statistically significant difference in both all-cause mortality (24% vs. 73%, $P = 0.006$) and infection related mortality (4% vs. 26%, $P = 0.017$) in the CAZ-AVI and BAT groups, respectively. There was a trend toward a lower overall length of stay favoring the CAZ-AVI cohort as opposed to the BAT cohort (16 days vs. 30 days, $P = 0.082$).

Conclusion. CAZ-AVI therapy was associated with lower mortality rates for CRE infections and have a high attributable mortality, especially with concomitant bacteremia. Future studies are warranted to confirm these results.

Disclosures. **All authors:** No reported disclosures.

2411. Expanded Susceptibility and Resistance Mechanism Testing Among Carbapenem-Resistant Enterobacteriaceae in Connecticut, 2017

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Session: 250. Treatment of AMR Infections
Saturday, October 6, 2018: 12:30 PM

Background. In Connecticut (CT), submission of clinical carbapenem-resistant Enterobacteriaceae (CRE, resistant to ≥1 carbapenem) isolates to the state public health laboratory (SPHL) was mandated in 2017 for expanded susceptibility and carbapenemase testing. To guide empiric treatment, we created a statewide CRE antibiogram and explored the role of carbapenemase production.

Methods. Susceptibility testing was conducted by broth microdilution and disk diffusion and interpreted using Clinical and Laboratory Standards Institute (CLSI) breakpoints, if available. Carbapenemase-producing CRE (CP-CRE) were identified using the modified carbapenem inactivation method (mCIM). Multiplex real-time polymerase chain reaction testing was used to identify genes for common carbapenemases.

Results. Of 198 CRE isolates received by the SPHL in 2017, 166 were confirmed as CRE. After patient deduplication, 147 records remained (46.9% *Enterobacter,* 35.4% *Klebsiella,* 14.3% *Escherichia coli,* and 3.4% other). Most were susceptible to ceftazidime/avibactam (CAZ-AVI) (range: 90–100%) and colistin (range 94–100%). Forty-six (31%) were CP-CRE (39 bla_{KPC}, 4 bla_{NDM}, 2 $bla_{OXA\text{-}48\text{-}like}$, and 1 gene unknown). Non-CP-CRE were more frequently susceptible (P <c0.05) than CP-CRE to levofloxacin (67 vs. 26%), moxifloxacin (64 vs. 20%), tigecycline (84 vs. 35%), and tobramycin (84 vs. 35%).

Conclusion. CP-CRE have demonstrated significant resistance to noncarbapenem antibiotic classes. Most CRE isolates were susceptible to CAZ-AVI and colistin. The predominant carbapenemase gene is bla_{KPC}. This statewide antibiogram can guide empiric prescribing and formulary selection for CRE treatment.

	# of isolates	% Susceptible											
		Carbapenems				Other antibiotics							
		Doripenem	Ertapenem	Imipenem	Meropenem	Ceftazidime/Avibactam	Ceftolozone/Tazobactam	Colistin†	Fosfomycin†	Levofloxacin	Moxifloxacin	Tigecycline	Tobramycin
Klebsiella	52	31	4	27	25	92	10	94	68	35	31	87	40
E. coli	21	60	0	52	50	90	19	100	100	10	10	95	71
Enterobacter	69	82	0	81	81	100	6		72	82	78	78	88
CP-CRE	46	10	2	4	9	91	4	97	80	26	20	35	35
Non-CP-CRE	101	81	3	79	76	98	14	88	71	67	64	84	84
		*		*	*					*	*	*	*

*$P < 0.05$, CP-CRE vs non-CP-CRE, χ^2 or exact test

†No CLSI breakpoint. Colistin broth MIC ≤ 2, fosfomycin disk diameter ≥ 16 mm

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2412. Our Experience With IV Fosfomycin

