Poster Number: 1610

Contact: Aisling_Caffrey@uri.edu

Epidemiology and treatment heterogeneity in *Acinetobacter baumannii* infections

Aisling R. Caffrey[1-4], Haley Appaneal [1-4], Vrishali Lopes[1], Kerry L. LaPlante[1-3,5]

[1] Infectious Diseases Research Program, Providence Veterans Affairs Medical Center, Providence, RI, United States, [2]Center of Innovation in Long-Term Support Services, Providence Veterans Affairs Medical Center, Providence, RI, United States, [3]College of Pharmacy, University of Rhode Island, Kingston, RI, United States, [4] School of Public Health, Brown University, Providence, RI, [5]Warren Alpert Medical School of Brown University, Division of Infectious Diseases, Providence, RI

ABSTRACT

Background: *Acinetobacter baumannii* is known as a highly resistant organism causing serious infections in intensive care populations. However, the epidemiology of infections caused by *Acinetobacter baumannii* and approaches to treatment are not well described in a national healthcare system.

Methods: Our retrospective cohort study included patients with positive *Acinetobacter baumannii* cultures collected from any source during hospitalizations at Veterans Affairs (VA) medical centers nationally from January 2010 to April 2019. We evaluated patient characteristics and utilized exposure mapping to identify treatment patterns, including treatment heterogeneity. Heterogeneity was defined as patterns of antibiotic treatment (drug and duration) not shared by any other patient.

Results: Our study included 6,929 admissions with positive *Acinetobacter baumannii* cultures. The mean age was 66.7 years (±12.1) and 97.4% were male. Most patients were admitted from other healthcare facilities (59.8%) and 21.6% were in intensive care during the admission. Most patients had their culture collected on the day after admission and the median time to culture completion was 4 days (interquartile range 3-5). *Acinetobacter baumannii* cultures were most commonly obtained from urine (31.1%), followed by skin and soft tissue (25.5%), lung (23.0%), blood (9.8%), and bone/joint (5.2%). The median length of hospital stay was 12 days, with inpatient mortality and 30-day mortality rates of 12.4% and 13.2%, respectively. Treatment heterogeneity was high, with 89.2% of admissions having different antibiotic treatment patterns (drug and duration), with a median time to first change of 1 day and median of 3 changes. Only 5.9% of the admissions were treated with polymyxins and 3.6% with colistin. Carbapenems were used in 22.9% of the admissions and extended-spectrum cephalosporins in 37.7% of the admissions.

Conclusion: In VA hospitals, *Acinetobacter baumannii* infections are observed in both critical and non-critical patient populations, mostly among patients with healthcare exposures. *Acinetobacter baumannii* infections were found to have various sources of infection, mostly from urine and skin and soft tissue, and approaches to treatment were highly varied.

***Updated to exclude *A. baumannii* admissions without records of antibiotics (n=622).**

BACKGROUND

Epidemiologic surveillance has identified decreasing rates of *A. baumannii* infections, and improved susceptibility profiles. There is a need to better define the epidemiology of patients with *A. baumannii* infections, including patient characteristics, resistance profiles, and approaches to treatment in light of these changes in resistance.

OBJECTIVES

To describe patients with *A. baumannii* infections, and how those infections are treated in the hospital setting.

METHODS

- Hospitalizations with *A. baumannii* positive cultures, Jan 2010-April 2019. Included subsequent admissions more than 30 days from the previous discharge date.
- Exposure mapping identified all antibiotics from 7 days prior to culture until discharge, or 30 from culture for longer hospital stays.
- Assessed combination therapy, duration of therapy, and changes in therapy.

RESULTS

Demographics and clinical characteristics	N = 6,929
Age (years), mean (SD)	66.7 (12.1)
Male, n (%)	6,749 (97.4%)
White, n (%)	4,467 (64.5%)
Admitted from home/community, n (%)	2,785 (40.2%)
Treating specialty intensive care, n (%)	1,499 (21.6%)
Hospitalization 30 days prior to admission, n (%)	1,437 (20.7%)
Time to culture from admission (days), median (IQR)	1 (0-9)
Co-infections, n (%)	4,487 (64.8%)

SD = standard deviation. IQR = interquartile range.

