Where next? The emergence of hypervirulent W meningococcus in the Netherlands

Published Online
August 24, 2017
http://dx.doi.org/10.1016/S2468-2667(17)30163-9

See Articles page e473

In *The Lancet Public Health*, Mirjam Knol and colleagues provide useful data on the recent emergence and spread of the so called original UK strain and the 2013 strain of the hypervirulent sequence type 11 clonal complex (cc11) of meningococcal serogroup W disease in the Netherlands and England.[1] As a result of these descendants of the South American 2003 strain, capsular group W now accounts for 30% of all meningococcal disease in England, while the 2013 strain is primarily responsible for the current outbreak in the Netherlands. The similarities between the outbreaks in England and the Netherlands are striking; in both countries an increase was first seen in adults aged older than 65 years, both had a substantial proportion of patients with atypical presentations (including pneumonia, gastrointestinal symptoms, and septic arthritis), and fatality rates were relatively high in both settings (11% in the Netherlands and 12% in England). As well as being important in their own right, these data raise the possibility that this hyperinvasive strain could continue to spread, and indeed the authors mention preliminary reports of increases in serogroup W disease in Germany, France, Spain, and Sweden. Meanwhile, a similar increase in serogroup W disease due to a hypervirulent cc11 strain (the ancestor of the UK strains) has been reported in Latin America and Australia.[2,3]

In response to the outbreak in the UK, a quadrivalent conjugate meningococcal vaccination (MenACWY) campaign targeting adolescents was introduced in 2015, which was designed to provide direct protection to this age group and reduce transmission from the population with highest rates of meningococcal carriage to other age groups, thereby inducing herd immunity.[4] This campaign combines routine immunisation of 13–14 year olds with a phased catch-up campaign for 14–18 year olds and new university entrants; uptake is currently 72% to 84% in 14–16 year olds, and 33% to 36% in school leavers.[5] In a study of the meningococcal ACWY vaccination programme in England in 2015–16, Campbell and colleagues suggest that the introduction of the programme led to 69% fewer cases among school leavers than would be predicted by trend analysis.[6] Nevertheless, rates of meningococcal serogroup W disease in adolescents have not yet declined, and rates in most other age groups continue to rise, suggesting that the herd immunity effect has yet to be seen or is only partly offsetting the increase in disease due to the hyperinvasive strain (figure).[7] Of possible relevance to this is a study in Nottingham in which Oldfield and colleagues reported that rates of serogroup W carriage in a cohort of university students increased from 0·7% to 8·0% during 1 academic year, despite MenACWY uptake of 72%.[8] An alternative approach focusing on direct protection alone was adopted in Chile, whereby a childhood vaccination schedule was introduced for children aged 9 months to 5 years following an outbreak in 2012. This approach lead to a reduction of disease in this age group, but not in unvaccinated age groups despite over 95% coverage.[2,9]

Data from more than 15 years of experience with serogroup C meningococcal (MenC) vaccination strategies might also inform decisions about vaccination. Following the introduction of MenC vaccination into the UK and Netherlands schedule, which was accompanied by a catch-up campaign for adolescents, a sustained reduction was seen in both disease and carriage rates in all age groups, consistent with herd immunity,[2,10] with

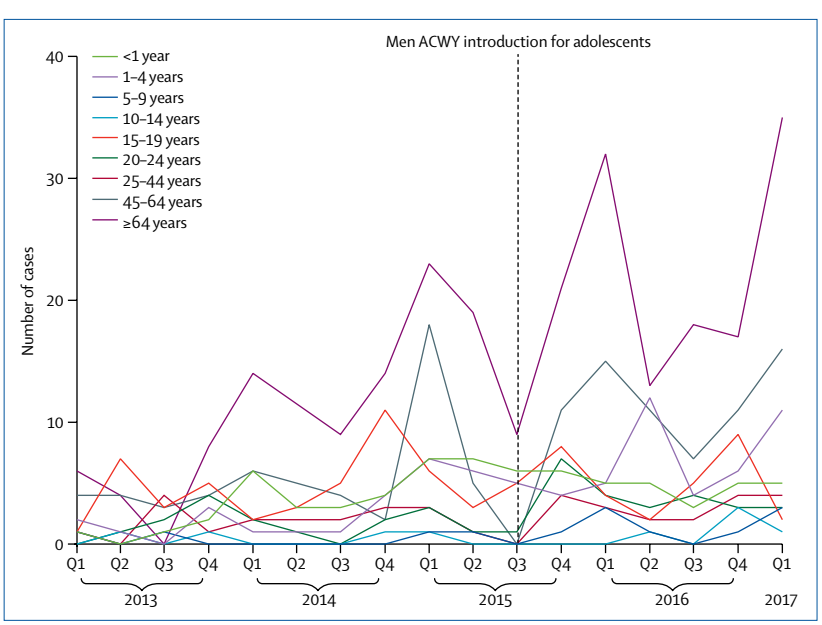

Figure: **Laboratory confirmed cases of invasive meningoccoal serogroup W disease in England by quarter**
Data are from the Public Health England.[7]

no evidence of serogroup replacement. By contrast, in Spain, no catch-up campaign was introduced for adolescents and rates of disease were not reduced in unvaccinated groups.