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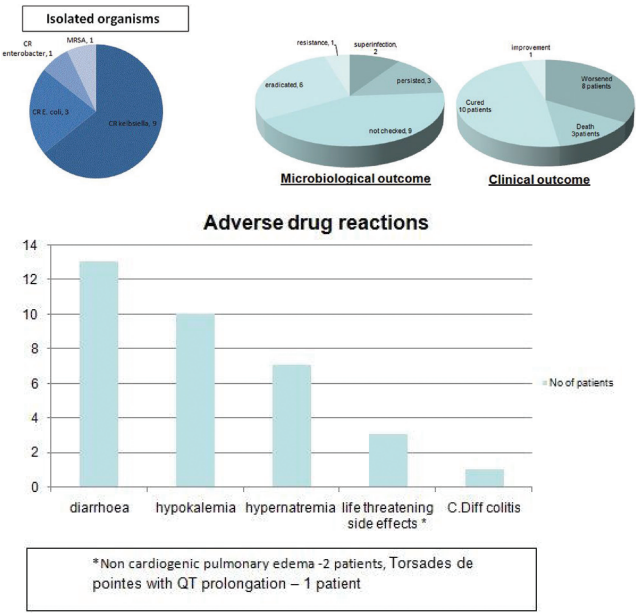
Session: 250. Treatment of AMR Infections
Saturday, October 6, 2018: 12:30 PM

Background. Antimicrobial resistance in Gram-negative organism is a global problem. There is an increased interest in Fosfomycin due to its attractive PK/PD properties. The present study aimed to examine the effectiveness and safety of IV Fosfomycin which has been recently licensed in India.

Methods. We retrospectively studied patients who received IV Fosfomycin from January 2017 to February 2018. Patients with proven or suspected sepsis given IV Fosfomycin were included in the study. Clinical, microbiological outcome, and adverse reactions were noted.

Results. 27 patients received IV fosfomycin. Of these 6 were excluded from the study because 2 had SIRS due to non-infective etiology, 1 had an organism with Fosfomycin resistance and 3 had incomplete clinical records. 7 patients received empirical and 14 received directed treatment. The most frequent isolate was carbapenem-resistant *Klebsiella pneumoniae* found in 8 patients. 1 patient received monotherapy while 20 received combination therapy. 9 patients were clinically cured. 1 showed clinical improvement, 8 worsened on treatment due to adverse drug reactions and 3 patients died while on treatment. Microbiological cure was seen in 6 patients. 3 had persistently positive cultures. 1 patient with bacteremic UTI due to *Klebsiella pneumoniae* received IV fosfomycin for 14 days and relapsed after 1 week of stopping treatment with the same organism showing fosfomycin resistance. 16 patients developed adverse drug reactions. The most common adverse drug reaction was diarrhea in 13, among them 1 had *C. difficile* colitis. Other adverse reactions like hypernatremia and hypokalemia were observed in 7 and 10 patients, respectively. Electrolyte imbalance were seen in patients aged >50 and those who received a higher dose than was appropriate for the creatinine clearance. 2 patients developed noncardiogenic pulmonary edema within 72 hours of starting fosfomycin and 1 developed torsades de pointes with QT prolongation due to hypokalemia



Conclusion. Fosfomycin appears to be a useful addition to the treatment armamentarium. Although adverse events have not been considered significant in most reviews, they are highly significant in our experience. We recommend careful monitoring of fluid and electrolyte balance in patients receiving IV fosfomycin

Disclosures. **All authors:** No reported disclosures.

2413. The Role of Minocycline in the Treatment of Nosocomial Infections Caused by Multidrug, Extensively Drug and Pandrug-Resistant *Acinetobacter baumannii:* A Systematic Review of Clinical Evidence

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Session: 250. Treatment of AMR Infections
Saturday, October 6, 2018: 12:30 PM

Background. Treatment options for multi-drug-resistant (including extensively and pandrug-resistant) *Acinetobacter baumannii* strains (herein MDR-AB) are limited. Minocycline, a synthetic tetracycline derivative, has been used alone or in combination in the treatment of infections associated with AB. We systematically reviewed the available clinical evidence regarding its role in the treatment of nosocomial infections caused by MDR-AB isolates in adult patients.

Methods. A systematic review of the published literature examining the clinical use of minocycline in nosocomial infections associated with MDR-AB isolates (defined according to ECDC guidance) was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Guidelines. PubMed, Scopus and Web of Sciences™ databases were searched from their inception until the March 20, 2018. Three researchers individually evaluated the available clinical studies according to predefined inclusion and exclusion criteria. No language restrictions were applied.

