

A previously unsuspected national clone of *Proteus mirabilis* with acquired CIT-type AmpC in the UK and Ireland

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BACKGROUND

The BSAC Bacteraemia Resistance Surveillance Programme (www.bsacsurv.org) monitors resistance in the pathogens of bacteraemia in the UK and Ireland.

METHODS

From Jan 2010 to Dec 2013 a total of 57 clinical laboratories (37-39/year) contributed 825 isolates of *Proteus mirabilis* from blood.

MICs were measured centrally by BSAC agar dilution and interpreted by BSAC (EUCAST) breakpoints.

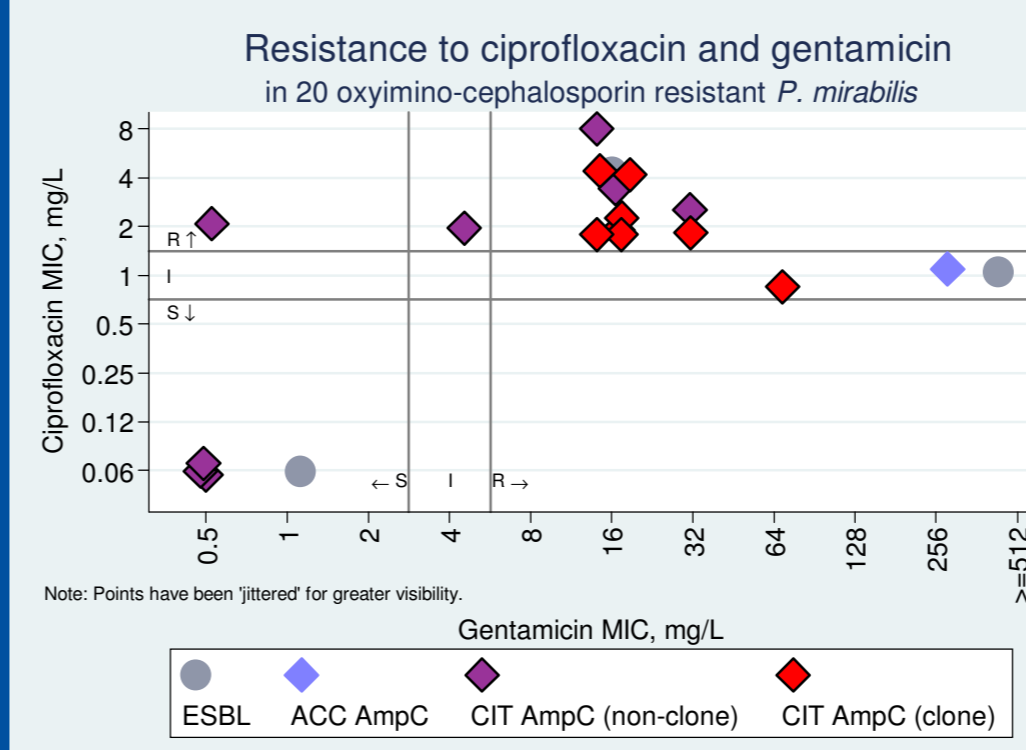
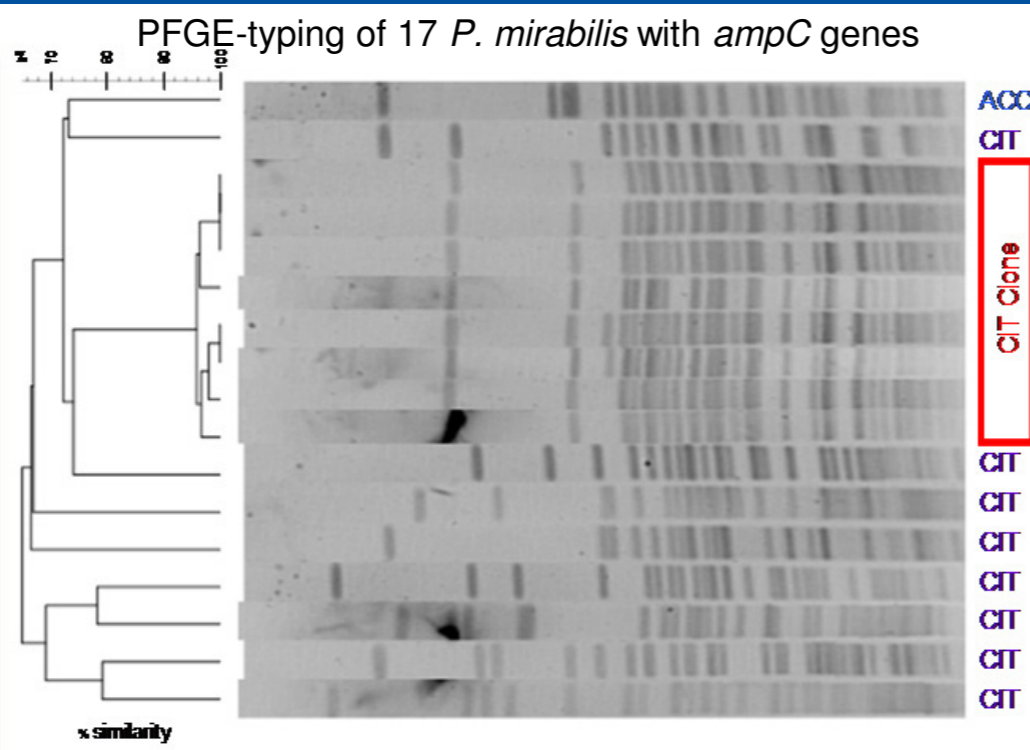
