Outcomes of Bloodstream Infections with Coagulase-Negative Staphylococcus with Elevated Minimum Inhibitory Concentration to Vancomycin at a Tertiary Care Veterans Affairs Medical Center

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BACKGROUND

- Treatment with vancomycin may be associated with worse clinical outcomes in serious infections caused by *Staphylococcus aureus* with vancomycin MICs ≥ 2 mcg/mL
- It is not clear if this applies to Coagulase-Negative *Staphylococcus* (CoNS), which have a lower pathogenic potential and a different distribution of vancomycin susceptibility
- *S. aureus* and CoNS have different breakpoints for interpretation of vancomycin minimum inhibitory concentration (MIC) recommended by the Clinical & Laboratory Standards Institute (CLSI)

CLSI Guidelines for Interpretation of Vancomycin MICs

	S. aureus	CoNS
Susceptible	≤ 2 mcg/mL	≤ 4 mcg/mL
Intermediate	4 – 8 mcg/mL	8 – 16 mcg/mL
Resistant	≥ 16 mcg/mL	≥ 32 mcg/mL

METHODS

Study Design

- Retrospective, single-center cohort study of patients with CoNS, identified using electronic clinical databases at the Cleveland VA
- Patients with CoNS bloodstream infection (BSI) with reported vancomycin MICs from January 2001 to August 2015
- Inclusion: age ≥18 years old; treatment with ≥ 7 days of parenteral vancomycin, daptomycin, ceftaroline, linezolid, or dalbavancin
- Exclusion: polymicrobial BSI; no change in empiric antibiotics for >72 h after cultures finalized; antibiotic therapy for other indication; lost to follow-up within 90 days; hospice care; CoNS vancomycin MIC >4 mcg/mL

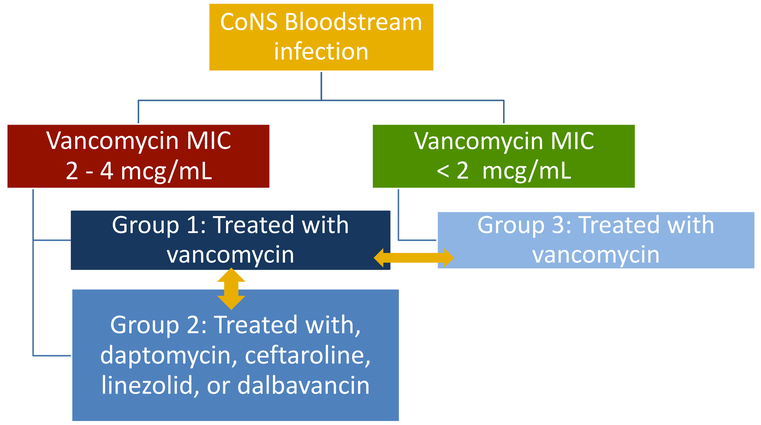
Study Objectives

- Compare rate of treatment failure of vancomycin in patients with CoNS BSI with vancomycin MIC 2-4 mcg/mL *versus* that of patients with CoNS BSI with vancomycin MIC < 2 mcg/mL
- Compare rate of treatment failure of vancomycin in patients with CoNS BSI with a vancomycin MIC 2-4 mcg/mL *versus* that of patients with CoNS BSI with a vancomycin MIC 2-4 mcg/mL treated with daptomycin, ceftaroline, linezolid, or dalbavancin

Analysis

- Demographics, clinical characteristics and outcomes
- Treatment failure (primary outcome) defined as infection relapse, hospitalization or surgery within 90 days of therapy, or incomplete, extended or unplanned oral suppressive therapy
- A Chi-square test was used to compare rates of treatment failure in each group

