RES-345

In Vitro Activity of Ceftazidime-avibactam and Comparator Agents Against Enterobacterales and *Pseudomonas aeruginosa* from Pediatric Patients in the Asia/Pacific Region: ATLAS Surveillance Program, 2019-2023

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Introduction

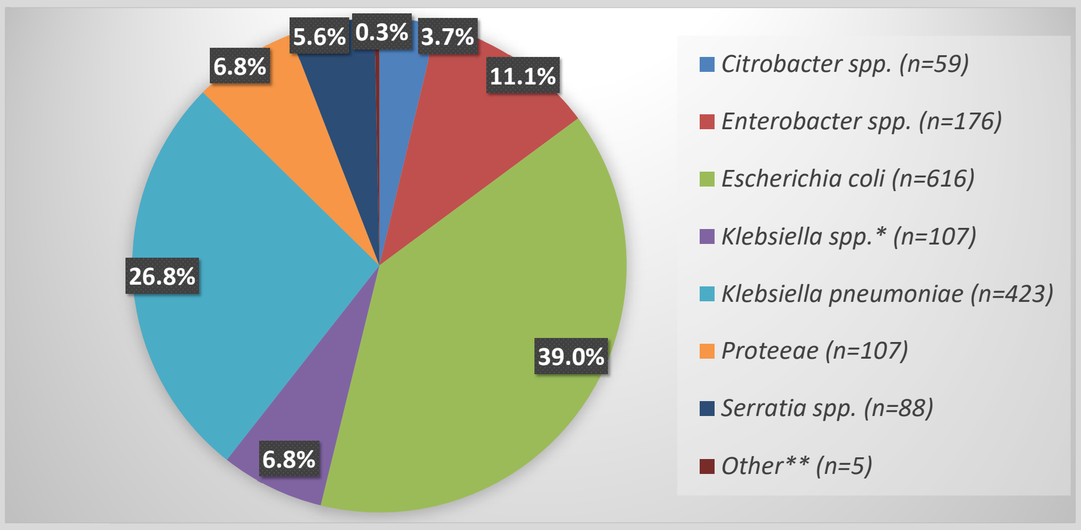
Antimicrobial resistance (AMR) is a major public health concern, including among pediatric patients. This study examined AMR among Enterobacterales and *Pseudomonas aeruginosa* collected from individuals <18 years of age in 11 Asia/Pacific countries as part of the Antimicrobial Testing Leadership and Surveillance (ATLAS) program [1] from 2019-2023, focusing on the activity of the cephalosporin/β-lactamase inhibitor combination, ceftazidime-avibactam, and comparator antimicrobials.

Methods

- For ATLAS, 1581 Enterobacterales (Figure 1) and 531 *P. aeruginosa* were collected from pediatric patients in 61 medical centers in 11 countries in the Asia/Pacific region (including Australia, China, Hong Kong, India, Japan, Malaysia, New Zealand, Philippines, South Korea, Taiwan, Thailand) from 2019-2023.
- Susceptibility testing was performed by broth microdilution following CLSI reference methodology [2].
- Minimum inhibitory concentrations (MIC) were interpreted with CLSI 2025 breakpoints [3].
- Most isolates testing non-susceptible to meropenem (Enterobacterales: MIC values ≥2 µg/mL; *P. aeruginosa* MIC values ≥4 µg/mL) and *Escherichia coli*, *Klebsiella pneumoniae*, *K. oxytoca*, *K. variicola* or *Proteus mirabilis* isolates testing with ceftazidime and/or aztreonam MIC values ≥2 µg/mL were screened for β-lactamase genes by PCR and Sanger sequencing, as previously described [4]. Isolates from China were not molecularly characterized for this study.

Results

Figure 1. Enterobacterales collected from pediatric patients in Asia/Pacific, 2019-2023