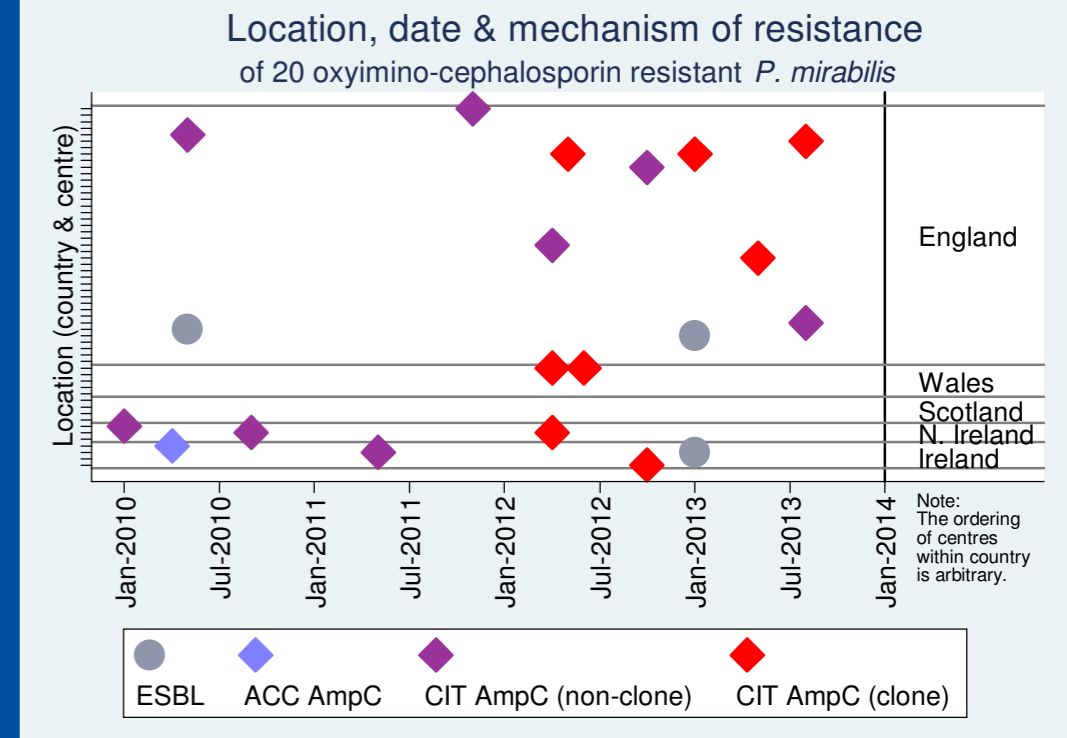
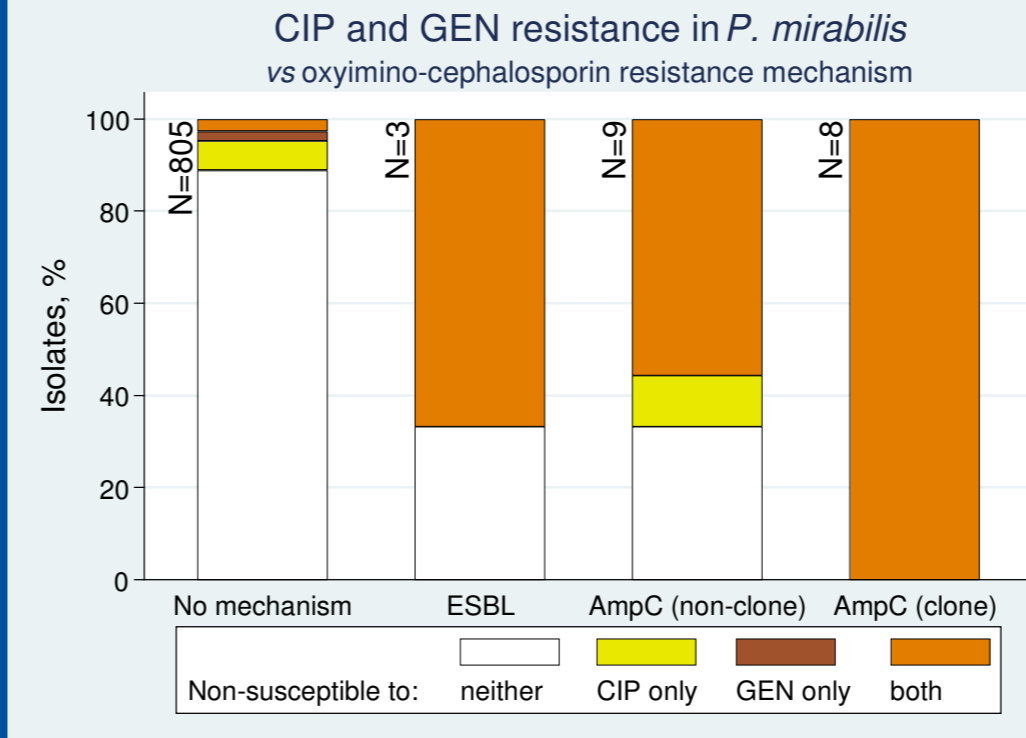
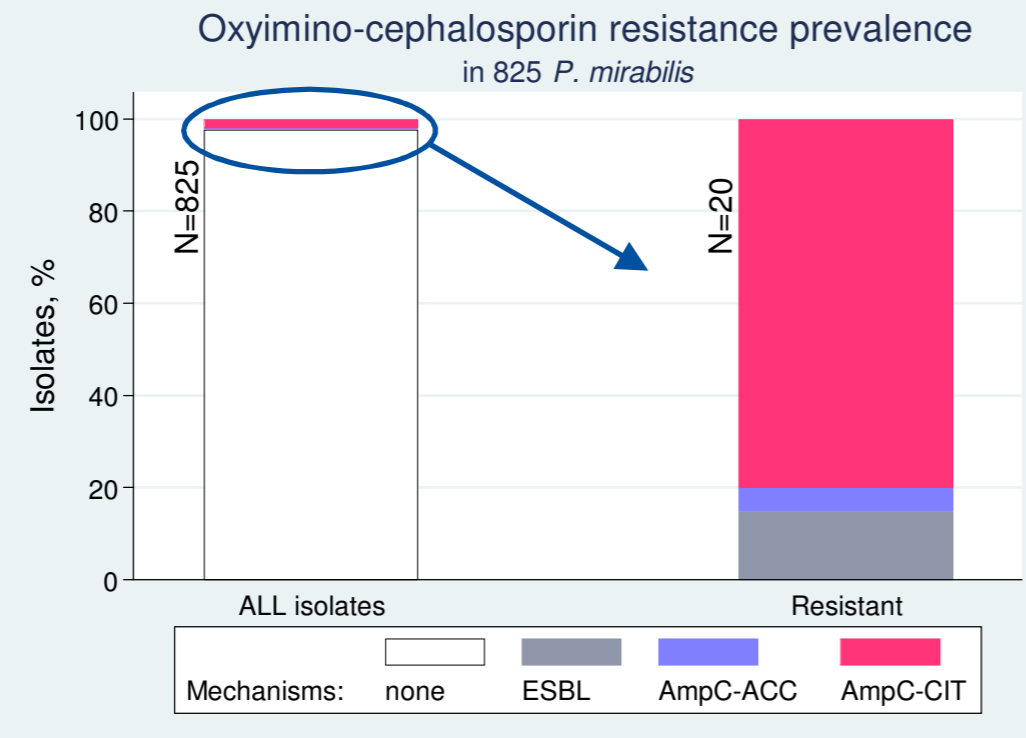
Isolates with ceftazidime or cefotaxime MIC ≥ 1 mg/L were tested for ESBLs by cephalosporin-clavulanate Etest and, if negative, by cefotetan-cloxacillin Etest for AmpC and multiplex PCR¹ for *ampC* genes.

