

INVASIVE MENINGOCOCCAL DISEASE (IMD), BACTERIAL/VIRAL MENINGITIS & *HAEMOPHILUS INFLUENZAE* INFECTIONS IN IRELAND

A REPORT BY THE HEALTH PROTECTION SURVEILLANCE CENTRE IN COLLABORATION WITH THE IRISH MENINGOCOCCAL AND MENINGITIS REFERENCE LABORATORY



Q4-2014

8th April 2015

Provisional Figures

Summary

Q4-2014

Thirty cases of invasive meningococcal disease (IMD) were notified in Q4-2014, three of whom were reported to have died. No imported IMD cases or outbreaks cases were reported during this period.

Cases of bacterial meningitis by specified, notifiable diseases were also reported, consisting of 11 cases of *Streptococcus pneumoniae*, two of whom died. Seven cases of bacterial meningitis, not otherwise specified (NOS), were notified during this quarter, but no deaths reported.

In addition, 91 cases of viral meningitis (NOS) were reported with no related deaths or related outbreaks. No other specified viral meningitis cases were reported during this time.

A total of 16 cases of *Haemophilus influenzae* were reported during the Q4-2014, only two of which was associated with meningitis; eight were non-typeable/non-capsulated, two each were type f and not type b and four were classified as not typed; of the latter four cases, all were diagnosed by PCR only. Three deaths occurred among the *H. influenzae* cases during this quarter, the cause of death in one was found not to be attributable to the type f infection and the causes of death in the other two cases (a type f and a non-typeable infection) were not known.

Introduction

Meningococcal disease became a notifiable disease on the 1st January 2004 with the implementation of the Infectious Disease (Amendment) (No. 3) Regulations 2003 (SI No. 707 of 2003). Prior to this, it was notifiable under the category bacterial meningitis (including meningococcal septicaemia).

Most forms of bacterial meningitis are now notifiable under the specific disease pathogen name as listed in the legislation. For bacterial meningitis pathogens not listed, these forms of meningitis are notifiable under the disease termed 'bacterial meningitis (not otherwise specified)'. Since 1st January 2012, revised versions of the case definitions of meningococcal disease, bacterial and viral meningitis have come into effect and are detailed in the HPSC Case Definitions for Notifiable Diseases booklet on the HPSC website (www.hpsc.ie).

An enhanced surveillance system is in place for [IMD and other forms of bacterial meningitis, not otherwise specified](#). Details of this surveillance system are described in the meningococcal disease chapter of the HPSC Annual Report 2005. In October 2000, the Meningococcal C conjugate (MCC) vaccine was introduced in Ireland to the infant schedule at 2, 4 and 6 months of age. A catch-up campaign targeting those less than 23 years of age was also run at the time. In September 2008 the MenC vaccination schedule was changed to administration of the vaccine at 4, 6 and 13 months of age. On 22nd August 2014, the National Immunisation Advisory Committee (NIAC) updated its [guidelines](#) indicating that MCC be given at 4, 13 months and 12-13 years as there is evidence that there is a satisfactory primary immune response to one dose in infants; however, because of waning immunity, booster doses are necessary.

An enhanced surveillance system is also in place for [Haemophilus influenzae \(invasive\) disease](#), but not for viral meningitis, not otherwise specified.

Data presented in this reported were extracted from CIDR on 8th April 2015. **These figures are provisional.** Incidence rates for 2014 were calculated using the 2011 Census of Population as denominator data.

Results

Meningococcal Disease (invasive) (IMD)

IMD Cases by Serogroup & Case Classification

In Q4-2014, 30 cases of IMD were notified, 26 of which were attributable to serogroup B, two to serogroup Y, one to serogroup C (vaccination status unknown) and one did not have a serogroup specified. All but one was case classified as confirmed (Table 1).

Table 1. Classification of IMD cases notified by Serogroup in Q4-2014

Case Class.	B	C	W135	Y	NG	No organism detected	Total
Confirmed	26	1	0	2	0	0	29
Probable	0	0	0	0	0	0	0
Possible	0	0	0	0	0	1	1
Not specified	0	0	0	0	0	0	0
Total	26	1	0	2	0	1	30

In the same quarter of the previous three years, 2011 to 2013, the average number of IMD cases was 20.7; for serogroup B it was 17.0 and for serogroup C it was 0.33 (Figure 1; Appendix 1).

