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Surprisingly High Prevalence of Colistin Resistance in *Enterobacter* spp. in the UK and Ireland

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UPDATE to abstract: Results now cover two years' surveillance.

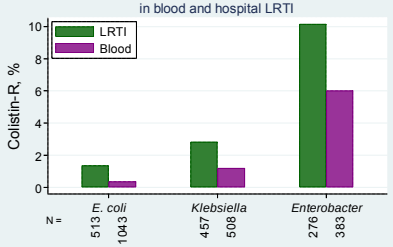
BACKGROUND

Colistin is used increasingly in the face of increasing multi-resistance among Gram-negative pathogens. The BSAC Resistance Surveillance Project monitors colistin resistance in Enterobacteriaceae.

METHODS

45 centres contributed 1934 isolates of *E. coli*, *Klebsiella* and *Enterobacter* from blood (Jan 2011 - Dec 2012) and 1246 from hospital-onset (>48hours) lower respiratory tract infection (LRTI, Oct 2010 - Sept 2012). MICs were measured centrally by BSAC agar dilution and interpreted by BSAC/EUCAST breakpoints.

Colistin resistance for 3 organism groups in blood and hospital LRTI



RESULTS - 3 species

Colistin resistance was uncommon in *E. coli* (≤1.4%) and *Klebsiella* (≤2.8%), but surprisingly prevalent in *Enterobacter* at 6% among blood isolates and 10% among LRTI.

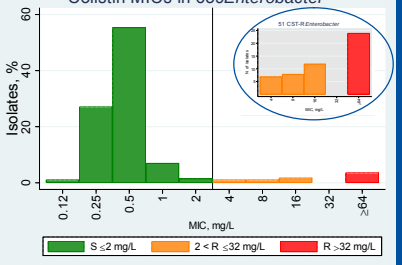
RESULTS - *Enterobacter*

Colistin-resistant isolates by year and centre

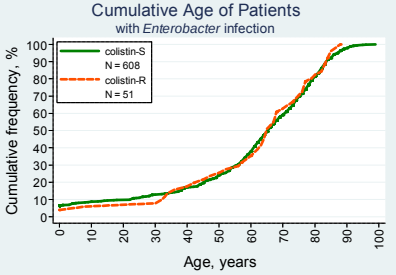
centre	2011 LRTI	2011 Blood	2012 LRTI	2012 Blood	centre
1				1/5	1
2	0/6	0/7	0/6	0/7	2
3	1/8	1/6	0/6	0/7	3
4	0/2	0/2		0/2	4
5	2/6	0/6	1/9	1/6	5
6	1/4	0/7	0/3	0/6	6
7	0/1	2/6	0/2	0/7	7
8	2/6	1/6			8
9			0/2	1/2	9
10	1/7	0/2	1/8	0/4	10
11	0/4		0/1	0/7	11
12	0/2	0/1			12
13	0/3				13
14	1/5	0/3	1/9	1/6	14
15	0/2	1/5	0/5	0/4	15
16	1/1	0/7	1/4	0/7	16
17	0/2	1/7	0/1		17
18	2/2	0/7	0/3	1/7	18
19				0/7	19
20		0/4	0/1	0/2	20
21	1/9	0/6	1/7	0/7	21
22	0/7	0/7	0/3	2/7	22
23	1/6	1/7	0/9	0/7	23
24	0/1	1/4			24
25		0/4	0/4	1/7	25
26	1/7	1/5	0/3	1/7	26
27		0/6		1/6	27
28	1/1	0/5		0/2	28
29	1/5	0/3	0/6	0/6	29
30		1/7			30
31			0/3	0/7	31
32	1/2	0/5	0/1	1/7	32
33	0/2	0/4		0/6	33
34				0/4	34
35	0/4	0/7	1/5	0/7	35
36				0/3	36
37	0/2		0/3	0/6	37
38	0/5	0/7	1/4	0/7	38
39			0/1	0/2	39
40	1/7	0/7	0/4	1/6	40
41		0/2	0/7		41
42	1/4	0/7	0/6	0/7	42
43	2/7	0/1	0/6	1/4	43
44	0/6	0/4			44
45	0/5	0/5	0/3	0/3	45

