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Paper Poster Session I

Detecting carbapenemase-producing Enterobacteriaceae: all media and methods are not created equal

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Objective

To compare five chromogenic media and four phenotypic methods for detecting/inferring the presence of carbapenemase-producing Enterobacteriaceae (CPE).

Methods

Rectal swabs sent for routine screening of CPE by the Department of Microbiology, Leeds Teaching Hospitals NHS Trust (LTHT) were tested using Brilliance™ CPE (Oxoid, UK), Colorex™ KPC (E&O, Scotland, UK), ChromID® Carba, ChromID® OXA-48, and ChromID® ESBL (bioMérieux, UK) with a 10µg ertapenem (ERT) disc. Bacteria were identified using MALDI-ToF. Enterobacteriaceae were investigated further using the Modified Hodge Test, D70C disc set (Mast Group Ltd., UK), Rosco DiaTabs KPC, MBL and OXA-48 kit, and Rapid CARB Screen Kit (both BioConnections, UK). Characterised isolates (93 carbapenemase producers and 7 non-carbapenemase producers) from the PHE Antimicrobial Resistance and Healthcare Associated Infections (AMRHAI) reference unit, London, UK were included in the evaluation; investigators were blinded to the identity of the carbapenemase present.

Results

Over 11-weeks (Jul-Sept 2014), 311 rectal swabs were tested. One swab cultured positive for CPE: an IMP-positive *K. pneumoniae*, confirmed by AMRHAI. Sensitivities of the chromogenic media were 62%, 72%, 86% and 87% for Colorex™ KPC, Brilliance™ CRE, ChromID® Carb and ChromID® ESBL media with 10µg ERT disc, respectively (Table 1). ChromID® OXA-48 media was 86% sensitive and 100% specific for detecting isolates carrying OXA-48. Phenotypic test sensitivities are shown in Table 1. Growth on ChromID® ESBL plus an ERT disc identified 16 isolates that produced extended-spectrum beta-lactamases (ESBLs).

Conclusions

Sensitivities of the chromogenic media and phenotypic tests ranged between 62%-87% and 59%-96%, respectively. Currently, LTHT does not have a high prevalence of CPE; however, 5% patients carried ESBL-producing bacteria, which we infer would have been undetected if a media specific for CPE detection had been used. CPE detection methods should reflect the needs of the clinical service, including local prevalence of target bacteria. Such decisions need to be reviewed as the epidemiology of target bacteria changes.

Table 1. Sensitivity and specificity of five culture media and four phenotypic tests.

Carbapenemase (n)	IMP (6)	KPC (22)	NDM (22)	VIM (21)	OXA-48 (22)	Non-CPE (7)	Sensitivity (95% CI)	Specificity (95% CI)
Brilliance™ CRE	6	12	18	17	14	4	72% (61-80%)	43% (11-79%)
Colorex™ KPC	5	11	20	8	14	7	62% (51-72%)	0 (0-43%)
ChromID® Carb	4	19	22	19	14	5	86% (76-92%)	29% (5-69%)
ChromID® OXA-48	0	0	0	0	19	0	86% (64-96%)	100% (94-100%)
ChromID® ESBL+ERT	6	18	22	21	14	7	87% (78-92%)	0 (0-30%)
Modified Hodge Test	6	18	22	20	22	4	96% (88-98%)	43% (11-79%)
ROSCO DiaTabs	3	15	15	19	12	4	84% (74-90%)	43% (11-79%)
CARB Screen Kit	6	18	19	20	20	1	90% (81-95%)	86% (42-99%)
D70C discs	5	9	21	18	NA	6	59% (48-69%)	85% (42-99%)