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Comparison of Disease and Carriage Meningococcal Isolates in the UK in 2018

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Background
Oropharyngeal carriage of N. meningitidis is a perquisite for invasive meningococcal disease (IMD). Carriage isolates are more diverse than those regularly associated with IMD. The relationship between carriage and IMD associated lineages is variable. We describe the association between carriage and IMD isolates from the UK in 2018, 3 years after the implementation of an adolescent-only MenACWY vaccination programme.

Aim/Methods
All UK IMD isolates from 2018 archived in the pubMLST.org-hosted Meningococcal Research Foundation Meningococcal Genome Library, were compared with baseline carriage isolates from 2018 of school-attending adolescents aged 16-19 participating in the 'Be on the TEAM' study (ISRCTN7 5858406). All isolates were sequenced and annotated using a standard bioinformatic pipeline and uploaded on pubMLST.org/neisseria.

Results
There were 543 carriage isolates detected from 13463 participants across 15 UK sites and 135 schools and these were compared with 529 IMD isolates. The most common IMD-associated clonal complexes (ccs) were: cc11 (38%); cc41/44 (16%); cc23 (13%); cc269 (9%); and cc213 (8%). The most common ccs recovered from carriage were: cc-1157 (16%); cc-198 (15%); cc41/44 (13%); cc-23 (12%); and cc213 (7%). The IMD to carriage Odds Ratio for each major IMD-associated clonal complex were: cc11, 35.2 (95% CI 18.0- 68.7); cc41/44, 1.2 (0.88 – 1.7); cc23, 1.08 (0.75 – 1.6); cc269, 2.3 (1.4 – 3.9); and cc213, 1.0 (0.64 – 1.6). The majority of cc11 carriage isolates (7/9) had a strain designation of P1.5,2:F1-1, identical to the W:cc11 hyperendemic strain associated with IMD. For the remaining commonly carried ccs, the IMD to carriage ORs were cc1157, 0.08 (0.04 – 0.17) and cc198, 0.42 (0.12 – 1.5).

Conclusions
The hyperinvasive W:cc11 variant that was responsible for 38% of all IMD was rarely carried. This may in part be due to high MenACWY coverage in this specific age group. This discordant relationship with highly prevalent IMD ccs that are rarely carried is consistent with previous studies undertaken during high prevalence of serogroup C IMD. For the next two most common causes of IMD, cc41/44 and cc-23, the IMD to carriage ratio was close to one.