

2014

ANNUAL EPIDEMIOLOGICAL REPORT



Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive



Table of Contents

Introduction	4
Scientific Advisory Committee	6
Subgroups and Committees	7
Staff List	12
1.0 Vaccine Preventable Diseases	13
1.1 <i>Haemophilus influenzae</i> (invasive)	14
1.2 Measles	18
1.3 Meningococcal disease	21
1.4 Mumps	26
1.5 Other forms of Bacterial Meningitis	29
1.6 Pertussis	32
1.7 Rubella	35
1.8 <i>Streptococcus pneumoniae</i> (invasive)	36
1.9 Tetanus	41
2.0 Respiratory and Direct Contact Diseases	43
2.1 Influenza and other Seasonal Respiratory Viruses	44
2.2 Legionellosis	50
2.3 Invasive Group A Streptococcal Disease	51
2.4 Invasive Group B Streptococcal Infections	56
2.5 Tuberculosis, 2014 and outcome data for 2013	57
2.6 Chickenpox-hospitalised cases	60
3.0 Infectious Intestinal Diseases	61
3.1 Campylobacter	62
3.2 Cryptosporidiosis	64
3.3 Verotoxigenic <i>E. coli</i>	68
3.4 Hepatitis A	75
3.5 Rotavirus	77
3.6 Salmonella	79
3.7 Less common gastroenteric infections	82
3.8 Shigellosis	84
4.0 Vectorborne and Zoonotic Diseases	87
4.1 Malaria	88
4.2 Leptospirosis	90
4.3 Other Notifiable Non-IID Zoonotic Diseases	92
4.4 Other Vectorborne Diseases	93

5.0	Blood-borne and Sexually Transmitted Infections	94
5.1	Hepatitis B	95
5.2	Hepatitis C	99
5.3	HIV	102
5.4	Voluntary antenatal HIV testing in Ireland: 2014	104
5.5	Sexually Transmitted Infections, 2014	105
5.6	Syphilis, 2014	107
6.0	Other Infections	110
6.1	Viral Encephalitis	111
6.2	Viral Meningitis	113
6.3	Creutzfeldt-Jakob disease	116
7.0	Infectious Disease Outbreaks	117
8.0	Immunisation Uptake	122
8.1	Immunisation uptake at 12 and 24 months of age	123
8.2	HPV vaccine uptake 2013/2014	130
8.3	Seasonal Influenza Vaccine Uptake in Hospitals & Long Term Care Facilities	136
8.4	Uptake of other childhood and adolescent vaccines	139
9.0	Healthcare-Associated Infections, Antimicrobial Consumption and Resistance	144
9.1	<i>C. difficile</i> Infection	145
9.2	Alcohol Hand Rub Surveillance	150
9.3	Hand Hygiene Compliance	151
9.4	Antimicrobial Consumption	153
9.5	Antimicrobial Resistance	156
	Enhanced surveillance of Carbapenem Resistant Enterobacteriaceae (CRE)	168
10.0	Computerised Infectious Disease Reporting (CIDR) system	171
Appendix 1 Notifiable Infectious Diseases in Ireland		174
Explanatory Notes		185
Glossary of Terms		189

Introduction



As always, it is a pleasure to present the Health Protection Surveillance Centre epidemiological report which provides an analysis of the most important infectious diseases affecting Ireland during 2014.

In Ireland, the 2014/2015 influenza season was more severe than recent seasons. Influenza A (H3N2) viruses predominated, with an increase in the predominance of influenza B viruses later in the season. The impact of influenza during the 2014/2015 season predominantly affected those aged 65 years and older. This was seen by the large numbers of outbreaks in residential care facilities, high hospitalisation rates, an increase in deaths reported in notified influenza cases and excess mortality which was significantly higher than recent seasons. Over 1,000 confirmed influenza cases were reported as hospitalised during the 2014/2015 season, a similar number to the 2009 pandemic. There was a significant increase in the overall hospitalisation rate for those aged 65 years and older compared to previous seasons, reaching the highest rate (81.4/100,000 population) ever reported for this age group. As most of those with complications from influenza do not get tested for influenza infection, another way to see the impact of influenza is to examine the excess deaths that occur while influenza is circulating. The estimated number of excess deaths reported during the 2014/2015 season for those aged 65 years and older in Ireland was 726. It is likely that influenza contributed significantly to these excess deaths, although adverse winter weather conditions and other respiratory infections may have also contributed.

In Ireland and most Northern Hemisphere countries, the emergence of A(H3N2) viruses antigenically and genetically drifted from the 2014/2015 vaccine strain resulted in reduced vaccine effectiveness (VE). The Irish overall adjusted VE in preventing confirmed influenza infection in primary care was very low. Excess all-cause mortality among people aged 65 years and older, concomitant with increased influenza activity and the predominance of

drifted A(H3N2) viruses was observed in Ireland for nine consecutive weeks between weeks 2 and 10 2015.

Antimicrobial resistance remains one of the priority challenges facing the Irish healthcare services. For the eighth consecutive year, the proportion of *S. aureus* bloodstream infections (BSI) attributable to methicillin resistant *S. aureus* (MRSA) further declined to 19.5%, the lowest reported level since Ireland joined EARS-Net in 1999. Unfortunately, antimicrobial resistance in other important BSI causative pathogens increased further and remains a cause for concern. Following the establishment of the national multi-drug resistant *K. pneumoniae* (MDRKP) outbreak control team (OCT) in 2013 to look at the emerging problem of MDRKP, initial recommendations were made to try to control the spread of MDRKP strains in healthcare settings. A welcome reduction in the proportion of *K. pneumoniae* BSI that were MDRKP was seen in 2014 (to 8.1% of isolates) and this may be in part due to some of the control measures put in place during 2014. However, many of the recommendations have still not been fully implemented and the OCT proposed that a national task force should be established with greater powers to influence and implement changes in policy and infrastructure needed. This task force has been established in 2015 and is working to strengthen control measures in both acute and non-acute healthcare settings. The findings of biannual hand hygiene compliance audit reports from acute hospitals in 2014, reported continued improvement to 86% compliance, but this fell short of the 90% compliance target set by HSE.

As well as improvements in the proportions of MRSA BSI, there were small improvements in *Clostridium difficile* infections that were categorised as healthcare-associated. (2.3 cases per 10,000 bed days used, a decrease from 2.4 in 2013).

There was a small improvement in the rates of antimicrobial consumption in both the community and acute hospital settings, but further work is required to restrict the use of certain antibiotics for essential care and the new HSE task force addressing the MDRKP outbreak will issue recommendations on this in the near future.

There were 33 reported cases (20 confirmed) of measles in 2014 – the lowest number since reporting began in 1948. There were no confirmed rubella cases and one probable case which was acquired outside Ireland. This reflects the excellent progress made in improving immunisation coverage with MMR vaccine, now at 93% almost reaching the 95% target. Unfortunately the mumps component of this vaccine has not been as successful in controlling mumps and there were over 740 cases reported in 2014, with the highest number of cases reported in 15-24 year olds. Chickenpox (Varicella) is a childhood infection that is now prevented through the use of a vaccine in many countries (not yet routinely used in Ireland). Chickenpox can be associated with serious complications and 61 cases required hospitalisation in 2014. Seven cases of varicella were complicated by invasive group A streptococcal disease (iGAS), a life threatening bacterial infection.

In 2014, the incidence of tuberculosis continued to fall in Ireland with 318 cases notified (incidence rate of 6.9/100,000). The rate in the indigenous Irish born population was lower again at 4.7 per 100,000. This decline has prompted a review of the need for universal BCG vaccination and it is likely that universal BCG vaccination will be discontinued in the near future.

Campylobacter infection remains the commonest cause of bacterial gastroenteritis in Ireland and Europe. Rotavirus is the commonest viral cause of gastroenteritis in children. Again a vaccine is available and hopefully the rotavirus vaccine will shortly be introduced into the vaccination schedule to protect Irish children. Shigella is a bacterial cause of gastroenteritis and affected 57 people in Ireland in 2014.

Hepatitis C remains the most significant infectious cause of liver disease in Ireland with 710 cases notified in 2014. There have been major advances in the treatment of hepatitis C in recent years and there is cautious optimism that the national programme of treatment established in the HSE in 2015 will avert the serious complications such as cirrhosis and cancer of the liver in many of those affected.

There was an increase in the number of people notified with HIV infection in 2014 – 377 cases an 11% increase from 2014. It is of concern that the number of new diagnoses among men who have sex with men has trebled (from 60 to 183) in the last ten years. Recent initiatives offering screening to attendees of some emergency departments in Dublin may result in earlier detection in those who may otherwise be unaware of their infection.

Four hundred and thirty five outbreaks of infectious disease were investigated by Departments of Public Health throughout the country. The highest numbers ill were

reported from nursing homes, community hospitals and acute hospitals.

As alluded to with measles immunisation, coverage for all vaccines in the childhood schedule continues to improve and for the fourth consecutive year exceeded the target of 95% for the 6in-1 vaccine given to infants. Almost 85% of girls in first year in the 2013/2014 academic year were vaccinated against HPV infection which reflects a great collaboration of those working in school immunisation teams, administrative staff and those working nationally in the National Immunisation Office. We still have a long way to go to improve influenza vaccine coverage in healthcare workers (HCW) – while not advocating mandatory HCW vaccination as they do in the US we do advocate mandatory assessment of coverage data in all acute and long term care facilities (LTCF). Not all hospitals and LTCF report their data and in those that do not all staff report their flu vaccination status. Well done to the four hospitals and 24 LTCF who reached the 40% target last year.

Well done also to the CIDR team who maintained IS27001 Information Security Accreditation in 2014. Maintenance of this standard is vital to ensuring the information security of the data we hold on infectious diseases and essential to reassure our partners and the public of the importance of the privacy and confidentiality of their data.

Once again, I would like to express my gratitude to all those who provide data and participate in committees and to staff in HPSC and elsewhere in the HSE. This report is a testament to all of those who are managing to do more with less and continue to support the prevention and control of infectious disease in Ireland.

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20
14

ANNUAL
EPIDEMIOLOGICAL
REPORT



01

VACCINE PREVENTABLE DISEASES

1.1 *Haemophilus influenzae* (invasive)

Summary

Number of cases, 2014: 61
 Number of cases, 2013: 41
 Number of cases, 2012: 41
 Crude incidence rate, 2014: 1.3/100,000

In 2014, 61 cases of invasive *Haemophilus influenzae* disease were notified in Ireland (1.3/100,000 total population). This is a 48.8% increase on the number reported in the previous year. The annual average between 2004 (when *H. influenzae* first became a notifiable disease) and 2013 was 36 (figure 1). No imported cases were reported in 2014.

The main change in 2014, when compared to 2013, is the increase in the number of non-typeable/non-capsular strains from 32 to 38, not typed PCR only diagnosed cases from one to eight and of not typed cases from one to seven (figure 1).

Non-typeable/non-capsular cases accounted for the

majority of the invasive *H. influenzae* cases notified in 2014 (62.3%, n=38/61). The remaining cases were due to *H. influenzae* type f (8.2%; n=5), 'not type b' (3.3%; n=2), type b (1.6%; n=1) and isolates that were not typed (24.5%; n=15), of which eight (13.1%) were diagnosed by PCR testing only. The median age of cases was 44 years (range three days to 95 years). The incidence rates were highest in infants <1 year (16.6/100,000) and those aged 1 to 4 years (3.5/100,000) (table 1).

Cases occurring in children <10 years of age (n=23) and in elderly adults (65 years of age and older (n=21)) accounted for 72.1% of all invasive *H. influenzae* notifications in 2014 (table 1). One notable trend since 2004 is the increase in the overall proportion of cases 65+ years of age from 26.3% to 34.4% in 2014 compared to the decline in those aged between 5 and 64 years from 47.4% to 29.5%.

In 2014, the highest frequency of cases tend to occur in the 0-4 year age group, after which it falls sharply

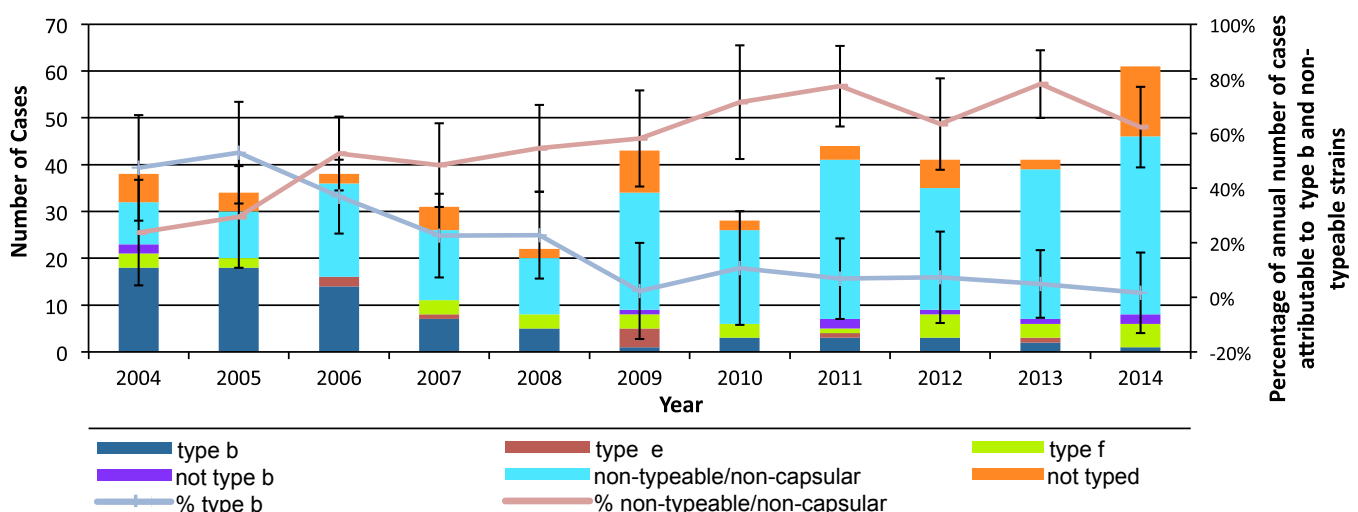


Figure 1. Number of invasive *H. influenzae* cases and proportion of cases attributable to type b and non-typeable strains with 95% confidence intervals, Ireland, 2004-2014

before increasing again among those aged 65+ years (table 1), consistent with what has been observed since 2004 (figure 2).

In 2014 the number of male cases (n=38) substantially exceeded that of females (n=22) (male to female ratio of 1.7:1.0), and for one case no gender details were reported. This M:F ratio was considerably higher than the 0.4:1.0 ratio recorded in 2013 (figure 3) which is atypical and is explained by the unusually large number in that year of non-typeable infections reported among females (n=23) compared to males (n=9), especially in the >65 year age group. Between 2004 and 2014, there were 132 and 109 cases of non-typeable cases among males and females, respectively, giving a M:F ratio of 1.2:1.0.

Between 2005 and 2011, the fewest quarterly number of cases has consistently been in the third quarter, but since 2012 that pattern no longer applies (figure 3).

Incidence of disease in 2014 was highest in the HSE SE area (2.41/100,000) with the lowest in the HSE NW area (0.39/100,000) (table 2). No HSE area had an incidence rate that was significantly different from the national rate (figure 4).

A breakdown by clinical diagnosis for all cases by age group between 2004 and 2014 is presented in Table 3. In 2014, 16.4% (n=10/61) of cases did not have a clinical diagnosis recorded.

Seven deaths were reported among the 61 cases in 2014; three were not caused by the infection; and the cause of death was not recorded for the remaining four cases. The age range was 36 to 95 years. Four non-typeable, two type f and one type b infection were recorded with these deaths.

In 2014, one case of *H. influenzae* type b (Hib) occurred in a 60-64 year old with an unknown vaccination status, no risk factors were identified. In the previous year, two

Table 1. Number and incidence rates of invasive *H. influenzae* cases by serotype and age group, Ireland, 2014

Age Group	Type b	Type e	Type f	Not type b	Non-typeable/ non-capsular	Not Typed, PCR only diagnosis	Not Typed	Total	ASIR of <i>H. influenzae</i> type b	ASIR of all <i>H. influenzae</i>
<1	0	0	1	1	5	4	1	12	0.00	16.57
1-4	0	0	1	0	5	2	2	10	0.00	3.52
5-9	0	0	0	0	0	1	0	1	0.00	0.31
10-14	0	0	0	0	1	0	0	1	0.00	0.33
15-19	0	0	0	0	1	0	0	1	0.00	0.35
20-24	0	0	1	0	0	0	0	1	0.00	0.34
25-34	0	0	0	1	1	0	0	2	0.00	0.26
35-44	0	0	0	0	3	0	1	4	0.00	0.58
45-54	0	0	1	0	1	0	0	2	0.00	0.35
55-64	1	0	1	0	3	1	0	6	0.22	1.30
65+	0	0	0	0	18	0	3	21	0.00	3.92
All Ages	1	0	5	2	38	8	7	61	0.02	1.33
CIR	0.02	0.00	0.11	0.04	0.83	0.17	0.15	1.33	-	-

CIR, crude incidence rate per 100,000 total population; ASIR, age specific incidence rate per 100,000 population

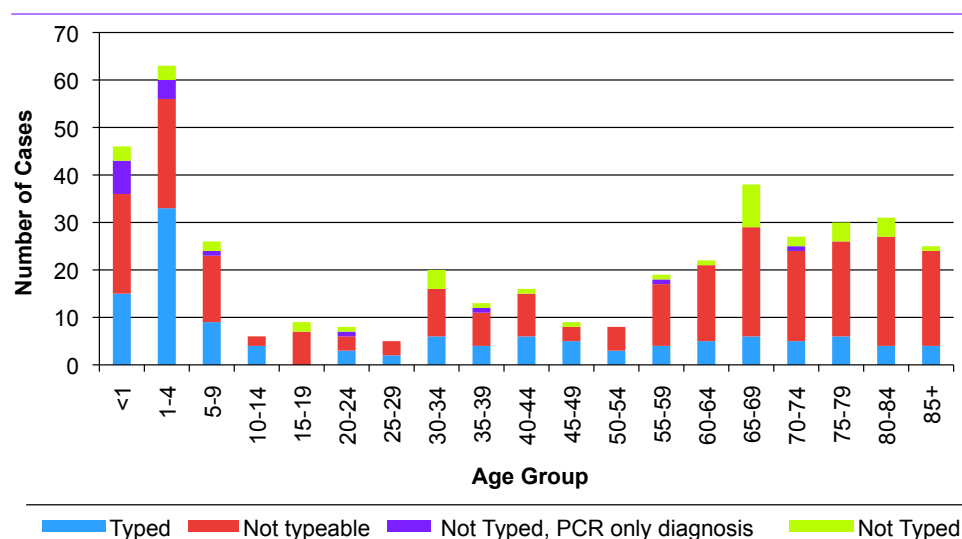


Figure 2. Number of *H. influenzae* cases by agegroup and type*, Ireland, 2004-2014

* Typed includes b, e, f, not-b

Table 2. Incidence rates per 100,000 population of invasive *H. influenzae* by HSE area, Ireland, 2004-2014

HSE Area	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
HSE E	1.07	1.00	0.87	0.80	0.53	0.74	0.56	1.11	1.11	0.62	0.99
HSE M	1.19	1.19	0.40	1.19	0.79	1.06	0.35	1.06	0.35	1.42	1.77
HSE MW	0.83	0.28	0.83	0.55	0.83	2.11	0.53	0.53	1.05	0.79	2.11
HSE NE	0.25	1.27	0.25	0.00	0.00	0.23	0.45	1.59	0.91	1.36	1.59
HSE NW	0.42	0.00	2.11	0.42	0.00	0.39	0.39	0.77	0.77	1.16	0.39
HSE SE	1.08	0.43	0.87	1.08	0.65	1.00	1.00	0.80	1.21	1.00	2.41
HSE S	1.13	0.32	1.29	0.32	0.64	1.20	1.05	0.30	0.60	0.90	1.20
HSE W	0.48	1.45	0.72	1.45	0.48	1.12	0.22	1.35	0.45	0.90	0.90
Ireland	0.90	0.80	0.90	0.73	0.52	0.94	0.61	0.96	0.89	0.89	1.33

Table 3. Number of invasive *H. influenzae* cases by clinical diagnosis, Ireland, 2004-2014

Clinical Diagnosis	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	% 2014
Septicaemia	8	14	13	6	3	9	9	11	11	14	15	24.6%
Pneumonia	5	0	3	6	3	8	5	12	12	4	12	19.7%
Meningitis	3	9	3	2	2	2	1	3	2	2	7	11.5%
Bacteraemia (w/o focus)	1	0	1	1	2	0	0	3	5	6	9	14.8%
Other	1	2	1	0	0	0	0	3	4	7	7	11.5%
Epiglottitis	1	3	3	1	1	0	2	0	0	3	1	1.6%
Cellulitis	1	1	2	1	1	0	0	1	0	0	0	0.0%
Meningitis & Septicaemia	1	0	1	0	1	1	1	1	1	0	0	0.0%
Osteomyelitis	1	0	0	0	0	0	0	0	0	0	0	0.0%
Septic arthritis	0	1	0	0	1	0	0	0	0	0	0	0.0%
Not specified	16	4	11	14	8	23	10	10	6	5	10	16.4%
Total	38	34	38	31	22	43	28	44	41	41	61	100%
% Known	57.9%	88.2%	71.1%	54.8%	63.6%	46.5%	64.3%	77.3%	85.4%	87.8%	83.6%	-

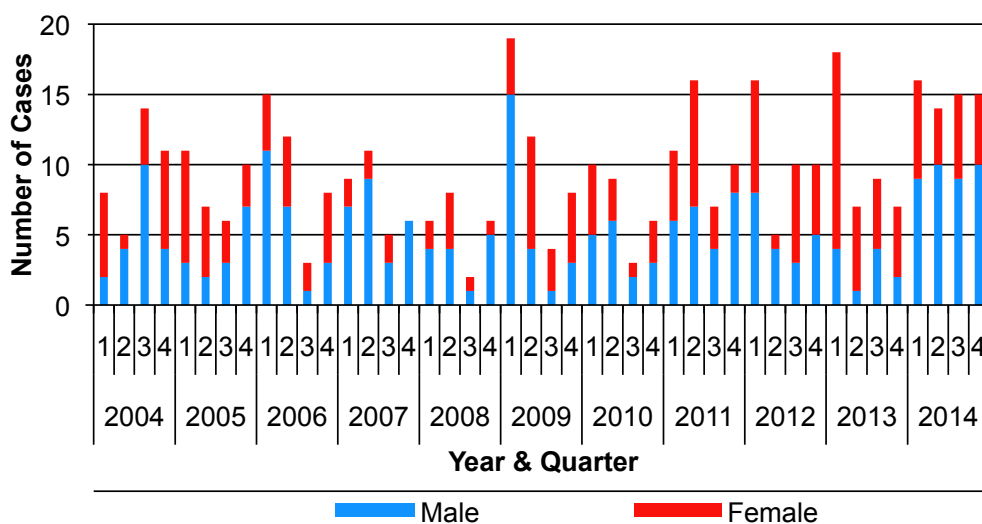


Figure 3. Number of *H. influenzae* cases by year/quarter and gender, Ireland, 2004-2014

cases of Hib occurred, both were two years of age and both were unvaccinated.

Between Q3-2007 and Q4-2014, a seven and a half year period, only one true Hib vaccine failure was reported, highlighting the continuing positive impact that the Hib booster catch up campaign has had in Ireland.

Since September 2008, the Hib booster dose has been administered at 13 months of age as part of the routine childhood immunisation schedule in addition to the three doses given during infancy (at 2, 4 and 6 months of age). Furthermore, vaccination is routinely recommended for those at increased risk of Hib disease due to underlying medical conditions or treatments.

In September 2014, a mother and baby pair of *H. influenzae* type f cases were reported, both of whom had septicaemia, but recovered. Type f *H. influenzae* was isolated from a placental swab.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 13th August, 2015. These figures may differ from those published previously due to on-going updating of notification data on CIDR.

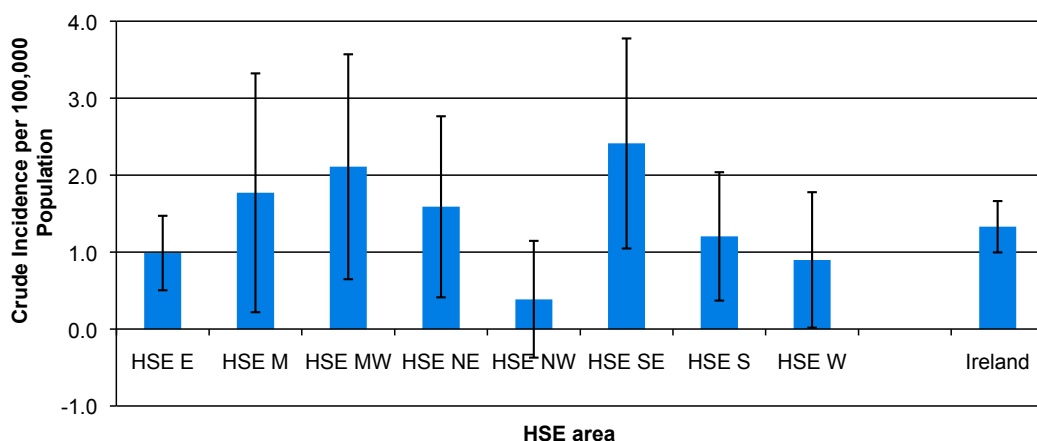


Figure 4. Crude incidence rates per 100,000 population with 95% confidence intervals for *H. influenzae* notifications by HSE area, Ireland, 2014

1.2 Measles

Summary

Number of cases, 2014: 33
 Number of confirmed cases, 2014: 20
 Crude incidence rate, 2014: 0.7/100,000
 Crude confirmed incidence rate, 2014: 0.4/100,000

There were 33 measles cases (0.7/100,000) in 2014. This is the lowest annual number reported since 1948 (figures 1 and 2).

Fifteen (45%) of the cases in 2014 were linked to an outbreak associated with a university/college. Of the 15 cases, 12 were in the HSE W and three were in the

HSE S. The cases ranged in age from 14 years to 33 years with a median age of 19 years and a mean age of 20 years. Eleven (73%) of the cases were unvaccinated, one (7%) had received one dose of MMR and three (20%) were reported to have received two doses. Of the cases reported to have received two doses of MMR vaccine only one had both vaccination dates reported. Of the 15 cases, ten were classified as confirmed and five were classified as probable. Measles virus from four of the cases were genotyped by the NVRL and all were genotype D8.

Two other localised measles outbreaks were notified during 2014. One of these was an outbreak in a workplace with two ill. One of the cases in this outbreak

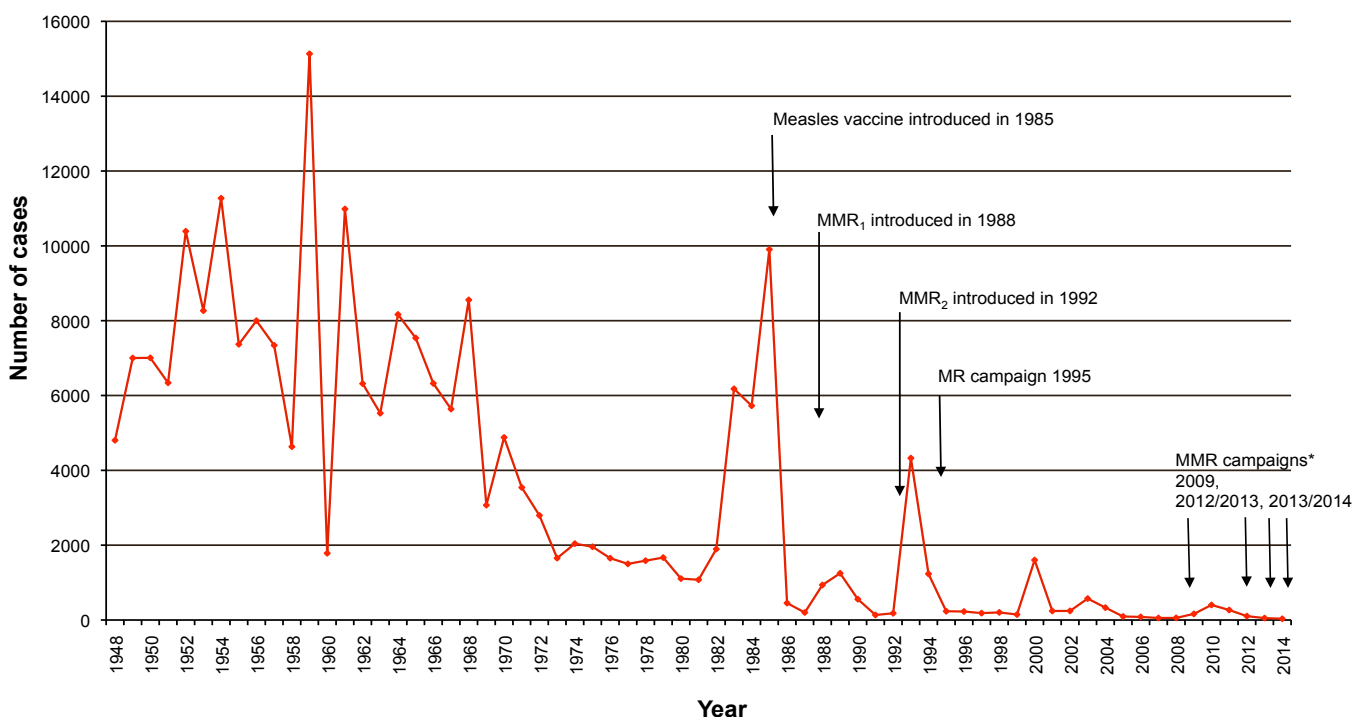


Figure 1. Annual number of measles cases in Ireland 1948-2014, the year of introduction of the measles vaccine and the measles mumps rubella (MMR) vaccine and vaccination campaigns years

A measles and rubella (MR) campaign for primary school age children was conducted in 1995

*A MMR vaccination campaign started in April 2009 for students in fourth, fifth and sixth year of second level schools

*A MMR catch-up campaign was conducted during the 2012/2013 and 2013/2014 academic years for children/students attending primary schools, second level schools and special schools and home-schooled students who had not completed (or were not sure they had) their two dose MMR vaccination schedule.

MMR₁-first dose of MMR

MMR₂-second dose of MMR

1948-June 2000 data collated by DoHC

July 2000-2014 data collated by HPSC

occurred in 2013 and was therefore in the 2013 data and 2013 annual report. The cases were in the age groups 25-34 years and 35-44 years and the vaccination status of both cases was reported as unknown. Measles virus from both of these cases was genotyped by the NVRL and both were genotype D8.

The remaining outbreak was associated with a private house with two ill. Both cases were laboratory confirmed. These cases were in the age groups 20-24 years and 25-34 years and both were unvaccinated.

Measles cases by HSE Area are shown in table 1. The largest number (45%, n=15/33) of cases in 2014 and the highest crude incidence rate was in the HSE W (table 1). The majority of the cases in the HSE W (80%, n=12/15) and the HSE S (75%, n=3/4) were linked to the university/college outbreak.

Of the 33 measles cases 24% (n=8) were classified as possible, 15% (n=5) were classified as probable while 61% (n=20) were classified as confirmed, giving a crude confirmed incidence rate of 0.4 per 100,000 population.

The cases ranged in age from six months to 37 years; with a median age of 19 years and a mean age of 16 years. The number of cases by age group and the age specific incidence rates are shown in figures 3 and 4. Seventy one per cent (n=15/21) of the cases aged 10-34 years were linked to the university/college outbreak. Of the 33 measles cases, 67% (n=22) were male and 33% (n=11) were female.

Laboratory results were provided for 25 cases in 2014. Sixty one per cent (n=20/33) of cases were laboratory test positive for measles. Three cases were laboratory negative for measles, however, for all three of these the specimens were not taken at the optimal time following disease onset. For two cases the laboratory tests were inconclusive for measles.

Isolates from eight cases were genotyped by the NVRL. Five were genotype D8, four of these had country of infection recorded as Ireland, while for one the country of infection was recorded as unknown. Three cases were genotype B3; the country of infection of these cases was Philippines (n=2) and Japan (n=1).

Of the 33 cases, the country of infection was recorded as Ireland for 15 cases, Philippines for two cases, Japan for one case and was unknown or not reported for the remainder.

Measles vaccine in Ireland is available as part of the combined Measles-Mumps-Rubella (MMR) vaccine. In Ireland, vaccination with the first dose of MMR is routinely recommended at twelve months of age and the second dose at four to five years of age. A MMR catch up campaign started in the academic year 2012/2013 and continued during the academic year 2013/2014. During the MMR catch up campaign the HSE offered a dose of MMR vaccine to children/ students attending primary schools, second level schools and special schools and home-schooled students who had not completed (or were not sure they had) their two dose MMR vaccination schedule.

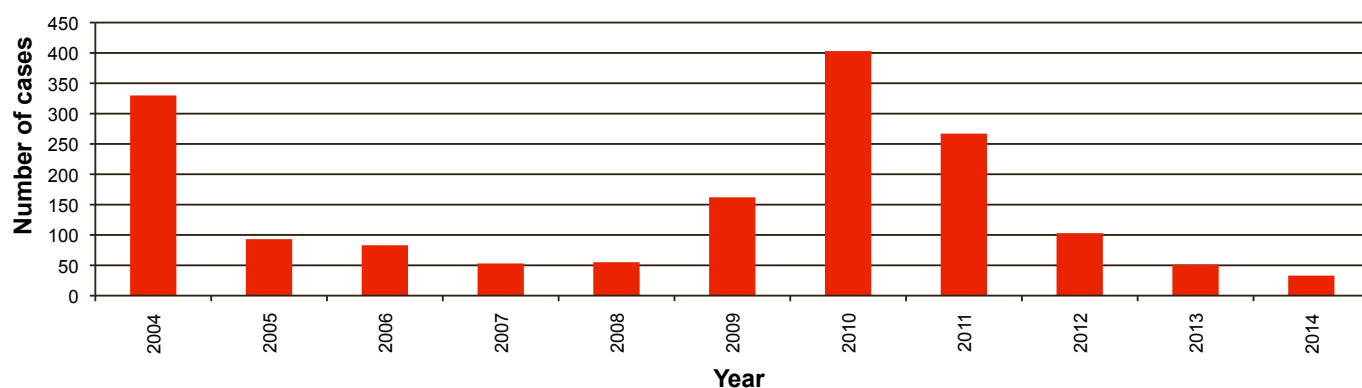


Figure 2. Number of measles cases by year, 2004-2014

Table 1. Number of measles cases and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2014

HSE Area	Number	CIR
HSE E	9	0.6
HSE M	1	0.4
HSE MW	2	0.5
HSE NE	1	0.2
HSE NW	0	0.0
HSE SE	1	0.2
HSE S	4	0.6
HSE W	15	3.4
Total	33	0.7

Vaccination data were reported for 88% (n=29/33) of measles cases in 2014. Sixty one per cent (n=20/33) of cases were unvaccinated; of these 30% (n=6/20) were less than 12 months of age.

Twelve percent (n=4/33) of cases were reported to have one dose of MMR vaccine; the majority (75%, n=3/4) of these were less than three years of age. One of those reported to have one dose of MMR was classified as confirmed. All four cases had a MMR vaccination date reported.

Fifteen per cent (n=5/33) of cases were reported as having received two doses of MMR. Only two of these cases had both vaccination dates reported. Three of the cases with two MMR doses were classified as confirmed, one case was classified as probable and one as possible.

Of the 33 cases, the country of birth was recorded as Ireland for seven cases, Romania for one, Japan for one and was unknown or not specified for the remainder.

Seven cases were reported as hospitalised, representing 21% (n=7/33) of all cases. The mean and median age of hospitalised cases was 23 years with cases ranging in age from 11 months to 37 years. All seven cases were classified as confirmed. Length of hospitalisation was reported for four cases with a median duration of stay of six days (range three to eight days). Four hospitalised cases were unvaccinated and three had no MMR details reported.

Reported complications of measles included pneumonia and seizures (4%, n=1/25), dehydration (n=1) and abnormal liver function tests and hematemesis (vomiting blood) (n=1).

Of the 33 cases, the setting where the case most likely acquired measles was reported as third level (18%, n=6), home (9%, n=3), overseas (9%, n=3), work (9%, n=3), and was unreported for the remainder (55%, n=18).

The figures presented above are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 19th August 2015. These

figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

WHO require information on discarded measles cases ie measles cases investigated and who were found not to meet the case definition. The HSE Areas reported the number of discarded CIDR cases to HPSC. For 2014, 59 cases were discarded from CIDR as following investigation they were not considered to be measles cases. Discarded cases are not available in CIDR for reporting and are therefore not included in the analysis above.

The NVRL is the WHO accredited National Measles Rubella laboratory for Ireland. Laboratories that perform measles/rubella investigations in their own laboratories are requested to send all positive samples for measles or rubella to the NVRL for confirmatory testing. In addition, a selection of negative specimens should also be referred. Genotyping is undertaken on a selection of specimens.

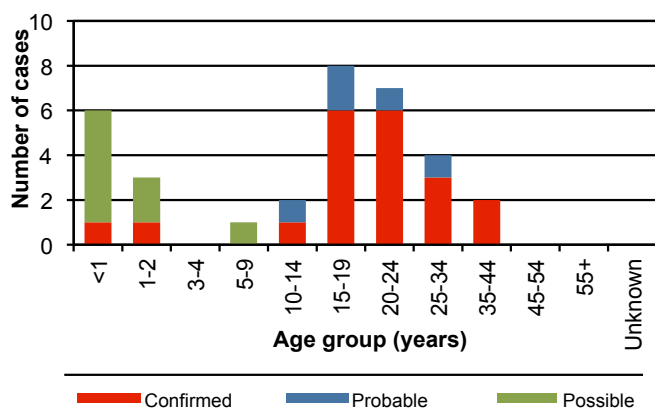


Figure 3. Number of measles cases in 2014 by age group and case classification

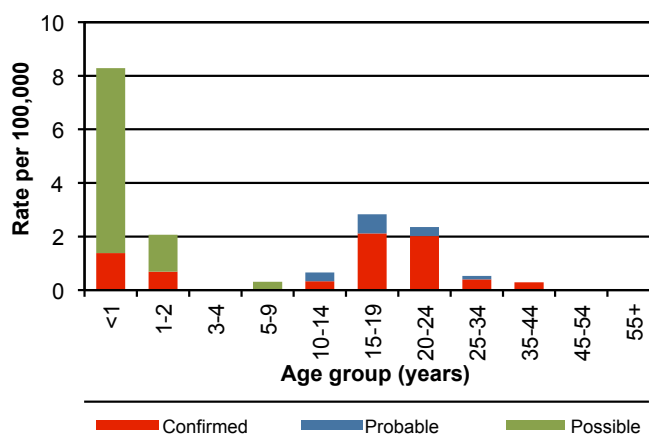


Figure 4. The age specific incidence rate (per 100,000) of measles cases in 2014 by case classification

1.3 Meningococcal Disease (*Neisseria meningitidis*) (invasive)

Summary

Number of cases, 2014: 82
 Number of cases, 2013: 81
 Number of cases, 2012: 66
 Crude incidence rate, 2014: 1.8/100,000

Between 1999 and 2012, a marked downward trend in invasive meningococcal disease (IMD) incidence was observed: in 1999 there were 536 cases (14.8/100,000) and in 2012 there were 66 cases (1.4/100,000), a decline of almost 88%. In 2014, however, 82 cases (1.8/100,000) of IMD were notified, similar to that reported in the previous year (n=81).

Typically, most cases in 2014 were diagnosed by blood/CSF culture testing, blood/CSF PCR testing or by detection of Gram negative diplococci in skin lesions/culture or in CSF specimens. Isolation of the organism from non-sterile sites (such as the eye, nose or throat) in clinically compatible cases is considered a possible case.

Of the 82 cases notified in 2014, 79 (96.3%) were case classified as confirmed and three (3.7%) as possible. Confirmation of diagnosis by laboratory testing of cases has improved with time. In 2014, 96.3% (n=79/82) of cases were confirmed by laboratory testing in comparison to 83.0% (n=445/536) in 1999.

In 2014, 49 of the 79 confirmed cases (62.0%) were confirmed by PCR testing alone and another eight confirmed cases (10.1%) were diagnosed by culture of

sterile specimens alone. Of the remaining 22 (27.9%) confirmed cases, all were diagnosed by both culture and PCR testing of sterile specimens. Additional laboratory testing was done on the 79 confirmed cases: one had a positive skin lesion culture and 11 had positive CSF microscopy test results.

Of the three possible cases reported in 2014, only one had a positive laboratory test result and it was based on an eye swab culture in which the peri-orbital cellulitis infection was attributable to a non-groupable strain.

In 2014, male cases (n=44) exceeded female cases (n=38), resulting in a male to female ratio of 1.2:1.0, following a consistent pattern observed since 2005. IMD cases in 2014 ranged in age from three weeks to 90 years (median age of 3 years).

Overall incidence in Ireland was 1.8/100,000 population in 2014. The incidence of IMD was highest in infants and young children. Age specific incidence rate (ASIR) was highest among infants <1 year of age (30.4/100,000; n=22), followed by children in the 1 to 4 year (9.2/100,000; n=26), and 15 to 19 year age groups (2.5/100,000; n=7) (table 1, figure 1).

Figure 2 presents the number of IMD cases by gender and age group between 1999 and 2014 and shows the decline in numbers across all of the age groups, with the steepest declines observed in the <1, 5-9 and 10-24 year age groups following the introduction of the meningococcal C conjugate (MCC) vaccine in late 2000.

Table 1. Number of cases, deaths, age-group specific incidence rates per 1000,000 population (calculated using Census 2011 denominator data) and case fatality ratios of IMD, Ireland, 2014

Age Group	No. Cases	ASIR	No. Deaths	%CFR
<1	22	30.4	1	4.5%
1-4	26	9.2	1	0.0%
5-9	6	1.9	0	0.0%
10-14	3	1.0	0	7.1%
15-19	7	2.5	1	0.0%
20-24	3	1.0	0	0.0%
25+	15	0.5	1	0.0%
All ages	82	1.8	4	4.9%

ASIR, age specific incidence rate per 100,000 population; %CFR, case fatality ratio

At regional level incidence was highest in the HSE M area (3.5/100,000) and lowest in the HSE MW area (0.3/100,000) (table 2). Apart from HSE MW, no other area had an incidence rate that was significantly different from the national rate (figure 3). There were no imported cases identified in 2014.

Apart from the years 2003, 2013 and 2014, IMD cases have tended to occur most frequently in the first quarter of each calendar year (figure 4).

Neisseria meningitidis serogroup B was the pathogen most commonly associated with IMD in 2014 and accounted for 69 of the 82 (84.1%) notifications. Since 2002 serogroup B has consistently accounted for more than 80% of annual IMD notifications (figure 5).

One meningococcal outbreak was reported in 2014. The serogroup B outbreak occurred in a child care facility in the HSE NE in which two cases (age range one month to 20 years) were notified.

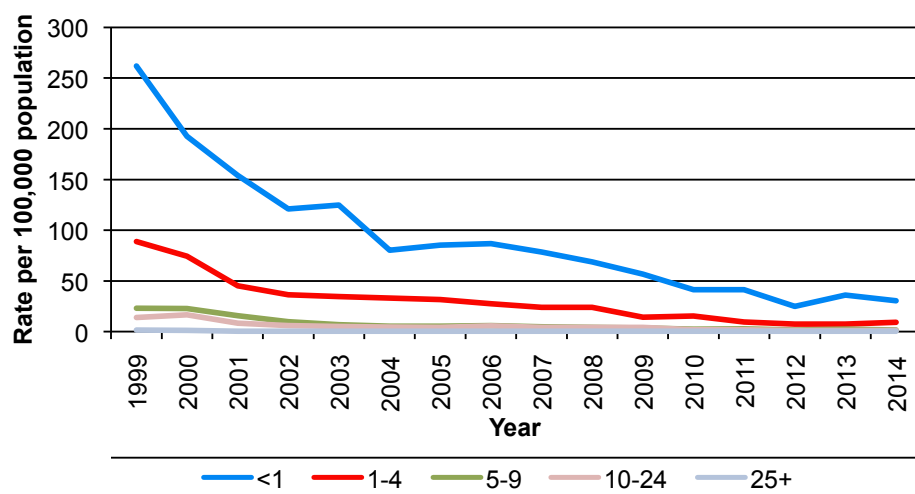


Figure 1. Age-specific rates per 100,000 population for invasive meningococcal disease (IMD), Ireland, 1999-2014

Table 2. Age specific incidence rates per 100,000 population (calculated using Census 2011 denominator data) of IMD by HSE area and age group, Ireland, 2014

HSE Area	<1	1-4	5-9	10-14	15-19	20-24	25+	Total
HSE E	34.6	8.2	2.8	0.0	1.0	0.0	0.4	1.5
HSE M	62.2	26.2	4.5	0.0	0.0	0.0	0.6	3.5
HSE MW	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.3
HSE NE	78.0	16.0	0.0	3.1	0.0	0.0	0.7	3.2
HSE NW	25.7	6.3	0.0	0.0	6.0	6.7	0.0	1.5
HSE SE	39.2	9.7	0.0	0.0	0.0	0.0	0.6	1.6
HSE S	0.0	5.0	2.2	0.0	4.9	2.4	0.5	1.2
HSE W	0.0	3.8	3.2	6.8	10.8	3.6	1.3	2.7
Ireland	30.4	9.2	1.9	1.0	2.5	1.0	0.5	1.8

Table 3. Number of cases, deaths and case fatality ratios (%CFR) by year for meningococcal B and C disease, Ireland, 1999-2014

Year	Meningococcal B			Meningococcal C		
	No. Cases	No. Deaths	%CFR	No. Cases	No. Deaths	%CFR
1999	292	12	4.1%	135	5	3.7%
2000	258	13	5.0%	139	11	7.9%
2001	245	8	3.3%	35	3	8.6%
2002	199	8	4.0%	14	0	0.0%
2003	206	11	5.3%	5	1	20.0%
2004	163	7	4.3%	5	1	20.0%
2005	169	5	3.0%	5	0	0.0%
2006	168	5	3.0%	4	0	0.0%
2007	157	6	3.8%	2	0	0.0%
2008	149	6	4.0%	4	1	25.0%
2009	119	6	5.0%	5	0	0.0%
2010	93	4	4.3%	4	0	0.0%
2011	84	2	2.4%	2	0	0.0%
2012	58	1	1.7%	0	0	0.0%
2013	68	4	5.9%	1	0	0.0%
2014	69	3	4.3%	6	1	16.7%

%CFR, case fatality ratio

There were four IMD related notified deaths in 2014 (case fatality ratio of 4.9%) (age range 9 months to 90 years) (table 1). This compares to an annual average of five deaths between 2005 and 2013. In 2014, the %CFR was highest amongst cases 65+ years of age (20.0%) as a result of one death among five cases. The next highest %CFR was 14.3% (n=1/7) due to a MenC death in an adult aged 15-19 years.

All but one of the four IMD deaths in 2014 disease was due to serogroup B. This is in marked contrast to the 13 deaths due to serogroup B out of all 25 deaths reported in 2000. In the same year, 11 deaths were due to serogroup C disease.

IMD due to serogroup C (MenC) has remained at very low levels over the last decade with five cases or less occurring annually. However, in 2014, the highest number of MenC cases (n=6) since 2002 was observed, all aged between 18 and 72 years (table 3). Three of these six cases were unvaccinated and were aged

between 19 to 77 years with no risk factors reported; the vaccination status of the remaining three cases was unknown, they ranged in age between 18 and 53 years, two of whom were foreign born, including one who was a student who died.

Since 2003, 11 true vaccine failures have been recorded, the most recent of which occurred in 2013. Prior to the introduction of the MCC vaccine, serogroup C incidence rate in 1999 was 3.7/100,000 population; in 2014 it was 0.13/100,000.

The recent small increase in MenC cases may represent waning population herd immunity and would be consistent with recent studies undertaken in the United Kingdom which have reported waning immunity to serogroup C disease following infant vaccination in early childhood. Furthermore, protection given by vaccination at 12 months also wanes by the teenage years, but vaccination later in childhood provides higher levels of antibody that persist for longer.¹⁻⁴ There is

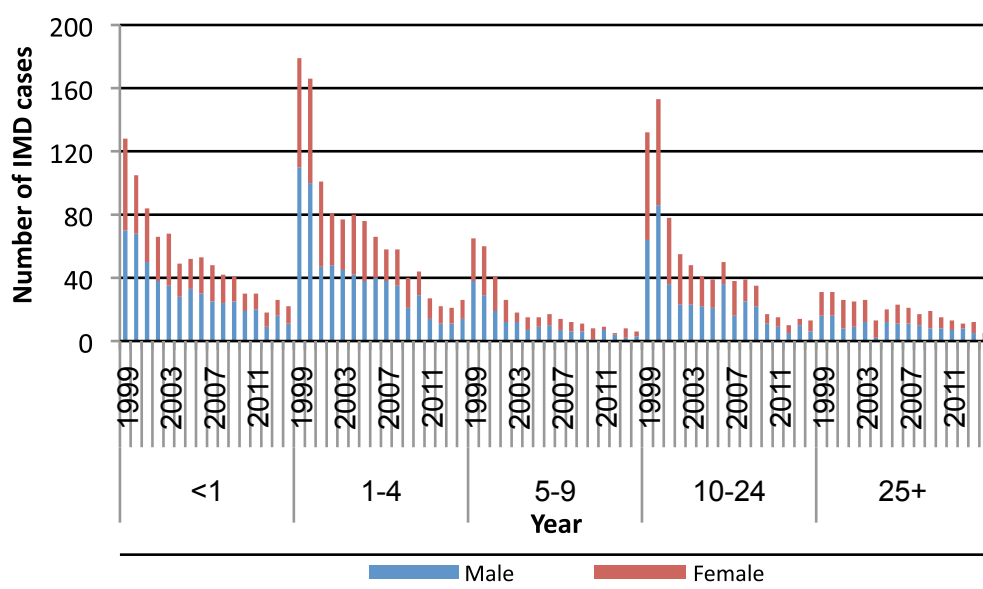


Figure 2. Number of IMD cases by gender and age group in Ireland, 1999-2014 (excludes one case with unknown gender details in 2009)

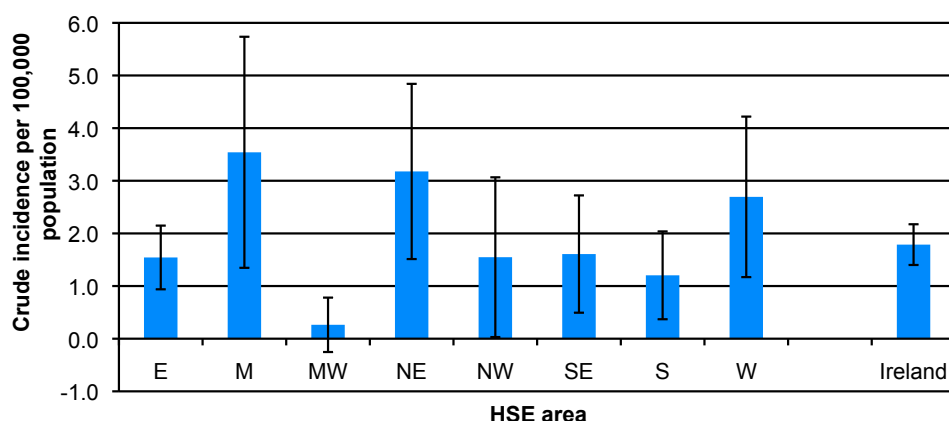


Figure 3. Crude incidence rates per 100,000 population with 95% confidence intervals for IMD notifications by HSE area, Ireland, 2014

evidence that shows that MCC vaccination significantly reduces nasopharyngeal carriage of the serogroup C meningococcus, providing indirect protection through herd immunity.⁵⁻⁶ The increase in MenC cases in Ireland in 2014 may reflect a decline in this herd immunity.

This emerging evidence of waning immunity and the recent increase in MenC cases has led to the routine MenC vaccination programme in Ireland being changed. Instead of three doses of meningococcal C conjugate (MCC) being administered to children at 4, 6 and 13 months of age, from July 2015 a single dose will be given at 4 months, 13 months and at 12-13 years (if not previously vaccinated at >10 years of age) (<http://www.hse.ie/eng/health/immunisation/hcpinfo/guidelines/chapter13.pdf>). The National Immunisation Advisory Committee (NIAC) has also recommended a booster dose of the MCC vaccine for those considered at increased risk of MenC disease, and since 2011, the MCC vaccine booster has been recommended for close contacts of cases if their last dose was more than one year before. In August 2014, NIAC recommended an

adolescent booster at 12-13 years to be offered in the first year of secondary level school. The adolescent booster MenC programme commenced in January 2015.

IMD is still an important public health concern due to its associated severity, high mortality rate and serious adverse sequelae, despite the marked reduction in the overall incidence in the past decade. Effective vaccination is necessary for complete IMD prevention and control. Effective vaccines are now available against serogroups A, B, C, W135 and Y forms of the disease. In 2012, Bexsero®, a recombinant multicomponent vaccine (4CMenB) against serogroup B disease was approved by the European Medicines Agency. In March 2014, the United Kingdom's Joint Committee on Vaccination and Immunisation (JCVI) recommended the vaccination of infants against serogroup B.⁷ In August 2014, NIAC issued guidelines on how this vaccine should be administered in Ireland (<http://www.hse.ie/eng/health/immunisation/hcpinfo/guidelines/chapter13.pdf>). In September 2015, the National Immunisation

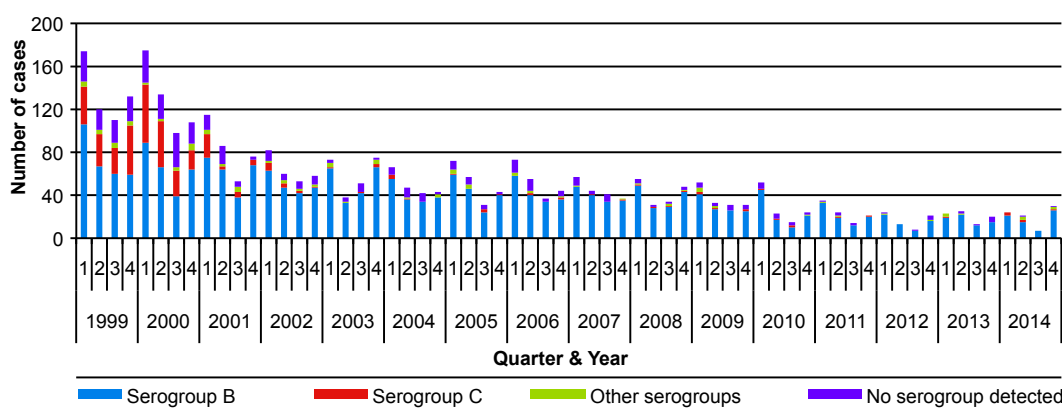


Figure 4. Number of IMD cases by quarter and serogroup, Ireland, 1999-2014

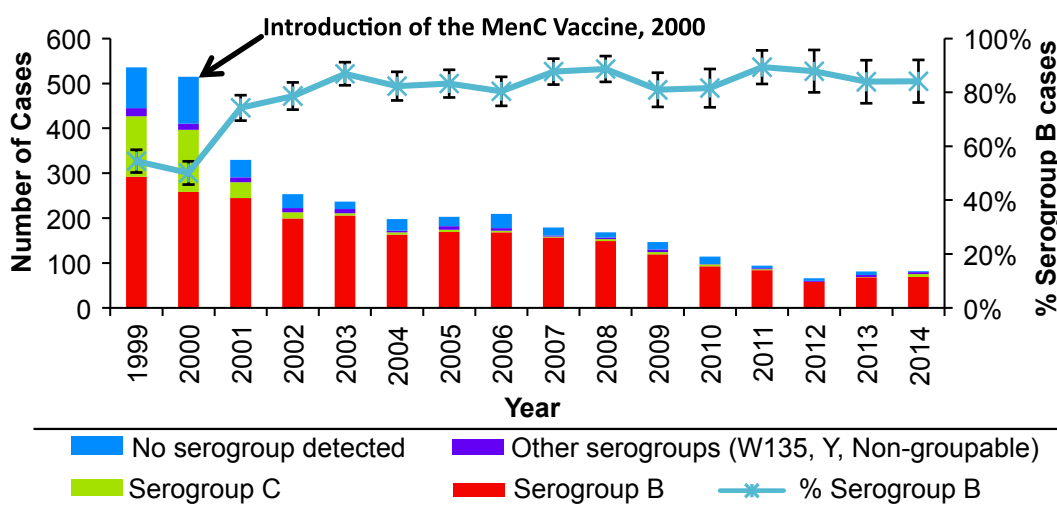


Figure 5. Number of IMD notifications in Ireland by serogroup and proportion of cases attributable to serogroup B with 95% confidence intervals, Ireland, 1999-2014

Office (NIO) included a universal MenB vaccination proposal in the HSE 2016 service plan. At the time of writing this report (September 2015), no decision has yet been made.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 13th August, 2015. These figures may differ from those published previously due to on-going updating of notification data on CIDR.

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1.4 Mumps

Summary

Number of cases, 2014: 742
 Number of cases, 2013: 223
 Crude incidence rate, 2014: 16.2/100,000

There was a large increase in mumps in 2014 with 742 (16.2/100,000) mumps cases notified. This is 3.3 fold higher than 2013 when 223 cases were notified and 4.6 fold higher than 2012 when 163 cases were notified (figure 1). Large mumps outbreaks previously occurred during the years 2004/2005 and 2008/2009 (figure 1). Nearly two-thirds (n=489) of the cases in 2014 were notified between September and December (figure 2). Of the cases notified between September and December 40% were in the HSE S, 22% in the HSE SE and 17% in the HSE E (figure 2).

In 2014, the largest number of cases was notified in the HSE S and the highest crude incidence rate was in the HSE S followed by the HSE SE (table 1).

Of the 742 mumps cases notified 40% (n=299) were classified as confirmed, 30% (n=222) as probable and 30% (n=221) were classified as possible.

The mean age of cases was 22 years and the median age of cases was 19 years with cases ranging in age from eight months to 81 years (age was unknown for three cases). The largest number of cases and the highest age specific incidence rates were in those 15-19 years and 20-24 years (figures 3 and 4). Fifty five per cent (n=406) of cases were male and 45% (n=336) were female.

Mumps vaccine in Ireland is available as part of the combined measles mumps rubella (MMR) vaccine. In Ireland, vaccination with the first dose of MMR is

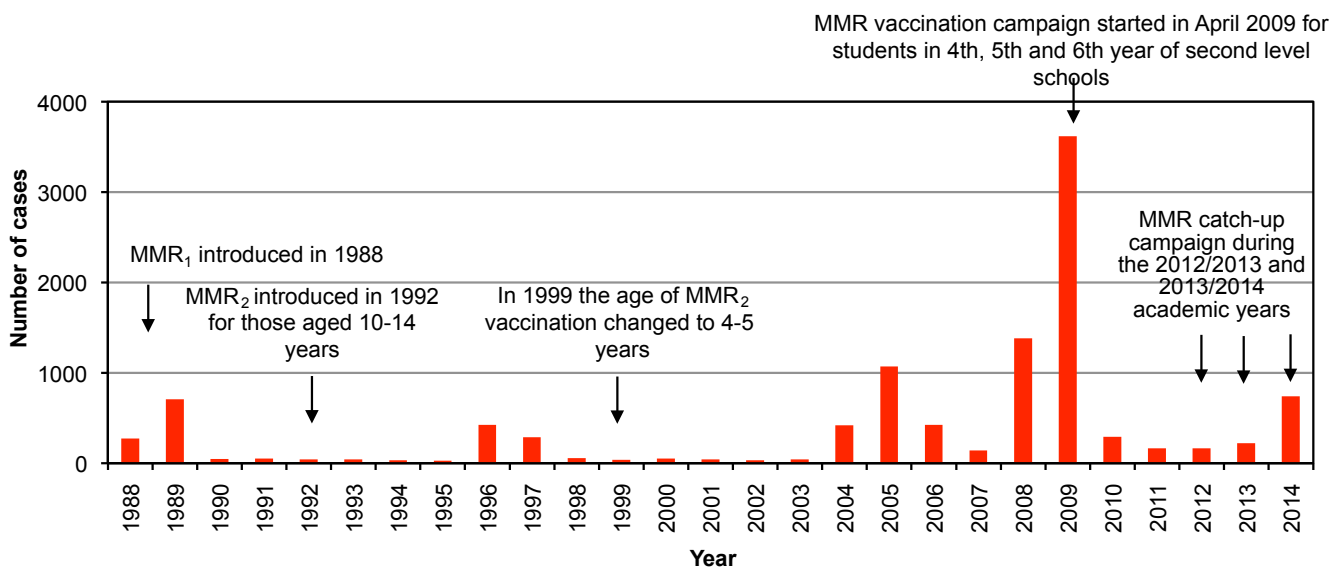


Figure 1. Number of mumps cases by year
 A MMR catch-up campaign was conducted during the 2012/2013 and 2013/2014 academic years for children/students attending primary schools, second level schools and special schools and home-schooled students who had not completed (or were not sure they had) their two dose MMR vaccination schedule
 MMR₁- first dose of MMR
 MMR₂- second dose of MMR
 1988-June 2000 data collated by DoHC
 July 2000-2014 data collated by HPSC

routinely recommended at twelve months of age and the second dose at four to five years of age. A MMR catch up campaign started during the academic year 2012/2013 and continued during the academic year 2013/2014. During the MMR catch up campaign the HSE offered a dose of MMR vaccine to children/ students attending primary schools, second level schools and special schools and home-schooled students who had not completed (or were not sure they had) their two dose MMR vaccination schedule.

Of the 742 mumps cases, 13% (n=97) were unvaccinated, 16% (n=118) had one dose of MMR, 38% (n=281) were reported to have received two doses of MMR, one per cent (n=9) were reported to have three doses of MMR while for 32% (n=237) of cases the number of doses of MMR were not reported. The vaccination date was reported for 52% (n=61/118) of cases reported to have received one dose of MMR. Both vaccination dates were reported for 42% (n=118/281) of cases vaccinated with two doses of MMR. Thirty-four per cent (n=96/281) of the cases reported to have received two doses of MMR were classified as confirmed; 46% (n=44/96) of these cases

had both MMR vaccination dates reported. All three vaccination dates were available for 89% (n=8/9) of the cases given three doses of MMR. Of the nine cases reported to have received three MMR doses four were classified as confirmed cases; three of these four cases had all vaccination dates reported.

The country of birth was recorded as Ireland (n=162), United Kingdom (n=8), France (n=7), Brazil (n=4), Philippines (n=3), Poland (n=3), Australia (n=1), Belgium (n=1), Hungary (n=1), Lithuania (n=1), Malaysia (n=1), Russian Federation (n=1), Togo (n=1), Uganda (n=1) and were unknown or not specified for the remainder.

Thirty six cases were hospitalised, representing five per cent (n=36/742) of all cases and seven per cent (n=36/541) of cases where hospitalisation data was known. The number of days hospitalised was reported for 23 of the hospitalised cases; the median number of days hospitalised was two days (range one to 17 days).

