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New Adventures in NTHi

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Pneumococcal vaccine impacts on the population genomics of non-typeable *Haemophilus influenzae*

Background: Widespread use of pneumococcal conjugate vaccines (PCVs) have reduced the disease burden from *Streptococcus pneumoniae* and altered the epidemiology of circulating serotypes. The indirect impacts on other members of the respiratory niche in which pneumococci reside have been less well studied. There is evidence that one such effect has been the increased carriage of non-typeable *Haemophilus influenzae* (NTHi), an opportunistic pathogen capable of causing both invasive and non-invasive disease. Although not ubiquitous, this outcome has been seen with PCV vaccines rather than those with a *Haemophilus*-protein conjugate.

Aims

Determine the population epidemiology of NTHi before, during and after the implementation of PCV13.

Methods

Samples: Nasopharyngeal swabs from children <5 years old attending outpatient clinics at Southampton General Hospital during five consecutive winters, October to March, 2008/9 to 2012/13

WGS: Illumina (MiSeq) PE 2x250

SPAdes, assembly Improvement and Prokka

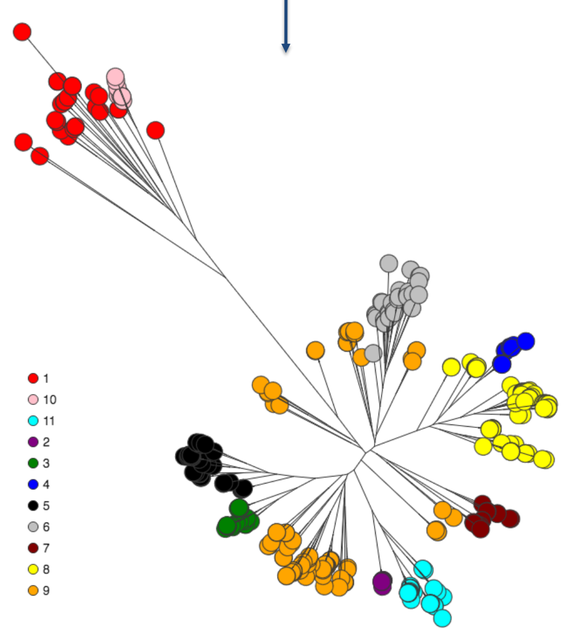
Population Structure: parsnp (MUM anchor 17, recombination filtered)