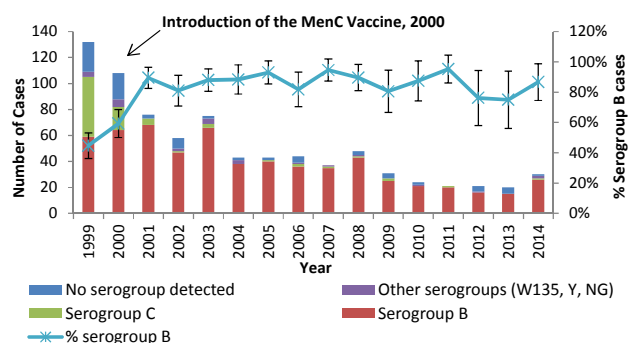


Figure 1. Number of IMD cases notified in Ireland by serogroup in Q4 of each year between 1999 and 2014 with percentage of quarterly cases attributable to serogroup B with 95% confidence intervals

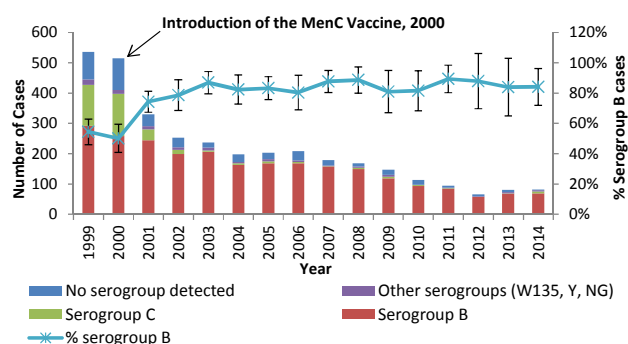


Figure 2. Number of IMD cases notified in Ireland by serogroup and by year between 1999 and 2014 with percentage of cases attributable to serogroup B with 95% confidence intervals

In Q4-2014 serogroup B disease accounted for 86.7% (n=26/30) of all IMD notifications. This differs significantly from Q4-1999 when 44.7% (95% CI 36.2%-53.2%) of cases were attributable to serogroup B (Figure 1, Appendix 1).

All but one confirmed cases reported on CIDR in Q4-2014 were also included in the electronic listings of laboratory tested *N. meningitidis* isolates/specimens provided to the HPSC on February 25th 2015 and on March 4th 2015 by the Irish Meningococcal and Meningitis Reference Laboratory (IMMRL).

IMD Trends & Outbreaks

The number of IMD cases reported in Q4-2014 (n=30) was significantly more than the average number reported in the same quarter over the previous three years (average=20.7; 95% CI 20.5-20.8). However, the latest Q4 figures are a continuation of a gradual downward trend observed since 1999 (Figure, 1, Appendix 1).

An overall downward trend is also apparent in the annual number of IMD cases reported over the same period of time, with the number reported in 2014 (n=82) being very similar to 2013 (n=81), but greater than that reported in 2012 (n=66) (Figure 2).

Fourth quarterly IMD cases have fallen by 77.2% since 1999 (Appendix 2). Since 1999, Q4 serogroup B cases have also declined by 55.9% (Appendix 1). In Q4-2014 one MenC case was reported, but an annual total of six cases were reported in

2014, the highest annual number of cases since 2002 when 14 cases occurred.

No IMD outbreaks or clusters were reported during Q4-2014.

IMD Cases by HSE Area and Age Group

The crude incidence rate in Q4-2014 was 0.65 cases per 100,000 population ranging from the lowest (0.00/100,000) in HSE MW to the highest (1.42/100,000) in HSE M (Appendix 3).

The burden of IMD disease is typically highest in the <1 year old age group and in Q4-2014 the incidence rate in this age group was 13.8 cases per 100,000 population. The next age group with the highest burden of IMD disease was the 1-4 year age group (3.2 cases/100,000) (Appendix 4).

IMD associated deaths

Three IMD related deaths were reported in Q4-2014, including one caused by a meningococcal C infection in an adolescent. The number of Q4 deaths associated with IMD cases has changed little from four in 1999 (Appendix 5).

Other Forms of Bacterial Meningitis *Streptococcus pneumoniae* meningitis

In Q4-2014, a total of 11 cases of invasive *S. pneumoniae* infection presenting as meningitis were notified with an age range of between three months and 87 years (Appendix 6). There were two IPD deaths in this quarter (age range 9-61 years).

One elderly case was vaccinated with the PCV23 vaccine; another 3 month old was incompletely vaccinated having received just one dose of the PCV13 vaccine. Of the remaining nine cases, five were unvaccinated: one aged 30-34 years had a 23A type infection, which is not covered by any pneumococcal vaccine and four had an unknown vaccination status. Of the latter four cases, one had a 33F type infection (aged 65-69 years), a type that is included in the PCV23 vaccine. Five of the 11 reported cases reported risk factors for IPD infection, one of whom, aged 5-9 years, was reported to have died and had an unknown vaccination status.