Reported complications of mumps included orchitis (12%, n=33/265), mastitis (1%, n=6/463), pancreatitis

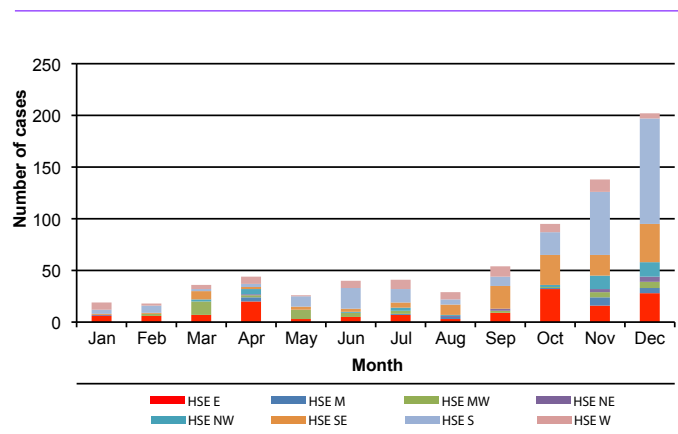


Figure 2. Number of mumps cases in 2014 by month and HSE Area

Table 1. Number of mumps cases and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2014

HSE Area	Number	CIR
HSE E	142	8.8
HSE M	21	7.4
HSE MW	47	12.4
HSE NE	13	2.9
HSE NW	41	15.9
HSE SE	141	28.3
HSE S	258	38.8
HSE W	79	17.7
Total	742	16.2

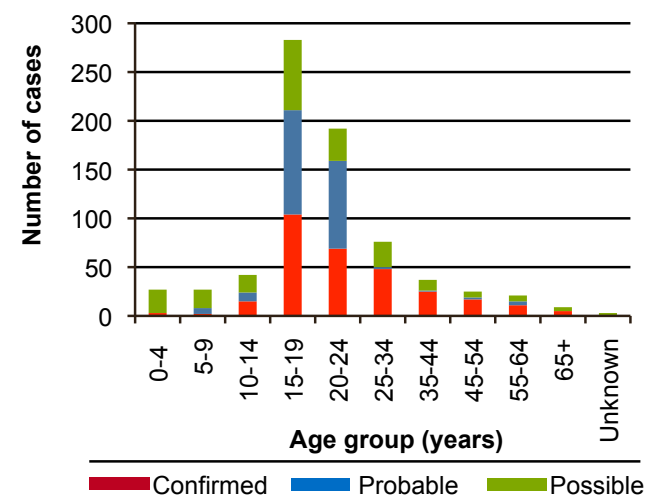


Figure 3. Number of mumps cases in 2014 by age group and case classification

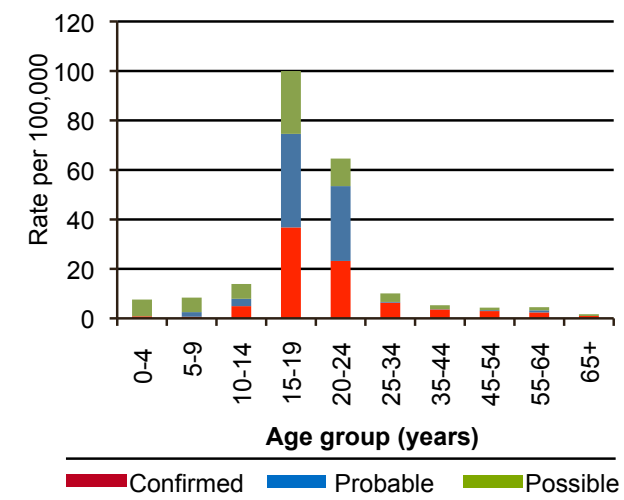


Figure 4. The age specific incidence rates (per 100,000) of mumps cases in 2014 (age unknown for three cases)

(0.4%, n=2/455), meningitis (0.4%, n=2/467), deafness (0.2%, n=1/465), abdominal pain and neck stiffness (n=1), elevated amylase (n=1), arthritis and hepatitis (n=1), back pain (n=1), chest infection (n=1), earache (n=2), neck stiffness (n=1), respiratory tract infection (n=1), stomach ache (n=1), testicular pain (n=1), query tonsillitis (n=1) and possibly viral myocarditis related to mumps (n=1). For some cases a number of clinical complications were reported.

The setting where the case most likely acquired mumps was reported for 53% (n=396/742) of cases. The identified settings were: university/college (32%, n=236), secondary school (7%, n=55), social setting (6%, n=47), family/household (4%, n=31), work (2%, n=13), primary school (1%, n=10), day-care/pre-school (0.4%, n=3) and international travel (0.1%, n=1).

The countries of infection were recorded as Ireland (n=328), United Kingdom (n=4), Bulgaria (n=1), Czech Republic (n=1), Pakistan (n=1), United Republic of Tanzania (n=1), United States (n=1) and was unknown/not specified for 405 cases.

Twenty-three localised outbreaks of mumps were notified during 2014 with a total of 426 associated cases of illness. The outbreak locations included 11 university/college outbreaks (with 322 ill), seven private houses (with 17 ill), two community outbreaks (with 72 ill) and three school outbreaks (with 15 ill).

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 15th October 2015. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

1.5 Other Forms of Bacterial Meningitis*

(*excluding meningococcal disease)

Summary

Number of cases, 2014: 23
Number of cases, 2013: 21
Number of cases, 2012: 29
Crude incidence rate, 2014: 0.5/100,000

Apart from *Neisseria meningitidis*, which is the most common cause of bacterial meningitis in Ireland, other pathogens cause this disease, including those caused by non-notifiable organisms. For information on invasive meningococcal disease (*Neisseria meningitidis*), see that chapter within this report. Information on bacterial meningitis caused by specified notifiable diseases is summarised below and further pathogen-specific data are available in the relevant chapter. The figures presented in this chapter are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 13th August, 2015. These figures may differ from those published previously due to on-going updating of notification data on CIDR.

Bacterial meningitis caused by diseases not otherwise specified (NOS):

In total, 23 cases of meningitis under this disease category were notified in 2014, none of whom died. Thirteen of the 23 (56.5%) cases were case classified as confirmed, eight as probable (34.8%) and two as possible (8.7%) (table 1). The causative pathogens were identified in 47.8% (n=11/23) of cases (table 2).

Prior to 1st January 2012, all cases of Group B streptococcus, also known as *S. agalactiae*, were notifiable under the 'Bacterial Meningitis (NOS)' disease category. In 2012, this changed when *Streptococcus agalactiae* in children < 90 days of age was notifiable in its own right, including those which were meningitis-related. This has meant that the overall number of bacterial meningitis (NOS) cases has, as a result, declined between 2012 and 2014 compared to previous years. In other words, without this change there would have been 21 extra cases reported under the Bacterial meningitis (NOS) category between 2012 and 2014. Furthermore, there is evidence of an additional 32 possible meningitis-related cases of this disease in this same age group during this same three year period where *S. agalactiae* was either isolated from or detected in CSF specimens from patients that were not clinically

categorised as having 'meningitis' and had in fact no clinical diagnosis reported on CIDR. These 32 cases have been excluded from Table 3, which is a summary breakdown of all bacterial meningitis cases by their causative pathogen (both specified and not specified types except for meningococcal disease) between 2009 and 2014.

Among the bacterial meningitis (NOS) cases notified in 2014 were six caused by *Escherichia coli* (age range two to eight weeks; none of which had serotype details), one each caused by *Enterococcus* species (30-34 years), *Klebsiella pneumoniae* (age unknown), *Micrococcus luteus* (2 months old); *Streptococcus agalactiae* (7 months old), and *Streptococcus suis* (50-54 years old). There were 12 other cases whose causative organism was not identified.

Bacterial meningitis caused by specified notifiable diseases:

Haemophilus influenzae

Seven cases of meningitis due to *H. influenzae* were notified in 2014, five of which were attributable to non-typeable/non-capsulated strains and the remaining two were PCR diagnosed positive, not typed. The age range was one month to 64 years. No deaths were reported among these cases. See Table 3 and the chapter on invasive *H. influenzae* disease for further details.

Listeria species

One case of listeriosis meningitis was notified in 2014. The case was 23 months of age, serotype 4b infection was diagnosed and the case had no underlying medical condition reported. See Table 3 and the chapter on listeriosis disease for further details.

Streptococcus pneumoniae

In 2014, 39 cases of pneumococcal meningitis were notified, compared to 33 in the previous year. The median age was 55 years (range one month to 87 years). Five (12.8%) pneumococcal meningitis related deaths were reported in 2014, with a median age of 56 years (range 9 to 83 years). The cause of death was reported for two cases: one was caused by this infection, the other was not; the cause of death was not reported on the remaining three cases.

Of the 39 cases in 2014, 24 were eligible for vaccination (13 cases were aged >65 years and 11 others had risk factors reported). Data on vaccination status were available for 34 of the 39 cases (87.2%). Eleven (28.2%) were vaccinated with either the PCV13 or PPV23

Table 1. Number and percentage of bacterial meningitis (NOS) cases reported by case classification, Ireland, 2009-2014

Case Classification	2009	2010	2011	2012	2013	2014	2009-2014
Confirmed	17	21	18	12	6	13	87
Probable	8	7	4	5	5	8	37
Possible	15	14	13	12	10	2	66
Total	40	42	35	29	21	23	190
% Confirmed	42.5%	50.0%	51.4%	41.4%	28.6%	56.5%	45.8%

Note: *Streptococcus agalactiae* < 90 days of age excluded from 2012, 2013 and 2014 figures

Table 2. Number and percentage of bacterial meningitis (NOS) cases reported with and without an identified causative organism, Ireland, 2009-2014

Causative Organism	2009	2010	2011	2012	2013	2014	2009-2014
Known	15	21	20	11	6	11	84
Unknown/Not specified	25	21	15	18	15	12	106
Total	40	42	35	29	21	23	190
% Known	37.5%	50.0%	57.1%	37.9%	28.6%	47.8%	44.2%

Note: *Streptococcus agalactiae* < 90 days of age excluded from 2012, 2013 and 2014 figures

Table 3. Annual notifications of bacterial meningitis (specified and NOS) except meningococcal disease, Ireland, 2009-2014

Notified under	Causative organism	2009	2010	2011	2012	2013	2014	2009-2014
<i>Haemophilus influenzae</i> disease (invasive)	<i>Haemophilus influenzae</i>	3	2	4	3	2	7	21
Leptospirosis	<i>Leptospira</i> spp.	1	0	1	1	0	0	3
Listeriosis	<i>Listeria</i> spp.	1	3	2	2	2	1	11
Salmonellosis	<i>Salmonella enteritidis</i>	1	0	0	0	0	0	1
<i>Streptococcus pneumoniae</i> infection (invasive)	<i>Streptococcus pneumoniae</i>	22	16	23	37	33	39	170
Streptococcus Group A infection (invasive) (iGAS)	<i>Streptococcus pyogenes</i>	0	2	0	1	3	0	6
Streptococcus Group B infection (invasive) (Group B Strep) < 90 days of age	<i>Streptococcus agalactiae</i> †	NA	NA	NA	11	5	5	21
Tuberculosis*	<i>Mycobacterium</i> spp.*	8	9	2	3	3	1	26
Total Bacterial Meningitis, specified		36	32	32	58	48	53	259
Bacterial Meningitis, not otherwise specified	<i>Enterococcus faecalis</i>	1	0	0	0	0	0	1
	<i>Enterococcus faecium</i>	0	0	0	1	0	0	1
	<i>Enterococcus</i> species	0	0	0	0	0	1	1
	<i>Escherichia coli</i>	3	2	1	7	4	6	23
	Group C Streptococcus	0	0	0	1	0	0	1
	<i>Klebsiella oxytoca</i>	0	0	1	0	0	0	1
	<i>Klebsiella pneumoniae</i>	0	0	0	0	0	1	1
	<i>Micrococcus luteus</i>	0	0	0	0	0	1	1
	<i>Mycoplasma pneumoniae</i>	0	1	0	0	0	0	1
	<i>Staphylococcus aureus</i>	2	6	2	1	0	0	11
	<i>Staphylococcus aureus</i> & <i>Staphylococcus capitis</i>	0	0	0	1	0	0	1
	<i>Staphylococcus capitis</i>	0	1	0	0	0	0	1
	<i>Streptococcus agalactiae</i> **	7	11	16	0	1	1	36
	<i>Streptococcus bovis</i> biotype II/2	2	0	0	0	0	0	2
	<i>Streptococcus salivarius</i>	0	0	0	0	1	0	1
	<i>Streptococcus suis</i>	0	0	0	0	0	1	1
	Unknown	1	1	1	2	2	1	8
Not specified	24	20	14	16	13	11	98	
Total Bacterial Meningitis, not otherwise specified		40	42	35	29	21	23	190
Total Bacterial Meningitis, specified and not otherwise specified		76	74	67	87	69	76	449

*Tuberculosis meningitis figure for 2014 is provisional

†*Streptococcus agalactiae* < 90 days of age in 2012 to 2014-these figures do not include 32 meningitis-related cases where the causative organism was isolated from or detected in CSF specimens from patients that were not clinically categorised as having 'meningitis'

***Streptococcus agalactiae* for all ages only in 2009 to 2011 and for cases > 90 days of age only in 2012 to 2014

NA not applicable

vaccines, one (2.6%) was incompletely vaccinated with PCV13; the remaining 27 (69.2%) cases with pneumococcal meningitis were either unvaccinated (n=12; 30.8%) or had an unknown vaccination status (n=15; 38.5%).

Mycobacterium species

In 2014, one tuberculosis meningitis case was notified (provisional at the time of writing) aged 6-10 years, with no risk factors reported. See the chapter on tuberculosis for further details.

Fourteen cases (35.9%) had serotypes that were covered by either the PCV13 or PPV23 vaccines. Of the eleven cases (28.2%) that were vaccinated, six (15.4%) had serotypes that were covered by either the PCV13 or PCV23 vaccines, including two cases (aged 1-4 years) which were vaccinated with two and four doses of the PCV13 vaccine, respectively. Of the 24 cases eligible for vaccination, including 13 that were aged >65 years, 20 were reported to have additional risk factors. Additional details are presented in Table 4. See also a separate chapter on invasive pneumococcal disease for further details.

Table 4. Details of the 39 pneumococcal meningitis cases reported, Ireland, 2014

Age Group (years)	Died	Vaccination Status	No. of PCV13 / Prevenar 13 Doses	No. of PPV23 / Pneumovax 23 Doses	Serotype of Infection	Serotype Covered by Vaccine Type	Risk Factors
<1		I	1	NA	NA		NA
		U	0	NA	NA		N
1-4		Y	2	NA	19A	PCV13, PPV23	N
		Y	4	NA	15B	PPV23	Y
5-9	Y	U	0	NA	19F	PCV13, PPV23	Y
		N	0	0	NA		N
10-14		U	0	NA	35B	Not covered	Y
15-19		U	0	NA	NA		N
25-29		U	0	NA	15A	Not covered	NA
30-34		U	0	NA	23A	Not covered	Y
35-39		U	0	NA	35B	Not covered	Y
		U	0	NA	NA		N
40-44	Y	Y	0	1	37	Not covered	Y
		U	0	NA	11A	PPV23	NA
		U	0	NA	29	Not covered	Y
45-49		N	0	0	NA		N
		N	0	0	22F	PPV23	N
		N	0	0	NA		Y
50-54		U	0	NA	3	PCV13, PPV23	NA
55-59	Y*	U	0	NA	10A	PPV23	U
		N	0	0	15A	Not covered	Y
		N	0	0	NA		NA
		Y	0	1	NA		NA
60-64		N	0	0	6C	Not covered	Y
	Y	N	0	0	15C	Not covered	Y
		Y	0	1	NA		U
65+		U	0	NA	NA		Y
		U	0	NA	15A	Not covered	NA
		U	0	NA	9N	PPV23	NA
		N	0	0	NA		Y
		N	0	0	NA		Y
		N	0	0	20	PPV23	Y
		N	0	0	33F	PPV23	NA
	Y	Y	0	1	8	PPV23	Y
		Y	0	1	24F	Not covered	Y
		Y	0	1	12F	PPV23	Y
		Y	0	1	NA		N
		Y	0	1	3	PCV13, PPV23	Y
	Y	0	2	19A	PCV13, PPV23	Y	

NA=not applicable or not available; Vaccinated: Y=Yes, N=No, U=Unknown, I=Incompletely vaccinated; * IPD was cause of death

1.6 Pertussis

Summary

Number of cases, 2014: 73
 Number of cases, 2013: 173
 Crude incidence rate, 2014: 1.6/100,000

Following an increase in pertussis in 2012 with 458 notifications (10.0/100,000), pertussis declined in 2013 with 173 cases (3.8/100,000) notified and declined further in 2014 with 73 cases (1.6/100,000) notified (figures 1 and 2).

Of the 73 cases in 2014, 86% (n=63) were classified as confirmed, four per cent (n=3) were classified as probable and 10% (n=7) were classified as possible.

The largest number of cases was notified in the HSE E while the highest crude incidence rate was in the HSE W followed by the HSE MW (table 1).

Fifty-eight per cent of cases (n=42) were female, 41% (n=30) were male (female to male ratio 1.4:1.0) while gender was not reported for one case.

The largest number of cases (51%, n=37/73) and the highest age-specific incidence rate (51/100,000) were in children aged less than one year with 47% (n=34/73) of all cases aged less than six months of age (figures 3 and 4).

Maternal antibodies from women immunised before pregnancy wane quickly and the concentration of

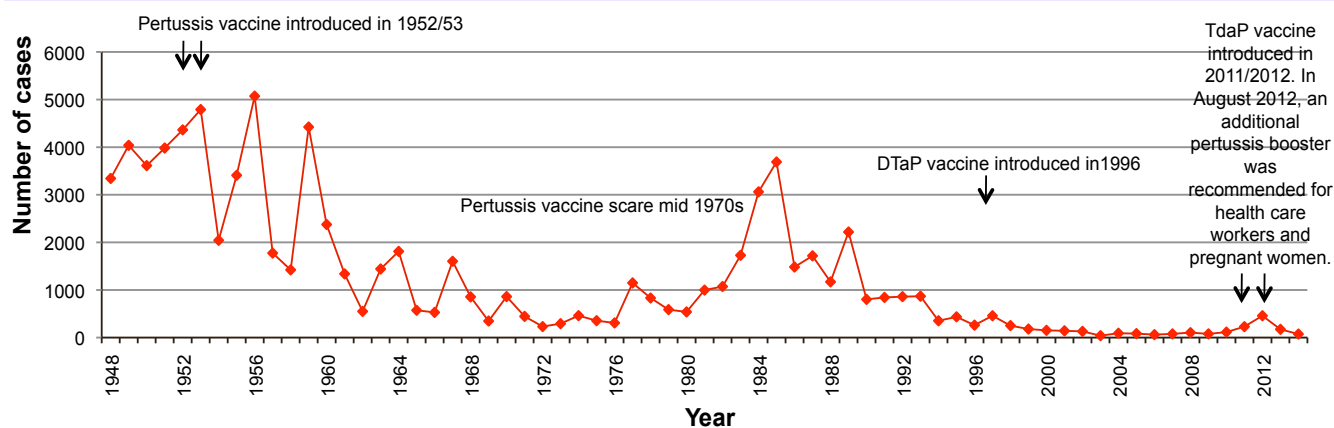


Figure 1. Number of notified pertussis cases in Ireland by year, 1948-2014
 1948-June 2000 data collated by DoHC
 July 2000-2014 data collated by HPSC

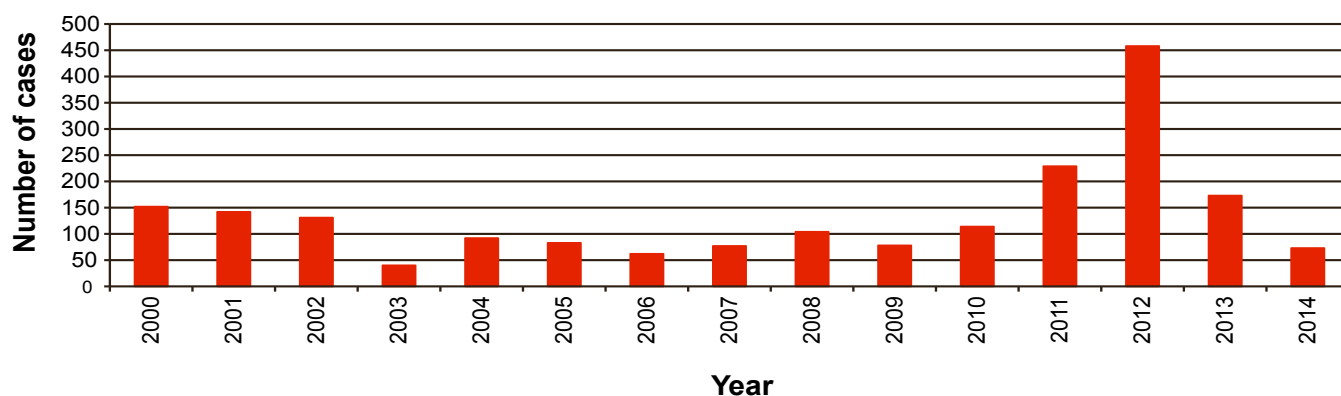


Figure 2. Number of notified pertussis cases in Ireland by year, 2000-2014

pertussis antibodies is unlikely to be high enough to provide passive protection to their infants prior to primary vaccination. Since August 2012, the National Immunisation Advisory Committee (NIAC) has recommended that pregnant women should be offered tetanus and low dose diphtheria and acellular pertussis (Tdap) vaccine during 27 -36 weeks gestation in each pregnancy, to protect themselves and their infant. Tdap can be given at any time in pregnancy before 27 or after 36 weeks gestation although it may be less effective in providing passive protection to the infant. Data on maternal antenatal vaccination status was provided for 54% (n=20/37) of children aged less than one year and none of the mothers of these infant pertussis cases reported vaccination during the antenatal period. Gestational age at birth was reported for seven cases and ranged from 28 to 41 weeks with a median of 40

weeks and an average of 38 weeks. All seven cases were aged ≤ 6 months at the time of notification. Data on maternal antenatal vaccination status was provided for four of these cases and none of the mothers of these infant pertussis cases reported vaccination during the antenatal period.

In Ireland, it is recommended that children be vaccinated with an acellular pertussis containing vaccine at two, four and six months of age and a booster dose at four to five years of age. In 2008, NIAC recommended a booster with low dose acellular pertussis vaccine for children aged 11-14 years. The adolescent pertussis booster was introduced into the school programme, in 19 LHOs, in 2011 and to all schools in 2012. In August 2012, an additional pertussis booster was recommended for health care workers

Table 1. Number of pertussis cases notified and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2014

HSE Area	Number	CIR
HSE E	25	1.5
HSE M	1	0.4
HSE MW	9	2.4
HSE NE	5	1.1
HSE NW	5	1.9
HSE SE	8	1.6
HSE S	9	1.4
HSE W	11	2.5
Total	73	1.6

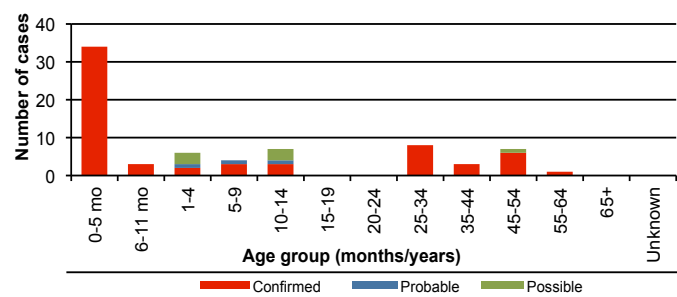


Figure 3. Number of notified pertussis cases in 2014 by age group and case classification. 'Mo' in graph indicates months i.e. 0-5 months and 6-11 months, the remaining age groups are in years

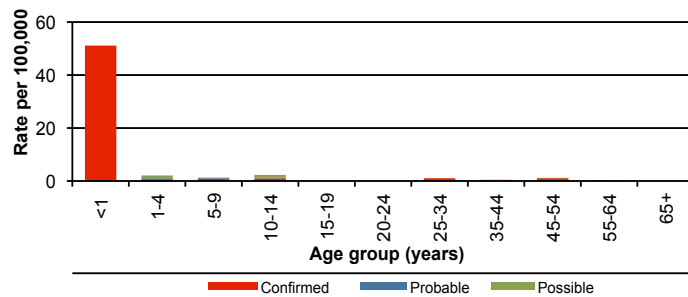


Figure 4. The age specific incidence rate (per 100,000 population) of notified pertussis cases in 2014 by case classification

and pregnant women; please see the HSE National Immunisation Office website at <http://www.hse.ie/eng/health/immunisation/> for additional information on pertussis vaccination recommendations.

In 2014, the number of doses of pertussis vaccine the cases received was reported for 71% (n=52/73) of cases. Forty four per cent of cases (n=32/73) were unvaccinated; these cases ranged in age from one month to 54 years, with 72% (n=23/32) of these cases aged less than six months. Forty-one per cent of the unvaccinated cases (n=13/32) were less than two months of age and were therefore not eligible for pertussis vaccine in the Irish schedule.

Twelve per cent (n=9/73) of cases were reported to have one dose of pertussis vaccine, all were less than five months of age. Ten per cent (n=7/73) had three doses of pertussis vaccine, these cases ranged in age from one to 12 years. Five per cent (n=4/73) had four doses of pertussis vaccine (one had no vaccination details available), these cases ranged in age from eight to 13 years with one case classified as confirmed. Vaccination status was unknown or not reported for the remainder of cases.

Country of birth was reported as Ireland for 24 cases, Brazil for one, Spain for one, United States for one and was unknown/not specified for the remainder.

Some reported symptoms included cough (98%, n=57/58), paroxysmal cough (87%, n=48/55), inspiratory whoop (59%, n=30/51), apnoea (34%, n=18/53), post-tussive vomiting (34%, n=17/50), cyanosis (29%, n=14/48), choking episodes in infant (46%, n=11/24) and tachypnoea (n=1). Reported complications included pneumonia (4%, n=2/50), conjunctival haemorrhages (2%, n=1/48), seizures (2%, n=1/50) and respiratory tract infection (n=1).

Thirty-six cases were hospitalised, representing 49% (n=36/73) of all cases and 58% (n=36/62) of cases where hospitalisation data was known. Eighty-nine per cent (n=32/36) of those hospitalised were aged less than one year and 36% (n=13/36) were less than two months of age.

Of the 73 cases, the likely setting of exposure to pertussis included home (21%, n=15), crèche/childcare (4%, n=3), healthcare associated (1%, n=1), other family setting (1%, n=1), work (1%, n=1) and was unreported or not specified for the remainder (71%, n=52).

The likely source of exposure included sibling (14%, n=10), mother (4%, n=3), father (1%, n=1), other relative (1%, n=1) and was unknown/not specified for the remainder (80%, n=58).

Antibiotic was known to be given for 89% (n=49/55) of cases where this data was provided and for 67% of all cases (n=49/73). A second antibiotic was known to be given for 40% (n=10/25) of cases where this data was provided and 14% (n=10/73) of all cases.

Three localised pertussis outbreaks were notified during 2014, with ten associated cases of illness. One was an outbreak in a private house with four ill and one was a community outbreak with three ill. The third outbreak was travel related with three ill; two of these cases were diagnosed in Ireland while the third case was diagnosed abroad and never travelled to Ireland.

The figures presented in this summary are based on data extracted from the CIDR system on 20th October 2015. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

1.7 Rubella

Summary

Number of cases, 2014: 3

Number of confirmed cases, 2014: 0

In 2014, three cases (0.07/100,000) of rubella were notified in Ireland while there were no cases in 2013. The three cases were in the age groups 1-2 years, 5-9 years and 15-19 years.

Of the three cases, one was classified as probable with country of infection Poland and two were classified as possible cases.

The probable case tested weakly positive for rubella IgM in the laboratory. The case was unvaccinated, their clinical details fitted the case definition and the case reported contact with friends in Poland diagnosed with rubella.

Both possible cases met the possible rubella case classification; however, the clinicians felt they were unlikely to have rubella. Unfortunately in both cases efforts to obtain samples failed. One of these cases had country of infection recorded as Ireland while country of infection was not recorded for the second case. One case had received one dose of MMR and one was unvaccinated.

The diagnosis of rubella based solely on clinical signs and symptoms is often unreliable because there are many other causes of fever and rash illness which may resemble rubella infection. Therefore, timely diagnostic samples should always be obtained from patients in order to accurately diagnose rubella. Since 2012 the laboratory criteria for case confirmation of rubella requires the identification of rubella virus specific antibody response (IgG) in serum or saliva or detection of rubella virus nucleic acid in a clinical specimen or isolation of rubella virus from a clinical specimen. Isolation of rubella virus is not routinely performed in Ireland but can be done following consultation with the National Virus Reference Laboratory (NVRL). The NVRL is the WHO accredited National Measles Rubella laboratory for Ireland. Laboratory results always need to be interpreted according to the vaccination status and

history of recent vaccination. Since 2012 the laboratory criteria for a probable case require the identification of rubella virus specific antibody response (IgM); again laboratory results need to be interpreted according to the vaccination status. When rubella in pregnancy is suspected, further confirmation of a positive rubella IgM result is required (e.g. a rubella specific IgG avidity test showing a low avidity). In certain situations, such as confirmed rubella outbreaks detection of rubella virus IgM can be considered confirmatory in non-pregnant cases.

Accurate and detailed information on all notified rubella cases is needed to monitor progress as part of the WHO European Measles and Rubella Elimination Strategy. HPSC is currently working with the HSE Areas and the NVRL to improve rubella surveillance data.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 26th November 2015. These figures may differ slightly from those published previously due to ongoing updating of data on CIDR.

WHO require information on discarded rubella cases i.e. rubella cases investigated and who were found not to meet the case definition. The HSE Areas reported the number of discarded CIDR cases to HPSC. For 2014, nine cases were discarded from CIDR as following investigation they were not considered to be rubella cases. Discarded cases are not available in CIDR for reporting and are therefore not included in the analysis above.

The NVRL is the WHO accredited National Measles Rubella laboratory for Ireland. Laboratories that perform measles/rubella investigations in their own laboratories are requested to send all positive samples for measles or rubella to the NVRL for confirmatory testing. In addition, a selection of negative specimens should also be referred. Genotyping is undertaken on a selection of specimens.

1.8 *Streptococcus pneumoniae* (invasive)

Summary

Number of confirmed cases in 2014: 350
Number of confirmed cases in 2013: 345
Number of deaths in 2014: 37
Number of deaths in 2013: 24
Crude incidence rate of confirmed cases in 2014: 7.6/100,000

Background

Invasive *Streptococcus pneumoniae* infection is a notifiable disease in Ireland; clinicians and laboratories are legally obliged to notify this infection. For the purposes of this report the term invasive pneumococcal disease (IPD) will be used to describe these infections. IPD includes meningitis and bloodstream infection (BSI) with and without pneumonia.

A number of different initiatives are in place in Ireland for the surveillance of IPD. Data on IPD notifications are collated in the Computerised Infectious Disease Reporting (CIDR) system. Enhanced surveillance of IPD notifications is undertaken by Departments of Public Health, particularly of children and adolescents <15 years, and these data are also collated in CIDR. A separate surveillance strand (EARS-Net project) involving the microbiology laboratories and the HPSC is used to monitor in detail the antimicrobial resistance profiles of invasive *S. pneumoniae* isolates from blood and/or CSF. EARS-Net laboratories can also

collect additional information, including risk factors, admission and outcome for each *S. pneumoniae* isolate reported and these data are collated by HPSC through the Enhanced Surveillance of Bloodstream Infection (ESBSI) system. In order to improve data quality regular processes for cross-checking CIDR data with other data sources was established in 2014; to identify missing IPD notifications and/or missing information CIDR data were linked to both the typing and ESBI databases and additional information on either of these systems but missing or incomplete in CIDR was collated.

Since April 2007, the National Pneumococcal Typing Laboratory has provided a typing service to Irish laboratories for all invasive *S. pneumoniae* isolates. This is a collaborative project involving the Royal College of Surgeons in Ireland/Beaumont Hospital, the Children's University Hospital, Temple Street and the HPSC. In addition, since August 2012 HPSC is participating in a European Centre for Disease Prevention and Control (ECDC) project called SpID-net. The project aims to strengthen or set up long term active population based IPD surveillance in order to estimate the impact of the pneumococcal conjugate vaccines in children less than five years of age in Europe.

In September 2008, the 7-valent pneumococcal conjugate vaccine (PCV7) was introduced into the Irish infant immunisation schedule at 2, 6 and 12 months of age. A catch-up campaign was also implemented at that time, targeting children <2 years of age. In December 2010, PCV13 replaced PCV7 in the infant schedule. Uptake of three doses of PCV by 24 months of age for 2014 was 92%.

Notification data for IPD was extracted from CIDR on 29th May 2015. These figures may differ slightly from those previously published due to ongoing updating of notification data on CIDR. For the 2012, 2013 and 2014 notifications, the 2012 HPSC case definition for IPD was used. In brief, isolation or detection of *S. pneumoniae* from a normally sterile site was classified as confirmed; detection of *S. pneumoniae* antigen from urine was classified as possible case. Since 2012 the previously used probable case definition is no longer applicable and any case in which *S. pneumoniae* antigen is detected from urine (previously defined as a probable case) is

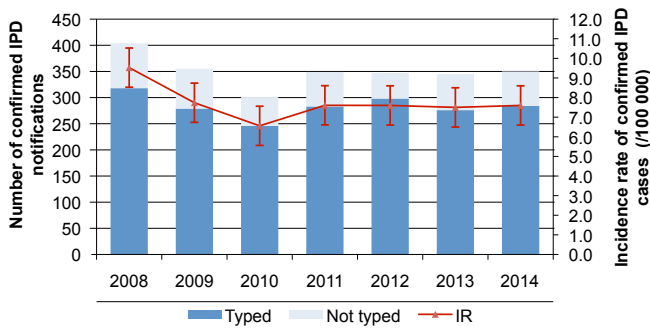


Figure 1. Number of confirmed invasive pneumococcal disease (IPD) notifications by typing status and the incidence rate (IR) of confirmed IPD with 95% confidence intervals, 2008-2014
Data source: CIDR

now classified as possible, and antigen detection from a sterile site is now categorized as confirmed.

Results

All IPD notifications

In 2014, 681 cases of IPD (14.8/100,000) were notified in Ireland, an increase compared with 2013 (637 cases; 13.9/100,000). This increase is related to an increase in the number of possible cases notified in 2014 in comparison to 2013 (293 in 2013 and 331 possible cases in 2014).

In 2014, 51% (n=350) of notifications were classified as confirmed and 49% (n=331) as possible. The majority of possible cases (89%) were notified by HSE-SE, HSE E and HSE MW (n=119/331; n=82/331 and n=94/331, respectively). These figures do not necessarily indicate a higher burden of IPD in these areas relative to other areas, but more likely reflects an increase in the use of urinary antigen tests being used and therefore more reports of positive urinary antigen cases from these areas.

Confirmed IPD notifications

Focusing specifically on the confirmed IPD notifications, 350 cases were notified in 2014 (7.6/100,000; 95% CI 6.8 - 8.4/100,000), unchanged compared with 2013 (7.5/100,000; 95% CI 6.8 - 8.3/100,000; 350 cases) (Figure 1). In 2014, the incidence of confirmed IPD declined by 13% compared with 2008 (9.5/100,000; 95% CI 8.6 - 10.5/100,000; 404 cases; p<0.05) (Figure 1).

In 2014, 81% of the confirmed IPD notifications had an isolate submitted for serotyping, similar to the proportion of cases in 2013 (80%) and in 2008 and 2009 when 79% of notifications had an isolate typed, however less than in 2012 when 86% of all isolates were typed (Figure 1). In 2014 however, 46% of notifications (17/37) relating to children <5 years of age did not have an isolate submitted for serotyping. For six of the 17 the cases were confirmed by PCR only and no isolate was available. For the remaining eleven isolates from a sterile site, no sample was available for typing.

Incidence rates by HSE area ranged from 6.3 per 100,000 in HSE-S to 9.2 per 100,000 in HSE-M, with the highest incidence in the HSE MW, HSE NE and HSE-SE

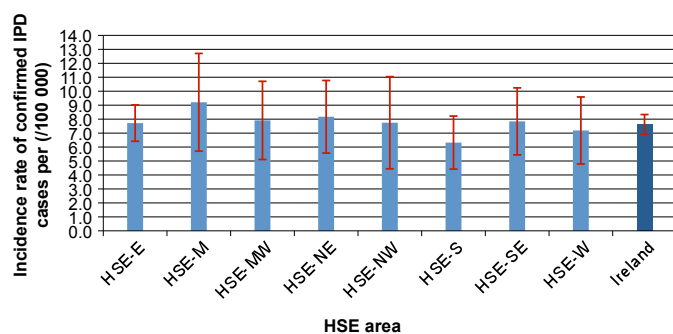


Figure 2. Crude incidence rate of confirmed invasive pneumococcal disease notifications by HSE area, 2014
Data source: CIDR

(Figure 2). However, the incidence rates in each of the eight HSE areas were not statistically different from the national one.

A clinical diagnosis was reported for 168 of the 350 confirmed cases (48%), which included BSI with pneumonia (n=107), meningitis (n=40), and other BSI for the remainder (n=21).

More cases occurred in males (n=183,52%) than in females. Cases ranged in age from 1 month to 96 years, with an average age of 55.5 years (median age 63 years). Those aged 65 years and older accounted for half of the cases (48%, n=168). The age specific incidence rate (ASIR) was highest in those 85 years of age and older (61.6/100,000; n=36), followed by those in the 75-84 years age group (36.6/100,000; n=63) and the 65-74 year age group (22.6/100,000; n=69) (Figure 3). In children < 2 years of age the ASIR was 13.1 cases per 100,000 population (n=19). A statistically significant decline (63%) in IPD incidence was seen in this age group when compared with 2008 (42/100,000; n=52; p<0.0001), highlighting the positive impact of the introduction of PCV7 in September 2008 to the infant schedule followed by PCV13 in December 2010 (Figure 3).

The medical risk factor field was completed for 113 (32%) confirmed cases; 37 cases (11%) did not have an identified risk factor; for the remaining 200 cases this information was either unknown or not specified. Based on the 113 cases for whom this information was reported, 91 (80%) of them had an underlying medical risk factor, with some patients having multiple risk factors. The main risk factors reported included immunosuppressive condition or therapies (n=30), chronic lung disease (n=31), chronic heart disease (n=37), chronic liver disease (n=5) and renal diseases (n=11). It should also be noted that being aged 65 years and older was also a recognised IPD risk factor; 168 cases in 2014 were in this age group. Apart from their age, 66 cases in this age group also had a reported medical risk factor.

IPD death notifications

Outcome was reported in 39% (n=264) of the IPD notifications in 2014 versus 30% in 2013. Therefore,

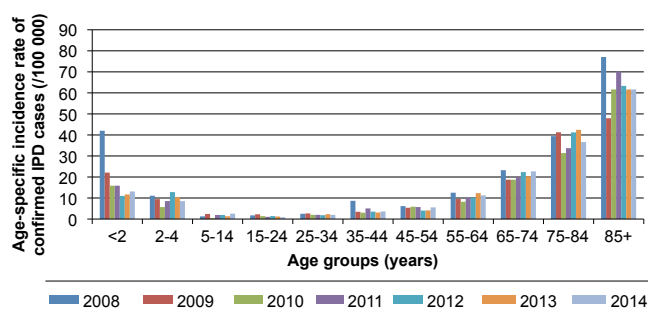


Figure 3. Age specific incidence rate of confirmed invasive pneumococcal disease notifications by age group, 2008-2014
Data source: CIDR

these figures may not accurately estimate the burden of IPD in terms of mortality. Based on the data available in 2014, 41 deaths in individuals with IPD were reported; for six case-patients the cause of death was reported as directly due to IPD, not due to IPD in four case-patients and for the remaining 31, the cause of death was not specified or was unknown. Thirty-five deaths occurred in adults, ranging in age from 36-94 years and two deaths occurred in a two and nine year old child. Thirty four deaths were in confirmed cases.

The apparent increase in IPD death notifications in 2014, 2013 and 2012 (24 cases in 2013 and 37 cases in 2012 versus 11 cases in 2011) is most likely related to the additional information that was available by linking CIDR data to the Enhanced Surveillance of Blood Stream Infections (ESBI) database. Using BSI data it was possible to identify missing information on outcome in CIDR and then the CIDR database was updated by HSE areas.

Impact of pneumococcal conjugate vaccines (PCV)

Data from the National Pneumococcal Typing Laboratory were used to assess the impact of introducing PCV on the distribution of *S. pneumoniae* serotypes associated with IPD and on the burden of IPD in Ireland. In 2014, of the 350 confirmed IPD notifications reported in CIDR, 284 had isolates sent for typing (81%). Six percent of IPD infections were due to serotypes covered by PCV7 (4, 6B, 9V, 14, 18C, 19F and 23F), 28% were associated with the six additional

serotypes included in PCV13 (1, 3, 5, 6A, 7F and 19A) and the remaining 66% of infections were due to non-vaccine types (NVTs).

Since introducing PCV7 to the Irish childhood immunisation schedule towards the end of 2008, there has been a 19% reduction in the overall burden of IPD disease. Reductions in the incidence of IPD due to PCV7 serotypes have been seen in all age groups (Figure 4a). Overall, the incidence of IPD due to PCV7 serotypes has significantly declined in 2014 compared with 2008 (89% decline, $p < 0.0000001$). The greatest impact has been seen in children <5 years of age where the incidence due to PCV7 serotypes has declined by 100% ($p < 0.0000001$) (Figure 4a). In 2014 the incidence of disease due to the additional six serotypes covered by the PCV13 declined by 78% in children <2 years of age compared with 2008 (Figure 4b). The decline was also observed in the other age groups with these additional six serotypes compared with 2008; however, this decline was not significant (Figure 4b). An increase in incidence due to the non-vaccine types (NVTs) was also seen in 2014 compared with 2008. In those aged 65 years and greater, an increase in incidence was observed in 2014 compared with 2013. There has been little change in the incidence of NVTs among other age groups (Figure 4c).

The predominant serotypes in circulation in 2014, were 7F and 15A (7F included in PCV13), followed by serotypes 22F (NVT), 3 (included in PCV13), 8 (NVT)

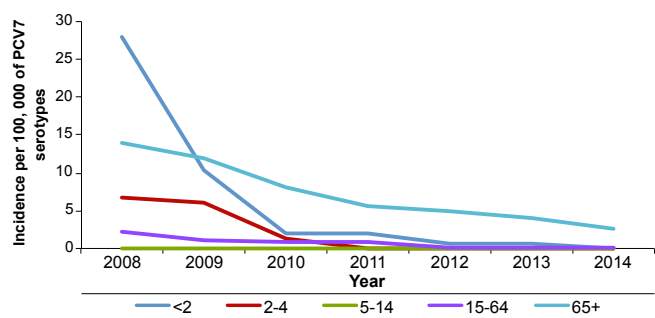


Figure 4a

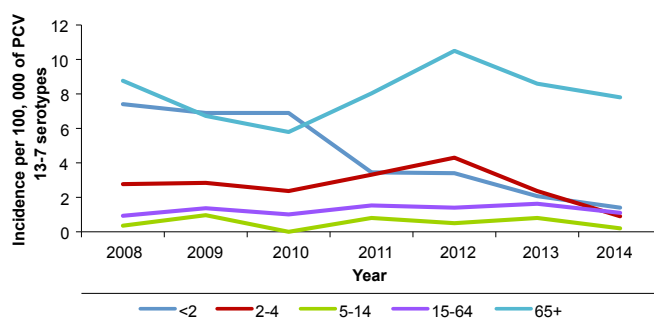


Figure 4b

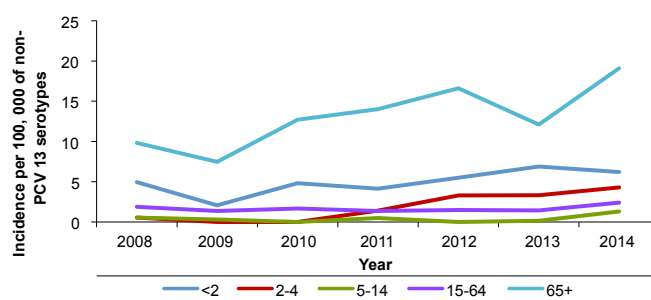


Figure 4c

Figure 4. Age specific incidence rate by age group of confirmed invasive pneumococcal disease cases due to (a) PCV7 serotypes, (b) the additional six serotypes covered by PCV13 and (c) non-vaccine types, 2008-2014. Data source: National Pneumococcal Typing Laboratory

and 19A (included in PCV13). In children <5 years of age, the predominant serotypes were 15B (NVT), 19A (included in PCV13), 22F(NVT), 10A, 11A, 15A and 15C (all NVTs); all these serotypes accounted for a two thirds of the isolates serotyped in this age group (Figure 5). For ongoing updates, see "Slides – Impact of PCV in Ireland" at <http://www.hpsc.ie/A-Z/VaccinePreventable/PneumococcalDisease/PostersPresentations/>

PCV vaccine failures

Based on data obtained through the IPD enhanced surveillance system, two PCV vaccine failures were reported in 2014, both due to serotype 19A (PCV 13). Since 2008, a total of nine vaccine failures have been reported in addition to the two reported in 2014, two in 2010 (19F and 14), two in 2012 (19F and 19A) and three in 2013 (19A).

Penicillin non-susceptible *S. pneumoniae* (PNSP)

In 2014, the proportion of penicillin non-susceptible invasive *S. pneumoniae* (PNSP) was 17.1%, (2.4% and 14.5% with high and intermediate level resistance, respectively) while 13.8% of isolates were resistant to erythromycin (Data source: Hpsc/EARS-Net Ireland). This compares to 20.8% and 17.9% in 2013 respectively. In the UK, the PNSP proportion in 2013 was 4.9% (0.5% and 4.4%, with high and intermediate level resistance, respectively).

In 2013, Ireland had one of the highest proportions of PNSP in Europe, ranking 5th out of 29 countries overall. Although, 34 different serotypes were identified in 2014, only 11 serotypes were associated with penicillin non-susceptibility. The predominant PNSP serotypes in 2014 were 7F, 15A and 22F whereas in 2008 serotypes 9V and 14 were the leading ones. For details on the antimicrobial resistance patterns of *S. pneumoniae*, please see the link on EARS-Net Report, Quarters 1-4 2014: <http://www.hpsc.ie/A-Z/MicrobiologyAntimicrobialResistance/Euro>

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Discussion

Although there was no significant changes in the incidence of confirmed cases of IPD in Ireland in 2014 compared with 2013, since its introduction in 2008, PCV7 has had a significant impact in reducing the overall burden of the disease in the total population. There has been a decline in IPD in all age groups due to serotypes covered by PCV7, indicating the indirect/herd immunity effect the vaccine confers on the population. The greatest impact has been in children <5 years of age where disease incidence due to PCV7 serotypes has fallen by over 100%. The impact due to additional six serotypes covered by PCV13 vaccine was observed in children <2 years of age, amongst whom the reduction in the incidence of disease was 78%.

However, despite reductions in the IPD burden during childhood, the incidence of disease due to non-PCV7 serotypes has increased in other age groups. There has been a shift in the prevalent serotypes associated with invasive disease. Serotypes 7F, 15A, and 22F were the predominant serotypes identified in 2014.

To accurately assess the impact of PCV on immunisation programmes and to monitor for vaccine failures in Ireland, it is crucial that samples from sterile sites are obtained for culture and sensitivity. Isolates obtained by culture are required for serotyping and antibiotic susceptibility. Furthermore it is crucial that laboratories continue to send all invasive *S. pneumoniae* isolates for typing to the National Pneumococcal Typing Laboratory. Although 81% of confirmed notifications had an isolate submitted for serotyping in 2014, 19% (n=66) did not, including 17 cases in children <5 years of age. In six of these 17 cases, an isolate was not available for

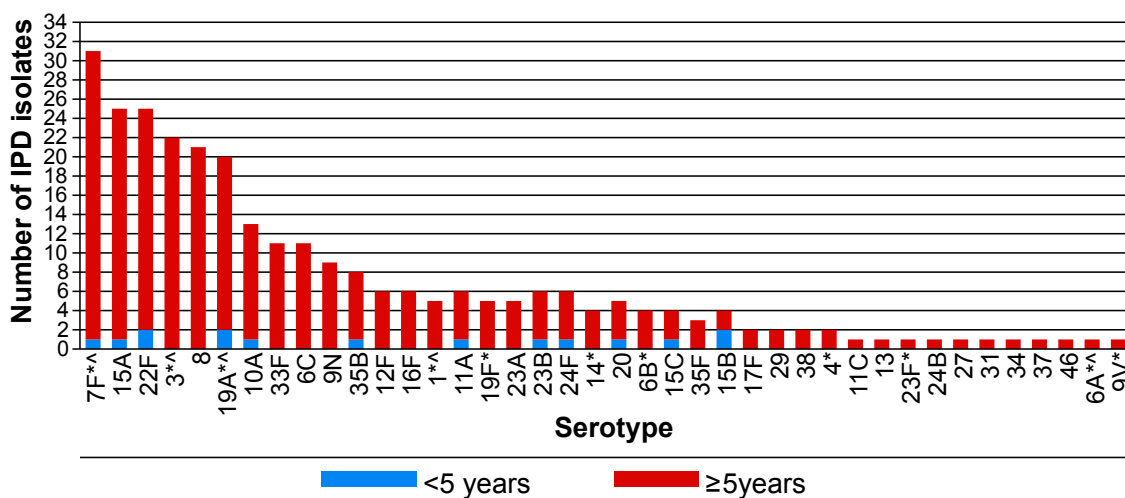


Figure 5. Serotype distribution of invasive *Streptococcus pneumoniae* isolates by age group (years) in Ireland, 2014

* Denotes serotypes included in PCV7

** Denotes additional six serotypes included in PCV13 (PCV13-7)

Data source: National Pneumococcal Typing Laboratory

typing and confirmation was by PCR only. Serotype information is unavailable for 46% of confirmed notifications in this age group and the absence of this data is of concern.

Continued good quality IPD surveillance including the monitoring of invasive *S. pneumoniae* serotypes is crucial in identifying any epidemiological changes in the disease, in assessing the impact of PCV13 on public health and in guiding further vaccination strategies, as newer expanded valency vaccines become available and changes to recommendations of PCV are made e.g. age related. For example, due to the incomplete data we do not know the impact of IPD on mortality and this is a key metric in assessing the true impact of this disease and the effectiveness of interventions, including new vaccines.

1.9 Tetanus

Summary

Number of cases, 2014: 1
Number of cases, 2013: 1

One case of non-fatal tetanus was notified in 2014. The case was in the age group 15-19 years and was classified as probable based on clinical presentation. The case was incompletely vaccinated and had received one dose of a tetanus vaccine as an infant and another dose at two years of age. The case reported having a discharging wound on a toe one week prior to onset of tetanus symptoms developing. The cause of the wound was not reported.

Summary of case data since 1981:

Fifteen cases of tetanus were reported since tetanus became notifiable in November 1981. The number of tetanus cases notified by age group is shown in figure 1. Two deaths were reported, both cases were aged >60 years.

Of the 15 tetanus cases, eight (53%) were male, five (33%) were female while gender was unreported for two (13%).

The following wound injuries (n=10) were reported among the 15 notified cases: wound injuries from a road traffic accident (n=1), wound from a fall outdoors (n=1), wound associated with a dog bite (n=1), wound from a kitchen knife (n=1), gardening associated leg wound (n=1), leg scratches in an avid gardener (n=1), hand wound associated with a clean piece of wood (n=1), a farming associated hand wound (n=1), a foot wound from a thorn (n=1) and hand injuries from a can and a rusty nail (n=1). In the case reported in 2014 the details of the wound injury on the toe were not reported.

Vaccination data were reported for six of the 15 cases. Two cases were unvaccinated. One case, in the age group 15-19 years, was reported to have received three doses of tetanus vaccine as a child and a booster at four years and again at five-six years of age. One case was reported to have received a single tetanus vaccine around 40 years prior to infection. One case was reported as having received one dose of a tetanus vaccine 20 years earlier but it was not known if the case had received any previous doses (i.e. primary tetanus vaccines as an infant). One case (in 2014) was reported as having received one dose of a tetanus vaccine as an infant and a dose when they were 2 years of age.

Vaccine efficacy after a complete series of vaccines (five doses) is almost 100%. However, immunity wanes and

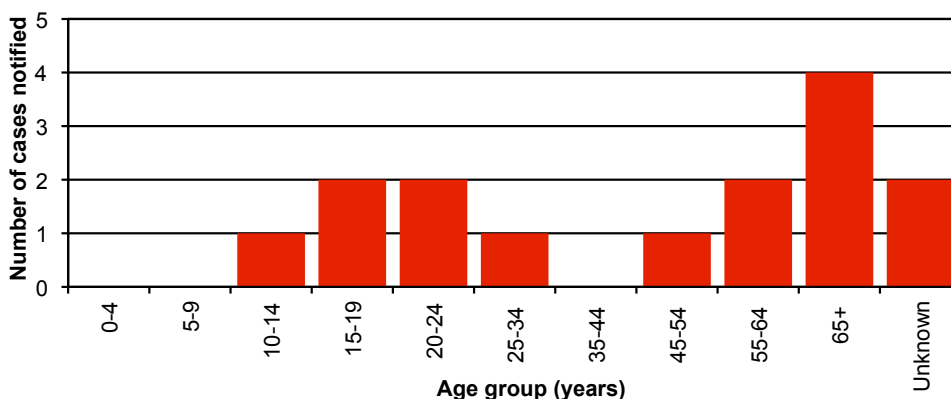


Figure 1. Tetanus cases notified (n=15) from November 1981 to 2014 by age group

after 10 years may be insufficient to provide protection. The childhood immunisation schedule in Ireland recommends children receive a dose of tetanus toxoid containing vaccine at two, four and six months of age and booster doses at four-five years of age and 11-14 years of age. For vaccinated persons who have received five doses of tetanus toxoid, booster doses may be considered every 10 years. This is based on concern regarding the decline of antibody levels with age and potential failure of single booster doses to produce protective levels in older individuals. For more complete and detailed information on recommended tetanus immunisations please see the HSE National Immunisation Office website at <http://www.hse.ie/eng/health/immunisation/>.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 12th August 2015. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

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02

RESPIRATORY AND DIRECT CONTACT DISEASES

2.1 Influenza and Other Seasonal Respiratory Viruses

Summary

2014/2015 influenza season summary:

Peak influenza-like illness rate: **70.4/100,000 population**

Confirmed influenza cases hospitalised: **1,009**

Confirmed influenza cases admitted to ICU: **69**

Notified influenza cases that died: **66**

Estimated excess deaths in those aged 65 years and older: **726**

Number of acute respiratory infection/influenza outbreaks: **117**

HPSC has worked in collaboration with the National Virus Reference Laboratory (NVRL), the Irish College of General Practitioners (ICGP) and the Departments of Public Health on the influenza sentinel surveillance project since 2000. During the 2014/2015 influenza season, 61 general practices (located in all HSE-Areas) were recruited to report electronically, on a weekly basis, the number of patients who consulted with influenza-like illness (ILI). Sentinel GPs were requested to send a combined nose and throat swab to the NVRL on one ILI patient per week. The NVRL also tested respiratory non-sentinel specimens, referred mainly from hospitals.

Other surveillance systems set up to monitor ILI/influenza activity include:

- Surveillance of all calls to GP out-of-hours (OOHs) centres, monitored for self-reported influenza. These data were provided by HSE-NE.
- Surveillance of all confirmed influenza notifications, including hospitalisation status reported to the Computerised Infectious Disease Reporting System (CIDR) in Ireland.
- Enhanced surveillance of hospitalised influenza cases aged 0-14 years.
- Intensive Care Society of Ireland (ICSI) enhanced surveillance of all critical care patients with confirmed influenza
- Surveillance of all reported influenza-associated deaths.
- All-cause mortality monitoring associated with the European mortality monitoring group ([EuroMOMO](#))

- A network of sentinel hospitals reporting admissions data.
- Outbreak surveillance – acute respiratory infections and influenza
- Influenza vaccine effectiveness study (I-MOVE)

This report summarises influenza and other seasonal respiratory virus activity in Ireland during the 2014/2015 influenza season. The 2014/2015 season commenced on 29/09/2014 (week 40 2014) and ended on 17/05/2015 (week 20 2015). The data presented in this summary were based on all data reported to HPSC by 3rd December 2015.

Sentinel GP clinical data

Influenza activity reported from the sentinel GP network in Ireland was at moderate levels during the 2014/2015-influenza season, with ILI consultation rates peaking at 70.4 per 100,000 population during week 7 2015 (early February) (figure 1). ILI rates first increased above baseline levels (18.2 per 100,000) during week 2 2015 and remained there for 11 consecutive weeks, a longer period than for the previous season (2013/2014). The highest age specific ILI rates were reported in the 5-14 year age group (peaking at 82.7/100,000), followed by those aged 15-64 years (74.9/100,000), those aged 65 years and older (64.1/100,000) and the 0-4 year age group (43.4/100,000). It is notable that the age specific rates in those aged 65 years and older were the highest reported in this age group since the 2010/2011 season and were only higher during the 2003/2004, 2008/2009 and 2010/2011 seasons.

Virological data from NVRL – influenza

Sentinel GP data: The NVRL tested 782 sentinel specimens for influenza virus during the 2014/2015 season. Three hundred and seventy-eight (48.3%) sentinel specimens were positive for influenza: 266 influenza A (227 A(H3), 35 A(H1)pdm09 and 4 A not subtyped) and 112 influenza B. Sixty percent of all confirmed influenza sentinel cases were positive for influenza A(H3). One hundred and twenty (16%; n=752 with known vaccination status) ILI cases tested for influenza were vaccinated with the 2014/2015 influenza vaccine; 47% (56/120) were positive for influenza. Fifty-nine percent of those aged 65 years and older were

vaccinated, 42% (17/41) of these cases were positive for influenza. One third of those aged less than 65 years with an underlying risk factor were vaccinated; 44% of these cases were positive for influenza. Only four cases were known to have commenced antiviral treatment.

Non-sentinel data: The NVRL tested 9,830 non-sentinel respiratory specimens during the 2014/2015 season, 1,578 (16.1%) of which were positive for influenza: 1,200 influenza A [1,003 A(H3), 129 A(H1)pdm09 and 68 A (not subtyped)] and 378 influenza B. Sixty-four percent of all confirmed influenza non-sentinel cases were positive for influenza A(H3).

Influenza A(H3) was the predominant influenza virus circulating during the 2014/2015 season, followed by an increase in the predominance of influenza B later in the season. Influenza A accounted for 75% of all influenza positive specimens and influenza B for 25%. Of the 1,394 influenza A sentinel and non-sentinel specimens that were subtyped, influenza A(H3) accounted for 88% and influenza A(H1)pdm09 for 12%. In total 1,230 positive influenza A(H3) cases were detected by the NVRL during the 2014/2015 season, this is the highest number of A(H3) viruses ever detected in any season by the NVRL.

Influenza virus characterisation:

For the 2014/2015 influenza season, genetic characterisation of influenza viruses circulating in Ireland was carried out by the NVRL on 91 positive samples: 49 A(H3), 22 A(H1)pdm09 and 20 B. Of the

49 A(H3N2) viruses attributed to a genetic group, the majority (79.6%) fell into genetic subgroups that were shown to be antigenically dissimilar to the A(H3N2) 2014/2015 vaccine virus. Over 75% (37/49) of A(H3) viruses tested were in genetic subgroup 3C.2a, represented by A/Hong Kong/5738/2014; and two viruses were in genetic subgroup 3C.3a, represented by A/Switzerland/9715293/2013. Of the remaining A(H3) viruses, 18.4% (9/49) fell into the genetic group 3C.3, represented by A/Samara/73/2013, which was shown to be antigenically similar to the A(H3N2) 2014/2015 vaccine virus. One additional A(H3) virus could not be attributed to a genetic group. Of the 18 B/Yamagata-lineage viruses characterised genetically, all fell in clade 3, and were represented by B/Phuket/3073/2013 which is related to, but antigenically and genetically distinguishable, from the B/Massachusetts/2/2012 2014/2015 vaccine virus. Two B/Victoria-lineage viruses were also genetically tested during the 2014/2015 season and belonged to the B/Brisbane/60/2008 clade (clade 1A), similar to the influenza B/Victoria-lineage component (B/Brisbane/60/2008) of the 2014/2015 quadrivalent vaccine. Of the 22 influenza A(H1)pdm09 viruses genetically characterised during the 2014/2015 season, all were similar to the 2014/2015 A(H1)pdm09 vaccine strain. The majority of influenza A(H3) and influenza B viruses and all influenza A(H1)pdm09 viruses genetically characterised during the 2014/2015 season in Ireland, belonged to genetic groups antigenically similar to the vaccine virus strains selected for the 2015/2016 Northern Hemisphere influenza vaccines.

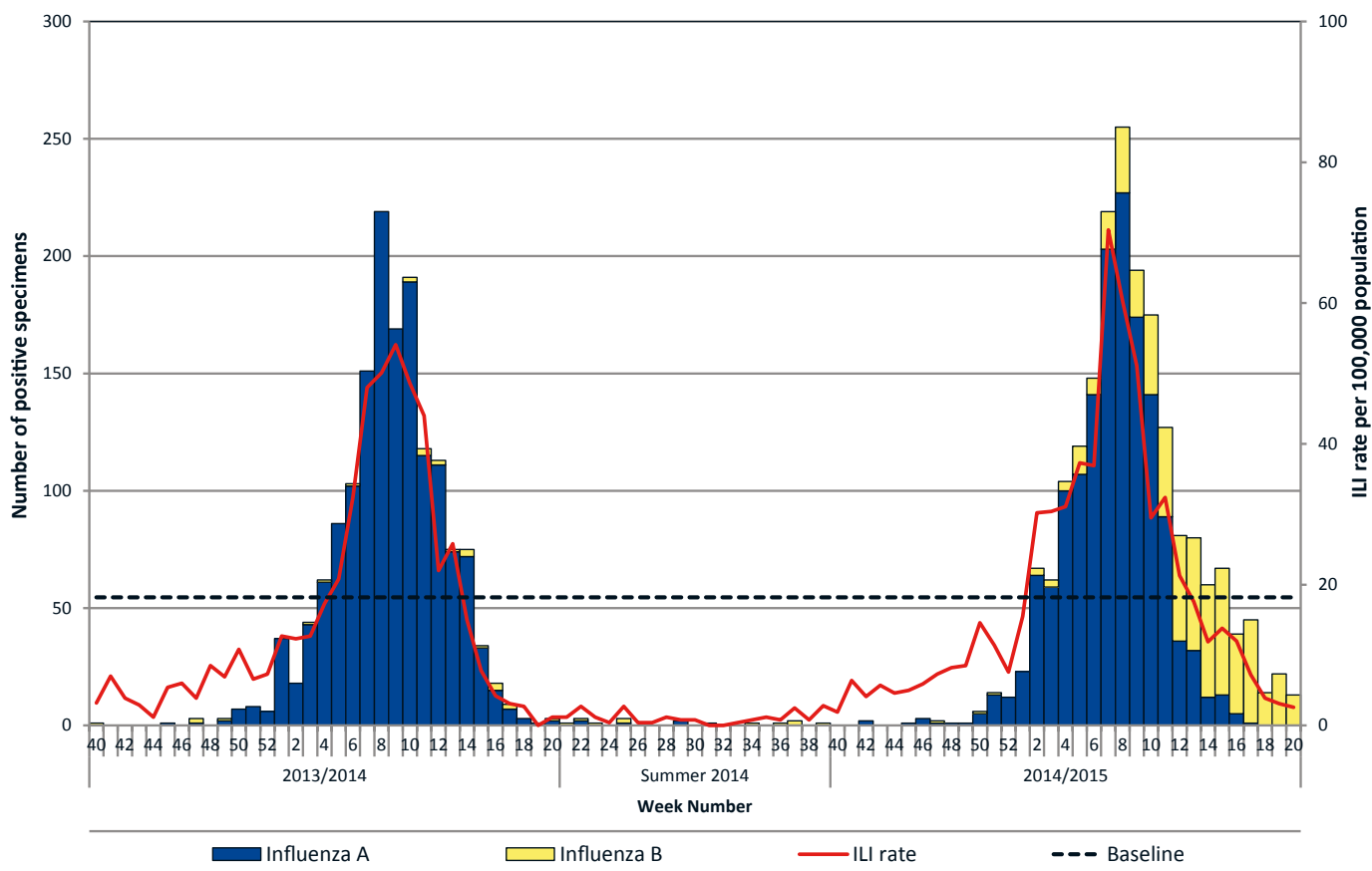


Figure 1: ILI sentinel GP consultation rates per 100,000 population, baseline ILI threshold rate, and number of positive influenza A and B specimens tested by the NVRL, by influenza week and season. Source: Clinical ILI data from ICGP and virological data from the NVRL.

