

# Clinical outcomes of Ceftriaxone 1 gram vs. 2 gram daily for the treatment of gram-negative Enterobacteriaceae bloodstream infections



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## Background

- Bloodstream infections (BSIs), especially gram-negative infections, have high mortality and morbidity<sup>1</sup>
- E. Coli*, *Klebsiella pneumoniae* are the most common organisms in gram-negative bacteremia<sup>2</sup>
- Even though The UCHHealth Antibiotic Guide recommend either a dose of 1 or 2 grams every 24 hours, data supporting either dosing regimen is both sparse and inconclusive<sup>3</sup>

## Methods

- Retrospective chart review of patients from January 1, 2018 through August 1, 2021 receiving either 1 g every 24 hours or 2 g every 24 hours of intravenous ceftriaxone for gram negative bloodstream infection
- Inclusion: Patients with gram-negative enterobacteriaceae BSI who received empiric ceftriaxone  $\geq 72$ h (N = 405)
- Exclusion: GN pathogen resistant to ceftriaxone, receipt of both 1 and 2 grams of ceftriaxone for treatment of index GN BSI
- Primary outcome: frequency of treatment failure 72 hours post initiation of therapy
- Secondary outcomes: frequency of CDI, 30-day mortality, and 30-day infection-related readmission

## Results

Table 1. Baseline Patient Characteristics

Variable	Ceftriaxone 1g IV q24h, n =168	Ceftriaxone 2g IV q24h, n =237	P value
Age, years $\pm$ SD	64.2 $\pm$ 19.1	67.2 $\pm$ 16.7	.10
Female, n (%)	125 (74.4)	154 (65.0)	.01
Height, cm $\pm$ SD	164.3 $\pm$ 12.3	167.1 $\pm$ 11.3	.02
Weight, kg $\pm$ SD	77.1 $\pm$ 21.3	83.2 $\pm$ 25.0	.01
BMI $\pm$ SD	29.1 $\pm$ 14.4	29.7 $\pm$ 8.9	.61
Race, n (%)			.00
Caucasian or White	97 (57.7)	184 (77.6)	
African American or Black	26 (15.5)	8 (3.4)	
Other/Unknown	45 (26.8)	45 (19.0)	
Quick Pitt Score, mean $\pm$ SD	0.79 $\pm$ 0.90	0.77 $\pm$ 0.92	.88
Source of infection, n (%)			.74
Respiratory	4 (2.4)	2 (0.9)	
Urinary	142 (84.5)	197 (83.8)	
CVC/other intravascular device	1 (0.6)	1 (0.4)	
Other	15 (8.9)	25 (10.6)	
Unknown	6 (3.6)	10 (4.3)	
Empiric duration, days $\pm$ SD	3.9 $\pm$ 1.3	4.7 $\pm$ 2.5	.00
Organism, n (%)	Ceftriaxone 1g IV q24h, n =168	Ceftriaxone 2g IV q24h, n =237	P value
Escherichia coli	148 (88.1)	196 (82.7)	.16
Klebsiella pneumoniae	20 (11.9)	31 (13.1)	.76
Proteus spp.	0 (0.0)	2 (0.8)	.51
Enterobacter cloacae complex	0 (0.0)	1 (0.4)	1.00
Other	1 (0.6)	10 (4.2)	.03

Table 2. Outcomes

Variable	Ceftriaxone 1g IV q24h, n =168	Ceftriaxone 2g IV q24h, n =237	P value
Early clinical failure, n (%) <sup>a</sup>	28 (16.7)	50 (21.1)	.31
Temperature $>38^{\circ}\text{C}$	19 (11.3)	29 (12.2)	.88
Hemodynamic support	1 (0.6)	5 (2.1)	.41
Respiratory Support	5 (3.0)	14 (5.9)	.23
Transfer to ICU	6 (3.6)	11 (4.6)	.80
Composite secondary outcomes, n (%)	9 (5.4)	21 (8.9)	.25
30-day mortality, n (%)	2 (1.2)	8 (3.4)	.21
Infectious cause of 30-day readmission, n (%)	7 (4.2)	13 (5.5)	.65
CDI infection w/n 60 days of discharge, n (%)	0 (0.0)	1 (0.4)	1.00

## Discussion

- No difference in early clinical failure between empiric ceftriaxone 1 g and 2 g in GN BSI
- Ceftriaxone 1 g and 2 g groups were associated with similar 30-day mortality, 30-day infection related readmission, and CDI
- Pyelonephritis was the predominant source of GNI in both groups, higher daily dose is not needed to achieve similar clinical outcomes as 1 g
- Ceftriaxone 2 g daily can be used empirically without higher risk of CDI compared to 1 g daily
- Limitations include retrospective design, single center study

## References

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