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## Introduction

Meningococcal disease is a notifiable disease caused by infection with the bacterium *Neisseria meningitidis*. It is a significant cause of morbidity and mortality, particularly in children and young people. Health Protection Scotland and the Scottish Haemophilus Legionella Meningococcus and Pneumococcus Reference Laboratory (SHLMPRL) have undertaken national enhanced surveillance of meningococcal disease since 1998.<sup>1</sup> National surveillance combines enhanced surveillance with laboratory diagnoses, and provides data on the epidemiology of the disease, serotype distribution, and clinical presentation.

The meningococcal serogroup C vaccine (Men C) was introduced into the childhood immunisation schedule in 1999, with a phased catch up campaign targeting everyone aged 4 months to 24 years.<sup>2,3</sup> Candidate meningococcal serogroup B (Men B) vaccines are currently under consideration by the Joint Committee for Vaccination and Immunisation (JCVI) for potential inclusion into the UK immunisation schedule.<sup>4</sup>

This poster presents the epidemiology of invasive meningococcal disease in Scotland from 1999-2010 and discusses the potential implications for meningococcal B vaccine introduction.

## Methods

Every diagnostic laboratory in Scotland refers all invasive isolates of *Neisseria meningitidis* (i.e. isolates from blood, CSF and other normally sterile sites) and provides information on all clinical meningococcal disease diagnoses to the SHLMPRL.<sup>5</sup> Information received with each isolate and clinical diagnosis includes the case's name, age, sex, clinical presentation, vaccination status and outcome.

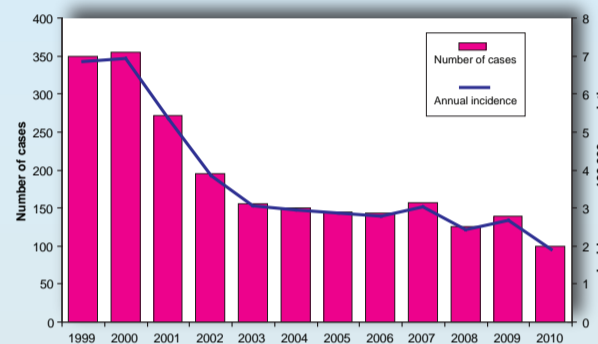
Data on the Scottish population for each of the years 1999 to 2010 were obtained from the General Registrar Office for Scotland.<sup>6</sup>

## Results

### Overall numbers and incidence

Between 1999 and 2010, 2285 cases of meningococcal disease were reported to Health Protection Scotland (including both clinical diagnoses and laboratory confirmed cases), equating to an average annual incidence of 3.4 cases per 100,000 population. Incidence peaked in 2000 with 6.9 cases per 100,000 population, decreasing to 1.9 cases per 100,000 population in 2010 ( $p < 0.0001$ ) (Figure 1).

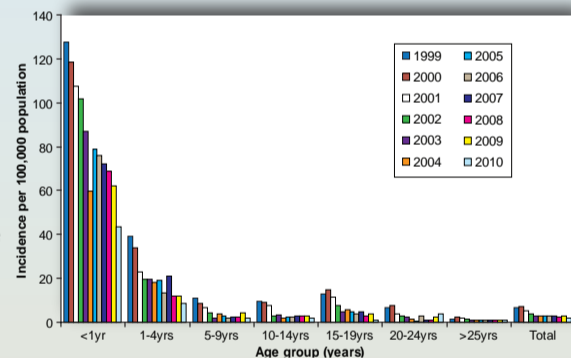
Figure 1: Number of cases and incidence of Meningococcal disease in Scotland, 1999-2010



### Age specific incidence

Approximately half of all cases reported were in children under five years of age (1083/2285; 47.4%) and the highest incidence was observed in children under one year of age with an average 82.8 cases per 100,000 population. However, the age specific incidence across age groups has decreased steadily over the study period (Figure 2).

Figure 2: Meningococcal disease incidence by age group, 1999-2010



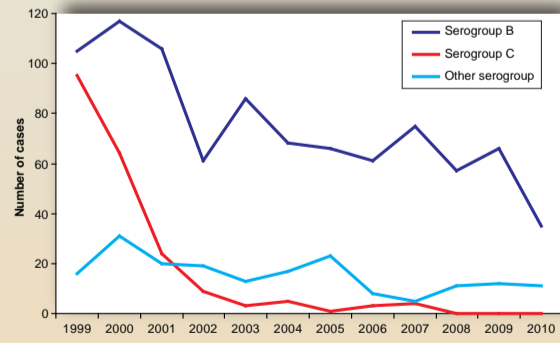
### Serogroup distribution

During the study period, 64% (1467/2285) of cases were laboratory confirmed. Of these, serogroup B was the most commonly detected serogroup (903 cases; 61.6%), followed by C (208 cases; 14.2%), Y (42 cases; 2.9%) and W135 (34 cases; 2.3%).