Virological data from NVRL - Other seasonal respiratory viruses

During the 2014/2015 season, of 9,830 non-sentinel specimens tested by the NVRL, 896 (9.1%) positive detections of respiratory syncytial virus (RSV) were reported, peaking (at 34.1% positivity) during week 49 2014, a slightly earlier season than usual. A total of 204 (2.1%) positive detections of human metapneumovirus (hMPV) were reported, peaking during late January. Seventy-six (0.8%) positive detections of adenovirus were reported, 3 (0.03%) parainfluenza virus type 1 (PIV-1), 77 (0.8%) PIV-3 and 4 (0.04%) PIV-4 during the 2014/2015 season. There were no positive detections of PIV- 2 from non-sentinel sources reported during the 2014/2015 season.

Of the 782 sentinel GP specimens tested during the 2014/2015 season, 28 (3.6%) were positive for RSV and 24 (3.1%) were positive for hMPV. There were no positive detections of adenovirus or parainfluenza viruses from sentinel GP sources during the 2014/2015 season.

Positive detections of RSV and hMPV from sentinel and non-sentinel sources were at higher levels than previously reported by the NVRL.

Outbreaks, GP OOHs & sentinel hospital data

Ninety influenza general outbreaks were reported during the 2014/2015 influenza season (table 1), which is the highest number of influenza outbreaks reported with the exception of the 2009 pandemic. The majority of these outbreaks were associated with influenza A(H3), in community hospitals/residential care facilities mainly affecting the elderly. Seventeen outbreaks were reported from acute hospitals, which is the highest number of confirmed influenza outbreaks in acute hospital settings ever reported. Over 74% of these outbreaks were associated with influenza A(H3). Seventy-four outbreaks were associated with influenza A (65 A(H3), 5 A(H1)pdm09, 2 associated with both A(H3) and A(H1)pdm09 and 2 A - not subtyped) and 14 with influenza B. No influenza type/subtype was reported for two outbreaks. In total 27 deaths were recorded associated with these 90 outbreaks. It is probable that the actual number of deaths linked with these outbreaks exceeds this number. Vaccination status was reported for patients from 24 healthcare facilities/residential care facilities, with over 92% (953/1,039) of patients

vaccinated prior to these outbreaks. Vaccination status was reported for staff from only 13 healthcare facilities/residential care facilities, with only 22% (153/691) of staff reported as vaccinated prior to these outbreaks. Use of antiviral chemoprophylaxis was reported from 47 outbreaks in healthcare settings (of 53 outbreaks with reported data on antiviral use).

A further 27 acute respiratory infection (ARI) general outbreaks were reported during the 2014/2015 influenza season, four were associated with RSV, four with hMPV and 19 associated with unidentified pathogens.

The percentage of influenza-related calls to GP out-of-hours services in Ireland, peaked during week 7 2015 at 4.6% (coinciding with the peak in sentinel GP ILI consultation rates). During the peak of activity, each service received on average, one call per hour relating to influenza.

Hospital respiratory admissions reported from a network of sentinel hospitals during the 2014/2015 season, peaked twice and reached the highest peak level reported since 2010. The first and largest peak in respiratory admissions reported (n=464) occurred during week 51 2014, coinciding with high RSV activity. The second peak in respiratory admissions (n=382) occurred during week 8 2015; coinciding with elevated influenza activity. Total emergency admissions reported from sentinel hospitals were also elevated during the periods of peak RSV and influenza activity, peaking at 2,945 during week 51 2015 and again during week 8 2015 at 2,999.

Influenza and RSV notifications

A total of 530 influenza notifications were reported on CIDR during the 2014/2015 influenza season; the highest number of influenza notifications reported with the exception of the 2009 pandemic. Of the 2,530 notified cases, 2,484 were confirmed, 13 were probable and 33 were possible. Of the 2,484 confirmed influenza cases, 1,260 (50.7%) were influenza A(H3), 200 (8.1%) were influenza A(H1)pdm09, 376 (15.1%) were influenza A (not subtyped) and 648 (26.1%) were influenza B. A total of 1,890 RSV notifications were reported to HPSC during the 2014/2015 season; the highest number of notifications reported since RSV was made notifiable in 2012.

Table 1: Number of influenza outbreaks by HSE-Area for the 2014/2015 influenza season (n=90). It is known that the number of hospitalised cases associated with these outbreaks was under-reported.

HSE-Area	No. of outbreaks	Total number ill	Total number hospitalised	Total number dead	Total number lab confirmed
HSE-E	25	544	74	10	259
HSE-M	5	58	2	1	24
HSE-MW	7	78	24	3	39
HSE-NE	7	96	2	4	31
HSE-NW	15	189	11	3	52
HSE-SE	10	126	9	4	34
HSE-S	17	283	22	1	45
HSE-W	4	46	14	1	25
Total	90	1420	158	27	509

Confirmed influenza cases hospitalised

One thousand and nine cases (22/100,000 population) with confirmed influenza were reported as hospitalised during the 2014/2015 influenza season; over 40% of all confirmed influenza notified cases. The highest age specific rate in hospitalised cases for the 2014/2015 season was in those aged 65 years and older (81.4/100,000 population) the highest ever reported in this age group, followed by those aged less than one year (74.6/100,000). The age specific rates in those less than one year of age were only higher during the 2009 pandemic. Of the 1,009 hospitalised cases, 780 (77.3%) were confirmed influenza A cases and 229 (22.7%) were influenza B cases. Of the 578 subtyped influenza A cases: 490 (84.8%) were influenza A(H3) and 88 (15.2%) were influenza A(H1)pdm09. Further data on confirmed influenza hospitalised cases are detailed in tables 1-4.

Enhanced surveillance hospital data on 0-14 year age group

A total of 351 confirmed influenza cases aged between 0 and 14 years were notified on CIDR for the 2014/2015 influenza season, 213 (60.7%) of these cases were hospitalised. One hundred and sixty-two cases (76.1%) were positive for influenza A [89 A(H3), 40 A(H1)pdm09 and 33 A (not subtyped)] and 51 (23.9%) were positive for influenza B. The median age of cases were 3 years. Over 63% of cases were aged between 0 and 4 years, with one quarter of cases aged less than one year. The most frequently reported symptoms included: fever (73.6%), cough (65.3%), fatigue (35.2%) and gastroenteric manifestations (29.6%). Complications were reported for 45 (21.1%) cases; of these cases more than one complication was reported for 29.2% of cases. The most frequently reported complications included secondary bacterial pneumonia, primary influenza viral pneumonia and other respiratory complications. The median length of stay in hospital was 2 days (ranging from 1 - 25 days). Approximately, 33% of hospitalised cases in this age group were reported as having an underlying medical condition, with chronic respiratory disease (including asthma), chronic neurological disease, immunosuppression, conditions that can compromise respiratory function and other medical conditions being the most frequently reported. Four cases were reported as being premature. Of the 52

cases with reported underlying medical conditions and known vaccination status, 90% were not vaccinated. Approximately, 27% of cases (44/162) commenced antiviral treatment and 73% (118/162) did not. Nine cases were reported as being admitted to critical care units (for further details, see below).

Confirmed influenza cases admitted to ICU

Of the 1,009 hospitalised confirmed influenza cases, 69 (6.8%) were admitted to critical care (60 adults and 9 paediatric cases). Of the 69 critical care cases, 33 (47.8%) were infected with influenza A(H3), 11 (15.9%) with influenza A(H1)pdm09, 11 (15.9%) influenza A (not subtyped) and 14 (20.3%) with influenza B. Age specific rates for patients admitted to critical care units were highest in those aged 65 years and over (6.2 per 100,000 population) followed by those aged less than one year (4.1 per 100,000 population) (table 2). The median age in years for paediatric cases was 2, and 67 for adult cases. Fifty-three (53/60, 88.3%) adults and six (6/9, 66.7%) paediatric cases had pre-existing medical conditions. The most frequently reported underlying medical conditions for adults were chronic respiratory disease (36/60, 60%), followed by chronic heart disease (30/60, 50%), and immunosuppression (11/60, 18.3%). One adult case was pregnant. Twenty-four (40.0%) adult cases were reported as current/former smokers and four (6.7%) adult cases were reported to have alcohol related disease. The most frequently reported underlying medical conditions for paediatric cases were respiratory disease (3/9; 33.3%) and neurological/neuromuscular conditions (2/9, 22.2%). Fifty-two (52/60, 86.7%) adults were ventilated during their stay in critical care units. Ventilation status was only reported for one of nine paediatric cases; this case was ventilated. The median length of stay in critical care for adult cases was 9 days (ranging from 1 - 44 days) and for paediatric cases was 3 days (ranging from 1 - 26 days). Of the 34 cases with underlying medical conditions and known vaccination status, 55% were vaccinated. Vaccination status was only known for four paediatric cases with underlying medical conditions, none of these cases were vaccinated. Twenty-three (23/69, 33.3%) confirmed influenza cases reported from critical care units died.

Table 2: Age specific rate for confirmed influenza cases hospitalised and admitted to critical care during the 2014/2015 influenza season. Age specific rates are based on the 2011 CSO census

Age (years)	Hospitalised		Admitted to ICU	
	Number	Age specific rate per 100,000 pop.	Number	Age specific rate per 100,000 pop.
<1	54	74.6	3	4.1
1-4	80	28.2	4	1.4
5-14	79	12.7	1	0.2
15-24	44	7.6	1	0.2
25-34	82	10.9	2	0.3
35-44	78	10.3	9	1.3
45-54	52	9.0	6	1.0
55-64	104	22.4	10	2.2
≥65	436	81.4	33	6.2
Total	1009	22.0	69	1.5

Mortality data

During the 2014/2015 influenza season, of the 2,530 influenza cases notified, 66 (2.6%) cases were reported as having died. The case classification of influenza was confirmed for 62 of these cases, probable for one and possible for three cases. Influenza was reported as a cause of death (either on the death certificate or by the physician) for 48 cases. Of the 62 cases with known virology, 36 were associated with influenza A(H3), 10 with influenza A(H1)pdm09, eight influenza A (not subtyped) and eight with influenza B. The median age of cases who died during the 2014/2015 influenza season was 77 years, ranging from 1-95 years. Cumulative excess all-cause mortality was reported in those aged 65 years and older, for nine consecutive weeks between weeks 2 and 10 2015. The estimated number of excess deaths during the 2014/2015 season for those aged 65 years and older was 726.

Summary tables of confirmed influenza hospitalised and critical care cases and influenza-associated deaths for all ages are detailed in tables 3, 4 and 5.

Overview of the 2014/2015 season

In Ireland, the 2014/2015 influenza season was more severe than recent seasons. Influenza A (H3) viruses predominated, with an increase in the predominance of influenza B viruses later in the season. The impact of influenza during the 2014/2015 season predominantly affected those aged 65 years and older, with high numbers of outbreaks in residential care facilities, high hospitalisation rates, an increase in deaths reported in notified influenza cases and excess mortality

significantly higher than recent seasons. Over 1,000 confirmed influenza hospitalised cases were reported during the 2014/2015 season, a similar number to the 2009 pandemic. There was a significant increase in the overall hospitalisation rate for those aged 65 years and older compared to previous seasons, reaching the highest rate (81.4/100,000 population) ever reported for this age group (hospitalisation data available from 2009).

In Ireland and most Northern Hemisphere countries, the emergence of A(H3N2) viruses antigenically and genetically drifted from the 2014/2015 Northern Hemisphere vaccine strain, resulted in reduced vaccine effectiveness (VE).^{1, 2, 3} The Irish overall adjusted VE in preventing influenza confirmed infection in primary care was very low, likely reflecting this mismatch between circulating A(H3) viruses and the 2014/2015 vaccine strain. Despite some antigenic drift among B/Yamagata viruses, the B/Yamagata and A(H1N1)pdm09 components in the 2014/2015 vaccine were thought likely to protect against circulating viruses.^{1, 4} Excess all-cause mortality among people aged 65 years and older, concomitant with increased influenza activity and the predominance of drifted A(H3N2) viruses was observed in Ireland and across Europe. It is likely that influenza contributed significantly to these excess deaths, although adverse winter weather conditions and other respiratory infections may also have contributed.^{4, 5, 6}

Sentinel GP ILI consultation rates in Ireland were above baseline levels for 11 consecutive weeks during the 2014/2015 season, a longer period than for the

Table 3: Summary table of confirmed influenza cases hospitalised for all ages by influenza season: 2009-2015. Rates are based on the 2011 CSO census.

	Hospitalised					
	Pandemic period	2010/11	2011/12	2012/13	2013/14	2014/15
Total cases	1059	968	147	469	693	1009
Crude rate /100,000	23.1	21.1	3.2	10.2	15.1	22.0
Median age (years)	17	29	27	32	51	59
Females	50%	55%	56%	57%	57%	53%
Case fatality rate	2%	4%	4%	5%	5%	5%

Table 4: Summary table of confirmed influenza cases admitted to critical care units for all ages by influenza season: 2009-2015. Rates are based on the 2011 CSO census.

	Admitted to ICU					
	Pandemic period	2010/11	2011/12	2012/13	2013/14	2014/15
Total cases	100	121	15	39	83	69
Crude rate /100,000	2.2	2.6	0.3	0.8	1.8	1.5
Median age (years)	34	49	60	39	50	63
Females	50%	53%	80%	49%	41%	41%
Cases with risk factor	82%	74%	93%	90%	85%	86%
% Vaccinated	NA	17%	-	-	32%	47%
Hospital:ICU ratio	9%	13%	10%	8%	12%	7%
ICU Median LOS - Adult	12	14	5	9	9	9
ICU Median LOS - Paediatric	8	7	3	5	8	3
Case fatality rate	18%	29%	33%	28%	33%	33%

previous season. The NVRL reported the highest number of influenza A(H3) viruses ever detected since surveillance began in 2000. Positive detections of RSV and hMPV were also at higher levels than previously reported.

The number of acute respiratory infection/influenza outbreaks reported during the 2014/2015 season was at the highest level reported in Ireland since the 2009 pandemic. The majority of these outbreaks were caused by influenza A(H3) and mainly affected the elderly in residential care facilities. Reported influenza vaccination status of patients/clients in these outbreaks was high, whilst vaccination status of staff was low, highlighting the need to improve influenza vaccine uptake amongst healthcare workers in order to reduce influenza-related morbidity and mortality. Further information on seasonal influenza vaccine uptake in hospitals and long term care facilities is available in the [HPSC Annual Epidemiological Report, 2014](#).

For the 2015/2016 influenza season in the Northern Hemisphere, WHO have recommended trivalent influenza vaccines contain the following strains: an A/California/7/2009 (H1N1)pdm09-like virus; an A/Switzerland/9715293/2013 (H3N2)-like virus; and a B/Phuket/3073/2013-like virus.⁷ This represents a change in the influenza A(H3) and influenza B(Yamagata lineage) components compared with the composition of the 2014/2015 influenza vaccine. The vast majority of influenza viruses genetically tested during the 2014/2015 season in Ireland, belonged to genetic groups antigenically similar to the influenza virus strains selected for the 2015/2016 Northern Hemisphere influenza vaccines.

In Ireland, for the 2015/2016 season, existing surveillance systems are being further strengthened. HPSC are currently evaluating the critical care influenza surveillance system, with a view to improving the efficiency of the system and overall reporting of cases for future seasons. HPSC are also focusing on improving influenza vaccine uptake and antiviral data on severe influenza cases, outbreaks, health care workers and those in risk groups for influenza. HPSC, ICGP and the NVRL are continuing to work on the European influenza vaccine effectiveness study (I-MOVE). Data from all of these surveillance projects will assist in guiding the management and control of influenza and of any future epidemics or pandemics. www.hpsc.ie

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Acknowledgements

HPSC would like to thank the sentinel GPs, ICGP, NVRL, Departments of Public Health, sentinel hospitals, ICSI and HSE-NE for their contributions towards influenza surveillance throughout the influenza season.

Table 5: Summary table of notified influenza cases that died from all causes and were reported on Ireland's Computerised Infectious Disease Reporting System (CIDR) by influenza season: 2009-2015. Rates are based on the 2011 CSO census.

	Influenza notifications - Deaths from all causes					
	Pandemic period	2010/11	2011/12	2012/13	2013/14	2014/15
Total deaths	32	43	12	38	58	66
Crude rate /100,000	0.7	0.9	0.3	0.8	1.3	1.4

2.2 Legionellosis

Summary

Number of cases in 2014: 8
Crude incidence rate: 1.7 per million

In 2014, there were eight cases of Legionnaires' disease notified in Ireland, a rate of 1.7 per million population, a decrease from the rate of 3.1 per million seen in 2013. No deaths associated with Legionnaires' disease were reported.

Six cases were reported from HSE East, one from HSE North West and one from HSE West.

Males and females were equally affected by Legionnaires' disease with half of all cases occurring in males and half in females. Although the number of cases reported was low, this was the first year since the reporting of cases to the national infectious disease surveillance system, CIDR that the majority of cases did not occur in males. The median age was 59.5 years with a range from 37 to 85 years.

All eight cases were classified as confirmed. The organism involved in seven of these cases which was detected by urinary antigen test was *Legionella pneumophila* serogroup 1. The diagnosis in one of the seven cases also included the use of the laboratory method nucleic acid amplification (PCR). The organism cultured from the remaining confirmed case was a previously unrecognised *Legionella pneumophila* non serogroup 1 or 2-15, with a novel sequence type ST1796.

Monoclonal subtyping information was not available for any of the cases.

Four cases were travel-associated. Countries of travel included Democratic Republic of Congo (1), Italy (1), Portugal (1) and Spain (1). No cases were linked to travel related clusters. The remaining four cases were assumed to be community acquired.

An autumnal seasonality was evident in the cases in 2014 where half of all cases reported were notified in September, as described in Figure 1.

Legionnaires' Disease Events by Month of Notification

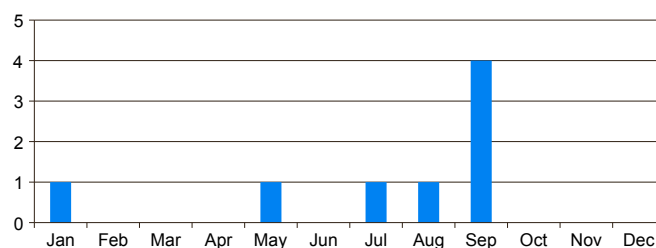


Figure 1. Number of Legionnaires' disease cases by month of notification in Ireland, 2014

Figures for the year 2014 presented in this report were extracted from the computerised infectious disease reporting (CIDR) system on the 11th August, 2015.

Table 1. Number of Legionnaires' disease cases per million population in Ireland, 2007-2014

Age group (years)	2007	2008	2009	2010	2011	2012	2013	2014
<30	1	0	0	1	0	0	0	0
30-39	3	0	0	0	0	1	1	1
40-49	4	2	0	2	0	1	3	1
50-59	2	3	2	1	1	1	4	2
60-69	3	4	3	3	4	6	1	3
70+	2	2	2	4	2	6	5	1
Total	15	11	7	11	7	15	14	8
CIR	3.5	2.6	1.5	2.4	1.5	3.3	3.1	1.7

For details of denominator data used, please see Explanatory Notes section at the end of the HPSC annual report

2.3 Invasive Group A Streptococcal Disease

Summary

Total number of cases, 2014 = 164
Crude incidence rate, 2014 = 3.57 per 100,000 population

Notifications

In 2014, 164 cases of invasive group A streptococcal (iGAS) disease were notified, which corresponds with a rate of 3.57 iGAS cases per 100,000 population [95% confidence interval (CI): 3.05 – 4.17 per 100,000]. The 2014 iGAS rate was slightly lower than in 2013 (3.57 versus 3.66 [95% CI: 3.13 – 4.26 per 100,000]). However, the increase is not considered to be statistically significant as the confidence intervals overlap.

Case classification

The majority (n = 160; 98%) were classified as confirmed cases: patients with group A streptococcus (GAS; *Streptococcus pyogenes*) isolated from a sterile site. However, one of these cases did not meet the case definition for a confirmed case as the case presented with an abscess and GAS was isolated from a non-sterile site (throat swab) only. Three cases were classified as probable iGAS cases: patients with streptococcal toxic shock syndrome (STSS) or necrotising fasciitis and GAS

isolated from a non-sterile site (e.g. throat, sputum, vagina). However, two of these cases did not meet the case definition for a probable case as neither presented with STSS or necrotising fasciitis and GAS was isolated from non-sterile sites only. One case was classified as a possible case, i.e. the case presented with STSS and there was serological evidence of recent GAS infection (high antibody titres to streptolysin O were detected).

Patient demographics

Of the 164 cases, 94 (57%) were male. The mean age of patients with iGAS was 44 years (range = 4 months – 99 years) and iGAS was more common in young children and older adults (Figure 1).

Geographic spread and seasonal variation

Table 1 displays the numbers and crude incidence rates (CIRs) of iGAS disease by HSE area from 2010 to 2014. While HSE East accounted for the highest number of reported cases in 2014 (n=65), HSE West had the highest CIR (4.94 per 100,000 population). In two of the HSE areas, HSE South and HSE West, both numbers of cases and CIRs increased, while in the other six HSE areas decreases were reported.

The peak months in 2014 were March (23 cases), April and July (21 cases each) and May (20 cases). As in

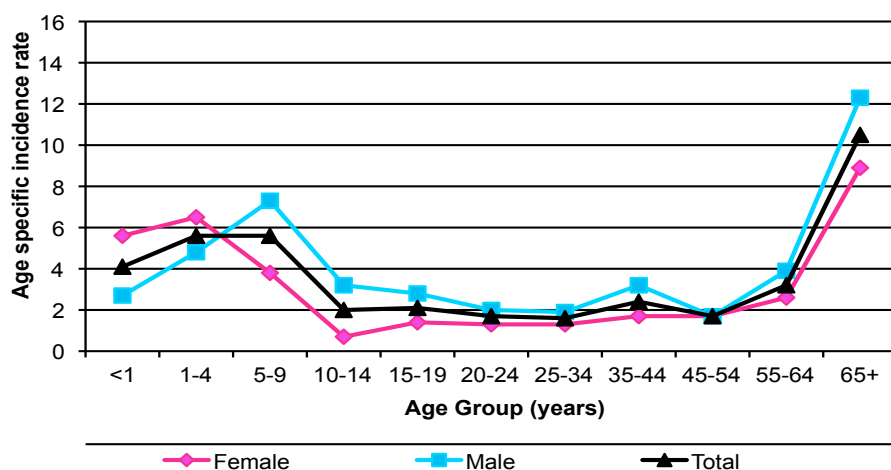


Figure 1. Age and sex specific rates of iGAS disease in 2014

previous years, the peak period occurred during the first half of the year (Figure 2). Upon annual review of cumulative monthly data, an increase in notifications was first noted from April 2012 (Figure 3). The increase was sustained throughout 2013 and into 2014 with the numbers starting to level off in the latter months of 2014. Data presented here are based on the date the case was notified to public health, not on the date the case was first detected.

Isolate details

Of 160 confirmed cases, GAS was isolated from a sterile site in 151 cases and a non-sterile site (throat) for one case (see earlier comment on this case classification), with a source site not reported for eight cases. GAS was isolated primarily from blood cultures (n=100; 66%), abscesses (n=21), deep tissue (n=12), joints (n=6), pleural fluid (n=3), bone (n=1) and peritoneal fluid (n=1). For four cases, GAS was isolated from another sterile site in addition to blood: abscess (n=2), bone (n=1) and joint (n=1).

Of the three probable iGAS cases notified, GAS was isolated from non-sterile sites, i.e. vaginal, perineal and thigh wound swabs. In two of these cases, the case

definition for probable iGAS was not met as they did not have a clinical presentation that included STSS or necrotising fasciitis (see earlier comment under "case classification"). In the possible iGAS case, there was no isolate but high antibody titres to streptolysin O were detected in conjunction with a clinical presentation that included STSS.

Typing data, based on sequencing of the *emm* genes that encode the M protein (the major virulence factor), were available on 130 isolates submitted from 29 laboratories: *emm*-types 3 (n=47; 36%), 1 (n=21; 16%), 28 (n=12; 9%), 89 (n=8; 6%), 4 and 81 (n=7; 5% each) and 12 (n=6; 5%) comprised 86% of all the isolates typed. Twelve other *emm*-types (each represented by four isolates or less) were also detected. Of the 15 patients with STSS for whom *emm*-typing was undertaken, eight GAS isolates belonged to *emm*3 (53%) and three to *emm*1 (20%).

Enhanced surveillance data

Enhanced data were provided for 150 (91%) of the 168 iGAS cases, which is slightly lower than in 2013 (156 of 168 cases; 93%). The source laboratory could be ascertained for all cases. As in previous years, there

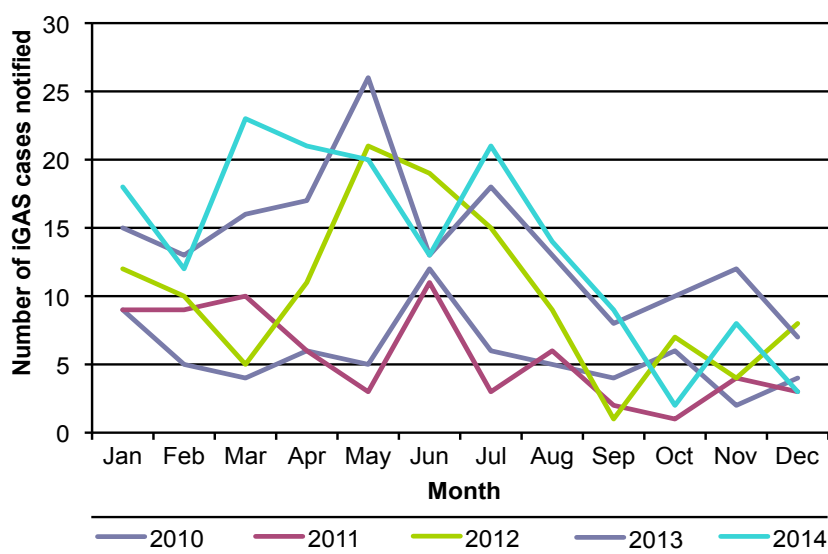


Figure 2. Monthly distribution of iGAS cases, 2010-2014

Table 1. Numbers (n) and Crude Incidence Rates (CIRs) per 100,000 population of iGAS disease by HSE Area (2010-2014)

HSE Area	2010		2011		2012		2013		2014	
	n	CIR	n	CIR	n	CIR	n	CIR	n	CIR
HSE E	22	1.36	29	1.79	51	3.15	67	4.14	65	4.01
HSE M	2	0.71	5	1.77	7	2.48	7	2.48	4	1.42
HSE MW	6	1.58	6	1.58	8	2.11	16	4.22	13	3.43
HSE NE	7	1.59	1	0.23	11	2.50	14	3.18	12	2.72
HSE NW	8	3.10	2	0.77	5	1.94	6	2.32	3	1.16
HSE SE	5	1.00	7	1.41	16	3.22	21	4.22	18	3.62
HSE S	12	1.81	12	1.81	14	2.11	18	2.71	27	4.06
HSE W	6	1.35	5	1.12	10	2.25	19	4.27	22	4.94
IRELAND	68	1.48	67	1.46	122	2.66	168	3.66	164	3.57

CIRs calculated using the 2011 census

was wide variation in completeness of enhanced data reporting. Table 2 summarises characteristics of iGAS cases in Ireland from 2010 to 2014.

Clinical details

Clinical presentation data were provided for 132 cases (80%). As in previous years, bacteraemia (n=100 cases, including cases where bacteraemia was not specifically stated but GAS was isolated from blood) and cellulitis (n=58) were the commonest presentations, followed by STSS (n=21; seven of which were implied based on the information provided on the clinical presentation), pneumonia (n=14), septic arthritis (n=11), necrotising fasciitis (n=7), myositis (n=6), puerperal sepsis (n=4), erysipelas (n=2) and peritonitis (n=1). Note that an iGAS case could have more than one clinical manifestation of infection.

Risk factors

Risk factor data were provided for 126 iGAS cases (77%). Risk factors included: age ≥ 65 years (n=56), presence of skin or wound lesions (n=50), diabetes mellitus (n=11), malignancy (n=10), varicella infection (n=7), steroid use (n=6), alcoholism (n=5), injecting drug use (IDU) (n=5), recent childbirth (n=4), and non-steroidal anti-inflammatory drug (NSAID) use (n=2). Note that an iGAS case could have more than one risk factor. No risk factors were identified for 37 cases.

Clinical management/Severity

Surgical intervention was required for 41 patients (aged 14 months – 86 years). This included one patient with STSS, three patients with necrotising fasciitis and three patients with both STSS and necrotising fasciitis.

Among patients requiring surgical intervention, risk factor data were provided for 39 cases. Risk factors included: skin and wound lesions (n=16), age ≥ 65 years (n=5), varicella infection (n=2), alcoholism (n=1),

malignancy (n=1), IDU (n=1) and NSAID use (n=1). Note that an iGAS case requiring surgery could have more than one risk factor. No risk factors were identified for 17 patients.

Thirty-six patients (aged 14 months – 99 years) required intensive care unit (ICU) admission. This included 12 patients with STSS, four patients with necrotising fasciitis and three patients with both STSS and necrotising fasciitis.

Among patients admitted to an ICU, risk factor data were provided for 32. Risk factors included: age ≥ 65 years (n=15), skin and wound lesions (n=13), diabetes mellitus (n=4), malignancy (n=3), alcoholism (n=2), IDU (n=1) and varicella infection (n=1). Note that an iGAS case requiring ICU admission could have more than one risk factor. No risk factors were identified for eight patients. Length of ICU stay was provided for 18 cases. The median length of ICU stay was three days (range = 1 – 7).

Other epidemiological information

Three cases were reported as hospital-acquired. There were no iGAS outbreaks reported.

Outcome

Outcome at seven-days following GAS isolation was reported for 102 cases:

- 92 were still alive
- 10 patients had died, where GAS was the main or contributory cause of death

The seven-day case fatality rate (CFR) for iGAS disease was 10%.

Of 21 STSS cases, outcome at seven-days was reported for 17. Of those, there were six deaths due to GAS (CFR = 35%).

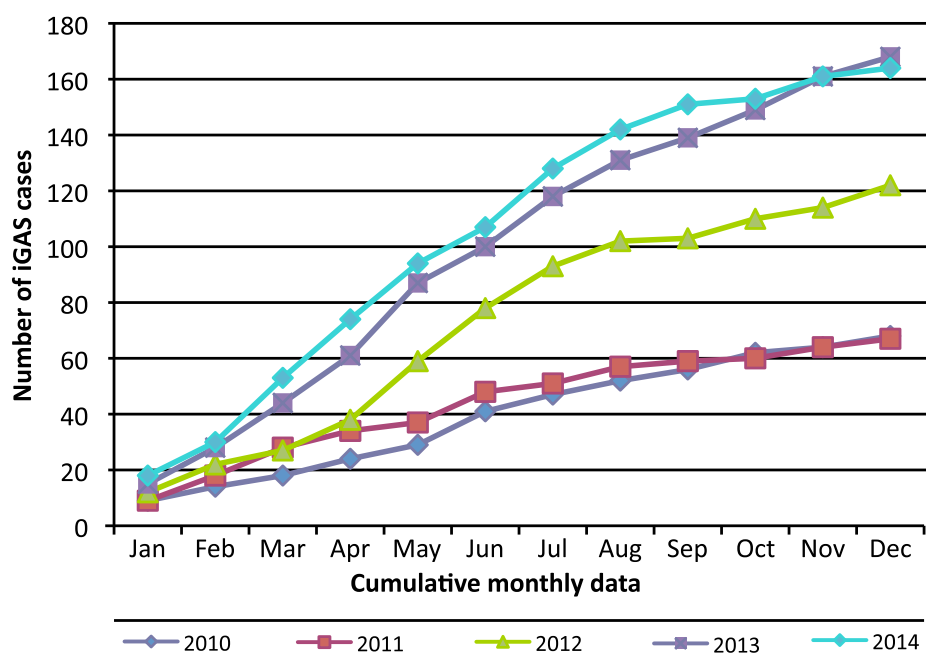


Figure 3. Cumulative monthly numbers of iGAS cases, 2010-2014

Table 2. Characteristics of iGAS cases in Ireland, 2010-2014

	Year				
	2010	2011	2012	2013	2014
Notifications					
Total iGAS cases notified	68	67	122	168	164
iGAS incidence rate per 100,000 population	1.48	1.46	2.66	3.66	3.57
Cases for which Enhanced data provided** (%)	61 (90%)	60 (90%)	106 (87%)	156 (93%)	150 (91%)
Patient Demographics					
Male (%)	36 (53%)	28 (42%)	59 (48%)	95 (57%)	94 (57%)
M:F ratio	1.13:1	0.72:1	0.94:1	1.30:1	1.34:1
Mean age	49	43	44	41	44
Median age	49	39	42	40	44
Age range	0-97	0-97	0-92	0-93	0-99
Paediatric cases (aged <18 years) (%)	10 (15%)	15 (22%)	28 (23%)	45 (27%)	47 (29%)
Older cases (aged 65+ years) (%)	22 (32%)	22 (33%)	42 (34%)	50 (30%)	56 (34%)
Clinical Presentation†					
Data on Clinical Presentation (%)	60 (88%)	58 (87%)	103 (84%)	142 (85%)	132 (80%)
Streptococcal Toxic Shock-like Syndrome (STSS) without NF (%)	7 (12%)	4 (7%)	22 (21%)	28 (20%)	18 (14%)
Necrotising fasciitis (NF) without STSS (%)	2 (3%)	1 (2%)	2 (2%)	6 (4%)	4 (3%)
STSS and NF (%)	2 (3%)	2 (3%)	4 (4%)	4 (3%)	3 (2%)
Bacteraemia with focal presentations (%)	27 (45%)	30 (52%)	42 (41%)	45 (32%)	45 (34%)
Bacteraemia with no focal presentations (%)	21 (35%)	15 (26%)	21 (20%)	36 (25%)	35 (27%)
Other focal presentations with no bacteraemia (%)	1 (2%)	6 (10%)	11 (11%)	23 (16%)	28 (21%)
Bacteraemia (%)	55 (92%)	52 (90%)	80 (78%)	107 (75%)	100 (76%)
Other focal presentations:					
Cellulitis (%)	22 (37%)	24 (41%)	41 (40%)	45 (32%)	58 (44%)
STSS (%)	9 (15%)	6 (10%)	26 (25%)	32 (23%)	21 (16%)
Pneumonia (%)	10 (17%)	8 (14%)	17 (17%)	24 (17%)	14 (11%)
Septic arthritis (%)	2 (3%)	2 (3%)	7 (7%)	10 (7%)	11 (8%)
Necrotising fasciitis (%)	4 (7%)	3 (5%)	6 (6%)	10 (7%)	7 (5%)
Myositis (%)	2 (3%)	0 (0%)	4 (4%)	3 (2%)	6 (5%)
Puerperal sepsis (%)	4 (7%)	5 (9%)	6 (6%)	6 (4%)	4 (3%)
Erysipelas (%)	0 (0%)	0 (0%)	3 (3%)	3 (2%)	2 (2%)
Peritonitis (%)	1 (2%)	3 (5%)	1 (1%)	4 (3%)	1 (1%)
Meningitis (%)	2 (3%)	1 (2%)	3 (3%)	3 (2%)	0 (0%)
Risk Factors†					
Data on Risk Factors (%)	49 (72%)	49 (73%)	96 (79%)	138 (82%)	126 (77%)
Age 65+ years (%)	22 (32%)	22 (33%)	42 (34%)	50 (30%)	56 (34%)
Skin lesions/wounds (%)	16 (33%)	20 (41%)	34 (35%)	56 (41%)	50 (40%)
Diabetes (%)	8 (16%)	7 (14%)	5 (5%)	16 (12%)	11 (9%)
Malignancy (%)	6 (12%)	6 (12%)	10 (10%)	23 (17%)	10 (8%)
Varicella (%)	2 (4%)	2 (4%)	9 (9%)	5 (4%)	7 (6%)
Steroid use (%)	2 (4%)	1 (2%)	8 (8%)	11 (8%)	6 (5%)
Alcoholism (%)	3 (6%)	1 (2%)	5 (5%)	6 (4%)	5 (4%)
Injecting drug user (%)	6 (12%)	3 (6%)	6 (6%)	5 (4%)	5 (4%)
Childbirth (%)	4 (8%)	5 (10%)	6 (6%)	6 (4%)	4 (3%)
Non-steroid anti-inflammatory drug use (%)	6 (12%)	1 (2%)	2 (2%)	4 (3%)	2 (2%)
No identified risk factor (%)	7 (14%)	8 (16%)	14 (15%)	37 (27%)	37 (29%)
Outcome at 7 days					
Data on outcome at 7 days (%)	43 (63%)	43 (64%)	65 (53%)	108 (64%)	102 (62%)
RIP/GAS main cause or contributory (%)	4 (9%)	5 (12%)	8 (12%)	16 (15%)	10 (10%)
STSS cases: Data on outcome at 7 days (%)	8 (89%)	5 (83%)	17 (65%)	26 (81%)	17 (81%)
STSS cases: RIP/GAS main cause or contributory (%)	2 (25%)	1 (20%)	6 (35%)	10 (38%)	6 (35%)
Severity					
Data on Admission to ITU (%)	57 (84%)	57 (85%)	99 (81%)	153 (91%)	144 (88%)
Admitted to ITU (%)	14 (25%)	11 (19%)	40 (40%)	44 (29%)	36 (25%)
Data on Surgical Intervention (%)	49 (72%)	45 (67%)	86 (70%)	136 (81%)	127 (77%)
Surgical Intervention Required (%)	12 (24%)	8 (18%)	26 (30%)	39 (29%)	41 (32%)
Typing					
iGAS isolates that were typed (%)			109 (89%)	140 (83%)	130 (79%)
Emm-1 (%)			53 (49%)	41 (29%)	21 (16%)
Emm-3 (%)			4 (4%)	33 (24%)	47 (36%)
Other emm-types (%)			52 (47%)	66 (47%)	62 (48%)
STSS cases: iGAS isolates that were typed (%)			25 (96%)	28 (88%)	15 (71%)
Emm-1 (%)			17 (68%)	9 (32%)	3 (20%)
Emm-3 (%)			2 (8%)	9 (32%)	8 (53%)
Other emm-types (%)			6 (24%)	10 (36%)	4 (27%)

** Degree of completion of enhanced surveillance forms varies from case to case: information may not be available on all variables/ categories, thus calculations of percentages take into account only those cases for which data are provided

†Note: A patient may have more than one clinical presentation or risk factor

Of 41 cases requiring surgical intervention, outcome at seven-days was reported for 32. Of those, there were no deaths due to GAS.

Of 36 cases admitted to ICU, outcome at seven-days was reported for 26. Of those, there were six deaths due to GAS (CFR = 23%).

Antimicrobial susceptibility

Antimicrobial susceptibility data were reported on 94 GAS isolates (88 from blood and six from other specimens) by 25 laboratories via the European Antimicrobial Resistance Surveillance Network (EARS-Net). All isolates tested were susceptible to penicillin (n=84) and vancomycin (n=71). Resistance to erythromycin was reported in four (5%) of 85 isolates, to clindamycin in one (2%) of 42 isolates and to tetracycline in four (12%) of 33 isolates.

CONCLUSION

In 2014, 164 cases of iGAS infection were notified in Ireland, the second highest annual number reported to date after 2013 (n=168). The CIR decreased from 3.66 in 2013 to 3.57 per 100,000 in 2014, but this was not statistically significant. There were signs that the numbers of iGAS infections was levelling off towards the end of 2014.

Invasive GAS is a potentially life-threatening disease. In 2014, the CFR was 10% for all iGAS infections and even higher for patients admitted to ICU (23%) or presenting with STSS (35%). Since 2012, more patients have presented with STSS than in previous years: with 26 cases in 2012, 32 cases in 2013, and 21 cases in 2014 compared with 6-9 cases in each of the previous four years.

Typing of *emm* genes was undertaken on a national basis for the first time in 2012, with the establishment of a GAS typing service by the Epidemiology and Molecular Biology Unit (EMBU) at the Children's University Hospital, Temple St. In 2014, one *emm* type, *emm3*, predominated comprising 36% of all isolates typed. This is in contrast with the situation in 2012 when another *emm* type, *emm1*, was predominant comprising 49% of all isolates typed; while in 2013 both *emm1* and *emm3* were the dominant *emm* types. Certain *emm* types, including *emm1* and *emm3*, are associated with STSS, and STSS in turn is strongly associated with increased mortality. The changes observed in the predominant *emm* types in circulation and in the clinical presentations over the last couple of years highlight the dynamic nature of iGAS infection.

Ongoing surveillance is essential, specifically completion of the enhanced data questionnaire, to gain a greater understanding of iGAS, to enable early detection of clusters/outbreaks, to ensure prompt implementation of infection prevention and control precautions and appropriate management of contacts. Epidemiological typing as provided by the EMBU is another vital element to increase insight into GAS infection in Ireland, as certain *emm* types are associated with greater morbidity and mortality.

Antimicrobial susceptibility data confirm that iGAS remains susceptible to penicillin and that penicillin should continue to be the treatment of choice for iGAS.

HPSC thanks participating microbiology laboratories and public health departments for their ongoing contribution to the iGAS enhanced surveillance scheme.

All microbiology laboratories are encouraged:

- to return enhanced iGAS surveillance forms for every patient with iGAS
- to submit all iGAS isolates to the Epidemiology and Molecular Biology Unit (EMBU), Children's University Hospital, Temple St for *emm*-typing
- to submit antimicrobial susceptibility data on all iGAS cases along with EARS-Net quarterly returns

The enhanced surveillance form can be downloaded from the HPSC web site at:

<http://www.hpsc.ie/hpsc/A-Z/Other/GroupAStreptococcalDiseaseGAS/SurveillanceForms/>

Further information on iGAS disease in Ireland, including factsheets for patients and contacts, national guidelines is available at: <http://www.hpsc.ie/A-Z/Other/GroupAStreptococcalDiseaseGAS/>

The figures presented in this summary are based on data extracted from the Computerised Infectious Diseases Reporting (CIDR) System on **1st October 2015**.

2.4 Invasive Group B Streptococcal Infections

Summary

Number of cases, 2014: 68

- 46 cases of early-onset disease (EOD)
- 22 cases of late-onset disease (LOD)

EOD rate per 1,000 live births, 2014: 0.68

LOD rate per 1,000 live births, 2014: 0.33

Background

Invasive group B streptococcal (iGBS; *Streptococcus agalactiae*) infections in infants <90 days old or stillborn infants have been notifiable in Ireland via the Computerised Infectious Diseases Reporting (CIDR) system since January 2012.

In neonates two syndromes exist:

- Early-onset disease (EOD; age at onset/diagnosis <7 days old)
- Late-onset disease (LOD; age at onset/diagnosis 7-89 days old)

Both include sepsis, pneumonia and meningitis. Stillbirth associated with isolation/detection of *Streptococcus agalactiae* from the placenta or amniotic fluid is also notifiable.

Notifications

In 2014, there were 68 iGBS cases, of which 46 and 22 cases represented EOD and LOD, respectively (Figure 1 and Table 1). The EOD and LOD rates were 0.68 and 0.33 per 1,000 live births, respectively (67,462 live births, CSO 2014 data obtained from <http://www.cso.ie/en/releasesandpublications/ep/p-vsystalstatisticsyearlysummary2014/>)

Five cases presented with meningitis and five cases were associated with stillbirth.

The figures presented in this summary are based on data extracted from CIDR on 19th October 2014.

Table 1. Annual breakdown, including rates, of iGBS cases by disease syndrome, 2012-2014

Disease syndrome	Year					
	2012		2013		2014	
	n (%)	Rate*	n (%)	Rate*	n (%)	Rate*
EOD	57 (75%)	0.79	41 (62%)	0.59	46 (68%)	0.68
LOD	19 (25%)	0.26	25 (38%)	0.36	22 (32%)	0.33
Total	76	1.05	66	0.96	68	1.01

* Incidence rate per 1,000 live births

Live births in the Republic of Ireland (source: www.cso.ie): 2012, 72,225; 2013, 68,930; 2014, 67,462

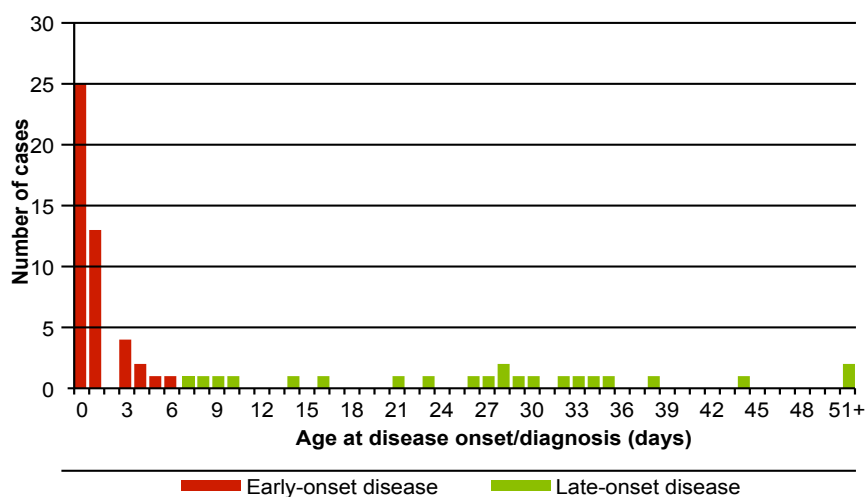


Figure 1. Distribution of cases of invasive Group B streptococcal infection by age (in days) at time of onset/diagnosis in 2014: early-onset disease (<7 days) and late-onset disease (7-89 days)

2.5 Tuberculosis, 2014 and outcome data for 2013

Summary

2013: 372 (8.1/100,000 population)

2014: 318 (6.9/100,000 population)

In 2014, 318 cases of tuberculosis (TB) were notified in Ireland, corresponding to a crude incidence rate (CIR) of 6.9 per 100,000 population, a decrease compared to 2013 (8.1/100,000 population)*. A summary of the epidemiology of TB in Ireland during 2013 and 2014 is shown in table 1 while the number of notifications and CIR from 1991 to 2014[†] with three-year moving averages is illustrated in figure 1. Outcome data will not be available for cases diagnosed during 2014 until February 2016.

Regional distribution:

The highest crude incidence rate in both 2013 and 2014 was reported by HSE-S (9.9) while the lowest rate was reported by HSE-M (5.7) in 2013 and HSE-W (3.8) in 2014.

The highest age-specific rate (ASIR) in 2014 was observed in those aged 65 years and older (13.1) while

the highest ASIR in 2013 occurred among those aged 25-34 years (11.7). For both years, rates among males were higher than females for all age groups except in the 15-24 year age group in 2013 and the 35-44 year age group in 2014. The highest rate among males in 2014 occurred in those aged 65 years and older (16.9) while the highest rate in 2013 (15.1) occurred in males aged 55-64 years. The highest rate in females in 2014 occurred in those aged 65 years and older (9.9) and those aged 25-34 years (9.8) while in 2013 it occurred in the 15-24 year age group (10.1). The male to female ratio (1.7:1) reported in 2013 was consistent with the ratio reported in previous years, while it was slightly lower during 2014 (1.2:1).

Geographic origin

During 2014, 43.1% (137 cases) of TB cases were born outside Ireland, a slight decrease from the proportion reported in 2013 (44.9%). The crude rate in the foreign-born population decreased from 21.8 per 100,000 in 2013 to 17.9 per 100,000 in 2014. The crude rate in the indigenous population was 4.7 per 100,000 in 2014, which decreased slightly compared to 5.4 per 100,000 reported in 2013. There was a notable difference in age between indigenous and foreign born cases, with a

Table 1: Summary of the epidemiology of TB in Ireland, 2013 and 2014

Parameter	2013			2014		
	Number of cases	CIR	% of total	Number of cases	CIR	% of total
Total number of cases	372	8.1	n/a	318	6.9	n/a
Cases in indigenous population	202	5.4	54.3	177	4.7	55.7
Cases in foreign-born persons [‡]	167	21.8	44.9	137	17.9	43.1
Culture positive cases	281	6.1	75.5	231	5.0	72.6
Pulmonary cases	249	5.4	66.9	196	4.3	61.6
Smear positive pulmonary cases	127	2.8	34.1	91	2.0	28.6
Multi-drug resistant cases	4	0.09	1.1	2	0.04	0.6
Mono-resistant to isoniazid	19	0.4	5.1	8	0.2	2.5
Deaths attributable to TB	6	0.1	1.6	n/a	n/a	n/a
Outcomes reported in cases [§]	294	6.4	79.0	n/a	n/a	n/a
TB meningitis cases	3	0.07	0.8	2	0.04	0.6

*All crude incidence rates (CIR) are calculated per 100,000 population unless otherwise stated.

[†]Data for 2014 are provisional data which may change significantly following validation

[‡]Country of birth was missing for 4 cases in 2014 and for 3 cases in 2013.

median age of 58 years in 2014 and 47 years in 2013 in Irish-born cases, compared to 34 years in 2014 and 35 years in 2013 in foreign-born cases.

Site of infection

During 2014, pulmonary TB was reported in 196 (61.8%) cases and 121 (38.2%) had exclusively extrapulmonary disease while in 2013, 249 cases (66.9) were pulmonary and 123 (33.1) were exclusively extrapulmonary. Of the extrapulmonary cases reported, there were three cases of TB meningitis in 2013 (0.07/100,000 population) and two in 2014 (0.04/100,000 population).

Microbiology

Of the 318 cases reported in 2014, 72.6% (231 cases) were culture confirmed. Of the 196 cases with a pulmonary component reported, 159 (81.1%) were reported as culture confirmed and 91 (46.4%) were reported as smear positive. Of the 372 cases reported in 2013, 75.5% (281 cases) were culture confirmed. Of the 249 cases with a pulmonary component reported, 207 (83.1%) were reported as culture confirmed and 127 (51.0%) were reported as smear positive.

Drug sensitivity

Information on antibiotic sensitivity testing was available for 230 (99.6%) of 231 culture confirmed cases in 2014 and 272 (96.8%) of the 281 culture confirmed cases in 2013. In 2014, there were 17 (7.4%) documented resistant cases, two (0.6% of total cases) of which were MDR-TB cases. In 2013 there were 32 (11.8%) documented resistant cases, three (0.8% of total cases) of which were MDR-TB of which one was an XDR-TB case (0.3% of total cases). This is the second XDR-TB case reported since enhanced surveillance began in 2000. The previous XDR-TB case was reported in 2005.

Outcomes for 2013 cases

In 2013, information on treatment outcome was provided for 79.0% (294) of cases, similar to 78.3% in 2012. Treatment outcome was reported as completed for 229 (61.6%) cases, 10 were still on treatment (2.7%), 18 (4.8%) cases died, 16 (4.3%) were lost to follow up, 14 cases transferred out (3.8%), seven (1.9%) had treatment interrupted. Six (1.6% of total cases) of the 18 deaths were reported as attributable to TB.

Outbreaks

The introduction of the amendment to the Infectious Disease Regulations 1981 on January 1st 2004, made outbreaks, unusual clusters or changing patterns of illness statutorily notifiable by medical practitioners and clinical directors of laboratories to the medical officer of health. Standard reporting procedures for surveillance of TB outbreaks were formally agreed in 2007.

During 2014, five outbreaks of TB were reported to HSPC, a decrease compared to 2013. Twenty cases of active TB and 10 cases of latent TB infection (LTBI) were reported. Three outbreaks were reported by HSE-S and one each was reported by HSE-E and NE. Two general outbreaks were reported, one occurred in a community setting and one occurred in a public house. There were also three family outbreaks, two were in private houses and one occurred across an extended family.

During 2013, 12 outbreaks of TB were reported to HSPC, with 46 reported cases of active TB, 174 with latent TB infection (LTBI) and 17 hospitalisations. Three outbreaks each were reported by HSE-E, -S and -W, two outbreaks by HSE-MW and one by HSE-SE. There were seven general outbreaks, four in a community setting and one each in a university/college, a workplace and a residential institution. There were also five family outbreaks, three of which occurred across extended

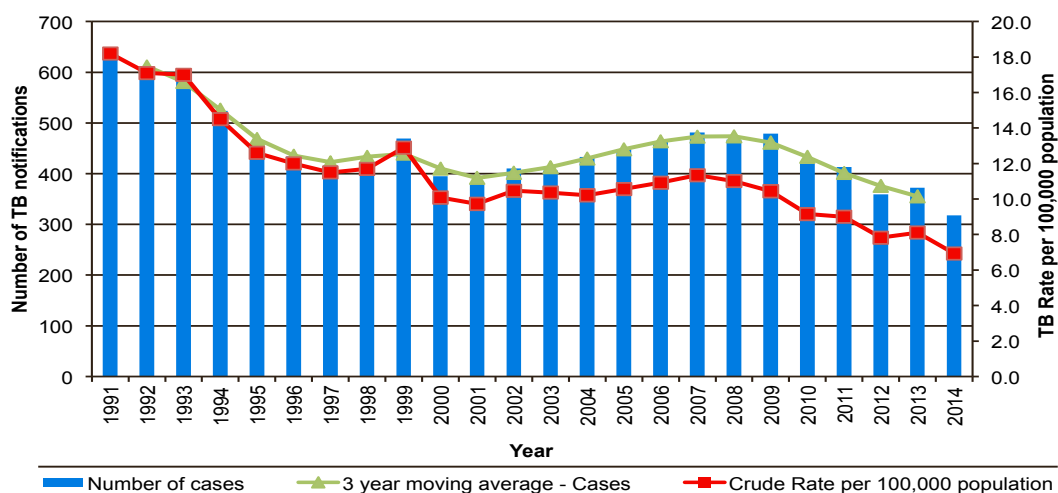


Figure 1: Notified cases of TB in Ireland with CIR per 100,000 population, 1991 to 2014 and 3-year moving averages, 1992-2014

families and two were in private houses. The number of outbreaks reported during 2013 increased compared to 2012, while the number of cases of LTBI reported as associated with the outbreaks increased sharply.

Further details on the epidemiology of TB cases reported in 2013 and 2014 will be available in the HPSC Report on the Epidemiology of TB in Ireland, 2013-2014 (www.hpsc.ie).

Figure 2 shows a summary of reported TB outbreaks from 2004 to 2014 by year of outbreak, number of active TB cases and number of persons with LTBI. Please note that numbers of LTBI for outbreaks reported during 2013 and 2014 are provisional and may increase as outbreak investigations continue.

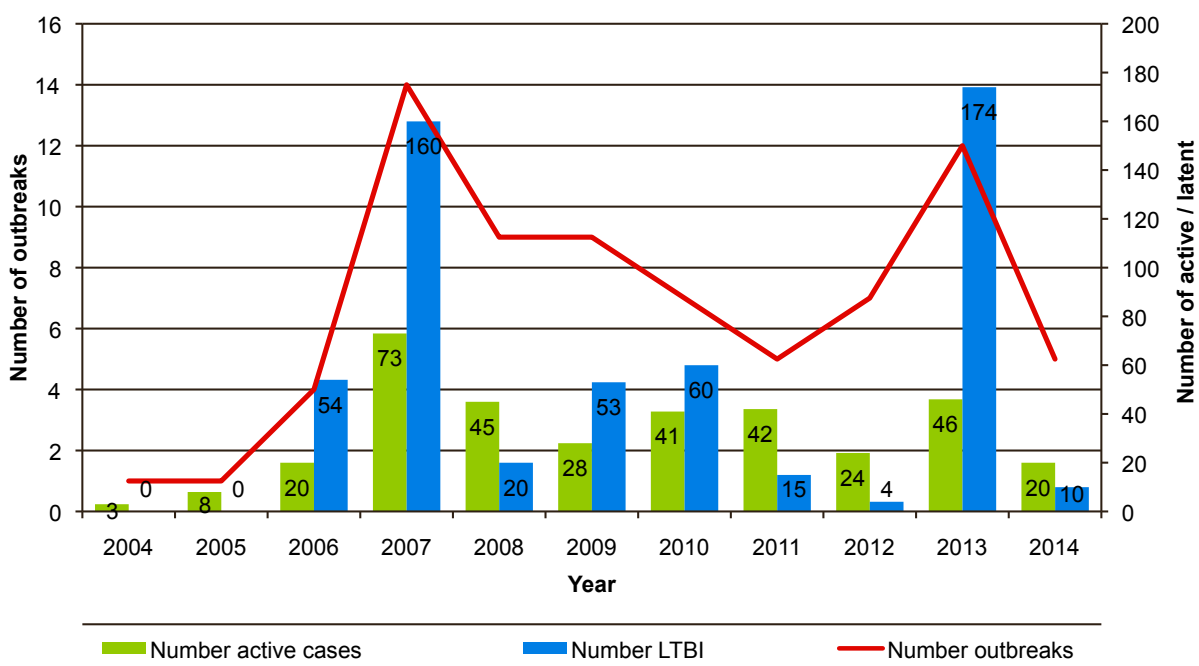


Figure 2: TB outbreak summary by year, 2004-2014

2.6 Chickenpox-hospitalised cases

Summary

Number of cases, 2014: 61
Crude incidence rate, 2014: 1.3/100,000

Chickenpox-hospitalised cases

The Health Act, 1947 entitles the Minister for Health to declare by regulation diseases that are infectious, covered by legislation and that require notification to a Medical Officer of Health. The infectious diseases notifiable in Ireland are regulated in the 1981 Infectious Diseases Regulations. The amendment S.I. No. 452 of 2011 to these regulations specified for the first time the disease chickenpox, hospitalised cases only, as notifiable. Chickenpox is caused by varicella-zoster virus. The case definition is available at www.hpsc.ie.

In 2014, 61 (1.3/100,000) hospitalised chickenpox cases were notified in Ireland compared to 53 (1.2/100,000) in 2013. The largest number of cases was in the HSE E (table 1). Of the 61 cases, 42 (69%) were classified as confirmed and 19 (31%) as possible. The largest number of cases and the highest age specific incidence rate was in the age group <1 year (figures 1 and 2). Of the 61 cases, 34 (56%) were male and 27 (44%) were female giving a male:female ratio of 1.3:1.

Chickenpox/varicella outbreaks

The amendment S.I. No. 707 of 2003 to the infectious disease regulations specified that unusual clusters or changing patterns of illness that may be of public health concern must be reported. Therefore, outbreaks of chickenpox must be notified regardless

Table 1. Number of notified hospitalised chickenpox cases and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2014

HSE Area	Number	CIR
HSE E	33	2.0
HSE M	1	0.4
HSE MW	3	0.8
HSE NE	4	0.9
HSE NW	5	1.9
HSE SE	6	1.2
HSE S	8	1.2
HSE W	1	0.2
Total	61	1.3

of hospitalisation status. Two outbreaks of chickenpox/suspected chickenpox were notified in 2014. One outbreak occurred in a childcare facility with 25 ill, the other occurred in a school, with 24 ill.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 11th August 2015. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

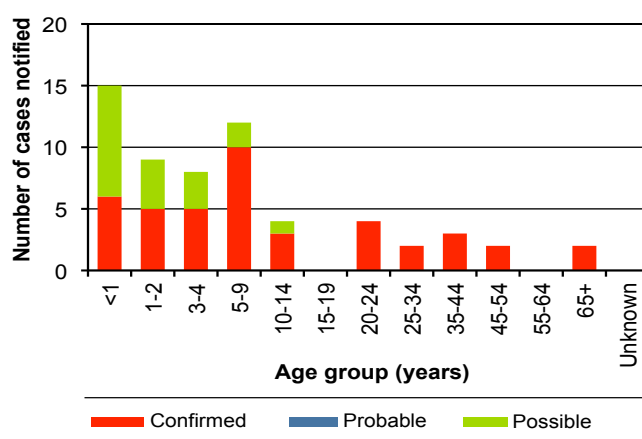


Figure 1. Number of notified hospitalised chickenpox cases in 2014 by age group and case classification

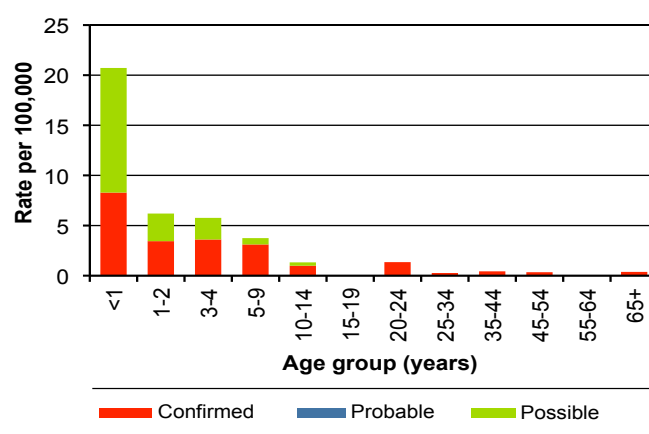


Figure 2. The age specific incidence rate (per 100,000 population) of notified hospitalised chickenpox cases in 2014 by case classification

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ANNUAL
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03

INFECTIOUS INTESTINAL DISEASES

3.1 Campylobacter

Summary

Number of cases: 2,615
Crude incidence rate: 57.0/100,000

Campylobacteriosis became a notifiable disease in Ireland in 2004 under the Infectious Diseases regulations. Prior to this, data on laboratory-confirmed cases of *Campylobacter* infection in humans were collected nationally as part of the EU Zoonoses Regulations (while some cases were included in the former category of "Food Poisoning (bacterial other than *Salmonella*)"). It is an acute zoonotic bacterial disease characterised by diarrhoea, abdominal pain, malaise, fever, nausea and vomiting. Symptoms generally last for only a few days. Campylobacteriosis is the commonest bacterial cause of gastroenteritis in Ireland and Europe. ¹

During 2014, levels of campylobacteriosis remained elevated for the fourth consecutive with 2,615 notifications reported to HPSC, an increase of 25.6% compared to 2013. This corresponded to a crude incidence rate of 57.0/100,000 population, which is

comparable with the 2013 European crude incidence rate of 64.8 per 100,000 population.⁷

Historically, variation in campylobacteriosis crude incidence rates (CIRs) has been reported between HSE areas. During 2014, the highest CIRs occurred in HSE-SE (78.6/100,000 population) and HSE-M (76.1/100,000 population). Both HSE areas also had the highest increases in CIR during 2014 compared to the mean CIR during 2004-2013 (HSE-M 52.1% and HSE-SE 47.7%). The lowest CIR was reported by HSE-NE (43.8/100,000 population).

Campylobacteriosis occurs in all age groups with the highest rate of notification reported in the 0-4 year age group. This preponderance in younger children is a well described characteristic of the disease and is also observed at European level. A comparison of the mean age-specific incidence rate between 2004-2013 and the age-specific rate in 2014 showed an increase of >45% in those aged 65 years and older (46.6%). This is the third consecutive year that the CIR has increased in this age group. Figure 1 compares the campylobacteriosis age specific rates (ASIR) for 2014 with the mean campylobacteriosis ASIR for 2004 to 2013.