Clinical outcomes	Overall N = 6,929	MDR N = 2,883 (42.0%)	Non-MDR N = 3,985 (58.0%)
Inpatient mortality, n (%)	857 (12.4%)	**565 (19.6%)**	**291 (7.3%)**
30-day mortality (from culture), n (%)	913 (13.2%)	**529 (18.4%)**	**377 (9.5%)**
Reinfection within 30 days of discharge, n (%)	261/6,072 (4.3%)	**170/2,318 (7.3%)**	**89/3,694 (2.4%)**
Length of hospital stay, from culture (days), median (IQR)	8 (4-22	**13 (6-39)**	**7 (3-14)**
A. baumannii readmission, n (%)	382 (6.0%)	**288 (11.2%)**	**94 (2.5%)**

IQR = interquartile range. MDR = multidrug resistance. Bolded indicates p-value <0.05 for comparison of MDR and non-MDR (chi-square or Wilcoxon tests as applicable). MDR could not be determined for 61 isolates, as two or less classes tested for susceptibility.

RESULTS

Treatment	Overall, N = 6,929	Inpatient mortality N = 857 (12.4%)	Inpatient survival N = 6,072 (87.6%)
Aminoglycoside[1]	783 (11.3%)	**205 (23.9%)**	**578 (9.5%)**
Carbapenems[2]	1,589 (22.9%)	**426 (49.7%)**	**1,163 (19.2%)**
Extended-spectrum cephalosporins[3]	2,610 (37.7%)	**358 (41.8%)**	**2,252 (37.1%)**
Fluoroquinolones[4]	2,656 (38.3%)	**289 (33.7%)**	**2,367 (39.0%)**
Antipseudomonal penicillins + β-lactamase inhibitors[5]	3,075 (44.4%)	**483 (56.4%)**	**2,592 (42.7%)**
Polymyxins[6]	409 (5.9%)	**167 (19.5%)**	**242 (4.0%)**
Tetracyclines[7]	542 (7.8%)	**29 (3.4%)**	**513 (8.5%)**

Data are n (%). Bolded indicates p-value <0.05 for comparison of inpatient mortality and inpatient survival (chi-square test). [1] Aminoglycosides (amikacin, gentamicin, tobramycin). [2] Carbapenems (imipenem, meropenem, doripenem). [3] Extended-spectrum cephalosporins (cefepime, ceftazidime, cefotaxime, ceftriaxone). [4] Fluoroquinolones (ciprofloxacin, levofloxacin). [5] Antipseudomonal penicillins + β-lactamase inhibitors (piperacillin/tazobactam, clavulanate/ticarcillin). [6] Polymyxins (colistin, polymyxin B). [7] Tetracyclines (tetracycline, minocycline, doxyclycline).

Treatment patterns		N = 6,929
Change in therapy	Number with change, n (%)	5,826 (84.1%)
	Day of change from culture, median (IQR)	1 (-1 to 3)
	Number of changes, median (IQR)	3 (2-5)
	Unique change patterns with length of therapy, n (%)	5,730 (98.4%)
	Unique change patterns without length of therapy, n (%)	5,221 (89.6%)
No change in therapy	Number without change, n (%)	1,103 (15.9%)
	Unique non-change patterns with length of therapy, n (%)	454 (41.2%)
	Unique non-change patterns without length of therapy, n (%)	141 (12.8%)

IQR = interquartile range.

CONCLUSIONS

Among nearly 7,000 hospital admissions with positive *A. baumannii* (AB) cultures, clinical outcomes were significantly worse among those with MDR-AB. Treatment heterogeneity was nearly universal among those with changes in therapy (98.4%), and 88.5% of all admissions had different antibiotic treatment patterns (drug and duration). Treatment approaches varied significantly between those who survived the admission and those who did not, with higher utilization of aminoglycosides, carbapenems, antipseudomonal penicillins/β-lactamase inhibitors, and polymixins among those who died during the admission.

Acknowledgements: The information presented are those of the authors and do not necessarily reflect the position or policy of the United States Department of Veterans Affairs. **Funding:** This work was funded in part by Shinogi, Inc. **Conflicts of Interest:** KLL has received research funding or is an advisor/consultant for Merck, Pfizer Pharmaceuticals, Ocean Spray Cranberries, Inc., Nabriva Therapeutics US, Inc., Melinta Therapeutics, Inc., and Tetraphase Pharmaceuticals. ARC has received research funding from Pfizer, Merck (Cubist), and Shionogi. No other financial disclosures.