For further information on *Streptococcus pneumoniae* notifications please refer to the latest report available at <http://www.hpsc.ie/A-Z/VaccinePreventable/PneumococcalDisease/Publications/QuarterlyReportsonInvasivePneumococcalDisease/>

Bacterial meningitis by other specified notifiable diseases (excluding *Haemophilus influenzae* and *S. pneumoniae*)

In Q4-2014, no other cases of bacterial meningitis by a specified notifiable disease were reported (Appendix 6).

Bacterial meningitis (not otherwise specified)

Seven cases of bacterial meningitis due to pathogens not otherwise specified (NOS) under the Infectious Disease (Amendment) (No. 3) Regulations (S.I. No. 452 of 2011) were notified during Q4-2014. No deaths were reported during this time. Two of these cases had an *Escherichia coli* infection and were two months of age or less. There was also one case each of *Enterococcus* species (aged 30-34 years) and *Streptococcus agalactiae* (6-12 months old) and the remaining three cases did not have a causative organism identified (aged between one month and 16 years) (Appendix 6).

Viral Meningitis (Specified and Not Otherwise Specified)

There were no reported cases of viral meningitis by specified notifiable diseases during Q4-2014.

Ninety-one viral meningitis notifications (NOS) (age range 6 days to 72 years; median 1 year) were reported in Q4-2014 (Figure 3). No viral meningitis outbreaks were reported during this time.

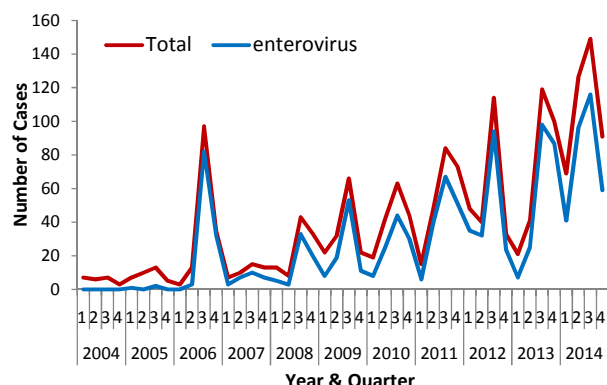


Figure 3. Total number of viral meningitis (NOS) cases notified, including those caused by enterovirus in Ireland by quarter and year, 2004-2014

In Q4-2014, 84 of the 91 cases (92.3%) had their causative organism identified: 59 enterovirus (serotypes not determined), 12 parechovirus, five human herpes virus type 6, four herpes simplex virus (three type 1 and one untyped) and four varicella zoster virus (Figure 3, Appendix 7). The highest ever annual number of cases reported to date was in 2014 with a total of 435 cases (Figure 4).

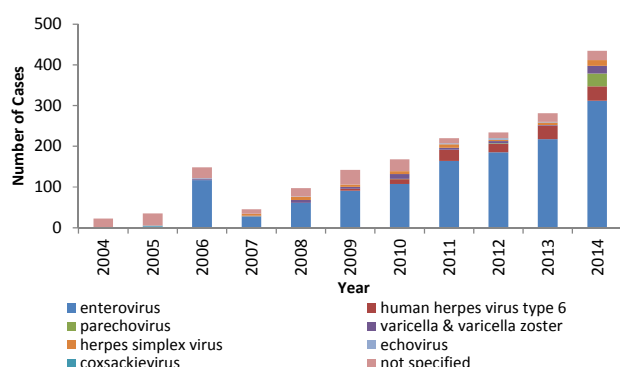


Figure 4. Annual number of viral meningitis (NOS) cases notified in Ireland by organism type, 2004-2014 (excludes one case of adenovirus in 2012)

In Q4-2014, the highest frequency of cases occurred in children <1 year of age (n=47/91; 51.6%) followed closely by adults aged 15-39 years (n=31/91; 34.1%) (Figure 5). Of the 47 cases <1 year of age reported in this quarter, 26 (55.3%) were attributable to enterovirus, 12 (25.5%) to parechovirus, five (10.6%) to human herpes virus type 6, and four (8.5%) had no virus specified.

In mid-June 2013, the NVRL introduced a new parechovirus test and as a result the numbers of viral meningitis cases attributed to this causative organism has increased sharply from zero during 2013 to 32 in 2014.