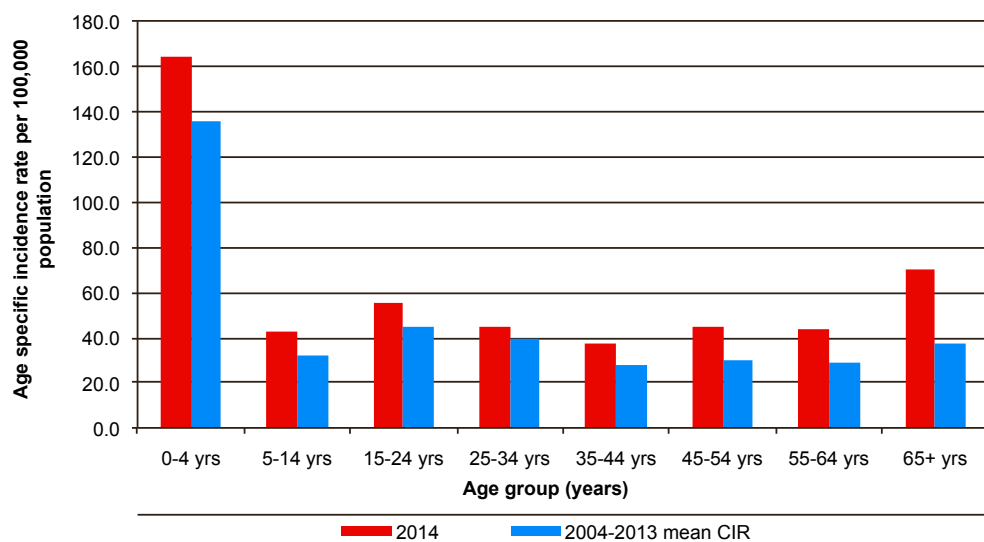


Figure 1: Campylobacteriosis ASIR 2014 compared to 2004-2013 mean ASIR (CIDR)

Campylobacteriosis has a well documented seasonal distribution with a peak in summer. In Ireland, notifications typically peak during May to July. While this typical warm-season peak was observed during May to July 2014, levels of campylobacteriosis notifications were also elevated during January 2014 with an increase of 38.3% reported compared to the mean number of notifications during January in 2004-2013. Figure 2 compares the monthly number of campylobacteriosis notifications for 2014 to the mean monthly number of campylobacteriosis notifications between 2004 and 2013.

All but two of the cases notified in Ireland during 2014 were laboratory confirmed. However, as there is currently no national reference facility for routine typing of *Campylobacter* isolates, information on *Campylobacter* species is strikingly incomplete. In 2014, 29.9% (n=781) of isolates were speciated. Of the 781 speciated isolates, 93.2% of isolates were *C. jejuni*, 6.5% were *C. coli*, while *C. fetus* and *C. sputorum* each accounted for 0.1%. The remaining 70.1% (n=1,834) of *Campylobacter* isolates identified were not further speciated.

During 2014, there were 10 outbreaks of campylobacteriosis reported to HPSC with 68 associated cases of illness. Six outbreaks were family outbreaks occurring in private houses. Four reported mode of transmission as person to person, while mode of transmission was unknown for the remaining two outbreaks. Four general outbreaks were also reported, two in nursing homes and two in community settings. Mode of transmission was foodborne for one and unknown for the remaining three outbreaks. During 2013, 16 European countries reported 414 food-borne outbreaks of campylobacteriosis which accounted for 8.0% of the total food-borne outbreaks reported to EFSA.¹

References:

1. European Food Safety Authority (EFSA), European Centre for Disease Prevention and Control (ECDC). *The Community summary report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in the European Union in 2013*. The EFSA Journal (2015); 11(4):3129 Available at: <http://www.efsa.europa.eu/en/efsajournal/doc/3547.pdf>

Table 1: Campylobacteriosis outbreaks summary, 2014 (CIDR)

Outbreak location	Mode of transmission	Number outbreaks	Number ill	Number hospitalised	Number dead
Nursing home	Foodborne	1	9	0	0
Nursing home	Unknown	1	9	0	0
Other	Unknown	2	37	4	0
Private house	Unknown	2	5	0	0
Private house	Person to person	4	8	0	0
Total		10	68	4	0

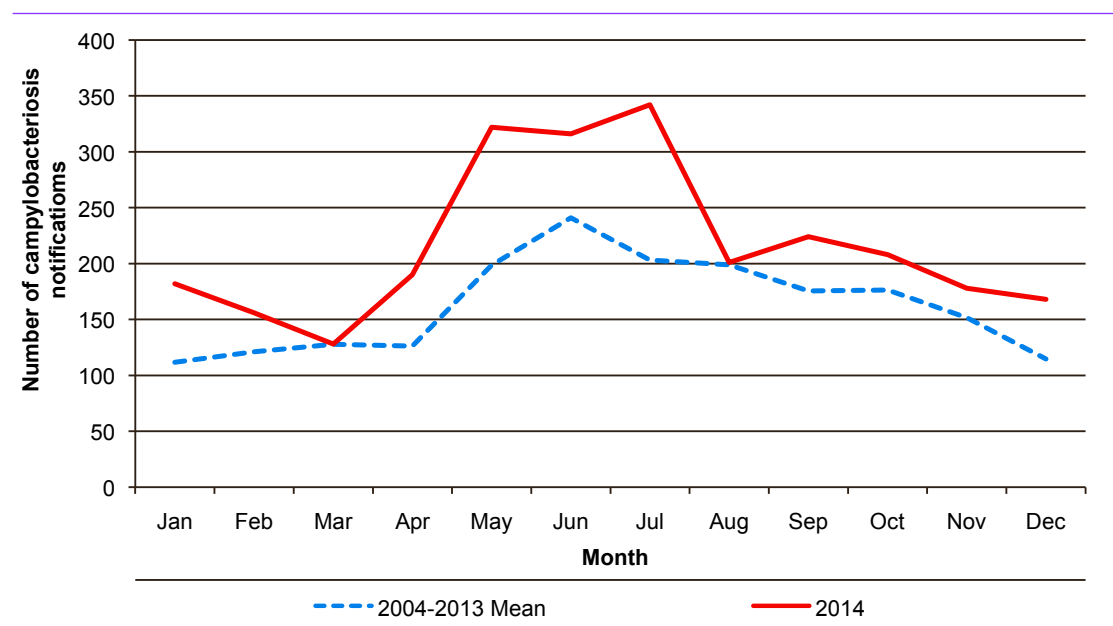


Figure 2: Campylobacteriosis notifications by month during 2014 compared to mean monthly notifications 2004-2013 (CIDR)

3.2 Cryptosporidiosis

Summary

Number of cases, 2014: 394

Number of cases, 2013: 514

Crude incidence rate, 2014: 8.6/100,000

Cryptosporidium is a protozoal parasite that causes a diarrhoeal illness in humans known as cryptosporidiosis. It is transmitted by the faeco-oral route, with both animals and humans serving as potential reservoirs. Human cryptosporidiosis became a notifiable disease in Ireland in 2004, and the case definition in use is published on the [HPSC website](#).

In 2013, 394 cases of cryptosporidiosis were notified in Ireland, a crude incidence rate (CIR) of 8.6 per 100,000 population (95% CI 7.7-9.4). Of the notified cases 34.8% were hospitalised. There were no reported deaths.

Compared with 2013 (11.2/100,000), in 2014 the incidence decreased by 23% ($p < 0.001$), which is the second lowest annual crude incidence rate since the disease became notifiable in 2004 (Figure 1). In 2012 (the most recent year for which data are available), the ECDC reported an overall incidence rate of 3.85 per 100,000 population in the European Union. Among the countries reporting on cryptosporidiosis at the time, Ireland reported the second highest rate after the United Kingdom (9.97/100,000), while Sweden had the third highest rate (2.61/100,000).¹

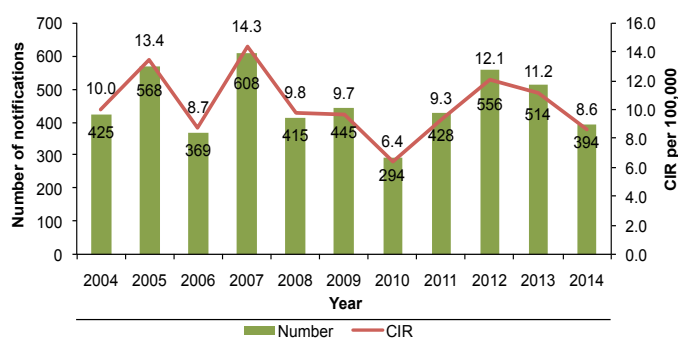


Figure 1. Annual number and crude incidence rate cryptosporidiosis, Ireland 2004-2014

Consistent with previous years, the highest incidence rate was in children under 5 years of age, with 58 cases per 100,000 population in this age group (Figure 2). While there is likely to be a bias towards testing of diarrhoeal stool specimens from children (as opposed to adults) for *Cryptosporidium*, it is also likely that this distribution reflects to some extent a true difference in risk between adults and children. In 2014, the distribution of cases by gender in children under 5 years of age was almost equal (M: F ratio 1.03:1), compared with 2013 when the majority of cases in this age group were male (M: F ratio 1.54:1).

Compared with 2013, in 2014, the crude incidence rate declined in six of the eight HSE areas, remaining stable in the HSE-M and increasing in the HSE-S (Figure 3). As in previous years, there was a strong urban-rural divide, with the HSE-E having a much lower reported incidence rate (1.4 per 100,000) than all other HSE areas. The HSE-NW, HSE-S and HSE-M reported the highest crude incidence rates (15.5, 15.5 and 15.2 per 100,000, respectively).

As in previous years, the highest number of cases was notified in spring and peaked in April (Figure 4).

Risk factors

Reviewing case-based enhanced surveillance data, exposure to farm animals or their faeces either by virtue of residence on a farm or by visiting a farm during the potential incubation period was common among cases;

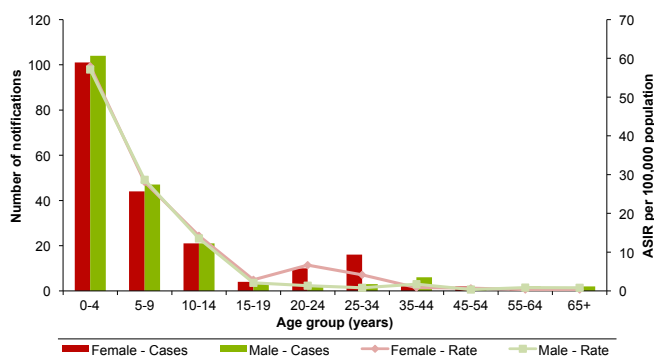


Figure 2. Age-specific incidence rate (ASIR) cryptosporidiosis, Ireland 2014

61% of cases reported either or both of these exposures (Table 1). This is consistent with the low incidence of cryptosporidiosis among residents in the largely urban HSE-E population and the higher incidence recorded in more rural parts of the country. The proportion of cases reporting exposure to pets were similar to last year, whereas exposure to swimming pools increased, although not significantly from 22.6% last year to 28.3% in 2014 ($p=0.074$) (Table 1).

Unlike salmonellosis, foreign travel plays only a minor role in cryptosporidiosis in Ireland with 96.7% of infections acquired indigenously (Table 1). However, similar to the United Kingdom a slightly higher proportion of cases from late summer/early autumn were reported as being acquired abroad (Figure 5).

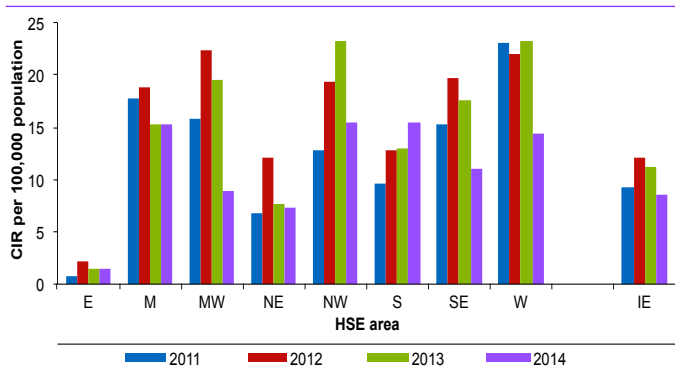


Figure 3. Regional crude incidence rates (CIR) cryptosporidiosis, Ireland 2011-2014

Table 2 shows the distribution of notified cases by home water supply type. It appears that persons who are not served by public water supplies have an increased risk of cryptosporidiosis as they are over-represented among the cases relative to the distribution of households by water supply type nationally; this was particularly noticeable for private well users (25% and 10%, respectively). However, it should be borne in mind that persons whose household drinking water is not from a public supply are more likely to be rural dwellers and therefore may also have a higher likelihood of exposure to farm animals and rural environments which is also likely to increase their risk.

Outbreaks

In 2014, in total 18 outbreaks were reported, including

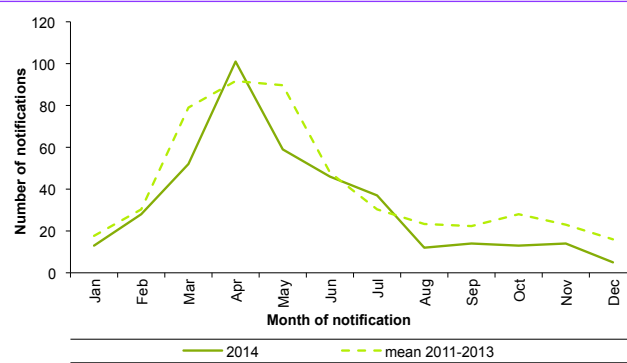


Figure 4. Seasonal distribution of cryptosporidiosis cases, Ireland 2014 compared to the mean for 2011-2013

Table 1. Number of cases (and percentage of cases where information available) where selected risk factors were reported for cryptosporidiosis cases ($n=394$), Ireland 2014

Risk factor	Yes (% of known)	No	Unknown / Not Specified
Travel	12 (3.7%)	310	72
Lives/cared for on farm	145(40.6%)	212	37
Visited farm	85 (27.2%)	228	81
Lives/works on or visited farm ^a	205 (61.0%)	131	58
Swimming pool visit	95 (28.3%)	241	58
Other water based activities	20 (7.2%)	258	116
Pets	207 (62.9%)	122	65

^aComposite of the 2 previous variables

Table 2. Number of cases (and percentage of cases where information available) by home water supply type compared to the number and percentage of households in Ireland by water supply type, Ireland 2014

Home water supply of notified cases	Number of cases	% of known	No. households served by these water supply types in the general population 2011 (Census 2011)	% of known	P value*
Group water scheme (private)	13	3.6%	45,774	2.9%	<0.001
Group water scheme (public)	31	8.6%	144,428	9.0%	
Other	1	0.3%	2,080	0.1%	
Private well	92	25.4%	161,532	10.1%	
Public water supply	225	62.2%	1,247,185	77.9%	
Unknown/not specified	32		48,409		
Total	394		1,649,408	100%	

*Comparing the proportion of cases and households served by public water supplies versus all other supply types: $X^2=52.1$, $P<0.001$

four general and 14 family outbreaks (Figure 6). This is a decrease from 2013 when 28 outbreaks were notified. However, overall since 2011 there has been an increase in the number of outbreaks notified which is most likely due to increased recognition of small family outbreaks following the introduction of enhanced surveillance for cryptosporidiosis cases late in 2010.

Among the four general outbreaks, three were associated with crèches/childcare settings and one with a swimming pool (Table 3 and Figure 7). The four general outbreaks were small in size and none of the cases were hospitalised. In 2014, there were no outbreaks reported associated with drinking water.

In 2014, all 14 family outbreaks occurred in private

Table 3. Number of outbreaks and number ill by transmission route and location, Ireland 2014

Outbreak location	Person-to-person		Waterborne		Animal contact		UNK/Not specified		Total	
	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill
Private house	5	12	0	0	6	12	3	9	14	33
Swimming pool	0	0	1	5	0	0	0	0	1	5
Childcare setting	1	3	0	0	1	2	1	4	3	9
Total	6	15	1	5	7	14	4	13	18	47

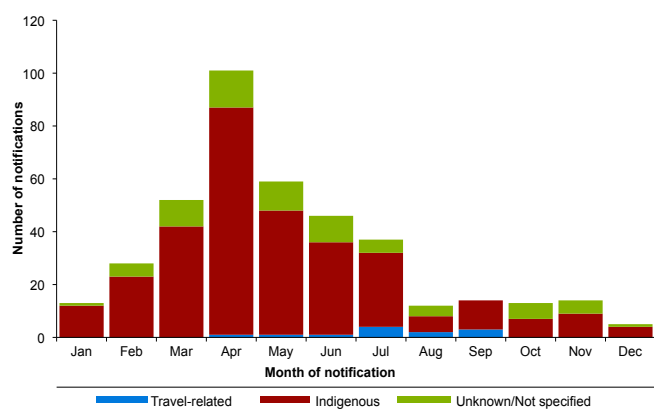


Figure 5. Seasonal distribution of cryptosporidiosis cases by country of infection, Ireland 2014

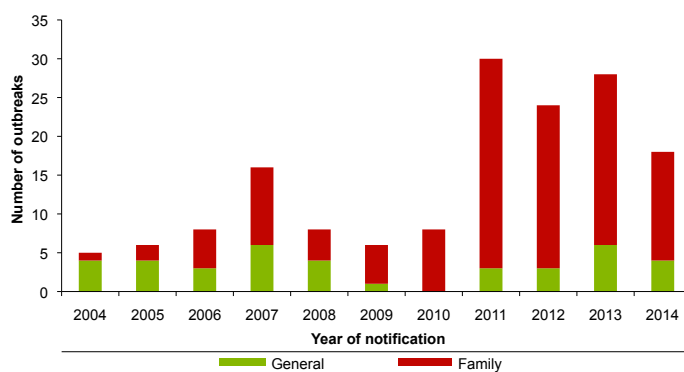


Figure 6. Number of cryptosporidiosis outbreaks notified by type, Ireland 2004-2014

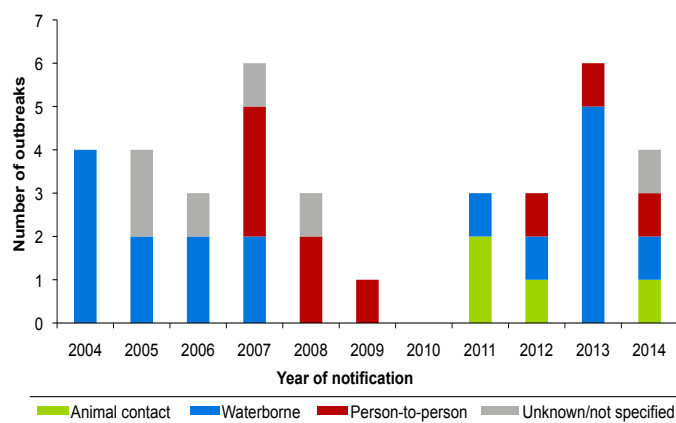


Figure 7. Number of general cryptosporidiosis outbreaks by transmission route and year, Ireland 2004-2014

Note: In this figure, reported transmission routes were grouped for simplicity. Any outbreak where food contributed was reported as foodborne, any outbreak where water contributed was reported as waterborne, any outbreak where animal contact contributed was reported as animal contact. Person-to-person outbreaks include only those outbreaks reported as being due only to person-to-person transmission. The waterborne outbreak in 2014 was reported as a recreational waterborne outbreak rather than a drinking waterborne outbreak.

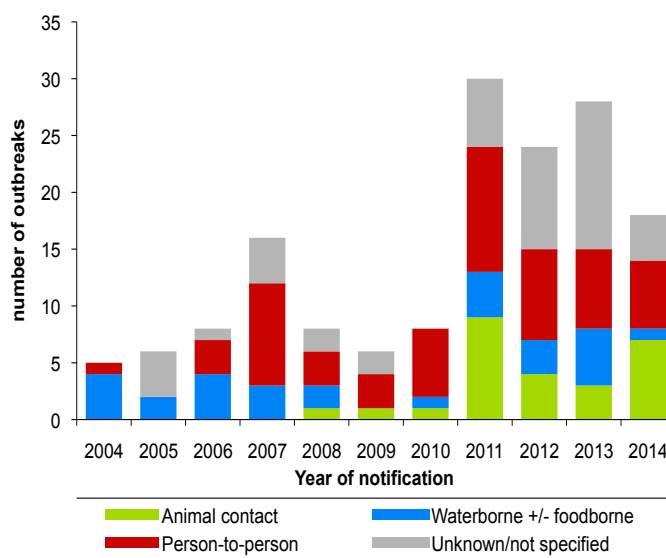


Figure 8. Number of cryptosporidiosis outbreaks by transmission route, Ireland 2004-2014

Note: In this figure, reported transmission routes were grouped for simplicity. Any outbreak where food contributed was reported as foodborne, any outbreak where water contributed was reported as waterborne, any outbreak where animal contact contributed was reported as animal contact. Person-to-person outbreaks include only those outbreaks reported as being due only to person-to-person transmission.

homes, with 33 cases ill and seven hospitalised. The most common mode of transmission reported was animal contact consisting of six family outbreaks resulted in 12 persons ill and two hospitalised. Contact with sick animals was suspected for two of these outbreaks. The second most common transmission route reported in family outbreaks was person-person spread (five outbreaks, 12 persons ill and three hospitalised). The transmission route was unknown for the remaining three family outbreaks; nine persons ill including three hospitalised cases (Table 3 and Figure 8).

Summary

In 2014, the incidence of cryptosporidiosis in Ireland declined such that it was one of the lowest rates reported since the disease became notifiable in 2004. However, the incidence of cryptosporidiosis in Ireland remains high relative to most other EU countries. The seasonal, age and regional distribution in incidence reported in 2014 was also typical of previous years; consistently there was a higher incidence in springtime, in young children and in non HSE-E areas.

Person-to-person spread appears to be an important mode of transmission within family outbreaks, while both enhanced surveillance data and outbreak surveillance data are consistent with animal contact being an important risk factor for cryptosporidiosis in Ireland. Unlike in the United Kingdom, travel-associated disease is reported infrequently, and is likely to be a minor contributor to transmission, as is transmission associated with food.

From the enhanced information on CIDR, exposure to water from non-public supplies appears to present a higher risk of cryptosporidiosis; persons who are not served by public water supplies were over-represented among the sporadic cases relative to the distribution of households by water supply type nationally. However, in 2014, there were no waterborne outbreaks associated with drinking water supplies, which is in contrast with 2013 when three such outbreaks occurred.

References

1. ECDC. 2014. Annual epidemiological report 2014 – food- and waterborne diseases and zoonoses. Available at <http://ecdc.europa.eu/en/publications/Publications/food-waterborne-diseases-annual-epidemiological-report-2014.pdf>

3.3 Verotoxigenic *E. coli*

Summary

Number of VTEC cases, 2014: 707
Crude incidence rate, 2014: 15.4/100,000
Number of VTEC-associated HUS, 2014: 27
Number of VTEC cases, 2013: 701

Introduction

The reported verotoxigenic *Escherichia coli* (VTEC) incidence rate in Ireland is generally high relative to other European countries. In 2012 (the latest year for which data are published), the overall VTEC incidence rate in the European Union was 1.59 per 100,000, which was 5.9% higher than in 2012.¹ The highest country-specific rates were observed in Ireland, the Netherlands and Sweden (12.3, 7.1 and 5.8 per 100,000 population, respectively). For many years, Ireland has reported the highest VTEC incidence rate of any Member State in the EU, except in 2011 when Germany reported the highest rate due to a large VTEC O104 outbreak linked with fenugreek seeds.²⁻³

The dominant transmission routes reported for VTEC infection in Ireland have been person-to-person spread, especially in childcare facilities and among families with young children, and waterborne transmission associated with exposure to water from untreated or poorly treated private water sources.⁴⁻⁷ Other important transmission routes identified internationally include food (often minced beef products or fresh produce such as lettuce and spinach), and contact with infected animals or contaminated environments.^{3, 8-9}

Materials and Methods

Infection with verotoxigenic *E. coli* became a notifiable disease in 2012; prior to that VTEC were notifiable since 2004 under the category Enterohaemorrhagic *E. coli* (EHEC). Enhanced epidemiological information was supplied as in previous years by HSE personnel, and the VTEC National Reference Laboratory at the Public Health Laboratory, Cherry Orchard Hospital Dublin (VTEC-NRL at PHL) provided VTEC confirmation and typing data. Data from all sources are maintained in the Computerised Infectious Disease Reporting (CIDR) system. Outbreaks of VTEC are notifiable since 2004 and data are provided to CIDR by the eight regional public health departments. The data used in this report were extracted from CIDR on 31st August 2015.

Data from the Central Statistics Office (CSO) 2011 census were used to provide denominators for the calculation of national, regional and age-specific incidence rates in 2014.

Results

Incidence

In 2014, there were 707 notifications of VTEC, equating to a crude incidence rate (CIR) of 15.4 per 100,000 (95% CI 14.3-16.5). This compares to an overall incidence rate of 13.1 per 100,000 in 2013, an increase of 0.9% and an overall incidence rate of 12.1 per 100,000 in 2012, an increase of 28%. Of the 707 VTEC notifications in 2014, 569 (80%) were classified as confirmed cases (CIR 12.4 95% CI 11.4-13.4), 136 as probable and 2 as possible cases. The criteria under which notified cases were reported in 2014 under the VTEC case definition

Table 1. Number of VTEC notifications by criteria for notification, Ireland, 2014

Notification criteria	Confirmed	Probable	Possible	Total
Culture confirmation ^a	467	123	-	590
Laboratory confirmation by PCR ^b	102	12	-	114
Serodiagnosis (valid for HUS only)	-	-	-	0
Reported solely on the basis of epidemiological link	-	1	-	1
Clinical HUS not meeting lab or epi criteria	-	-	2	2
Total	569	136	2	707

^a Symptomatic culture confirmed cases are classified as confirmed cases, while asymptomatic culture confirmed cases are classified as probable cases

^b Symptomatic PCR-confirmed cases are classified as confirmed cases, while asymptomatic PCR-confirmed cases are classified as probable cases

is outlined in Table 1. As the classification of VTEC cases changed significantly upon the amendment of the Irish VTEC case definition in 2012, it is not valid to directly compare the number of notifications by case classification with the period before 2012.

Of the 704 cases with laboratory evidence of infection, 233 cases were reported as being infected with *E. coli* O26 (5.1 per 100,000; 95% CI 4.4-5.7), 177 with *E. coli* O157 (3.9 per 100,000; 95% CI 3.3-4.4), 290 with other VTEC strains, and 4 cases had mixed VTEC infections, being infected with more than one VTEC strain. The one probable case reported on the basis of an epidemiological link to a confirmed case, was linked to an *E. coli* O157 outbreak. Figure 1 illustrates the distribution of VTEC cases in Ireland by serogroup since 1999. Compared to 2013, the serogroup distribution in 2014 represents a 20.4% decrease in O157 infections, a 7.8% increase in O26 infections, and a 12.4% increase in other non-O157/O26 infections.

Severity of illness

Five hundred and sixty-eight (80.3%) of the 707 notified cases were symptomatic, 220 (38.7%) of

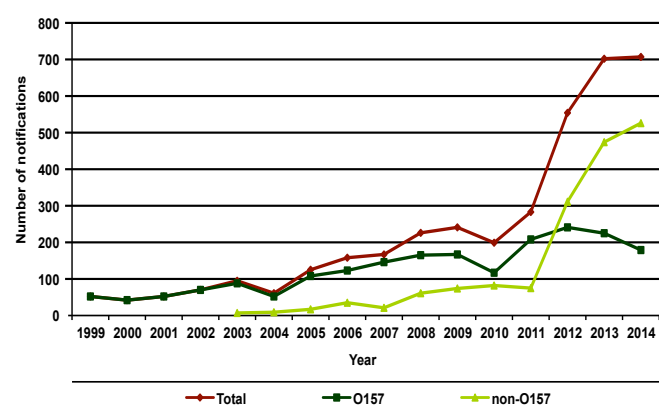


Figure 1. Annual number of confirmed and probable VTEC cases by serogroup, Ireland 1999-2014

Note: For simplicity in this figure, cases with mixed VTEC O157/other serogroup infections are included in the data for O157, as are probable cases linked to known *E. coli* O157 outbreaks. Non-O157 data includes cases with mixed non-O157 infections and probable cases linked to known O26 outbreaks

which developed bloody diarrhoea (42.3% when only symptomatic cases where the bloody diarrhoea variable completed are included). Twenty-seven individuals (3.8%) developed HUS, a decrease of 12.9% on 2013 (n=31). There was one death in a confirmed VTEC case; three other persons diagnosed with VTEC infection in 2014 also died, but their deaths were not reported as due to VTEC. Where reported (n=688), 237 (34.4%) of notified cases were hospitalised (40.0% of symptomatic cases).

Of the 27 HUS cases, 13 were infected with *E. coli* O157, eight with *E. coli* O26 and one each with *E. coli* O103, O111, O145 and ungroupable (Table 2). The remaining two HUS cases were reported as possible VTEC notifications. HUS cases ranged in age from 9 months to 68 years and 77.8% (n=21) of the cases were in children under 10 years of age. Seventeen of the HUS cases were sporadic cases, eight were part of family outbreaks (including two cases in one household), and two were part of a general outbreak (i.e. two cases in a childcare setting).

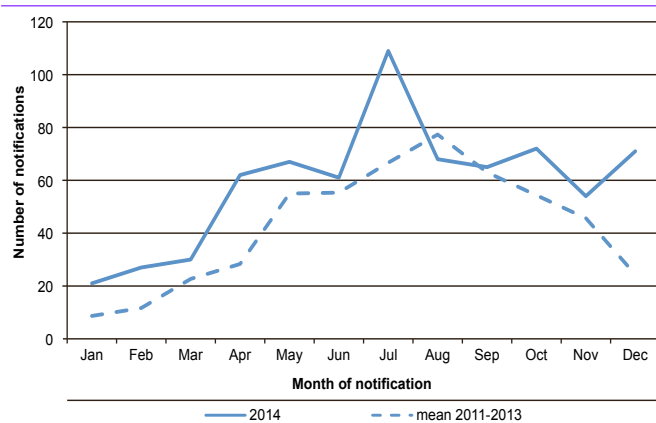


Figure 2. Seasonal distribution of the number of VTEC notifications in Ireland, 2014 and the mean of 2011-2013

Table 2. Number of VTEC notifications by serogroup and verotoxin and HUS status, Ireland, 2014

Serogroup ^a	HUS	non-HUS	Total
O157 VT2 ^b	13	135	148
O157 VT1+VT2	0	31	31
O26 VT1	0	100	100
O26 VT2	1	8	9
O26 VT1+VT2	7	120	127
Other VT1	1	121	122
Other VT2	1	93	94
Other VT1+VT2	2	72	74
No organism	2	0	5
Total	27	680	707

^aFor simplicity mixed infections were recorded as O157 if at least one strain was O157, as O26 if at least one strain was O26 but not O157, and as Other if only non-O157 non-O26 strains were detected.

^bIncludes one probable case epi-linked to an O157 VT2 outbreak

Seasonal distribution

Figure 2 shows the seasonal distribution of notifications in 2014 relative to the mean monthly number of cases in the years 2011-2013. Despite the increase in the number of notifications, the typical summer seasonal peak was maintained, the peak month was July followed by September/October and April/May. An increase in December was also noted in 2014.

Similar to previous years, during 2014 there was variation in the seasonal distribution by serogroup, with VTEC O157 showing the typical peak in numbers in late summer / early autumn; in contrast, VTEC O26 notifications peaked in July with a smaller peak in May (Figure 3). Other non-O157 serogroups were also more common in early summer in 2014. Unlike previous years, in 2014 an upsurge in VTEC O157 and O26 notifications was also observed in December.

Regional distribution

In 2014, the highest VTEC incidence rates overall were reported in the HSE-W followed by the HSE-MW, HSE-M and HSE-SE, where the rates were significantly higher than the national crude incidence rate (Table 3). The incidence of VTEC overall in HSE-E and HSE-

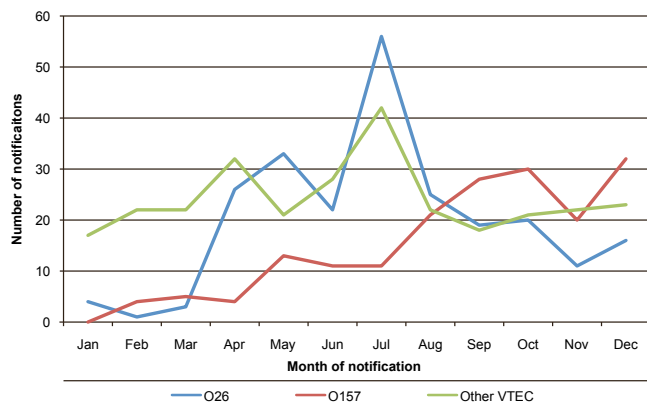


Figure 3: Seasonal distribution of VTEC notifications by serogroup, Ireland 2014

NW were significantly lower than the national crude incidence rate (Table 3).

The incidence of *E. coli* O157 was significantly higher in HSE-W and significantly lower in HSE E when compared with the national crude incidence rate. With the exception of the HSE NW, in seven of the eight HSE areas, the incidence of non-O157 infections was at least twice that of *E. coli* O157 infections (Table 3).

The highest incidence of HUS amongst VTEC cases was in HSE-NE, despite being ranked sixth in the overall VTEC incidence rates (Table 3).

Age-sex distribution

As in previous years, the highest reported age-specific incidence rate was in the 0-4 years age group (92 per 100,000). Incidence rates were higher among females in the majority of the age groups; however, the incidence rate was higher in males compared with females in the 0-4 years age group (Figure 5).

Laboratory typing

In 2014, the serogroup and verotoxin profiles of VTEC isolates/samples referred to the VTEC-NRL at PHL, Cherry Orchard Hospital are displayed in Table 4. The most common serogroup reported was VTEC O26 (n=233), followed by VTEC O157 (n=178). Among the other serogroups listed by the World Health Organisation as having the highest association with HUS internationally, there were 18 VTEC O103 cases, 10 VTEC O111, and 31 VTEC O145. Compared with 2013, there was an 82% increase in the number of VTEC O145 notified in 2014 (17 and 31 cases, respectively). The number of serogroup O146 quadrupled in 2014, compared with 2013 (20 and 5 cases, respectively).

As usual among VTEC O157 in Ireland, isolates containing the genes for verotoxin 2 (*vt2*) were more common (82.6%) than strains containing genes for both *vt1* and *vt2*. Among the VTEC O26 strains those containing the genes for both *vt1* and *vt2* accounted for the majority of these strains (54%), followed by *vt1*

Table 3. Number and crude incidence rates of by serogroup and HSE area, and number and crude incidence rate of VTEC-associated HUS by HSE area, Ireland, 2014

HSE-area ^a	Number [CIR; 95% CI] VTEC O157 ^b	Number [CIR; 95% CI] non-O157 VTEC ^c	Number [CIR; 95% CI] all VTEC ^d	Number [CIR; 95% CI] VTEC-associated HUS
E	27 [1.7; 1.0-2.3]	69 [4.3; 3.3-5.3]	96 [5.9; 4.7-7.1]	6 [0.4; 0.07-0.7]
M	15 [5.3; 2.6-8.0]	51 [18.1; 13.1-23.0]	66 [23.4; 17.7-29.0]	3 [1.1; 0.0-2.3]
MW	21 [5.5; 3.2-7.9]	85 [22.4; 17.6-27.2]	107 [28.2; 22.9-33.6]	5 [1.3; 0.2-2.5]
NE	15 [3.4; 1.7-5.1]	40 [9.1; 6.3-11.9]	55 [12.5; 9.2-15.8]	6 [1.4; 0.3-2.5]
NW	13 [5.0; 2.3-7.8]	4 [1.6; 0.03-3.1]	17 [6.6; 3.5-9.7]	1 [0.4; 0.0-1.2]
S	28 [4.2; 2.7-5.8]	92 [13.8; 11.0-16.7]	120 [18.1; 14.8-21.3]	2 [0.3; 0.0-0.7]
SE	16 [3.2; 1.6-4.8]	100 [20.1; 16.2-24.0]	116 [23.3; 19.1-27.6]	0 [0.0; 0.0-0.0]
W	44 [9.9; 7.0-12.8]	85 [19.1; 15.0-23.1]	130 [29.2; 24.2-34.2]	4 [0.9; 0.02-1.8]
IE	179 [3.9; 3.3-4.5]	526 [11.5; 10.5-12.4]	707 [15.4; 14.3-16.5]	27 [0.6; 0.4-0.8]

^a Rates per 100,000 calculated using CSO census 2011 for denominator data

^b For simplicity, cases with mixed VTEC O157/other serogroup infections are included in the data for O157, as are probable cases linked to known *E. coli* O157 outbreaks.

^c Non-O157 data includes cases with mixed non-O157 infections and probable cases linked to known O26 outbreaks.

^d Possible cases (i.e. those with no associated organism are also included in this column), and therefore the total in this column will not always be the sum of the previous two columns.

only (42.1%) and those containing vt2 making up the remaining 9.1% of VTEC O26. In contrast, the majority (80.6%) of O145 strains were vt2-positive. Furthermore, vt1-containing strains made up the majority of O103 strains (88.8%), while VTEC O111 comprised mainly of and vt1+vt2-containing (90%) strains (Table 4).

Risk factors

Under the enhanced surveillance system for VTEC, risk factor information is routinely collected on VTEC notifications (Table 5).

Exposure to farm animals or their faeces and exposure to private well water were relatively common among cases; 34.2% and 32.0% reported these exposures respectively. However, both were less commonly reported than in 2013 and in 2012. According to CSO data, in the general population, around 10.1% of households are served by private wells, indicating that, on a national basis, exposure to private wells appears to be more common among VTEC cases than among the general population.

Unlike salmonellosis, foreign travel plays only a minor role in VTEC infection in Ireland, with the overwhelming majority of infections acquired indigenously.

Where the information was available, just under a quarter of VTEC cases in 2014 reported attendance at a childcare facility (CCF). When these analyses were restricted to notified VTEC under five years of age, 47.8% reported attendance at a childcare facility. This is higher than the proportion of children in the general population who use non-parental childcare (42%) as reported by the Central Statistics Office.¹⁰

Outbreak and environmental investigations

The outbreak surveillance system plays a key role in our understanding of VTEC transmission in Ireland. Eighty-three VTEC outbreaks were notified in 2014, which included 275 of the 707 VTEC notifications. Twenty-two outbreaks were due to VTEC O157, 38 to VTEC O26, 12 were mixed VTEC strain outbreaks, and 11 were caused by other VTEC strains.

The majority of outbreaks (88%) were family outbreaks, with ten general outbreaks notified. The 73 family outbreaks resulted in 134 persons becoming ill, an average of 1.9 (range 1-4) persons ill per outbreak,

while the ten general outbreaks resulted in 68 persons becoming ill, an average of 6.8 (range 2-23) persons ill per outbreak.

Sixty-nine outbreaks occurred in private homes, eight involved childcare facilities, one was a community outbreak, three involved extended families and the locations for two outbreaks was not specified.

The suspected modes of transmission are listed in Table 6.

Person-to-person spread is consistently the most common mode of VTEC transmission reported in Ireland, particularly between young children, and was suspected to have played a role in 45 (54%) VTEC outbreaks in

Table 4. Serotype and verotoxin (vt) profiles for strains associated with laboratory confirmed VTEC cases, as determined at the VTEC-NRL at PHL, Cherry Orchard Hospital, 2014

Serogroup	vt1	vt1+vt2	vt2	Total
O26	98	126	9	233
O157		31	147	178
O145	1	5	25	31
O146	9	6	5	20
O103	16		2	18
O111	1	9		10
O5	5	2		7
O182	6			6
O76	4	1		5
O84	5			5
O128ab		3	1	4
O55	2		2	4
O91	1	2	1	4
O108	3			3
O118	3			3
O177	2		1	3
O113	1	1		2
O163			2	2
O165		2		2
O75		1	1	2
O78	2			2
O8			2	2
O105ac			1	1
O107	1			1
O112ab	1			1
O123			1	1
O128ac	1			1
O128ad		1		1
O138			1	1
O181	1			1
O98	1			1
OE11362-78			1	1
Ungroupable	56	41	48	145
Mixed	2	1		3
Total	220	232	250	704

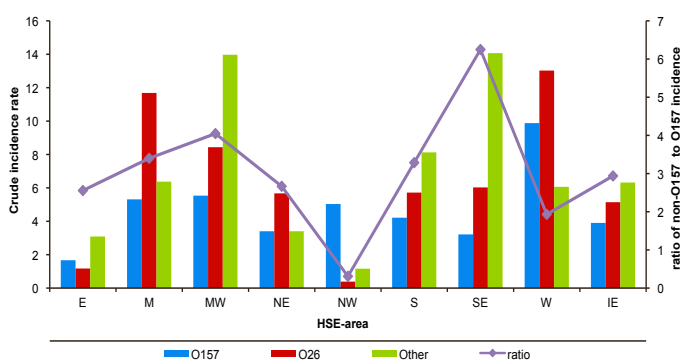


Figure 4: Crude incidence rate VTEC O157, O26 and other serogroups by HSE area, Ireland, 2014

2014 in which 140 persons were reported ill (Table 6 and Figure 5). Forty of these outbreaks were reported as being solely due to person-to-person transmission, including six of the outbreaks which occurred in CCFs.

Animal/environmental contact and waterborne transmission were joint second as the most common reported routes of transmission. Animal/environmental contact was reported to have contributed to nine outbreaks (10.8%) with 16 persons ill. All were family outbreaks in private houses. This is similar to the number of VTEC outbreaks due to this transmission route, notified in 2013 (Figure 6).

Waterborne transmission was reported to have contributed to nine outbreaks (10.8%) with 19 persons ill. This is similar to the number of waterborne VTEC outbreaks reported in 2013 but less than half the number reported in 2012 (Figure 6). Two were general outbreaks and seven were family outbreaks; with private wells suspected in eight of the nine outbreaks.

One outbreak (family outbreak, 3 persons ill) was reported as being suspected to be foodborne, however the suspected food item was not reported.

For 29% (n=24) of VTEC outbreaks in 2014, the transmission route was reported as unknown or not specified (Table 6 and Figure 6).

Summary

The number of VTEC notifications remained stable in 2014 relative to 2013, following a statistically significant increase in 2013 compared with 2012. Since 2011,

there has been a continuous increase in non-O157 notifications and this trend continued in 2014, reflecting the more widespread use of diagnostic methods in the primary hospital laboratories that detect both O157 and non-O157 VTEC.

Interesting the incidence of VTEC O157 continued to decrease in 2014.

Guidance for Laboratory Diagnosis of Human Verotoxigenic *E. coli* Infection developed by The Laboratory Sub-Group of the VTEC Sub-Committee of the HPSC Scientific Advisory Committee was issued in September 2014. It is anticipated that this will further contribute to a co-ordinated approach to VTEC diagnosis in Ireland.¹¹

Within the European Union, Ireland continues to have the highest incidence rate for VTEC, reporting over seven times the European average in 2013.¹ It is anticipated when the data are available across Europe for 2014, that Ireland will have one of the highest reported incidence rates in Europe again

Foodborne transmission was the first recognised transmission route for VTEC infection historically, with minced beef, unpasteurised dairy products, and fresh produce consumed raw all having been implicated in outbreaks across the world. Foodborne outbreaks typically comprise a small percentage of the total number of VTEC outbreaks in Ireland and 2014 was not an exception with foodborne outbreaks comprising 1.2% of the VTEC outbreaks notified.

Table 5. Number of cases of VTEC (and percentage where information available) for selected risk factors, Ireland, 2014 (n=707)

Risk factor	Yes (% of known)	No	Unknown or not reported
Food suspected	30 (6.1)	465	212
Exposure to farm animals or their faeces	211 (34.2)	406	90
Exposure to private well water ^a	202 (32.0)	430	75
Travel-associated ^b	21 (3.3)	625	61
Attendance at a CCF ^c	137 (23.1)	455	115
Attendance at a CCF ^c (among <5 yrs)	128 (47.8)	140	59

^aComposite variable recoded from two different water supply exposure enhanced variables in CIDR

^bInferred from CIDR core variable *Country of Infection*

^cCCF=childcare facility

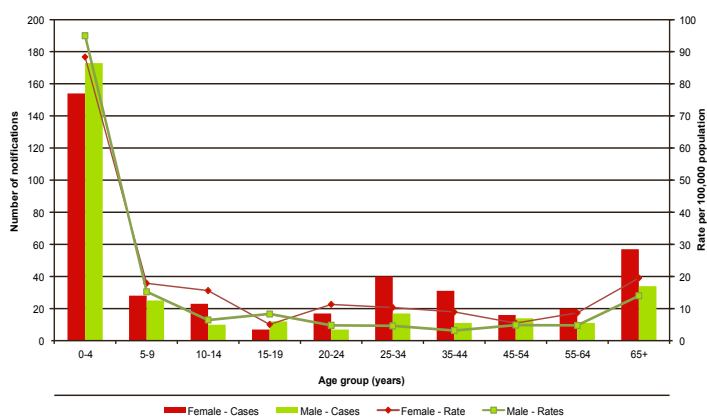


Figure 5. Age-sex distribution VTEC notifications, Ireland, 2014

Similar to 2013, animal/environmental contact was reported as the second most common route of transmission for VTEC outbreaks in 2014. This has long been recognised as a risk factor for VTEC infection⁸⁻⁹ and cases due to this transmission route are not unexpected in Ireland given the large cattle population, the high proportion of rural dwellers, and the large number of farming families. Fortunately, none of these animal contact outbreaks were associated with public venues such as open farms, and so the numbers of people affected were small. Advice is available on the HPSC website on how to minimise the risk of gastrointestinal infections following exposure to farm animals and environments, and for the safe recreational use of farmland.¹²

In 2014, contaminated drinking water contributed to a similar number of outbreaks as 2013. As in previous years, the majority of the drinking water associated outbreaks reported were linked with private water

supplies. Exposure to water from contaminated untreated or poorly treated private water supplies has historically been recognised as a strong risk factor for VTEC infection in Ireland.^{6,7} This has been particularly pronounced following periods of heavy rainfall. The HSE and EPA have both developed resources for owners of private wells, providing advice on private well maintenance.¹³⁻¹⁴

Transmission by person-to-person spread, however, remained the most common transmission route reported in VTEC outbreaks and was involved in 54% of outbreaks. As usual, person-to-person spread was most frequently associated with private house and childcare facility outbreaks. Handwashing and exclusion of cases in risk groups from high risk settings remains a key prevention measures for VTEC.¹⁵

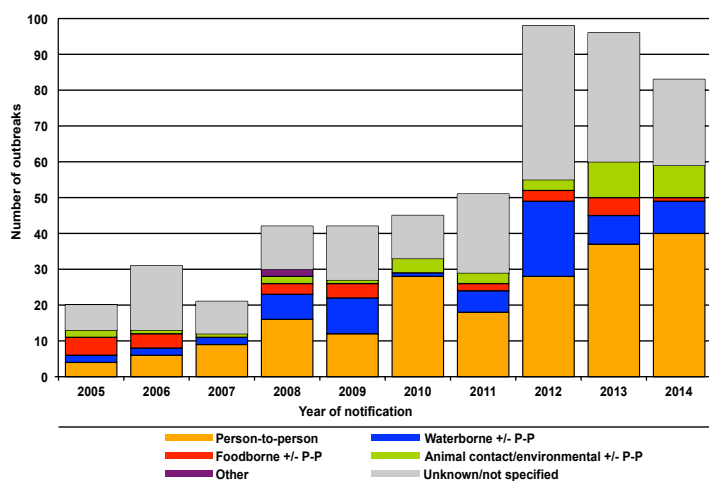


Figure 6. Number of VTEC outbreaks by suspected transmission route and year, Ireland 2005-2014

Note: In this figure, reported transmission routes were grouped for simplicity. Any outbreak where food contributed was reported as foodborne, any outbreak where water contributed was reported as waterborne, any other outbreak where animal contact contributed was reported as animal contact. Person-to-person outbreaks include only those outbreaks reported as being due only to person-to-person transmission.

Table 6. VTEC outbreaks by suspected mode of transmission, Ireland, 2014

Transmission Route	Number of outbreaks	Number ill	Number of associated CIDR Events
Person-to-person	40	124	166
Foodborne	1	3	5
Person-to-person and foodborne	0	0	0
Waterborne	7	12	15
Person-to-person and animal contact	3	9	8
Person-to-person and waterborne	2	7	8
Animal contact	3	2	6
Environmental / fomite	3	5	8
Foodborne and animal contact	0	0	0
Unknown	22	37	55
Not specified	2	3	4
Total	83	202	275

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3.4 Hepatitis A

Summary

Number of cases, 2014: 21
 Crude notification rate, 2014: 0.45/100,000 population
 Number of cases, 2013: 50

Hepatitis A virus causes an acute, usually self-limiting disease of the liver. It is primarily transmitted from person to person via the faecal-oral route and is associated with poor hygiene and sanitation. Common source outbreaks due to contaminated food or water also occur.

The incidence of hepatitis A in Ireland has been low in recent years and remained low in 2014, with 21 cases notified (figure 1). This corresponds to a crude notification rate of 0.45/100,000 population. This rate is lower than the previous two years with rates of 0.63 and 1.1/100,000 population for 2012 and 2013 respectively. Case classification was reported for all cases and all were laboratory confirmed. The number of notifications in each HSE area is shown in figure 2.

Fifty two percent of cases were female (n=11) and 48% were male (n=10). The highest notifications rates were

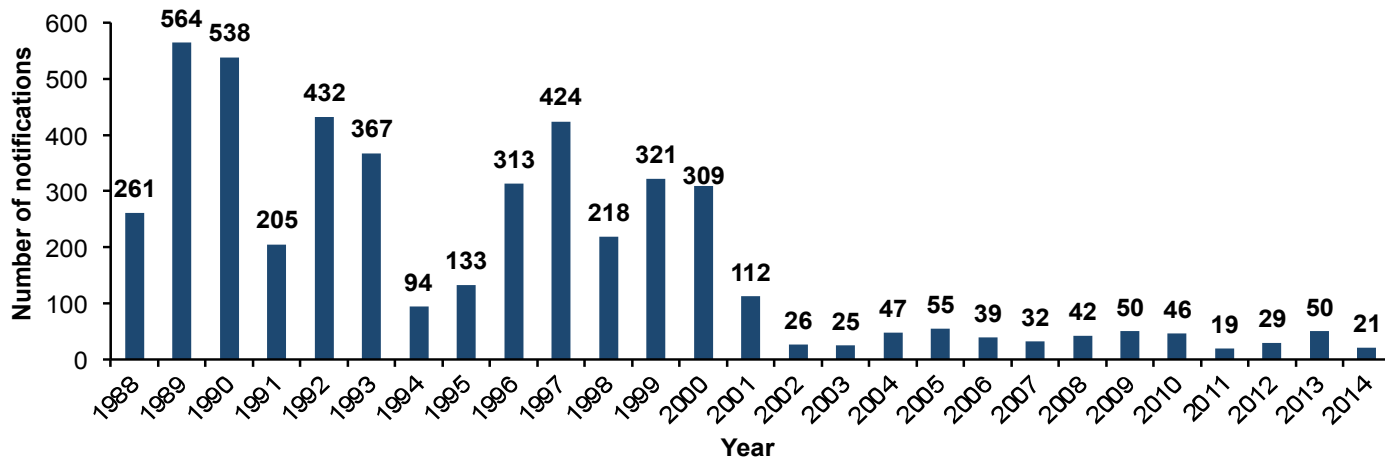


Figure 1: Number of hepatitis A notifications, 1988-2014

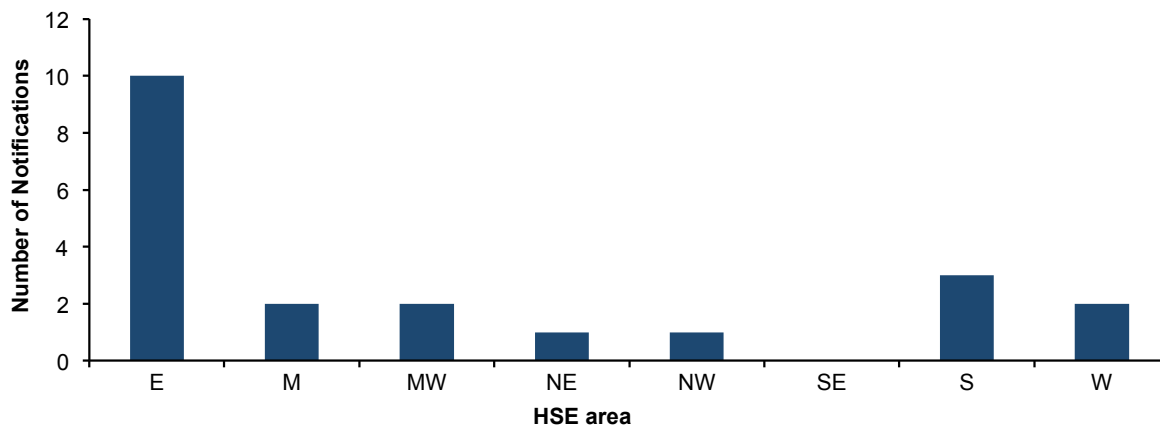


Figure 2: Number of hepatitis A notifications by HSE area, 2014

in children and young adults, with 52% of cases aged between 0 and 24 years (figure 3).

Six cases were reported as infected in Ireland and eight cases were linked to travel outside of Ireland. Country of infection was not known for seven cases.

Two hepatitis A outbreaks were reported in 2014. One outbreak involved three adults in two separate households. All cases reported the same genotype however no source of infection was identified. A second outbreak involved an adult and two children in the same household for which there was no source of infection identified.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 10th August 2015. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

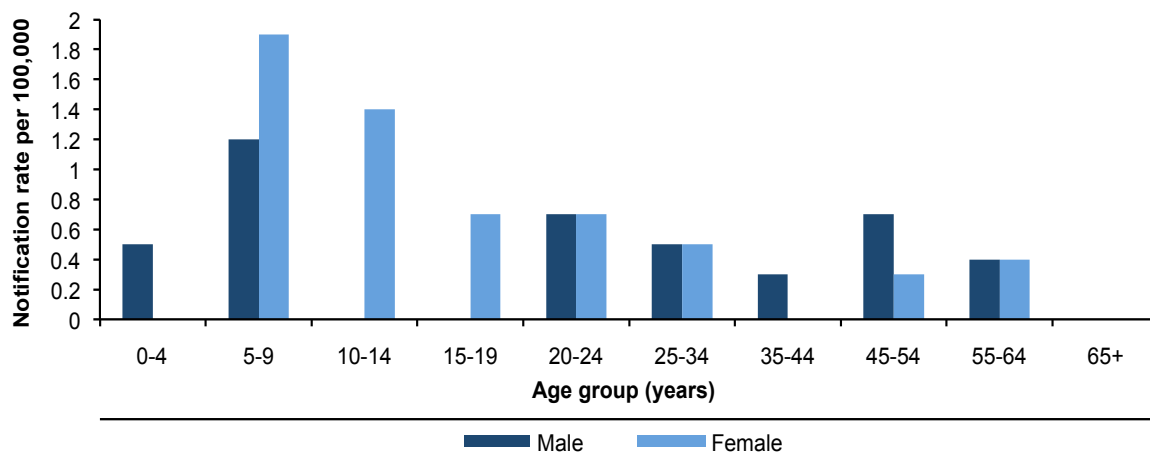


Figure 3: Hepatitis A age and sex-specific notification rates/100,000 population, 2014

3.5 Rotavirus

Summary

Number of cases: 2,061
Crude incidence rate: 44.9/100,000 population

Rotavirus is the commonest global cause of paediatric gastrointestinal infection and causes sporadic, seasonal and occasionally severe gastroenteritis of infants and young children, characterised by vomiting, fever and watery diarrhoea. Transmission is usually person-to-person, mainly via the faecal-oral route. Children less than two years of age are most susceptible to infection, although cases are often seen in elderly and immunocompromised adults, particularly in institutional settings. By the age of six years old, virtually all children will have had at least one episode of rotavirus infection. Symptoms usually last for only a few days but in severe cases hospitalisation may be required due to dehydration.

Prior to 2004, rotavirus cases were notified under the "Gastroenteritis in children under two years"

disease category. From 2004 to 2010, rotavirus was notifiable in all age groups under the "Acute Infectious Gastroenteritis" (AIG) disease category, until it became notifiable as a disease in its own right under the Infectious Diseases (Amendment) Regulations 2011 (S.I. No. 452 of 2011). Since March 2013, rotavirus notifications from HSE-East are based on laboratory testing results rather than patient episodes. Notifications from HSE-E may also refer to area of laboratory testing rather than area of patient residence.

During 2014, there were 2,061 cases of rotavirus notified in Ireland, corresponding to a national crude incidence rate (CIR) of 44.9 per 100,000 population and representing a decrease of 11.9% compared to the mean CIR during 2004-2013.

Significant geographical variation was observed in regional rotavirus CIR. The highest regional CIRs were observed in HSE-W (73.9/100,000 population) and in HSE-M (73.7/100,000 population). The lowest regional CIR was observed in HSE-E (25.4 per 100,000 population) and HSE-MW (30.3 per 100,000 population).

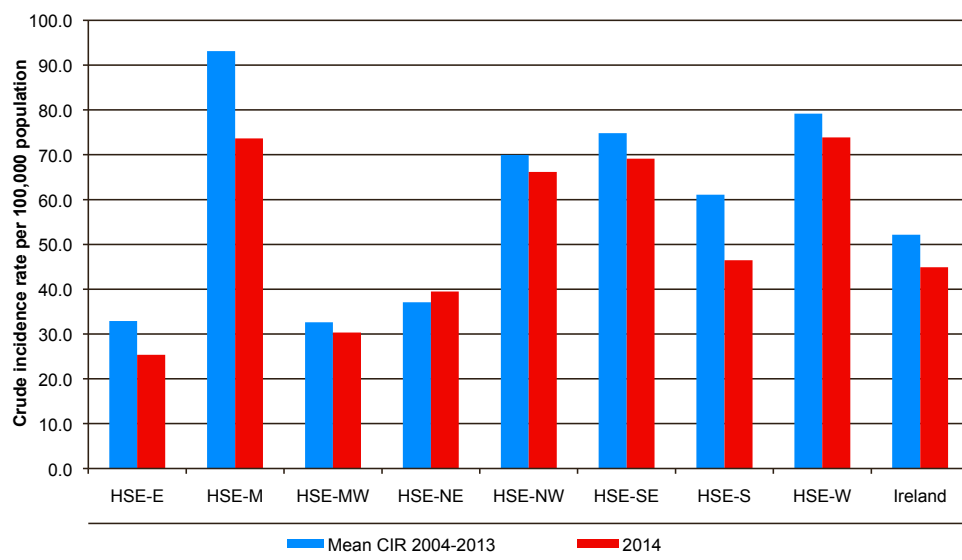


Figure 1: Rotavirus 2014 CIR compared to 2004-2013 mean CIR by HSE area (CIDR)

Figure 1 illustrates the rotavirus CIR by HSE area for 2014 compared to the mean CIR during 2004-2013.

Rotavirus infection has a well documented seasonal pattern in Ireland with the number of cases typically peaking during March to May. During 2014, rotavirus notifications peaked during April (n=421) and May (n=368). Figure 2 illustrates the seasonal variation in rotavirus cases by month of notification for 2014 compared to the mean monthly number of notifications reported during 2004 to 2013.

During 2014, 1,103 cases (53.5%) were male and 957 (46.4%) were female. Sex was not reported for the remaining case. This represented a ratio of females: males of 1.0:1.2, which was similar to the ratio observed in previous years.

Four outbreaks of rotavirus were notified during 2014 with 36 cases of associated illness, two of whom were hospitalised. Three general outbreaks occurred across two child-care facilities and one hospital. The remaining outbreak was a family outbreak that occurred in a private home. All outbreaks reported mode of transmission as person to person spread.

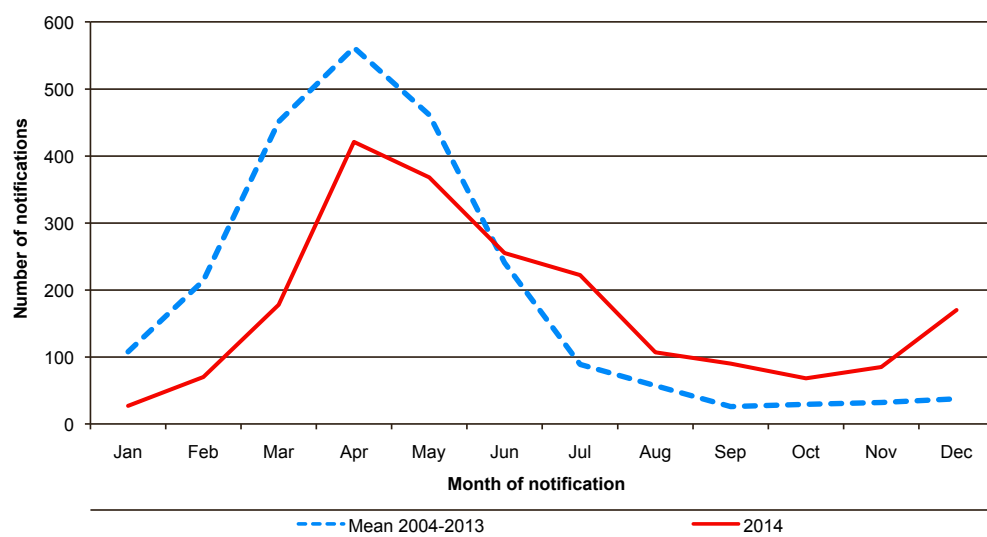


Figure 2: Number of rotavirus notifications by month, 2014 compared to mean monthly number of notifications 2004-2013 (CIDR)

3.6 Salmonella

Summary

Number of confirmed cases: 260

Crude incidence rate: 5.7/100,000

Salmonellosis typically presents clinically as an acute enterocolitis, with sudden onset of abdominal pain, diarrhoea, nausea, headache and occasionally vomiting. Fever is almost always present. Dehydration, especially amongst vulnerable populations such as infants, the immunocompromised and the elderly, may be severe. Invasive infection occurs in a proportion of cases. *S. Typhi* and *S. Paratyphi* can cause enteric fever, a severe systemic life threatening condition, but these are not common in Ireland and are almost invariably travel-associated.

The common reservoirs for non-typhoidal *Salmonella* are the intestinal tract of domestic and wild animals (including birds), which may result in a variety of foodstuffs, of both animal and plant origin, becoming contaminated with faecal organisms either directly or indirectly. The organism may also be transmitted through direct contact with infected animals or humans

or faecally contaminated environments. Infected food handlers may also act as a source of contamination for foodstuffs. Of particular concern is the number of cases of infection associated with direct contact with reptiles kept as companion animals.

During 2014, 260 cases of salmonellosis were notified, corresponding to a crude incidence rate (CIR) of 5.7 per 100,000 population (figure 1). The annual CIR has remained consistently low over the last five years (2010-2014 mean: 6.8 per 100,000) compared to the previous five year (2005-2009: 9.3 per 100,000). The highest CIR in 2014 occurred in HSE-M (8.1) and the lowest in HSE-S (4.8).

The number of male cases was slightly higher than for females in 2014 (male: female ratio=1.3:1.0) which is consistent with previous years. Overall, the highest age-specific incidence rate was in children under 5 years of age (18.2) which is likely to be influenced by clinicians more readily seeking clinical samples in that age group. Specifically, the incidence rates were higher in males than females in all age groups less than 45 years old. Incidence rates were higher in females for those aged 45-54 years while the rates were comparable for both sexes in those aged over 55 years.