The highest number of cases of serogroup C disease was reported in 1999 when 95 cases were detected. Following the introduction of the Men C vaccine in 1999, Serogroup C disease decreased rapidly and no cases have been reported in Scotland since the four cases in 2007.

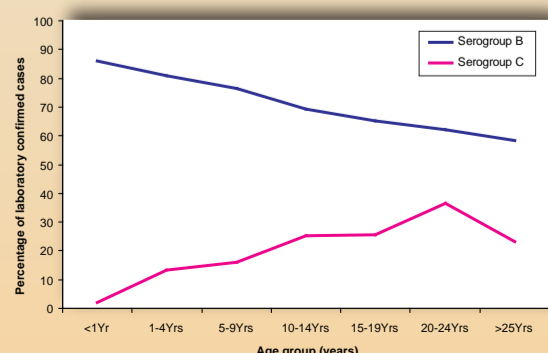
The highest number of cases of serogroup B disease was reported in 2000 when 117 cases were detected. The number of cases decreased until 2002, since when there has been an average of 63 cases reported each year (Figure 3).

Figure 3: Laboratory confirmed Meningococcal disease by serogroup, 1999-2010



Serogroup B was more common in younger age groups, decreasing from 86% of laboratory confirmed cases in those aged under one year to 58% in those aged over 25 years. Conversely, serogroup C was more common in older age groups increasing from 2% of laboratory confirmed cases in those aged under one year to 58% in those aged over 25 years (Figure 4).

Figure 4: Percentage of laboratory confirmed Meningococcal disease cases by serogroup and age group, 1999-2010



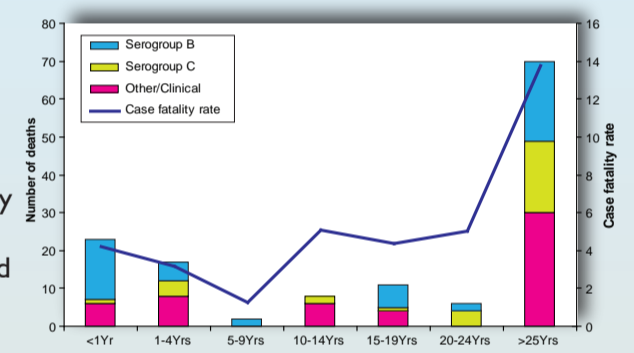
### Clinical presentation

The most commonly reported clinical presentation for cases was meningitis (799 cases; 35%), followed by septicaemia (641 cases; 28%) and both meningitis and septicaemia (387 cases; 17%). However, clinical presentation was found to vary by age group; cases aged under five years were more likely to present with septicaemia (OR=1.5, 95% CI 1.2-1.8,  $p < 0.00001$ ) while cases aged 25 years and over were more likely to present with meningitis (OR=2.6, 95% CI 2.1-3.2,  $p < 0.00001$ ). Clinical presentation was not found to vary significantly by meningococcal serogroup.

### Deaths

There were 136 deaths reported in the time period equating to an overall case fatality ratio (CFR) of 5.9%. However, CFR was found to vary by age and meningococcal serogroup (Figure 5); cases aged 25 years and over were more likely to die (OR=4.1, 95% CI 2.8-5.8,  $p < 0.00001$ ) as were cases infected with serogroup C (OR=2.8, 95% CI 1.8-4.4,  $p = 0.00003$ ).

Figure 5: Meningococcal disease deaths by age group and serogroup, 1999-2010



## Conclusions

Meningococcal disease has declined significantly in recent years in Scotland but remains a significant source of morbidity and mortality, especially among young children; approximately half of all cases occur in children under five years of age and the highest incidence is observed in children under one year of age. Serogroup C disease has not been detected in Scotland since the few cases reported in 2007, indicating the effectiveness of the Men C vaccine campaign. Serogroup B is the most commonly reported serogroup and levels have remained relatively unchanged in Scotland since 2004.

The majority of cases presented with meningitis, septicaemia or a combination of both meningitis and septicaemia. However, younger children were more likely to present with septicaemia while adults aged over 25 years were more likely to present with meningitis. Approximately 6% of cases are known to have died, but death was found to be more likely in older age groups and those with serogroup C disease.

As serogroup B accounts for around three quarters of laboratory confirmed cases and predominantly affects younger age groups, any ability to prevent these infections could have a substantial impact on the overall incidence of disease in Scotland.

## Acknowledgements

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