Results. Out of 2,576 articles, 9 clinical studies (8 retrospective case series and 1 prospective single-center trial) met the eligibility criteria. In total, 221 out of 265 (83.4%) evaluated adult patients received a minocycline-based antimicrobial regimen and 44 out of 265 (16.6%) received other antimicrobial agents (most frequently aminoglycocides); 198 out of 216 (91.7%) patients with available data, received minocycline as part of an antimicrobial combination regimen (most frequently colistin and carbapenems). Pneumonia was the most prevalent infection (81.5% with 50.4% ventilator associated pneumonias). Clinical and microbiological success rates in the minocycline group were 72.4% and 59.7%, respectively. Mortality rate was 21.2% among 165 patients with relevant data. In the non-minocycline group, clinical and microbiological cure rates were 45.5% and 18.2%, respectively.

Conclusion. In this systematic review, minocycline demonstrated promising activity against MDR-AB isolates. This study could set the grounds for further research with large randomized, controlled trials that would explore and establish the role of minocycline in the treatment of MDR-AB-associated infections.

Disclosures. **All authors:** No reported disclosures.

2414. Real-World Evaluation of Patient Characteristics and Outcomes of Patients Treated With Ceftolozane/Tazobactam Across 253 US Hospitals

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Session: 250. Treatment of AMR Infections
Saturday, October 6, 2018: 12:30 PM

Background. Treatment of patients with Gram negative infections is increasingly difficult due to rising resistance to commonly used agents. Ceftolozane/tazobactam (C/T) is a potent anti-pseudomonal agent with broad Gram-negative coverage, that is indicated for cUTI and cIAI and currently being studied for ventilated nosocomial pneumonia. This study evaluates C/T in a large database of US hospitals to better understand treatment patterns and associated outcomes.

Methods. This is a retrospective cohort of adult hospitalized patients in the Premier Healthcare Database (PHD) from January 1, 2015 to June 30, 2017, who received ≥2 consecutive days of C/T. The PHD contains demographic, clinical and healthcare resource utilization. Microbiology data are available from a subset of PHD hospitals. Multidrug resistance (MDR) was resistance or intermediate to 1 or more agents in at least 3 classes. Outcomes included hospital length of stay (LOS), 30-day mortality, and readmissions (all cause and infection-related).

Results. A total of 1490 patients across 253 hospitals met study criteria. Mean age was 59.1 ± 17.5 years, 57% were male, and 65% were Caucasian. The most common comorbidities were chronic pulmonary disease (36%), renal disease (34%), and congestive heart failure (25%). 27% of patients had a prior hospitalization within 30 days. The mean Charlson score was 3 ± 2.4. Over half (55%) of patients were in the ICU, 49% were mechanically ventilated and 15% were on dialysis. Within the 259 patients with microbiology data, the most prevalent pathogen was *Pseudomonas aeruginosa* (78%). The median (IQR) number of days from admission to first day of C/T was 6 (2–15). Patients received a median (IQR) 7 (4–11) days of C/T. The median (IQR) LOS after the first dose of C/T was 10 (6–18) days. The 30-day mortality rate was 9%. All cause and infection related readmissions were 17 and 9%, respectively.

Conclusion. Most of C/Ts usage was among critically ill, complex patients treated in the intensive care unit with *P. aeruginosa.* In spite of the complex nature of these patients, the outcomes among patients treated with C/T were positive and provides needed real-world evidence. Further studies with a comparator group will allow further interpretation.

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2415. Comparison of Minocycline MIC's Obtained by Etest to Those Obtained by Broth Microdilution in a Bank of Isolates of *Acinetobacter baumannii* Collected in Southeastern Michigan

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Session: 250. Treatment of AMR Infections
Saturday, October 6, 2018: 12:30 PM

Background. Minocycline is an important antibacterial for the management of AB infections. Discordance in tigecycline susceptibilities between BMD and ET has been as high as 43% (a ≥log 2 dilution higher MIC by ET). As many automated susceptibility panels do not include minocycline clinicians must rely on ET results. This analysis assesses the discordance between methodologies for minocycline and compares activity of minocycline and tigecycline against a clinical set of AB isolates from Southeast Michigan.

Methods. Testing using BMD and ET were done on 386 isolates of AB from 5 hospitals. Results were compared using FDA breakpoints with BMD considered the gold-standard. Correlations were defined as: (i) essential agreement (EA) if the ET MIC was identical to or 1 doubling dilution from the BMD MIC, (ii) categorical agreement (CA) if results via BMD and ET were the same susceptibility category, (iii) minor error if the isolate was intermediate by either test, but either susceptible or resistant by the other test, (iv) a major error if the isolate was false resistant by ET, and (v) a very major error if ET was false susceptible. Comparative BMD susceptibility between tigecycline and minocycline was also assessed.