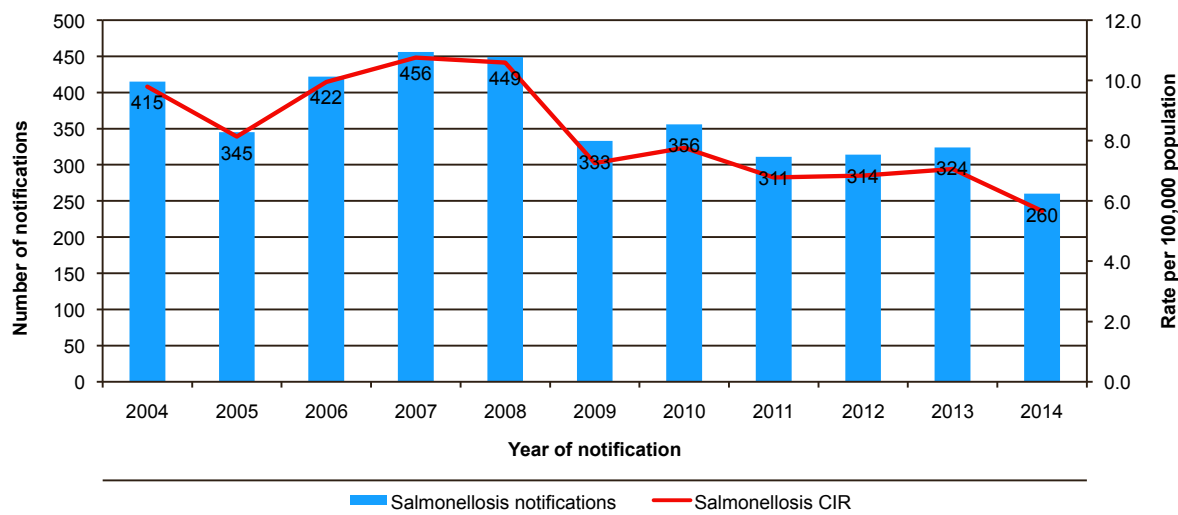


Figure 1: Salmonellosis notifications and CIR by year of notification [Data source: CIDR]

National *Salmonella*, *Shigella* and *Listeria* Reference Laboratory (NSSLRL) data:

The National *Salmonella*, *Shigella* and *Listeria* Reference Laboratory (NSSLRL) based in Galway has been providing reference services nationally since 2000. In 2014, the NSSLRL analysed 258 human non-typhoidal *Salmonella* isolates referred for further typing. Figure 2 shows the trend in referral of isolates to NSSLRL by organism over time.

The NSSLRL conducted phage typing analysis on all 107 *S. Typhimurium* and all 44 *S. Enteritidis* isolates. Phage type DT193 (n=26) comprised over 24.3% of all *S. Typhimurium* strains. Other currently important *S. Typhimurium* phage types included Untypable (16.8%) and DT104 (8.4%). Phage types PT8 (20.5%), PT14b (15.9%), and PT1 (13.6%) were the most common types observed among *S. Enteritidis* isolates.

Of the 258 isolates analysed for antimicrobial

resistance, 139 (53.9%) were fully susceptible to all antimicrobials tested. The remaining 119 isolates exhibited some degree of antimicrobial resistance, 43 of which exhibited resistance to five or more antimicrobials among 27 antibiograms. The majority of isolates exhibiting this level of resistance were *S. Typhimurium* (67.4% of multi-drug resistant isolates). Overall, the commonest resistance pattern seen was resistance to ampicillin, streptomycin, sulphadiazine and tetracycline (ASSuT, n=26, 10.1% of isolates). The ASSuT pattern was almost exclusively identified in *S. Typhimurium* isolates (96.2% of resistant isolates). Resistance to nalidixic acid and ciprofloxacin (NaCp, n=18, 7.0% of isolates) was the second most common AMR profile among all isolates. The NaCp pattern was mostly seen in *S. Enteritidis* isolates (68.4% of resistant *S. Enteritidis* strains).

The NSSLRL's Annual Report 2014 provides a more detailed analysis of clinical *Salmonella* typing results

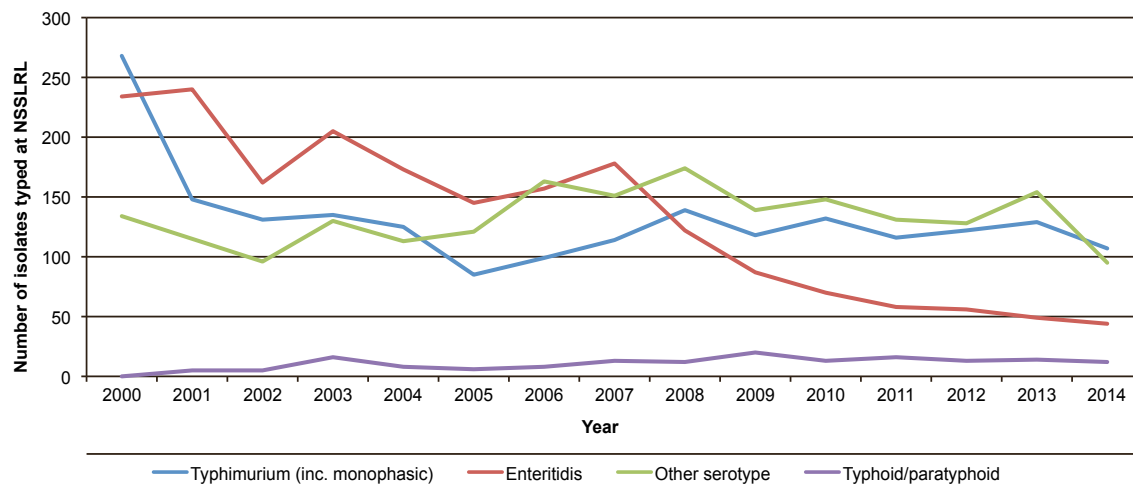


Figure 2. Annual number of *Salmonella* isolates referred to NSSLRL by serotype [Data source: NSSLRL]

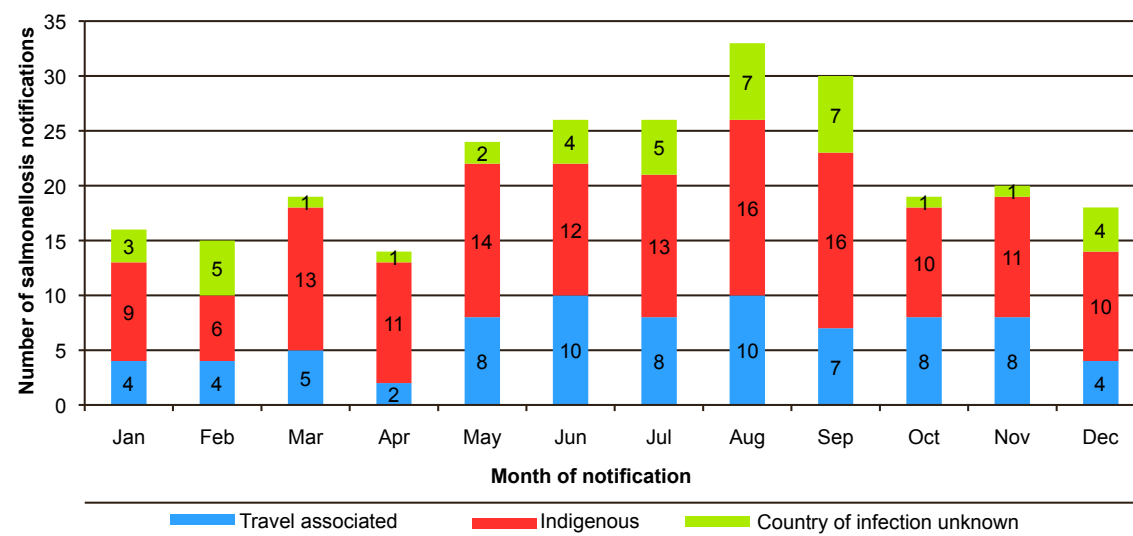


Figure 3: *Salmonellosis* notifications by month of notification and travel history, 2014 [Data source: CIDR]

and a comparison with isolates from non-human sources.¹

Foreign travel as a risk factor for salmonellosis in Ireland

Country of infection was reported for over 81% of notifications in 2014. Where country of infection was reported, 37.0% of cases were travel associated. The number of travel associated cases peaked during the period May to August while indigenous cases peaked during August and September (Figure 3). Among travel associated cases, the most common countries of infection reported were: Spain (n=18), Thailand (n=8) and Poland (n=5). The popularity of a country as a travel destination is likely to be an important factor in determining the number of cases associated with each country.

When serotyping data were analysed by travel history, over half of all indigenous cases were infected with *S. Typhimurium* (or monophasic *S. Typhimurium*), with 'Other' serotypes making up a further 34.8% of cases. In contrast, *S. Enteritidis* features more prominently among travel-associated cases (29.5%) with just 10.6% of indigenous cases due to *S. Enteritidis* (table 1).

Outbreaks

During 2014, eight outbreaks of salmonellosis were reported, comprising 20 cases of illness, three of whom were hospitalised. Five family outbreaks occurred in private houses and one family outbreak was travel related. Two general outbreaks occurred in community settings. Two outbreaks were reported as being foodborne, four were reported as due to person to person spread while mode of transmission for the remaining two outbreaks was reported as unknown.

In consequence of the increasing recognition in recent years of fresh produce as a cause of gastrointestinal disease outbreaks, the National *Salmonella* Outbreak Trawling Questionnaire was recently expanded and updated. The form is available at <http://www.hpsc.ie/A-Z/Gastroenteric/Salmonellosis/SurveillanceInvestigativeForms/>

Typhoid/Paratyphoid:

In 2014 there were seven cases of typhoid notified and five cases of paratyphoid (3 Paratyphi A and 2 Paratyphi B). Of the seven *S. Typhi* cases, two had travelled to India and one each to Bangladesh, Qatar and Tanzania. The remaining two typhoid cases did not report country of infection. Among the paratyphoid cases, one each reported travel to Bolivia, Cambodia and Peru. The remaining two paratyphoid cases did not report country of infection.

References:

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Table 1: *Salmonellosis* notifications by serotype and travel history, 2014 [Data source: CIDR]

<i>Salmonella</i> serotype	Indigenous		Travel associated		Travel history unknown	
	Number	%	Number	%	Number	%
<i>S. Typhimurium</i>	77	54.6	19	24.4	14	34.1
<i>S. Enteritidis</i>	15	10.6	23	29.5	6	14.6
Other serotypes	49	34.8	36	46.2	21	51.2
All serotypes (n)	141	100.0	78	100.0	41	100.0

3.7 Less common gastroenteric infections

Listeriosis

During 2014, 15 cases of listeriosis were notified, an increase compared to eight cases reported in 2013. This equates to a crude incidence rate of 0.3 per 100,000 population which remains below the EU average of 0.4 per 100,000 in 2013.

Two neonatal cases were reported in 2014, which compared to three neonatal cases reporting in 2013 (Figure 1). Eight adult/juvenile cases were reported in 2014, which was similar to the numbers reported in the previous 10 years. Five of the eight adult/juvenile cases were male. Three adult/juvenile cases developed bloodstream infection, while a fourth developed meningitis. One case with a predisposing condition died, but the case of death was not known. Outcome

was reported as recovered for five adult/juvenile cases and as unknown or not specified for the remaining two adult cases. Five of the eight adult/juvenile cases were more than 65 years of age, with a sixth being in the 55-64 years age group.

Since 2007, the National *Salmonella*, *Shigella* and *Listeria* Reference Laboratory in Galway has offered a national service for typing of *Listeria* strains. In 2014, isolates from 10 of the 15 notified cases were referred. The serotypes for these 10 cases are listed in table 1 below.

Listeria in Ireland remains a hazard for the elderly, persons with underlying illness, and other vulnerable groups such as pregnant women and neonates.

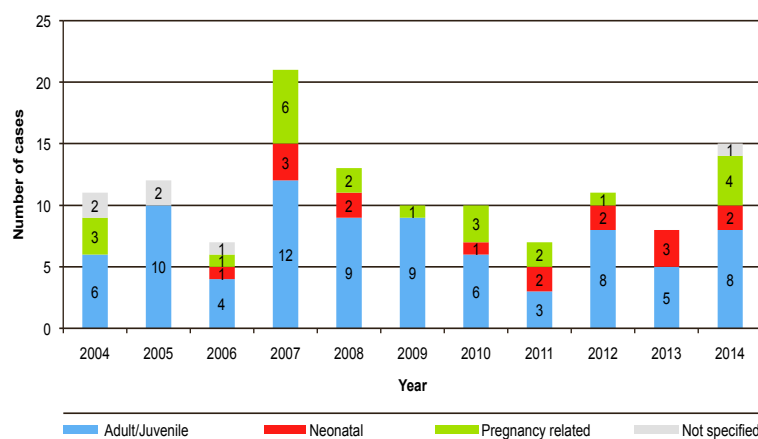


Figure 1: Number listeriosis notifications by case type, Ireland 2004-2014

Table 1: Listeriosis notifications by case type and serotype, Ireland 2014*

Type	Serotype 1/2a	Serotype 1/2b	Serotype 4b	Not referred for serotyping	Total
Adult or juvenile	2	0	2	0	4
Pregnancy-related	2	0	0	0	2
Neonatal	2	0	2	0	4
Total	6	0	4	0	10

* typing data provided by the National Salmonella, Shigella and Listeria Reference Laboratory (NSSLRL)

Giardiasis

In 2014, there were 71 cases of giardiasis notified, corresponding to a crude incidence rate (CIR) of 1.5 per 100,000 population. Cases ranged in age from 7 months-79 years (median age=27 years) with 16 cases reported in children under 15 years of age. The male to female ratio was 1.3:1.0. Hospitalisation rates were low with six cases admitted, corresponding to 9.8% of cases where patient type was reported.

The number of cases for which travel status was reported has improved markedly over the last six years from 11% of cases in 2006 to 69.0% of cases this year (Figure 2). Forty-eight cases (67.6% of all cases; 98.0% of those with known travel status) were reported as being associated with foreign travel. The most commonly reported countries of infection included India (n=16), Spain (n=4), Australia (n=3) and Indonesia (n=2) while there was one case each reported associated with travel to 12 other countries. Sixteen cases were reported as being acquired in Ireland, and for the remaining 22 cases, country of infection was unknown or not specified.

Three family outbreaks of giardiasis were notified in 2014. Two outbreaks occurred in private houses and one was travel associated.

According to CDC, *Giardia* infects nearly 2% of adults and 6% to 8% of children in developed countries worldwide so it is likely that there is a high degree of underreporting of the illness in Ireland. Giardiasis in Ireland is mainly identified among adults, unlike countries such as the United States, Australia and the United Kingdom where children are mainly reported.

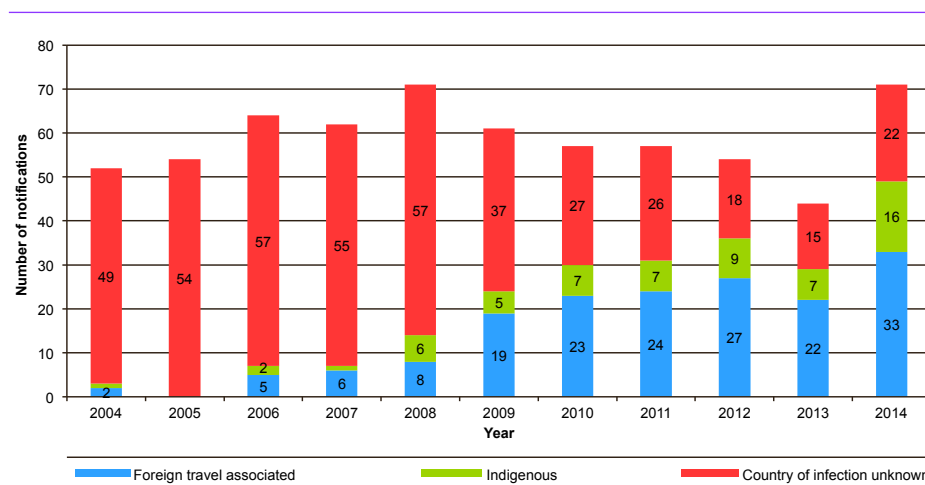


Figure 2: Number of giardiasis notifications by country of infection, 2004-2014

Yersiniosis

In 2014, there were five cases of yersiniosis (one female and four males), three of whom were aged 65 years and older. Four were reported as being infected with *Y. enterocolitica* and one was *Y. pseudotuberculosis*. The reported incidence of yersiniosis in Ireland is low relative to the EU as a whole, and to Northern Europe in particular.

Foodborne intoxications

Notifications of foodborne intoxications in Ireland are uncommon.

There was one case of infant botulism notified in 2014. The causative organism was identified as *C. botulinum*.

In 2014, there were no cases or outbreaks of staphylococcal food poisoning, *Clostridium perfringens* (type A) food-borne disease or *Bacillus cereus* food-borne infection/intoxication notified.

3.8 Shigellosis

Summary

Number of notifications: 57
Crude incidence rate: 1.2/100,000

Fifty-seven cases of shigellosis were notified in Ireland in 2014, corresponding to a crude incidence rate (CIR) of 1.2 per 100,000. This represents an increase of 16% compared to 2013. Of 43 cases where hospitalisation status was recorded, 11 (26%) were reported as hospital in-patients. Of the 57 cases, 54 were laboratory confirmed.

During 2014, there was an excess of male cases compared to females, with a male to female ratio of 2.3:1.0. This trend has been observed since 2009 with the exception of 2013 where more females were notified (figure 1). During 2014, cases ranged in age from 10 months to 72 years (median age=30 years). The male to female ratio was highest in the age groups 25-34 years (3.5:1.0), 35-44 years (6.0:1.0) and 45-54 years (2.0:1.0). Males in the 35-54 years age group were mostly travel associated whereas males in the 25-34 year age group were mostly indigenous or travel history unknown (table 1).

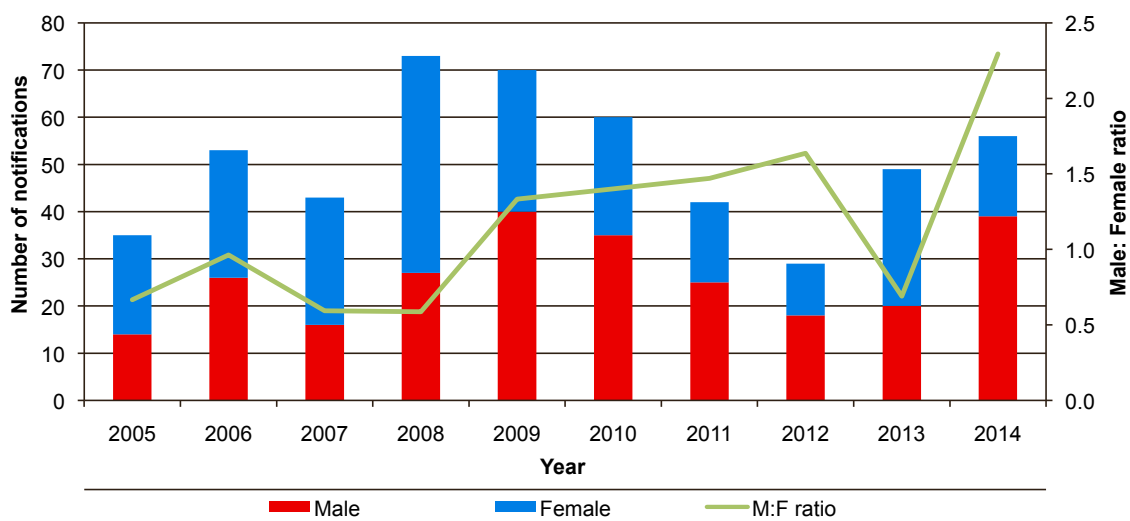


Figure 1: Annual number of notifications shigellosis by sex and year (Data source: CIDR)

Table 1: Number of notifications shigellosis by travel association, age group and sex, 2014 (Data source: CIDR)

2014	Indigenous		Travel associated		Travel history unk			Total notifications				
	F	M	F	M	F	M	Sex unk	F	M	Sex unk	Total	M: F ratio
0-4 yrs	0	0	2	2	1	2	0	3	4	0	7	1.3
5-14 yrs	0	0	0	2	3	1	0	3	3	0	6	1.0
15-24 yrs	0	0	2	2	0	1	0	2	3	0	5	1.5
25-34 yrs	0	5	4	0	0	9	1	4	14	1	19	3.5
35-44 yrs	0	1	1	4	0	1	0	1	6	0	7	6.0
45-54 yrs	1	1	1	4	1	1	0	3	6	0	9	2.0
55-64 yrs	1	0	0	0	0	1	0	1	1	0	2	1.0
65+ yrs	0	1	0	1	0	0	0	0	2	0	2	0.0
Total	2	8	10	15	5	16	1	17	39	1	57	2.3
M:F ratio	4.0: 1.0		1.5: 1.0		3.2: 1.0			2.3: 1.0				

Information on travel history is very valuable when reviewing surveillance data for possible indigenous clusters. Data on country of infection was available for 58% of shigellosis notifications this year, a decrease compared to 88% in 2013. Twenty-five cases were reported as being associated with foreign travel in 2014. The countries of infection reported were India (n=6), Egypt (5), two each associated with Kenya and Morocco, and one case each associated each with travel to Afghanistan, Croatia, Haiti, Lebanon, Somalia, Spain, Nigeria, Pakistan, Poland and UK. Ten cases were reported as being acquired in Ireland, while no country of infection information was available for 22 cases.

S. sonnei was the most common species reported (n=32), followed by *S. flexneri* (n=19). Species was not reported for the remaining three confirmed cases. When analysed by travel association, *S. flexneri* was equally common among indigenous cases (22.2%) as travel associated cases (20.8%) but more common in cases without travel history reported (50.0%). *S. sonnei* was slightly more common among indigenous cases (77.8%) than travel associated cases (62.5%).

There were four shigellosis outbreaks notified in 2014, resulting in 11 cases of illness. All four outbreaks were family outbreaks, of *S. sonnei*. Three outbreaks occurred in private houses while one was in an extended family associated with travel to Egypt. The mode of transmission was reported as person-to-person for two while the transmission was unknown for the remaining two.

More detailed typing of *Shigella* isolates can provide useful information on the relatedness of strains which can be used by public health personnel to outrule/provide evidence for links between cases during investigations of case clusters. The National *Salmonella*, *Shigella* and *Listeria* Reference Laboratory (NSSLRL) provide laboratory services for speciation, serotyping, antimicrobial resistance profiling, and where appropriate, Pulsed Field Gel Electrophoresis (PFGE) of *Shigella* isolates. The species/serotype and antimicrobial resistance patterns of these cases are reported in Table 2.

During 2014 the NSSLRL reported an increase in

Table 2: Species/serotypes and AMR profiles of *Shigella* isolates referred to NSSLRL in 2014

Serotype	Number by serotype	AMR profile	Number by serotype and AMR profile
<i>Shigella flexneri</i> 1b	4	ACST	1
<i>Shigella flexneri</i> 1b		ACSTTm	1
<i>Shigella flexneri</i> 1b		ASSuTTmNaCtx	1
<i>Shigella flexneri</i> 1b		STTm	1
<i>Shigella flexneri</i> 2a	4	ACSSuTTm	2
<i>Shigella flexneri</i> 2a		ACSSuTTmAzt	1
<i>Shigella flexneri</i> 2a		ACSSuTTmNaCp	1
<i>Shigella flexneri</i> 2b	1	SuTTm	1
<i>Shigella flexneri</i> 3a	2	ACSTAzt	1
<i>Shigella flexneri</i> 3a		none	1
<i>Shigella flexneri</i> 4	2	A Azt	1
<i>Shigella flexneri</i> 4a		ACSSuTTm	1
<i>Shigella flexneri</i> X variant	4	ASSuTTmAzt	2
<i>Shigella flexneri</i> X variant		ASuTTmAzt	1
<i>Shigella flexneri</i> X variant		T	1
<i>Shigella sonnei</i>	27	ASSuTTm	1
<i>Shigella sonnei</i>		ASuTm	1
<i>Shigella sonnei</i>		SSuTm	1
<i>Shigella sonnei</i>		SSuTTm	15
<i>Shigella sonnei</i>		SSuTTmNa	3
<i>Shigella sonnei</i>		SSuTTmNaCp	5
<i>Shigella sonnei</i>		TmNaCp	1
Total	44	Total	44

Table 3: Notified shigellosis outbreaks 2014 (Data source: CIDR)

HSE-area	Outbreak type	Location	Transmission mode	Number ill	Serotype
HSE-W	Family	Private house	Person-to-person	4	<i>S. sonnei</i>
HSE-W	Family	Private house	Person-to-person	2	<i>S. sonnei</i>
HSE-NE	Family	Travel-related in extended family	Unknown	3	<i>S. sonnei</i>
HSE-E	Family I	Private house	Unknown	2	<i>S. sonnei</i>

specimen referral from regional laboratories. This is likely a result of the increased sensitivity of direct molecular detection methods which were recently introduced for faecal pathogen screening by regional laboratories.¹ An increase in ciprofloxacin resistance among *S. sonnei* isolates has been identified by NSSLRL since 2010; this appears to have a significant association with exposure in India.¹ Further details of *Shigella* strain characterisation performed at NSSLRL can be found in the NSSLRL Annual Report.¹

References

1. National Salmonella Reference Laboratory of Ireland, Annual Report for 2014. Available at: http://www.nuigalway.ie/research/salmonella_lab/reports.html

20
14

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04

VECTORBORNE AND ZONOTIC DISEASES

4.1 Malaria

Summary

Number of cases malaria, 2014: 71
Crude incidence rate malaria 2014: 1.55/100,000

In 2014, 80 malaria cases were notified in Ireland, an increase of 13% compared to 71 cases in 2013 (Figure 1). The incidence rate now stands at 1.74 per 100,000 population. Among European Union (EU) member states reporting malaria data to the European Centre for Disease Control, Ireland had the third highest incidence rate for imported malaria in 2012 (the latest year for which comparative data are available); only the United Kingdom and Belgium had higher reported incidence rates.

In common with the rest of the EU, males predominated (male: female ratio 2.2:1), with the highest numbers of cases among males aged between 35 and 54. The number of paediatric cases reported was 10, a slight decrease compared to 12 cases reported during 2013 (Figure 1).

Four of the paediatric cases reported "visiting family in country of origin" as their reason for travel, two were new entrants to Ireland and one was an Irish citizen

living abroad. There was no information on reason for travel for the remaining three paediatric cases. Of the four paediatric cases that travelled to visit family, three visited sub-Saharan Africa and one visited South Asia. Duration of the visit was reported for two of these cases and ranged between 20 days to 4 months duration. Two of the paediatric cases reported taking malaria prophylaxis but were not fully compliant, four paediatric cases reported not taking any prophylaxis for their travel, while the remaining four paediatric cases did not have information on prophylaxis reported.

Among all age groups, the category of traveller most affected in Ireland continued to be African immigrants and their families who were exposed while returning to 'visit family in country of origin'. This almost certainly reflects the greater frequency with which this group travels to malarious areas, but also reflects Ireland's importance as a destination for those emigrating from English speaking West Africa. Where the reason for travel was reported in 2014, 62% cited 'visiting family in country of origin', 91.7% of whom travelled to Africa.

The second most commonly cited reasons for travel this year were "Business/professional travel" (n=8, 13.8%) and "New entrant to Ireland" (n=6, 10.3%).

Nigeria remained the country most frequently visited, accounting for 49% of total cases and 60% of cases

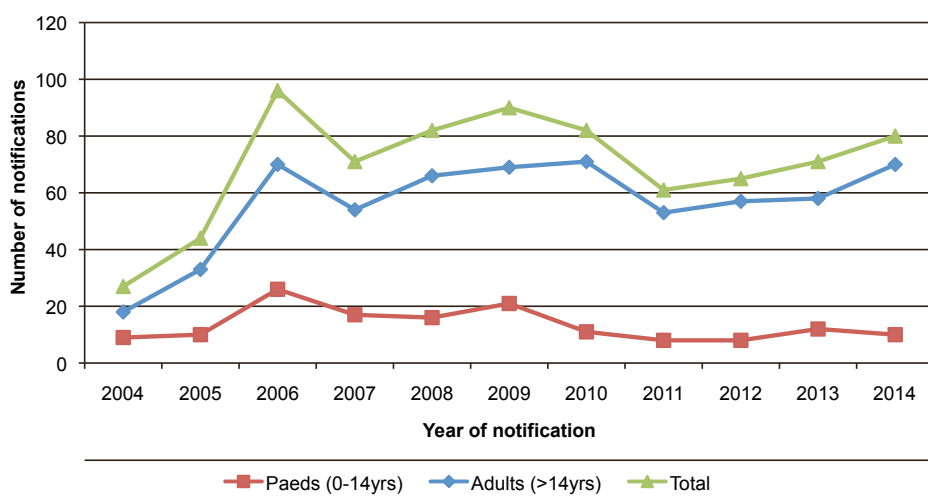


Figure 1: Annual number of malaria notifications by age, Ireland 2004-2014

where country of infection was reported. The remaining cases were exposed in other countries within Africa and South Asia. The majority of cases who reported travel to Nigeria were "visiting family in country of origin" (25/34) with known reason for travel.

Plasmodium falciparum accounted for 74% of infections in 2014, reflecting the dominance of exposure in Africa as the source of the majority of notifications. Six cases of *P. vivax*, and one case each of *P. ovale* and *P. malariae* were also reported which remains stable in comparison to previous years. The remaining 12 cases did not have *Plasmodium* species specified.

HPSC resources for health professional include a poster which can be downloaded from the HPSC website for display in GP surgeries, maternity hospitals, paediatric hospitals and A&E departments, advising immigrant families travelling to Africa to consult their doctor about malaria before travelling. A leaflet for intending travellers, available in English and French, highlights the value of antimalarial prophylaxis and protection against mosquito bites. The poster and leaflet are available [here](#).

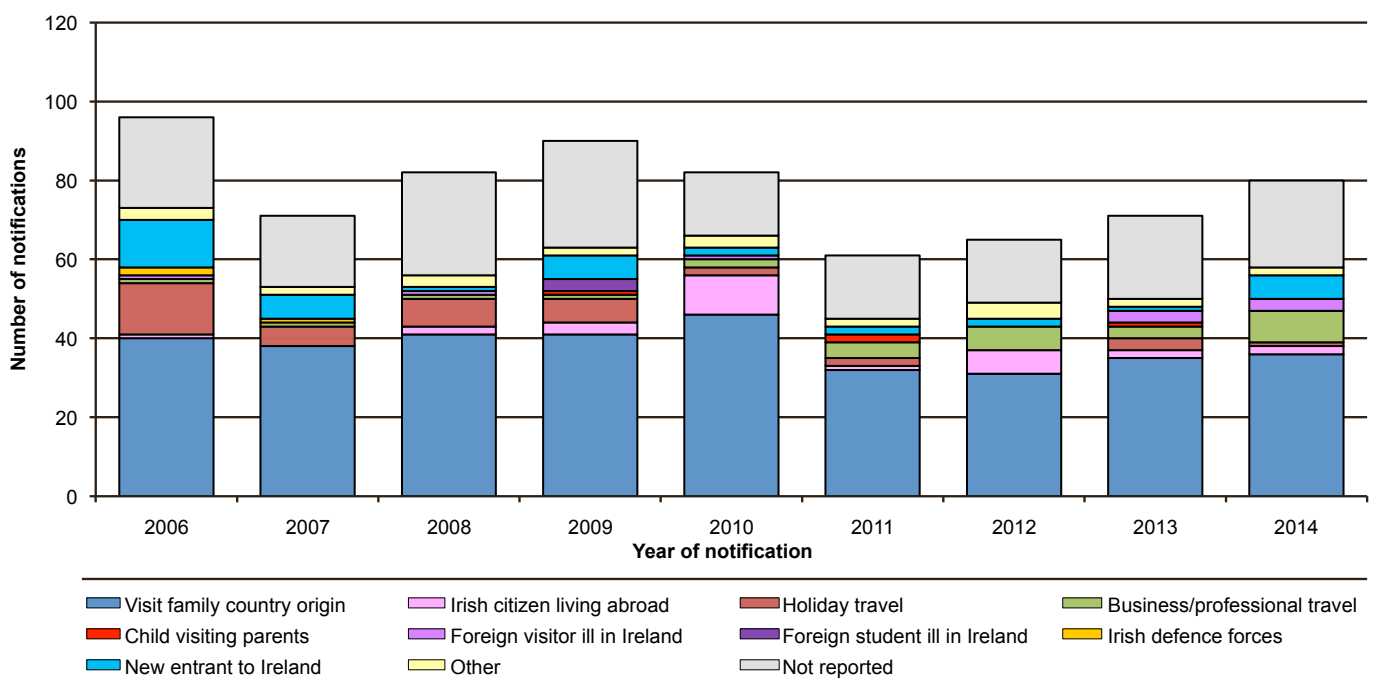


Figure 2: Annual number of notifications malaria by reason for travel, Ireland 2006-2014

4.2 Leptospirosis

Summary

Twenty-three cases of leptospirosis were notified in Ireland in 2014, an increase compared to 13 cases notified in 2013 (Figure 1). This equates to a crude incidence rate (CIR) of 0.15 per 100,000 population. The latest year for which data is available across the European Union is 2012. Among the 27 countries that reported leptospirosis incidence in 2012, Ireland reported the fifth highest incidence rate after Estonia, Malta, Lithuania and Romania. The incidence in the EU as a whole was 0.1 per 100,000.

The age range of cases was 16-74 (mean age =42 years, median age=43 years). Cases in the younger age groups were mainly associated with recreational exposure and history of foreign travel while older cases were mainly indigenous and associated with occupational exposure. Figure 1 illustrates the annual trend by travel history. The leptospirosis notification dataset is typically dominated by adult males, and this year was no exception with male cases accounting for 87% of cases (Table 1).

Thirteen cases (56.5%) were believed to have acquired their illness occupationally, seven of whom were either farmers or reported contact with farm environments while the remaining six occupationally acquired cases

reported contact with rats or other animals. Five (21.7%) cases were reported as being associated with recreational activities, four of whom reported river water exposure Thailand. One case reported both recreational and occupational exposures and one case had accidental exposure to farm animals. No risk factors were reported for the remaining three cases but one case reported recent travel history to multiple countries in SE Asia. Figure 2 shows the trend in notifications by exposure group and year.

Table 1: Leptospirosis notifications by age and sex, 2014

Age group (years)	Male	Female	Total
0-4	0	0	0
5-14 yrs	0	0	0
15-24 yrs	2	3	5
25-44 yrs	1	6	7
45-64 yrs	0	8	8
65+ yrs	0	3	3
Total	3	20	23

reported contact with rats or other animals. Five (21.7%) cases were reported as being associated with recreational activities, four of whom reported river water exposure Thailand. One case reported both recreational and occupational exposures and one case had accidental exposure to farm animals. No risk factors were reported for the remaining three cases but one case reported recent travel history to multiple countries in SE Asia. Figure 2 shows the trend in notifications by exposure group and year.

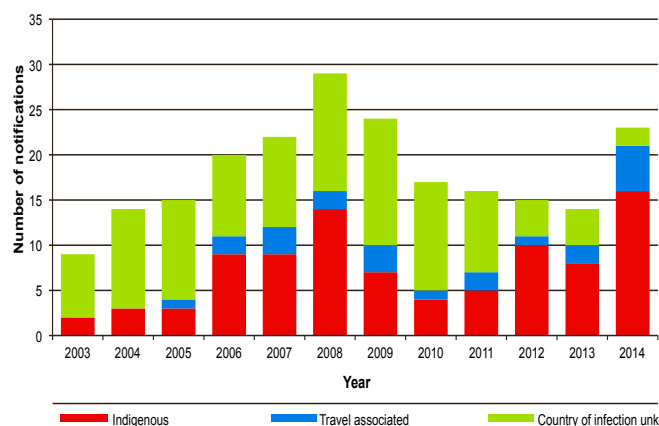


Figure 1: Annual number of leptospirosis notifications by year and travel history (Data source: CIDR)

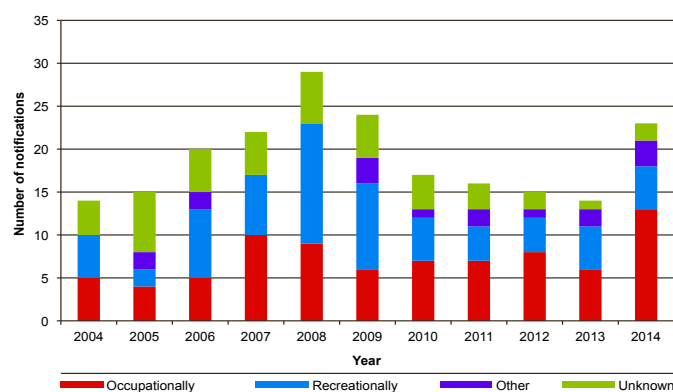


Figure 2: Annual number of leptospirosis notifications by exposure group by year (Data source: CIDR)

Among the 20 cases for which hospital admission status was reported, 15 (75%) required hospitalization. There were no deaths reported.

While a number of regional hospital laboratories offer a diagnostic service for leptospirosis, around two thirds of cases are diagnosed by the National Virus Reference Laboratory each year. Positive specimens are generally referred to the United Kingdom's Leptospirosis Reference Unit (LRU) for confirmation and for typing where possible. In 2014, species information was available on CIDR for only three cases (13%)—one was *Leptospira ballum* and two were *L. interrogans hardjo*.

Activities that continue to be associated with leptospirosis risk in Ireland include recreational activities such as water sports, and farming. In recent years, travel to Asia and other tropical destinations has emerged as a risk factor for leptospirosis.

4.3 Other Notifiable Non-IID Zoonotic Diseases

Toxoplasmosis

During 2014, 20 cases of toxoplasmosis were notified, a slight decrease compared to an annual mean of 35 notifications in the previous five years. Among cases where patient type was reported, 18.8% were hospitalised. No congenital cases were reported.

Cases ranged in age from 16 to 75 years (median: 32 years). As in previous years, more cases were reported among females than males, (F:M ratio 2.6:1.0). This was particularly evident among females in the 25-34 year age group, which is most likely a reflection of enhanced testing during pregnancy (Table 1).

Brucellosis

During 2014, there were three cases of brucellosis notified, with cases ranging in age from 2 to 55 years. This remains stable compared to an annual mean of two notifications in the previous five years. Two cases were reported as *Brucella species*; and one was reported as *B. melitensis*. Country of infection was reported as Turkey for one case while the remaining two cases did not report country of infection.

Despite the reporting of two female cases this year, the age and sex distribution for brucellosis in recent years in Ireland has tended towards adult males, suggesting that occupational exposure is likely to be a major transmission route for this disease.

Echinococcosis, Trichinosis and Q Fever

No cases of echinococcosis, trichinosis and Q fever were notified in Ireland in 2014.

Table 1: Toxoplasmosis notifications by age and sex, Ireland 2014

Age group	Female	Male	Unknown	Total	%
15-19 yrs	0	1	1	2	10.0
20-24 yrs	1	1	0	2	10.0
25-34 yrs	7	2	1	10	50.0
35-44 yrs	2	1	0	3	15.0
45-54 yrs	1	0	0	1	5.0
55-64 yrs	1	0	0	1	5.0
65+ yrs	1	0	0	1	5.0
Total	13	5	2	20	100.0
%	65.0	25.0	10.0	100.0	

4.4 Other Vectorborne Diseases

Four vectorborne diseases were added to the notifiable disease list in Ireland from the beginning of 2012. This chapter summarises the information gathered on these notifications in the second year of formal surveillance. The case definitions for these diseases are outlined on the HPSC website at <http://www.hpsc.ie/NotifiableDiseases/CaseDefinitions/>.

Lyme neuroborreliosis

Lyme neuroborreliosis is an infection caused by a spiral-shaped bacterium called *Borrelia burgdorferi* that is transmitted to humans by bites from ticks, generally hard-bodied ticks (*Ixodidae*).

During 2014, 18 cases of Lyme neuroborreliosis were notified in Ireland, 10 female and eight male. Six patients were admitted to hospital, two were reported as hospital out-patients and nine were GP patients. The hospitalisation status of the remaining case was not specified. One case was reported as being acquired abroad, seven acquired the infection in Ireland and the remaining 10 cases did not report country of infection.

Cases were reported from five of the eight HSE areas, with 72.2% of the cases reported by HSE-S and -MW. Table 1 displays the regional distribution of cases by age group in years.

Dengue Fever

During 2014, 21 confirmed cases of dengue fever were notified. Three cases were reported as being admitted to hospital, 10 were GP patients, one was a hospital outpatient and one was an emergency department patient. Patient type was not reported for the remaining six cases. Table 2 displays the regional distribution of cases by age group in years.

Dengue is found commonly throughout the tropics and subtropics and is endemic in about 100 countries. Of the 21 cases reported in 2014, country of infection was reported for 11 cases (47.6%). Three cases reported country of infection as Thailand, two as Malaysia and one case each as Columbia, Costa Rica, India, Philippines, Tunisia and Viet Nam. The remaining 10 cases did not have a country of infection specified but two of these cases reported recent travel in Asia. These destinations most likely reflect the frequency of travel by Irish residents to dengue endemic countries.

West Nile fever

No cases of West Nile fever was notified in Ireland in 2014.

Chikungunya fever:

One case of chikungunya was notified in Ireland in 2014. Country of infection was not reported but the case had a recent travel history to South America.

Table 1: Lyme neuroborreliosis notifications by age group (years) and HSE-area, 2014

Age group (years)	HSE-E	HSE-M	HSE-MW	HSE-NE	HSE-NW	HSE-SE	HSE-S	HSE-W	Total
15-19 yrs			1			1			2
20-24 yrs								1	1
25-34 yrs			2				1		3
35-44 yrs			1						1
45-54 yrs							3	1	4
55-64 yrs	1					1	2		4
65+ yrs			1				2		3
Total	1	0	5	0	0	2	8	2	18

Table 2: Dengue fever notifications by age group (years) and HSE-area, 2014

Age group (years)	HSE-E	HSE-M	HSE-MW	HSE-NE	HSE-NW	HSE-SE	HSE-S	HSE-W	Total
15-19 yrs						1			1
20-24 yrs	2								2
25-34 yrs	5					1		1	7
35-44 yrs	3					1	1	2	7
45-54 yrs	1								1
55-64 yrs	1					1			2
65+ yrs		1							1
Total	12	1	0	0	0	4	1	3	21

20
14

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05

BLOOD-BORNE AND
SEXUALLY TRANSMITTED INFECTIONS

5.1 Hepatitis B

Summary

Number of cases, 2014: 445
 Crude notification rate, 2014: 9.7/100,000 population
 Number of cases, 2013: 425

Hepatitis B is a vaccine preventable disease caused by the hepatitis B virus. It is transmitted through percutaneous or mucocutaneous contact with the blood or body fluids of an infected person. After acute HBV infection, the risk of developing chronic hepatitis B declines with increasing age.¹ Approximately 90% of infants infected at birth will develop chronic infection, compared to 20% - 50% of children infected between the ages of one and five years. Only 1%-10% of those infected as older children or adults will develop chronic hepatitis B. An estimated 15%-25% of those who go on to develop chronic infection will die prematurely, of either cirrhosis of the liver or hepatocellular carcinoma.

The prevalence of hepatitis B in the general population in Ireland is low (less than 1%). Most cases fall into defined risk groups such as people with multiple sexual partners, household or sexual contacts of known cases, injecting drug users and people who were born in

countries of intermediate (2-7%) or high ($\geq 8\%$) hepatitis B endemicity.

The number of hepatitis B cases reported in Ireland increased by 5% in 2014, with 445 cases (9.7/100,000 population) notified compared to 425 in 2013. However, there has been a general downward trend in the number of notifications since peak levels in 2008 (n=901). Annual hepatitis B notifications since 1997 are shown in figure 1.

Notification rates were highest in HSE E (15.6/100,000 population, n=253) and HSE M (11/100,000 population, n=31). Geographic trends for the past four years are shown in figure 2.

All cases were laboratory confirmed and 97% (n=431) contained information on acute/chronic status. Where status was known, 7% of cases were acute (n=29, 0.6/100,000 population) and 93% were chronic (n=402, 8.8/100,000 population). Both acute and chronic cases of hepatitis B are notifiable in Ireland.

Acute cases (recent infections)

The number of acute cases of hepatitis B notified in Ireland is relatively low and decreased by 3% in 2014

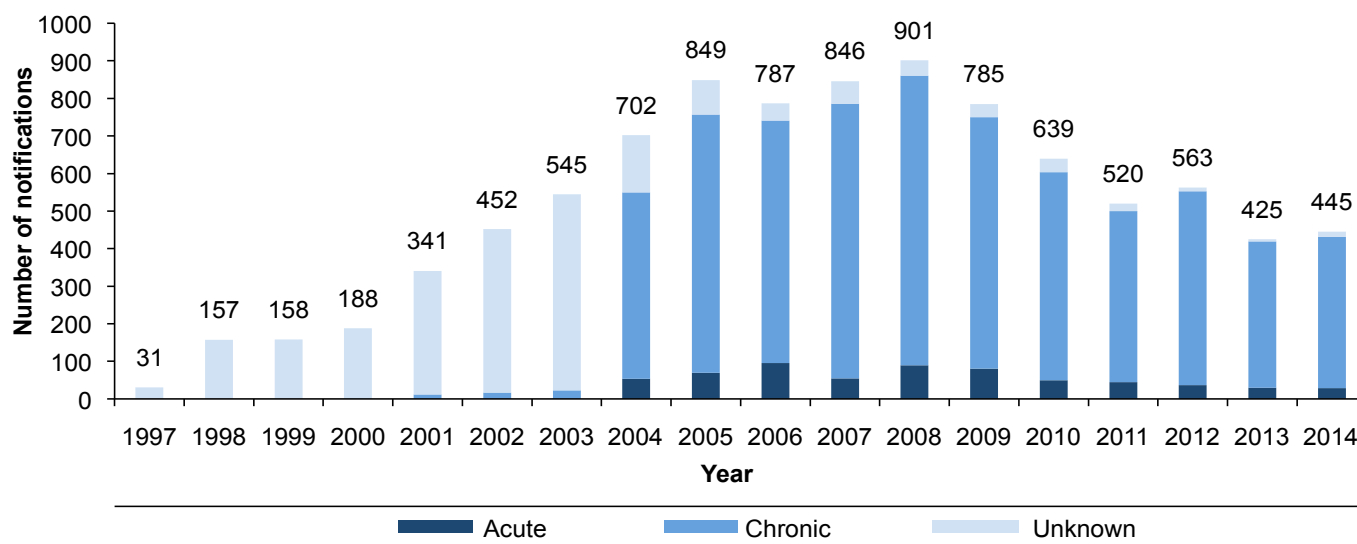


Figure 1. Number of hepatitis B notifications by acute/chronic status, 1997-2014

(n=29) compared to 2013 (n=30) (figure 3). The majority of acute cases of hepatitis B in Ireland are sexually acquired.

Of the 29 acute cases notified in 2014, 69% (n=20) were male and 31% (n=9) were female. The highest notification rates were in young to middle aged adults, with 90% (n=26) of acute cases aged between 20 and 54 years (figure 4). Males were older overall, with a median age of 38.5 years compared to 28 years for females. The median age at notification decreased in 2014 compared to previous years (figure 3).

Information on risk factor was available for 97% (n=28) of acute cases. Of these, 61% (n=17) were likely to have been sexually acquired (12 heterosexual and five men who have sex with men), one case was a household contact of an infected person in Ireland and another case was attributed to dental procedures. No risk factor was identified for six cases despite public health follow up. Three further cases had no risk factor information but were known to have been born in hepatitis B endemic countries.

Country of birth was specified for 83% (n=24) of acute cases notified in 2014. Fifty four percent (n=13) were born in Ireland and 17% (n=5) were born in Western Europe. A further two cases were born in Asia, two cases were born in Sub-Saharan Africa and there was one case born in each of Latin America and the Caribbean. Reasons for testing were available for 97% (n=28) of acute cases. Of these, 61% of cases reported being tested because they were symptomatic.

Chronic cases (long-term infections)

There was a 3% increase in chronic hepatitis B notifications in 2014 (n=402) compared to 2013 (n=389) (figure 5). However, notifications have decreased significantly since peak levels in 2008. The large increase in hepatitis B notifications between 1997 and 2008 (figure 1) was mostly due to increased numbers of people immigrating to Ireland from hepatitis B endemic countries. Following a drop in immigration numbers from 2009 to 2011, immigration has increased again each year from 2012 (52,700 immigrants) to 2014 (60,600), which could explain the slight increase in chronic hepatitis B in 2014.²

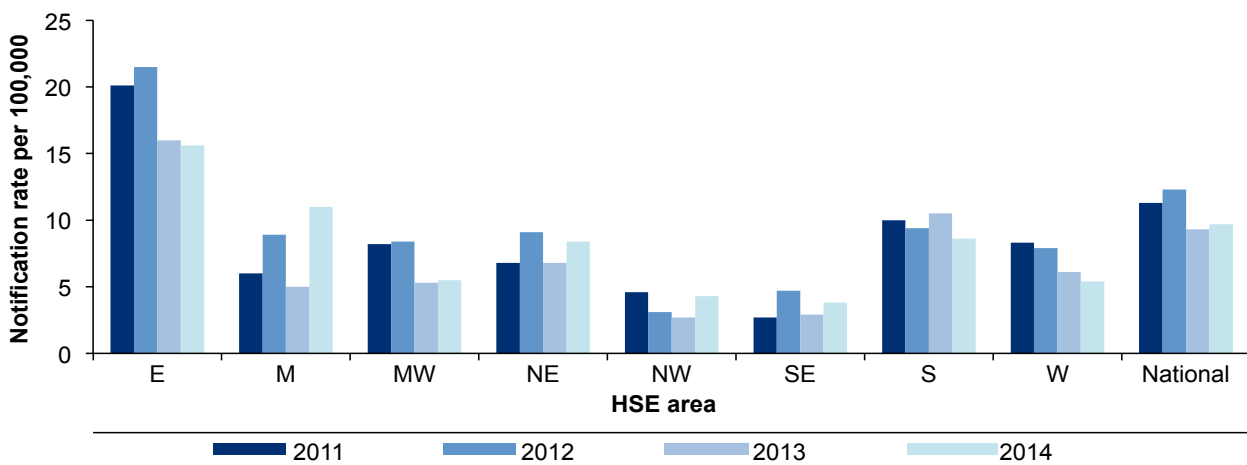


Figure 2. Hepatitis B notification rates/100,000 population, by HSE area, 2011-2014

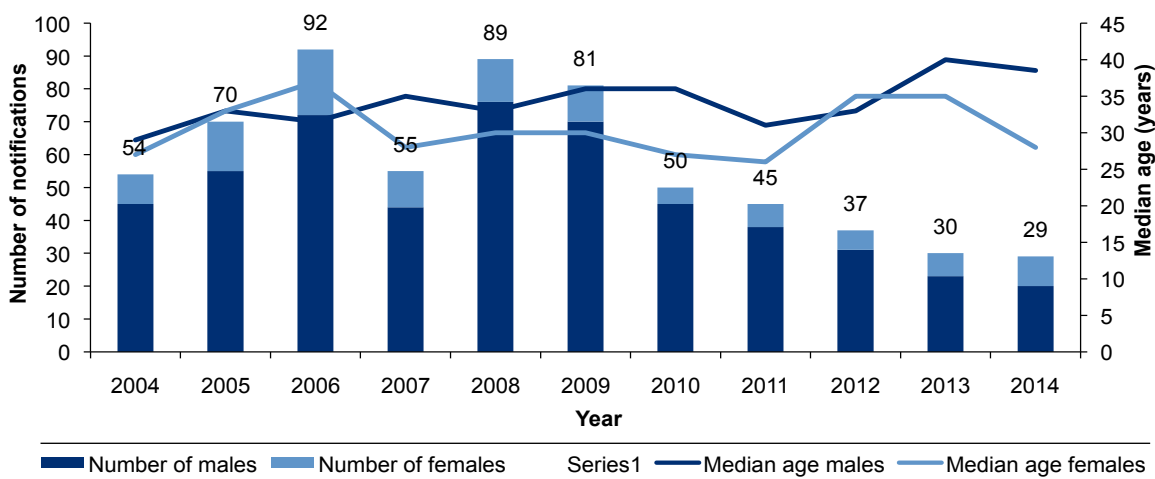


Figure 3. Number of acute cases of hepatitis B notified, by sex and median age, 2004-2014

Of the 402 chronic cases notified in 2014, 59% (n=237) were male, 38.5% (n=155) were female and sex was not reported for 2.5% (n=10). Seventy nine percent (n=316) of chronic cases were aged between 20 and 44 years when notified (figure 6). Males were slightly older overall, with a median age at notification of 36 years compared to 28 years for females (figure 5).

Although risk factor was reported for a minority of chronic cases, some information on country of birth or asylum seeker status was available for 60% (n=242). Of these, 86% (n=208) were either born in a hepatitis B endemic country (hepatitis B surface antigen prevalence $\geq 2\%$) or were asylum seekers. Most of these cases are likely to have been infected outside Ireland, but the actual mode of acquisition of infection is unknown for the majority. Where country of birth was available (59%, n=236), the most common birth countries were in Central or Eastern Europe (37%, n=87), Asia (30%, n=70), Sub-Saharan Africa (21%, n=49) and Western

Europe (10%, n=24). Of those born in Western Europe, 18 were born in Ireland.

Risk factors for transmission were provided for 15% (n=60) of the chronic cases notified in 2014. Where data were available, the most common risk factors were sexual exposure (28%, n=17), vertical transmission (20%, n=12), being a household contact of a case (10%, n=6), injecting drug use (7%, n=4) and attending an intellectual disability setting (7%, n=4). Three of the cases with an intellectual disability were born in Ireland, but infection may have been acquired in the past and only diagnosed in 2014 as part of routine testing.

The reason for testing was known for 66% (n=265) of chronic cases. The main reasons were: antenatal screening (21%, n=56), re-testing of known cases (not previously notified) (15%, n=41), routine health screening (13%, n=34), asylum seeker screening (11%, n=29) and STI screening (9%, n=24).

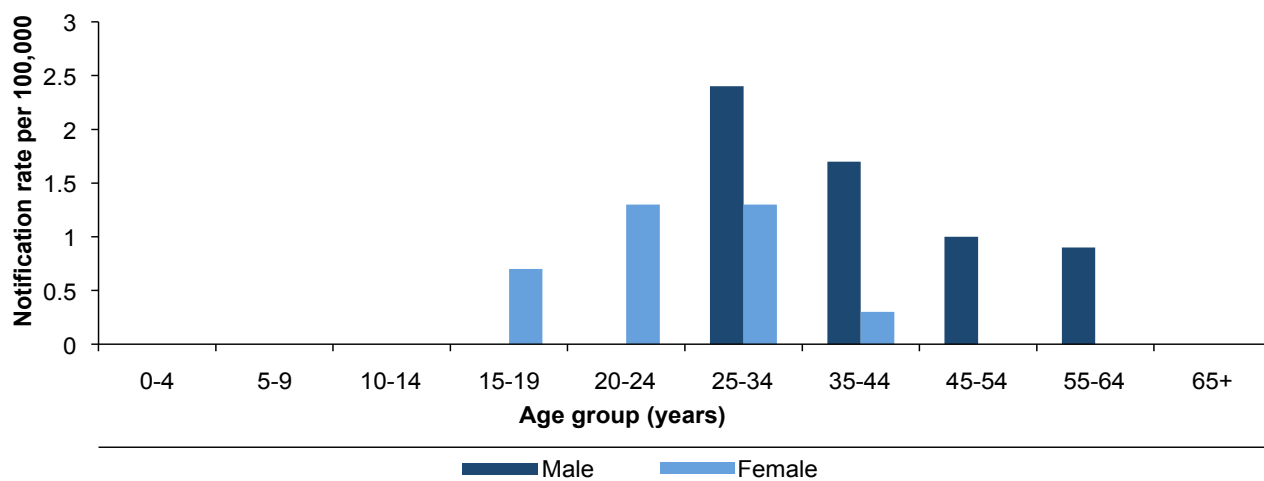


Figure 4. Age and sex-specific notification rates/100,000 population for acute cases of hepatitis B, 2014

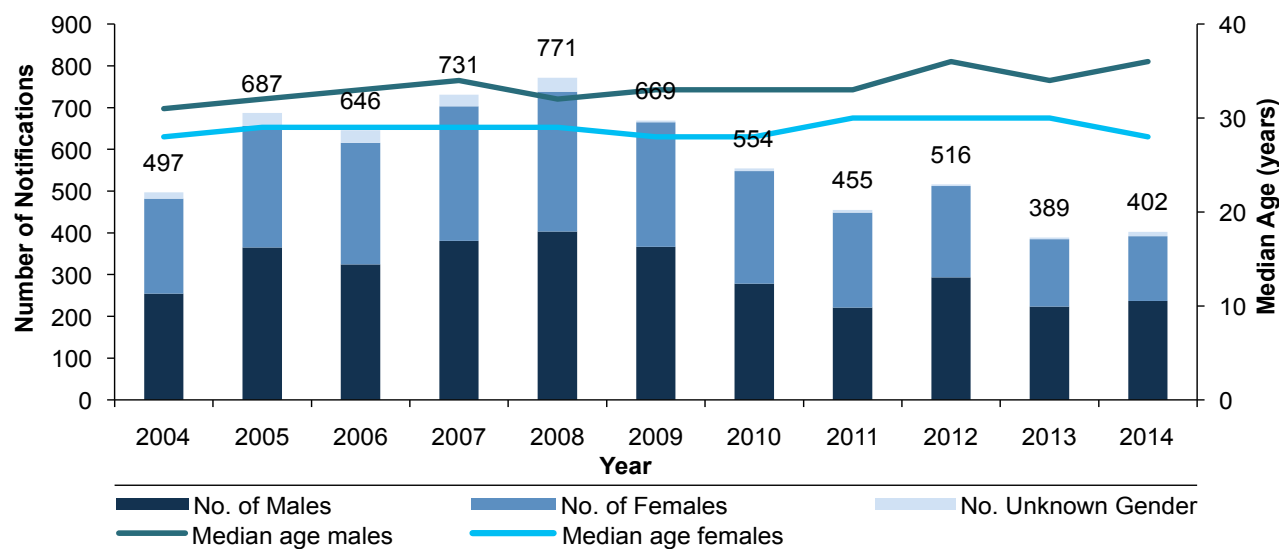


Figure 5. Number of chronic cases of hepatitis B notified, by sex and median age, 2004 to 2014

Co-infections

Co-infection with HIV or hepatitis C can lead to more severe liver disease and an increased risk of liver cancer in people with hepatitis B infection. Eleven of the cases of hepatitis B notified in 2014 were co-infected with HIV. One additional case was infected with HIV and hepatitis C.

1. Heyman DL. Control of Communicable Diseases Manual. 19th Edition. Washington: American Public Health Association, 2008.
2. Central Statistics Office (2014) Immigrants (thousand) by country of origin. Accessed 21st August 2015. Available from: http://www.cso.ie/multiquicktables/quickTables.aspx?id=pea18_1

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 13th August 2015. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

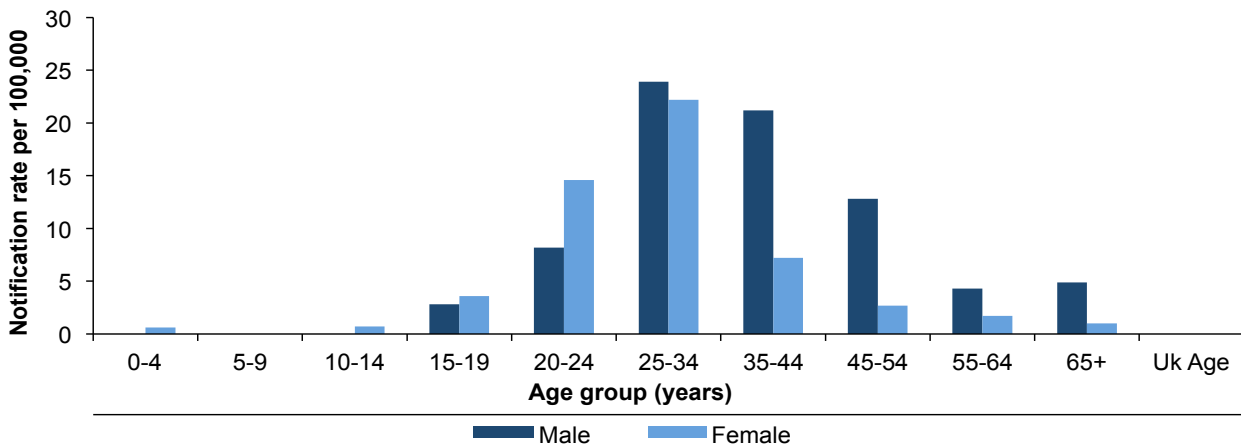


Figure 6. Age and sex-specific notification rates/100,000 population for chronic cases of hepatitis B, 2014

5.2 Hepatitis C

Summary

Number of cases, 2014: 710
 Crude notification rate, 2014: 15.4/100,000 population
 Number of cases in 2013: 761

Hepatitis C is a major cause of liver disease worldwide. The hepatitis C virus (HCV) is primarily transmitted through sharing contaminated equipment when injecting drugs or through receipt of unscreened blood or blood products (this is no longer a risk in Ireland). Sexual, occupational and vertical transmission can also occur but are less common.

Infection is initially asymptomatic in most cases, but approximately 75% of those infected fail to clear the virus and develop chronic infection. Between 5 and 20% of chronically infected individuals develop cirrhosis of the liver after 20 years of infection. Of those with cirrhosis, 1.5% to 2.5% will go on to develop hepatocellular carcinoma (liver cancer) each year.¹ There have been major advances in the treatment of hepatitis C in recent years with the arrival of all-oral interferon-free regimens. Sustained virological response (SVR) rates of 90% to 100% have been reported.² SVR is regarded as a virological cure and is associated with improved morbidity and mortality.²

The overall prevalence of chronic hepatitis C in Ireland is comparable to other Northern European countries, and is estimated to be between 0.5% and 1.2%. Most

cases fall into defined risk groups such as people who inject drugs, people who received unscreened blood or blood products in the past and people who were born in hepatitis C endemic countries.³

Hepatitis C notifications decreased by 7% in 2014 (n=710, 15.4/100,000 population) compared to 2013 (n=761, 16.5/100,000 population) (figure 1). This was a continuation of a general downward trend since peak levels in 2007 (n=1539). There was a strong predominance of males: 70% (n=497) of cases were male, 29.7% (n=211) were female and sex was not reported for two cases. The highest notification rates were in young to middle aged adults. Eighty four percent (n=593) of cases were aged between 25 and 54 years (figure 2). The median age at notification has continued to rise. The median age for females was younger (36 years) than that for males (39 years).

The geographical distribution of cases was skewed, with the HSE-East reporting 69% of the cases notified in 2014 (n=493, 30.4/100,000 population) (figure 3).

