

# Resistance Still Rising in Enterobacteriaceae from Blood in the UK and Ireland

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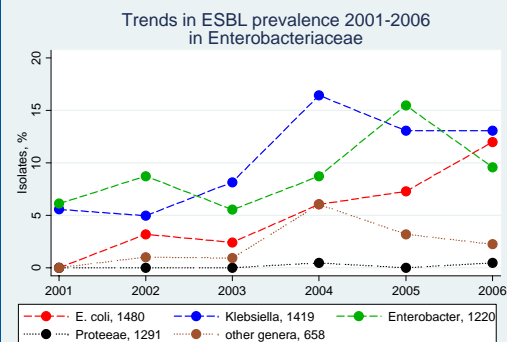
**Background** Enterobacteriaceae, especially *E. coli*, are important agents of bacteraemia. Antimicrobial resistance limits treatment options.

**Methods** 29 UK and Irish centres collected 6068 blood isolates of Enterobacteriaceae in 2001-2006. MICs were measured centrally by BSAC methods; isolates were 'non-susceptible' if intermediate or resistant by the latest (2007) BSAC/EUCAST breakpoints. ESBL production was inferred from phenotypes; *bla*<sub>CTX-M</sub> genes were sought by PCR.

**Results** Non-susceptibility to several agents increased rapidly, and only partly as a result of the spread of multi-resistant strains with CTX-M ESBLs. By 2006, non-susceptibility rates to many established agents were >10%, and some >20%. Carbapenems were generally active, but 27% of Proteaeae were imipenem non-susceptible (>2mg/L) and 23% of *Enterobacter* were ertapenem non-susceptible (>0.5mg/L). Meropenem and doripenem had good activity in all organism groups.

**Conclusion** Increasing ESBL production and resistance to ciprofloxacin and gentamicin in Enterobacteriaceae demands careful choice of empirical therapy since species differ in their resistance profiles, even to related antimicrobials

## ESBL trends and multi-resistance



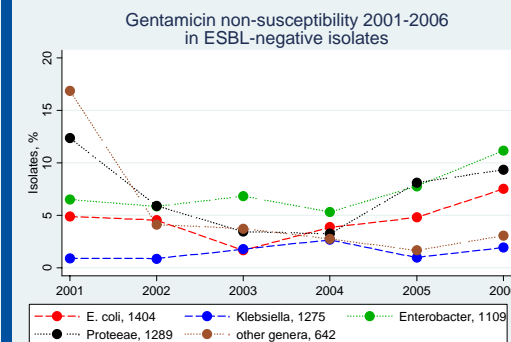
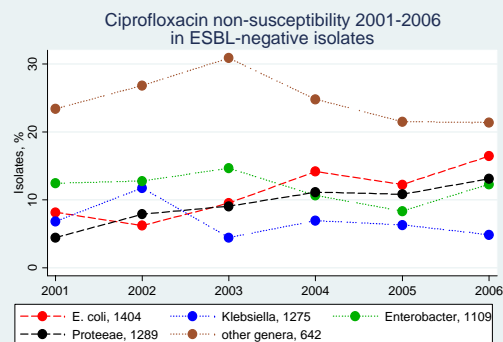
Prevalence of ESBLs rose throughout the period in *E. coli*, but may now have stabilised after an initial rise in *Enterobacter* and *Klebsiella*. ESBLs remain uncommon in Proteaeae and other genera.

The commonest ESBL type in *E. coli* and *Klebsiella* was CTX-M. ESBL-producers were very often also resistant to other (non-β-lactam) antimicrobials - see table below.

Non-susceptibility in ESBL-producers			
% of isolates	<i>E. coli</i> n = 76	<i>Klebsiella</i> n = 144	<i>Enterobacter</i> n = 111
CTX-M	78	57	20
CIP > 0.5	79	75	48
GEN > 2	41	65	77
IPM > 2	1	0	0
TGC* > 1	0	21	36

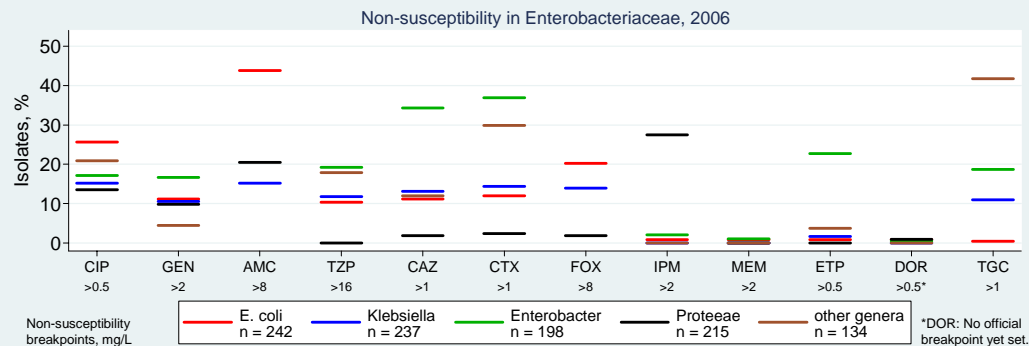
\*2002-2006 only

## Non-susceptibility trends in ESBL-negative Enterobacteriaceae



Non-susceptibility to ciprofloxacin and gentamicin also increased markedly in ESBL-negative isolates of some species, as shown above. Similar trends were seen in community- and hospital-acquired infections.

## Most recent results - non-susceptibility patterns in 2006



Inherently resistant combinations excluded: *Enterobacter* & 'other genera' vs. AMC & FOX; Proteaeae vs. TGC

AMC amoxicillin-clavulanate; CAZ ceftazidime; CIP ciprofloxacin; CTX cefotaxime; DOR doripenem; ETP ertapenem; FOX ceftoxitin; GEN gentamicin; IPM imipenem; MEM meropenem; TGC tigecycline; TZP piperacillin-tazobactam.

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