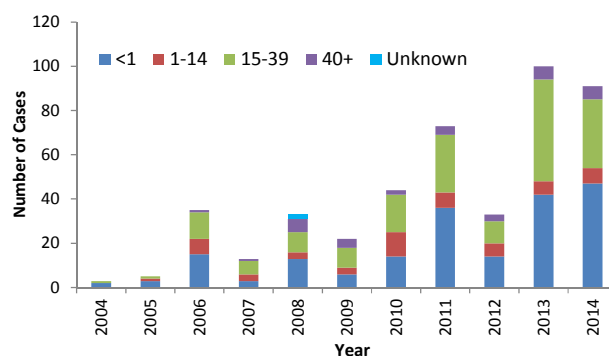


Figure 5. Quarter 4 number of viral meningitis (NOS) cases in Ireland by age group (years), 2004-2014

Haemophilus influenzae (invasive) infections *H. influenzae* Cases by Type, Case Classification

In Q4-2014, 16 cases of invasive *H. influenzae* in total were notified in Ireland: eight were non-typeable/non-capsulated, two each were type f and not type b, and four were classified as not typed; of the latter four cases, all were diagnosed by PCR only. This compares to a total of 7, 10 and 10 cases notified in the same quarter in 2013, 2012 and 2011, respectively (Table 2, Appendices 8, 9). The number of annual cases reported in 2014 (n=61) was the highest since 2011 when 43 cases were notified (Figure 6).

In the electronic listing provided by the Epidemiology and Molecular Biology Unit (EMBU) in Temple Street Children's Hospital on February 25th, 2015, all confirmed *H. influenzae* events on CIDR between Q1 and Q4, 2014 were included on it.

Appendices 10 and 11 give a breakdown of all Q4 cases notified since 2004 by HSE area and age group, respectively. Of all the Q4 cases reported between 2012 and 2014, 12.1% (n=4/33) had no clinical diagnosis reported (Table 3).

H. influenzae deaths

Three deaths occurred among the *H. influenzae* cases during this quarter, the cause of death in one was found not to be attributable to the type f infection and the causes of death in the other two cases (with separate type f and non-typeable infections) were not known.

H. influenzae meningitis

Two cases of invasive *H. influenzae* causing meningitis were reported in Q4-2014 (Table 3, Appendix 9). One had a non-typeable infection and the other had an infection that was not typed (age range 16-59 years).

H. influenzae type b (Hib)

A true vaccine failure (TVF) is the occurrence of invasive Hib infection in an individual, despite having been fully vaccinated against Hib disease in the past. No Hib cases were reported in Q4-2014. The last reported TVF however was in Q4-2010 in a 10 year old child (Figure 7). The occurrence of only one true Hib vaccine failure in nearly eight years between Q3-2007 and Q4-2014 is an indication of the continuing positive impact of the Hib immunisation catch-up booster campaign launched in November 2005 (Figure 7). A routine Hib booster is now recommended for all children at 13 months of age. Ensuring high uptake of the Hib vaccine during infancy and a booster in the second year of life is recommended to provide continued protection of the population from invasive Hib disease. Individuals with risk conditions for Hib, regardless of age are also recommended the Hib vaccine.

Table 2. Number of *H. influenzae* cases notified in the fourth quarter of 2014, 2013 and 2012

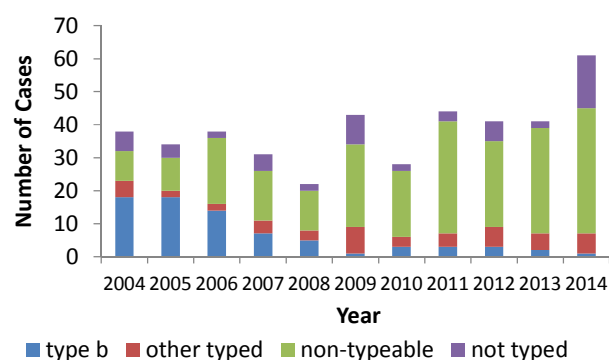
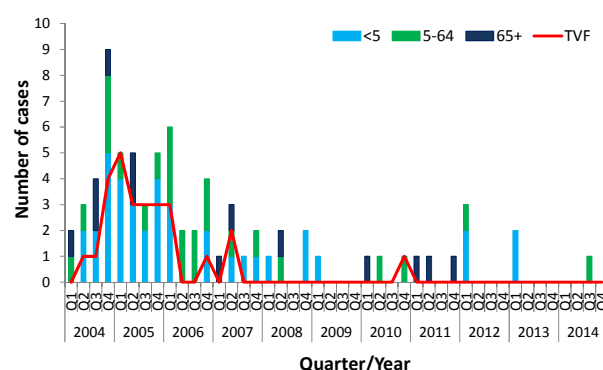
Number of cases	Q4-2012	Q4-2013	Q4-2014
All <i>H. influenzae</i>	10	7	16
All <i>H. influenzae</i> <5yrs	1	1	5
All <i>H. influenzae</i> ≥65yrs	3	2	3
<i>H. influenzae</i> type b	0	0	0
<i>H. influenzae</i> type b <5yrs	0	0	0
<i>H. influenzae</i> type b ≥65yrs	0	0	0
<i>H. influenzae</i> non-typeable	9	6	8
<i>H. influenzae</i> non-typeable <5yrs	0	1	1
<i>H. influenzae</i> non-typeable ≥65yrs	3	2	3

