Invasive *Haemophilus influenzae* in Ireland, 2004

Key Points

- **38 cases of invasive *H. influenzae* disease were notified in 2004**
- **18 of the cases were due to *H. Influenzae* type b (Hib) disease**
- **9 Hib cases occurred in children < 15 years of age**
- **67% of the children who had Hib disease in 2004 had been fully vaccinated (TVFs). This is an increase in Hib vaccine failures compared to previous years.**
- **A national Hib Booster Catch-up Campaign was launched in November 2005 for children 12-47 months of age to protect them against Hib infection**

Introduction

Haemophilus influenzae can cause serious invasive disease especially in young children. Many strains of *H. influenzae* are surrounded by an outer polysaccharide capsule. Of the six antigenically distinct capsular types (a-f), *H. influenzae* type b (Hib) is the predominant cause of such serious infections as meningitis, septicaemia and epiglottitis in children. Other capsular serotypes, notably types e and f and non-capsulated strains can also cause serious infections.

A conjugate vaccine against Hib disease has been available in Ireland since October 1992, when it was introduced to the routine childhood immunisation schedule at 2, 4 and 6 months. A catch-up campaign targeting under five year olds was also undertaken the time. The Hib immunisation programme has had a striking impact in reducing the rate of Hib disease. After the vaccine was introduced the number of cases fell by 90%, from an incidence of 2.8 per 100,000 total population in the late 1980's to 0.26 per 100,000 total population by 2002. Hib disease however, has not disappeared completely and a small number of cases continue to occur, sometimes even in fully vaccinated children.

Materials and Methods

A case of invasive *H. influenzae* disease is defined as the isolation/detection of the organism or its nucleic acid from a normally sterile site. A detailed description of the case definition is provided in the HPSC Case Definitions booklet.[1]

Prior to the 1st January 2004 data on invasive *H. influenzae* were collected from a number of sources including bacterial

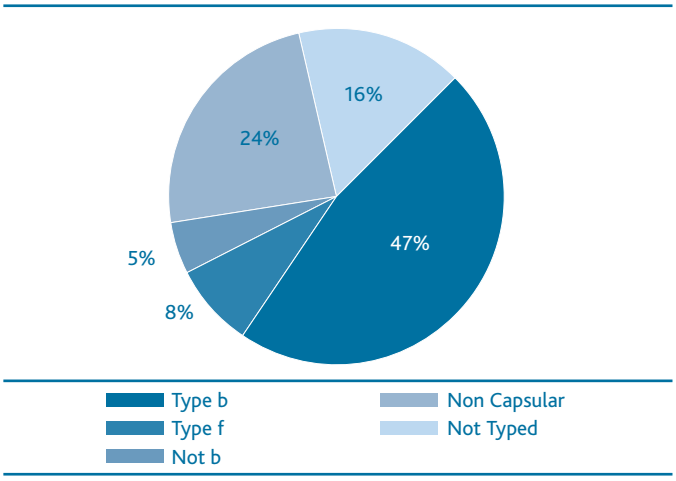

Figure 1. Invasive Haemophilus influenzae disease notifications in 2004 by serotype

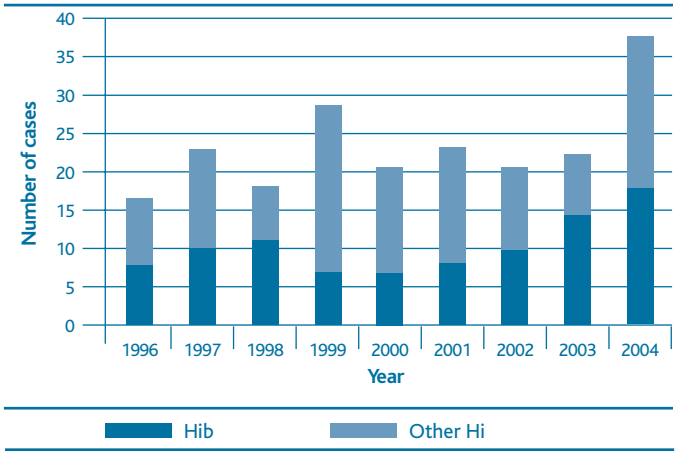

Figure 2. Invasive H. influenzae cases in Ireland, 1996-2004

Table 1. Invasive Haemophilus influenzae cases notified in 2004, by age group and serotype

