

Comparison of antimicrobial resistance in hospital-acquired and community-acquired bacteraemia

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Introduction: It is widely believed that hospital-acquired infections (HAI) are more often antibiotic-resistant than community-acquired infections (CAI) because hospitals have:

- more intensive antibiotic use
- greater concentration of patients vulnerable to infection
- obvious opportunities for clonal spread.

We compared prevalence of resistance in isolates from patients hospitalised for more than 48 hours (representing HAI) with that in isolates from all other known sources (taken to represent CAI).

Methods. 29 UK and Irish laboratories contributed blood isolates (excluding duplicates within one week) to the BSAC Bacteraemia Resistance Surveillance Programme in 2001 and 2002. MICs were determined centrally by the BSAC agar dilution method.

Abbreviations AMC amoxicillin/ clavulanate, AMX amoxicillin, CAZ ceftazidime, CIP ciprofloxacin, ERY erythromycin, ESBL extended spectrum β -lactamase, GEN gentamicin, IPM imipenem, LZD linezolid, OXA oxacillin, PEN penicillin, TET tetracycline, TZP piperacillin/ tazobactam, CNS coagulase-negative staphylococci, * $p < 0.05$ (exact test).

Results: Charts show % resistance, breakpoints in mg/L, and risk ratios for HAI vs. CAI.

- Resistance rates were higher in HAI than CAI for most antimicrobials; statistically significant differences are highlighted.
- Other significant differences could not be ruled out, as even 200 isolates per group are too few to reliably detect moderate differences where baseline resistance rates are low.
- True differences are likely to be greater than shown here as patients in the CAI group may have been hospitalised previously.

Conclusion: Antimicrobial resistance was more prevalent in hospital-acquired infection than in infections acquired elsewhere. ESBLs were much more prevalent in, but not exclusive to, isolates from patients hospitalised >48 hours.

Acknowledgements

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Organism ID and Susceptibility Testing: M. Colman⁶, A. Williams⁶.

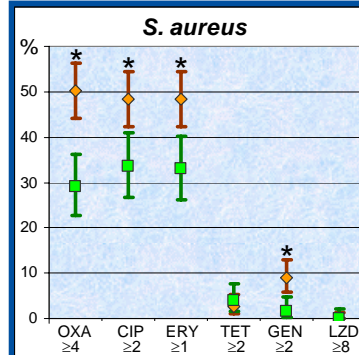
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Collecting Laboratories: Ashford HPA; Bangor HPA; Belfast City; City Birmingham; Bristol HPA; West Suffolk Hospital, Bury St Edmunds; Cambridge HPA; Cardiff HPA; Chelmsford HPA; Chester HPA; Cork University; Coventry HPA; Ninewells Dundee; Beaumont Dublin; Glasgow Royal; Victoria Kirkcaldy; Altnagelvin Londonderry; Manchester HPA; Middlesbrough HPA; Freeman Newcastle; Norwich HPA; Nottingham HPA; Sheffield HPA; Shrewsbury HPA; Southampton HPA; St Mary's London; Sunderland Royal; Truro HPA; UCH, London.

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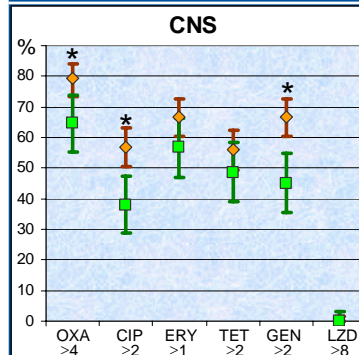
Central Laboratory: HPA, London



◆ hospital-acquired n= 267
■ community-acquired n= 182

Antimicrobial	Risk Ratio (95% CI)
OXA*	1.72 (1.33, 2.24)
CIP*	1.44 (1.13, 1.83)
ERY*	1.47 (1.15, 1.87)
TET	0.68 (0.24, 1.91)
GEN*	5.45 (1.67, 17.84)
LZD	no resistance

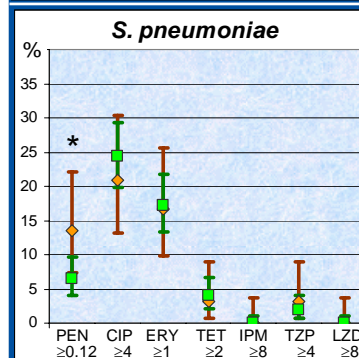
Excess of OXA, CIP & ERY-R in HAI reflects dominant EMRSA-15 and -16 in UK hospitals.