Results. Of the 386 isolates of AB, 87% were susceptible to minocycline by BMD and 77% by ET (9.6% difference, $P < 0.001$). MIC comparisons are shown in Table 1. EA occurred in 80% of isolates and CA in 87%. Discordant results included 47 minor errors, 11 major errors, and 0 very major errors. 14% of isolates had >1 double dilution difference between the methodologies and 4% had >2 double dilution differences. Susceptibility rates to tigecycline and minocycline were both 87%, with 11% of tigecycline nonsusceptible isolates susceptible to minocycline and 4% of minocycline nonsusceptible isolates susceptible to tigecycline.

Conclusion. Minocycline provides excellent activity against AB. ET provides reliable susceptibility results in comparison to BMD.

Table 1: Minocycline Susceptibility Comparing ET vs. BMD

		ET, *n* (%)						
BMD, *n* (%)	MIC	≤0.25	0.5	1	2	4	8	>8
	>8	0	0	0	0	0	0	18(4.7%)
	8	0	0	0	0	2(0.5%)	13(3.4%)	17 4.4%)
	4	2 (0.5%)	0	1(0.25%)	3 (0.8%)	5(1.3%)	10(2.6%)	7(1.8%)
	2	0	1(0.25%)	2 (0.5%)	33 (8.5%)	15(1.3%)	11(2.8%)	2(0.5%)
	1	0	2 (0.5%)	14(3.6%)	78(20.2%)	20(5.2%)	7 (1.8%)	2 (0.5%)
	0.5	1(0.25%)	6 (1.6%)	14(3.6%)	6(1.6%)	0	0	0
	≤0.25	78(20.2%)	9 (2.3%)	5 (1.3%)	2(0.5%)	0	0	0

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2416. Risk Factors and Outcomes of Bacteremia Caused by Carbapenem-Resistant Enterobacteriaceae Compared With Carbapenem Susceptible Enterobacteriaceae

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Background. Due to shrinking therapeutic options, infections due to Carbapenem-resistant enterobacteriaceae (CRE) are an urgent threat in healthcare systems across the world. While the CRE phenotype is determined by a number a different genes, the metallo β-lactamases such as the NDM, are particularly prevalent in the South Asian region. Data regarding infections with CRE caused by these strains is relatively limited. Our objective was to compare the risk factors and outcomes (mortality and length of hospitalization) of bacteremia secondary to CRE with bacteremia secondary to carbapenem susceptible enterobacteriaceae (CSE).

Methods. We conducted a cross-sectional study on patients admitted between 2013 and 2016, to a large tertiary care hospital in Karachi, Pakistan. Patients with CRE bacteremia were matched for the same year with patients with bacteremia due to CSE. Patients with polymicrobial blood cultures were excluded. Clinical data of these patients were obtained using a structured performa.

Results. A total of 131 patients were enrolled (65 CRE and 66 CSE). The mean age was similar in both groups (51.8 years and 57.1 years in CRE and CSE patients respectively). Compared with CSE, CRE bacteremia was more likely to occur in patients with Diabetes Mellitus or those with a tracheostomy ($P = 0.002$ and 0.014, respectively). The most common source of CRE bacteremia was central line associated (24.6% of all cases) as opposed to urinary tract infections in those with CSE bacteremia (62.1% of all cases). Fewer patients with CRE bacteremia received appropriate antibiotics (72.3% vs. 81.8%). Mortality was over three times higher in patients with CRE (41.5% vs. 12.1%, $P = 0.001$). The mortality remained higher when adjusted for the severity of illness using the PITT-bacteremia score. Increased mortality was also associated with central venous catheterization in both CRE and CSE bacteremia, while urinary catheterization and hemodialysis were associated with mortality in patients in CSE bacteremia only. While length of ICU stay was similar between the two groups, the median length of hospital stay was longer in patients with CRE (median of 8 days vs. 6 days, $P = 0.021$)

Conclusion. CRE bacteremia was more likely associated with central lines and led to significantly higher mortality and length of stay.

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2417. Risk Factors, Response to Empiric Therapy, and Healthcare Utilization Among Children With UTI Due to Extended Spectrum β-Lactamase-Producing Enterobacteriaceae

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