Serotype	<1	1-4	5-9	10-14	15-19	20-44	45-64	>65	Total
Type b	1	8	0	0	0	4	1	4	18
Type f	0	0	1	0	0	1	1	0	3
Non-capsular (NC)	0	1	2	0	0	2	2	2	9
Other	0	0	0	0	0	1	3	4	8
All *H. influenzae*	1	9	3	0	0	8	7	10	38
ASIR of type b (Hib)	1.8	3.6	0.0	0.0	0.0	0.3	0.1	0.9	0.5
ASIR of all *H. influenzae*	1.8	4.0	1.1	0.0	0.0	0.7	0.8	2.3	1.0

ASIR, age specific incidence rate per 100,000

meningitis notifications, data obtained from the laboratories and updates from the HPA Haemophilus Reference Unit in UK. On the 1st January 2004 invasive *H. influenzae* disease became notifiable in Ireland, with clinicians and laboratories legally obliged to notify. An enhanced surveillance system is in place whereby demographic, clinical, microbiological and epidemiological information are provided by Departments of Public Health to HPSC. Notifications in 2004 were reconciled regularly with updates from HPA Haemophilus Reference Unit in UK.

H. influenzae data prior to 2004 are on a MS Access database. *H. influenzae* notifications from 2004 were inputted to the Computerised Infectious Disease Reporting (CIDR) system and analysis was performed using Business Object Reporting in CIDR and MS Excel. Incidence rates were calculated using population data taken from 2002 Census of Population as denominator.

Results

Invasive Haemophilus influenzae disease

In 2004, 38 cases of invasive *H. influenzae* disease were notified (0.97/100,000 total population). *H. influenzae* type b (Hib) accounted for 47% of these notifications (n=18) and non-capsular strains for 24% (n=9) (figure 1).

An increase in *H. influenzae* cases was seen in 2004 (n=38) compared with 2002 and 2003 when 21 and 22 cases were reported, respectively (figure 2). The reason for this increase can largely be attributed to the rise in the number of non-type b cases reported, from eight in 2003 to 20 in 2004. The vast majority of these occurred in adults (80%, n=16; Table 1). In 2003 five of the eight non-type b cases were in adults. The total number of invasive *H. influenzae* cases in adults almost trebled in 2004, rising from nine in 2003 to 25 in 2004.

The age distribution of cases by serotype is presented in Table 1 and the age specific incidence rates for Hib and all forms of invasive *H. influenzae* are also presented. The age specific incidence rate was highest in the 1-4 year olds (4.0/100,000, n=9). These cases were predominantly due to type b strains. Hib accounted for eight of these nine notifications (3.6/100,000). The elderly (aged 65 years or older) had the next highest age incidence rates for *H. influenzae* (2.3/100,000, n=10), but Hib contributed to only 0.9 per 100,000 of the cases (n=4).

There were 3 deaths reported due to invasive *H. influenzae* in 2004, one death was in a child and two were in adults. All deaths were due to non-capsular strains. However, the outcome was not reported for 18/38 *H. influenzae* notifications and therefore, an accurate case fatality rate cannot be calculated.

Haemophilus influenzae type b

Eighteen Hib cases were notified in 2004 (0.5/100,000 total population). This was an increase from 14 cases in 2003 (0.4/100,000 total population). A rise in adult Hib cases accounted for this increase, as these comprised of 50% of the Hib notifications (figure 3). Nine Hib cases occurred in children <15 years of age in 2004 compared to 10 cases in 2003. The nine Hib cases in children in 2004, actually

