



EXTERNAL QUALITY ASSESSMENT (EQA) FOR ANTIMICROBIAL SUSCEPTIBILITY TESTING WITH ESBL-PRODUCING ENTEROBACTERIACEAE

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Objective

To assess the results from clinical diagnostic laboratories taking part in the United Kingdom National Quality Assessment Service (UK NEQAS) antimicrobial susceptibility testing scheme with specimens containing extended beta-lactamase (ESBL) producing strains of *Enterobacteriaceae*.

Introduction

- The prevalence of *Enterobacteriaceae* producing extended-spectrum β -lactamases has been rapidly increasing in many countries
- Routine antimicrobial susceptibility testing (AST) methods may not detect all ESBL mediated resistance
- External quality assessment (EQA) of laboratories checks the efficacy of a laboratory quality assurance programme covering AST with specimens of known but undisclosed content
- EQA facilitates the recognition and correction of problems resulting in improved performance with AST methods

Method

External quality assessment of antimicrobial susceptibility testing was performed by 775 participating laboratories on the following isolates:

ESBL-producing *Enterobacteriaceae*

Organism	Beta-lactamase
<i>Klebsiella pneumoniae</i>	SHV-2 and SHV-5
<i>Escherichia coli</i>	CTX-M-14
<i>Escherichia coli</i>	TEM-5
<i>Escherichia coli</i>	TEM-10
<i>Escherichia coli</i>	TEM-26

Non-ESBL-producing *Enterobacteriaceae*

Four *Escherichia coli*, including a TEM-1, and a *Citrobacter koseri*.

Chart 1 Reporting beta-lactams with ESBL-producing *Enterobacteriaceae*

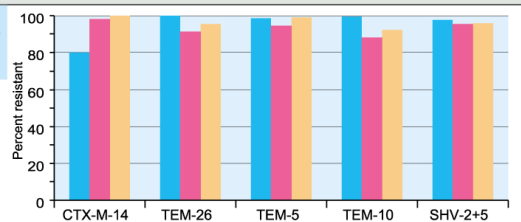


Chart 2 Reporting beta-lactams with non-ESBL-producing *Enterobacteriaceae*

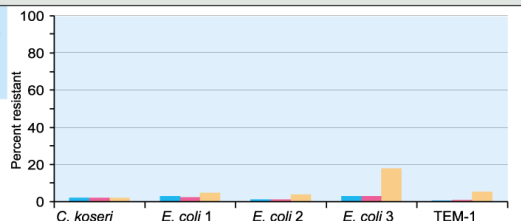


Chart 3 Participants doing additional tests for ESBLs and percent reporting ESBL +ve for ESBL producers

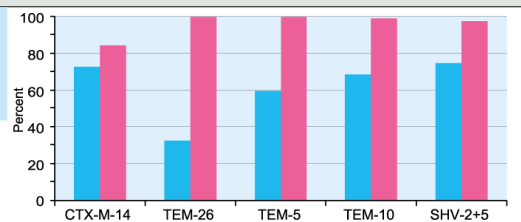


Chart 4 Participants doing additional testing for ESBLs and percent reporting ESBL for non-ESBL-producers

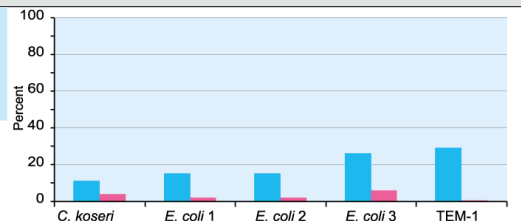
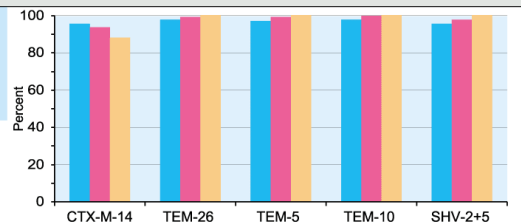


Chart 5 Reporting ESBL detection by different methods with ESBL-producing *Enterobacteriaceae*



Results

- An average 96% of the reports received for each strain/antibiotic combination were correct [charts 1 and 2]
- An error rate of 17% was seen for cefuroxime with a non-ESBL-producing *E. coli* [chart 2]
- With ESBL positive strains, between 32% and 74% of laboratories did additional tests to confirm the presence of ESBLs [chart 3]
- With ESBL negative strains, up to 30% of laboratories did additional tests for the presence of ESBLs. This may be related to use of automated systems that include ESBL tests in standard panels [chart 4]
- ESBL detection rates for laboratories using BSAC, CLSI and SRGA methods were between 88% and 100% [chart 5]

Minimum inhibitory concentrations as determined in the reference laboratory by BSAC and CLSI methods (MIC results mg/L: BSAC/CLSI)

	CTX-M-14	TEM-26	TEM-5	TEM-10	SHV-2 + 5
Ceftazidime	4/8	64/64	16/16	64/128	0.25/0.25
Cefotaxime	128/128	16/32	2/4	1/1	0.12/0.12
Cefuroxime	>128/>128	32/48	32/64	8/8	8/4

Minimum inhibitory concentrations as determined in the reference laboratory by BSAC and CLSI methods (MIC results mg/L - BSAC/CLSI)

	<i>C. koseri</i>	<i>E. coli 1</i>	<i>E. coli 2</i>	<i>E. coli 3</i>	TEM-1
Ceftazidime	0.06/0.12	0.12/0.5	0.25/0.25	0.25/0.25	0.25/0.5
Cefotaxime	<0.03/<0.03	0.06/0.12	0.12/0.12	0.12/0.12	0.06/0.06
Cefuroxime	2/2	4/4	8/4	8/4	4/4

Conclusions

- For ESBL-producers resistance is more likely to be reported to ceftazidime than other agents tested, except for CTX-M producers which are more likely to be detected with cefotaxime
- False reporting of resistance to ceftazidime and cefotaxime was rare; more likely with cefuroxime
- The number of laboratories performing additional tests for ESBLs increased over time
- There was little difference in reliability of standardised methods in detecting resistance or ESBL production