Comparisons of Treatment Failures in CoNS BSI



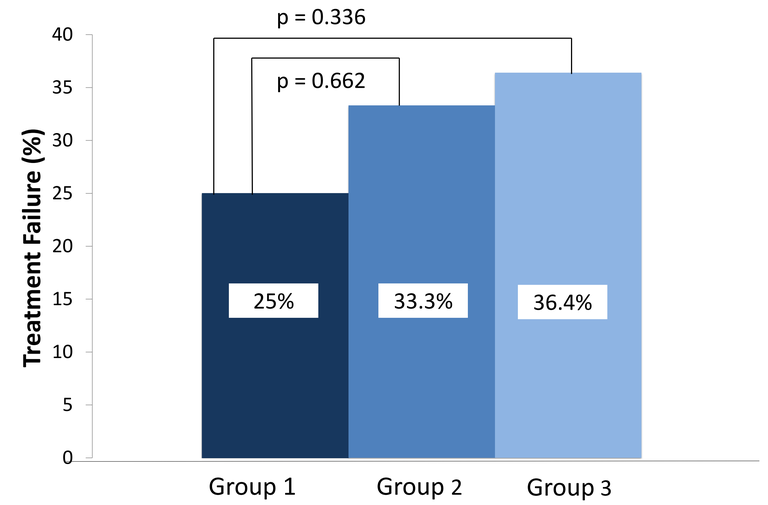
- Treatment failures compared between Group 1 and Group 2
- Treatment failures compared between Group 1 and Group 3

RESULTS

Characteristics of Patients with CoNS BSI

	Group 1 (n=44)	Group 2 (n=6)	Group 3 (n=22)
Age, mean ± SD, years	64 ± 12	59 ± 9	66 ± 13
Male, n (%)	43 (97.7)	5 (83.3)	22 (100)
Race , n (%)			
Caucasian	19 (43.2)	2 (33.3)	12 (54.5)
African American	23 (52.3)	4 (66.7)	10 (45.5)
Other	2 (4.5)	--	--
Weight , mean ± SD , kg	81.5 ± 23.9	99.8 ± 24.1	93.9 ± 31.9
Charlson comorbidity index, mean (range)	5.82 (0-12)	6.67 (3-13)	6.18 (2-14)
Length of therapy, mean (range), days	18 (6-51)	16 (12-26)	19 (6-45)
Treatment setting, n (%)			
Hemodialysis	22 (50.0)	4 (66.7)	8 (36.4)
Community Living Center	1 (2.3)	--	3 (13.6)
Inpatient	14 (31.8)	--	9 (40.9)
Skilled nursing facility	1 (2.3)	1 (16.7)	--
Home	5 (11.4)	1 (16.7)	2 (9.1)
Spinal cord injury unit	1 (2.3)	--	--
Hospital length of stay, mean (range), days	23 (2-134)	9 (5-17)	15 (1-46)

Treatment Failure in Patients with CoNS BSI, by Type of Treatment



Outcomes of Patients with CoNS BSI

	Group 1 (n=44)	Group 2 (n=6)	Group 3 (n=22)
Relapse , n (%)	3 (6.8)	--	2 (9.1)
Recurrence, n (%)	3 (6.8)	1 (16.7)	1 (4.5)
90-day all-cause mortality	8 (18.2)	4 (66.7)	3 (13.6)
Hospital readmission	21 (47.7)	2 (33.3)	7 (31.8)
Infection-related	3 (6.8)	1 (16.7)	1 (4.5)
Other	18 (40.9)	1 (16.7)	6 (27.3)

DISCUSSION

- In this cohort of CoNS BSI in patients with significant comorbidities and ESRD, treatment failure rates were high
- This study did not detect a higher rate of treatment failure in patients treated with vancomycin for CoNS BSI with vancomycin MIC 2 - 4 mcg/mL , similar to Valencia-Rey *et al* (J Infect 2015, 71, 53-60.)
- Likely no advantage in choosing more expensive alternative agents to treat CoNS BSI when vancomycin MIC 2 - 4 mcg/mL
- Limitations: treatment selection bias; retrospective single center study; small sample size; power was not met resulting in the possibility of type II error; inclusion of methicillin-susceptible isolates; did not consider vancomycin dosing or levels
- Further studies are required to understand the relationship between comorbidities, vancomycin MIC, type of treatment and outcome in patients with CoNS BSI