

EP0108

ePoster Session

Characterizing pathogens using molecular techniques

Molecular characterization and antimicrobial resistance of scarlet fever and invasive *Streptococcus pyogenes* in England and Wales, 2014

Juliana Coelho*¹, Michel Doumith¹, Rachel Pike¹, Roger Daniel¹, Chenchal Dhimi¹, Mcdonald Prest¹, Timothy Chambers¹, Robert Hill¹, Neil Woodford¹, Victoria Chalker²

¹Public Health England, London, United Kingdom

²Public Health England, Respiratory and Vaccine Preventable Bacterial Reference Unit, London, United Kingdom

Background: An unprecedented increase in the number of scarlet fever (SF) cases was reported in England during 2014. The Bacterial Reference Department, Public Health England, performed microbiological characterization of 308 throat swab isolates from patients with SF and 237 isolates from patients with invasive infection (iGAS) referred during April to June 2014.

Material/methods: A total of 545 *S. pyogenes* isolates were characterised by *emm* sequence typing by Sanger sequencing, and MICs were determined by agar dilution and Etest according to EUCAST guidelines to ascertain susceptibility to erythromycin, penicillin & ciprofloxacin.

Results: The isolates were polyclonal, with 25 *emm* types identified (*emm* 1, 2, 3, 4, 5, 6, 9, 11, 12, 18, 22, 28, 44, 53, 58, 73, 75, 76, 77, 81, 82, 87, 89, 90 and 94). *Emm* 3 represented 36% (32.22-40.27) of isolates, followed by *emm* 1, 12, 4 and 89, with percentages varying from 15 to 6%, respectively. Similar diversity and distribution of *emm* types was found for isolates from patients with SF and iGAS, all *emm* types found amongst iGAS were also found in SF isolates. A detailed breakdown of *emm* types from SF and iGAS isolates is listed as follows: iGAS, total of 25 *emm* types - *emm* 3 (27%, 21.74-33.00 95% CI), *emm* 1 (23%, 18.27-29 95% CI), *emm* 89 (10%, 6.5-14.19 95% CI), *emm* 12 (7%, 4.13-10.76 95% CI), *emm* 28 (6%, 3.8-10.25 95% CI), *emm* 6 (4%, 2.21-7.69 95% CI); SF, total of 17 *emm* types - *emm* 3 (43%, 37.77-48.76 95% CI), *emm* 12 (17%, 12.8-21.14 95% CI), *emm* 1 (9%, 6.33-12.86 95% CI), *emm* 4 (9%, 6.05-12.49 95% CI), *emm* 6 (6%, 3.67-9.1 95% CI).

Erythromycin resistance was identified in 18 isolates (6 SF and 12 iGAS), with nine of the iGAS isolates (*emm* types: one *emm* 9, one *emm* 44, two *emm* 58, two *emm* 76, and three *emm* 11) showing high-level resistance (MICs >16 mg/L). The six erythromycin-resistant SF and three iGAS isolates had lower level resistance (MICs 1-8 mg/L) and comprised 4 *emm* types (*emm* 3, 4, 12 and 58). Ciprofloxacin MICs were interpreted against EUCAST's epidemiological cutoff (ECOFF) value of 1 mg/L, as a clinical breakpoint is not defined for *S. pyogenes*: only one isolate was 'non-wild type' (MIC 2 mg/L), MICs for 214 isolates (111 iGAS and 103 SF) were 1 mg/L, and for the remaining 330 isolates were ≤0.5 mg/L. No penicillin resistance was identified.

Conclusions: Isolates belonged to 25 *emm* types, with similar distribution in those from patients with SF and iGAS indicating that the increase in SF was not due to an individual *emm* lineage strain. Resistance to erythromycin was found, most isolates were considered sensitive to ciprofloxacin based on EUCAST ECOFF, and penicillin susceptibility was universal.