Prescription Precision: An Exploration into Antimicrobial Management of Central-Line Associated Bloodstream Infections at UC San Diego Health

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Introduction

- Central-line associated bloodstream infections (CLABSIs) remain a major cause of preventable morbidity and mortality among hospitalized patients globally.
- CLABSIs significantly increase the risk of in-hospital mortality (1) and are associated with increased length of hospital stay and increased healthcare costs (2).
- Empiric treatment for CLABSI is started prior to receiving results of diagnostic tests. Once results are received, antimicrobial treatment should be updated and narrowed according to IDSA and CDC guidelines.
- Suboptimal antimicrobial stewardship is associated with selection of drug-resistant organisms, which further increases morbidity and mortality, cost of care, and length of hospital stay (3).
- Antimicrobial stewardship practices remain critical in combating antimicrobial resistance in healthcare-associated infections.

Objectives

- Examine prevalence and resistance patterns of organisms causing CLABSIs among hospitalized patients at two of the campuses at UC San Diego Health System, Jacobs Medical Center (JMC) and Hillcrest Medical Center (HMC).
- Analyze trends in de-escalation of antimicrobials after culture results are received, and extent of involvement of the infectious disease team.

Methods

- The patients selected for data analysis had a CLABSI, **defined as a positive blood culture in patients with a central line at the time of infection, or within 48 hours before the development of an infection**. In addition, the infection cannot be related to an infection at another site.
- Chart review included reviewing clinical notes, laboratory data, and medication administration information. The cases were individually reviewed by an infectious disease physician.
- Patients who fit the definition of a Central Line-Associated Mucosal Barrier Infection (CLAMBI) were excluded from the data analysis to prevent misclassification of bloodstream infections caused by oral/intestinal microbiota in immunocompromised patients.

Results

Demographic Characteristics (n = 39)		
Mean age (years) ± SD	54.91 ± 14.95	
	n	%
Sex		
Male	21	53.85%
Female	18	46.15%
Ethnicity		
Hispanic, Latino (a), or of Spanish origin	13	33.33%
Non-Hispanic	26	66.67%
Race		
Asian	2	5.13%
Black or African American	7	17.95%
Native Hawaiian or Other Pacific Islander	2	5.13%
Other Race or Mixed Race	17	43.59%
White	11	28.21%

Table 1: Percent breakdown of CLABSI cases by demographic characteristics at JMC and HMC

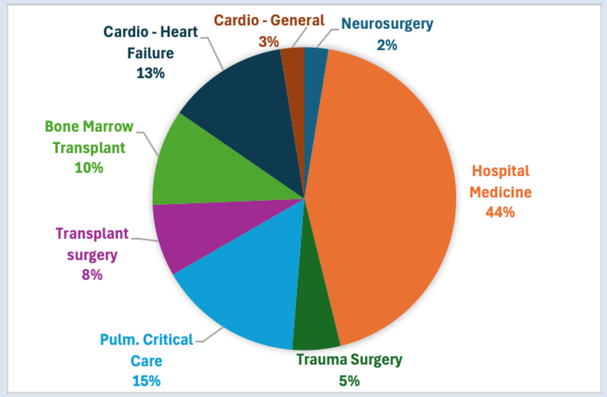

Figure 1: Distribution of CLABSI Patients by Primary Service at time of event.

Organism	JMC (n = 24)		HMC (n = 15)		Total (n = 39)	
	n	%	n	%	n	%
Acinetobacter	1	4.16%	0	0.00%	1	2.56%
Candida albicans	0	0.00%	1	6.67%	1	2.56%
Candida dubliniensis	1	4.16%	0	0.00%	1	2.56%
Candida glabrata	0	0.00%	1	6.67%	1	2.56%
Citrobacter freundii	0	0.00%	1	6.67%	1	2.56%
Enterobacter	1	4.16%	0	0.00%	1	2.56%
Enterococcus faecalis	1	4.16%	2	13.30%	3	7.69%
ESBL *Klebsiella pneumoniae*	1	4.16%	0	0.00%	1	2.56%
Leuconostoc lactis	1	4.16%	1	6.67%	2	5.13%
MRSA	1	4.16%	1	6.67%	2	5.13%
MRSE	1	4.16%	0	0.00%	1	2.56%
MSSA	3	12.50%	0	0.00%	3	7.69%
Polymicrobial	3	12.50%	3	20.00%	6	15.40%
Pseudomonas aeruginosa	3	12.50%	0	0.00%	3	7.69%
Serratia marcescens	1	4.16%	1	6.67%	2	5.13%
Staph. epidermidis	2	8.30%	1	6.67%	3	7.69%
Stenotrophomonas maltophilia	1	4.16%	1	6.67%	2	5.13%
VRE	3	12.50%	2	13.30%	5	12.80%

Table 2: Percent breakdown of CLABSI cases at JMC, HMC, and combined sites based on causative organism.

- 84.6 % of CLABSI cases involved an infectious disease consultation
- All analyzed CLABSI cases at JMC demonstrated appropriate antibiotic management
- 13/15 cases at HMC demonstrated appropriate antibiotic management
- The two cases at HMC with inappropriate antibiotic management were found to have:
  - Delayed involvement of ID consult
  - Inappropriate antibiotic coverage for organism (No ID consult involved)

Conclusions

- Overall, clinicians prescribed appropriate antibiotics and conducted appropriate antibiotic stewardship, reflecting a strong institutional commitment to optimizing antimicrobial use and minimizing resistance.
- Patients with CLABSIs came from a wide variety of services in the hospital suggesting that standardized institutional surveillance methodologies in tandem with initiatives customized to the specialty needs, is the most inclusive approach to CLABSI management.
- The Infectious Disease Team was consulted on most of CLABSI cases, demonstrating the importance of their expertise in managing complex healthcare-associated infections.

Limitations

- This study has a small sample size from one institution with results that are not generalizable.
- The retrospective nature of this study may not represent current infection trends.
- Current demographic information has been collected from Epic, based on patient-reported race and ethnicities. Although free response has allowed for more specific self-reporting, clarification or standardization of ethnic and racial categories would allow for meaningful data analysis about at-risk groups.

Future Directions

- Examining data from other healthcare-associated infections such as surgical site infections, catheter-associated urinary tract infections, infectious ventilator-associated complications, and ventilator-associated pneumonia could provide a more comprehensive review of infection trends and resistance patterns, guiding antibiotic stewardship practices among hospitalized patients.

References

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