RES-343

In Vitro Activity of Aztreonam-avibactam Against Enterobacterales Isolates Collected from Patients in Intensive Care Units and General Wards, by Infection Source, ATLAS Surveillance Study, 2019-2023

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Introduction

Aztreonam (ATM) is a monobactam stable against hydrolysis by metallo-β-lactamases (MBLs), and avibactam (AVI) inhibits class A, class C, and some class D serine β-lactamases. The combination of aztreonam-avibactam is being developed for use against infections caused by drug-resistant Enterobacterales, especially those co-producing MBLs and other β-lactamases. This study evaluated the *in vitro* activity of aztreonam-avibactam and comparators against Enterobacterales collected in 2019-2023 from patients in intensive care units and general wards, by infection source, as part of the ATLAS global surveillance program [1].

Methods

21,638 isolates from patients in ICUs and 50,465 isolates from patients in general wards were collected from 225 medical centers and 56 countries excluding North America and China. Antimicrobial susceptibility was performed by broth microdilution according CLSI methods [2] and interpreted using EUCAST 2025 breakpoints [3]. The presence of genes encoding metallo-β-lactamase (GES, NDM, IMP, VIM, SPM, and GIM) carbapenemases was assessed via multiplex PCR, followed by amplification of the full-length genes and sequencing [4].

Results

Table 1. *In vitro* activity of aztreonam-avibactam and comparators against Enterobacterales from ICUs and general wards by infection source and select genotypes

Organism	N	AZA		ATM		FEP		MEM		LVX		CST	
		MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S
ICU Ebac	21620	0.25	**99.4**	>64	60.2	>32	63.5	16	86.6	>8	64.5	>8	81.3
BSI	5435	0.25	**99.5**	>64	54.8	>32	57.2	>16	84.8	>8	60.2	>8	82.1
IAI	2128	0.25	**99.4**	>64	62.1	>32	66.3	16	87.7	>8	65.8	>8	87.2
LRTI	9756	0.25	**99.6**	>64	64.6	>32	68.7	16	88.1	>8	70.4	>8	80.7
SSSI	2114	0.25	**99.1**	>64	59.1	>32	61.7	16	86.2	>8	60.8	>8	77.6
UTI	2187	0.5	**98.2**	>64	53.3	>32	55.3	>16	83.4	>8	51.3	>8	79.9
CRE	2903	1	**97.0**	128	7.0	>32	0.5	>16	0	>8	7.1	>8	76.1
E. coli	4832	0.12	**97.8**	64	61.0	>32	63.3	≤0.06	**95.1**	>8	58.2	0.5	**99.7**
MBL-pos	214	8	72.4	>64	5.6	>32	0	>16	1.9	>8	5.6	0.5	**100**
K. pneumoniae	7965	0.25	**99.9**	>64	43.0	>32	42.9	>16	71.9	>8	47.3	1	**92.1**
MBL-pos	1018	0.5	**99.7**	>64	6.7	>32	0.2	>16	2.8	>8	5.7	8	79.2
General Ebac	50430	0.25	**99.7**	>64	68.6	>32	71.9	0.12	**93.5**	>8	67.5	>8	81.5
BSI	11648	0.25	**99.8**	>64	67.2	>32	70.4	0.25	**93.2**	>8	67.8	>8	87.0
IAI	8107	0.25	**99.7**	64	70.9	>32	75.5	0.12	**94.9**	>8	71.6	>8	88.1
LRTI	7631	0.25	**99.8**	>64	69.9	>32	73.6	0.25	**92.9**	>8	71.4	>8	80.8
SSSI	11088	0.12	**99.7**	64	71.1	>32	74.0	0.12	**93.9**	>8	68.3	>8	73.1
UTI	11956	0.25	**99.6**	>64	65.2	>32	67.9	0.25	**93.0**	>8	61.2	>8	80.0
CRE	3263	1	**97.6**	128	7.7	>32	0.8	>16	0	>8	8.2	>8	82.1
E. coli	15971	0.12	**99.3**	64	66.5	>32	69.0	≤0.06	**97.9**	>8	59.0	0.5	**99.7**
MBL-pos	276	8	**81.5**	>64	5.8	>32	0	>16	2.9	>8	6.5	0.5	**100**
K. pneumoniae	14093	0.25	**99.9**	>64	53.9	>32	54.6	>16	83.2	>8	56.6	1	**96.2**
MBL-pos	979	0.5	**99.8**	>64	7.3	>32	0	>16	3.2	>8	5.5	8	87.0

