
- We identified opportunities for improvement in antimicrobial management, including both overuse and underuse of vancomycin. Future ED antimicrobial stewardship interventions would be valuable to improve MRSA risk assessment and appropriate selection of antimicrobials for ABSSSI