Invasive *Haemophilus influenzae* in Ireland, 2003

Key Points

- **22 cases of invasive *Haemophilus influenzae* were reported in 2003**
- **14 of the cases were due to *H. influenzae* type b (Hib) disease**
- **64% of Hib cases occurred in children <5 years of age**
- **There were two true Hib vaccine failures in 2003**

Introduction

Routine *Haemophilus influenzae* type b (Hib) immunisation has resulted in a marked decrease in the incidence of invasive *H. influenzae* disease. Since the introduction of the vaccine in 1992 the incidence of Hib disease has declined from approximately 2.8 per 100,000 in the late 1980s to <0.4 per 100,000 more recently. Despite these preventive measures, diseases due to Hib have not been completely eliminated and the organism still causes serious invasive blood-borne infections such as meningitis, septicaemia, epiglottitis, cellulitis and septic arthritis.

Materials and methods

A case is defined as invasive *H. influenzae* disease in a person with an isolate from a normally sterile site.

Two sources of data allowed NDSC to monitor the incidence of invasive *H. influenzae* in Ireland in 2003.

1. Reports from laboratories which NDSC received via Departments of Public Health
2. Updates from the HPA Haemophilus Reference Unit, Oxford, UK

Details of all cases were inputted to an MS Access database at NDSC. Analysis was preformed using MS Access and MS Excel.

Incidence rates were calculated using population data taken from 2002 Census of Population, as the denominator.

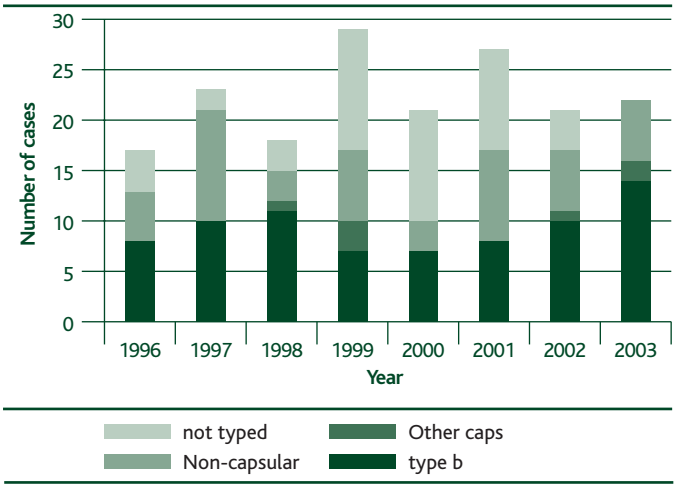

Figure 1. Invasive Haemophilus influenzae cases reported in Ireland by serotype

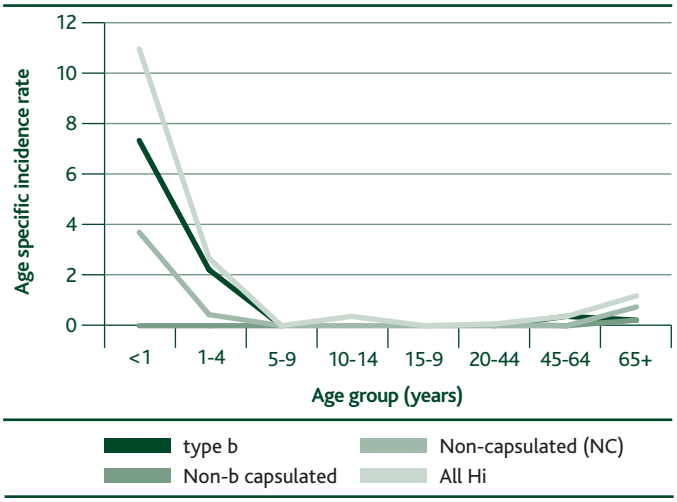

Figure 3. Age specific incidence rates of invasive Haemophilus influenzae cases reported in 2003 by serotype

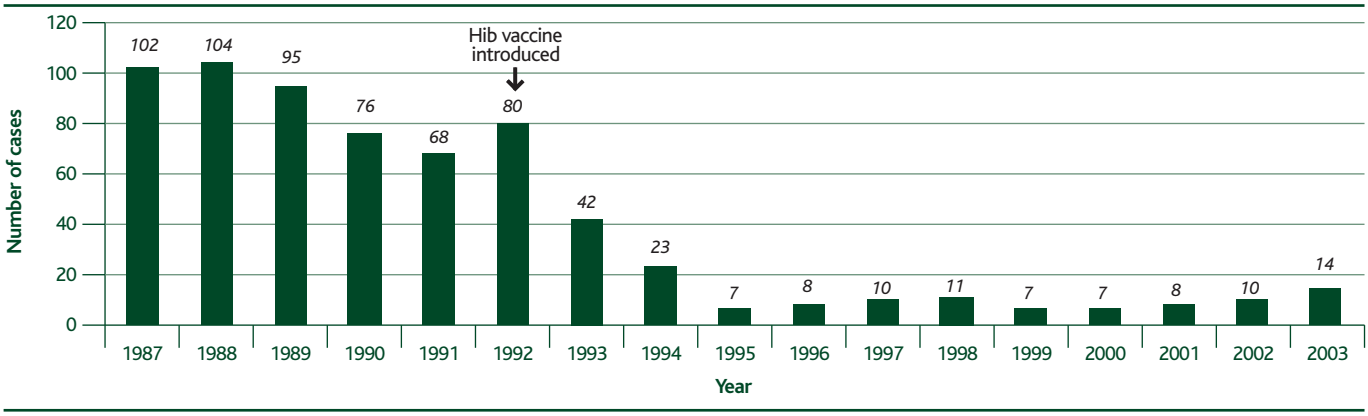

Figure 2. Invasive Haemophilus influenzae type b cases reported in Ireland, 1987-2003