Abbreviations: AZA, aztreonam-avibactam; ATM, aztreonam; FEP, cefepime; MEM, meropenem; LVX, levofloxacin; CST, colistin; %S, percent susceptible; MIC_{90} in µg/mL; ICU, intensive care unit; Ebac, Enterobacterales; BSI, bloodstream infection; IAI, intraabdominal infection; LRTI, lower respiratory tract infection; SSSI, skin/skin structure infection; UTI, urinary tract infection; CRE, carbapenem (meropenem) nonsusceptible; MBL, metallo-β-lactamase

Figure 1. Distribution of aztreonam-avibactam MIC values by infection source in ICUs (A) and general wards (B)

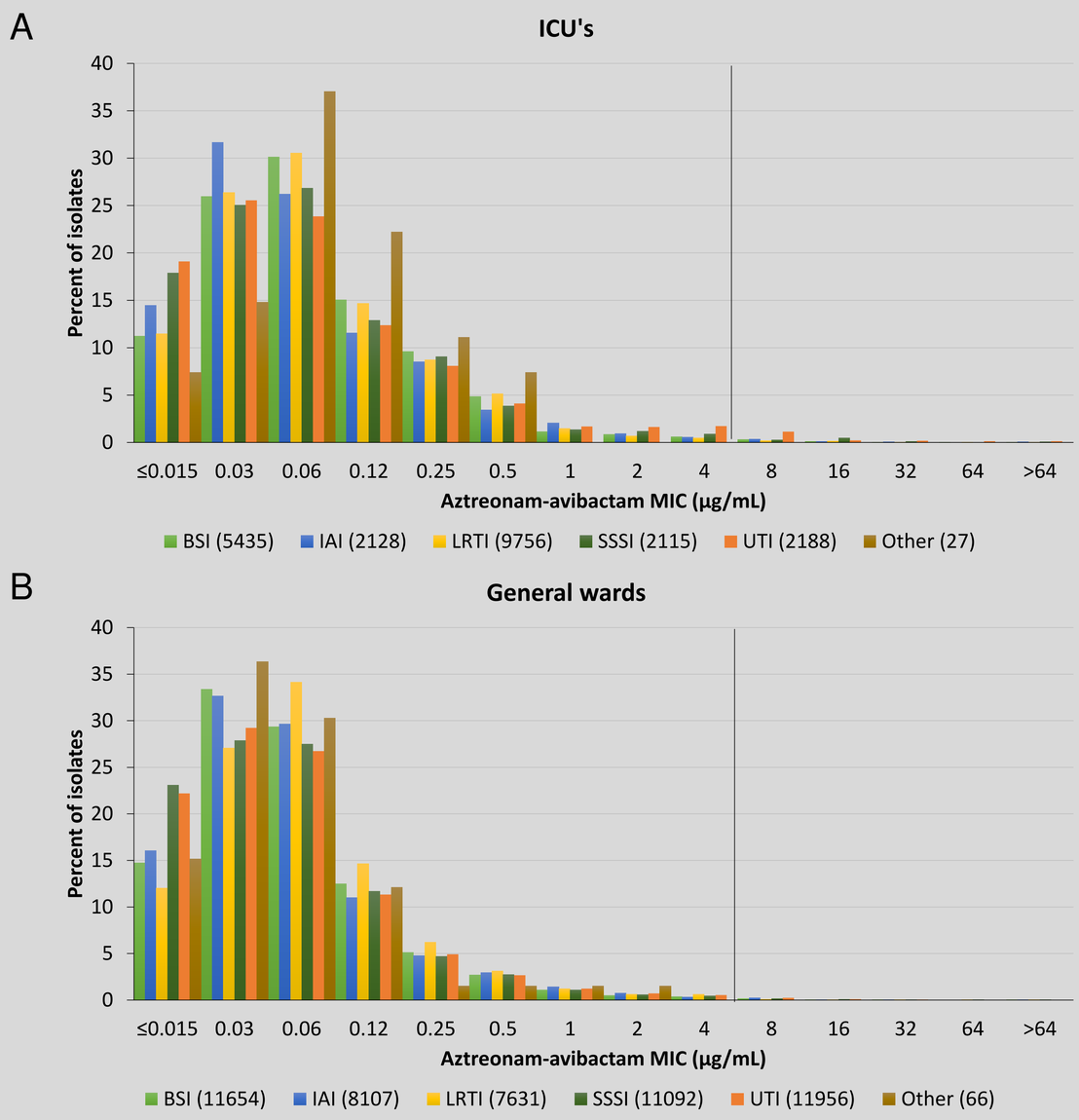


Figure 2. Percent of Enterobacterales susceptible to aztreonam-avibactam and comparators by infection source in ICUs (A) and general wards (B)