Table 3. Number of *H. influenzae* cases by clinical diagnosis notified in the fourth quarter, 2014, 2013 and 2012

Number of cases	Q4-2012	Q4-2013	Q4-2014	Total	Total (%)
Septicaemia	3	2	1	6	18.2%
Bacteraemia (without focus)	3	1	5	9	27.3%
Other	1	2	2	5	15.2%
Pneumonia	2	1	3	6	18.2%
Meningitis	1	0	2	3	9.1%
Epiglottitis	0	0	0	0	0.0%
Cellulitis	0	0	0	0	0.0%
Meningitis & septicaemia	0	0	0	0	0.0%
Osteomyelitis	0	0	0	0	0.0%
Septic arthritis	0	0	0	0	0.0%
Clinical diagnosis not reported	0	1	3	4	12.1%
Total	10	7	16	33	100%

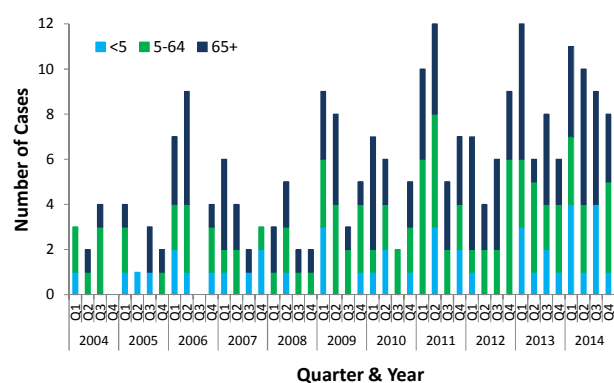
Table 4. Annual number of *H. influenzae* cases by clinical diagnosis and type of infection, 2014

Number of cases	Typed (b, e, f or not b)	Non-typeable	Not-typed	Total
Septicaemia	1	4	3	8
Bacteraemia (without focus)	0	0	0	0
Other	1	0	0	1
Pneumonia	0	5	2	7
Meningitis	0	0	0	0
Epiglottitis	0	0	0	0
Cellulitis	0	2	5	7
Meningitis & septicaemia	1	9	2	12
Osteomyelitis	0	0	0	0
Septic arthritis	3	10	2	15
Clinical diagnosis not reported	1	8	2	11
Total	7	38	16	61

**Figure 6.** Annual number of *H. influenzae* cases by type since 2004**Figure 7.** Quarterly number of Hib cases by age group and of true Hib vaccine failures (TVFs), since 2004

Non-typeable/non-capsulated *H. influenzae*

In Q4-2014 the number of non-typeable cases was eight, compared to an average of 7.3 cases in the same quarter between 2011 and 2013. Unlike Hib disease, non-typeable strains tend to occur more frequently in the ≥65 year old age group compared to the <5 year old group (Table 2). Of the 38 non-typeable cases reported in all of 2014, eight (21.1%) had no clinical diagnosis stated (Table 4). The emergence in 2014 of non-typeable/non-capsulated cases warrants continuing monitoring (Figure 8).

**Figure 8.** Quarterly number of non-typeable/non-capsulated cases by age group, since 2004

Acknowledgements

HPSC wishes to thank all who provided data for this report: Departments of Public Health, the Irish Meningococcal and Meningitis Reference Laboratory (IMMRL) and Epidemiology and Molecular Biology Unit (EMBU) in Temple Street Children's Hospital, National Virus Reference Laboratory (NVRL) and other Microbiology Laboratories

Appendices

Appendix 1. IMD Cases by Serogroup in Quarter 4, 1999- 2014

Serogroup	Q4-1999	Q4-2000	Q4-2001	Q4-2002	Q4-2003	Q4-2004	Q4-2005	Q4-2006	Q4-2007	Q4-2008	Q4-2009	Q4-2010	Q4-2011	Q4-2012	Q4-2013	Q4-2014
B	59	64	68	47	66	38	40	36	35	43	25	21	20	16	15	26
C	46	18	5	1	3	0	1	2	1	1	2	0	1	0	0	1
W135	1	1	0	0	1	1	0	0	1	0	0	1	0	0	0	0
Y	0	2	0	1	1	1	0	1	0	1	0	0	0	1	0	2
Non-groupable (NG)	3	3	0	1	2	1	0	0	0	0	0	0	0	0	0	0
No organism detected	23	20	3	8	2	2	2	5	0	3	4	2	0	4	5	1
Total	132	108	76	58	75	43	43	44	37	48	31	24	21	21	20	30

