Antimicrobial Susceptibility Profiles of *Acinetobacter baumannii* from Europe: TEST 2014-2017

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Introduction

Acinetobacter baumannii has been recognized as an important opportunistic pathogen responsible for pneumonia, septicemia, urinary tract infections and meningitis, and is often associated with nosocomial outbreaks. Due to their capacity to acquire and accumulate resistance determinants, clinical isolates of *A. baumannii* are often multi-drug resistant and difficult to eradicate. In this study, data from the Tigecycline European Surveillance Trial (TEST) program were analyzed to evaluate the activity of Tigecycline and comparator antibiotics against recent (2014-2017) clinical isolates of *A. baumannii* from Europe.

Materials & Methods

- Between 2014 and 2017, 23 European countries participated in the TEST program. A total of 2,640 isolates of *A. baumannii* were identified to the species level and MICs determined at each participating laboratory using supplied broth microdilution panels.
- Organism collection, transport, confirmation of organism identification, and development and management of a centralized database were coordinated by International Health Management Associates, Inc. located in Schaumburg, IL, USA. Organism identification was confirmed using MALDI-TOF mass spectroscopy.
- Minimum inhibitory concentrations (MICs) were determined by the Clinical and Laboratory Standards Institute (CLSI) recommended broth microdilution testing method [1].
- EUCAST breakpoint criteria were applied to define susceptibility and resistance where available (amikacin, levofloxacin, meropenem); CLSI breakpoints were applied for antimicrobials for which there are no EUCAST breakpoints (cefepime, ceftazidime, ceftriaxone, minocycline, and piperacillin-tazobactam) [2,3]. There are no breakpoint criteria for Tigecycline when tested against *A. baumannii*.
- Quality control testing was performed on each day of testing using appropriate ATCC control strains and following CLSI and manufacturer guidelines. Results were included in the analysis only when corresponding QC results were within the acceptable ranges [2].
- MDR was defined as resistant to amikacin, meropenem, and piperacillin-tazobactam utilizing CLSI breakpoint criteria.

Results

Table 1. *In Vitro* Activity of Tigecycline and Comparator Antimicrobial Agents Against *Acinetobacter baumannii* by Year

	2014 (n=728)		2015 (n=644)		2016 (n=496)		2017 (n=772)	
Drug	% Sus	MIC_{90}	% Sus	MIC_{90}	% Sus	MIC_{90}	% Sus	MIC_{90}
Tigecycline	na*	2	na	2	na	1	na	1
Amikacin	44.8	>64	48.1	>64	52.2	>64	56.6	>64
Cefepime	28.9	>32	30.9	>32	39.9	>32	38.1	>32
Ceftazidime	29.4	>16	32.9	>16	41.9	>16	41.6	>16
Ceftriaxone	18.4	>32	20.0	>32	27.0	>32	27.5	>32
Levofloxacin	26.2	>8	31.2	>8	39.3	>8	38.2	>8
Meropenem	31.5	>16	32.9	>16	42.5	>16	40.4	>16
Minocycline	70.3	16	64.6	16	72.4	8	78.2	8
Pip-Tazo	26.9	>128	32.0	>128	41.9	>128	40.4	>128

* na; no breakpoints available

Table 2. *In Vitro* Activity of Tigecycline and Comparator Antimicrobial Agents Against *A. baumannii* Isolates

		A. baumannii (2640)			MDR *A. baumannii* (1236)		
Region	Drug	%Sus	MIC_{50}	MIC_{90}	%Sus	MIC_{50}	MIC_{90}
Europe	Tigecycline	na*	0.5	2	na	1	2
	Amikacin	47.1	16	>64	0	>64	>64
	Levofloxacin	31.4	8	>8	0.95	>32	>32
	Meropenem	36.5	>16	>16	3.18	>16	>16
	Cefepime	34.1	32	>32	0.48	>32	>32
	Ceftazidime	36.2	>16	>16	0	>8	>8
	Ceftriaxone	23.1	>32	>32	0	>16	>16
	Minocycline	71.6	2	8	50	4	16
	Pip-Tazo	34.9	>128	>128	0.32	>128	>128

* na; no breakpoints available

Figure 1. Frequency Distributions of Tigecycline MICs for *A. baumannii* and MDR *A. baumannii*

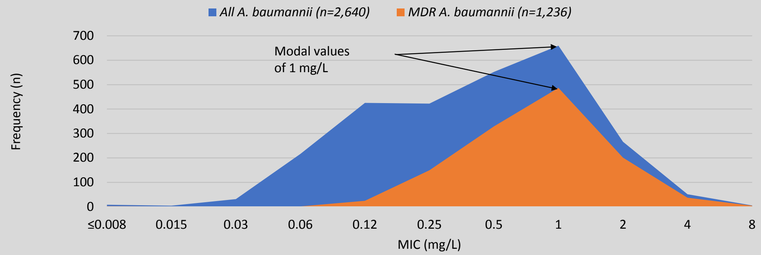

Table 3. *In Vitro* Activity of Tigecycline and Comparator Antimicrobial Agents Against *A. baumannii* and MDR *A. baumannii* Isolates by Country where N >100