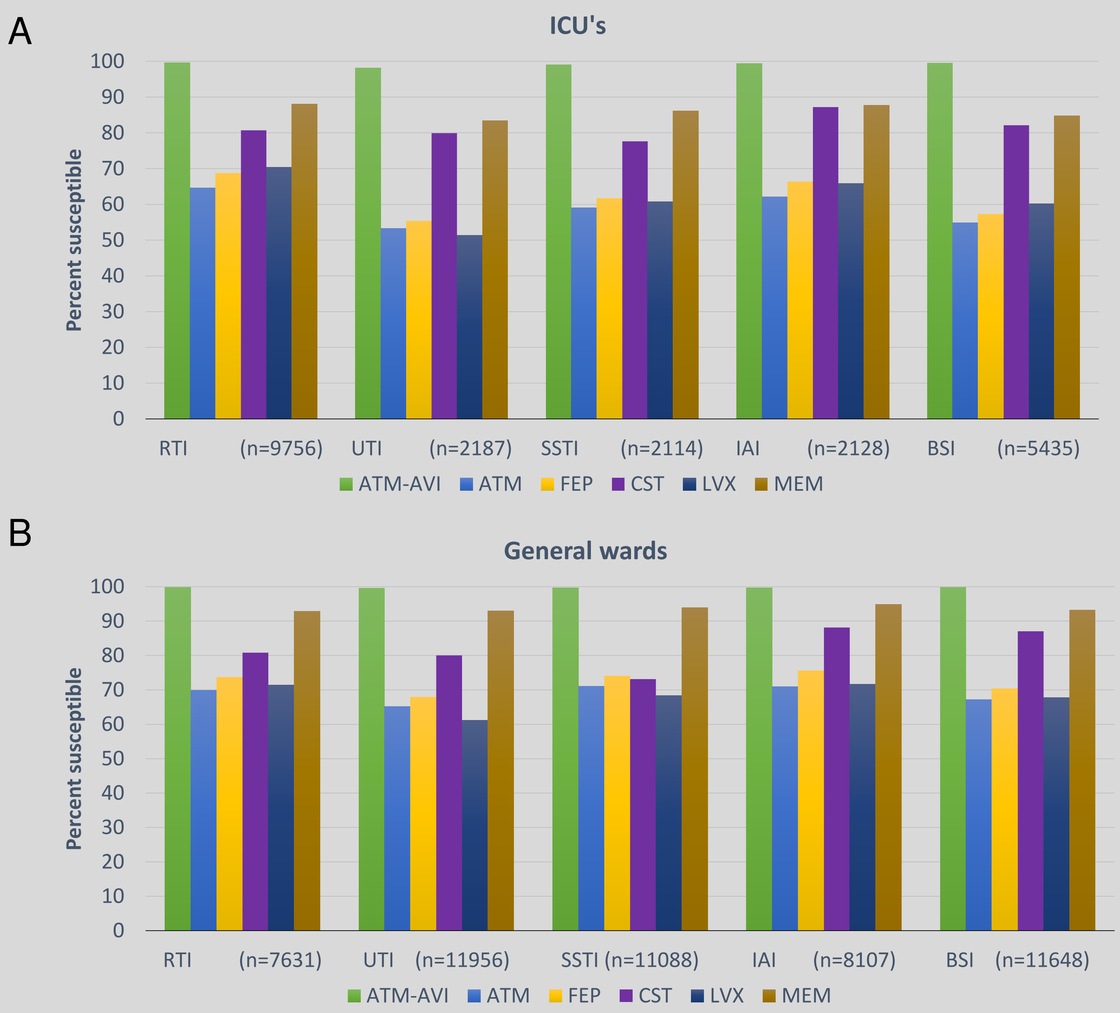
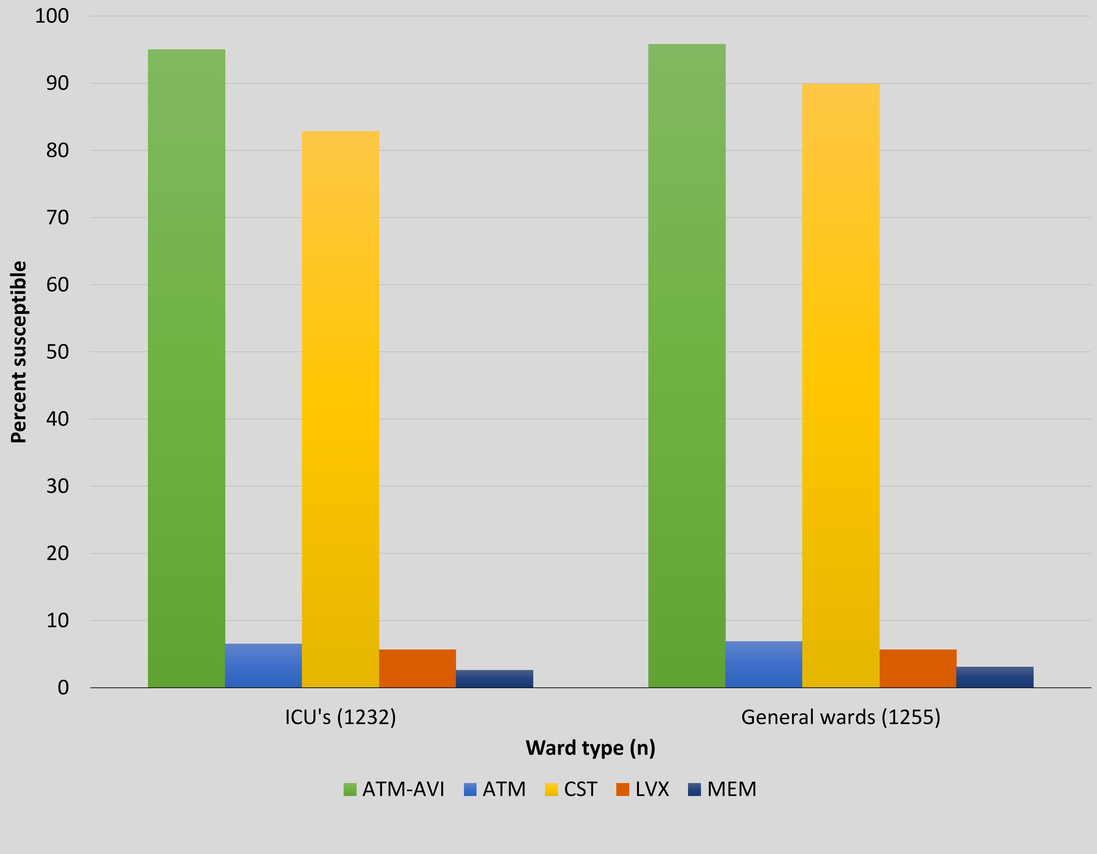