Data on most likely risk factor were available for 49% of cases (n=348) in 2014. The most common risk factors reported were injecting drug use (80%, n=278), sexual exposure (5%, n=18), receipt of blood or blood products (4.5%, n=16) and vertical transmission (2%, n=7) (figure 4). Of those infected through vertical transmission, six were born in Ireland and one was born in a hepatitis C endemic country. Of those who were infected

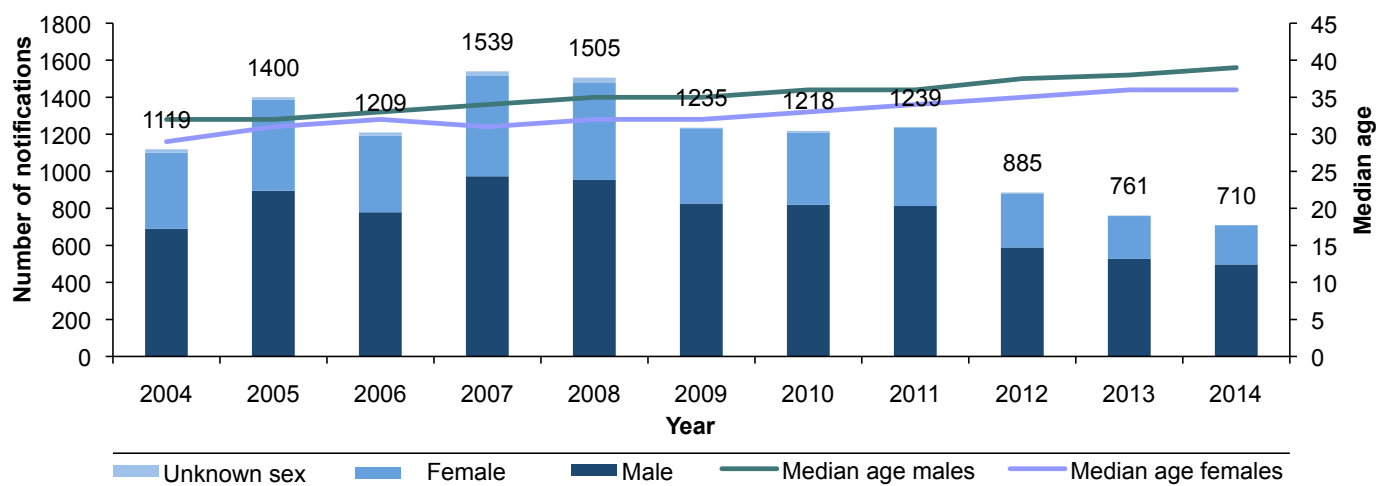


Figure 1. Number of notifications of hepatitis C and median age at notification, by sex, 2004-2014

through contaminated blood or blood products, three were infected in Ireland, eight were infected in other countries and country of infection was unknown for the remaining five cases. The Irish infections occurred many years in the past, but were notified for the first time in 2014. Figure 4 shows recent risk factor trends for hepatitis C in Ireland.

Data on country of birth were available for 33% of cases (n=232) in 2014. Where information was available, 47.5% of cases were born in Ireland and 52.5% were born outside of Ireland. For the non-Irish nationals, the most common regions of birth were Central and Eastern Europe (65%, n=79), Western Europe (excluding Ireland) (12%, n=15) and Asia (11%, n=14). Sub-Saharan Africa (n=5), North Africa (n=3), Latin America (n=3), North America (n=2) and Oceania (n=1) were also reported as countries of birth of hepatitis C cases.

Hepatitis C genotype data were collected retrospectively from NVRL and the Molecular Diagnostic & Research Laboratory in University College Cork and were available for 24.5% of notifications in 2014. Of these, 59% (n=103) were genotype 1, 37% (n=64) were

genotype 3, 2.3% (n=4) were genotype 2 and 1.7% (n=3) were genotype 4. Subtype was available for 91% (n=94) of genotype 1 cases. Of these, 70 cases were reported as genotype 1a and 24 cases as genotype 1b.

Co-infections with HIV or hepatitis B can lead to more severe liver disease and an increased risk of liver cancer in those with hepatitis C infection. Eighteen of the hepatitis C cases notified in 2014 were known to be co-infected with HIV and six with hepatitis B. Two of these were infected with hepatitis B, hepatitis C and HIV.

Hepatitis C notifications have been decreasing in recent years. Some of this decline may be explained by the introduction of new case definitions, explicitly excluding the notification of resolved cases, in 2012. Data completeness has also improved in recent years and this has facilitated better deduplication of notifications. However, overall indications are that the incidence of hepatitis C in Ireland is decreasing. Where risk factor information was available, 80% of cases were drug users who were likely to have been infected through unsafe injecting practices. Anecdotally, the proportion of drug users who are injecting is decreasing and the

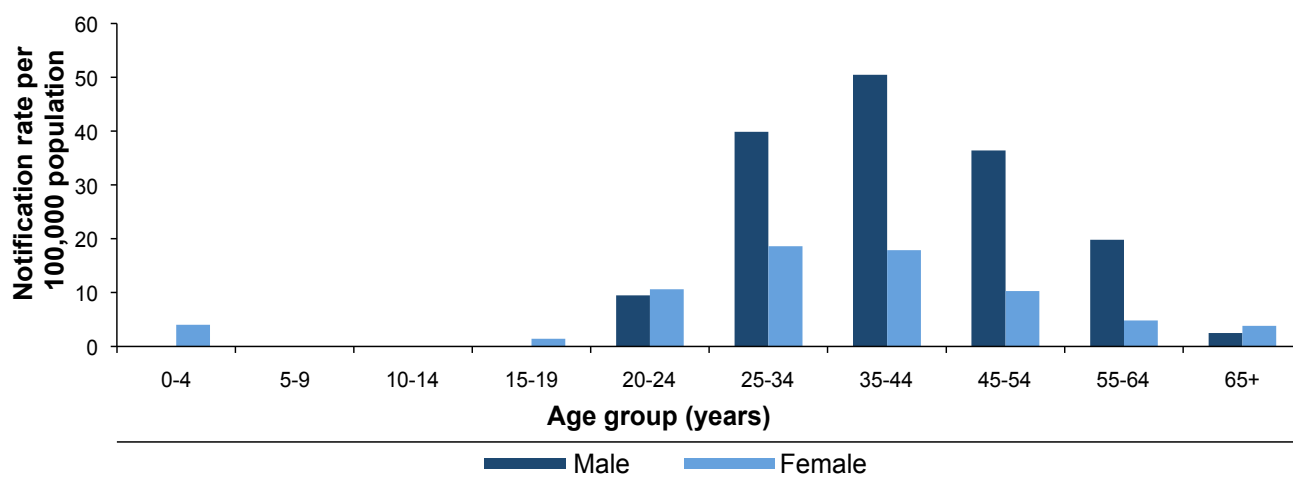


Figure 2. Age and sex-specific notification rates/100,000 population for hepatitis C, 2014

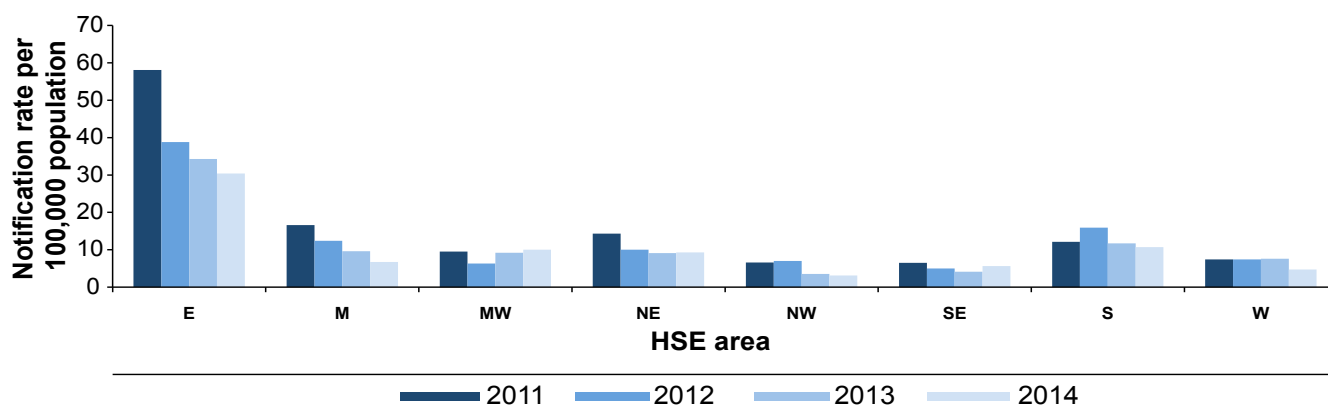


Figure 3. Notification rates/100,000 population for hepatitis C by HSE area, 2011-2014

incidence of hepatitis C appears to be decreasing in this population.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 14th August 2015. These figures differ from those published previously and those reported in the appendices of this report due to ongoing updating of notification data on CIDR.

1. Global Burden of Hepatitis C Working Group. Global burden of disease (GBD) for hepatitis C. *J Clin Pharmacol.* 2004 Jan;44(1):20-9.
2. Conjeevaram H. Continued progress against hepatitis C infection. *JAMA* 2015;313(17):1716-17.
3. Thornton L, Murphy N, Jones L, Connell J, Dooley S, Gavin S et al. Determination of the burden of hepatitis C virus infection in Ireland. *Epidemiol Infect.* 2011 Sep 19:1-8

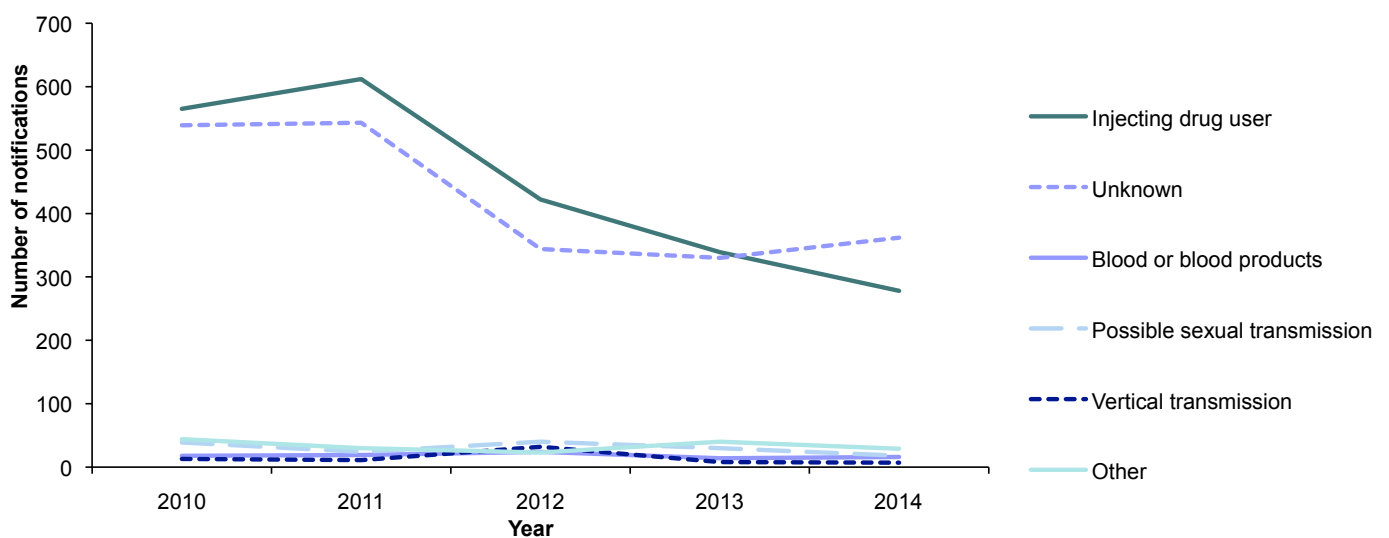


Figure 4. Most likely risk factor for hepatitis C, 2010-2014

5.3 HIV

Summary

Number of notifications: 377
Crude notification rate: 8.2 per 100,000 population

In 2014, 377 people were newly diagnosed with HIV in Ireland, an increase of 11% compared to 2013. Between 2010 and 2013, the annual rate of new HIV diagnoses had been relatively stable in Ireland, ranging from 7.0 to 7.5 per 100,000 population. Cumulatively, to the end of 2014, 7,353 people have been newly diagnosed with HIV in Ireland but this number does not represent the number of people living with HIV (PLHIV) in Ireland, as it does not take factors such as death and migration into account.

A summary of new HIV diagnoses in 2014 is given in table 1. Notifications of HIV include all people who test HIV positive for the first time in Ireland and include a number of people who have previously tested HIV positive abroad. Among the new diagnoses in 2014, 17% were reported to have previously tested HIV positive abroad, compared to 16% in 2013, 17% in 2012 and 14% in 2011.

Probable route of transmission

Probable route of transmission was known for 89% of new diagnoses in 2014. Figure 1 shows the trends in new HIV diagnoses from 2003 to 2014. As in recent years, the highest number of new diagnoses was among

men who have sex with men (MSM) (183; 49%). In the 10 years since 2005, the number of new diagnoses among MSM has increased threefold (from 60 to 183) and the median age at diagnosis has dropped from 37 to 31 years.

Heterosexual contact was the second most commonly reported mode of transmission in 2014, (125; 33%). Since 2010, the number of diagnoses among heterosexuals has remained stable, ranging from 125 to 133 diagnoses per year. The majority of heterosexuals (62%) diagnosed in 2014 were born in countries with generalised HIV epidemics¹. The proportion diagnosed late in male heterosexuals (71%) was higher than in previous years (60% in 2013 and 68% in 2012) while in female heterosexuals, the proportion diagnosed late (56%) was less than in previous years (59% in 2013 and 58% in 2012).

There were 27 (7%) new diagnoses among people who inject drugs (PWID) in 2014, the highest number reported in this risk group since 2009. Of the new diagnoses, 85% were Irish-born, 89% were resident in Dublin and 89% were co-infected with hepatitis C. Forty one percent of PWID newly diagnosed in 2014 were recently infected, with documented previous negative HIV tests in either 2013 or 2014.

¹ A generalised HIV epidemic is where greater than 1% of the general population is HIV positive

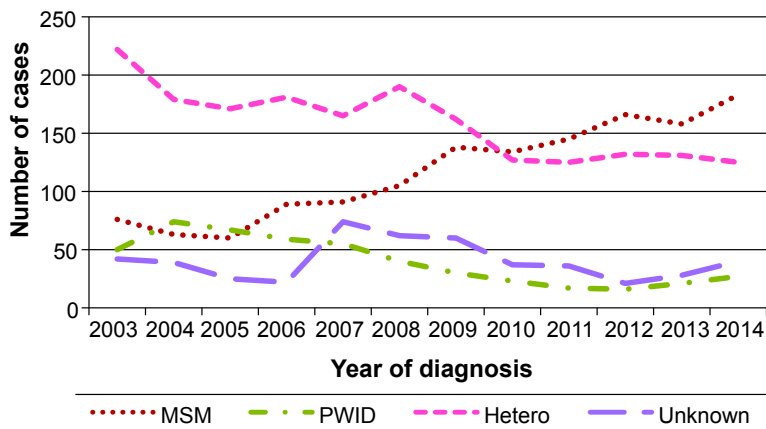


Figure 1: New HIV diagnoses by probable route of transmission, 2003 to 2014

Two mother to child transmission (MTCT) cases were notified in 2014. Both of the children were born in sub-Saharan Africa. No MTCT cases were identified in children born in Ireland in 2014.

Late diagnosis

Forty nine percent of new diagnoses in 2014 were late presenters (with CD4 <350 cells/µl or an AIDS defining illness at diagnosis) and 28% had advanced HIV infection (with CD4 <200 cells/µl. or an AIDS defining illness at diagnosis). Late presentation was less common among MSM (38%) and PWID (44%) than among heterosexuals (56% in females and 71% in males). Thirty eight (10%) people were diagnosed with an AIDS defining illness at the time of their HIV diagnosis.

Discussion

There was an 11% increase in the number of new HIV diagnoses in 2014, which can be accounted for by an increasing number of HIV notifications among MSM and PWID. Sex between men is the commonest mode of transmission in Ireland since 2010 and is also the predominant mode of transmission in EU/EEA countries (43% in 2013).² In light of the continued increase in new HIV diagnoses among MSM, effective interventions such as promoting condom use, and peer led outreach interventions that provide information and support to the MSM community, need to be sustained and strengthened. The increase in recently acquired infections among PWID in Dublin since January 2014 is currently under investigation.¹

Overall, the number of individuals that were diagnosed at a late stage of infection remains high: 49% compared with 50% in 2013 and 49% in 2012. The proportion diagnosed late varied by risk group and was highest among heterosexuals followed by PWID and lowest in MSM. More emphasis on the benefits of early testing, and ready access to HIV testing are needed to reduce the proportion presenting late, which will benefit both the individual and will also reduce the likelihood of transmission to others. Recent initiatives offering HIV screening to attendees of some emergency departments at large hospitals in Dublin may result in earlier detection of infections in people that may otherwise be unaware of their infection.

The detailed 2014 annual report and slide set are available at <http://www.hpsc.ie/A-Z/HIVSTIs/HIVandAIDS/SurveillanceReports/>

Note: Data for this chapter were extracted from CIDR in May 2014.

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1. HPSC. Increase in diagnoses of recently acquired HIV in persons who inject drugs (PWID), Epi Insight, Volume 16, Issue 7, July 2015
2. European Centre for Disease Prevention and Control/WHO Regional Office for Europe. HIV/AIDS surveillance in Europe 2013. Stockholm: European Centre for Disease Prevention and Control; 2014.

Acknowledgements

We would like to sincerely thank all who have contributed to this report including the National Virus Reference Laboratory (NVRL), Microbiology Laboratories, the Departments of Public Health, Consultants in Infectious Disease/GUM and all other clinicians involved. Data on paediatric infections were provided by the Infectious Disease Unit, Our Lady's Hospital for Children (OLHC), Crumlin.

Table 1: Summary of HIV diagnoses in Ireland, 2014

Number of HIV diagnoses		377
Rate of diagnoses (per 100,000 population)		8.2
Age	Median age of adult cases	33 years
	Age range of adult cases	18 to 77 years
	Young people (15-24 years)	44 (11.7%)
Gender	Aged 50 and older	32 (8.5%)
	Males	277 (73%)
	Females	100 (27%)
Route of Transmission	Male to female ratio	2.8
	Men who have sex with men (MSM)	183 (49%)
	Heterosexual	125 (33%)
	PWID (People who inject drugs)	27 (7%)
	Mother to Child transmission (MTCT)	2 (0.5%)
Geographic origin	Unknown	40 (11%)
	Born in Ireland	137 (36.3%)
	Born Abroad	203 (53.8%)
Stage of Infection	Unknown	37 (9.8%)
	Late	159 (48.6%)
	Advanced HIV infection	90 (27.5%)
Co-infections	Concurrent AIDS diagnosis	38 (10.1%)
	Acute STI	39 (10.3%)
	TB	16 (4.2%)
	Hepatitis B	18 (4.8%)
	Hepatitis C	31 (8.2%)

5.4 Voluntary antenatal HIV testing in Ireland: 2014

Key Points

National reported uptake rate: 99.9%*
 Number HIV positive cases 93
 Prevalence: 0.15%
 Number new HIV positive cases: 11
 Prevalence of new HIV positive cases: 0.02%

* Returns not available for approximately 6% of antenatal women in 2014

Seventeen (of 19) maternity hospitals and units provided antenatal HIV screening data for 2014. Table 1 describes the data collected from maternity hospitals between 2008 and 2014. Antenatal screening data were available for 63,538 women from 17 maternity hospitals in 2014. Data for 2014 were not available for two hospitals (Letterkenny General Hospital and Waterford Regional Hospital). In addition, 9 of the 17 hospitals (52.9%) were able to provide data on public patients only. There were 67,462 births in 2014 and while these figures are not directly comparable, there was a shortfall in returns for approximately 6% of antenatal women. This is a lower figure than 2013 (16%) and 2012 (10%).

Ninety three women tested HIV positive at their antenatal screen, giving a HIV prevalence rate of 0.15%, slightly higher than the rate in 2013 (0.14%). The prevalence of HIV infection among pregnant women varied among HSE areas, ranging from 0.05% in HSE West to 0.23% in HSE Dublin Northeast. Of

the 93 HIV cases, 11 were newly diagnosed at their antenatal screen. The prevalence of newly diagnosed HIV infection was 0.02% in 2014, the same as 2013, and slightly lower than the prevalence reported in 2012, 2011 and 2010 (0.03%).

Some hospitals can only provide estimates or proxy measures for the number of women booked and/or the number offered HIV testing. Booking data was retrieved from a variety of sources including maternity IT systems (6 hospitals), maternity unit manual data collection (6 hospitals), patient administrations systems (4 hospitals), and laboratory IT systems (3 hospitals).

Background information on the system, a copy of the data collection form and the full 2014 report can be found at <http://www.hpsc.ie/hpsc/A-Z/HIVSTIs/HIVandAIDS/AntenatalHIVTesting/>

Acknowledgements:

We would like to sincerely thank staff in the maternity hospital/units for all the effort involved in providing the antenatal screening data. We would also like to acknowledge the help of staff in the department of public health in the Northwest and laboratory staff in Waterford Regional Hospital for collating their regional data

(Footnotes)

- 1 Uptake of HIV antenatal test is calculated as the number of women tested divided by the number of women booked, multiplied by 100
- 2 Prevalence of HIV infection is calculated as the number of women testing positive divided by the number of women tested, multiplied by 100

Table 1: Results of the antenatal screening programme, 2008 to 2014

Parameter	2008	2009	2010	2011	2012	2013	2014
Number of hospitals participating	18/20	19/20	19/20	20/20	18/20	16/19	17/19
Number of live births per year (CSO)	75,173	75,554	75,174	74,650	72,225	68,930	67,462
Number of women booked	66,558	68,378	70,024	68,111	64,803	57,638	63,538
Number offered test	66,558	68,026	69,615	67,849	64,803	57,638	63,538
Number tested	66,210	67,694	69,292	67,135	64,781	57,618	63,532
Uptake of HIV antenatal test ¹ (%)	99.5	99.0	99.0	98.6	99.9	99.9	99.9
Number HIV positive	123	140	118	109	105	83	93
Prevalence ² (%)	0.19	0.21	0.17	0.16	0.16	0.14	0.15
Number newly diagnosed HIV positive	34	32	21	17	22	14	11
Prevalence of new diagnoses (%)	0.05	0.05	0.03	0.03	0.03	0.02	0.02

5.5 Sexually Transmitted Infections (STIs), 2014

Summary

Total number of STIs in 2014: 12,626
 Crude notification rate, 2014: 275.2/100,000
 Most frequently reported STI in 2014: *Chlamydia trachomatis* infection (n=6,695)

Summary

During 2014, a total of 12,626 cases of sexually transmitted infections (STIs) were reported. The most frequently reported STIs were *Chlamydia trachomatis* infection (n=6,695), ano-genital warts (n=2,147), gonorrhoea (n=1,320) and non-specific urethritis (n=897; table 1). The burden of STIs is greatest among those aged less than 25 years and among men who have sex with men (MSM).

Chlamydia trachomatis infection

Chlamydia trachomatis infection was the most frequently reported STI with 6,695 notifications in 2014. The crude incidence rate (CIR) increased to 145.9 per 100,000 population having remained steady in recent years with rates between 139.6/100,000 and 136.4/100,000 between 2011 and 2013 (figure 1). Half (n=3,426) of chlamydia cases were among those aged 25 years or younger. There were 10 cases of *Chlamydia*

trachomatis infection in young children (<6 months); half of these were reported as conjunctivitis. Data on mode of transmission are not collected for chlamydia cases.

Gonorrhoea

In 2014, a total of 1,320 cases of gonorrhoea were reported in Ireland, giving a notification rate of 28.8 per 100,000 population. The overall trend has increased by 200% between 2009 and 2014. The trend among men has been consistently upwards since 2009 while the notification rate amongst women decreased slightly in 2014 (9.7/100,000 in 2014 vs. 11.4/100,000 in 2013). The vast majority of cases were among men (n=1,097, 83%) and 43% (n=566) of gonorrhoea cases notified in 2014 were among those aged less than 25 years old. Where mode of transmission was available, mode of transmission was reported as men who have sex with men (MSM) for 73% of cases (n=344) and heterosexual for 27% (78 male and 49 female).

Ano-genital warts

During 2014, 2,147 cases of ano-genital warts were reported in Ireland giving a CIR of 46.8 per 100,000 population, an increase from 2013 (42.2/100,000) (figure 1). There were more notifications among men (55%) than women (35%); gender was not provided for 10% of cases. The highest age-specific incidence rate was

Table 1: Number, crude incidence rate (CIR) per 100,000 & median age of STIs, 2014

STI	Number	CIR	Median Age (range)
Chlamydia	6,695	145.9	27 years (14 -89 years)*
Ano-genital warts (AGW)	2,147	46.8	NA
Gonorrhoea	1,320	28.8	27 years (14-66 years)*
Herpes simplex (genital)	1,235	26.9	27 years (14-71 years)
Non-specific urethritis (NSU)	897	19.5	NA
Syphilis (early infectious)	205	4.5	32 years (19-70 years)
Trichomoniasis	92	2.0	33 years (18-75 years)
LGV	35	0.8	35 years (20 -55 years)
Total	12,626	275.2	-

*Excludes those <14 years; NA: case-based data were not collected

among those aged 20-24 years (193/100,000). The numbers reported here are likely to be an underestimate of the true incidence as data were not reported from every STI clinic. Further details on the completeness of reporting are available in the report *Ano-genital Warts in Ireland, 2014*, available on the HPSC website, www.hpsc.ie.

Herpes simplex (genital)

There were 1,235 cases of herpes simplex (genital) notified in Ireland during 2014 corresponding to a CIR of 26.9 per 100,000 population, a small increase from 2013 (24.8/100,000) (see figure 1). Most cases were reported as Herpes simplex virus (HSV) type 1 (42%) and 31% as HSV type 2; subtype was not reported for 27% of cases. Three-quarters of cases (n=924) were in women and 39% (n=476) were aged less than 25 years.

Trichomoniasis

During 2014 there were 92 cases of trichomoniasis notified in Ireland corresponding to a CIR of 2.0 per 100,000 population, a slight increase from 1.6/100,000 in 2013. The majority of cases were among women (n=90, 98%) and 28% (n=26) of cases were aged less than 25 years. The highest gender- and age-specific rate was among women aged 20-24 years (12.6/100,000).

Lymphogranuloma venereum (LGV)

There were 35 cases of LGV reported in 2014 giving a crude incidence rate of 0.8 per 100,000 population (compared with five cases in 2013 and four in 2012). This is the highest number of LGV cases ever notified in a single year and follows an outbreak among MSM in the Greater Dublin area. All cases were reported in HSE East (n=34) or HSE North East (n=1) in men who have sex with men (MSM) and most were HIV positive. A multidisciplinary outbreak control team (OCT) was convened in October, 2014, to actively investigate cases

and instigate control measures¹ and the outbreak was declared over in July, 2015.

Non-specific urethritis

At total of 897 cases of non-specific urethritis were reported in 2014 compared with 1,272 in 2012.

More detailed annual reports on STIs are available on the HPSC website at <http://www.hpsc.ie/A-Z/HIVSTIs/SexuallyTransmittedInfections/Publications/STIReports/STIAnnualReports/>. Weekly reports on STIs and HIV are available on the HPSC website at <http://www.hpsc.ie/A-Z/HIVSTIs/SexuallyTransmittedInfections/Publications/STIReports/STIWeeklyReports/>.

Data on syphilis, HIV and hepatitis B are presented elsewhere in this report.

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1. Cooney F, ÓhAiseadha C. and Downes P. LGV outbreak in Ireland. *Epi Insight* 2015; 16(2). <http://ndsc.newsweaver.ie/epiinsight/13f78gewgqd?a=1&p=48371552&t=17517774> (accessed 18th September, 2015)

Note: CIDR information is updated on an on-going basis with the most up to date information available and so numbers reflect the date of extraction from CIDR. Data for this chapter were extracted from CIDR in September, 2015.

Acknowledgements

The Health Protection Surveillance Centre (HPSC) would like to thank all those who provided data for this report, particularly the STI clinics, the infectious disease surveillance staff within the departments of public health, the laboratories, and GP clinics.

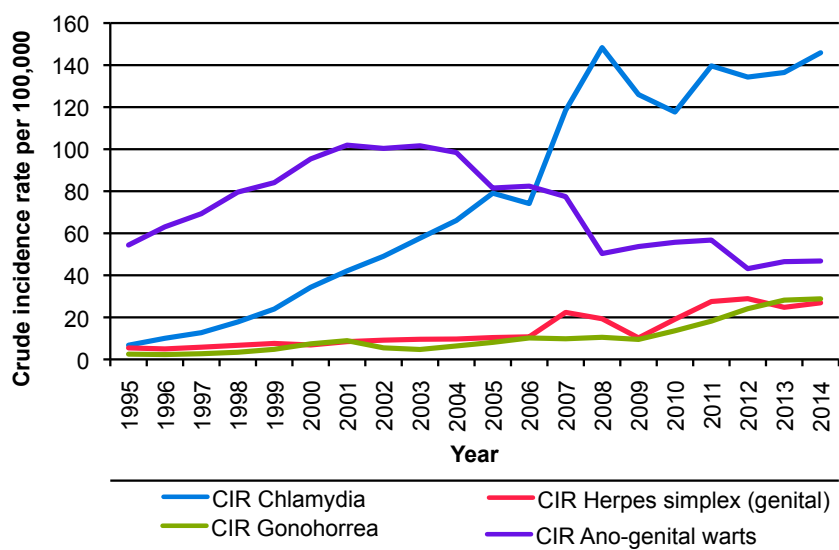


Figure 1: Trend in CIR per 100,000 population of selected STIs, 1995-2014

5.6 Syphilis, 2014

Summary

Number of early infectious syphilis cases: 205
Crude incidence rate of early infectious syphilis: 4.5/100,000 population
Number of congenital syphilis cases: 0

As of 1st January, 2014, all laboratories are asked to notify new cases of syphilis, with one of: positive serology (*T. pallidum* EIA and TPPA) **AND** either RPR **OR** *T. pallidum* EIA IgM positive; demonstration of treponemes in lesions, exudates or tissues from clinically appropriate sites by dark ground microscopy; or demonstration of treponemes in lesions, exudates or tissues from clinically appropriate sites by PCR. Re-infections, as defined by the laboratory's own criteria, are also notifiable.

During 2014, 279 cases of syphilis were notified which met the criteria for laboratory diagnosis of early syphilis. Of these, 205 (73%), where enhanced information was provided by clinicians, were reported as early infectious syphilis. Stage of infection was reported as unknown or enhanced surveillance forms were not received for the

remaining 74 cases. No congenital syphilis cases were notified in 2014.

This analysis focuses on cases fitting the laboratory criteria and clinical criteria (n=205) and so the number of early cases in this report is likely to be an underestimate of the true number of early infectious syphilis cases.

The crude incidence rate for early infectious syphilis in 2014 was of 4.5 per 100,000 population, an increase of 13% compared to 2013 (4.0 per 100,000). Figure 1 shows the trend in crude incidence rate (CIR) for early syphilis cases from 2000 to 2014.

Of the 205 early infectious syphilis cases notified in 2014:

- 126 (61%) were primary, 39 (19%) secondary and 40 (20%) early latent; two cases classified as secondary syphilis were reported as neurosyphilis.
- Rates varied throughout the country, with the age-standardised incidence rate (9.0 per 100,000) in HSE East (Dublin, Kildare and Wicklow) twice the national rate (4.5 per 100,000) (figure 2).
- The majority of cases occurred in males (n=192; 94%), with a male to female ratio of 15:1.

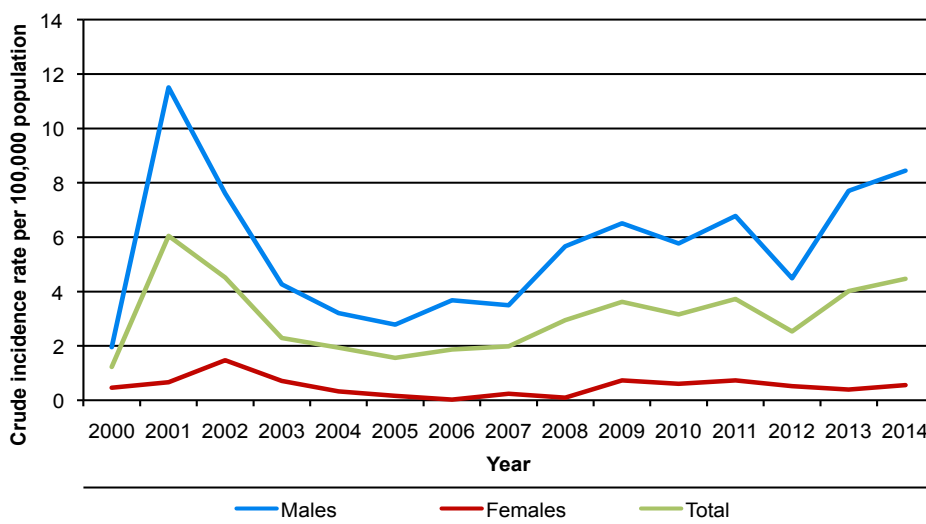


Figure 1: Crude incidence rate of early infectious syphilis (per 100,000 population), 2000-2014

- The crude incidence rates in men and women were 8.4 and 0.6 per 100,000 population respectively (figure 1).
- The majority of cases (84%) were reported in people over 25 years of age.
- Almost three quarters of cases (73%) were identified in STI clinics, with 18% being diagnosed in general practice.
- More than two thirds (69%) of all cases occurred in men who have sex with men (MSM) (table 1), with rates highest in the 25 to 29 year age group. In MSM, a significant proportion (29%) was co-infected with HIV at the time of syphilis diagnosis, a small reduction compared to 2013 when 33% were co-infected.
- Seventeen percent of cases were among heterosexuals. Eleven percent of heterosexuals were co-infected with HIV.
- Three of the 13 female cases were pregnant at time of diagnosis.
- A quarter of early cases were also diagnosed with an STI other than HIV during 2014. Since full patient identifiers were not provided for all cases, the true figure for STI co-infections is likely to be much higher.

Discussion

For the first time in 2014 only cases of early infectious syphilis were notifiable with the aim of improving completeness of information and data quality. An improvement was seen in that a higher proportion of enhanced forms were received (73% vs. 60% in 2013); this is very welcome. However, the true number of early infectious syphilis cases may be higher than that reported here, as only cases with both laboratory and clinical data indicating infectious syphilis, were included in the analysis.

In 2014, the crude incidence rate of early syphilis increased to 4.5 per 100,000, the highest rate since the syphilis outbreak among MSM in Dublin in 2001 (6.1/100,000). The increase in early syphilis in 2014 was concentrated among men (94% of cases). The rate among men increased to 8.4 per 100,000 compared to 4.5/100,000 and 7.7/100,000 in 2012 and 2013, respectively. The rate among women increased slightly in 2014 with a rate of 0.6 per 100,000 compared to 0.5/100,000 and 0.4/100,000 in 2012 and 2013, respectively. As in previous years, these data demonstrate that MSM are disproportionately affected by early infectious syphilis (80% of cases where mode of transmission was known). This mirrors the pattern seen in England¹ and Scotland².

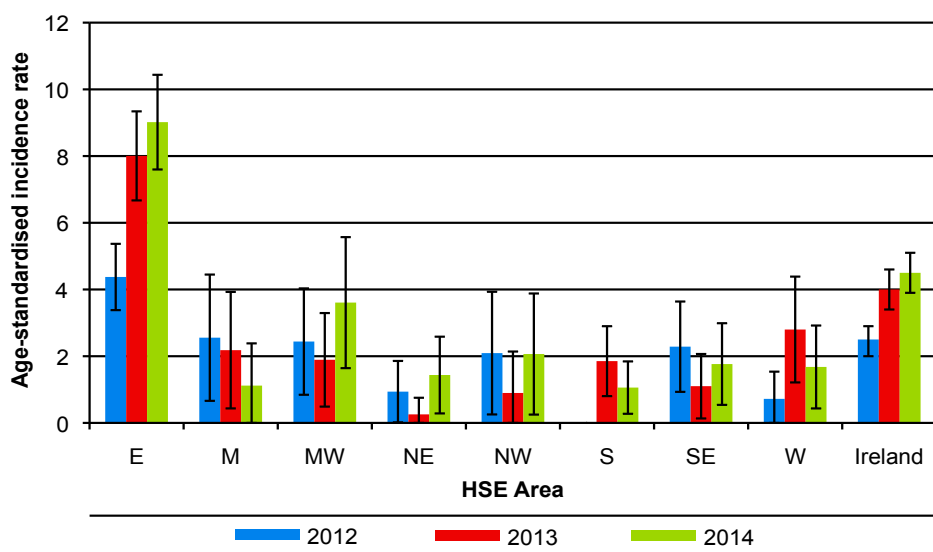


Figure 2: Age-standardised incidence rate of early infectious syphilis by HSE area, 2012-2014

Table 1: Summary of early infectious syphilis cases, 2012, 2013 and 2014

	2012		2013		2014	
	n	%	n	%	n	%
Total number of early cases	115		184		205	
Male	101	87.8	175	95.1	192	93.6
Men who have sex with men (MSM)	81	70.4	118	64.1	141	68.8
Heterosexuals	24	20.9	22	12.0	35	17.1
Unknown mode of transmission	10	8.7	44	23.9	29	14.1
Median age (years)	34		33		32	
Age range (years)	19-68		19-73		19-70	

The proportion of early syphilis cases co-infected with HIV in 2014 dropped back to 24% in 2014, the same proportion as 2012, having increased to 29% in 2013. The proportion of HIV co-infection continues to be higher among MSM (29%) compared to heterosexuals (11%). Those co-infected with HIV in 2014 were younger than in previous years; the median age of HIV positive cases was 38 years in 2012, 36 years in 2013 and 34 years in 2014. The proportion of cases co-infected with HIV remains a concern as co-infection increases the risk of acquiring and transmitting HIV³.

A more detailed analysis of syphilis in Ireland in 2014 is available in the report Syphilis in Ireland, 2014, which is available on the HPSC website www.hpsc.ie.

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2. Potts A., Wallace L.A., Nicholson D., Goldberg D.J. Syphilis in Scotland 2014: update. Health Protection Weekly Report 2015:49(24).
3. Panel on Opportunistic Infections in HIV-Infected Adults and Adolescents. Guidelines for the prevention & treatment of opportunistic infections in HIV-infected adults and adolescents: recommendations from the Centres for Disease Control and prevention, the National Institutes of Health and the HIV Medicine Association of the Infectious Diseases Society of America. Available at http://aidsinfo.nih.gov/contentfiles/lvguidelines/adult_oi.pdf.

Note: CIDR information is updated on an on-going basis with the most up-to-date information available and so numbers reflect the date of extraction from CIDR. Data for this chapter were extracted on 30th September, 2015.

Acknowledgements

The Health Protection Surveillance Centre (HPSC) would like to thank all those who provided data for this report, particularly the STI clinics, and the infectious disease surveillance staff within the departments of public health, the laboratories and GPs.

20
14

ANNUAL
EPIDEMIOLOGICAL
REPORT



06

OTHER INFECTIONS

6.1 Viral Encephalitis

Summary

Number of cases, 2014: 68
 Number of cases, 2013: 6
 Number of cases, 2012: 18
 Crude incidence rate, 2014: 1.5/100,000

Encephalitis due to viruses not otherwise specified (NOS) are notifiable under the disease category 'viral encephalitis'. Details of viral encephalitis cases caused by other notifiable diseases, if any, are presented in other chapters in this report.

In 2014, 68 cases of viral encephalitis (NOS) were notified in Ireland (1.5/100,000 population) compared to six (0.1/100,000) in the previous year (figure 1). One contributing factor for the sharp increase in numbers can be attributable to the late notification of 15 cases from 2013 (based on their specimen dates) reported during weeks 4 to 7 in 2014. Another reason can be attributable to the 33 reported cases of varicella zoster virus in 2014 compared to none in the previous year;

improved notification and investigation (with laboratory confirmation) may be the reason for this.

The number of viral encephalitis (NOS) cases among males (n=35) and females (n=33) was similar. The median age of cases was 48 years (range two weeks to 91 years); 26 (42%) cases occurred in those aged 65 or more years. Most infant VE was caused by HSV and most VE in elderly (> 65 years) was associated with VZV and HSV (14 and 12 cases respectively) (figure 1, table 1).

Of the 68 cases, all were laboratory tested positive and case classified as confirmed. All but one had a causative pathogen identified: varicella virus & varicella zoster virus (n=33; 48.5%), herpes simplex virus (n=30; 44.1%), human herpes virus type 6 (HHV 6) (n=2; 2.9%), and one each of parechovirus, enterovirus and not specified (n=1; 1.8%) (figure 2).

Caution is advised regarding the detection of HHV 6 DNA in cerebral spinal fluid (CSF) specimens, especially in those cases aged less than 3 months as HHV 6 DNA can be chromosomally integrated as it may not be clinically relevant. Both cases of HHV 6-related

Table 1. Number, age-specific incidence rates and proportion of viral encephalitis (NOS) cases by age group, Ireland, 2014*
 * includes the late notification of 15 cases in 2013 reported in early 2014

Age Group	Causative pathogen						Total	ASIR	% Proportion
	herpes simplex virus	varicella virus & varicella zoster virus	human herpes virus type 6	enterovirus	parechovirus	not specified			
<1	4	0	0	0	1	0	5	6.91	7.4
1-4	4	1	1	0	0	0	6	2.11	8.8
5-14	1	1	0	0	0	0	2	0.32	2.9
15-24	1	6	0	0	0	1	8	1.38	11.8
25-44	4	7	0	1	0	0	12	1.17	17.6
45-64	4	4	1	0	0	0	9	0.86	13.2
65+	12	14	0	0	0	0	26	4.86	38.2
All ages	30	33	2	1	1	1	68	1.48	100
% total cases	44.1	48.5	2.9	1.5	1.5	1.5	100		

ASIR, age specific incidence rate per 100,000 population of total cases

encephalitis in 2014 occurred in patients greater than three months of age.

There were no reported deaths associated with viral encephalitis (NOS) in 2014. There was one imported case (caused by herpes simplex virus type 1); it is not clear if the patient was a visitor to Ireland or if the patient was an Irish resident returning from abroad.

The figures presented in this report are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 13th August, 2015. These figures may differ from those published previously due to on-going updating of notification data in CIDR.

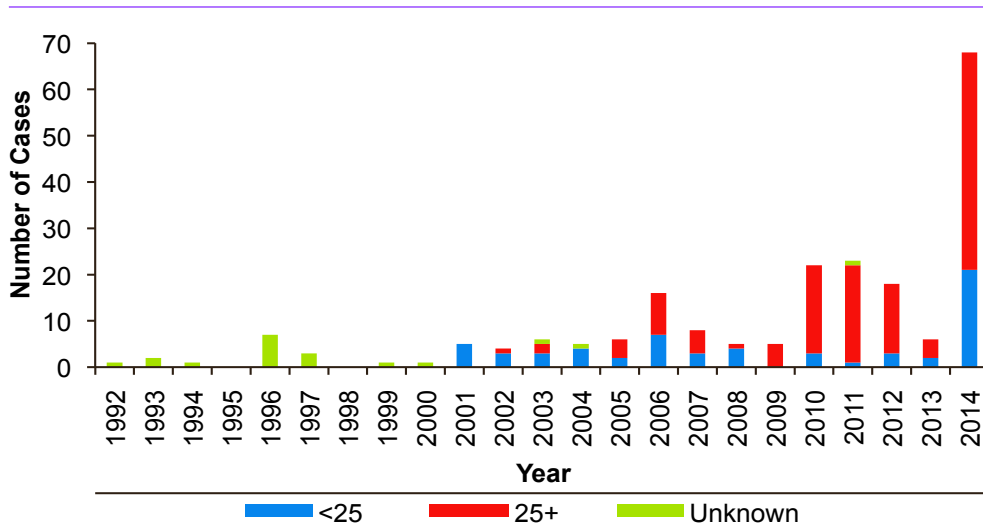


Figure 1. Number of viral encephalitis (NOS) cases by age group and year, Ireland, 1992-2014*

* includes the late notification of 15 cases in 2013 reported in early 2014

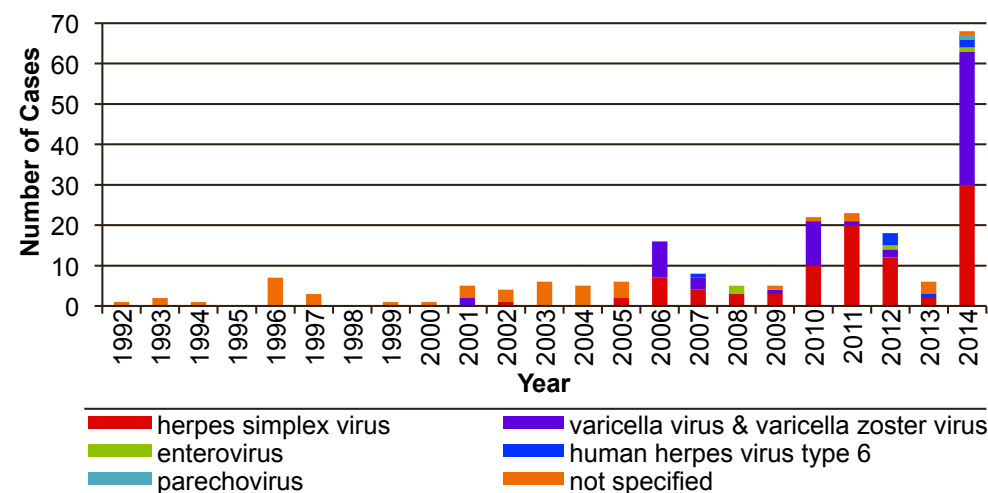


Figure 2. Number of viral encephalitis (NOS) cases by causative pathogen and year, Ireland, 1992-2014*

* includes the late notification of 15 cases in 2013 reported in early 2014

6.2 Viral Meningitis

Summary

Number of cases, 2014: 435
 Number of cases, 2013: 281
 Number of cases, 2012: 235
 Crude incidence rate, 2014: 9.5/100,000

Meningitis due to viruses not otherwise specified (NOS) are notifiable under the disease category 'viral meningitis'. Details of viral meningitis caused by other specified notifiable diseases (such as mumps and influenza viruses, if any) are presented in other chapters in this report.

The sharp, steady increase in annual notifications, which started back in 2007 continued in 2014 when 435 were reported. The latter number is considerably higher than the 300 cases notified back in 1990, the highest previous ever recorded in a single year (figure 1). It should be noted that the total number of cases reported in 2014 includes the late notification of seven cases from 2013 (based on their specimen dates) reported during weeks 5 and 6 of 2014.

Since 1997, eight deaths have been reported with cases of viral meningitis (NOS), one of which was attributable to the infection itself. There were one reported in 2014, but the infection did not cause death.

Of the 435 cases notified in 2014, 428 were classified as confirmed (98.4%) and seven as probable (1.6%). There were slightly more cases among males (n=223) than in females (n=205), giving a male to female ratio of 1.09:1.0. Seven cases were reported with unknown gender details in 2014.

The national crude incidence rate in 2014 was 9.5 (95% CI 8.6–10.4) cases per 100,000 population, a 54.8% increase compared with the previous year when 281 cases were notified (6.1/100,000). The highest age specific incidence rate (ASIR) in 2014 was in infants <1 year of age (256.9/100,000; n=186), followed by the 15-19 year age group (13.8/100,000; n=39). The lowest ASIR was in the 55-64 year age group (ASIR 0.2/100,000 (n=1)) (table 1).

In 2014 the highest frequency of cases was in children aged 1 to 2 months (n=121) and in those aged between 15 to 39 years (n=184) with an overall median age of 11 years (range 6 days to 86 years) (figure 2). Sixty-eight percent of cases (n=296) occurred in those under 25 years of age (figure 3, table 1).

By HSE region, the highest rate was in HSE E at 13.5/100,000 (95%CI 11.7–15.2) and lowest in HSE MW at 4.2/100,000 (95%CI 2.2-6.3), with both rates significantly different from the national rate (figure 4).

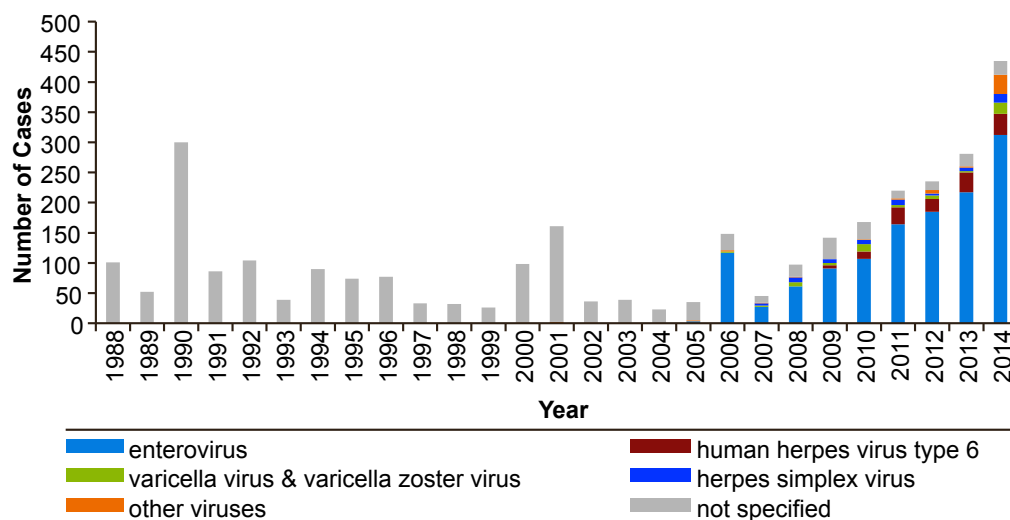


Figure 1. Number of viral meningitis (NOS) cases by organism type and year, Ireland, 1988-2014*
 * includes the late notification of seven cases in 2013 reported in early 2014

In 2014, enteroviruses were the most common pathogen associated with viral meningitis, accounting for 71.7% (n=312/435) of all notifications (figure 3, table 1) and account for the marked increase in notifications in 2014 when compared to previous years. As a cause of viral meningitis, enteroviruses have accounted for 60% or more of all cases each year since 2006. Enteroviruses are not routinely specified on CIDR, so it is not possible to attribute which type of enterovirus, of which there are many, accounts for the majority of reported viral meningitis cases in recent years. It is hoped that an enterovirus typing service, currently in development in the NVRL, will in future years be able to routinely ascertain which type is circulating in the population.

In 2014, human herpes virus (type 6) (HHV 6) was the causative pathogen for 8.0% (n=35) notifications, parechovirus for 7.4% (n=32), varicella virus/varicella zoster virus for 4.4% (n=19) and herpes simplex virus (HSV) accounting for 3.2% (n=14) of all cases (figure

3, table 1). There were 5.3% (n=23) cases with no viral pathogen specified. Caution is recommended regarding the detection of HHV 6 DNA in cerebral spinal fluid (CSF) specimens, especially in those cases aged less than 3 months (n=17/35; 48.6%) as HHV 6 DNA can be chromosomally integrated. When this occurs the HHV 6 DNA can be inherited through the germ line and therefore when it is detected, it may not be clinically relevant.

Enterovirus was also the most common pathogen in infants under one year of age with viral meningitis (NOS) in 2014 in 111 out of total of 186 cases in that age group (59.7%). Between 2007 and 2014 enteroviruses accounted for 71.7% (n=1164/1623) of all viral meningitis (NOS) cases, with typical summer peaks observed each year (figure 5). The large number of enterovirus-related viral meningitis cases observed in recent years is likely due in part to improved notification and investigation with laboratory confirmation.

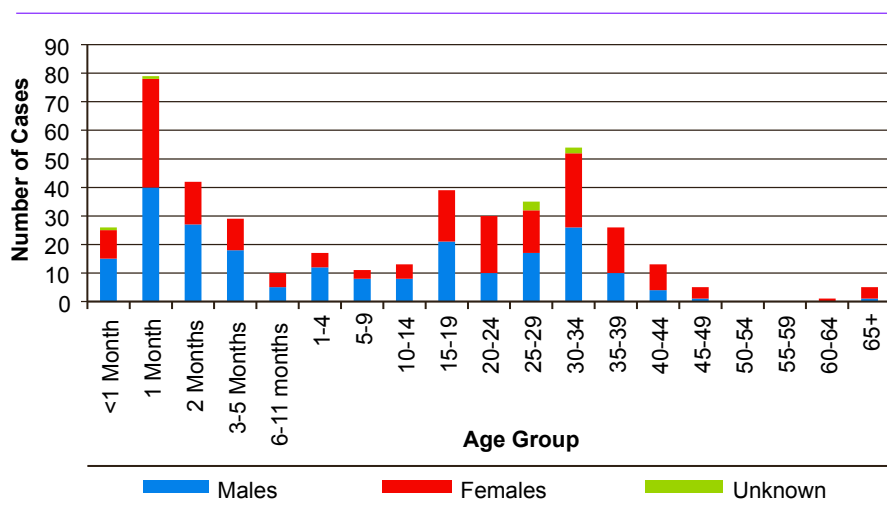


Figure 2. Number of viral meningitis (NOS) cases by age group and gender, Ireland, 2014*

* includes the late notification of seven cases in 2013 reported in early 2014

Table 1. Number, age-specific incidence rates and proportion of viral meningitis (NOS) notifications by age group and causative pathogen, Ireland, 2014*

* includes the late notification of seven cases in 2013 reported in early 2014

Age Group	Causative pathogen						Total	ASIR	% Proportion
	entero-virus	human herpes virus	herpes simplex virus	varicella virus & varicella zoster virus	echo-virus	not specified			
<1	111	29	2	1	32	11	186	256.9	42.8
1-4	9	5	2	0	0	1	17	6.0	3.9
5-9	11	0	0	0	0	0	11	3.4	2.5
10-14	12	0	0	1	0	0	13	4.3	3.0
15-19	33	0	1	3	0	2	39	13.8	9.0
20-24	23	0	0	3	0	4	30	10.1	6.9
25-34	79	1	2	4	0	3	89	11.8	20.5
35-44	32	0	2	4	0	1	39	5.6	9.0
45-54	2	0	2	1	0	0	5	0.9	1.1
55-64	0	0	1	0	0	0	1	0.2	0.2
65+	0	0	2	2	0	1	5	0.9	1.1
All Ages	312	35	14	19	32	23	435	9.5	100
% Total	71.7	8.0	3.2	4.4	7.4	5.3	100.0		

ASIR, age specific incidence rate per 100,000 population of total cases

The figures presented in this report are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 13th August, 2015. These figures may differ from those published previously due to on-going updating of notification data in CIDR.

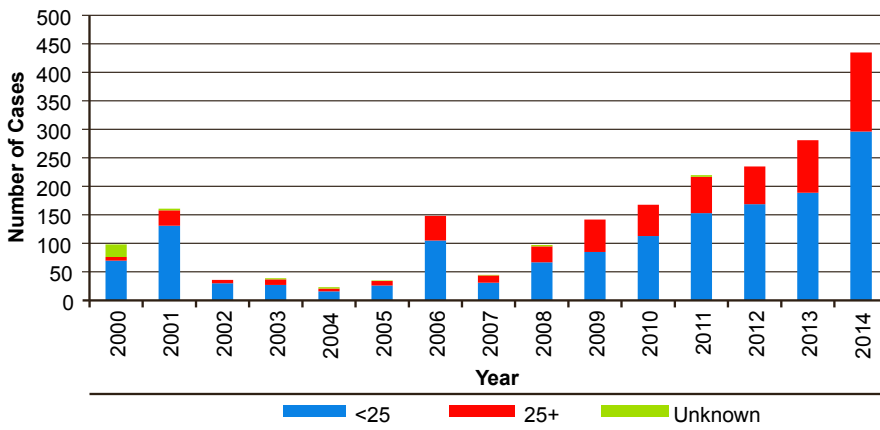


Figure 3. Number of viral meningitis (NOS) cases by age group (<25, >25 years of age) and year, Ireland, 2000-2014*
* includes the late notification of seven cases in 2013 reported in early 2014

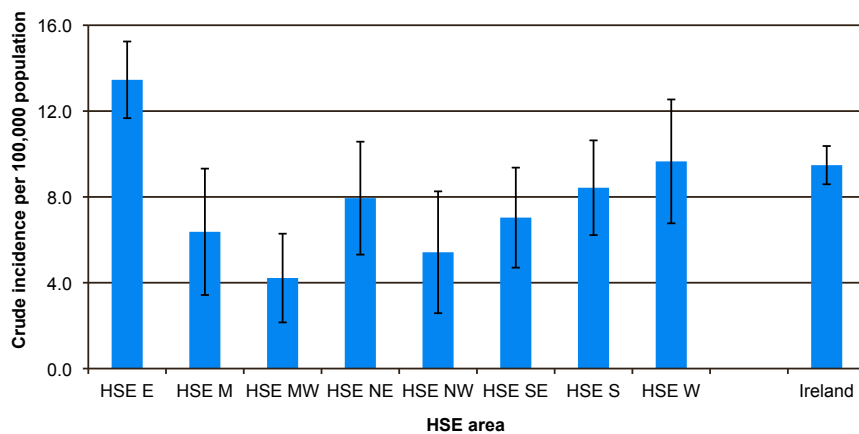


Figure 4. Crude incidence rates per 100,000 population with 95% confidence intervals for viral meningitis (NOS) cases by HSE area, Ireland, 2014*
* includes the late notification of seven cases in 2013 reported in early 2014

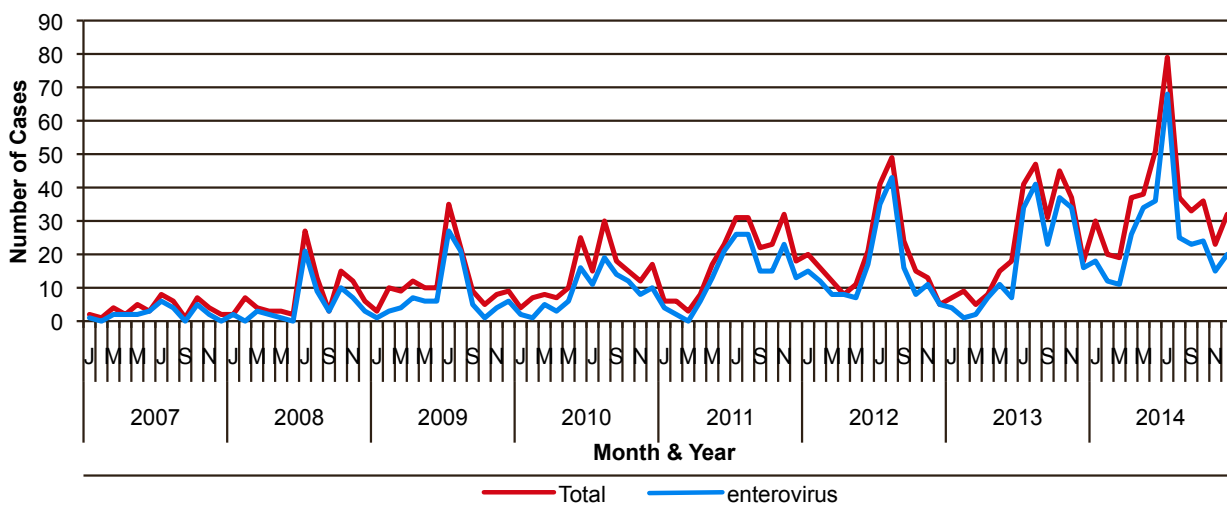


Figure 5. Monthly number of viral meningitis, NOS and enterovirus-related meningitis notifications, 2007-2014*
* includes the late notification of seven cases in 2013 reported in early 2014

6.3 Creutzfeldt-Jakob disease

Summary

Number of cases, 2014: 2
Number of cases, 2013: 5

Two cases of Creutzfeldt-Jakob disease (CJD) were notified in 2014 compared to 2013 when five cases were notified. Both cases in 2014 were sporadic CJD cases. One of the cases was in the age group 55-64 years and one was in the age group ≥ 65 years. Both cases were female.

In total, 70 cases of CJD were notified since CJD was first specified as a notifiable disease in December 1996 (figure 1). Figure 2 shows the 70 CJD notifications by age group. The majority (80%, $n=56$) of the cases were aged greater than 54 years. Of the 70 cases, 35 were male and 35 were female. Sixty-six cases were sporadic CJD, two were familial CJD and two were iatrogenic.

Variant CJD (vCJD) is specified as a separate notifiable disease. No cases have been notified since 2006. In total, four cases of vCJD were notified since vCJD became notifiable in December 1996. A summary of these four cases was provided in the 2006 HPSC annual report.

Data presented in this summary are based on notifications from HSE Areas and from the Irish National Creutzfeldt-Jakob Disease Surveillance Unit. Annual figures published here are based on the year the notification was entered on the Computerised Infectious Disease Reporting (CIDR) system and consequently may differ from annual figures published by the Irish National Creutzfeldt-Jakob Disease Surveillance Unit.

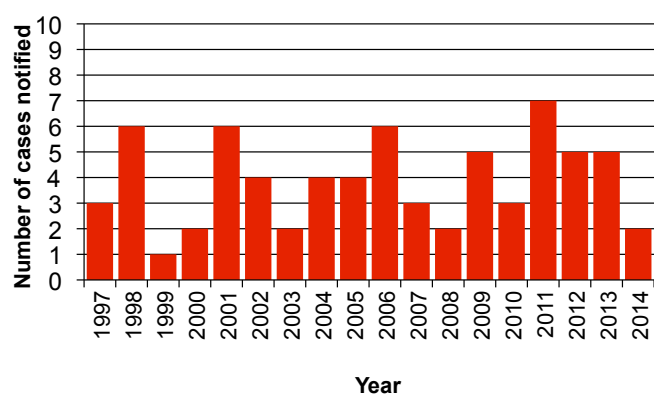


Figure 1. Number of CJD notifications by year from December 1996 to 2014

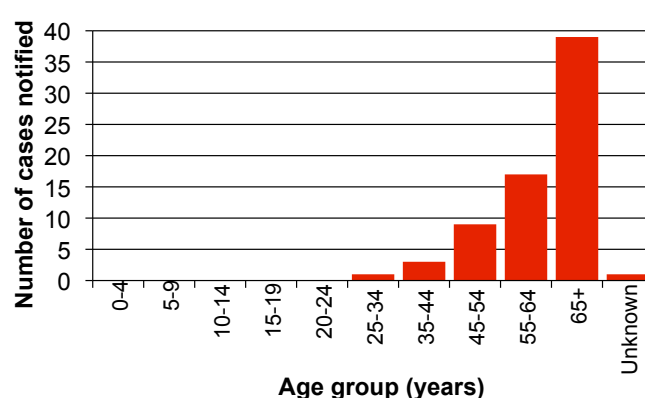


Figure 2. Number of CJD notifications ($n=70$) from December 1996 to 2014 by age group

20
14

ANNUAL
EPIDEMIOLOGICAL
REPORT



07

INFECTIOUS DISEASE OUTBREAKS

7. Outbreaks

Summary

Number of outbreaks: 435
 Number of IID outbreaks: 294
 Number of non-IID outbreaks: 141

During 2014, 435 outbreaks of infectious diseases were reported with 4,529 associated cases of illness, including 422 (9.3%) cases hospitalised and 40 deaths.* Regional variation in outbreaks was observed between HSE areas with the highest rates observed in HSE-NW (17.8/100,000 population) while the lowest rate was observed in HSE-NE at 5.2 per 100,000 population. Table 1 details the regional distribution of all outbreaks by HSE area and outbreak disease.

The number of outbreaks peaked between January and March. The January peak observed was mainly due to high numbers of norovirus and AIG outbreaks while the March peak was mostly due to influenza and acute respiratory infection outbreaks. Figure 1 illustrates the number of IID and non-IID outbreaks by month of notification during 2014.

Similar to previous years, airborne/ person-to-person spread was reported as the mode of transmission for the majority of outbreaks (75.6%, n=329). Table 2 details all outbreaks by infectious disease and probable mode of transmission.

The most frequently reported outbreak locations were private houses (n=115, 26.4%), nursing homes (n=90, 20.7%) and community hospital/ long-stay units (n=57, 13.1%). The highest numbers ill were reported from outbreaks in nursing homes (n=1,452), community hospital/long-stay units (n=662) and hospitals (n=604).

General outbreaks accounted for 71.0% (n= 309) of all outbreaks notified during 2014. The remaining outbreaks (29.0%, n= 126) were reported as family/ household outbreaks.