		All *A. baumannii*			MDR *A. baumannii*		
Country (N)	Drug	%Sus	MIC_{50}	MIC_{90}	%Sus	MIC_{50}	MIC_{90}
Croatia (n=108)	Tigecycline	na*	1	2	na	1	2
90.7% MDR	Amikacin	6.5	>64	>64	0	>64	>64
	Levofloxacin	0	8	>8	0	8	>8
	Meropenem	1.9	>16	>16	0	>16	>16
	Cefepime	0.9	>32	>32	0	>32	>32
	Ceftazidime	0.9	>16	>16	0	>16	>16
	Ceftriaxone	0.9	>32	>32	0	>32	>32
	Minocycline	52.8	4	8	48.0	8	8
	Pip-Tazo	0.9	>128	>128	0	>128	>128
France (n=309)	Tigecycline	na	0.12	1	na	1	2
11% MDR	Amikacin	87.4	2	64	0	>64	>64
	Levofloxacin	69.3	0.12	>8	0	>8	>8
	Meropenem	79.9	0.5	>16	0	>16	>16
	Cefepime	76.1	4	>32	2.9	>32	>32
	Ceftazidime	77.7	4	>16	5.9	>16	>16
	Ceftriaxone	44.7	16	>32	0	>32	>32
	Minocycline	90.0	≤0.5	8	29.4	8	>16
	Pip-Tazo	76.4	2	>128	2.9	>128	>128
Germany (n=196)	Tigecycline	na	0.12	1	na	1	2
19.9% MDR	Amikacin	76	2	>64	0	>64	>64
	Levofloxacin	62.8	0.12	>8	0	8	>8
	Meropenem	69.9	0.5	>16	0	>16	>16
	Cefepime	63.3	4	>32	0	>32	>32
	Ceftazidime	69.9	4	>16	2.6	>16	>16
	Ceftriaxone	48.0	16	>32	0	>32	>32
	Minocycline	87.2	≤0.5	8	59.0	4	8
	Pip-Tazo	68.9	1	>128	0	>128	>128
Greece (n=142)	Tigecycline	na	0.5	1	na	0.5	1
97.9% MDR	Amikacin	1.4	>64	>64	0	>64	>64
	Levofloxacin	0.7	8	>8	0	8	>8
	Meropenem	2.1	>16	>16	0	>16	>16
	Cefepime	1.4	>32	>32	0	>32	>32
	Ceftazidime	0.7	>16	>16	0	>16	>16
	Ceftriaxone	1.4	>32	>32	0	>32	>32
	Minocycline	51.4	4	8	51.8	4	8
	Pip-Tazo	1.4	>128	>128	0	>128	>128
Italy (n=666)	Tigecycline	na	1	2	na	1	2
78.7% MDR	Amikacin	20.1	>64	>64	0	>64	>64
	Levofloxacin	7.7	>8	>8	0	>8	>8
	Meropenem	8.6	>16	>16	0	>16	>16
	Cefepime	8.9	>32	>32	1.2	>32	>32
	Ceftazidime	11.9	>16	>16	4.6	>16	>16
	Ceftriaxone	6.6	>32	>32	0.8	>32	>32
	Minocycline	48.2	8	16	40.7	8	16
	Pip-Tazo	8.7	>128	>128	0.6	>128	>128
Portugal (n=134)	Tigecycline	na	0.5	2	na	1	2
70.1% MDR	Amikacin	29.9	>64	>64	0	>64	>64
	Levofloxacin	6.7	>8	>8	0	>8	>8
	Meropenem	5.2	>16	>16	0	>16	>16
	Cefepime	6	>32	>32	0	>32	>32
	Ceftazidime	9.7	>16	>16	4.3	>16	>16
	Ceftriaxone	3	>32	>32	1.1	>32	>32
	Minocycline	60.5	4	16	48.9	8	16
	Pip-Tazo	5.2	>128	>128	0	>128	>128
Spain (n=623)	Tigecycline	na	0.5	1	na	1	2
23.9% MDR	Amikacin	73.7	4	>64	0	>64	>64
	Levofloxacin	41.9	8	>8	0	>8	>8
	Meropenem	44.0	16	>16	0	>16	>16
	Cefepime	41.6	16	>32	1.3	>32	>32
	Ceftazidime	43.8	16	>16	4	>16	>16
	Ceftriaxone	29.2	>32	>32	0	>32	>32
	Minocycline	81.4	≤0.5	8	57.1	4	16
	Pip-Tazo	43.2	128	>128	0	>128	>128

* na; no breakpoints available

The overall MDR rate for *Acinetobacter baumannii* was 46.8% in Europe between 2014 and 2017.

Conclusions

- Among the European countries that tested *A. baumannii* for the TEST study, Tigecycline MIC_{90} values were either 1 or 2 mg/L, except for Romania which had a Tigecycline MIC_{90} value of 4 mg/L (Table 1).
- Over 47.7% of the *A. baumannii* collected from patients in Europe were MDR. Of those France, United Kingdom, Denmark, Czech Republic, Switzerland, and Finland showed less than 11% of MDR; while the percentage was greater than 70% in Portugal, Latvia, Lithuania, Austria, Italy, Croatia, Romania, Serbia, Greece and Sweden.
- Only Tigecycline maintained appreciable activity against *A. baumannii* from patient infections in Europe, including MDR isolates. Modal values were 1 mg/L for both all *A. baumannii* and MDR *A. baumannii* (Figure 1).
- *A. baumannii* is a significant opportunistic pathogen with limited treatment options and requires continued monitoring through surveillance efforts such as the TEST program.

References

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Disclosures

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