

Comparison of Mast D72C AmpC ESBL and carbapenemase detection set with the D68C AmpC and ESBL, D63C ESBL, and D69C AmpC detection sets for the identification of ESBL and AmpC activity in *Enterobacteriales* species

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Introduction

Alder Hey is a specialist paediatric hospital in Liverpool, providing clinical services across north-west England and north Wales.

Clinical and surveillance isolates of *Enterobacteriales* species are screening for suspected ESBL and AmpC production as below:

- Isolates resistant to cefpodoxime, ceftazidime, cefotaxime or ceftazidime by EUCAST disc diffusion susceptibility testing
- Isolates resistant to cefotaxime or ceftazidime by Vitek AST card susceptibility testing
- Isolates inherently resistant to ceftazidime (chromosomal AmpC carriers)
- Isolates are screened with either the Mast D68C AmpC and ESBL detection set (suspected *E. coli* isolates) or both the D63C ESBL and D69C AmpC detection sets.

The D72C AmpC ESBL and carbapenemase detection set was evaluated as a possible replacement for all three tests in use.

Methods

Isolates from samples submitted for the surveillance of multi-resistant Gram-negative carriage (rectal swab, faecal samples, and throat swabs) were processed as normal; those isolates which underwent testing for suspected ESBL or AmpC expression were tested concurrently with the D72C disc set.

Results

Resistance	No of Isolates	Result of D72 test	Confirmed by:
AmpC and ESBL negative	<i>E. coli</i>	3	Negative for AmpC and ESBL
	<i>K. pneumoniae</i>	3	
	<i>E. asburiae</i>	1	
AmpC and ESBL positive	<i>E. cloacae</i> complex	3	Positive for AmpC and ESBL
	<i>C. freundii</i>	1	
	<i>K. pneumoniae</i>	1	
	<i>Pantoea</i> spp.	1	
AmpC positive	<i>E. cloacae</i> complex	15	Positive for AmpC
	<i>E. coli</i>	10	
	<i>C. freundii</i>	6	
	<i>Serratia</i> spp	1	
	<i>Pantoea</i> spp	1	
Inducible AmpC	<i>E. cloacae</i> complex	6	Inducible AmpC
	<i>C. freundii</i>	1	
ESBL positive	<i>E. coli</i>	14	Positive for ESBL
	<i>K. pneumoniae</i>	7	
	<i>K. oxytoca</i>	2	
Suspected Carbapenemase	<i>E. cloacae</i> complex	2	Suspected carbapenemase activity
Equivocal	<i>C. freundii</i>	1	Equivocal
	<i>K. oxytoca</i>	1	
	<i>M. morgani</i>	1	

* For one *K. oxytoca* isolate the result was negative by both D63C and D69C tests

76 of 82 isolates (92.7%) showed agreement between the different tests, with 5 isolates (6.1%) requiring additional work following the D72C test and 1 (1.2%) showing a discrepancy between the tests.

Discussion

- The D72C AmpC ESBL and carbapenemase detection test showed equivalent detection as the D63C/D68C/D69C tests for the detection of AmpC and ESBL activity, with the advantage that the single test can identify inducible AmpC alongside derepressed and acquired enzymes, unlike the D68C.
- We decided that the small number of isolates reported as "Equivocal" or "Suspected Carbapenemase" by D72C should be followed up with D63C and D69C tests, with those showing suspected carbapenemase activity also receiving CPE screening.
- The Mast D72C has been introduced as a part of our resistance screening algorithm as shown, alongside the D63C/D69C and carbapenemase detection tests.