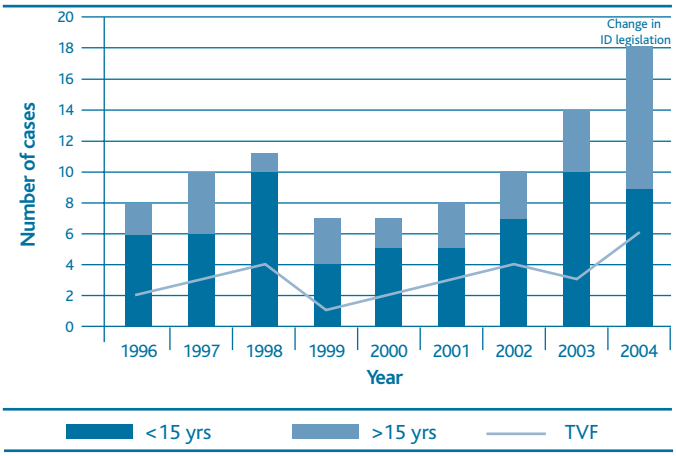

Figure 3. Number of Haemophilus influenzae type b (Hib) cases in under and over 15 year olds 1996-2004 and the number of true vaccine failures (TVF)

occurred in the under 4 year old age group age range 1 month – 3 years, while the nine adult Hib cases ranged in age from 25-93 years (table 1).

The clinical presentation of Hib disease in the children was meningitis and/or septicaemia for seven of the nine cases, one case of osteomyelitis was reported and the clinical diagnosis was not reported for one case. In adults the disease presented as septicaemia (n=3), pneumonia (n=2), epiglottitis (n=1) and clinical diagnosis not reported (n=3). No Hib deaths were reported in 2004, but two children had permanent adverse neurological sequelae.

Hib vaccine failures

A true vaccine failure (TVF) is defined as the occurrence of a laboratory confirmed case of Hib disease in a person who had been fully vaccinated, while an apparent vaccine failure (AVF) is the occurrence of Hib disease in a person who was incompletely vaccinated (i.e. had commenced but had not completed the Hib immunisation schedule). Six of the nine children (67%) who had Hib disease in 2004 had been fully vaccinated (TVFs) compared to three in 2003 and four in 2002 (figure 3). Five of the six vaccine failures occurred between August and December of 2004.

The TVFs occurred in children ranging in age from 17 to 45 months. The failures arose between 10 and 39 months following the third dose Hib vaccine in these children. In 2004 there was one AVF in a 2 year old child, two AVFs occurred in 2003.

Discussion

The number of cases of invasive *H. influenzae* disease reported in 2004 increased when compared with previous years. The increase can largely be attributed to a rise in the number of adult cases notified, in particular non type b cases, but an increase in adult Hib cases was also seen. The reasons for this increase may be due to a number of factors (i) perhaps there was a true rise in adult *H. influenzae* cases (ii) a reflection of improved reporting of the disease in adults as a result of *H. influenzae* being made a notifiable disease from 1st January 2004 (iii) a combination of the two previous reasons. However, this upsurge in adult cases has not been seen to date in 2005 even though it is still a notifiable disease, which would more support the hypothesis that there was a true increase in adult cases in 2004.

The number of *H. influenzae* cases notified in children under 15 years of age remained unchanged in 2004 compared with 2003, with 13 cases reported in both years. The number of Hib cases in this age group declined by one in 2004, from ten to nine cases. However, an increase in the number of Hib vaccine failures was seen in 2004, increasing from three in 2003 to six in 2004. Prior to 2004, the number of TVFs never exceeded four in any one year. There was just one TVF over the first seven and half months of 2004, while the other five occurred in the space of four and half months. The fact that five vaccine failures had occurred over such a short period of time was a cause for concern. The situation was closely monitored over the first half of 2005; eight cases of Hib disease occurred, all in fully vaccinated children. As a result of this upward trend in Hib disease and the fact cases were predominantly in vaccinated children, the National

Immunisation Advisory Committee recommended that an additional booster dose was required for children >1 year. A Hib catch-up campaign is to be launched in November 2005 offering an additional dose of Hib vaccine to children under 4 years of age (12-47 months) in order to further protect these children against Hib infection.

Acknowledgements

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References

1. Case Definitions for Notifiable Diseases. Infectious Disease ~(Amendment) (No. 3) Regulations 2003 (SI No. 707 of 2003). Available at http://www.hpsc.ie