◆ hospital-acquired n= 241
■ community-acquired n= 111

Antimicrobial	Risk Ratio (95% CI)
OXA*	1.22 (1.05, 1.42)
CIP*	1.5 (1.16, 1.95)
ERY	1.18 (0.98, 1.42)
TET	1.15 (0.92, 1.44)
GEN*	1.48 (1.19, 1.86)
LZD	no resistance

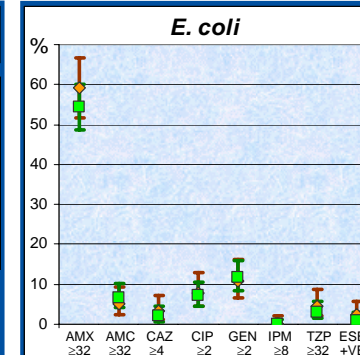
CNS have higher resistance rates than *S. aureus*, but show similar excess resistance in HAI vs. CAI.



◆ hospital-acquired n= 96
■ community-acquired n= 324

Antimicrobial	Risk Ratio (95% CI)
PEN*	2.1 (1.09, 4.03)
CIP	0.86 (0.55, 1.32)
ERY	0.97 (0.58, 1.61)
TET	0.78 (0.23, 2.69)
IPM	no resistance
TZP	1.69 (0.43, 6.64)
LZD	no resistance

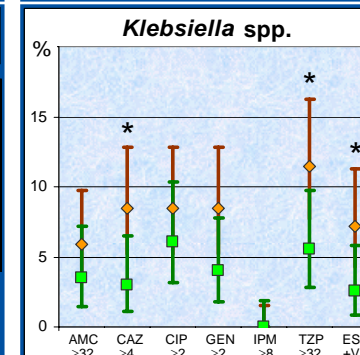
There is less evidence of increased resistance in HAI for *S. pneumoniae* than staphylococci.



◆ hospital-acquired n= 177
■ community-acquired n= 296

Antimicrobial	Risk Ratio (95% CI)
AMX	1.09 (0.93, 1.28)
AMC	0.75 (0.35, 1.62)
CAZ	1.67 (0.55, 5.11)
CIP	1.11 (0.58, 2.14)
GEN	0.91 (0.54, 1.54)
IPM	no resistance
TZP	1.49 (0.58, 3.78)
ESBL	2.23 (0.5, 9.85)

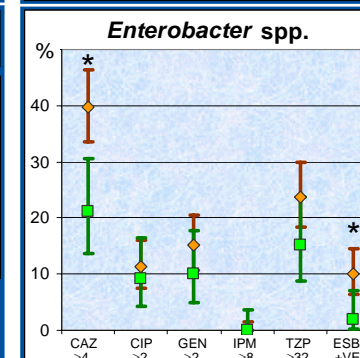
Resistance in *E. coli* is generally rare, making differences between HAI and CAI hard to detect.



◆ hospital-acquired n= 236
■ community-acquired n= 198

Antimicrobial	Risk Ratio (95% CI)
AMC	1.68 (0.69, 4.08)
CAZ*	2.8 (1.15, 6.83)
CIP	1.4 (0.7, 2.79)
GEN	2.1 (0.94, 4.67)
IPM	no resistance
TZP*	2.06 (1.05, 4.05)
ESBL*	2.85 (1.07, 7.59)

Excess resistance in HAI appears more pronounced in *Klebsiella* than in *E. coli* or *Enterobacter*.



◆ hospital-acquired n= 231
■ community-acquired n= 99

Antimicrobial	Risk Ratio (95% CI)
CAZ*	1.88 (1.24, 2.83)
CIP	1.24 (0.6, 2.54)
GEN	1.5 (0.77, 2.91)
IPM	no resistance
TZP	1.57 (0.93, 2.64)
ESBL*	4.93 (1.18, 20.5)

Links with HAI are stronger (risk ratios are higher) for ESBLs than for individual resistances.

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