

# A Review of Antibiotic Therapy Among Patients Treated for Gram-negative Bacteremia

Matthew Ficinski MD, Olga Vasylyeva MD, and Maryrose Laguio-Vila MD

Department of Infectious Diseases, Rochester General Hospital

## Introduction

Gram-negative bacteremia is frequently encountered among hospitalized patients. In a non-inferiority trial, it was found that in hospitalized patients who achieve clinical stability by day 7, an antibiotic course of 7 days was non-inferior to 14 days of therapy.<sup>1</sup> Another study showed that follow up blood cultures add little value in the management of Gram Negative Bacteremia.<sup>2</sup> Furthermore one study showed that a 30-day mortality was not different among hospitalized patients who received oral step-down vs continued parenteral therapy for treatment of Enterobacteriaceae bloodstream infections.<sup>3</sup> A review of patients treated for Gram-negative bacteremia was performed to determine the average duration of antibiotic therapy. The frequency of follow up blood cultures was also determined and 30 day readmission rates were assessed as well.

## Methods

This study is a retrospective review of cases of Gram-negative bacteremia. For each case, the following information was determined: The number of days of IV antibiotics, days of oral antibiotics, and total days of antibiotics. Other information recorded included whether follow up blood cultures were collected and the corresponding results. 30 day re-admission rates were assessed as well. Descriptive statistics were applied for baseline characteristics and comparison of continuous variables was assessed using the t-test.

## Results

Fifty patients met inclusion criteria for the review. The average age was 69 years old, and there were 28 Female Patients (56%). There were 9 cases in the ICU and 41 cases not in the ICU during the treatment of Gram-negative bacteremia. In 9 cases there was a formal Infectious Diseases (ID) Consult. In 11 cases there was an Antimicrobial Stewardship (ASP) recommendation.

A comparison of total days of antibiotic therapy among the different groups of patients can be seen in Figure 1. Comparisons between All cases, ICU cases and Non – ICU cases can be seen in Table 1. Comparisons of cases who received an ID Consult or ASP recommendation to those cases without such recommendations can be seen in Table 2.

Among oral antibiotics provided there was Ciprofloxacin, Cefpodoxime, Flagyl, Cefuroxime, Augmentin, Ampicillin, Cefalexin, Levaquin, Bactrim, and ciprofloxacin. B-Lactams were used in 23 cases.

The sources of Infection can be seen in Figure 2. The Gram-negative pathogens encountered can be seen in Figure 3.

In 28 cases (56%), there were follow up cultures drawn. Among cases were follow up blood cultures were drawn: 25 cases (89%) showed no growth. In 1 case (4%) there was growth of a different organism. In 2 cases (7%) the same organism grew as in the first positive blood cultures.

The average length of stay was 12.02 days (3-58). There were 8 cases (16%) of a 30 day re-admission, and only 1 case (2%) was re-admitted for the same problem which involved a UTI.

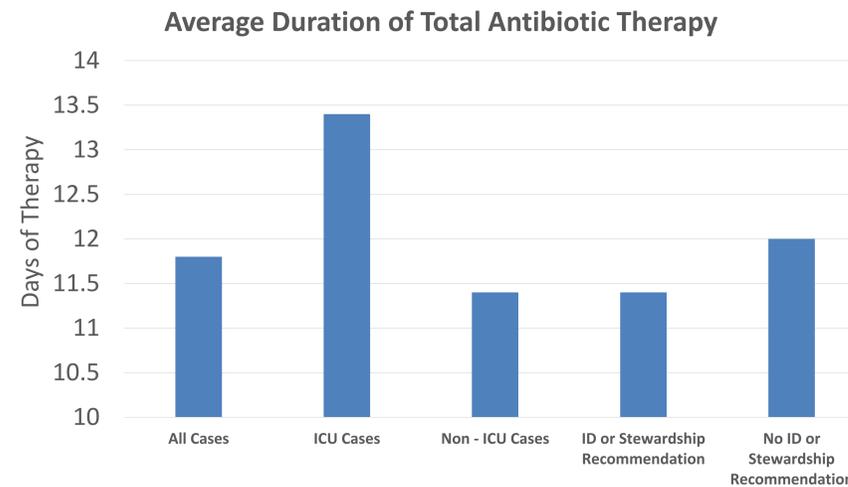


Figure 1: Average Duration of Total Antibiotic Therapy between Groups of Patients

	All	ICU	Non-ICU	p-value
n	50	9	41	
WBC	18.0 (12.1 - 21.5)	18.0 (12.1 - 21.5)	18.0 (12.8 - 21.7)	0.9958
IV abx	6.48 (4-7.75)	8.6 (6 - 9)	6.0 (4 - 7)	0.0676
PO abx	5.22 (0-8)	4.9 (0 -8)	5.3 (0 - 8)	0.8023
Total length of therapy	11.76 (10-14)	13.4 (11 - 14)	11.4 (10 - 14)	0.0567
Length of Stay	15.7 (6 - 14)	15.7 (6 - 14)	11.2 (5 - 11)	0.3707

