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Paper Poster Session

Lessons from surveillance of resistance in Gram-negatives

Antimicrobial susceptibility and multi-drug resistance in the Middle East: SMART 2012-2014

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**Background:** Multi-drug resistance (MDR) presents an increasing challenge for antimicrobial treatment of infections caused by gram-negative organisms, especially ESKAPE pathogens. MDR rates have been shown to vary widely across global regions seriously limiting therapeutic options in some areas. Using isolates from intra-abdominal infections (IAI) and urinary tract infections (UTI) from the Study for Monitoring Antimicrobial Resistance Trends (SMART), this report assessed antimicrobial susceptibility and MDR of selected species in the Middle East, and placed MDR rates into a regional context by comparing to rates in Eastern Europe (Croatia, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Romania, Serbia, Slovenia, Turkey) and Western Europe (France, Germany, Italy, Portugal, Spain, United Kingdom).

**Material/methods:** Participating sites collected up to 100 consecutive gram-negative isolates from IAI and 50 from UTI each year 2012-2014. 12 hospitals participated in the Middle East (Georgia [1 site], Israel [3], Jordan [2], Lebanon [2], Saudi Arabia [2], and the United Arab Emirates [UAE, 2]). Susceptibility was determined using CLSI broth microdilution guidelines and EUCAST interpretive breakpoints. MDR was defined as resistance to at least one drug in three or more of the tested drug classes (aminoglycosides,  $\beta$ -lactam/ $\beta$ -lactamase inhibitor combinations, cepheems, penems, and quinolones).

**Results:** Susceptibility to selected agents of the three most common *Enterobacteriaceae* species and two most common non-fermenters are shown below (with values  $\geq 90\%$  shaded).

	n	% Susceptible								
		ETP	IPM	FEP	CRO	CAZ	SAM	TZP	CIP	AMK
<i>E. coli</i>	1663	98.5	99.2	61.0	58.5	60.2	33.8	86.4	53.4	94.6
<i>K. pneumoniae</i>	633	89.7	92.1	50.1	49.1	48.7	38.9	66.8	53.1	87.2
<i>E. cloacae</i>	137	86.9	98.5	65.0	51.8	49.6	16.1	71.5	70.1	95.6
<i>P. aeruginosa</i>	314	NA	75.8	72.0	NA	71.7	NA	72.6	65.9	79.0
<i>A. baumannii</i>	100	NA	10.0	NA	NA	NA	NA	NA	6.0	13.0
MDR <i>E. coli</i>	460	95.2	97.8	5.7	2.4	4.6	0.0	67.8	1.1	85.0
MDR <i>K. pneumoniae</i>	250	75.6	82.4	2.0	1.6	1.6	0.0	32.4	2.8	68.0
MDR <i>E. cloacae</i>	35	68.6	94.3	14.3	8.6	2.9	0.0	45.7	8.6	85.7
MDR <i>P. aeruginosa</i>	73	NA	20.6	4.1	NA	11.0	NA	5.5	15.1	38.4
MDR <i>A. baumannii</i>	69	NA	0.0	NA	NA	NA	NA	NA	0.0	0.0

ETP, ertapenem; IPM, imipenem; FEP, cefepime; CRO, ceftriaxone; CAZ, ceftazidime; SAM, ampicillin-sulbactam; TZP, piperacillin-tazobactam; CIP, ciprofloxacin; AMK, amikacin; NA, no breakpoint available.

MDR rates for *E. coli* were 27.7% in Middle East compared to 12.2% in Eastern Europe and 8.7% in Western Europe; for *K. pneumoniae* 39.5%, 44.7%, and 23.0%, respectively; for *E. cloacae* 25.5%, 26.2%, and 11.6%; for *P. aeruginosa* 23.2%, 24.3%, and 17.4%; and for *A. baumannii* 69.0% 64.0, and 59.8%, respectively. The two most common species had large enough sample sizes in all studied

Middle East countries to allow comparison of national rates: MDR rates for *E. coli* ranged from 12.1% in Saudi Arabia to 48.7% in UAE and for *K. pneumoniae* from 24.8% in Saudi Arabia to 53.8% in Jordan.

**Conclusions:**

- *In vitro* susceptibility of the studied gram-negative pathogens was low in the Middle East with only the carbapenems and amikacin highly active against the studied *Enterobacteriaceae* and none of the tested agents exceeding 80% susceptibility for the non-fermenters.
- MDR rates varied somewhat across countries but were overall high in the Middle East, not only for the studied ESKAPE pathogens but also for *E. coli*. MDR rates demonstrated an East-West gradient, with MDR rates in the Middle East generally higher or similar to Eastern Europe and much higher than Western Europe.
- Physicians in Western Europe may need to take the high resistance levels in the Middle East into account when making empiric IAI and UTI treatment decision for patients from this region.