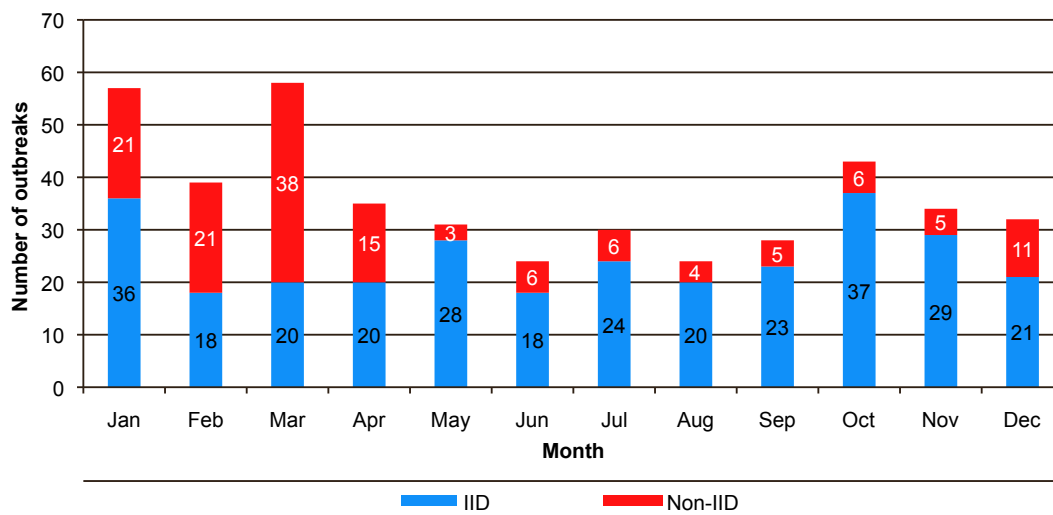


Figure 1: Number of IID and non-IID outbreaks by month of notification, 2014

Outbreak data extracted from CIDR on 24/07/2015.

Table 1 Number of IID and non-IID outbreaks by disease and HSE area, 2014

IID/ Non-IID	Outbreak Disease	HSE-E	HSE-M	HSE-MW	HSE-NE	HSE-NW	HSE-SE	HSE-S	HSE-W	Total
IID	Acute infectious gastroenteritis	23	2	1	2	14	12	12	10	76
	<i>Campylobacter</i> infection	2	1			1		2	4	10
	<i>C. difficile</i> infection	6		1				2	1	10
	Cryptosporidiosis	1	4			3	2	6	2	18
	Giardiasis		1						2	3
	Hepatitis A (acute)							1		1
	Noroviral infection	17	14	7	3	10	13	7	4	75
	Rotavirus infection	1					2		1	4
	Salmonellosis	2		2		1		1	2	8
	Shigellosis	1			1				2	4
	Typhoid	1								1
	Verotoxigenic <i>E. coli</i> infection	4	19	8	5	4	11	18	14	83
	Viral meningitis							1		1
IID Total		58	41	19	11	33	40	50	42	294
Non-IID	Acute respiratory infection	3	1		1	2	1	5	4	17
	Dengue fever	1								1
	<i>E. coli</i> (ESBL)				1					1
	Enterococci (Carbapenam resistant)			1						1
	<i>H. influenzae</i> disease (invasive)				1					1
	Hand foot and mouth (suspected)						1			1
	Hepatitis B	1								1
	Human metapneumovirus	1						1		2
	Impetigo (suspected)	1								1
	Influenza	24	2	4	7	8	7	9	4	65
	<i>K. pneumoniae</i> (MDR)			1						1
	Lymphogranuloma venereum	1								1
	Measles	2							1	3
	Meningococcal disease				1					1
	Mumps	6		3		3	3	3	5	23
	Pertussis			1					2	3
	<i>Pseudomonas</i>	1							1	2
	Respiratory syncytial virus infection	3						1		4
	Scabies (suspected)	1					1			2
	<i>S. aureus</i> (drug resistant							2		2
Tuberculosis	1			1			3		5	
Varicella-zoster/ suspected varicella zoster	1	1							2	
Viral illness							1		1	
Non-IID Total		48	4	10	12	13	13	24	17	141
Total		106	45	29	23	46	53	74	59	435

Table 2: Number of IID and non-IID outbreaks by disease and probable route of transmission, 2014

IID/ Non-IID	Outbreak disease	Airborne/ P-P	Animal contact	Food- borne	Water- borne	Other	Unk	Total
IID	Acute infectious gastroenteritis	61		6	1		8	76
	<i>Campylobacter</i> infection	4		1			5	10
	<i>C. difficile</i> infection	7					3	10
	Cryptosporidiosis	6	7		1		4	18
	Giardiasis	2	1					3
	Hepatitis A (acute)						1	1
	Noroviral infection	69			1		5	75
	Rotavirus infection	4						4
	Salmonellosis	4		2			2	8
	Shigellosis	2					2	4
	Typhoid				1			1
	Verotoxigenic <i>E. coli</i> infection	40	6	1	9	3	24	83
	Viral meningitis						1	1
IID total		199	14	10	13	3	55	294
Non-IID	Acute respiratory infection	16					1	17
	Dengue fever					1		1
	<i>E. coli</i> (ESBL)	1						1
	Enterococci (Carbapenam resistant)					1		1
	<i>H. influenzae</i> disease (invasive)					1		1
	Hand foot and mouth (suspected)	1						1
	Hepatitis B	1						1
	Human metapneumovirus	2						2
	Impetigo (suspected)	1						1
	Influenza	65						65
	<i>K.pneumoniae</i> (MDR)	1						1
	Lymphogranuloma venereum	1						1
	Measles	3						3
	Meningococcal disease	1						1
	Mumps	20					3	23
	Pertussis	3						3
	<i>Pseudomonas</i>						1	1
	Respiratory syncytial virus infection	4						4
	<i>S. aureus</i> (drug resistant)						2	2
	Scabies (suspected)	2						2
Tuberculosis	5						5	
Varicella-zoster/ suspected varicella zoster	2						2	
Viral illness	1						1	
Non-IID total		130				4	7	141
Total		329	14	10	13	7	62	435

Infectious intestinal disease (IID) outbreaks:

During 2014, 294 IID outbreaks were reported, accounting for 67.6% of all outbreaks. This was a decrease of 21.0% compared to the number of reported during 2013 (n=520) and lower than the mean proportion of IID outbreaks in the previous 3 years (74.7%). After VTEC (n=83 outbreaks with 200 ill), the next most commonly reported IID outbreaks were AIG (n=76 outbreaks with 792 ill) and norovirus (n=75 outbreaks with 1,230 ill).

Non-infectious intestinal disease (Non-IID) outbreaks:

During 2014, 141 non-IID outbreaks were reported, accounting for 32.4% of all outbreaks. This remains stable compared to the number reported during 2014 (n=148) but was higher than the mean proportion of IID outbreaks in the previous three years (25.3%). After influenza (n=65 outbreaks with 1,209 ill), the next most commonly reported non-IID outbreaks were mumps (n=23 outbreaks with 395 ill) and acute respiratory infection (n=17 outbreaks with 147 ill).

20
14

ANNUAL
EPIDEMIOLOGICAL
REPORT



08

IMMUNISATION UPTAKE

8.1 Immunisation uptake at 12 and 24 months of age

Summary

Among children at 12 months of age in 2014 uptake of:
D₃, T₃, P₃, Hib₃, Polio₃, HepB₃, MenC₂ and PCV₂ was 92%

Among children at 24 months of age in 2014 uptake of:
D₃, T₃, P₃, Hib₃, Polio₃ and HepB₃ reached or exceeded the target of 95%
D₃, T₃, P₃, Hib₃ and Polio₃ was 96%
HepB₃ was 95%
MMR₁ was 93%
PCV₃ and Hib_b was 92%
MenC₃ was 88%

Introduction

In 2014, the HSE Areas provided HPSC with quarterly immunisation uptake data for their Area and for each of the Local Health Offices (LHOs) in their Area. HPSC collated these data and quarterly reports were produced which are available on the HPSC website. The annual immunisation uptake rates presented

here represent the collation of the 2014 quarterly data. The proportion of children who completed the recommended primary childhood immunisation schedule by 12 months (born between 01/01/2013 and 31/12/2013) and 24 months (born between 01/01/2012 and 31/12/2012) of age in 2014 are reported.

Children who were 12 and 24 months of age in 2014 were recommended one dose of vaccine against tuberculosis (BCG vaccine) at birth or by one month of age; three doses of vaccines against diphtheria (D₃), tetanus (T₃), pertussis (P₃), *Haemophilus influenzae* type b (Hib₃), polio (Polio₃) and Hepatitis B (HepB₃) with one dose of each recommended at two, four and six months of age; three doses of pneumococcal conjugate vaccine (PCV₃) recommended at two, six and 12 months of age and three doses of meningococcal group C (MenC₃) vaccine recommended at four, six and 13 months of age (table 1). Also at 12 months of age a dose of MMR (MMR₁) was recommended and at 13 months a dose of Hib (Hib_b) was recommended (table 1). A new primary childhood immunisation schedule was introduced in 2015 for babies born on or after July 1st 2015. Further vaccinations are recommended for older children and

Table 1. Primary childhood immunisation schedule for children born between 01/07/2008 and 30/06/2015

Age	Vaccines
Birth	BCG
2 months	DTaP/Hib/IPV/HepB (6 in 1) + PCV
4 months	DTaP/Hib/IPV/HepB (6 in 1) + MenC
6 months	DTaP/Hib/IPV/HepB (6 in 1) + PCV + MenC
12 months	MMR + PCV
13 months	MenC + Hib

Please note the primary immunisation schedule changed in 2015 for children born on or after 01/07/2015. Please see the HSE-National Immunisation Office website at <http://www.hse.ie/eng/health/immunisation/> for current and detailed information on the Irish primary childhood immunisation schedule and also recommended vaccinations for older children and adults

BCG	Bacille Calmette Guerin vaccine
DTaP	Diphtheria, Tetanus and acellular Pertussis vaccine
HepB	Hepatitis B vaccine
Hib	<i>Haemophilus influenzae</i> type b vaccine
IPV	Inactivated Polio Virus vaccine
MenC	Meningococcal group C vaccine
MMR	Measles, Mumps and Rubella vaccine
PCV	Pneumococcal Conjugate Vaccine

adults. Please see the HSE-National Immunisation Office website at <http://www.hse.ie/eng/health/immunisation/> for current and detailed information on the Irish primary childhood immunisation schedule and also recommended vaccinations for older children and adults

In children at 12 months of age in 2014 (born between 01/01/2013 and 31/12/2013) uptake of BCG, D₃, T₃, P₃, Hib₃, Polio₃, HepB₃ and two doses of PCV (PCV₂) and MenC (MenC₂) were measured. In children at 24 months of age in 2014 (born between 01/01/2012 and 31/12/2012) uptake of D₃, T₃, P₃, Hib₃, Polio₃, HepB₃, MenC₃, PCV₃, MMR₁, Hib_b, one dose of vaccine against meningococcal group C (MenC_b) on or after twelve months of age and one dose of vaccine against pneumococcal conjugate vaccine (PCV_b) on or after twelve months of age were measured.

The immunisation uptake rates are reported here by HSE Area and LHO. The uptake rates presented here were rounded to zero decimal place. While there are 32 LHOs the immunisation uptake rates for the LHOs of North Lee and South Lee are reported as a combined figure.

Caveats to data

BCG uptake data at 12 months of age has been incomplete since reporting to HPSC began in Quarter 3 2003. This has occurred due to differences in implementation of a neonatal BCG programme across the HSE Areas as well as difficulties in providing these data to the HPSC where the programme was implemented. Prior to the establishment of the HSE each former health board determined their own BCG vaccination policy and some health boards (Western and parts of the Southern Health Board) stopped routine neonatal BCG vaccination but provided BCG vaccination for adolescents or high risk groups. The neonatal programme has now been routinely implemented for all neonates in most, but not all, HSE Areas. Additionally more complete data on neonatal BCG vaccination is now available. However, in the HSE NE, where a neonatal programme is implemented, data is not currently available for reporting. In the HSE W the neonatal programme is not routinely or comprehensively implemented in all LHOs. Therefore, data provided for the HSE W reflects BCG vaccination data for just a small proportion of all babies born in this Area. Galway and Roscommon BCG LHO data became available for reporting for the first time in Quarter 4 2014. Mayo LHO BCG data was not available for reporting purposes prior to 2015. The numbers vaccinated with BCG in Mayo were not included in the HSE W BCG figures prior to 2015. National data for 2014 are presented in this report and compared to 2013 data. The available national BCG cohort data may be around 89% of the national birth cohort in 2014 and 90% in 2013 (these figures are estimates only).

As uptake of MenC₃ was low since Q3 2010 and as those over 12 months of age need only one dose of MenC and those aged 12-23 months need only one dose of PCV, data on MenC_b (one dose of MenC on or after first birthday and before second birthday) and PCV_b (one dose of PCV on or after first birthday and before second birthday) were requested in 2012 for the first time. Six HSE Areas (HSE E, M, MW, NW, SE and S) were able to provide data representing approximately 81% of the national birth cohort in 2014 and 80% in 2013 (these figures are estimates only).

Immunisation uptake rates at 12 months

Ninety-two per cent of children, at 12 months of age in 2014, received D₃, T₃, P₃, Hib₃, Polio₃, HepB₃, MenC₂ and PCV₂ (table 2). Compared with 2013, the uptake rates for these vaccines increased by one per cent.

The available 2014 BCG cohort data may be around 89% (estimate only) of the national birth cohort; based on these data BCG uptake was 87% (table 2). In 2013, BCG cohort data may be around 90% (estimate only) of the national birth cohort; based on these data BCG uptake in 2013 was 86%.

Among the HSE Areas, uptake rates for D₃, T₃, P₃, Hib₃ and Polio₃ ranged from 90% to 96%, HepB₃ ranged from 91% to 96% and MenC₂ and PCV₂ ranged from 88% to 96% (table 2). The target uptake of ≥95% was reached in the HSE Midland Area for all vaccines (table 2). The target uptake of ≥95% was reached in four HSE Areas for BCG (table 2).

Among the LHOs, uptake rates for D₃, T₃, P₃, Hib₃, Polio₃ and HepB₃ ranged from 88% to 97% and MenC₂ and PCV₂ ranged from 84% to 97% (table 2). The target uptake of ≥95% was reached in Laois/Offaly, Longford/Westmeath and Roscommon for D₃, T₃, P₃, Hib₃, Polio₃, HepB₃, MenC₂ and PCV₂ and in Cavan/Monaghan for MenC₂ and PCV₂ with the highest uptake (97%) of these vaccines in Roscommon (table 2). The target uptake of ≥95% was reached for BCG in 12 LHOs reporting data (table 2).

Immunisation uptake rates at 24 months

National annual immunisation uptake rates, in children at 24 months of age in 2014, were 96% for D₃, T₃, P₃, Hib₃ and Polio₃, 95% for HepB₃, 93% for MMR₁, 92% for Hib_b and PCV₃ and 88% for MenC₃ (table 3). This is the fourth year national annual uptake rates reached the target of ≥95% for D₃, T₃, P₃, Hib₃, Polio₃ and HepB₃. Compared with 2013, the uptake rates for Hib_b increased by two percent, Hib₃, MenC₃ and PCV₃ increased by one percent while D₃, T₃, P₃, Polio₃, HepB₃ and MMR₁ were unchanged (figure 1).

Six of the eight HSE Areas were able to provide uptake

Table 2. Immunisation uptake (%) at 12 months of age in 2014 (i.e. cohort born 01/01/2013-31/12/2013) by LHO and HSE Area

HSE Area	Local Health Office/ HSE Area	Number in cohort for BCG *	Number in cohort for D ₃ , T ₃ & P ₃ †	Immunisation Uptake (%)					
				BCG	D ₃	Hib ₃	HepB ₃	MenC ₂	PCV ₂
HSE E	Dublin South	1710	1710	89	92	92	92	91	92
	Dublin South East	1701	1701	88	93	93	93	92	92
	Dublin South City	1813	1813	93	93	93	93	93	93
	Dublin South West	2462	2462	97	93	93	93	93	93
	Dublin West	2767	2767	91	92	92	92	92	92
	Dublin North West	3773	3773	93	90	90	90	90	90
	Dublin North Central	1953	1953	91	89	89	89	89	89
	Dublin North	4181	4181	94	89	89	89	89	89
	Kildare/West Wicklow	3812	3812	96	92	92	92	92	92
	Wicklow	1775	1775	93	92	92	92	92	92
	HSE E Total	25947	25947	93	91	91	91	91	91
HSE M	Laois/Offaly	2471	2471	96	95	95	95	95	95
	Longford/Westmeath	1916	1916	95	96	96	96	96	96
	HSE M Total	4387	4387	95	96	96	96	96	96
HSE MW	Clare	1535	1552	96	93	92	92	92	92
	Limerick	1730	1850	97	92	92	92	92	92
	Tipperary NR/East Limerick	1815	1838	97	93	93	93	93	93
	HSE MW Total	5080	5240	96	92	92	92	92	93
HSE NE	Cavan/Monaghan	na	2015	na	93	93	93	95	95
	Louth	na	1939	na	90	90	90	91	91
	Meath	na	3378	na	92	92	92	93	93
	HSE NE Total	na	7332	na	92	92	92	93	93
HSE NW	Donegal	2092	2092	95	94	94	93	93	94
	Sligo/Leitrim	1368	1368	96	94	94	94	93	94
	HSE NW Total	3460	3460	95	94	94	93	93	94
HSE SE	Carlow/Kilkenny	1945	1945	96	91	91	91	91	91
	South Tipperary	1335	1335	97	94	94	94	94	94
	Waterford	1897	1897	94	92	92	92	92	92
	Wexford	2056	2056	96	94	94	94	94	94
	HSE SE Total	7233	7233	96	93	93	93	93	93
HSE S	North Cork	1451	1438	94	91	91	92	89	89
	North South Lee	5840	5778	94	91	91	91	89	88
	West Cork	740	735	91	88	88	88	84	84
	Kerry	1827	1807	92	91	91	91	87	86
	HSE S Total	9858	9758	93	90	90	91	88	88
HSE W	Galway	na	3703	na	94	94	94	94	94
	Mayo	na	1670	na	93	93	93	93	93
	Roscommon	na	908	na	97	97	97	97	97
	HSE W Total	5863*	6281	16*	94	94	94	94	94
Ireland		61828	69638	87	92	92	92	92	92

na=not available

* Galway and Roscommon BCG LHO data became available for reporting for the first time in Quarter 4 2014 and were 12% and 62%, respectively. Prior to this BCG data was available for the HSE W but was unavailable for the individual LHOs in the HSE W. Mayo LHO BCG data was not available for reporting purposes prior to 2015. The numbers vaccinated with BCG in Mayo were not included in the HSE W BCG figures prior to 2015.

†As the denominator/number in cohort varied slightly according to vaccine the D₃, T₃ and P₃ cohorts are shown here.

Since T₃, P₃ and Polio₃ uptake identical to D₃ uptake only D₃ uptake figures are presented

Please note while North Lee and South Lee are two separate Local Health Offices their combined immunisation uptake data are reported here

Table 3. Immunisation uptake (%) at 24 months of age in 2014 (i.e. cohort born 01/01/2012-31/12/2012) by LHO and HSE Area

HSE Area	Local Health Office/HSE Area	Number in cohort for D ₃ , T ₃ & P ₃ *	Immunisation Uptake (%)								
			D ₃	Hib ₃	Hib _b	HepB ₃	MenC ₃	MenC _b	PCV ₃	PCV _b	MMR ₁
HSE E	Dublin South	1782	95	95	91	95	89	91	91	92	92
	Dublin South East	1633	95	95	92	95	90	92	92	94	94
	Dublin South City	1740	95	95	89	95	86	89	90	92	92
	Dublin South West	2631	96	96	93	96	89	93	92	95	94
	Dublin West	2926	96	96	90	96	86	89	90	93	93
	Dublin North West	3924	93	93	87	93	84	87	89	90	90
	Dublin North Central	1853	93	93	88	93	85	88	88	90	90
	Dublin North	4380	94	94	90	94	88	90	91	93	93
	Kildare/West Wicklow	3949	96	96	92	96	89	91	92	94	93
	Wicklow	1985	95	95	86	95	84	86	90	91	91
HSE E Total	26803	95	95	90	95	87	90	91	93	92	
HSE M	Laois/Offaly	2552	98	98	98	98	92	95	94	96	96
	Longford/Westmeath	2063	98	98	98	98	93	95	95	97	97
	HSE M Total	4615	98	98	98	98	93	95	95	97	97
HSE MW	Clare	1743	96	96	93	96	90	93	92	94	93
	Limerick	1931	94	94	88	94	85	88	90	92	90
	Tipperary NR/East Limerick	1855	95	95	89	95	86	89	91	93	92
	HSE MW Total	5529	95	95	90	95	87	90	91	93	92
HSE NE	Cavan/Monaghan	2025	97	97	91	97	88	na	92	na	93
	Louth	1996	93	93	87	93	84	na	89	na	91
	Meath	3377	95	95	90	95	87	na	91	na	92
	HSE NE Total	7398	95	95	89	95	87	na	91	na	92
HSE NW	Donegal	2190	96	96	93	95	88	93	91	94	94
	Sligo/Leitrim	1426	97	96	92	96	86	92	90	95	95
	HSE NW Total	3616	97	96	93	96	87	92	91	95	94
HSE SE	Carlow/Kilkenny	1989	96	96	94	96	88	93	93	94	95
	South Tipperary	1297	97	97	97	96	89	95	94	95	95
	Waterford	1911	96	96	93	96	88	92	93	94	94
	Wexford	2185	96	96	95	96	89	93	93	95	94
	HSE SE Total	7382	96	96	95	96	89	93	93	95	94
HSE S	North Cork	1555	95	94	90	95	88	89	92	91	93
	North South Lee	5795	96	95	90	96	87	89	91	93	93
	West Cork	779	93	93	88	93	85	85	89	90	91
	Kerry	1974	97	97	92	97	90	91	93	94	94
	HSE S Total	10103	96	95	91	96	87	89	91	92	93
HSE W	Galway	3805	97	97	96	97	92	na	95	na	95
	Mayo	1708	97	97	94	97	91	na	96	na	93
	Roscommon	889	98	98	97	98	96	na	98	na	97
	HSE W Total	6402	97	97	96	97	92	na	96	na	95
Ireland	71848	96	96	92	95	88	91	92	93	93	

* As the denominator/number in cohort varied slightly according to vaccine the D₃, T₃ and P₃ cohorts are shown here
 Since T₃, P₃ and Polio₃ uptake identical to D₃ uptake only D₃ uptake figures are presented
 Please note while North Lee and South Lee are two separate Local Health Offices their combined immunisation uptake data are reported here

data on MenC_b (one dose of MenC on or after first birthday and before second birthday) and PCV_b (one dose of PCV on or after first birthday and before second birthday) in 2014. The available data may be around 81% (estimate only) of the national birth cohort. Where data were available, national uptake was 91% for MenC_b and 93% for PCV_b at 24 months of age (table 3).

Among the HSE Areas uptake rates for D₃, T₃, P₃, Hib₃, Polio₃ and HepB₃ ranged from 95% to 98%, MMR₁ ranged from 92% to 97%, PCV₃ ranged from 91% to 96%, Hib_b ranged from 89 to 98% and MenC₃ ranged from 87% to 93% (table 3). Among the six Areas in a position to provide data PCV_b uptake ranged from 92% to 97% and MenC_b uptake ranged from 89% to 95% (table 3).

The target uptake of ≥95% was reached in all eight HSE Areas during 2014 for D₃, T₃, P₃, Hib₃, Polio₃ and HepB₃, in three HSE Areas for Hib_b and PCV_b, in two for PCV₃ and MMR₁, in one for MenC_b and in none for MenC₃ (table 3).

D₃, Hib_b, MenC₃ and MMR₁ uptake rates are mapped by LHO in figure 2. Among the LHOs the uptake rates ranged from 93% to 98% for D₃, T₃, P₃, Hib₃, Polio₃ and HepB₃, 90% to 97% for MMR₁ and PCV_b, 88% to 98% for PCV₃, 86% to 98% for Hib_b, 85% to 95% for MenC_b and 84% to 96% for MenC₃ (table 3).

The target uptake of ≥95% was reached in 25 LHOs for D₃, T₃, P₃, Polio₃ and HepB₃, in 24 LHOs for Hib₃, in seven LHOs for MMR₁, in six LHOs for Hib_b and PCV_b, in four LHOs for PCV₃, in three LHOs for MenC_b and in one

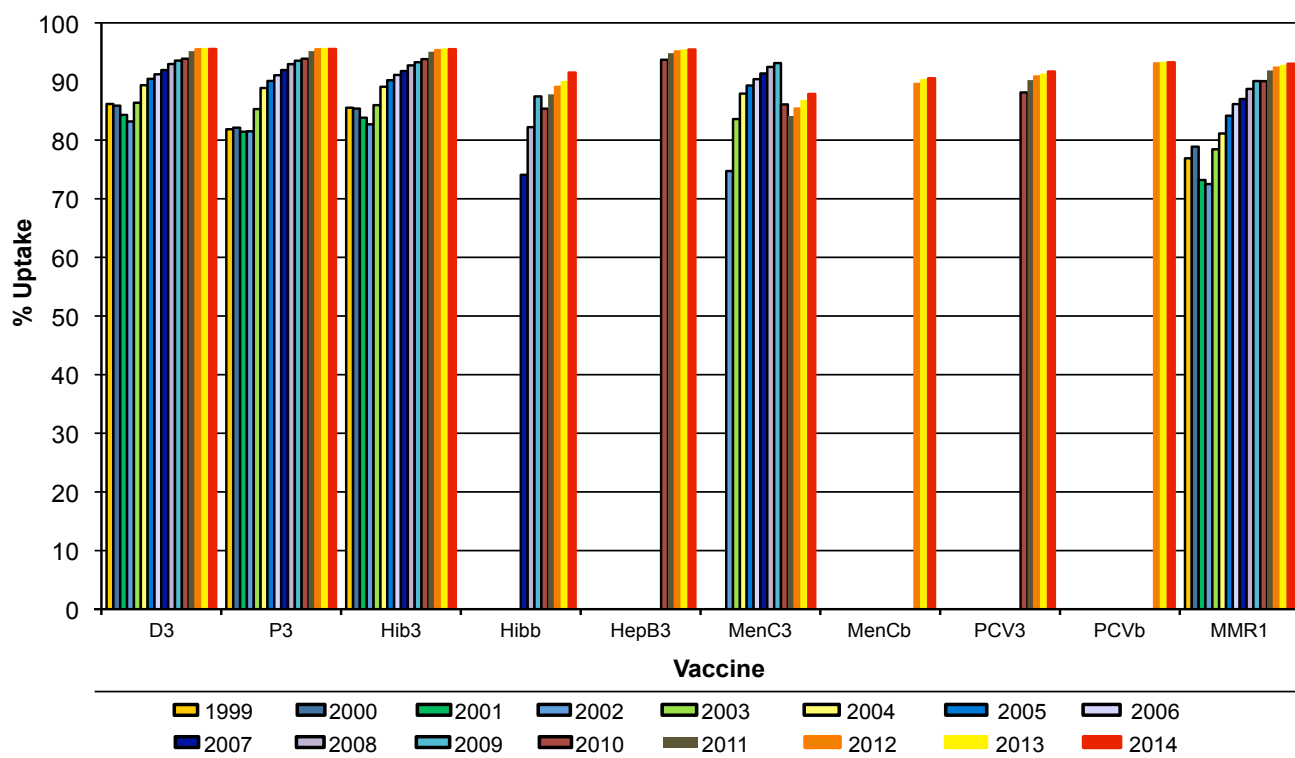


Figure 1. National annual immunisation uptake rates (based on available data) at 24 months, 1999-2014
Since T₃ and Polio₃ uptake identical to D₃ uptake only D₃ uptake figures presented.

P₃ uptake could not be calculated accurately during 1999-2001 as DTaP/DT uptake was reported as a combined value for the HSE NE during 1999, Quarters 3 and 4 2000 and Quarter 1 2001 and the HSE NW in 2000 and 2001. The 2002 MenC₃ figure is based on uptake rates for Quarter 3 and Quarter 4 2002 only. The 2005 MMR₁ uptake figure is incomplete as the HSE E was unable to provide MMR data for Quarter 4 2005, due to technical problems. The 2006 MMR₁ figure includes the Quarter-1 2006 HSE E figure, which is an estimate only due to technical problems. The 2007 national Hib_b figure is incomplete, as the HSE W data for Quarter 1 2007 and the HSE NW data for Quarter 3 2007 were not available. The 2007 national Hib_b figure also includes the HSE SE data which are an underestimate due to data extraction methods. The 2008 Hib_b figure is incomplete as the HSE SE data for Q2 2008 and the HSE MW data for Quarter 3 2008 were not available. The 2008 national MenC₃ figure is incomplete as the HSE E and HSE MW MenC₃ data for Quarter 3 2008 were not available. The 2009 data are incomplete as the following were unavailable: the Quarter 1 2009 HSE E D₃, T₃, P₃ and Polio₃ data for those born on the 31/03/2007; the Quarter 2 2009 HSE E Dublin North Hib_b uptake data and; the Quarter 4 2009 HSE MW data, HSE E Dublin North Hib_b data and HSE SE Hib_b data for those given a Hib dose as part of the five in one or six in one vaccine after 12 months of age. The 2010 data are incomplete as the following were unavailable: the Quarter 1 2010 HSE M and HSE S data and the HSE E Dublin North Hib_b data; the Quarter 2 2010 HSE M data and; the Quarter 4 2010 HSE NE data. As a new childhood immunisation schedule was introduced in 2008, for those born on or after July 1st 2008, the 2010 HepB₃ and PCV₃ data at 24 months are for those born between July 1st and December 31st 2008 (i.e. Quarters 3 and 4 2010 data) only. The MenC_b and PCV_b data were available for only six of the eight HSE Areas.

LHO for MenC₃ (table 3). Roscommon was the only LHO to reach the target of ≥95% for D₃, T₃, P₃, Hib₃, Polio₃, HepB₃, Hib_b, MenC₃, PCV₃ and MMR₁ for children at 24 months (table 3).

Conclusion

National immunisation uptake rates, in children at 12 months of age in 2014, were 92% for D₃, T₃, P₃, Hib₃, Polio₃, HepB₃, MenC₂ and PCV₂. Based on available data uptake of BCG was 87%. The HSE Midland Area was the only Area to reach the target uptake rate of ≥95% for all vaccines among children at 12 months of age. Among the LHOs, Roscommon had the highest uptake (97%) of D₃, T₃, P₃, Hib₃, Polio₃, HepB₃, MenC₂ and PCV₂ at 12 months of age.

In 2014, national uptake rates at 24 months for MenC₃ (88%), Hib_b (92%), PCV₃ (92%) and MMR₁ (93%) were lower than the target uptake of ≥95%. In 2014, national uptake rates at 24 months of age for D₃, T₃, P₃, Hib₃, Polio₃ and HepB₃ reached the target rate of ≥95%. This is the fourth year national annual uptake rates reached the target of ≥95% for these vaccines. All eight HSE Areas reached the target uptake of ≥95% for D₃, T₃, P₃, Hib₃, Polio₃ and HepB₃ at 24 months during 2014. The target uptake of ≥95% was reached in three HSE Areas for Hib_b and PCV_b, in two HSE Areas for PCV₃ and MMR₁ and in one for MenC_b. Roscommon was the only LHO to reach the target of ≥95% for D₃, T₃, P₃, Hib₃, Polio₃, HepB₃, MenC₃, PCV₃, Hib_b and MMR₁ uptake at 24 months of age.

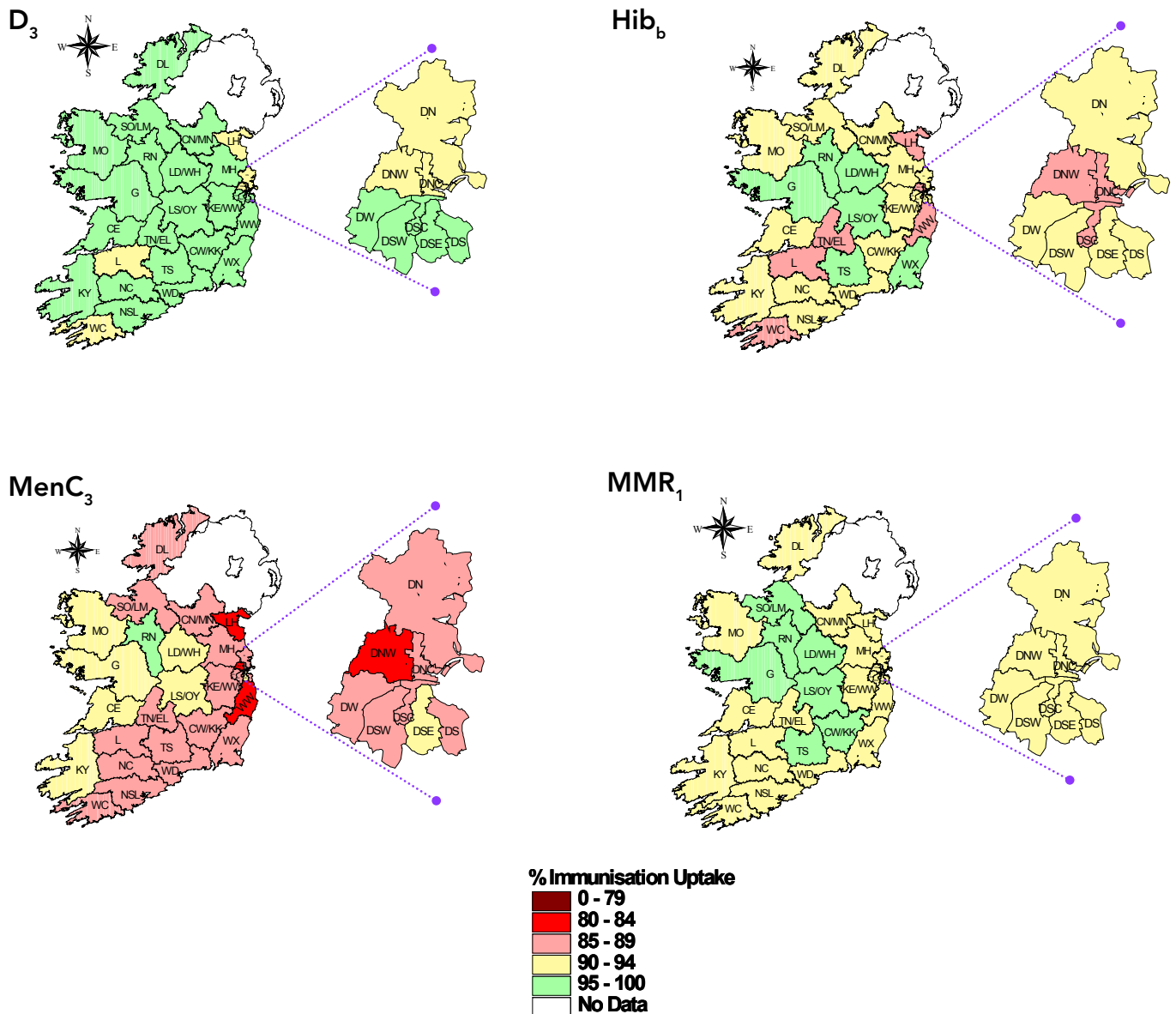


Figure 2. D₃, Hib_b, MenC₃ and MMR₁ immunisation uptake rates (%) in those 24 months of age in 2014 by Local Health Office (LHO)

LHOs in Dublin are highlighted separately for ease of viewing

North Lee and South Lee are separate LHOs, however, their combined (labelled NSL on the map) immunisation uptake rate is reported here

Please see table 4 to translate LHO abbreviations

Table 4. Local Health Office (LHO) abbreviations used in this chapter

Local Health Office Abbreviations	Local Health Office
CE	Clare
CN/MN	Cavan/Monaghan
CW/KK	Carlow/Kilkenny
DL	Donegal
DN	Dublin North
DNC	Dublin North Central
DNW	Dublin North West
DS	Dublin South
DSC	Dublin South City
DSE	Dublin South East
DSW	Dublin South West
DW	Dublin West
G	Galway
KE/WW	Kildare/West Wicklow
KY	Kerry
L	Limerick
LD/WD	Longford/Westmeath
LH	Louth
LS/OY	Laois/Offaly
MH	Meath
MO	Mayo
NC	North Cork
NSL*	North South Lee*
RN	Roscommon
SO/LM	Sligo/Leitrim
TN/EL	Tipperary North /East Limerick
TS	South Tipperary
WC	West Cork
WD	Waterford
WX	Wexford
WW	Wicklow

*Please note while North Lee and South Lee are two separate LHOs their combined immunisation uptake data are reported

Quarterly Reports

The immunisation reports for Quarters 1 to 4 2014 are available on the HPSC website in *Topics A-Z* under the heading *vaccination*.

Acknowledgements

HPSC would like to thank the HSE Areas for providing data and special thanks to the Immunisation Co-ordinators, Specialists in Public Health Medicine, Surveillance Scientists and Systems Analysts for their assistance.

8.2 HPV vaccine uptake 2013/2014

Summary

In the academic year 2013/2014, 84.9% of girls in first year and 44.6% of girls in sixth year in second level schools were recorded as having received at least stage 3 HPV vaccine (considered to have completed a three dose HPV vaccine course).

In addition, 201 girls in the first year and sixth year age equivalent cohorts in non-second level schools (ie special schools, Youthreach, Community Training Centres, home schooled or out of school) and 138 girls outside the cohorts recommended for vaccination were recorded as having received at least stage 3 HPV vaccine.

Background

Following a recommendation from the National Immunisation Advisory Committee, that human papillomavirus (HPV) vaccine should be given to 12 year old girls, a routine HSE school HPV vaccination programme began in May 2010 for girls in the first year of second level school and age equivalent in non-second level schools (see below for cohort details). The aim of the programme is to protect girls from their future risk of developing cervical cancer.

A catch-up campaign for girls in sixth year of second level schools and their age equivalents in non-second level schools (see below for cohort details) was added in the academic year 2011/2012. This catch-up campaign continued during the academic years 2012/2013 and 2013/2014.

Quadrivalent HPV vaccine, which protects against HPV types 6, 11, 16 and 18 associated with 70% of cervical cancer, is used in the school vaccination programme. A schedule of three vaccine doses given over a six month period was recommended in the academic year 2013/2014. The HPV vaccine does not protect against all cervical cancers, so regular cervical screening is still needed.

The vaccinations are provided by vaccination teams from the Local Health Offices (LHOs) who go into schools in their areas to vaccinate or provide vaccination clinics free of charge for girls in the target cohorts. Please see the HSE-National Immunisation Office (NIO) website at <http://www.hse.ie/eng/health/immunisation/> for detailed and current information on the HPV school vaccination programme.

The target for uptake of three doses of vaccine for the routine HPV vaccination programme in 2013/2014 was $\geq 80\%$.

HPV vaccinations provided through the schools immunisation programme are entered into the School Immunisation System (SIS). Here we report on the uptake of HPV vaccine, provided through the school immunisation programme and recorded on SIS, in the academic year 2013/2014 in Ireland.

The data presented here are the result of collaboration between NIO, school immunisation teams, immunisation coordinators, immunisation system administrators, immunisation administrative staff and HPSC.

Cohorts for vaccination in the academic year 2013/2014

The routine and catch-up cohorts for the 2013/2014 HPV vaccination programme as agreed with the Department of Education and Skills was as follows:
Routine HPV Vaccination programme

- All girls in **first year of second level schools**
- **and their equivalents** i.e. those who were born between 01/09/2001 and 31/08/2002
 - attending special schools or
 - registered with the National Educational Welfare Board to be home schooled.

Catch up HPV Vaccination Programme

- All girls in **sixth year of second level schools**
- **and their equivalents** i.e. those who were born between 01/09/1995 and 31/08/1996 and
 - attending special schools or
 - registered with the National Educational Welfare Board to be home schooled or
 - attending Youthreach and Community Training

Centres funded by the Department of Education and Skills.

- A large proportion of sixth year girls in the academic year 2013/2014 were previously targeted for vaccination at the start of the HSE school programme in the academic years 2009/2010 and 2010/2011 ie girls who were in sixth year but did not do transition year were previously targeted for vaccination. Previously vaccinated girls were not vaccinated as part of the 2013/2014 school programme.

Terminology used in this report

At least stage 1 - means a girl had a stage 1 HPV vaccine recorded on SIS, this girl may or may not have had a stage 2 or a stage 3 HPV vaccine recorded on SIS.

At least stage 2 - means a girl had a stage 2 HPV vaccine recorded on SIS, she may or may not have had stage 1 or a stage 3 HPV vaccine recorded on SIS.

At least stage 3 - means a girl had a stage 3 HPV vaccine recorded on SIS, she may or may not have had a stage 1 or a stage 2 HPV vaccine recorded on SIS. Girls with at least stage 3 are considered to have completed a course of vaccination.

Home schooled - refers to girls registered with the National Educational Welfare Board to be educated at home. These girls were recorded on SIS and reported here as home schooled.

Out of school - refers to vaccinated girls who were neither enrolled in a second level school, special school, Youthreach or Community Training Centre nor registered with the National Educational Welfare Board as home schooled.

Local Health Office (LHO) - refers to the LHO the school is located in (it does not refer to the LHO the girl is resident in).

Outside cohort - refers to those who were vaccinated but who were not in first year or sixth year of second level schools or their equivalents in non-second level schools ie they were outside the cohorts recommended for vaccination.

The **denominator** for girls in second level schools was defined as the number of girls on the school roll on 30th September 2013 for first year in the routine programme and for sixth year in the catch-up programme. The denominator for age equivalent to first years in second level schools in the routine programme was defined as girls born between 01/09/2001 and 31/08/2002 on the school roll of special schools or registered with the National Educational Welfare Board on 30th September 2013. The denominator for age equivalent to sixth years in second level schools in the catch-up programme was defined as girls born between 01/09/1995 and 31/08/1996 on the school roll of special schools or registered with the National Educational Welfare Board or attending Community Training Centres or Youthreach

on 30th September 2013. All the denominator data was entered on SIS by the relevant System Administrator.

Results

Academic Year 2013/2014

The figures presented in this summary are based on data recorded on SIS on the 30th June 2015. These figures are subject to change due to ongoing updating of data on SIS.

First year girls in second level schools

In Ireland, 84.9% of girls in first year in second level schools were recorded as having received at least HPV stage 3 (considered to have completed a three dose course) (Table 1). This is an increase of 0.7% compared to the academic year 2012/2013 when 84.2% of girls in first year in second level schools were recorded as having received at least HPV stage 3.¹ Among the 32 LHOs, in the academic year 2013/2014, uptake of at least HPV stage 3 ranged from 71.3% to 89.7%; with 29 reaching the target of $\geq 80\%$ uptake.

Sixth year girls in second level schools

In Ireland, 44.6% of girls in sixth year in second level schools were recorded as having at least HPV stage 3 (Table 2). A large proportion of sixth year girls in the academic year 2013/2014 were previously targeted for vaccination at the start of the HSE school programme in the academic years 2009/2010 and 2010/2011 ie girls in sixth year who did not do transition year were previously targeted for vaccination. These vaccinated girls would be included in the denominator data but not in the numbers vaccinated as they were not vaccinated as part of the 2013/2014 school programme. In the academic year 2012/2013, 67.4% of girls in sixth year in second level schools were recorded as having received at least HPV stage 3.¹

First and Sixth year second level equivalent cohorts in non-second level schools/Outside cohort/Out of school

An additional 339 girls were recorded as having received at least HPV stage 3 (Table 3); of these 201 were recorded in the first year routine and sixth year catch up age equivalent cohorts in special schools, Youthreach, Community Training Centres, home schooled or out of school and 138 were recorded as being outside the cohorts recommended for vaccination.

The target cohort of girls in special schools, Community Training Centres, Youthreach, and home schooled were identified by birth cohort either equivalent to first years (born between 01/09/2001 and 31/08/2002) or equivalent to sixth years (born between 01/09/1995 and 31/08/1996). For operational reasons HSE vaccinating staff did not adhere strictly to these birth cohorts. Some of the vaccinations in these school settings were actually 'outside cohort'. The identification of denominator data for the target birth cohorts in these settings was difficult and staff focused on vaccinations rather than defining

Table 1. HPV vaccine uptake in the academic year 2013/2014 among first year girls (routine HPV programme) in second level schools

HSE Region	Local Health Office/ HSE Region	2013/2014						
		First year (routine HPV vaccination programme)**						
		Denominator	Numbers vaccinated with:			% Vaccinated with:		
At least Stage 1	At least Stage 2		At least Stage 3	At least Stage 1	At least Stage 2	At least Stage 3		
Dublin Mid Leinster	Dublin South	969	842	834	821	86.9%	86.1%	84.7%
	Dublin South East	596	505	501	490	84.7%	84.1%	82.2%
	Dublin South City	806	703	702	681	87.2%	87.1%	84.5%
	Dublin South West	800	715	705	671	89.4%	88.1%	83.9%
	Dublin West	1041	931	926	898	89.4%	89.0%	86.3%
	Kildare/West Wicklow	1639	1507	1489	1438	91.9%	90.8%	87.7%
	Wicklow	749	643	639	623	85.8%	85.3%	83.2%
	Laois/Offaly	1103	936	931	909	84.9%	84.4%	82.4%
	Longford/Westmeath	1024	928	921	907	90.6%	89.9%	88.6%
Total Dublin Mid Leinster	8727	7710	7648	7438	88.3%	87.6%	85.2%	
Dublin North East	Dublin North	1576	1475	1432	1368	93.6%	90.9%	86.8%
	Dublin North Central	652	537	517	465	82.4%	79.3%	71.3%
	Dublin North West	1260	1262	1215	951	100.2%	96.4%	75.5%
	Cavan/Monaghan	863	758	752	734	87.8%	87.1%	85.1%
	Louth	999	880	869	837	88.1%	87.0%	83.8%
	Meath	1259	1156	1146	1128	91.8%	91.0%	89.6%
	Total Dublin North East	6609	6068	5931	5483	91.8%	89.7%	83.0%
South	North Cork	606	536	530	503	88.4%	87.5%	83.0%
	North Lee - Cork	1181	1058	1048	1012	89.6%	88.7%	85.7%
	South Lee - Cork	1192	1086	1078	1037	91.1%	90.4%	87.0%
	West Cork	377	291	291	288	77.2%	77.2%	76.4%
	Kerry	918	775	768	756	84.4%	83.7%	82.4%
	Carlow/Kilkenny	970	891	882	850	91.9%	90.9%	87.6%
	South Tipperary	517	478	468	441	92.5%	90.5%	85.3%
	Waterford	822	744	738	730	90.5%	89.8%	88.8%
	Wexford	1045	919	908	868	87.9%	86.9%	83.1%
Total South	7628	6778	6711	6485	88.9%	88.0%	85.0%	
West	Donegal	1103	983	977	968	89.1%	88.6%	87.8%
	Sligo/Leitrim	604	549	544	542	90.9%	90.1%	89.7%
	Galway	1619	1445	1442	1406	89.3%	89.1%	86.8%
	Mayo	913	774	767	737	84.8%	84.0%	80.7%
	Roscommon	338	299	299	297	88.5%	88.5%	87.9%
	Clare	772	680	680	677	88.1%	88.1%	87.7%
	Limerick	1021	894	875	847	87.6%	85.7%	83.0%
	Tipperary NR/ East Limerick	955	860	847	829	90.1%	88.7%	86.8%
Total West	7325	6484	6431	6303	88.5%	87.8%	86.0%	
Ireland	30289	27040	26721	25709	89.3%	88.2%	84.9%	

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Local Health Office refers to the Local Health Office of the school.

'At least stage 1' means a girl had a stage 1 HPV vaccine recorded on SIS, this girl may or may not have had a stage 2 or a stage 3 HPV vaccine recorded on SIS. Similarly, 'at least stage 2' means a girl had a stage 2 HPV vaccine recorded on SIS, she may or may not have had a stage 1 or a stage 3 HPV vaccine recorded on SIS. Similarly, 'at least stage 3' means a girl had a stage 3 recorded on SIS, she may or may not have had a stage 1 or a stage 2 HPV vaccine recorded.

**Please see the background section of this report for details of the cohorts recommended HPV vaccine during the academic year 2013/2014.

Table 2. HPV vaccine uptake in the academic year 2013/2014 among sixth year (catch up campaign) girls in second level schools

HSE Region	Local Health Office/ HSE Region	2013/2014						
		Sixth year (catch up campaign)**						
		Denominator	Numbers vaccinated with:			% Vaccinated with:		
At least Stage 1	At least Stage 2		At least Stage 3	At least Stage 1	At least Stage 2	At least Stage 3		
Dublin Mid Leinster	Dublin South	894	560	550	537	62.6%	61.5%	60.1%
	Dublin South East	634	363	361	353	57.3%	56.9%	55.7%
	Dublin South City	751	451	439	408	60.1%	58.5%	54.3%
	Dublin South West	718	279	264	231	38.9%	36.8%	32.2%
	Dublin West	828	455	434	398	55.0%	52.4%	48.1%
	Kildare/West Wicklow	1257	525	515	465	41.8%	41.0%	37.0%
	Wicklow	592	361	354	330	61.0%	59.8%	55.7%
	Laois/Offaly	840	322	317	303	38.3%	37.7%	36.1%
	Longford/Westmeath	900	346	340	326	38.4%	37.8%	36.2%
	Total Dublin Mid Leinster	7414	3662	3574	3351	49.4%	48.2%	45.2%
Dublin North East	Dublin North	1198	409	383	344	34.1%	32.0%	28.7%
	Dublin North Central	516	299	264	244	57.9%	51.2%	47.3%
	Dublin North West	1024	325	306	295	31.7%	29.9%	28.8%
	Cavan/Monaghan	891	477	476	463	53.5%	53.4%	52.0%
	Louth	831	191	184	172	23.0%	22.1%	20.7%
	Meath	968	286	282	271	29.5%	29.1%	28.0%
	Total Dublin North East	5428	1987	1895	1789	36.6%	34.9%	33.0%
South	North Cork	565	258	255	244	45.7%	45.1%	43.2%
	North Lee - Cork	1147	703	697	677	61.3%	60.8%	59.0%
	South Lee - Cork	1025	752	747	716	73.4%	72.9%	69.9%
	West Cork	297	133	133	131	44.8%	44.8%	44.1%
	Kerry	840	248	248	248	29.5%	29.5%	29.5%
	Carlow/Kilkenny	911	486	474	455	53.3%	52.0%	49.9%
	South Tipperary	542	266	257	249	49.1%	47.4%	45.9%
	Waterford	768	448	444	432	58.3%	57.8%	56.3%
	Wexford	939	320	312	293	34.1%	33.2%	31.2%
	Total South	7034	3614	3567	3445	51.4%	50.7%	49.0%
West	Donegal	1025	456	454	447	44.5%	44.3%	43.6%
	Sligo/Leitrim	579	287	284	284	49.6%	49.1%	49.1%
	Galway	596	524	517	498	87.9%	86.7%	83.6%
	Mayo	831	473	471	456	56.9%	56.7%	54.9%
	Roscommon	316	140	138	136	44.3%	43.7%	43.0%
	Clare	569	147	148	144	25.8%	26.0%	25.3%
	Limerick	843	494	484	442	58.6%	57.4%	52.4%
	Tipperary NR/ East Limerick	886	425	419	402	48.0%	47.3%	45.4%
	Total West	5645	2946	2915	2809	52.2%	51.6%	49.8%
Ireland	25521	12209	11951	11394	47.8%	46.8%	44.6%	

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Local Health Office refers to the Local Health Office of the school.

'At least stage 1' means a girl had a stage 1 HPV vaccine recorded on SIS, this girl may or may not have had a stage 2 or a stage 3 HPV vaccine recorded on SIS. Similarly, 'at least stage 2' means a girl had a stage 2 HPV vaccine recorded on SIS, she may or may not have had a stage 1 or a stage 3 HPV vaccine recorded on SIS. Similarly, 'at least stage 3' means a girl had a stage 3 recorded on SIS, she may or may not have had a stage 1 or a stage 2 HPV vaccine recorded.

**Please see the background section of this report for details of the cohorts recommended HPV vaccine during the academic year 2013/2014.

Table 3. HPV vaccinations in the academic year 2013/2014 among those in non-second level schools and those outside the recommended cohorts in second level schools

HSE Region	Local Health Office/ HSE Region	Recommended cohorts** for vaccination and those outside cohort in special schools, Youthreach, Community Training Centres, home schooled and out of school and those outside cohort in second level schools with:		
		At least Stage 1	At least Stage 2	At least Stage 3
Dublin Mid Leinster	Dublin South	23	22	19
	Dublin South East	13	13	12
	Dublin South City	1	1	1
	Dublin South West	12	11	8
	Dublin West	24	19	19
	Kildare/West Wicklow	20	14	8
	Wicklow	19	19	17
	Laois/Offaly	7	6	5
	Longford/Westmeath	19	19	18
	Total Dublin Mid Leinster	138	124	107
Dublin North East	Dublin North	3	3	3
	Dublin North Central	4	1	0
	Dublin North West	3	1	1
	Cavan/Monaghan	17	16	14
	Louth	10	10	9
	Meath	19	17	14
	Total Dublin North East	56	48	41
South	North Cork	7	6	5
	North Lee - Cork	19	18	17
	South Lee - Cork	23	24	22
	West Cork	2	1	1
	Kerry	2	2	2
	Carlow/Kilkenny	16	14	11
	South Tipperary	8	7	6
	Waterford	36	32	32
	Wexford	14	13	11
	Total South	127	117	107
West	Donegal	16	16	13
	Sligo/Leitrim	5	5	5
	Galway	13	11	9
	Mayo	9	9	3
	Roscommon	3	3	3
	Clare	14	11	9
	Limerick	34	30	27
	Tipperary NR/East Limerick	17	14	13
	Total West	111	99	82
Home schooled		2	1	1
Total of LHOs and home schooled		434	389	338
Out of school		1	1	1
Total of LHOs and home schooled and out of School		435	390	339

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**Please see the background section of this report for details of the cohorts recommended HPV vaccine during the academic year 2013/2014.

cohort numbers accurately. Therefore, this report gives the number of girls vaccinated in these settings reflecting activity in these settings rather than HPV vaccine uptake.

Total doses administered

A total of 116,198 administered vaccine doses were recorded in the academic year 2013/2014. This compares to 132,925 and 139,646 administered vaccine doses recorded in 2012/2013 and 2011/2012, respectively.

Academic Years 2009/2010 and 2010/2011

Uptake for 2009/2010 and 2010/2011 cohorts of first year girls vaccinated from May 2010 was measured by manual reports and national uptake for the combined cohort was estimated at 81.9%.²

Discussion

The uptake of HPV vaccine in Ireland is very encouraging and reflects the huge effort and support put in by all staff and schools involved in the school vaccination programme. Uptake of HPV vaccine compares very favourably with estimates in other countries that have introduced HPV vaccination and monitored uptake.^{3,4,5,6}

Acknowledgements

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8.3 Seasonal Influenza Vaccine Uptake in Hospitals & Long Term Care Facilities (LTCFs)

Summary

Uptake in Hospitals during 2014-2015 Season

- 79.7% (47/59) of known hospitals (including six private ones) participated in the 2014-2015 survey
- Nationally, influenza vaccine uptake among all categories of hospital HCWs was 23.4% (based on 45 complete returns)
- Uptake varied by HSE region (range 13.3%-30.6%)
- Highest uptake was reported in Dublin Mid-Leinster
- At national level, uptake varied by HSE staff category (17.1-36.4%), the highest uptake was reported among 'medical and dental' professionals and lowest among 'nursing' staff

Uptake in LTCFs during 2014-2015 Season

- 41.7% (101/242 known LTCFs) participated in the 2014-2015 survey
- Nationally, influenza vaccine uptake among LTCF HCWs was 25.7% (based on 91 complete returns)
- Uptake varied by HSE region (range 17.0%-36.1%)
- Highest uptake was reported in Dublin North-East
- At national level, uptake varied by HSE staff category (range 22.8%-41.5%); the highest uptake was in the 'medical and dental' category and lowest among 'general support' staff

Seasonal influenza vaccination is recommended to reduce influenza infection in individuals aged six months and older who are at increased risk of influenza related

complications (including all elderly), those likely to transmit influenza to individuals at high risk for influenza complications (including health care workers (HCWs), household contacts of at-risk persons and out of home carers to at-risk persons), pregnant women at any stage in pregnancy and those who have close regular contact with pigs, poultry or water fowl. The HSE procures and provides free influenza vaccine to all those for whom vaccination is recommended. For HCWs, influenza vaccination is typically provided by occupational health services, either within the facilities, or contracted by the facility to provide these services.

Influenza vaccination uptake among HCWs is of particular interest as influenza transmission between patients and HCWs can occur in the health care setting. Influenza can cause severe disease in both patients and staff and infection can spread rapidly in health care settings. Achieving a high uptake of influenza vaccination among HCWs is therefore recognised as an important infection control intervention and occupational health issue. Since October 2013 the HSE Leadership team has recommended a national influenza vaccination target of 40% among HCWs.

Since the 2011-2012 influenza season, HPSC has collected data on seasonal influenza vaccination coverage among hospitals and long term care facilities (LTCFs). Each year since then a protocol has been provided to all facilities outlining the rationale and methodology for data collection. For the 2014-2015 season, a similar protocol as used for previous years was distributed to all facilities and posted on the HPSC website. Separate online survey forms for hospitals and LTCFs were designed to capture aggregate data on eligible and vaccinated staff and were based on six categories of HSE staff: management & administration;

Table 1. Vaccine uptake (with 95% CIs) among HCWs in 21 hospitals by season (2011-2012, 2012-2013, 2013-2014 and 2014-2015)*

Season	No. Eligible Staff	No. Vaccinated Staff	% Uptake	% Uptake 95% CIs
2011-2012	30939	5618	18.2	17.7-18.6
2012-2013	30393	6085	20.0	19.6-20.5
2013-2014	30619	7842	25.6	25.1-26.1
2014-2015	32185	8784	27.3	26.8-27.8

*Results based on complete returns consisting of eligible and vaccinated staff numbers by HSE grade in 21 hospitals that reported back in each survey over the past four seasons

medical & dental; nursing; health & social care professionals; other patient & client care; and general support staff.

For hospitals, occupational health departments were asked to provide data on the number and category of HCWs vaccinated by the service (numerator). The human resource (HR) departments were requested to provide data on the numbers of staff employed (denominator). For LTCFs, uptake details were sought from nominated coordinators (or other named contacts) on the number of staff, residents and respite care patients present and vaccinated during the influenza season.

For the 2014-2015 season, a link to an online form was emailed to each nominated coordinator (or contact person) in 59 known public hospitals (including six private ones) and separately to 242 HSE funded LTCFs

on 4th December 2014. Each coordinator was asked to complete the online form using aggregate uptake data since the beginning of October 2014. A second and final survey seeking aggregate data for the entire season was sent on 27th April 2015. Reminders were sent to non-responders in January (for mid-season data) and May (for end of year data).

For the 2014-2015 influenza season, vaccination uptake among HCWs in hospitals and LTCFs was calculated based on data provided. Trend analysis for seasonal influenza vaccine uptake was limited to those hospitals and LTCFs that had reported in each of the previous three seasons (2011-2012, 2012-2013 and 2013-2014).

Uptake trend analysis- consistently reporting facilities

Since 2011-2012, 21 hospitals and 21 LTCFs have been able to provide annual data. Between 2013-2014 and 2014-2015, both groups have increased their uptake by

Table 2. Vaccine uptake (with 95% CIs) among HCWs in 21 LTCFs by season (2011-2012, 2012-2013, 2013-2014 and 2014-2015)**

Season	No. Eligible Staff	No. Vaccinated Staff	% Uptake	% Uptake 95% CIs
2011-2012	1397	352	25.2	22.9-27.5
2012-2013	1405	305	21.7	19.6-23.9
2013-2014	1533	425	27.7	25.5-30.0
2014-2015	1456	500	34.3	31.9-36.8

**Results based on complete returns consisting of eligible and vaccinated staff numbers by HSE grade in 21 LTCFs that reported back in each survey over the past four seasons

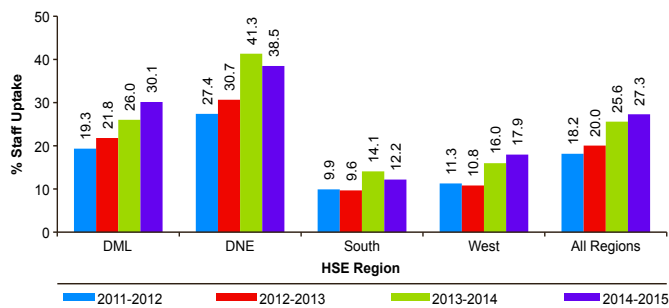


Figure 1. Hospital staff uptake by HSE region by season based on 21 reporting hospitals only

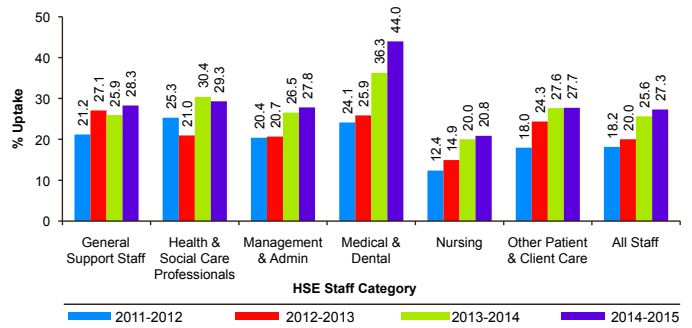


Figure 2. Hospital staff uptake by HSE grade category by season based on 21 reporting hospitals only

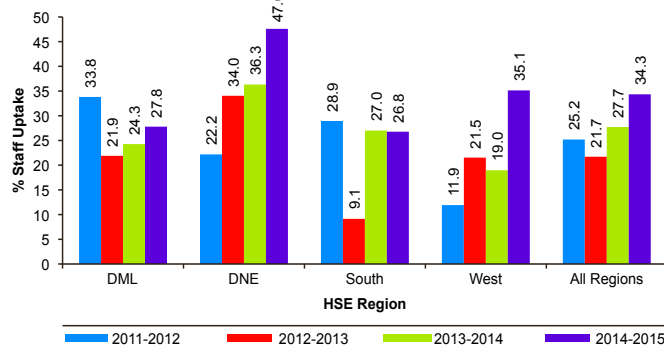


Figure 3. LTCF staff uptake by HSE region by season based on 21 reporting LTCFs only

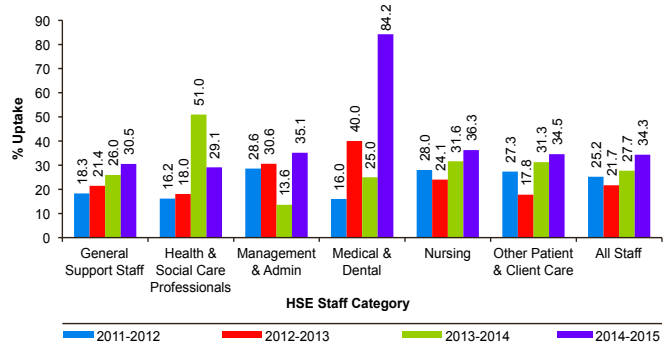


Figure 4. LTCF staff uptake by HSE grade category by season based on 21 reporting LTCFs only

1.7% and 6.6% respectively (tables 1, 2). Additionally, since 2011-2012, an upward trend in uptake was observed among the 21 consistently reporting hospitals from 18.2% to 27.3%, a difference of +9.1%. And since 2012-2013, the uptake among the consistently reporting 21 LTCF increased from 21.7% to 34.3%, a difference of +12.6%.

Figures 1 to 4 below give details of vaccine uptake among HCWs based in hospitals and LTCFs that consistently reported over the past four seasons by category of staff and HSE region.

Uptake reporting for 2014-2015 – all facilities, by HSE region and professional category

In 2014-2015, the overall uptake among 45 hospitals (excluding two hospitals in the North-Eastern region that reported a combined overall staff uptake figure) was 23.4% with the highest uptake reported in Dublin Mid-Leinster region (30.6%) and the lowest (13.3%) in the Southern region. At national level, hospital staff was highest among 'medical and dental' professionals (36.4%) and lowest among 'nursing' staff (17.1%).