Appendix 2. IMD Cases by Quarter, 1999- 2014

Qr	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	1999-2014 change
Q1	174	175	115	82	73	66	72	73	57	55	52	52	35	24	23	24	-86.2%
Q2	120	134	86	60	38	47	57	55	44	31	33	23	24	13	25	21	-82.5%
Q3	110	98	53	53	51	42	31	37	41	34	31	15	14	8	13	7	-93.6%
Q4	132	108	76	58	75	43	43	44	37	48	31	24	21	21	20	30	-77.3%
Total	536	515	330	253	237	198	203	209	179	168	147	114	94	66	81	82	84.7%

Appendix 3. IMD Cases by HSE Area in Quarter 4, 1999-2014

HSE Area	Q4-1999	Q4-2000	Q4-2001	Q4-2002	Q4-2003	Q4-2004	Q4-2005	Q4-2006	Q4-2007	Q4-2008	Q4-2009	Q4-2010	Q4-2011	Q4-2012	Q4-2013	Q4-2014	Q4-2014 CIR*
E	54	37	27	15	29	16	12	11	16	12	11	13	10	4	5	12	0.74
M	3	8	6	3	5	1	3	1	5	2	1	1	3	0	3	4	1.42
MW	13	5	7	12	6	4	3	7	4	2	2	2	3	2	2	0	0.00
NE	16	13	5	6	4	3	7	5	4	5	3	0	0	0	1	6	1.36
NW	5	5	6	3	2	6	3	3	0	2	4	2	3	0	0	0	0.00
SE	10	18	4	5	6	4	2	8	3	9	3	3	0	9	5	1	0.20
S	22	19	14	11	16	7	8	8	3	11	3	3	1	2	3	2	0.30
W	9	3	7	3	7	2	5	1	2	5	4	0	1	4	1	5	1.12
Total	132	108	76	58	75	43	43	44	37	48	31	24	21	21	20	30	0.65

* CIR, crude incidence rate per 100,000

Appendix 4. IMD Cases by Age Group in Quarter 4, 1999-2014

Age Grp (Yrs)	Q4-1999	Q4-2000	Q4-2001	Q4-2002	Q4-2003	Q4-2004	Q4-2005	Q4-2006	Q4-2007	Q4-2008	Q4-2009	Q4-2010	Q4-2011	Q4-2012	Q4-2013	Q4-2014	Q4-2014 CIR*
<1	30	20	23	13	19	9	10	11	6	9	8	6	7	5	5	10	13.81
1-4	43	33	17	18	25	21	12	8	11	21	9	8	7	9	6	9	3.17
5-9	14	11	11	7	7	3	4	0	7	1	3	1	2	1	3	2	0.62
10-14	8	16	7	4	1	1	3	4	2	3	1	1	2	1	0	2	0.66
15-19	16	17	9	7	12	6	7	10	3	6	4	5	1	3	2	1	0.35
20-24	8	4	2	1	6	2	2	3	3	5	2	0	0	0	0	1	0.34
25-34	2	2	3	1	2	0	1	1	4	2	1	1	0	2	0	2	0.26
35-44	4	1	0	1	0	1	1	0	0	0	2	0	0	0	2	1	0.14
45-54	3	3	0	1	2	0	0	3	0	1	0	0	2	0	0	0	0.00
55-64	2	0	0	3	1	0	2	2	0	0	0	0	0	0	1	0	0.00
65+	1	1	4	2	0	0	0	2	1	0	1	2	0	0	1	2	0.37
Total	132	108	76	58	75	43	43	44	37	48	31	24	21	21	20	30	0.65

* CIR, crude incidence rate per 100,000

Appendix 5. Deaths associated with IMD by Serogroup in Quarter 4, 1999-2014

Serogroup	Q4-1999	Q4-2000	Q4-2001	Q4-2002	Q4-2003	Q4-2004	Q4-2005	Q4-2006	Q4-2007	Q4-2008	Q4-2009	Q4-2010	Q4-2011	Q4-2012	Q4-2013	Q4-2014
B	4	1	2	2	3	1	0	0	1	1	2	0	0	0	0	2
C	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1
W135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Y	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-groupable (NG)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No organism detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	4	4	3	2	3	1	0	0	1	1	2	0	0	0	0	3