Results

Overall incidence of Haemophilus influenzae

Twenty two cases of invasive *H. influenzae* were reported in 2003 (0.6/100,000), which was similar to the previous year when 21 cases were reported (figure 1). The clinical manifestations of the 22 cases reported were: meningitis (n=2), septicaemia (n=4), meningitis and septicaemia (n=5), pneumonia (n=3), osteomyelitis/septic arthritis (n=1), cellulitis (n=1), epiglottitis (n=1) and unknown (n=5). The highest number of *H. influenzae* type b (Hib) cases since 1994 was reported in 2003 (figure 2). The age distribution of cases by serogroup is presented in table 1 and the age specific incidence rates by serogroup are presented in figure 3. Sixty four percent of cases were due to serotype b (14/22), 9% (2/22) were non-b capsulated strains (1 serotype e and 1 serotype f) and the remainder (6/22) were non-capsulated. Over half the cases (12/22) occurred in children <5 years of age. Of the Hib cases reported, 64% (9/14) occurred in this age group.

The highest incidence rates of invasive *H. influenzae* were in the <5 year olds followed by the elderly (table 1 and figure 3). The predominant cause of disease in the <5 year olds was due to serotype b strains whereas in the elderly non-capsulated strains were more common.

Incidence of Haemophilus influenzae type b (Hib) in childhood

Thirteen cases of invasive *H. influenzae* occurred in children <15 years of age (table 1). Seventy seven percent of these cases (10/13) were due to serotype b strains with non-capsulated strains accounting for the remaining three cases. The incidence of Hib was highest in the <1 year olds (7.3/100,000), followed by 1-4 year olds (2.2/100,000) and dropped thereafter in the older age groups ranging from 0.0 to 0.4 per 100,000 (figure 3). During 2003, the clinical presentations of Hib disease in childhood were septicaemia (n=7), pneumonia (n=2) and cellulitis (n=1).

Hib vaccine failures

Five of the 10 Hib cases in the <15 year olds had not been vaccinated against Hib, while five had been vaccinated. Three of the vaccinated children had received three doses of Hib vaccine as per the childhood immunisation schedule at two, four and six months and therefore were fully vaccinated. These three cases constitute true vaccine failures and Hib disease occurred between two to three and a half years after receiving the third/final dose of vaccine. However it should be noted that one of these true vaccine failures occurred in an immunocompromised child. The number of true Hib vaccine failures tends to fluctuate between two and four per year, no change in this trend was observed in 2003.

The other two vaccinated Hib cases in 2003 had been incompletely vaccinated, each receiving only one of the three recommended doses. Therefore, these are classified as apparent vaccine failures.

In 2003, true vaccine failures occurred in only 30% of the Hib cases in children <15 year of age. Since 1996, the proportion Hib disease in fully vaccinated children has ranged between 20-60% per annum.

Table 1. Invasive Haemophilus influenzae cases reported in 2003, by serotype and age group

Serotype	<1	1-4	5-9	10-14	15-19	20-44	45-64	>65	Total
type b	4	5	0	1	0	0	3	1	14
Non-b capsulated	0	0	0	0	0	1	0	1	2
Non-capsulated (NC)	2	1	0	0	0	0	0	3	6
All *H. influenzae*	6	6	0	1	0	1	3	5	22
ASIR of all *H. influenzae*	11.0	2.7	0.0	0.4	0.0	0.1	0.4	1.2	0.6

ASIR, age specific rate per 100,000

Discussion

A recent resurgence of Hib infections observed in the UK over the last four years has predominantly been in vaccinated children. Experts believe that a reduction in antibody levels throughout the first five years of life in vaccinated children in recent years has fuelled the rise in reported Hib cases in the absence of an obvious increase in transmission.[1]

This trend has not been identified in Ireland. Although the number of Hib cases reported in Ireland in 2003 increased somewhat compared to previous years, the number of Hib vaccine failures remained unchanged. In 2003, only 30% of the Hib cases that occurred in those <15 years of age had been fully vaccinated. Therefore, a concomitant rise in true vaccine failures did not occur with the observed increase in Hib disease in 2003. Furthermore, the proportion of Hib disease in fully vaccinated children has never risen above 60% when data from 1996-2003 are reviewed. Based on these data for Ireland, there is no evidence to indicate that waning immunity to the Hib vaccine is the reason for the increase in Hib disease seen in 2003. The fact that at least 50% of the children diagnosed with Hib disease in 2003 were unvaccinated is more a cause for concern. Poor uptake of the Hib vaccine (86% in 2003) in Ireland is potentially one of the main contributory factors to the increase in childhood Hib disease recently observed.

Incidence rates of non-b capsulated *H. influenzae* remain low and no evidence of serotype replacement have been observed despite over 10 years of Hib vaccination. Non capsulated strains now account for approximately a third of invasive *H. influenzae* cases in Ireland and therefore highlights the importance of referring strains to a reference centre for accurate identification of all strains.

In conclusion, although the incidence of invasive Hib disease dropped impressively in the years after the introduction of appropriate vaccination, the disease did not disappear completely. Continued surveillance is essential to monitor trends in the incidence of invasive *H. influenzae* disease and Hib vaccine failures. This information is vital in measuring the impact of preventive measures being used and in examining strategies to eliminate Hib disease in Ireland.

Acknowledgements

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References

1. McVernon J, Howard A, Slack M, Ramsay M. Long-term impact of vaccination on *Haemophilus influenzae* type b (Hib) carriage in the United Kingdom. Epidemiol Infect 2004; **132:** 765-767.