ampC-positive isolates were typed by PFGE of Apal-digested genomic DNA.

RESULTS

Twenty of 825 isolates (2.4%) were resistant to ceftazidime or cefotaxime - three with ESBLs, one with an ACC-type *ampC* and 16 with CIT-type *ampC* genes.

Phenotypic confirmation of AmpC activity was often not possible because the MIC of cefotetan-cloxacillin was typically off-scale at ≤ 0.5 mg/L and that of cefotetan alone seldom high enough (≥ 2 mg/L) to confirm 4-fold synergy.



DISTRIBUTION

The eight clonal CIT-positive isolates were found in six separate centres and in four of the five countries of the UK and Ireland, but only in 2012-2013.

The nine non-clonal *ampC*-positive isolates were spread across nine separate centres and all four years of the study.

Overall, *ampC*-positive *P. mirabilis* numbered 6/418 (1.4%) in 2010-11, and 11/407 (2.7%) in 2012-13.

CONCLUSIONS

➤ Resistance to oxyimino (“3rd-generation”) cephalosporins is rare as yet in *Proteus mirabilis* in the UK and Ireland. (It has not become widespread as in e.g. Poland² and Italy³.)

BUT

➤ A previously unsuspected clone with acquired CIT-type *ampC* and additional resistance to ciprofloxacin and gentamicin has gained a wide distribution recently.

TYPING

Of 16 isolates with CIT-type *ampC* genes, eight showed >95% similarity in their PFGE profiles, indicating clonality.

The remaining nine *ampC*-positive isolates (eight CIT- and one ACC-type) were much more varied (<80% similarity).

RESISTANCE

The 805 isolates lacking ESBLs or *ampC* genes were generally susceptible to ciprofloxacin (91%) and gentamicin (95%).

All eight clonal CIT-positive isolates were non-susceptible to both ciprofloxacin (MICs 1-16 mg/L) and gentamicin (MICs 16-64 mg/L).

References: ¹Pérez-Pérez & Hanson; J Clin Micro, 2002, 40 (6) 2153-2162. ²Empel *et al*; AAC, 2008, 52 (7) 2449-2454. ³D’Andrea *et al*; AAC, 2006, 50 (2) 618-624

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Organism ID and Susceptibility Testing: S. Mushtaq⁵ and staff at Public Health England, Colindale.

Collecting Laboratories: See www.bsacsurv.org or White 2008, JAC 62 (Suppl 2) ii3-ii14.

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Central Laboratory: Public Health England, London.

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Support: BSAC.

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