RES-107

Impact of Ceftolozane/Tazobactam Initiation Timing on Hospitalization and Readmission Rates in Cystic Fibrosis Patients: SPECTRA Healthcare Resource Utilization Analysis

Emre Yucel[1]; Alex Soriano[2]; David L. Paterson[3]; Florian Thalhalmmer[4]; Stefan Kluge[5]; Pierluigi Viale[6]; Mike Allen[7]; Brune Akrich[8]; Jessica Levy[1]; Huina Yang[9]; Sunny Kaul[10]

[1]Merck & Co., Inc., Rahway, NJ, USA; [2]Hospital Clinic, Barcelona, Spain; [3]The University of Queensland, Queensland, Australia; [4]Medizinische Universität Wien, Spitalgasse, Austria; [5]University Medical Center Hamburg-Eppendorf, Hamburg, Germany; [6]Università di Bologna - Via Zamboni, Bologna, Italy; [7]MSD (UK) Limited, London, United Kingdom; [8]MSD France, Puteaux, France; [9]Tan Tock Seng Hospital, Singapore; [10]Royal Brompton & Harefield NHS Foundation Trust, London, United Kingdom

Topline summary

In 64 cystic fibrosis patients (CF) from SPECTRA, timing (rank) of ceftolozane/tazobactam (C/T) initiation was associated with differences in 30-day all-cause readmissions (RRs) and infection-related RRs (IRRs) and hospital length of stay (LOS); medians were used as the primary descriptor to address skew.

Background

- SPECTRA (2016-2020) was a multicenter observational study of hospitalized adults treated ≥48 hours with C/T across Austria, Australia, Germany, Italy, Mexico, Spain, and the United Kingdom (overall N, 617). This subanalysis reports healthcare resource utilization (HCRU) in 64 CF patients
- **Rationale**: Timing of antibiotic initiation may influence LOS and readmission risk; understanding HCRU by rank of C/T initiation can inform stewardship and care pathways
- **Objective**: Describe 30-day all-cause RRs and 30day IRRs, number of patients remaining hospitalized 30 days after last C/T dose (NPH30DP), median hospital LOS (MHLOS), and median post-C/T LOS (PCTLOS) by rank of C/T initiation in (CF) patients

Methods

- **Population**: 64 CF patients stratified by rank of C/T initiation: first n, 10; second n, 16; third n, 11; fourth n, 8; fifth n, 9; sixth+ n, 10
- **Outcomes**:
  - 30 day all-cause RR and 30-day IRR
  - NPH30DP
  - MHLOS and CTLOS; medians (Q1-Q3) used as primary descriptors to address skew
- **Key definitions**:
  - "Not applicable" = patient died during index hospitalization or was still hospitalized 30 days post-C/T
  - For patients not hospitalized ≥30 days after last C/T: LOS = date of hospital discharge/death − date of index admission + 1
  - For patients remaining hospitalized ≥30 days after last C/T: time from last C/T to discharge imputed as 30 days; LOS = C/T stop date − admission + 30 + 1
  - PCTLOS (not hospitalized ≥30 days): discharge/death date − date of last C/T dose + 1. If discharged before last C/T dose, PCTLOS can be ≤0
  - For patients remaining hospitalized ≥30 days after last C/T, PCTLOS imputed as 31 days

Results

- Cohort distribution: total n=64 (first, 10; second, 16; third, 11; fourth, 8; fifth, 9; sixth+, 10)
- 30-day all-cause RR
  - Overall: 7/64 (10.9%)
  - By rank: first, 10.0% (1/10); second, 12.5% (2/16); third, 0% (0/11); fourth, 0% (0/8); fifth, 44.4% (4/9); sixth+, 0% (0/10)
  - Not applicable/unknown: 13 (20.3%)/3 (4.7%) in total
- 30-day IRR
  - Overall: 4/64 (6.3%)
- By rank: first, 10.0% (1/10); second, (0/10); third, (0/10); fourth, (0/10); fifth, 33.3% (3/9); sixth+, (0/10)
- NPH30DP
  - NPH30DP = 4 (6.25%): 1 patient each in ranks first, second, fourth, sixth+
- MHLOS, days; all patients
  - First, 23.0; second, 16.0; third, 32.0; fourth, 53.5; fifth, 28.0; sixth+, 46.5; total, 31.5
- Median PCTLOS, days; all patients
  - First, 4.0; second, 1.0; third, 3.0; fourth, 2.5; fifth, 1.0; sixth+, 3.0; total, 2.0
- Median PCTLOS for patients not hospitalized ≥30 days after last C/T
  - First, 3.0; second, 1.0; third, 3.0; fourth, 2.0; fifth, 1.0; sixth+, 2.0; total, 1.0