Figure 3. Percent of MBL-positive Enterobacterales susceptible to aztreonam-avibactam and comparators by infection source in ICUs and general wards



Results Summary

- Aztreonam-avibactam showed potent *in vitro* activity against Enterobacterales isolates collected in ICUs (99.4% susceptible; MIC_{90}=0.25 mg/L) and general wards (99.7% susceptible; MIC_{90}=0.25 mg/L) (Table 1, Figure 1 A and B). Aztreonam-avibactam was also the most active agent against carbapenem-nonsusceptible (CRE) isolates, with >97% susceptible (Table 1).
- From each infection source, aztreonam-avibactam was the most active compound tested against isolates from ICUs, with >98% susceptible, compared to 83-88% susceptible to meropenem and 77-87% susceptible to colistin (Table 1, Figure 2A).
- From each infection source, aztreonam-avibactam showed consistently lower MIC_{90} values and higher percent susceptible than comparators against isolates from general wards (Table 1, Figure 2), except for meropenem, where percent susceptible also >90% for each source (Table 1, Figure 2B).
- Aztreonam-avibactam maintained *in vitro* activity against MBL-positive Enterobacterales isolates (n=2,487) across all infection sources from both ICUs and general wards, with ≥95% of isolates susceptible (Figure 3). In contrast, <3% of MBL-positive isolates were susceptible to meropenem (Table 1, Figure 3).

Conclusions

The *in vitro* activity of aztreonam-avibactam against Enterobacterales isolates from all infection sources in both ICU and general wards underscores its importance as a potential therapy for infections caused by these organisms, including CRE and MBL-positive isolates.

References

1. Pfizer. *Antimicrobial Testing Leadership and Surveillance.* Available at: https://atlas-surveillance.com. Accessed August 2025.
2. Clinical Laboratory Standards Institute (CLSI), 2024. *Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically; Approved Standards – 12th Edition.* CLSI document M07-A12 (ISBN 978-1-68440-227-4). CLSI, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898 USA.
3. The European Committee on Antimicrobial Susceptibility Testing – *EUCAST Clinical Breakpoints* 2025; http://www.eucast.org/clinical_breakpoints/
4. Lob SH, Kazmierczak KM, Badal RE, Hackel MA, Bouchillon SK, Biedenbach DJ, Sahm, DF. 2015. *Trends in susceptibility of Escherichia coli from intra-abdominal infections to ertapenem and comparators in the United States according to data from the SMART program, 2009 to 2013.* Antimicrob Agents Chemother 59:3606-3610.

Disclosures

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