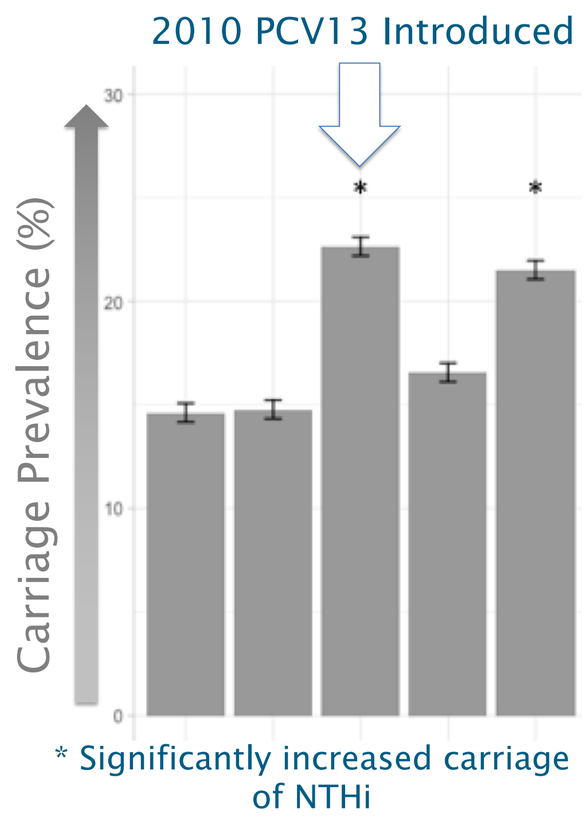
xmfa2fasta and Gblocks

RAxML GTR + GAMMA, 100 bootstrapping

hierBAPS

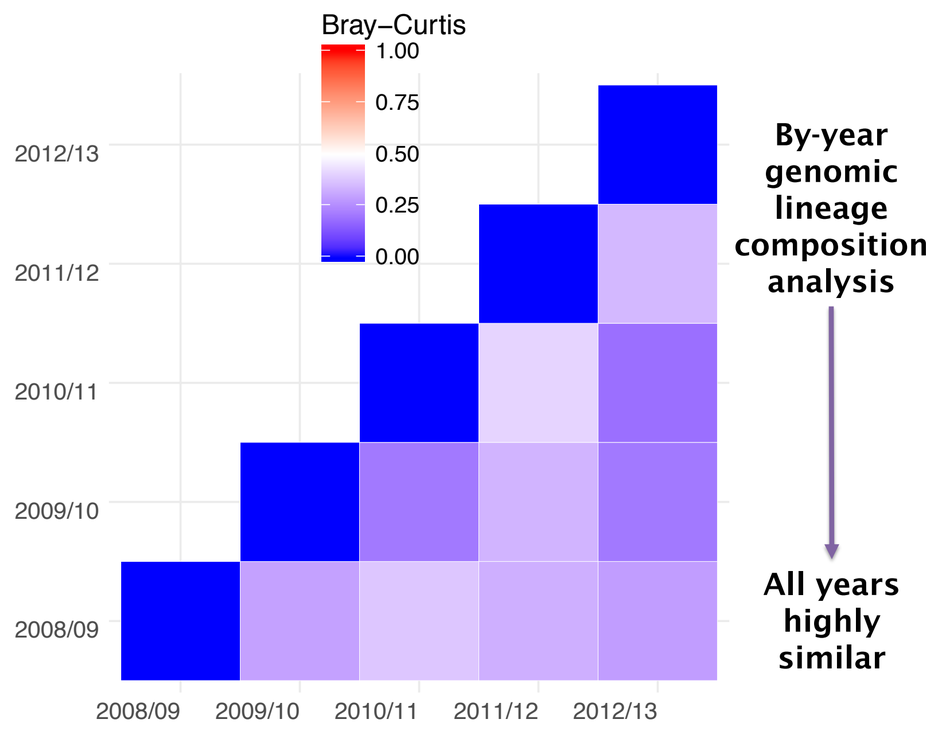
Eleven NTHi Genomic Lineages identified

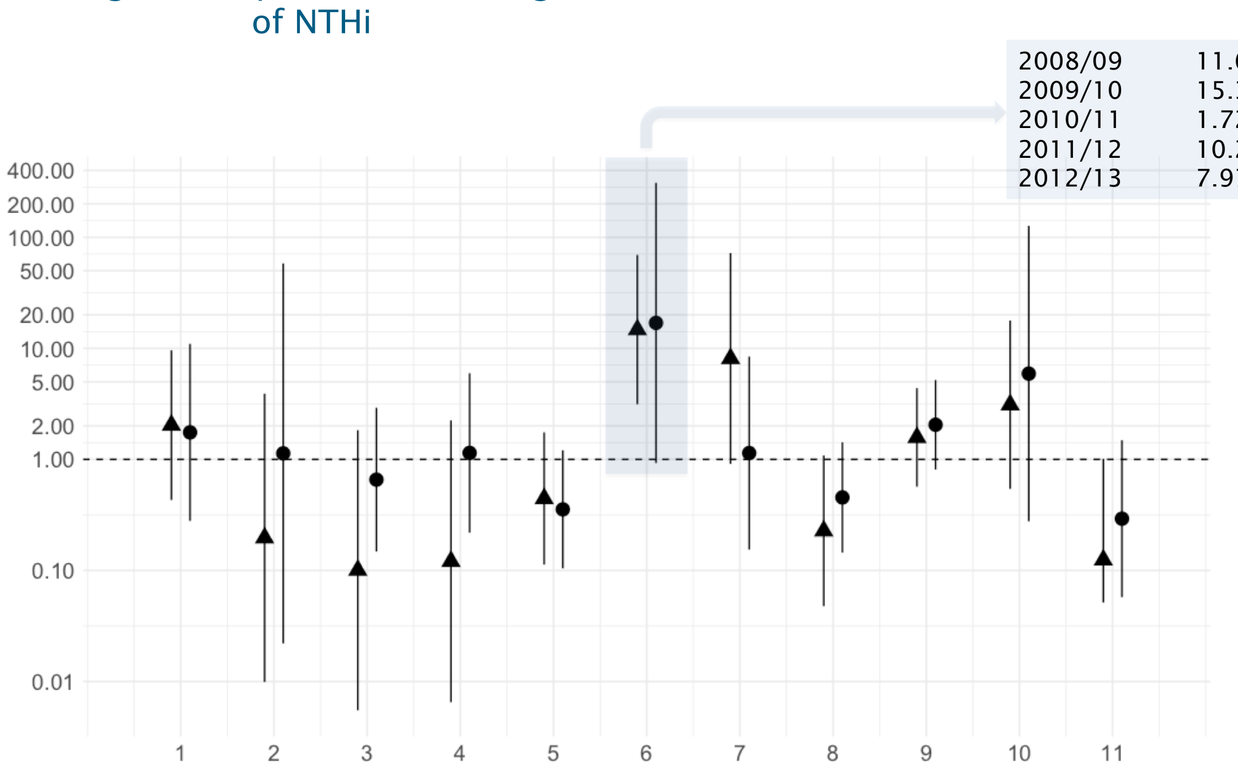


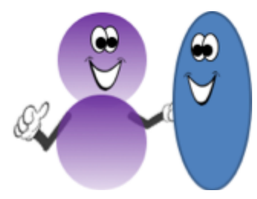


* Significantly increased carriage of NTHi

Results







Odds Ratio (OR Log10) for co-carriage of each NTHi genomic lineage with *S. pneumoniae* pre-PCV13 (▲) and post-PCV13 (●). Main analysis excludes 2010/11, inset numbers show per-year OR with 95% CI for lineage 6.

Conclusions

- NTHi were characterised into eleven discrete, temporally stable lineages.
- Significantly increased carriage in post-PCV13 years was observed. Increase could not be linked to the expansion of a particular clone.
- Lineage-specific associations with *S. pneumoniae* were observed.

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Read the pre-print: bioRxiv https://doi.org/10.1101/228791

www.southampton.ac.uk/medicine