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Characterisation of non-meningococcal/gonococcal *Neisseria* strains from invasive disease cases in England

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Background

Non-meningococcal, non-gonococcal *Neisseria* species have traditionally been termed “commensal” but can cause opportunistic disease. Pathogenesis may occur in more minor manifestations such as conjunctivitis or urethritis, but also in serious invasive presentations such as meningitis, septicaemia and endocarditis.

Predisposing factors such as the creation of a surgical or similar access point for bacteria or an immunocompromised host state may increase the likelihood of infection, but disease may occur in otherwise healthy hosts. The UK Health Security Agency’s (UKHSA) Meningococcal Reference Unit (MRU) characterises, types and stores meningococcal isolates sent from clinical laboratories across England, Wales and Northern Ireland. Occasionally the isolates received are non-meningococcal but have been isolated from normally sterile sites such as blood and cerebrospinal fluid, indicative of invasive disease.

Aim/Methods

The aim of the study is to determine how many isolates from normally sterile body sites were non-meningococcal, non-gonococcal *Neisseria* species. Invasive non-meningococcal/gonococcal *Neisseria* isolates received by the MRU between 2010 and 2021 were subcultured and assessed for microbiological congruity with basic *Neisseria* species by colony morphology, Gram staining, inspect of colonies and biochemical characteristics. Candidate isolates were sent for Illumina® whole-genome sequencing and the sequences uploaded to the *Neisseria* BIGSDB database (PubMLST.org) to determine species, antigenic profile and genetic similarity.

Results

Thirty-five unique isolates from invasive sites were identified as non-meningococcal, non-gonococcal *Neisseria* including 11 *N. subflava*, 9 *N. mucosa*, 4 *N. mucosa* ssp. *Heidelbergensis* / *N. oralis*, 4 *N. polysaccharea*, 3 *N. cinerea*, 2 *N. elongata* and 2 *N. bergeri*. Isolates resistant to one or more of the antibiotics penicillin, rifampicin, ciprofloxacin and cefotaxime were identified. Microbiological and clinical data (where available) are described and discussed.

Conclusions

Though uncommon, infections caused by non-meningococcal, non-gonococcal *Neisseria* spp can result in invasive disease, and should be considered as causative agents, particularly where attempts to speciate presumed meningococcal or gonococcal isolates are inconclusive. These species possess virulence factors found in *N. meningitidis* and have significant potential for antibiotic resistance, possibly leading to challenges in treatment. This study also describes, to the author's knowledge, the first cases of *N. polysaccharea* disease in available literature.