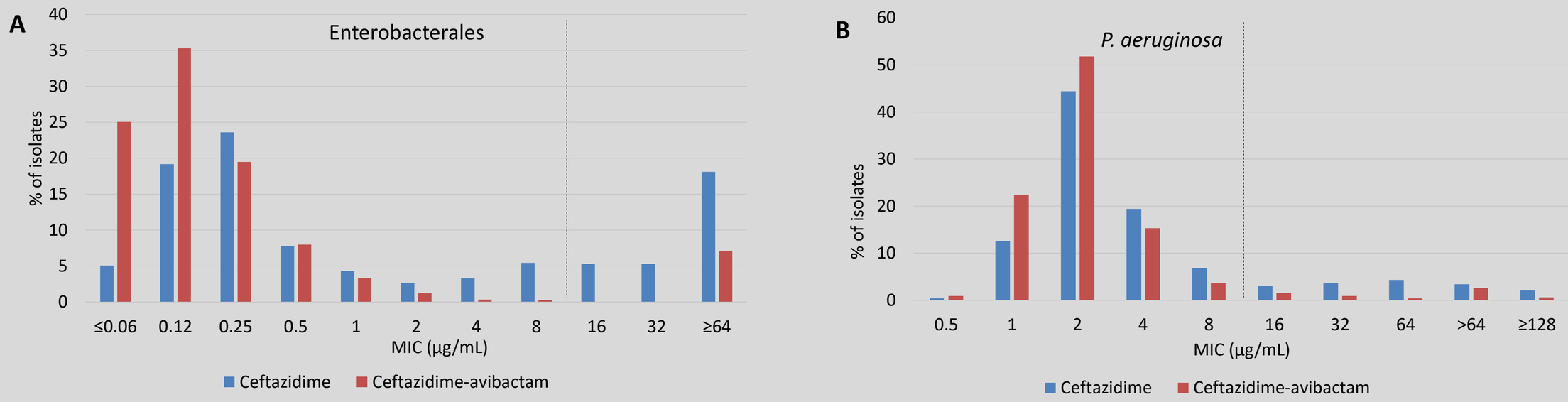
*not including *K. pneumoniae*
**includes: *Escherichia* sp. (n=1), *Raoultella ornithinolytica* (n=2), *Salmonella* sp. (n=2)

Table 1. Activity of ceftazidime-avibactam and comparator agents against Enterobacterales collected from pediatric patients in the Asia/Pacific region (2019-2023) by country

Region/country (n)	% Susceptible					
	CZA	CAZ	MEM	TZP	C/T[a]	LVX
All Asia/Pacific (1581)	92.9	66.6	90.7	80.4	85.1	65.8
Australia (164)	100	89.6	100	91.5	95.7	90.2
China (704)	95.9	68.9	93.6	83.8	88.0	61.8
Hong Kong (48)	100	81.3	100	93.8	93.0	79.2
India (213)	69.5	27.2	64.8	53.1	56.5	38.0
Japan (41)	100	87.8	97.6	85.4	88.2	80.5
Malaysia (79)	97.5	79.7	97.5	89.9	91.0	86.1
New Zealand (45)	100	86.7	100	91.1	95.5	97.8
Philippines (59)	89.8	67.8	88.1	83.1	85.7	72.9
South Korea (94)	100	71.3	100	87.2	93.0	72.3
Taiwan (14)	100	92.9	100	78.6	81.8	78.6
Thailand (120)	90.8	55.0	85.8	70.0	81.3	59.2

Abbreviations: CZA, ceftazidime-avibactam; CAZ, ceftazidime; MEM, meropenem; TZP, piperacillin-tazobactam; C/T, ceftolozane-tazobactam; LVX, levofloxacin.
[a]C/T not tested in 2019 (Enterobacterales tested 2020-2023: n=1332)

Figure 2. Ceftazidime and ceftazidime-avibactam MIC frequency distributions against (A) Enterobacterales (n=1581) and (B) *P. aeruginosa* (n=531) collected from pediatric patients in the Asia/Pacific region, 2019-2023



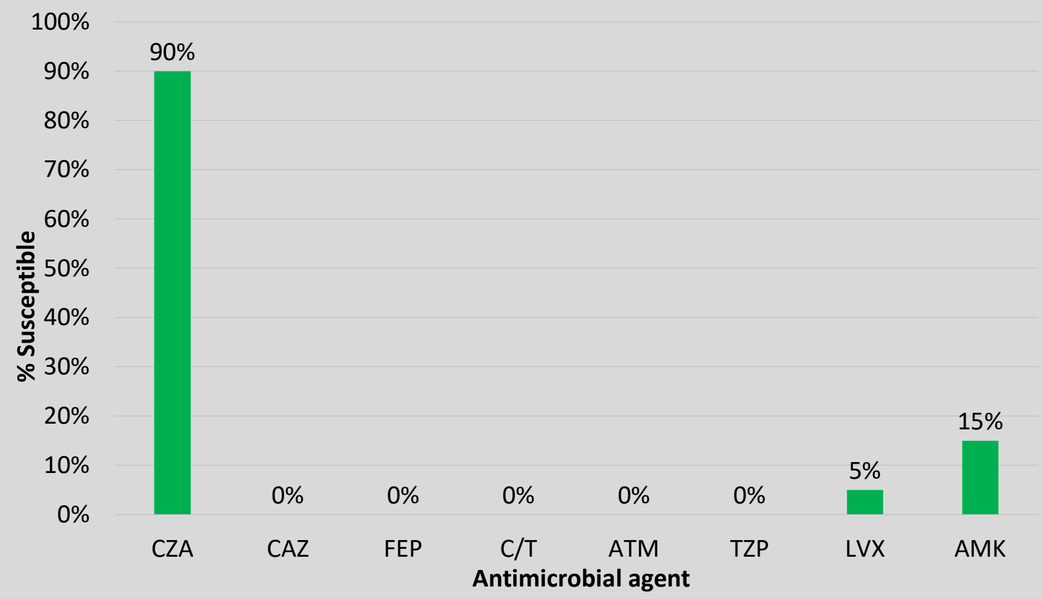
Dashed lines indicate the CLSI susceptibility breakpoints for ceftazidime-avibactam