Variability/outliers

Use of medians reduces outlier impact and is therefore the primary focus:

- *Means and SDs reported in source tables show wide variability, especially fourth rank (mean, 89.6; SD, 125.0; max, 395 days). Medians are presented to reduce influence of outliers*

Interpretation:

- **The second timing signal**: Second-rank initiation was associated with the shortest MHLOS (16.0 days) and shortest median PCTLOS (1.0 day), suggesting earlier initiation may be linked to shorter hospital stays in this cohort
- **Readmission outlier**: Fifth-rank initiation had the highest 30-day all-cause RRs (44.4%) and IRRs (33.3%)—may represent later initiation among higher-risk patients or confounding clinical factors; warrants further investigation
- **Prolonged stays**: Fourth and sixth+ ranks had high median LOS (53.5 and 46.5 days, respectively), with fourth showing extreme outliers. Despite long LOS, median PCTLOS remains relatively short, indicating discharge often follows C/T completion relatively quickly
- **Overall**: Most patients (59/64) were not hospitalized 30 days after last C/T; median PCTLOS among those not hospitalized is 1.0 day

Limitations

- *Small sample sizes per rank (n range, 8-16); percentage estimates unstable*
- *Observational, descriptive analysis without adjustment for disease severity, pathogens, comorbidities, C/T dosing/duration, or concomitant therapies*
- *Imputation for patients hospitalized ≥30 days post-C/T (30/31 days) may bias LOS estimates*
- *Outliers (eg, LOS up to 395 days) heavily influence means; medians used to mitigate skew*
- *"Not applicable" and "unknown" entries affect denominators for some ranks*

Table 1. HCRU – patients from the analysis population with CF by rank of C/T initiation