Appendix 6. Other Bacterial Meningitis Cases by Causative Organism (Specified and Not Otherwise Specified) in Quarter 4, 2004-2014 (excluding IMD and *Haemophilus influenzae*)

Causative organism	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2004-2014
<i>Leptospira</i> spp.	1	0	0	0	1	1	0	0	0	0	0	3
<i>Listeria</i> spp.	1	0	0	0	1	0	0	0	1	1	0	4
<i>Mycobacterium tuberculosis</i> #	2	3	2	1	1	4	1	1	1	0	0	16
<i>Streptococcus pneumoniae</i>	n/a	n/a	n/a	n/a	5	9	4	5	5	11	11	50
<i>Streptococcus agalactiae</i> *	na	na	na	na	na	na	na	na	4	1	0	5
<i>Streptococcus pyogenes</i>	0	0	0	0	0	0	1	0	0	0	0	1
<i>Enterococcus</i> spp.	0	0	0	0	0	0	0	0	0	0	1	1
<i>Escherichia coli</i>	0	0	1	0	6	2	2	0	2	3	2	18
Group C <i>Streptococcus</i>	0	0	0	0	0	0	0	0	1	0	0	1
<i>Klebsiella oxytoca</i>	0	0	0	0	0	0	0	1	0	0	0	1
<i>Mycoplasma pneumoniae</i>	0	0	0	0	0	0	1	0	0	0	0	1
<i>Proteus mirabilis</i>	0	0	0	1	0	0	0	0	0	0	0	1
<i>Serratia liquefaciens</i>	0	0	0	0	1	0	0	0	0	0	0	1
<i>Staphylococcus aureus</i>	0	0	0	0	1	0	1	1	0	0	0	3
<i>Streptococcus agalactiae</i>	0	2	0	4	2	1	4	2	0	1	1	17
Unknown	3	6	6	5	9	5	5	4	5	6	3	57
Total	7	11	9	11	27	22	19	14	19	23	18	180

#TB meningitis figures for 2013 and 2014 are provisional

**Streptococcus agalactiae* causing meningitis aged < 90 days old notifiable under the disease category Streptococcus Group B infection (invasive) after 01/01/2012

†All *Streptococcus agalactiae* causing meningitis cases notifiable under the disease category Bacterial Meningitis (NOS) except after 01/01/2012 when cases aged ≥90 days old only notifiable

n/a not available-details of meningitis-related *Streptococcus pneumoniae* currently not complete on CIDR for the years 2004-2007

na not applicable for the years prior to 2012

Appendix 7. Viral Meningitis Cases, Not Otherwise Specified, by Causative Organism in Quarter 4, 2004-2014

Causative Organism	Q4-2004	Q4-2005	Q4-2006	Q4-2007	Q4-2008	Q4-2009	Q4-2010	Q4-2011	Q4-2012	Q4-2013	Q4-2014
enterovirus	0	0	32	7	20	11	30	51	24	87	59
human herpes virus type 6	0	0	0	0	0	3	3	13	3	6	5
parechovirus	0	0	0	0	0	0	0	0	0	0	12
varicella & varicella zoster	0	0	1	0	1	2	1	1	3	0	4
herpes simplex virus	0	0	0	2	3	1	3	3	0	3	4
echovirus	0	0	0	0	0	0	0	1	0	0	0
coxsackievirus	0	1	0	0	0	0	0	0	0	0	0
adenovirus	0	0	0	0	0	0	0	0	1	0	0
not specified	3	4	2	4	9	5	7	4	2	4	7
Total	3	5	35	13	33	22	44	73	33	100	91
% enterovirus	0.0%	0.0%	91.4%	53.8%	60.6%	50.0%	68.2%	69.9%	72.7%	87.0%	64.8%
% known organism	0.0%	20.0%	94.3%	69.2%	72.7%	77.3%	84.1%	94.5%	90.9%	96.0%	92.3%

Appendix 8. *H. influenzae* Cases by Type in Quarter 4, 2004-2014

Type	Q4-2004	Q4-2005	Q4-2006	Q4-2007	Q4-2008	Q4-2009	Q4-2010	Q4-2011	Q4-2012	Q4-2013	Q4-2014
b	9	5	4	2	2	0	1	1	0	0	0
e	0	0	0	1	0	0	0	0	0	0	0
f	0	1	0	0	1	0	0	1	1	1	2
Not type b	0	0	0	0	0	1	0	1	0	0	2
Non-typeable/non-capsulated	0	2	4	3	2	5	5	7	9	6	8
Not typed	2	2	0	0	1	2	0	0	0	0	4
Total	11	10	8	6	6	8	6	10	10	7	16