Table 1: Comparisons of All cases, ICU cases, and Non-ICU Cases

	ID or ASP consult	ASP	No consult	p-value (ID/ASP vs No consult)	p-value (ASP vs No consult)
n	20	11	30		
WBC	20.2 (14.3 - 23.9)	20.2 (15.7 - 23)	16.5 (12.3 - 21)	0.0573	0.1055
IV abx	7.4 (4 - 9)	7.0 (4.5 - 8)	5.9 (4 - 7)	0.1855	0.4088
PO abx	3.9 (0 - 7)	5.0 (2 - 7)	6.1 (2.25 - 9.8)	0.0662	0.4542
Total length of therapy	11.4 (10 - 14)	11.8 (10 - 14)	12 (10 - 14)	0.485	0.8678
Length of Stay	9.8 (5 - 10)	8.1 (5 - 9.5)	13.5 (5 - 11.8)	0.342	0.2824

Table 2: Comparisons of cases who received an ID Consult or Antimicrobial Stewardship recommendation to those cases without such recommendations

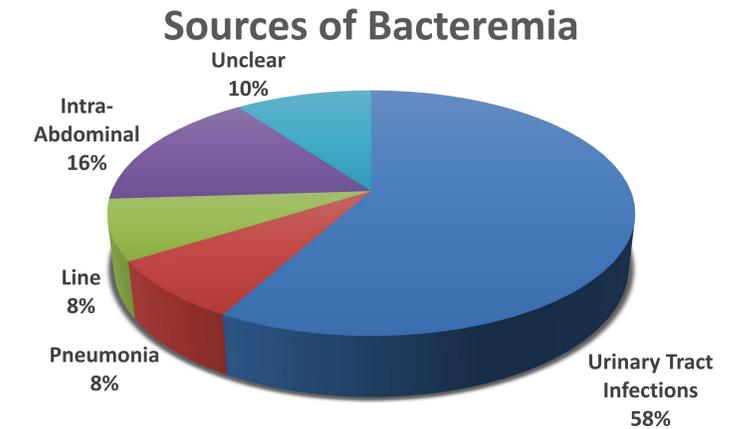


Figure 2: Sources of Bacteremia

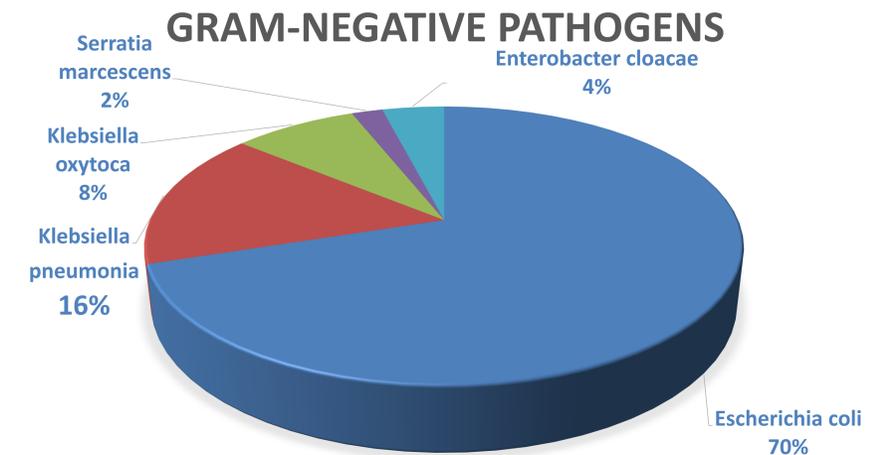


Figure 3: Gram-negative Pathogens

## Conclusions

No significant difference was observed in IV or total antibiotic durations between the groups of patients. There was a trend toward longer IV and total antibiotic durations in the ICU group compared to the non-ICU group. There were numerically shorter lengths of hospital stay in patients receiving ID or ASP consultation, although the difference was not statistically significant. Limitations include the retrospective nature of the study and the small size of the cohort analyzed. Future investigations should include larger populations.

## References:

1. Yahav, Dafna, et al. "Seven versus 14 Days of Antibiotic Therapy for Uncomplicated Gram-Negative Bacteremia: A Noninferiority Randomized Controlled Trial." *Clinical Infectious Diseases*, vol. 69, no. 7, 2018, pp. 1091–1098.
2. Canzoneri, Christina N, et al. "Follow-up Blood Cultures in Gram-Negative Bacteremia: Are They Needed?" *Clinical Infectious Diseases*, vol. 65, no. 11, 2017, pp. 1776–1779.
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For additional information please contact:  
Matthew Ficinski – Matthew.Ficinski@rochesterregional.org