Comparison of Cefdinir versus Cephalexin Failure Rates in the Treatment of Gram-Negative Bacteremia: A single-center retrospective chart review

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INTRODUCTION

- Treatment of gram-negative bacteremia (GNBSI) with oral antibiotics favors the use of highly bioavailable antibiotics, like fluoroquinolones and sulfamethoxazole-trimethoprim to decrease recurrent infection rates
- The two most common GNBSI pathogens, *E. Coli* and *Klebsiella* species, can be treated by less bioavailable antibiotics such as cephalexin and cefdinir.
  - Cephalexin treats some strains of *E. Coli* and *Klebsiella* species; oral bioavailability 90%; recommended dose for GNBSI is 1 g Q6H
  - Cefdinir treats *E. coli* and *Klebsiella* species; oral bioavailability 16-21%; treatment dose for GNBSI is 300 mg BID
- Compared to cephalexin, cefdinir has a lower bioavailability but more reliably covers both *E. Coli* and *Klebsiella* species making it an ideal agent for oral treatment of GNBSI.

Percentage of Strains Susceptible to Beta-Lactam

	Cephalexin	Cefdinir
E. coli	94	95
K. aerigenes	0	79
K. oxytoca	81	95
K. pneumoniae	92	93
K. variicola	97	99

Data extrapolated from cefazolin and ceftriaxone from Bronson's 2022 antibiogram

OBJECTIVE

- To compare clinically relevant outcomes in patients treated with cephalexin versus cefdinir for GNBSI.

STUDY DESIGN

- Retrospective chart review of 80 patients at treated for GNBSI at Bronson Methodist Hospital in Kalamazoo, Michigan from 3/1/2023 to 8/31/2024.

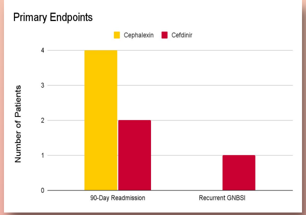
METHODS

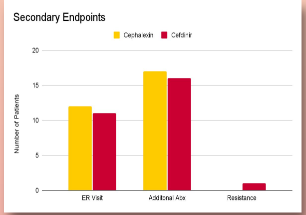
- **Patient Identification**: ICD-10 code A41.50 for diagnosis of GNBSI

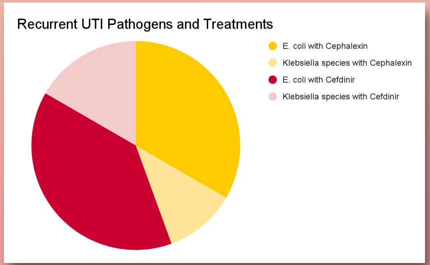
Inclusion Criteria	Exclusion Criteria
≥18 years old	Previous recurrent GNBSI
Positive blood culture for gram negative pathogen	Polymicrobial or nosocomial (positive blood culture >48 hours after admission)
Pathogen susceptible to cephalexin or cefdinir	Identification of *Pseudomonas aeruginosa*
	Pathogen has ESBL or inducible beta-lactamase
	Admission for >7 days from initial positive blood culture
	Discharged on IV antibiotics

- **Data Collection**: After patients were identified, the patient charts were reviewed by the primary investigator (PI) to assess inclusion/exclusion criteria. Culture results were then pulled from the time of diagnosis to determine the causitive pathogen and assess for susceptibilities. Data regarding readmission, recurrent GNBSI, and mortality within 90 days was also assessed as primary endpoints. The intravenous antibiotics, oral antibiotics, and the length of time used for each was documented.

Patient Demographics	Cephalexin	Cefdinir
Patients, N	40	40
Age (years)	70.6 (20-98)	66.6 (35-94)
Female sex, N (%)	25 (62.5)	24 (60)
Avg. WBC, N	9.54	9.2
Avg. Temp (°F)	98.0	98.2
Source of Infection, N (%)		
UTI	33 (82.5)	32 (80)
Pneumonia	1 (2.5)	2 (5)
Other*/Unknown	6 (15)	6 (15)
Causative Pathogen, N (%)		
E. coli	28 (70)	32 (80)
Klebsiella species	12 (30)	8 (20)
IV Antibiotics Used, N (%)		
Ceftriaxone	34 (85)	37 (92.5)
Cefepime	5 (12.5)	2 (5)
Pip/Tazo	1 (2.5)	1 (2.5)
Duration of IV Abx (days)	4.1 (1-7)	4.8 (1-7)
Duration of PO Abx (days)	7.4 (1-14)	6.9 (1-12)
Total Duration of Abx (days)	11.5	11.7







RESULTS

	Cephalexin	Cefdinir
Composite Primary Outcome N, (%)	4 (10)	3 (7.5)
Mortality	0 (0)	0 (0)
Recurrent GNBSI	0 (0)	1 (2.5)
Readmission	4 (10)	2 (5)
Secondary Outcomes N, (%)	29 (72.5)	28 (70)
ER Visits	12 (30)	11 (27.5)
Additional Antibiotics	17 (42.5)	16 (40)
Resistance	0 (0)	1 (2.5)

- Recurrent UTIs with the same pathogen as the patient's GNBSI was not an outcome that was evaluated in this study, however:
  - 20% (n=8) of patients in the cephalexin group developed recurrent UTIs
  - 25% (n=10) of patients in the cefdinir group developed recurrent UTIs

LIMITATIONS

- Only one patient in the cephalexin group received the recommended 1 g Q6H dose.
- Patients' need for source control was not evaluated - considered achieved as patient was being discharged from hospital.
- The majority of infections in this study originated from a urinary source in both groups.
- The study population was small and from a single institution.

NEXT STEPS

- Possible implementation of 1 g Q6H when using cephalexin to treat GNBSI.
- Another study that looks into failure rates of cephalexin when dosed at the recommended 1 g Q6H.

CONCLUSIONS

- There is no statistically significant difference in outcomes when treating GNBSI with cephalexin versus cefdinir.
- Treating GNBSI with cephalexin may increase the patient's readmission risk, visits to the ER, and additional antibiotic use.
- Patients treated with cefdinir may be at an increased risk of developing recurrent GNBSI or UTIs with the same pathogen and developing resistance.

REFERENCES AND DISCLOSURES

Both authors have declared no potential conflicts of interest.

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