We therefore agree with Knol and colleagues' suggestion that urgent public health actions need to be considered in response to the emergence of the 2013 strain in the Netherlands, including surveillance and mass immunisation. The emerging data from the UK and Latin America will be instructive for any countries facing the emergence of meningococcal serogroup W disease. Furthermore, heightened awareness of the potential for the rapid emergence and atypical presentation of serogroup W disease is essential for countries in Europe and beyond to ensure early detection and a timely public health response.

More broadly, these developments highlight the unpredictable nature of meningococcal disease epidemiology and the importance of having vaccines available to cover all capsular groups of meningococcal disease. To this end, the availability of new vaccines against capsular group B are welcome, as is the programme to develop a new vaccine that extends the coverage of MenACWY to include serogroup X (MenACWYX);[11] the results from the phase 1 study of this vaccine are expected to be available later in 2017. The challenge of preventing invasive meningococcal disease continues, but so does the effort to provide the potential for comprehensive vaccine prevention of this deadly pathogen.

*Jonathan Broad, *Matthew D Snape*
Oxford Vaccine Group, University of Oxford Department of Paediatrics, NIHR Oxford Biomedical Research Centre, Oxford University Hospitals NHS Trust, Oxford OX3 7LE, UK
matthew.snape@paediatrics.ox.ac.uk

MDS has acted as Chief and/or Principal investigator on behalf of the University of Oxford for research studies sponsored and/or funded by vaccine manufacturers including Medimmune, Novavax GlaxoSmithKline, Pfizer, and Johnson and Johnson; and has spoken at an industry-sponsored symposium funded by Novovax; he has not received any personal financial benefit from these activities. JB declares no competing interests.

1 Knol MJ, Hahné SJM, Lucidarme J, et al. Temporal associations between national outbreaks of meningococcal serogroup W and C disease in the Netherlands and England: an observational cohort study. *Lancet Public Health* 2017; published online Aug 24. http://dx.doi.org/10.1016/S2468-2667(17)30157-3.

2 Sáfadi MA, Bettinger JA, Maturana GM, Enwere G, Borrow R. Evolving meningococcal immunization strategies. *Expert Rev Vaccines* 2015; **14:** 505–17.

3 Carville KS, Stevens K, Sohail A, et al. Increase in meningococcal serogroup W disease, Victoria, Australia, 2013–2015. *Emerg Infect Dis* 2016; **22:** 1785–87.

4 Trotter CL, Maiden MCJ. Meningococcal vaccines and herd immunity: lessons learned from serogroup C conjugate vaccination programs. *Expert Rev Vaccines* 2009; **8:** 851–61.

5 Public Health England. Vaccine update: issue 263, May 2017. Public Health England, 2017. https://www.gov.uk/government/publications/vaccine-update-issue-263-may-2017 (accessed: Aug 15, 2017).

6 Campbell H, Edelstein M, Andrews N, Borrow R, Ramsay M, Ladhani S. Emergency meningococcal ACWY vaccination program for teenagers to control group W meningococcal disease, England, 2015–2016. *Emerg Infect Dis* 2017; **23:** 1184–87.

7 Public Health England. Meningococcal disease: laboratory confirmed cases in England. Public Health England, 2017. https://www.gov.uk/government/publications/meningococcal-disease-laboratory-confirmed-cases-in-england-and-wales (accessed July 26, 2017).

9 Departamento de Epidemiologia, Ministerio de Salud, Chile. Boletín epidemiológico trimestral. Edición No 2, 2016. http://epi.minsal.cl/boletin-epidemiologico-trimestral-edicion2-2016/ (accessed Aug 15, 2017).

8 Oldfield NJ, Cayrou C, AlJannat MAK, et al. Rise in group W meningococcal carriage in university students, United Kingdom. *Emerg Infect Dis* 2017; **23:** 1009–11.

10 Maiden MCJ, Ibarz-Pavón AB, Urwin R, et al. Impact of meningococcal serogroup c conjugate vaccines on carriage and herd immunity. *J Infect Dis* 2008; **197:** 737–43.

11 ClinicalTrials.gov. Study of meninigococcal conjugate vaccine containing serogroups A, C, Y, W and X (MCV5) in healthy adults. NCT02810340. National Library of Medicine (US), 2016. https://clinicaltrials.gov/ct2/show/NCT02810340 (accessed Aug 16 2017).