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Abstract (poster session)

Phenotypic detection of carbapenemase-producing Gram-negative bacteria using the MICRONAUT-S system for antimicrobial susceptibility testing

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Objectives: The occurrence of carbapenemase-producing (CASE+) Gram-negative pathogens has increased in many parts of the world. The genes encoding for serine (classes A and D) and metallo- beta-lactamases (MBL; class B) are often located on mobile genetic elements suggesting spread through horizontal transfer. The detection of CASE+ clinical isolates is of major importance for the assessment of effective antimicrobial treatment options and stringent infection control measures. The MICRONAUT-S beta-lactamase VI test panel is a novel test to detect CASE+ isolates with a KPC, MBL or class D phenotype based on the microdilution method. The aim of the present study was to evaluate the usefulness of the MICRONAUT-S system for the phenotypic detection of CASE+ strains among a collection of Pseudomonas aeruginosa (PSA) and Enterobacteriaceae (EBC) isolates recovered from hospitalized patients during a multicentre resistance surveillance study conducted by the Paul-Ehrlich-Society in 2010. Methods: Strains were collected in 25 laboratories across Germany (n=21), Switzerland (n=3) and Austria (n=1). 32 EBC and 41 PSA isolates that fulfilled the following criteria of suspected CASE+ isolates were collected: EBC showing ertapenem MICs of >1 mg/L and PSA showing MICs of >8 mg/L each for imipenem, meropenem (MEM) and ceftazidime. Standard PCR techniques were applied to detect the CASE genes. The MICRONAUT-S beta-lactamase VI test panel (MERLIN Diagnostika, Bornheim, Germany) was performed according to manufacturer's instructions. Strains showing a decrease of >=3 dilution steps in the MIC of MEM-EDTA and MEM-boronic acid (BOR) vs MEM when tested alone were defined as suggested MBL and KPC-producing strains, respectively, while EBC strains with an MEM MIC of >=2 mg/L and a ratio of <=4 for both MEM:MEM-BOR and MEM:MEM-EDTA were defined as suggested class D CASE+ strains. Results: 7/32 EBC and 22/41 PSA isolates were tested positive by PCR (Table). The MICRONAUT-S system produced a sensitivity of 75.9% and a specificity of 95.5%, and suggested a MBL, KPC and class D CASE in 17, 4 and 3 isolates, respectively. Conclusion: The MICRONAUT-S beta-lactamase VI test panel is useful for the phenotypic detection of CASE that produced reliable results for 87.8% of isolates in a set of 73 suspected CASE+ EBC and PSA strains.

Table: Detection of CASE+ strains by the MICRONAUT-S system compared to PCR

PCR	MICRONAUT-S system			
	KPC	MBL	class D CASE	CASE-neg.
Enterobacter spp. (n=18)				
MBL-positive (n=1)		1		
CASE-negative (n=17)			1	16
Klebsiella pneumoniae (n=12)				
MBL-positive (n=1)		1		
KPC-positive (n=4)	4			
Oxa-48-like positive (n=1)			1	
CASE-negative (n=6)			1	5
Escherichia coli (n=1)				
CASE-negative (n=1)				1
Serratia spp. (n=1)				
CASE-negative (n=1)				1
Pseudomonas aeruginosa (n=41)				
MBL-positive (n=21)		15		6
GES-5-positive* (n=1)				1
CASE-negative (n=19)				19

*not detectable according to manufacturer's instructions