	Rank of C/T initiation						
	First n=10	Second n=16	Third n=11	Fourth n=8	Fifth n=9	Sixth or more n=10	Total n=64
30-day all-cause readmission							
Yes	1 (10.0%)	2 (12.5%)	0	0	4 (44.4%)	0	7 (10.9%)
Not applicable[a]	1 (10.0%)	1 (6.3%)	2 (18.2%)	3 (37.5%)	1 (11.1%)	5 (50.0%)	13 (20.3%)
Unknown	1 (10.0%)	1 (6.3%)	0	0	0	1 (10.0%)	3 (4.7%)
30-day infection-related readmission							
Yes	1 (10.0%)	0	0	0	3 (33.3%)	0	4 (6.3%)
Not applicable[a]	1 (10.0%)	1 (6.3%)	2 (18.2%)	3 (37.5%)	1 (11.1%)	5 (50.0%)	13 (20.3%)
Unknown	1 (10.0%)	1 (6.3%)	0	0	1 (11.1%)	1 (10.0%)	4 (6.3%)
Number of patients who remain hospitalized 30 days after the last day of C/T	1	1	0	1	0	1	4
Hospital length of stay (days) - all patients[b]							
n	10	16	11	8	9	10	64
Mean (SD)	33.0 (28.1)	21.3 (12.7)	41.0 (36.3)	89.6 (125.0)	33.9 (23.8)	56.6 (28.1)	42.3 (52.3)
95% CI	(12.9, 53.1)	(14.5, 28.0)	(16.6, 65.4)	(0.0, 194.2)	(15.6, 52.2)	(36.5, 76.7)	(29.3, 55.4)
Median	23	16	32	53.5	28	46.5	31.5
Q1; Q3	13.0 ; 45.0	11.5 ; 28.5	15.0 ; 58.0	28.5 ; 70.5	21.0 ; 33.0	38.0 ; 82.0	16.0 ; 48.5
Min; Max	9 ; 102	8 ; 54	9 ; 127	17 ; 395	16 ; 94	31 ; 115	8 ; 395
Hospital length of stay (days) - patients who did not remain hospitalized 30 days after the last day of C/T							
n	9	15	11	7	9	9	60
Mean (SD)	31.6 (29.4)	20.3 (12.5)	41.0 (36.3)	91.4 (134.9)	33.9 (23.8)	53.3 (27.7)	41.1 (53.5)
95% CI	(8.9, 54.2)	(13.3, 27.2)	(16.6, 65.4)	(0.0, 216.2)	(15.6, 52.2)	(32.1, 74.6)	(27.2, 54.9)
Median	20	16	32	52	28	44	29.5
Q1; Q3	13.0 ; 42.0	11.0 ; 22.0	15.0 ; 58.0	26.0 ; 64.0	21.0 ; 33.0	38.0 ; 50.0	16.0 ; 46.5
Min; Max	9 ; 102	8 ; 54	9 ; 127	17 ; 395	16 ; 94	31 ; 115	8 ; 395
Post-C/T length of stay (days) - all patients[c]							
n	10	15	11	8	9	10	63
Missing	0	1	0	0	0	0	1
Mean (SD)	14.7 (22.7)	3.9 (8.5)	14.5 (22.5)	55.9 (130.8)	8.0 (14.2)	15.2 (20.3)	16.5 (49.4)
95% CI	(-1.5, 30.9)	(-0.8, 8.6)	(-0.6, 29.7)	(-53.5, 165.2)	(-2.9, 18.9)	(0.7, 29.7)	(4.0, 28.9)
Median	4	1	3	2.5	1	3	2
Q1; Q3	1.0 ; 23.0	1.0 ; 6.0	1.0 ; 24.0	1.0 ; 30.5	1.0 ; 4.0	1.0 ; 31.0	1.0 ; 13.0
Min; Max	1 ; 72	-5 ; 31	1 ; 67	1 ; 378	1 ; 44	1 ; 55	-5 ; 378
Post-C/T LOS, days – patients who did not remain hospitalized 30 days after the last day of C/T							
n	9	14	11	7	9	9	59
Missing	0	1	0	0	0	0	1
Mean (SD)	12.9 (23.3)	2.0 (4.1)	14.5 (22.5)	59.4 (140.9)	8.0 (14.2)	13.4 (20.7)	15.5 (50.9)
95% CI	(-5.0, 30.8)	(-0.4, 4.4)	(-0.6, 29.7)	(-70.9, 189.7)	(-2.9, 18.9)	(-2.5, 29.4)	(2.2, 28.7)
Median	3	1	3	2	1	2	1
Q1; Q3	1.0 ; 9.0	1.0 ; 2.0	1.0 ; 24.0	1.0 ; 30.0	1.0 ; 4.0	1.0 ; 13.0	1.0 ; 9.0
Min; Max	1 ; 72	-5 ; 12	1 ; 67	1 ; 378	1 ; 44	1 ; 55	-5 ; 378

[a]Not applicable: Patient died during index hospitalization or was still hospitalized 30 days past C/T treatment.
[b]For patients who did not remain hospitalized 30 days past the last day of C/T for the index infection, hospital LOS is defined in days as: date of hospital discharge/death – date of index hospitalization admission + 1. for patients who remain hospitalized 30 days after the last day of C/T, the time from the last day of C/T to hospital discharge is imputed by 30 and the hospital LOS is then defined in days as: C/T stop date – date of index hospitalization admission + 30 + 1.
[c]For patients who did not remain hospitalized 30 days past the last day of C/T for the index infection, post-C/T length of stay is defined as:
date of hospital discharge/death – date of last dose of C/T + 1. some patients may discharge from hospital before the last day of C/T for the index infection. In such a case, post-C/T length of stay is <=0. for patients who remain hospitalized 30 days after the last day of C/T, the time from the last day of C/T to hospital discharge is imputed by 30 and the post-C/T hospital LOS is then imputed by 31.

Keywords: antibiotic stewardship; treatment patterns; healthcare resource utilization; ceftolozane/tazobactam; SPECTRA; cystic fibrosis.

Conclusions

In this descriptive SPECTRA subanalysis of 64 CF patients, timing of C/T initiation was associated with differing HCRU. Second-rank initiation was associated with the shortest median hospitalization and PCTLOS, while fifth-rank initiation had the highest 30-day all-cause RRs and IRRs. Further adjusted analyses and exploration of patient-level factors are needed to understand causality and inform antibiotic stewardship and care pathways in CF.

Presented at: Asia Pacific Congress of Clinical Microbiology and Infection (APCCMI 2025); Bangkok, Thailand; 2-4 November 2025.