Epidemiology and surveillance of meningococcal disease in England.

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Background

- The Public Health England (PHE) Meningococcal Reference Unit (MRU) has been providing data on invasive meningococcal disease for England since 1984.
- In November 2009 Meningococcal serogroup C conjugate (MCC) vaccine was introduced into the UK as part of the routine infant schedule and is a mandatory component of the infant vaccination programme.
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- In November 2014 ACWY conjugate vaccine was introduced into the UK immunisation schedule to prevent group B infection for infants born after 1st May 2015.
- Group B cases have fallen steadily since 2000/01 to a low of 396 (53% of all IMD cases) in 2008/09. In 2017/18 Group B accounted for 12% (88 cases) in 2017/18: the proportion has remained similar in recent years (since peaking at 103 cases in 2015/16) with some variation. The Group Y increase is due to a few cases confirmed in adults aged 245 (Figure two).
- An increase was observed in Group W cases (often with severe disease and unusual presentation) from 19 cases (2% of all IMD cases) in 2008/09, 95 cases in 2013/14, 176 cases in 2014/15 peaking at 225 (30%) in 2016/17. In 2017/18 cases of Group W decreased to 193 representing 26% of all IMD. The cases were predominately due to phenotype W:2a:P1.5,2 and confirmed as cc11 by WGS. WGS analysis implicated a single lineage: 95% (190/200) of the UK Group W cases isolates in the MGL for 2015/16 were confirmed as cc11 Group Wcc11 cases were observed nationwide and across all ages (Figure three), leading to the introduction of an ACWY conjugate vaccine programme for UK teenagers and university freshers commencing August 2015 as an emergency response measure. Provisional data show a fall in MenW cases across all age groups in 2018/19 to date (Figure three).
- There has been an overall decrease in Group B cases in recent years from 1,424 (2001/02) to 397 (2016/17) (Figure tw). In 2017/18 Group B accounted for 54% (404 cases) of all confirmed cases. With the UK national infant 4CMenB programme resulting in reduced disease in the targeted cohorts.
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- A large proportion of the total IMD cases are observed in pre-school children aged under five years (Figure four) accounting for 40% of all cases in 2014/15 and 26% in 2017/18. Whilst cases in this age group have been predominantly due to Group B, this proportion has fallen from 83% of cases in 2014/15 to 70% in 2017/18. Cases in the 45+ years age groups accounted for 30% of all IMD increasing to 38% in the same period.
- These changes have been driven by continued decline in Group B disease with a concomitant increase in Groups Y and W. Distribution by capsular group is therefore related to age, with non-group B infections forming a larger proportion of cases in older age groups.
- MenACYW vaccination of young people may be having an impact on disease in older adults in 2018/19 (Figure four). It is observed that fewer PCR investigations and therefore confirmations are made for elderly patients.

Methods

- Clinicians are required to notify all clinical cases of suspected invasive meningococcal disease via the local PHE Health Protection Teams to the PHE National Infection Service, Colindale, London.
- Since 1984, all microbiology laboratories in England have been encouraged to submit cultures of Neisseria meningitidis for characterisation to the MRU. Since October 1996, the MRU has provided a non-culture meningococcal PCR diagnostic service for England.
- Non-culture confirmation is based on real-time Taqman® PCR assays; cmr for detection, siaD for serogroup B, C, Y or W characterisation and myrB for serogroup A. Routine characterisation of non-culture positives by porA and ihbp sequencing commenced in January 2012.

Results

The incidence of laboratory-confirmed cases of all meningococcal disease peaked in 1999/20 and then decreased overall. Laboratory confirmed cases fell from 2,595 (in 1999/20) to a low of 636 in 2013/14; there were 755 cases in 2017/18 (Figure one).

High levels of IMD in 1998/99 and 1999/00 were partly explained by better ascertainment resulting from the use of PCR (Figure one). During 2017/18 38% (295) cases were confirmed by PCR only; this proportion has fallen in recent years from ~50% up to 2011/12. The decrease in total cases from 1999/00 has, in part, been due to the major reduction in Group C cases resulting from both direct and indirect (herd) protection from MCC vaccination (Figure two). Since 2005/06, there have only been 13 - 33 serogroup C cases each epidemiological year in England. This increased to 42 cases in 2015/16 and 64 cases in 2017/18, the highest total in 13 years and representing 8.5% of all IMD cases.

Discussion and Conclusions

- Group B cases have fallen steadily since 2000/01 to a low of 396 (53%) in 2016/17 and maintained at 404 (54%) in 2017/18 of all IMD cases; where the introduction of 4CMenB (Bexsero®) to UK infants post 1st September 2015 has reduced B cases in the immunised population.
- The profile of IMD changed since MCC vaccine introduction; where Group C disease demonstrated historically low levels from 2006/08 with only 13 confirmed cases and with ~30 cases confirmed in each of the last 10 years but has increased recently to 42 in 2015/16, 37 in 2016/17 and now 64 in 2017/18.
- In the light of the rapidly increasing Group W (cc11) disease from 2009/10 to 2014/15, ACWY conjugate vaccine was introduced from August 2015 (replacing the mcA vaccine booster) to protect teenagers and university freshers and is intended to induce herd protection.
- Enhanced surveillance to carefully monitor any changes in IMD epidemiology (in vaccinated and unvaccinated age groups) following the introduction of infant Bexsero®, the MenACYW and MCC vaccine programmes in England is essential and ongoing.