

seem much less stark.⁴ This might be predicted to lead to proportionately more replacement disease after PCV in that age group, the extent of which might further vary by patient population characteristics. At least worthy of further investigation.

I declare no competing interests.

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Authors' reply

We are grateful to William P Hausdorff for his interesting letter¹ regarding our Personal View² on the perplexing variation in the extent of pneumococcal serotype replacement, especially among adults aged 65 years and older, suggesting a role for systematic differences in surveillance and the severity of the underlying invasive pneumococcal disease (IPD). It is true that differences in blood culturing practices can influence estimates of IPD incidence, and the serotype distribution associated with IPD. A systematic difference in the reduction in IPD incidence following pneumococcal conjugate vaccine (PCV) implementation might be explained by differences in the nature of the disease measured in each place, coupled with differences in the way PCVs affected the serotypes associated with those disease manifestations.

The correlation plotted by Hausdorff would suggest that surveillance systems capturing a broader spectrum of clinical illness (such as that in the USA) might

report larger reductions in cases because of the prevention of milder illness, with severe cases persisting. However, a pronounced drop in IPD among older adults followed PCV7 implementation in both the USA and the UK.^{3,4} It is only following PCV13 that these patterns have diverged, with incidence appearing to stabilise in the USA but increasing, to the time of writing, in the UK.²

Puzzlingly, these observations cannot be reconciled with the logic of severity alone. If the reduction in the USA is due to the removal of less severe disease, then why was the initial effect of PCV7 similar in the UK, which according to this hypothesis underestimates the incidence of milder infections? And then if, following PCV13, there has been an increase in severe disease in the UK, why has there been no similar increase in the USA, where surveillance should be more than capable of detecting it alongside milder infections?

In short, the mystery remains. As Hausdorff argues, how pneumococcal serotypes vary in the nature and severity of disease in the older population has been hitherto neglected.⁵ Why carried serotypes would cause disease among older adults in the UK, but curiously not the USA, is an issue that we agree wholeheartedly should be addressed. Studies of colonisation, transmission, and disease progression among older adults are warranted to identify epidemiological dynamics at play. The continuing discussion and ongoing observation of replacement illustrates the importance of this work to basic science and public health.

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Identification of *Streptococcus pyogenes* M1_{UK} clone in Canada

Nicola Lynskey and colleagues¹ reported on the rapid emergence of a new group A streptococcus (GAS) *emm1* lineage in the UK (M1_{UK}), which was characterised by increased production of the SpeA toxin. Isolates were associated with scarlet fever cases and invasive *emm1* cases, providing a possible explanation for the increased incidence of invasive GAS disease in the UK. Despite numerous large-scale genomic studies examining the association between genetic variation and virulence, the exact reasons for the recurrent epidemics of invasive GAS disease remain unresolved.^{2,3}

The M1_{UK} strain was found to differ from pandemic *emm1* (M1_{global}) by 27 key single-nucleotide polymorphisms (SNPs). Of all the GAS genomes available in the published global genomic databases, only single M1_{UK} clones were identified, in Denmark and the USA.¹

From 2010 to 2017, the incidence of invasive GAS cases increased in Canada by 63%, from 4.1 cases per 100 000 population to 6.7 cases per 100 000 population.⁴ Laboratory-based surveillance for invasive GAS *emm* types and antimicrobial resistance has been