Table 2. Activity of ceftazidime-avibactam and comparator agents against *P. aeruginosa* collected from pediatric patients in the Asia/Pacific region (2019-2023) by country[a]

Region/country (n)	% Susceptible					
	CZA	CAZ	MEM	TZP	C/T[b]	LVX
All Asia/Pacific (531)	94.0	83.6	83.8	81.5	95.5	81.0
Australia (74)	98.6	81.1	97.3	83.8	100	86.5
China (166)	97.6	83.7	80.1	78.3	98.6	82.5
India (81)	87.7	84.0	86.4	85.2	85.5	74.1
Japan (29)	86.2	82.8	72.4	72.4	100	82.8
Malaysia (38)	94.7	86.8	81.6	86.8	100	84.2
New Zealand (29)	100	93.1	93.1	96.6	100	79.3
South Korea (11)	100	81.8	90.9	72.7	100	81.8
Philippines (27)	96.3	92.6	85.2	88.9	94.7	77.8
Thailand (59)	83.1	76.3	74.6	78.0	83.3	76.3

Abbreviations: CZA, ceftazidime-avibactam; CAZ, ceftazidime; MEM, meropenem; TZP, piperacillin-tazobactam; C/T, ceftolozane-tazobactam; LVX, levofloxacin.
[a] Countries with ≤10 *P. aeruginosa* isolates from pediatric patients not shown (Hong Kong, n=10; Taiwan, n=7).
[b] C/T not tested in 2019 (*P. aeruginosa* tested 2020-2023: n=425)

Figure 3. Susceptibility of meropenem-nonsusceptible, MBL-negative, Enterobacterales (n=20) to ceftazidime-avibactam and comparators



Abbreviations: CZA, ceftazidime-avibactam; CAZ, ceftazidime; FEP, cefepime; C/T, ceftolozane-tazobactam; ATM, aztreonam; TZP, piperacillin-tazobactam; LVX, levofloxacin; AMK, amikacin

Results Summary

- Against the Enterobacterales (n=1581), ceftazidime-avibactam was the most active agent among comparators, inhibiting the growth of 92.9% of the isolates (Table 1).
- Meropenem (90.7% susceptible [S]) and ceftolozane-tazobactam (85.1% S) were also highly active.
- Ceftazidime-avibactam inhibited 100% of the Enterobacterales isolates from six countries (Australia, Hong Kong, Japan, New Zealand, South Korea and Taiwan), while those from India and Thailand were the least susceptible to all antimicrobials.
- Against *P. aeruginosa* (n=531), ceftazidime-avibactam was the second most active agent among comparators (94.0% S; Table 2).
- Regarding the individual countries, 100% of the *P. aeruginosa* collected in New Zealand and South Korea were susceptible to ceftazidime-avibactam, while those from Thailand were the least susceptible (83.1% S to ceftazidime-avibactam and 83.3% S to ceftolozane-tazobactam).
- MIC frequency distributions of ceftazidime-avibactam and ceftazidime alone against both the Enterobacterales and *P. aeruginosa* illustrate the potentiation of ceftazidime by avibactam (Figure 2).
- Ceftazidime-avibactam was the sole agent with activity versus meropenem non-susceptible, metallo-β-lactamase (MBL)-negative, Enterobacterales (Figure 3).

Conclusions

Ceftazidime-avibactam demonstrated potent *in vitro* activity against both Enterobacterales and *P. aeruginosa* from pediatric patients in Asia/Pacific. These data suggest ceftazidime-avibactam remains a prudent therapeutic choice to consider against these pathogens, as long as they do not carry MBLs.

References

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Disclosures

This study was sponsored by Pfizer. GS an KP are employees of Pfizer. MW and DS are employees of IHMA, which received fees from Pfizer for the conduct of the study and poster preparation.

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