Ceftolozane/Tazobactam (C/T) and Ceftazidime/Avibactam (CZA) Non-susceptibility (NS) among Hospitalized Adults with *Pseudomonas aeruginosa* (PSA) Isolated from Lower Respiratory Tract (LRT) Clinical Cultures: Index and Subsequent Episodes in the Kaiser Permanente Southern California (KPSC) System

Poster # **151**

Thomas Lodise[1], Pharm D, PhD; Sean T. Nguyen[2], PharmD; Rong Wei[3], MA; Vicki Chiu[3], MS; Theresa M. Im[3], MPH; Sara Y. Tartof[3], PhD

[1]Albany College of Pharmacy Health Sciences, Albany, NY, USA; [2]Shionogi Inc., Florham, NJ, USA; [3]Kaiser Permanente Southern California, Department of Research & Evaluation, Pasadena, CA, USA

Background

- Rising antimicrobial resistance has reduced reliability of conventional anti-pseudomonal β-lactams for lower respiratory tract (LRT) infections due to *Pseudomonas aeruginosa* (PSA), increasing use of Ceftolozane/Tazobactam (C/T) and Ceftazidime/Avibactam (CZA).
- However, non-susceptibility (NS) is emerging, including treatment-emergent resistance.
- NS frequency and magnitude in subsequent vs index PSA episodes, particularly for newer agents, are not well characterized in hospitalized real-world populations.
- We evaluated C/T and CZA NS among hospitalized adults with PSA from LRT clinical cultures, including index (collection date of the first respiratory tract culture positive for PSA during the qualifying hospitalization) and subsequent (non-index) episodes.

Methods

- Retrospective descriptive cohort study of adult Kaiser Permanente Southern California (KPSC) members hospitalized between 2021 and 2025 with PSA from LRT cultures consistent with pneumonia.
- Patients could contribute multiple PSA episodes.
- To limit repeated cultures from the same episode, isolates were grouped into rolling 3-day windows.
- One isolate per window was selected, prioritizing the most resistant phenotype: (1) NS to both C/T and CZA, (2) NS to either, (3) susceptible to both.
- Non-susceptibility was defined as intermediate or resistant according to the Clinical & Laboratory Standards Institute (CLSI) breakpoints in effect at the time of testing.
- A subsequent episode was an isolate obtained > 3 days after the prior included isolate.
- Susceptibility testing used VITEK N806 and XN30 cards. The primary outcome was NS to C/T, CZA, or both, stratified by index vs subsequent episodes.

Table 1. Baseline Characteristics of *Pseudomonas aeruginosa* Episodes (N=5,668)

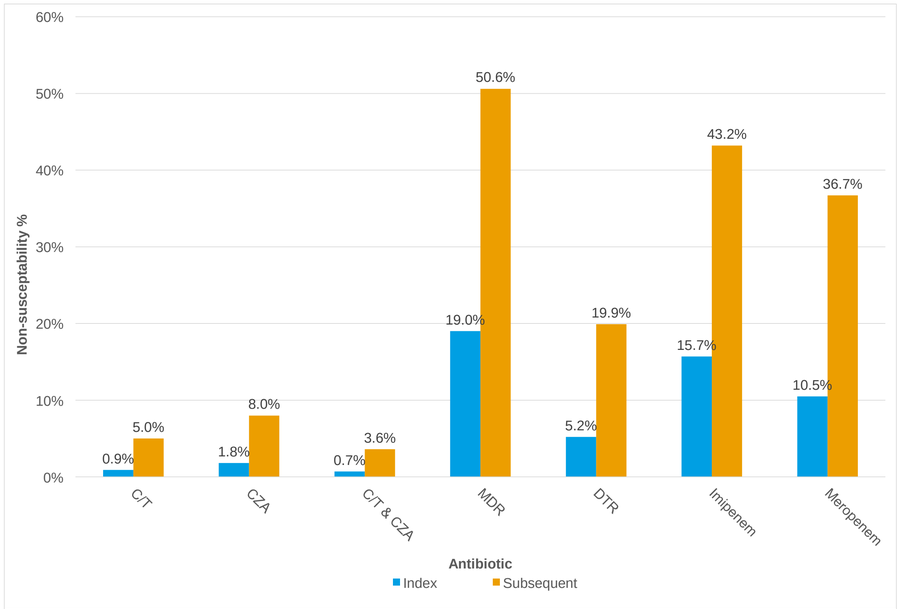
Characteristic	Total (N=5,668)
Age at index culture date, mean (SD)	68.3 (15.6)
Age category, n (%)	
18–64	1,821 (32.1)
65–74	1,546 (27.3)
75–84	1,698 (30.0)
≥85	603 (10.6)
Sex, n (%)	
Male	3,330 (58.8)
Race/Ethnicity, n (%)	
Asian/Pacific Islander	746 (13.2)
Black	1,056 (18.6)
Hispanic	1,922 (33.9)
White	1,782 (31.4)
Other/Unknown	162 (2.9)
30-day all-cause mortality, n (%)	
No	4,049 (71.4)
Yes	1,619 (28.6)
Episode indicator, n (%)	
Index	3,242 (57.2)
Subsequent	2,426 (42.8)
Charlson Comorbidity Index, mean (SD)	5.6 (3.4)
Charlson category, n (%)	
0-2	1,172 (20.7)
3+	4,496 (79.3)

SD: Standard Deviation

Results

- 5,668 PSA episodes among 3,242 patients met inclusion criteria.
- The mean age was 68.3 years, and 58.8% were male (**Table 1**).
- Overall, NS to C/T was 2.6% of episodes, NS to CZA in 4.4%; NS to both in 1.9%.
- NS was more frequent among subsequent episodes.
- For C/T, NS occurred in 0.9% of index versus 5.0% of subsequent episodes.
- For CZA, NS occurred in 1.8% of index versus 8.0% of subsequent episodes.
- NS to both agents was 0.7% of index versus 3.6% of subsequent episodes.
- Similar patterns were observed for carbapenems and for MDR and DTR episodes.

Figure 1. Non-susceptibility to Anti-pseudomonal Agents among *P. aeruginosa* Isolates by Index and Subsequent Infection



MDR: Multi-Drug Resistant; DTR: Difficult-to-Treat

Conclusions

- **NS to C/T and CZA was infrequent overall but substantially higher in subsequent episodes.**
- **NS from the LRT was approximately 5-fold more frequent in subsequent episodes and should be considered when selecting empiric therapy.**
- **These findings are hypothesis-generating and may inform future clinical prediction models incorporating additional clinical and treatment-related covariates.**

This study was funded by Shionogi Inc., Florham Park, NJ, USA. STN is an employee of Shionogi Inc.

ID Week October 2026