Key: N isolates: CST-R / total; CST-R, max >32 mg/L; CST-R, max <=32 mg/L; All CST-susceptible; No *Enterobacter*; Not in study

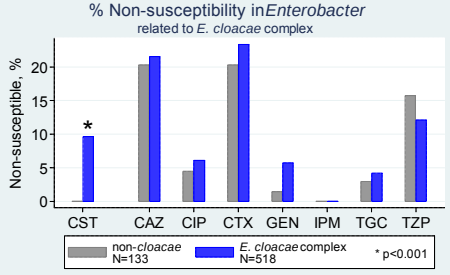
Colistin MICs in 659 *Enterobacter*



Cumulative Age of Patients with *Enterobacter* infection



% Non-susceptibility in *Enterobacter* related to *E. cloacae* complex



Colistin resistance in *Enterobacter* was clear-cut and geographically widespread.

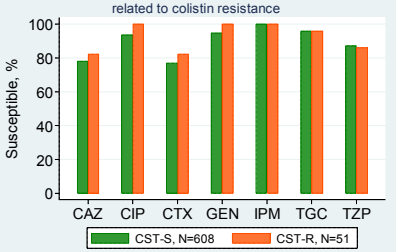
Resistance was high-level (MIC ≥64 mg/L) in 24/51 resistant isolates (47%) and borderline (MIC of 4 mg/L) in only 7 (14%).

The colistin-resistant isolates came from 29 of 45 centres in total: 19 centres contributed 28 isolates from LRTI, and 20 centres contributed 23 isolates from blood.

There was no evidence that colistin resistance was related to patient age or sex, or to non-susceptibility to other antibiotics.

All 51 colistin-resistant isolates were susceptible to CIP, GEN and IPM; 44 were also susceptible to TZP; and 42 were susceptible to CTX and CAZ.

% Susceptibility in *Enterobacter* related to colistin resistance



Colistin resistance appeared more prevalent in hospital-onset (8%) than community-onset (4%) bacteraemia, but this difference was not significant (p=0.06).

Source & hospital stay	N	%CST-R
Blood, up to 48 hours	177	4.0
Blood, >48 hours	204	7.8
LRTI, >48 hours	276	10.1

Colistin resistance among Enterobacter was strongly associated with isolates of *cloacae* complex (p<0.001).

651/659 *Enterobacter* isolates were identified to species level. Of these, 198/276 (72%) of LRTI and 320/375 (85%) of blood isolates belonged to *E. cloacae* complex.

50 colistin-resistant isolates identified to species level were all of *cloacae* complex.

There was no significant association between *Enterobacter* species and non-susceptibility to other tested antibiotics.

CONCLUSION

- **Clinicians should be alert to appreciable rates of colistin resistance (7-14%) among isolates of *Enterobacter cloacae* complex; BUT**
- **These colistin-resistant isolates were susceptible to standard antibiotics.**

ABBREVIATIONS and susceptible breakpoints (mg/L) CAZ ceftazidime (≤1), CIP ciprofloxacin (≤0.5), CST colistin (≤2), CTX cefotaxime (≤1), GEN gentamicin (≤1) , IPM imipenem (≤2) , TGC tigecycline (≤1), TZP piperacillin/tazobactam (≤8). R = resistant, NS = non-susceptible.

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Organism ID and Susceptibility Testing: A. Kidney[7] and S. Mushtaq.[8]
Collecting Laboratories: *See* www.bsacsurv.org *or* White 2008, JAC 62 (Suppl 2) ii3–ii14.

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Central Laboratories: Public Health England, London; Quotient Bioresearch, Fordham.
Sponsors 2011-12: Astellas, Basilea, Cubist, Janssen, Pfizer.
Support: BSAC.

[†]Reynolds 2008, JAC 62 (Suppl 2) ii15–ii18.

QUOTIENT BIORESEARCH MICROBIOLOGY

Health Protection Agency

BSAC british society for antimicrobial chemotherapy

www.bsac.org.uk