Appendix 9. *H. influenzae* Cases by Quarter, 2004-2014

Quarter	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2004-2014 change
Q1	8	11	15	9	6	19	10	11	16	18	16	+100%
Q2	5	7	12	11	8	12	9	16	5	7	14	+180%
Q3	14	6	3	5	2	4	3	7	10	9	15	+7.1%
Q4	11	10	8	6	6	8	6	10	10	7	16	+45.5%
Total	38	34	38	31	22	43	28	44	41	41	61	+60.5%
<i>Meningitis</i>	4	9	4	2	3	3	2	4	3	2	7	-
<i>Type b meningitis</i>	4	7	3	1	1	0	1	0	1	0	0	-

Appendix 10. *H. influenzae* Cases by HSE Area in Quarter 4, 2004-2014

HSE Area	Q4-2004	Q4-2005	Q4-2006	Q4-2007	Q4-2008	Q4-2009	Q4-2010	Q4-2011	Q4-2012	Q4-2013	Q4-2014
E	7	4	3	1	4	1	2	3	6	4	5
M	0	1	0	1	0	0	0	0	0	1	1
MW	1	1	0	2	0	2	1	1	1	0	3
NE	0	1	0	0	0	1	1	1	0	1	0
NW	0	0	2	0	0	0	0	1	0	0	1
SE	0	0	1	1	0	1	1	1	2	0	3
S	3	1	1	0	1	0	1	1	1	1	2
W	0	2	1	1	1	3	0	2	0	0	1
Total	11	10	8	6	6	8	6	10	10	7	16

Appendix 11. *H. influenzae* Cases by Age Group in Quarter 4, 2004-2014

Age Group	Q4-2004	Q4-2005	Q4-2006	Q4-2007	Q4-2008	Q4-2009	Q4-2010	Q4-2011	Q4-2012	Q4-2013	Q4-2014
0-5mo	1	1	2	1	2	2	0	1	0	0	2
6-11 mo	0	0	0	0	1	0	0	0	0	1	0
1-2 yrs	3	2	1	2	0	0	0	1	1	0	1
3-4 yrs	1	1	0	1	0	0	1	0	0	0	2
5-9 yrs	0	1	1	0	1	1	0	1	1	0	0
10-14 yrs	0	0	0	0	0	1	1	0	0	0	1
15-19 yrs	0	1	0	0	0	0	0	0	2	0	1
20-24 yrs	0	0	1	0	0	0	0	0	0	0	0
25-34 yrs	1	0	0	2	0	1	0	0	0	1	1
35-44 yrs	1	1	1	0	0	0	0	1	1	0	2
45-54 yrs	1	1	0	0	0	0	2	0	0	0	1
55-64 yrs	1	1	1	0	1	1	0	1	2	3	2
65+ yrs	2	1	1	0	1	2	2	5	3	2	3
Total	11	10	8	6	6	8	6	10	10	7	16

Notes regarding invasive IMD and other bacterial meningitis notifications:

- The collection of specimens for all bacterial meningitis diagnostic testing should be performed as per recommendations outlined in the HPSC's 'Guidelines for the Early Clinical and Public Health Management of Bacterial Meningitis (including Meningococcal Disease). Report of the Scientific Advisory Committee of HPSC' published in January 2012, a copy of which is available at: <http://www.hpsc.ie/A-Z/VaccinePreventable/BacterialMeningitis/Guidance/File,12977.en.pdf>
- An enhanced surveillance form should be completed for each notification. A copy is available at: <http://www.hpsc.ie/A-Z/VaccinePreventable/BacterialMeningitis/SurveillanceForms/File,1832.en.pdf>.

Notes regarding invasive viral meningitis notifications:

- The collection of specimens for viral meningitis diagnostic testing should be performed as per recommendations in the NVRL's user manual, which is available at: http://nvrl.ucd.ie/sites/default/files/uploads/pdfs/NVRL_USER_MANUAL_13.0.pdf.

Notes regarding invasive *H. influenzae* notifications:

- Serotype should be determined for all isolates, regardless of patient age, and the results reported to HPSC.
- For all type b cases born since 1987, Hib vaccination status should be ascertained and the vaccine details reported to HPSC.
- On time Hib vaccinations (at 2, 4, 6 and 13 months of age) are strongly recommended to prevent unnecessary Hib disease occurring in children. Older children/adults with risk conditions (asplenia/hyposplenism/complement deficiency) are recommended the Hib vaccine (two doses, at least two months apart).
- An enhanced surveillance form should be completed for each Hib notification. A copy is available at: <http://www.hpsc.ie/A-Z/VaccinePreventable/Haemophilusinfluenzae/SurveillanceForms/File,1847.en.pdf>.