The overall uptake among 101 LTCFs in 2014-2015 was 25.7% with the highest uptake reported in Dublin North East region (36.1%) with the lowest in the Southern region (17.0%). Uptake at national level was highest in the 'medical and dental' category (41.5%) and lowest among 'general support' staff (22.8%).

Although there has been marked improvement in uptake, at national and regional level, the 40% target has not been met. However, four hospitals achieved this target during the 2014-2015 season (range 41.1% to 47.5%) and 24 LTCFs also achieved this target (range 40.0% to 96.9%). The incomplete participation of hospitals is of concern, assuming that most should have information systems to enable them to report. Reasons for non-participation need to be explored and obstacles to reporting addressed. The low participation of LTCFs is also of concern as these units care for extremely vulnerable populations and outbreaks among these settings spread rapidly and have been related to high influenza morbidity and mortality in some years. Whether non-participation of many LTCFs reflects a lack of information systems to collect and report on vaccine uptake or other non-specified reasons is not known to HSPC, but further work is needed to identify reasons for non-participation and efforts made to support LTCFs in collating and reporting this data.

The national uptake among hospital staff (23.4%) was somewhat less than the overall uptake reported among LTCFs (25.7%) in 2014-2015. This lack of substantial difference occurs against different organisational structures for vaccination in these services. Unlike many LTCFs, most hospitals have formal occupational health services available to hospital staff; however this has not translated into overall better coverage in hospital staff. With some notable exceptions the lack of progress in this area in all regions may reflect either a lack of awareness, lack of resources or lack of acceptance of vaccination.¹ Reasons for low vaccination in each hospital or LTCF should be identified locally if improvements are to be made.

The World Health Organization has stated that annual vaccination is especially important for people at higher risk of serious influenza complications, and for people who live with or care for high risk individuals.² In Ireland, more action is required to reach a national HSE target of 40% vaccination uptake among HCWs if unnecessary disease and mortality is to be prevented. Other countries have already achieved uptake rates well above our target. For example, during the 2014-2015 season in England, where vaccination uptake among those HCWs with direct patient contact is monitored (compared to Ireland where uptake among all HCWs is monitored), the reported uptake was 54.9%, similar to the previous season (54.8 %).³ In the United States, the Centre for Disease Control analysed data from an internet panel survey of HCWs conducted from October 29-November 12, 2014⁴. Early season 2014-2015 influenza vaccination coverage among HCWs in the US was 64.3%, similar to the 62.9% coverage reported by early season 2013-2014⁴. Furthermore, vaccination coverage among HCWs was found to be highest in hospitals (78.7%) and lowest in LTCFs (54.4%).⁴ In the HSE at local level further work is being done across the various clinical and management groups to improve uptake among HCWs.

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8.4 Uptake of other childhood and adolescent vaccines

Vaccine uptake (DTaP-IPV* and MMR†) in Junior Infants during the 2013/2014 academic year

Background

Uptake of the DTaP-IPV* and MMR† vaccines in 4-5 year old schoolchildren was monitored across all Local Health Offices (LHOs) during the academic year 2013/2014. The uptake data were compared to those reported for the previous 2012/2013 season, where possible.

HSE-school team versus GP-vaccine administered LHOs

In 29 out of the 31 LHOs across the country, the junior infant vaccination programme is delivered by HSE school teams who administer the vaccine to the children at school. In the remaining two LHOs, Donegal and Sligo/Leitrim, these vaccines are administered to children exclusively by GPs rather than by school teams. During 2013/2014 however, a combination of a School team/GP programme also existed in 13 HSE-administered LHOs with a percentage of children been given vaccines by a GP (tables 1 and 2). During 2014-2015 most of these areas moved towards a predominantly school based administration programme for junior infants.

Target populations

For the 2013/2014 academic year, the target population in HSE-vaccine administered LHOs was all children in Junior Infants on the school register on the 30th September 2013. For GP-vaccine administered LHOs, the target population was all children born between the 1st September 2007 and 31st August 2008.

Table 1. Proportion of DTaP-IPV vaccine uptake in HSE-administered LHOs attributable to GPs

LHO	% DTaP-IPV Vaccine Uptake
Dublin West	2.7%
Louth	64.0%
Meath	47.0%
Cavan/Monaghan	58.0%
Carlow/Kilkenny	3.5%
Tipperary South	3.3%
Wexford	% not specified
North Cork	56.0%
Cork North Lee	24.0%
Cork South Lee	10.50%
West Cork	10.80%
Kerry	34.60%
Roscommon	<1%

The different ways in which the target populations have been defined in the HSE- and GP-vaccinated administered LHOs has meant that a national uptake for either vaccine could not be calculated.

Furthermore, between the 2012/2013 and 2013/2014 seasons, the following six LHOs changed from being GP-administered areas to HSE-administered areas: Louth, Cavan/Monaghan, Meath and Dublin North Central, Galway and Mayo. This means that comparing uptake between seasons in the Dublin North East and Western regions is not possible as the criteria for defining the birth cohorts in both these regions have changed.

Uptake of DTaP-IPV vaccine

Between 2012/2013 and 2013/2014, the uptake of the DTaP-IPV vaccine in HSE-vaccine administered LHOs, but excluding Louth, Cavan/Monaghan, Meath, Galway, Mayo and Dublin North Central, increased from 90.4% to 91.9%. In 2013/2014, the average uptake among these LHOs was 90.3% with a range from 78.2% in Dublin West to 98.8% in Kildare/West Wicklow.

During the same period of time, DTaP-IPV vaccine uptake in exclusively GP-vaccine administered LHOs (Donegal; Sligo/Leitrim) rose from 90.6% to 92.2%.

Uptake of MMR vaccine

The uptake of the MMR vaccine between 2012/2013 and 2013/2014 in HSE-vaccine administered LHOs (excluding Louth, Cavan/Monaghan, Meath, Galway, Mayo and Dublin North Central), rose from 90.5% to

Table 2. Proportion of MMR vaccine uptake in HSE-administered LHOs attributable to GPs

LHO	% MMR Vaccine Uptake
Dublin West	2.9%
Louth	64.0%
Meath	47.0%
Cavan/Monaghan	58.0%
Carlow/Kilkenny	3.5%
Tipperary South	3.2%
Wexford	% not specified
North Cork	56.0%
Cork North Lee	24.0%
Cork South Lee	10.80%
West Cork	10.80%
Kerry	34.60%
Roscommon	<1%

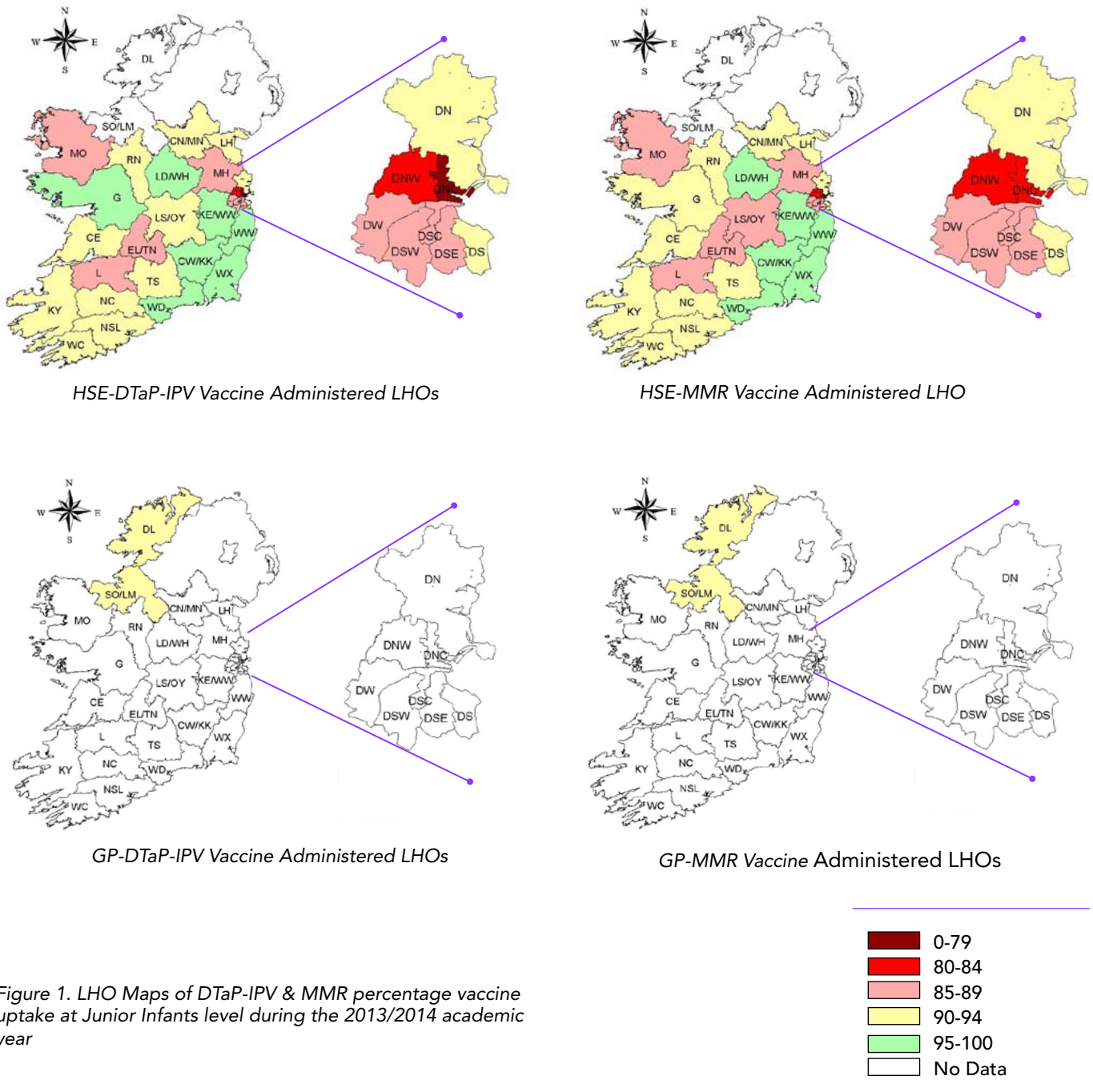


Figure 1. LHO Maps of DTaP-IPV & MMR percentage vaccine uptake at Junior Infants level during the 2013/2014 academic year

91.6%. In 2013/2014, the average uptake among these LHOs was 90.4% with a range from 72% in Galway to 99.7% in Carlow/Kilkenny.

MMR vaccine uptake in exclusively GP-vaccine administered LHOs also increased from 90.3% to 92.7% during the same time period.

MMR catch-up vaccination

Eighteen HSE-vaccine administered LHOs identified a number of children as needing a catch-up MMR dose one month later after been given their first dose. The total number of children identified was 127, of which 100 (78.7%) received a catch-up vaccine dose, ranging from no children in Dublin South, Dublin South East, Dublin West, Dublin North East and Louth to 29 children in Wicklow.

Details of the overall uptake of the two vaccines in the

HSE- and GP-vaccinated LHOs during 2013/2014 are presented in Table 1 and in the maps in Figure 1.

* DTaP-IPV = Diphtheria, Tetanus, acellular Pertussis and Polio vaccine

†MMR = Measles, Mumps and Rubella vaccine

Tdap vaccine uptake during the 2013/2014 academic year

The National Immunisation Advisory Committee recommends vaccination with tetanus and low-dose diphtheria and acellular pertussis (Tdap) vaccine at 11-14 years of age. Tdap vaccine uptake in the academic year 2013/2014, provided through the school immunisation programme for those in first year of second level schools and their equivalents in non-second level schools (i.e. special school, home schooled

Table 3. Overall uptake of the DTaP-IPV and MMR vaccines in Junior Infants during the 2013/2014 academic year

HSE Region & LHO	HSE-Vaccine Administered School Immunisations Programme for Junior Infants 2013/2014				GP-Vaccine Administered Programme for Junior Infants 2013/2014						
	Cohort	Number children who have received 1 dose DTaP-IPV vaccine	%	Cohort	Number children who have received 1 dose MMR vaccine	%	Cohort	Number children who have received 1 dose DTaP-IPV vaccine	%	Number children who have received 1 dose MMR vaccine	%
Dublin Mid Leinster											
Dublin South	1,884	1,744	92.6%	1,884	1,725	91.6%	HSE	HSE	HSE	HSE	
Dublin South East	1,596	1,405	88.0%	1,596	1,401	87.8%	HSE	HSE	HSE	HSE	
Wicklow	2,054	1,963	95.6%	2,054	1,956	95.2%	HSE	HSE	HSE	HSE	
Dublin South City	1,562	1,374	88.0%	1,562	1,388	88.9%	HSE	HSE	HSE	HSE	
Dublin South West	2,129	1,902	89.3%	2,129	1,896	89.1%	HSE	HSE	HSE	HSE	
Dublin West	2,798	2,475	88.5%	2,798	2,479	88.6%	HSE	HSE	HSE	HSE	
Kildare/W Wicklow	4,229	4,051	95.8%	4,229	4,037	95.5%	HSE	HSE	HSE	HSE	
Laois/Offaly	2,918	2,655	91.0%	2,918	2,609	89.4%	HSE	HSE	HSE	HSE	
Longford/Westmeath	2,119	2,070	97.7%	2,119	2,070	97.7%	HSE	HSE	HSE	HSE	
Totals	21,289	19,639	92.2%	21,289	19,561	91.9%	0	0	0.0%	0	0.0%
Dublin North East											
Louth	2,288	2,127	93.0%	2,288	2,130	93.1%	HSE	HSE	HSE	HSE	
Cavan/Monaghan	2,195	1,980	90.2%	2,195	1,980	90.2%	HSE	HSE	HSE	HSE	
Meath	3,607	3,215	89.1%	3,607	3,213	89.1%	HSE	HSE	HSE	HSE	
Dublin Nth West	3,416	2,807	82.2%	3,416	2,807	82.2%	HSE	HSE	HSE	HSE	
Dublin Nth Central	1,518	1,175	77.4%	1,518	1,219	80.3%	HSE	HSE	HSE	HSE	
Dublin North	4,333	3,940	90.9%	4,333	3,944	91.0%	HSE	HSE	HSE	HSE	
Totals	17,357	15,244	87.8%	17,357	15,293	88.1%	0	0	0.0%	0	0.0%
West											
Limerick	2,362	2,060	87.2%	2,362	2,055	87.0%	HSE	HSE	HSE	HSE	
Clare	1,638	1,508	92.1%	1,638	1,505	91.9%	HSE	HSE	HSE	HSE	
Tipperary North	1,727	1,533	88.8%	1,727	1,538	89.1%	HSE	HSE	HSE	HSE	
Galway	4,138	3,962	95.7%	4,138	3,919	94.7%	HSE	HSE	HSE	HSE	
Mayo	1,826	1,604	87.8%	1,826	1,630	89.3%	HSE	HSE	HSE	HSE	
Roscommon	950	896	94.3%	950	887	93.4%	HSE	HSE	HSE	HSE	
Donegal	GP	GP	GP	GP	GP	GP	1,449	1,334	92.1%	1,333	92.0%
Sligo/Leitrim	GP	GP	GP	GP	GP	GP	2,550	2,352	92.2%	2,375	93.1%
Totals	12,641	11,563	91.5%	12,641	11,534	91.2%	3,999	3,686	92.2%	3,708	92.7%
South											
North Lee/South Lee	5,891	5,484	93.1%	5,891	5,487	93.1%	HSE	HSE	HSE	HSE	
North Cork	1,491	1,387	93.0%	1,491	1,385	92.9%	HSE	HSE	HSE	HSE	
West Cork	776	709	91.4%	776	709	91.4%	HSE	HSE	HSE	HSE	
Kerry	1,998	1,847	92.4%	1,998	1,847	92.4%	HSE	HSE	HSE	HSE	
South Tipperary	1,373	1,265	92.1%	1,373	1,273	92.7%	HSE	HSE	HSE	HSE	
Carlow/Kilkenny	2,057	1,964	95.5%	2,057	1,958	95.2%	HSE	HSE	HSE	HSE	
Waterford	1,850	1,808	97.7%	1,850	1,774	95.9%	HSE	HSE	HSE	HSE	
Wexford	2,535	2,474	97.6%	2,535	2,422	95.5%	HSE	HSE	HSE	HSE	
Totals	17,971	16,938	94.3%	17,971	16,855	93.8%	0	0	0.0%	0	0.0%
National Totals	69,258	63,384	91.5%	69,258	63,243	91.3%	3,999	3,686	92.2%	3,708	92.7%

GP=Vaccine administered by GPs in these areas; HSE=Vaccine administered by HSE public health personnel in these areas; Target population HSE-vaccine administered areas: All children in Junior Infants on the school register on 30/09/2013 for the 2013/2014 academic year; Target population in GP-vaccine administered areas: All children born between 01/09/2007 and 31/08/2008

Table 4. Tdap uptake data in the academic year 2013/2014 (data extracted 20/04/2015)

HSE Region	Local Health Office/HSE Region	2013/2014				
		First year in second level and equivalent in special schools, home schooled and out of school			Outside cohort	
		Denominator	Numbers vaccinated with Tdap:	% Vaccinated with Tdap:	Denominator	Numbers vaccinated with Tdap:
Dublin Mid Leinster	Dublin South	2010	1642	81.7%	N/A	12
	Dublin South East	1157	883	76.3%	N/A	3
	Dublin South City	1466	1180	80.5%	N/A	6
	Dublin South West	1762	1362	77.3%	N/A	10
	Dublin West	2110	1574	74.6%	N/A	9
	Kildare/West Wicklow	3589	2991	83.3%	N/A	8
	Wicklow	1420	1212	85.4%	N/A	3
	Laois/Offaly	2197	1850	84.2%	N/A	20
	Longford/Westmeath	2090	1937	92.7%	N/A	4
Total Dublin Mid Leinster	17801	14631	82.2%	N/A	75	
Dublin North East	Dublin North	3048	2462	80.8%	N/A	8
	Dublin North Central	1518	1063	70.0%	N/A	2
	Dublin North West	2476	2299	92.9%	N/A	0
	Cavan/Monaghan	1756	1319	75.1%	N/A	0
	Louth	2050	1631	79.6%	N/A	0
	Meath	2571	2206	85.8%	N/A	498
	Total Dublin North East	13419	10980	81.8%	N/A	508
South	North Cork	1181	955	80.9%	N/A	2
	North Lee - Cork	2466	2089	84.7%	N/A	5
	South Lee - Cork	2444	2092	85.6%	N/A	2
	West Cork	741	643	86.8%	N/A	0
	Kerry	1856	1587	85.5%	N/A	0
	Carlow/Kilkenny	1997	1845	92.4%	N/A	16
	South Tipperary	1147	1032	90.0%	N/A	3
	Waterford	1720	1625	94.5%	N/A	5
	Wexford	1976	1767	89.4%	N/A	83
Total South	15528	13635	87.8%	N/A	116	
West	Donegal	2264	2057	90.9%	N/A	5
	Sligo/Leitrim	1251	1142	91.3%	N/A	1
	Galway	3089	2537	82.1%	N/A	43
	Mayo	1759	1453	82.6%	N/A	0
	Roscommon	-	-	-	N/A	-
	Clare	1418	1209	85.3%	N/A	17
	Limerick	2185	1511	69.2%	N/A	3
	Tipperary NR/ East Limerick	1867	1578	84.5%	N/A	16
Total West	13833	11487	80.5%	N/A	85	
Homeschooled		0	3	0	N/A	0
Total of LHOs and home schooled		60581	50736	83.7%	N/A	784
Out of School		N/A	0	N/A	N/A	2
Total of LHOs and home schooled and out of school		N/A	50736	N/A	N/A	786

Outside cohort refers to those who were vaccinated but who were outside the routine cohort for vaccination

Local health office (LHO) refers to the LHO of the school. Therefore, in reports the LHOs of homeschooled and out of school children do not appear

N/A-Not applicable

Roscommon Tdap data were excluded as this LHO reported incomplete data entry at the time of data extraction and that a larger number were vaccinated than were recorded on the database; therefore their numbers are excluded here from the total denominator and calculation of percentage uptake figures.

and out of school), and recorded on the School Immunisation System (SIS) are presented in table 4. The vaccinations are provided by vaccination teams from the Local Health Offices (LHOs) who go into schools in their areas to vaccinate. Data on vaccination is inputted into the SIS database at a local level. Please see the HSE National Immunisation Office (NIO) website at <http://www.hse.ie/eng/health/immunisation> for detailed and current information on the school vaccination programme.

The data presented here are the result of collaboration between NIO, School Immunisation Teams, Immunisation Coordinators, Immunisation System Administrators, Immunisation administrative staff and HPSC.

The figures presented in this summary are based on data recorded on the SIS database on the 20th April 2015. These figures are subject to change due to on-going updating of data on the database.

MMR vaccine catch-up campaign

In Ireland the first dose of MMR vaccine is recommended for children at 12 months of age. A second dose of MMR is recommended at four to five years of age. There was a MMR catch-up campaign during the 2012/2013 and 2013/2014 academic years. During the MMR catch up campaign the HSE offered a dose of MMR vaccine to children/students attending primary schools, second level schools and special schools and home-schooled students who had not completed (or were not sure they had) their two dose MMR vaccination schedule. In Ireland this campaign was in response to measles and mumps outbreaks among those who had not received their recommended two MMR vaccine doses. It is also part of the World Health Organization campaign to eliminate measles and congenital rubella. Please see the NIO website at <http://www.hse.ie/eng/health/immunisation/> for detailed and current information on the school vaccination programme.

MMR catch-up data entry was not complete at the time of writing this report and therefore MMR catch-up uptake data are not reported on here.

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20
14

ANNUAL
EPIDEMIOLOGICAL
REPORT



09

HEALTHCARE-ASSOCIATED INFECTIONS
ANTIMICROBIAL CONSUMPTION
ANTIMICROBIAL RESISTANCE

9.1 *Clostridium difficile* Infection

Key Points

- In 2014, 1,802 cases of *Clostridium difficile* infection (CDI) were notified. Of those, 1,613 (89.5%) were classified as new cases, 155 (8.5%) as recurrent, with 34 (2%) of unknown case type. This represents a national crude incidence rate of 38.5 cases per 100,000 population, which represents a small decrease compared to the rate reported in 2013 (41.3)
- Of the 1,802 CDI cases, 1,202 (67%) were reported from patients aged 65 years or older
- The voluntary enhanced CDI surveillance scheme received information on 1,780 CDI cases from 53 hospitals, covering 94% of all cases notified to Public Health Departments. Of those, 1,131 were healthcare-associated, representing a national CDI incidence rate of 2.9 cases per 10,000 bed days used for 2014, an increase from 2.4 in 2013
- Data collected on patient location at symptom onset highlights that CDI is not confined to acute healthcare facilities. It is commonly encountered in long term care facilities (7% of all CDI) and in the community (34% of all CDI)
- Of 290 *C. difficile* isolates with available ribotyping data (16% of all cases) reported from 20 hospitals, the most frequent ribotypes reported in 2014 were: 078 and 014 (both n=31; 11%), 015 (n=27, 9%) and 005 (n=18, 6%).

Notifiable *C. difficile* infection

In May 2008, new cases of CDI in persons two years or older became notifiable in Ireland under the disease category "acute infectious gastroenteritis" (AIG). Since January 2012, CDI has become a notifiable infection in its own category, with both new and recurrent CDI cases now notifiable.

In 2014, 1,802 cases of CDI were notified to Public Health Departments via the Computerised Infectious Diseases Reporting (CIDR) system. Of those, 1,613 (89.5%) were classified as new, 155 (8.5%) as recurrent, with 34 (2%) of unknown case type. All cases were laboratory-confirmed.

The national crude incidence rate (CIR) of new CDI cases in 2014 was 35.1 per 100,000 population, a decrease of 3.3% from 37.5 per 100,000 population in 2013. Taking both new and recurrent cases into account, the overall CIR for 2014 was 38.5 per 100,000 population, which is lower than the reported rate in 2013 (41.3).

Since surveillance began in 2008, there has been a decrease in the incidence of CDI in Ireland (**Figure 1**). Since 2012, the CDI incidence rate has remained stable. There was a slight increase in the number of recurrent cases notified in 2014 (n=155) compared to 2013 (n=146). Identification of seasonal patterns from CIDR notification data is hindered by delayed and batched laboratory notifications.

Figure 2 displays the gender and age breakdown of patients with CDI. The majority were female (61%). The

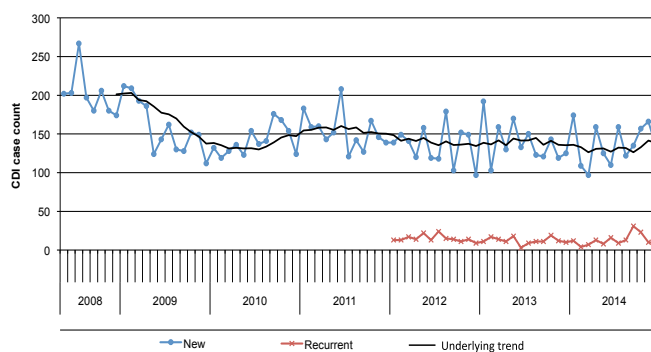


Figure 1. Numbers of CDI notifications by month and case type (2008 – 2014)

mean age was 67 years (range: 2 – 100 years), with 1,202 cases (67%) reported in patients aged 65 years and older.

* Rates calculated using 2011 census data

Regarding patient location at the time of CDI diagnosis, most were classified as 'hospitalised' (72%), with 13% from general practice, 6% from the emergency department, 4% from outpatients or day patients and 4% from either 'other', or 'unknown' patient location. This is similar to that reported in 2013. However, this data does not provide information on the origin or onset of CDI, as that information is collected as part of the enhanced CDI surveillance scheme.

In 2014, 22 deaths were reported in patients with CDI, which is lower than that reported in 2013. One death was attributed to CDI, 12 were not attributed to CDI and for the remaining 9 deaths, the contribution of CDI to death was unknown.

Notifiable *C. difficile* infection: Outbreaks

In 2014, 10 CDI outbreaks, nine of which were healthcare-associated and involving 43 patients, were notified to Public Health Departments as displayed in **Table 1**. Four were linked to hospitals, three to nursing homes, two to residential institutions, and one specified as "other".

Enhanced surveillance of *C. difficile* infection

Although notifiable CDI data provides important preliminary information on the burden of CDI in Ireland,

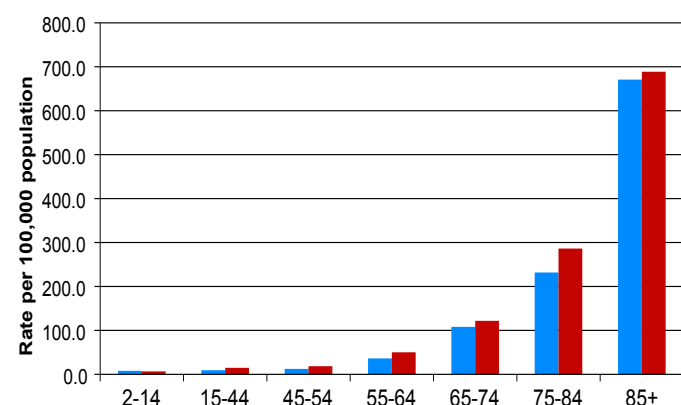


Figure 2: Age and gender distribution of CDI in Ireland, 2014 (Source: CIDR)

Table 1. CDI outbreaks reported in Ireland in 2014 by public health region (Source: CIDR)

Public Health Region	Outbreak location	Total number ill
East	Hospital	4
East	Hospital	6
East	Hospital	7
East	Other	3
East	Nursing Home	3
East	Nursing Home	11
South	Residential	2
South	Nursing Home	2
Midwest	Residential	2
West	Hospital	3

it represents an underestimate of the true burden of CDI, as it does not capture information on the origin, onset or severity of CDI. National collation of *C. difficile* enhanced surveillance information commenced on a voluntary basis on 1st August 2009. Information on case type, origin, onset and infection severity is collected using the European Society for Clinical Microbiology and Infectious Diseases Study Group on *C. difficile* (ESCMID-ESGCD) interim case definitions. To the end of 2014, 53 acute hospitals participated in the voluntary enhanced surveillance CDI scheme, comprising 45 (94%) public hospitals [27 general (100%), nine tertiary (100%) and nine specialist hospitals (75%)] and eight private hospitals (67%).

In 2014, 1,780 CDI cases were reported to the enhanced surveillance scheme (94% of all the CDI cases notified via CIDR). Of those, 1,522 (86%) were classified as new, 149 (8%) as recurrent and 109 (6%) of unknown CDI case type.

Of the reported cases, 48% (n=860) originated within the reporting healthcare facility. The overall national CDI incidence rate of new and recurrent cases combined, acquired within the reporting healthcare facility was 2.2 cases per 10,000 bed days used (BDU), a decrease from 2.4 in 2013. The incidence rate of new CDI was 2.1 cases per 10,000 BDU, a decrease from 2.2 in 2013. The incidence of recurrent cases remained at 0.2 cases, unchanged from 2013. The CDI rate is based on the number of new and recurrent CDI cases that originated in the participating healthcare facility (both

Table 2. Origin and onset of CDI, 2012 – 2014

	Year		
	2012 %	2013 %	2014 %
ONSET: Location of where patient symptoms occurred			
Healthcare-onset	64	60	59
Breakdown of healthcare-onset cases:			
Within reporting hospital	77	76	75
Other hospital	4	2	4
Nursing home/LTCF	16	18	18
Unknown	3	4	3
Community-onset	30	29	34
Unknown	6	11	7
ORIGIN: Location of where infection was acquired			
Healthcare-associated	68	64	64
Breakdown of healthcare-associated cases:			
Within reporting hospital	76	76	76
Other hospital	6	5	5
Nursing home/LTCF	15	17	16
Unknown	3	2	3
Community-associated	17	18	21
Indeterminate	5	5	6
Unknown	10	14	9

public and private hospitals). The rate is calculated using acute public hospital activity data from the HSE Business Intelligence Unit, Corporate Planning and Corporate Performance (CPCP), with private hospital activity data provided directly by participating hospitals.

Since enhanced surveillance began in 2009, the national CDI rate has declined from 3.1 cases per 10,000 BDU (2009) to 2.8 (2010), with an increase to 3.0 (2011). Since 2011, the rate steadily decreased from 2.7 (2012) to 2.3 (2014) (**Figure 3**).

Caution should be taken when interpreting national CDI trends, particularly prior to 2012 due to:

- (i) Changes in the numbers of participating hospitals, as displayed in **Figure 3**. Throughout 2012, the total number of hospitals participating in enhanced CDI surveillance stabilised. Since 2012, there has been a complete participation in CDI enhanced surveillance by all tertiary and general hospitals
- (ii) Changes in *C. difficile* laboratory testing protocols. Throughout 2013 and 2014, there were fewer changes in laboratory testing protocols. Please also refer to the section on laboratory testing of *C. difficile* in Ireland.

There was a wide range in the incidence of CDI among participating hospitals in 2013 (range, 0 – 6.5 cases per 10,000 BDU; median = 1.8 cases). In 2013, tertiary hospitals (n = 9) had a median CDI rate of 2.3 cases per 10,000 BDUs (range: 2.1 – 4.5), which was higher when compared to that of general hospitals (n = 27), with a median rate of 1.8 (range: 0 – 6.5). Since 2011, the median CDI rate in both tertiary (3.0 to 2.3 cases per 10,000 BDU) and general hospitals (2.4 to 1.8 cases per 10,000 BDU) declined.

The differences in CDI median incidence rates may reflect inter-hospital variation with regard to patient case mix, *C. difficile* ribotypes, laboratory testing protocols, antimicrobial prescribing policies, antimicrobial stewardship interventions and surveillance resources. No obvious seasonal trend for CDI is distinguishable from enhanced surveillance data in 2014.

The percentage coverage of acute hospital activity was calculated using bed days used data from participating hospitals as a percentage of total acute hospital bed days used activity in Ireland

Severe CDI

A severe case of CDI is defined as (i) a patient requiring admission to an intensive care unit (ICU) for treatment of CDI or its complications, (ii) a patient requiring colectomy or (iii) death within 30 days after diagnosis, if CDI is either the primary or contributory cause of death. The enhanced CDI surveillance scheme does not collect information on patient outcome. Therefore, surgery and ICU admission for CDI are the two markers of severity captured via enhanced surveillance. In 2014, 26 (1.4%) severe CDI cases were reported, similar to 2013 (1.7%). Eight patients required both surgery and ICU admission,

six required surgery only and 12 required ICU admission without surgery.

Onset & Origin of CDI

Onset: Patient location when symptoms of CDI commenced

Fifty nine percent (n=1,049) of patients had CDI symptom onset in a healthcare facility (healthcare-onset), 34% (n=608) had symptom onset in the community and for 7% (n=123), location at CDI onset was unknown (**Table 2**).

Of the 1,049 patients with healthcare onset CDI, 75% (n=783) had onset in the reporting hospital, 4% (n=42) in another hospital, 18% (n=192) in a long term care facility (LTCF) and for the remaining 4% (n=46) onset location was unknown.

Between 2012 and 2014, there was a decrease in the proportion of patients with CDI symptom onset in a healthcare facility (64 to 59%), with the exception of LTCFs, where a slight increase was noted (16 to 18%). Community onset decreased from 30% to 29% between 2012 and 2013, but increased to 34% in 2014 (**Table 2**).

Origin: Location where the patient acquired the CDI

For the majority of CDI cases, the infection was acquired in a healthcare setting (healthcare-associated) (n=1,131; 63.5%). Community-associated cases accounted for 21.5% (n = 383) and in 6% (n = 111) the origin could not be assigned as either healthcare or community-associated, as the patient had been discharged from a healthcare facility between four and 12 weeks prior to the CDI onset date. For the remaining 9% (n = 155) of cases, the origin was unknown (**Table 2**).

Of the 1,131 healthcare-associated CDI cases, 76% (n=860) originated in the reporting hospital, 4.5% (n=52) originated in a hospital other than the reporting hospital, 16.5% (n=189) originated in a LTCF and 3% (n=33) originated in another unspecified healthcare facility or were of unknown origin.

Between 2012 and 2014, there was a decrease in the proportion of cases associated with a healthcare facility (68 to 64%), although the reporting hospital and other hospital categories remained stable. The proportion of cases associated with the community increased from 17% to 21%, but there was little change in cases classified as indeterminate. Cases classified as 'unknown' increased from 10% to 14% between 2012 and 2013 but decreased to 9% in 2014 (**Table 2**).

Of the 1,131 cases of healthcare-associated CDI:

Table 3. National Reporting of *C. difficile* ribotyping data: 2011 - 2014

Year	Total number of CDI cases reported	Number (%) of cases with ribotype data	Number of hospitals providing ribotype data
2011	1511	211 (14%)	10
2012	1735	263 (15%)	14
2013	1801	258 (14%)	19
2014	1780	290 (16%)	20

- 87% (n=982) experienced onset of CDI symptoms at least 48 hours following admission to a healthcare facility (healthcare-onset, healthcare-associated)
- 13% (n=147) experienced symptom onset in the community, within four weeks of discharge from a healthcare facility (community-onset, healthcare-associated)
- 0.1% (n = 2) had no information recorded on symptom onset

Of the 383 cases of community-associated CDI:

- 91.5% (n=350) experienced CDI symptom onset while outside a healthcare facility and without a history of discharge from a healthcare facility within the previous 12 weeks
- 8% (n=31) experienced symptom onset within the first 48 hours of admission to a healthcare facility, without a history of admission to or residence in a healthcare facility within the previous 12 weeks
- 0.5% (n = 2) had no information recorded on symptom onset

Information was also captured on the location where the patient's faeces specimen was taken. The reporting hospital accounted for the majority (77%) of specimens (n=1,366), with 10% (n=183) taken in the GP surgery, 9% (n=160) in LTCF and 2.5% (n=44) in a hospital other than the reporting hospital. For the remaining 1.5% (n=27), no information was provided.

Discussion

The collation of national data on *C. difficile* through CIDR notifications and the enhanced CDI surveillance system has provided a valuable insight into the burden of CDI in Ireland. Both surveillance systems present a similar decreasing trend since 2009. The notifiable surveillance system, which reflects total burden of disease, shows that the CDI rate stabilised between 2012 and 2014, while the enhanced surveillance system shows a decrease in the CDI rate during this time period, including a decrease in the number of new CDI cases acquired in an acute hospital. The reasons for this decrease are unknown, but may be attributed to improved hand hygiene compliance and other infection

control practices, changes in antimicrobial prescribing or changes in laboratory testing practices.

In 2014, recurrent CDI accounted for 8% of notifications through the enhanced surveillance scheme, a slight decrease from 8.5% in 2013. Recurrent CDI may result in severe infection, which places a further burden on limited hospital isolation resources and results in significant patient morbidity.

CDI is not confined to acute healthcare settings and is increasingly common in LTCF and the community. In 2014, 11% of cases had onset in LTCF, with 34% having onset in the community. Of the 383 community-associated cases reported in 2014, 91% experienced CDI symptom onset in the community, without a history of discharge from a healthcare facility within the previous 12 weeks. It is important to consider CDI in the differential diagnosis of all patients presenting with diarrhoea of potentially infectious origin and to send specimens in a timely fashion for laboratory diagnosis.

C. difficile PCR ribotyping

As part of the voluntary *C. difficile* enhanced surveillance scheme, participating hospitals are requested to provide *C. difficile* PCR ribotyping information, where available. Ireland does not yet have a national *C. difficile* reference laboratory or ribotyping service. Therefore, laboratories submit specimens abroad for ribotyping. In 2014, ribotyping data was provided for 290 *C. difficile* isolates (16% of all samples) from 20 hospitals (Table 3). The most common ribotypes reported in 2014 were: 078 and 014 (both n=31; 11%), 015 (n=27, 9%) and 005 (n=18, 6%) (Figure 4).

Laboratory Testing of *C. difficile* in Ireland

Since 2010, information on *C. difficile* testing has been collected quarterly as part of the enhanced surveillance system. In the first quarter of 2010, the majority of hospitals participating in the enhanced surveillance project were using a one step Toxin EIA (60%). In the last quarter of 2014, this had reduced to 0%. All hospitals participating in the enhanced surveillance system are now using a method which complies with what is recommended in the 2014 update of the 2008 Irish *C. difficile* guidelines. This includes either a PCR test for

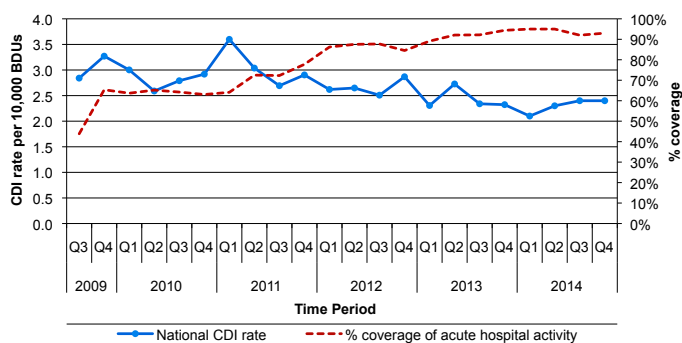


Figure 3. Quarterly national rate of healthcare-associated CDI (new and recurrent): 2009 – 2014

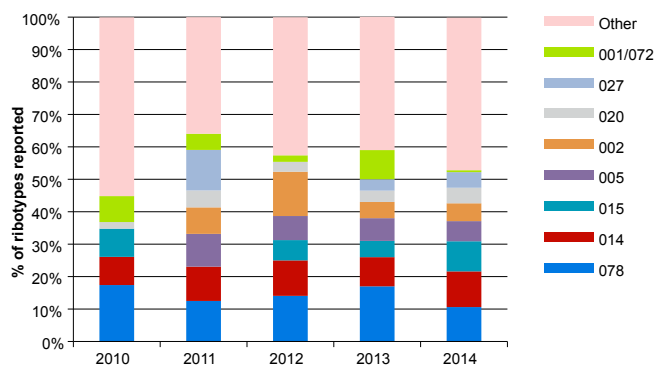


Figure 4. Most frequently reported *C. difficile* ribotypes in Ireland: 2010 – 2014

detection of toxin genes (43%, n=23) or a two-step testing method (57%, n=30) (**Figure 5**).

Owing to considerable variations in current Irish laboratory *C. difficile* testing methodologies, inter-hospital comparison of CDI rates is not recommended where testing methods differ, as the data in the national quarterly enhanced surveillance reports are not adjusted for differences in the sensitivities of the different diagnostic methodologies.

Conclusion

The continued excellent participation in the voluntary CDI enhanced surveillance scheme ensures that a significant amount of information is collected regarding the burden of CDI in Ireland.

The updated National Clinical Guidelines on the Surveillance, Diagnosis and Management of CDI in Ireland were updated in 2013 and endorsed by the National Clinical Effectiveness Committee in 2014. The updated guidelines may be accessed on the HPSC website at:

<http://www.hpsc.ie/A-Z/Gastroenteric/Clostridiumdifficile/Guidelines/>.

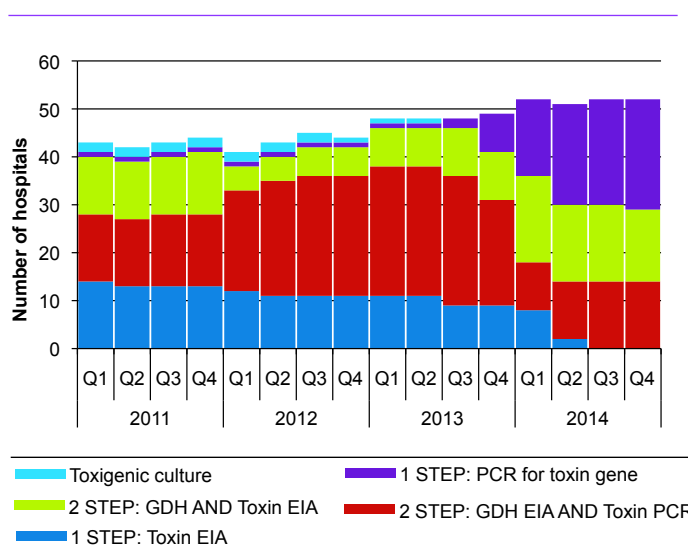


Figure 5. Changes in *C. difficile* laboratory testing protocols: 2011 - 2014

Toxigenic culture: a culture method for the detection of toxin-producing *C. difficile*; **1 STEP: PCR for toxin gene:** Polymerase chain reaction (PCR) for the detection of TcdA and/or TcdB genes; **2 STEP: GDH AND TOXIN EIA:** Enzyme immunoassay (EIA) for the detection of glutamate dehydrogenase (GDH) of *C. difficile* as well as or followed by an EIA for the detection of *C. difficile* TcdA and/or TcdB.; **2 STEP: GDH EIA AND Toxin PCR:** EIA for the detection of GDH of *C. difficile* as a first screening test followed by a PCR for the detection of TcdA and/or TcdB genes; **1 STEP: Toxin EIA:** EIA for the detection of *C. difficile* TcdA and/or TcdB.

9.2 Alcohol Hand Rub Surveillance

Summary

Key Points

- The median rate of alcohol hand rub consumption in acute hospital in Ireland increased by 5% to 27.7 litres per 1,000 bed-days used in 2014, from 26.3 in 2013

Hand hygiene is one of the most important actions to prevent HCAI. Alcohol hand rubs (AHR) are an effective and rapid method of hand hygiene, and recommended as the primary means of hand hygiene in national and international guidelines. Measurement, which includes alcohol hand gels and foams, of hospital-level consumption of AHR, expressed as volume used per 1,000 bed-days, has been shown to correlate with overall hand hygiene activity in hospitals. It is a recommended process measure of hand hygiene activity by both the World Health Organization (WHO) and the US Centers for Disease Control & Prevention (CDC).

HPSC has collated data on AHR consumption in acute public hospitals in Ireland since 2006. The data are collected quarterly and represent the total volume of AHR dispensed to wards, clinics and other hospital areas for hospitals that provide the data via their pharmacy department, and total volume purchased for hospitals that provide the data via their supplies department. Quantities used for pre-operative surgical hand hygiene were excluded. The rate of usage per hospital is calculated as the total volume of AHR consumed in litres per 1,000 bed-days used (Table 1).

In 2014 the median rate of AHR consumption increased to 27.7 litres per 1,000 bed-days used, from a 26.3 in 2013, an increase of 5%. The wide variation in levels of AHR consumption between hospitals (4.3 - 72.1 litres per 1,000 bed-days used) though not as wide as seen in past years, may be explained by differences in methodologies for collecting and reporting the data, and difference in types and range of hand hygiene agents used. One limitation of this surveillance system is that the data refer to the use of AHR only, and do not take account of the other hand hygiene agents (e.g. medicated liquid soap) that may also be in use in

hospitals. In addition, the data do not give an indication of the frequency with which hand decontamination is carried out at a given hospital, whether or not hand hygiene is carried out at the correct time or using the correct technique, nor distinguish between who has used the AHR (visitor, patient or healthcare worker). Nevertheless, given that AHR should be used for the vast majority of hand hygiene opportunities in hospital settings, AHR consumption remains a useful process measure for hand hygiene activity.

The data are prone to reporting artefacts, particularly for hospitals that report supplies (rather than pharmacy dispensing) data. For example, the hospital with the highest reported rate had undergone a change in suppliers and the products had been restocked in all areas of the hospital over a relatively short period of time. It is expected that there will be occasional outliers of this nature. Using the median consumption figure provides a stable indicator of the national AHR rate over time. However, the volume of AHR consumed remains a crude measure of hand hygiene activity at individual hospital level and must be viewed with other indicators such as direct observation of hand hygiene compliance.

Table 1. National data on AHR consumption in acute public hospitals in Ireland by year, 2006 – 2014.

	Number of participating hospitals	National consumption rate*	Range for participating hospitals
2006	52	10.0	0.5 - 29.0
2007	50	15.0	5.2 - 47.1
2008	50	18.1	5.9 - 67.0
2009	49	20.3	4.1 - 47.7
2010	45	18.8	4.2 - 36.4
2011	43	21.3	10.9 - 130.0
2012	44	23.8	9.6 - 160.0
2013	44	26.3	16.4 - 132.5
2014	43	27.7	4.3 - 72.1

* The consumption rate is the total volume of AHR consumed in the defined time period in litres per 1,000 bed-days used. The national rate represents the median of the national sample for each time period.

9.3 Hand Hygiene Compliance

Summary

- Two national hand hygiene compliance audits took place in 2014
- For Period 7 (May/June), 51 hospitals participated: 44 HSE and 7 private. In total, 10,669 opportunities for hand hygiene were observed; achieving an average compliance of 86.8%, range 62.4% to 97.1%
- For Period 8 (October/November), 51 hospitals participated: 44 HSE and 7 private. In total, 10,672 opportunities for hand hygiene were observed; achieving an average compliance of 88.1%, range 70.0% to 98.6%
- The overall compliance for the combined periods for HSE hospitals was 86.4%, which is below the HSE target for 2014 of 90%, however, the underlying trend is increasing. Compliance for the participating private hospitals over both periods was 94.0%

Hand hygiene is one of the most important actions to prevent HCAI. Measuring hand hygiene compliance by direct observation is described by the World Health Organization (WHO) as the gold standard. In Ireland, biannual hand hygiene compliance data from acute hospitals commenced in 2011. Healthcare workers (HCWs) were observed for their compliance against the '5 moments of hand hygiene' by trained auditors using the WHO methodology for hand hygiene audits. Each hospital was required to measure HCW compliance against 30 hand hygiene opportunities for each of the seven randomly selected wards in their facility resulting in a maximum of 210 opportunities per hospital per period. In 2013, the analysis and management of data were moved to the HPSC online service, MicroB.

Biannual audits were undertaken in May/June (Period 7) and October/November 2013 (Period 8). In total, 10,669 opportunities for hand hygiene were observed for Period 7; achieving an average compliance of 86.8%, range 62.4% to 97.1%. For Period 8, 10,672 opportunities for hand hygiene were observed; achieving an average compliance of 88.1%, range 70.0% to 98.6%

Table 1: Summary of hand hygiene compliance in acute hospitals in Ireland combined for the two national audit periods in 2014. Note that data from private hospitals were excluded for the Staff Categories and WHO 5 Moments sections.

	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Overall	21,341	18,655	87.4%	86.9%	87.9%
HSE Hospitals	18,430	15,918	86.4%	85.8%	86.9%
Private Hospitals	2,911	2,737	94.0%	93.1%	94.9%
HSE - South	6,294	5,390	85.6%	84.7%	86.6%
HSE - Dublin North-East	3,772	3,209	85.1%	83.8%	86.3%
HSE - Dublin Mid-Leinster	4,194	3,656	87.2%	86.1%	88.3%
HSE - West	4,170	3,663	87.8%	86.8%	88.9%
Nurse/Midwife	10,653	9,595	90.1%	89.5%	90.7%
Auxiliary	2,900	2,445	84.3%	82.9%	85.8%
Medical	3,478	2,648	76.1%	74.5%	77.8%
Allied health/Other	1,399	1,230	87.9%	86.1%	89.7%
Moment 1	4,917	4,269	86.8%	85.8%	87.8%
Moment 2	986	819	83.1%	80.5%	85.6%
Moment 3	1,381	1,262	91.4%	89.8%	92.9%
Moment 4	6,693	6,019	89.9%	89.2%	90.7%
Moment 5	5,548	4,543	81.9%	80.8%	83.0%

Staff category: "Auxiliary" includes healthcare assistants, porters, catering and household services; "Allied health/Other" includes physiotherapists, radiologists, dieticians, social workers and pharmacists

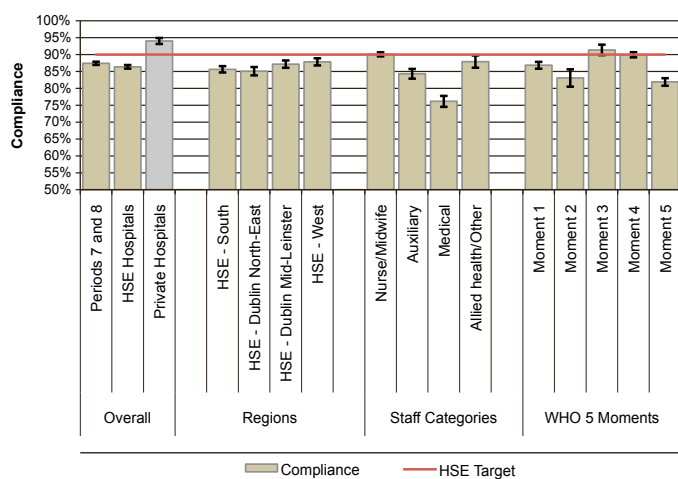
- Moment 1: Before touching a patient;
- Moment 2: Before clean/aseptic procedure;
- Moment 3: After body fluid exposure risk;
- Moment 4: After touching a patient;
- Moment 5: After touching patient surroundings

Results for the two periods are combined in a summary in Table 1 and Figure 1. In 2014, the overall compliance for HSE and private hospitals combined was 87.4%, and was 86.4% for HSE hospitals, below the 2013 target of 90%. The underlying trend for compliance among HSE hospitals has increased (Figure 2) over the first six periods, however, over the last two periods, compliance has levelled. Participating private hospitals had reported an overall compliance of 94.0% in 2014.

In 2014, of the four major HCW categories, medical staff had the lowest compliance at 76.1% and nurse/midwife staff the highest at 90.1%. Based on the WHO '5 moments for hand hygiene', compliance for moment 5 (after touching patient surroundings) was the lowest at 81.9% and the highest for moment 3 (after body fluid exposure risk) at 91.4%. The proportion of hand hygiene actions that were undertaken using soap and water was 30.2% as opposed to hand rub at 69.8%. Note that data from private hospitals were excluded for the Staff Categories and WHO 5 Moments sections in Table 1 and Figure 1.

While standardised hand hygiene auditor training and validation (with inter-rater reliability testing) should

ensure that measurement of hand hygiene should be comparable, the results have not been validated by external auditors. Furthermore, all auditors measured compliance in the facility in which they work; therefore there may be an element of bias in the results. It is therefore possible that hand hygiene auditing may not have been performed in a comparable fashion in all hospitals. The results may also not be reflective of HCW compliance at all times. Compliance with hand hygiene is measured by auditors observing HCWs workers undertaking patient care who may change their behaviour if aware that they are being observed. However, it is also known that this effect (known as the Hawthorne effect) diminishes over time and HCWs under observation may not be aware of the presence of the auditor due to the many competing demands on their attention. Auditors are requested to give immediate feedback to ward staff following an audit, thereby increasing awareness and knowledge of hand hygiene. This risk of bias should be balanced by the benefits of increasing local staff's knowledge and awareness of hand hygiene.



Staff category: "Auxiliary" includes healthcare assistants, porter, catering and household services; "Allied health/Other" includes physiotherapists, radiologists, dieticians, social workers and pharmacists

- Moment 1: Before touching a patient;
- Moment 2: Before clean/aseptic procedure;
- Moment 3: After body fluid exposure risk;
- Moment 4: After touching a patient;
- Moment 5: After touching patient surroundings

Figure 1: Summary of hand hygiene compliance in acute hospitals in Ireland combined for the two national audit periods in 2014. The 95% confidence intervals are shown in bars and the HSE target for 2014 (90%) is shown as a red line.

Note that data from private hospitals were excluded for the Staff Categories and WHO 5 Moments.

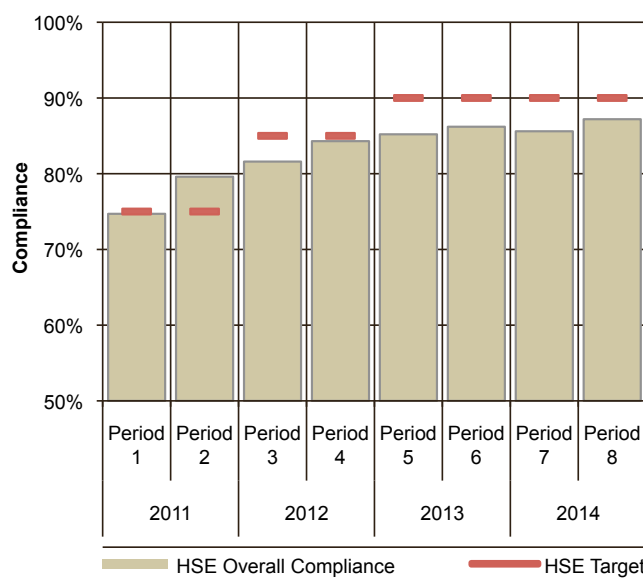


Figure 2: Summary of hand hygiene compliance in HSE acute hospitals in Ireland for the last eight national audit periods, 2011 to 2014. The HSE target for each year is shown as red lines.

9.4 Antimicrobial Consumption

Key Points

- The overall outpatient antimicrobial consumption in Ireland for 2014 was 23.1 DID, a 3% decrease from the 2013 rate of 23.8 DID. This rate is mid-to-high in comparison with other European countries
- The median rate of hospital antimicrobial consumption in Ireland for 2014 was 82.9 DBD (range 36.4 – 128.8 DBD), a 2% decrease from 2013. This rate is mid-range in comparison with other European countries. Forty-three public acute hospitals contributed data in 2014

Ireland participates in ECDC's European Surveillance of Antimicrobial Consumption (ESAC-Net) project which aims to collect systemic antimicrobial usage data from the outpatient (ambulatory, community or primary care) setting and from the hospital (inpatient) setting. Antimicrobial consumption is measured in Defined Daily Dose (DDD), which is the assumed average maintenance dose per day for a drug used for its main indication in adults. Rates are calculated in DDD per 1000 inhabitants per day (DID) for outpatients and DDD per 100 bed-days used (DBD) for inpatients. Please see "Antimicrobial consumption" and "Denominator data" parts of the explanatory notes section for further details.

Outpatient Antimicrobial Consumption

The overall outpatient antimicrobial consumption for Ireland in 2014 was 23.1 DID, a decrease of 3% from the previous year's rate of 23.8 DID. In the latest interim ESAC-Net report (provisional 2014 data), the reported range of outpatient antimicrobial usage among European countries was 10.6 to 34.1 DID; the median for 30 European countries with reliable data was 19.8 DID, with Ireland ranking as the ninth highest.

The underlying trend for outpatient antimicrobial consumption for Ireland (Figure 1) has been increasing steadily since 2000. After a decrease in 2008 and 2009, the rate increased again to the highest level so far in quarter 1 of 2013, before a small decrease in the first

half of 2014. There is a marked seasonal fluctuation in usage, with the highest levels occurring during periods of increased influenza activity.

In Ireland in 2014, outpatient consumption of penicillins accounted for the largest class used (57% of total at 13.2 DID), followed by macrolides (18%, 4.2 DID), tetracyclines (12%, 2.7 DID), cephalosporins (5%, 1.1 DID), sulphonamides/trimethoprim (4%, 1.0 DID) and fluoroquinolones (4%, 0.8 DID). Penicillin in combination with a beta-lactamase inhibitor (such as co-amoxiclav) accounted for the largest proportion of all penicillins at 45% (6.0 DID). Broad-spectrum penicillin (such as amoxicillin) usage was also high at 33% of all penicillins (4.3 DID). See Table 1 for a detailed breakdown by pharmacological drug groups.

There was considerable variability in the overall outpatient antimicrobial usage at county level (16.8 to 32.8 DID) as shown in Figure 2.

Hospital Antimicrobial Consumption

Forty-three public acute hospitals provided valid antimicrobial usage data for 2014. The median rate of antimicrobial consumption was 82.9 DBD (range 36.4 – 128.8 DBD). This was a 2% decrease from the previous year's median rate of 84.4 DBD. The overall rate for 2014 was 82.1 DBD. These levels are mid-to-high in Europe.

The largest group of antimicrobials, penicillins at 39.9 DBD accounted for 49% of all inpatient antimicrobial usage. The use of fluoroquinolones such as ciprofloxacin (representing 6% of all inpatient antimicrobial usage) was 5.3 DBD. Consumption of cephalosporins, monobactams and carbapenems (representing 10% of all inpatient antimicrobial usage) was 7.9 DBD. Consumption of glycopeptides such as intravenous vancomycin, imidazoles such as intravenous metronidazole and nitrofurans (representing 11% of all inpatient antimicrobial usage) was 8.9 DBD. Consumption of erythromycin and related agents (macrolides, representing 14% of all inpatient antimicrobial usage) was 11.7 DBD. Less frequently used agents in hospitals are tetracyclines, sulfonamides/trimethoprim, aminoglycosides and other systemic

antimicrobials; collectively these drugs represent less than 10% of all inpatient antimicrobial usage. All consumptions levels remained proportionately the same as those seen 2013 (see Figure 3). The rate of carbapenem use has increased sharply from a rate of 1.2 DBD in 2007 to 3.3 in 2013, however, the level has remained the same for 2014.

It should be noted that the data do not indicate whether or not the level of antimicrobial use is appropriate for a given patient populations. For example, higher levels of antimicrobial consumption among tertiary hospitals may be appropriate if such hospitals have specific patient populations that are more likely to require antimicrobial therapy (e.g.

organ transplant, cystic fibrosis etc). Furthermore, DDD calculations are based on adult dosing and may therefore underestimate antimicrobial consumption in paediatric settings.

Though HPSC antimicrobial consumption data are comprehensive, gaps remain. Most notably, data from private hospitals is missing. All hospitals dispense to outpatients, day-patients and external long term facilities, and the data representing this volume is excluded from our analyses. Outpatient data represents 95% of wholesaler to retail pharmacy transactions, therefore, there is a further gap in the data. Collectively, these gaps would represent about 10% of the total antimicrobial consumption for Ireland. Though HPSC

Table 1. Breakdown by pharmacological drug groups for outpatient antibiotic use in Ireland for 2012 and 2013.

	2013	Percent of 2013	2014	Percent of 2014	Percent Change 2013 to 2014
Penicillins	13.1	55.1%	13.2	56.9%	0.3%
Narrow spectrum penicillins	1.1	4.5%	1.0	4.5%	-2.2%
Beta-lactamase resistant penicillins	1.2	5.0%	1.8	8.0%	54.6%
Broad spectrum penicillins	3.9	16.4%	4.3	18.4%	9.3%
Penicillin with beta-lactamase inhibitor	7.0	29.2%	6.0	26.0%	-13.6%
Macrolides and related drugs	4.4	18.5%	4.2	18.1%	-5.0%
Tetracyclines	3.0	12.5%	2.7	11.8%	-7.7%
Cephalosporins and other beta-lactam drugs	1.4	5.7%	1.1	4.8%	-18.5%
First-generation cephalosporins	0.2	0.8%	0.2	1.1%	25.3%
Second-generation cephalosporins	1.1	4.5%	0.8	3.4%	-26.0%
Third-generation cephalosporins	0.1	0.4%	0.1	0.3%	-25.9%
Quinolones	0.9	3.7%	0.8	3.7%	-3.1%
Sulfonamides and Trimethoprim	1.0	4.1%	1.0	4.4%	2.3%
Other antibiotics	0.1	0.4%	0.1	0.4%	-14.8%
TOTAL	23.8	100.0%	23.1	100.0%	-2.8%

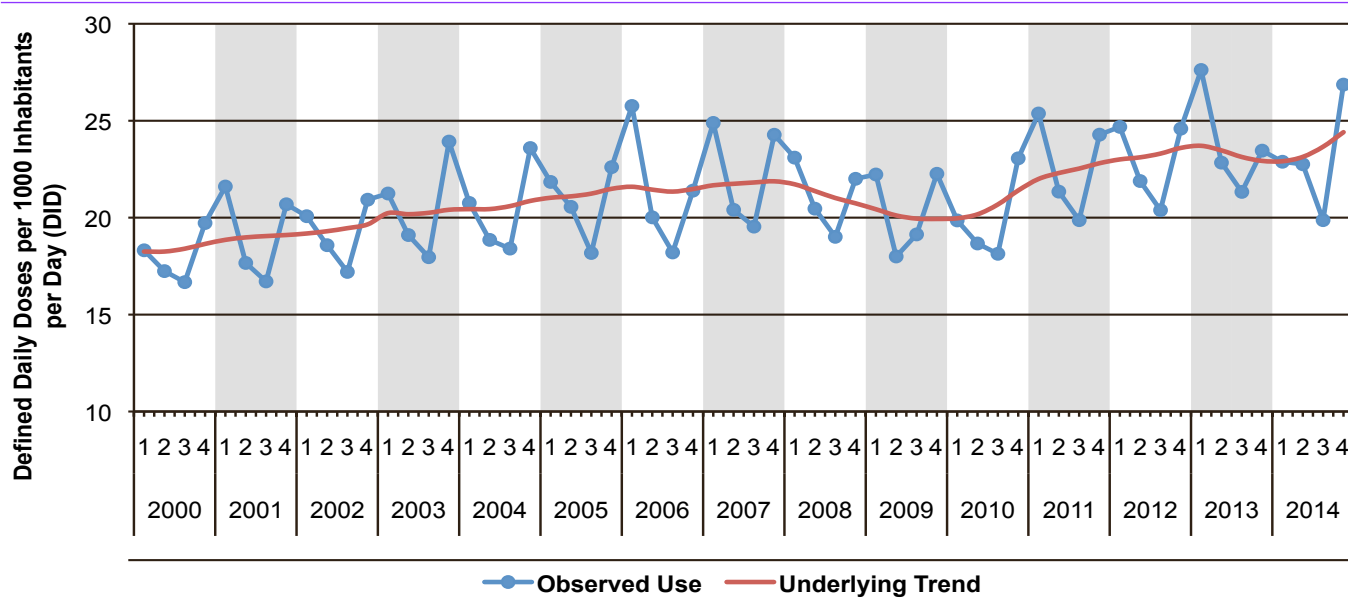


Figure 1. Outpatient antibiotic consumption in Ireland by quarter, 2000-2014.

provides antifungal consumption data to ESAC-Net, this report is primarily focussed on antibacterial drug consumption only. ESAC-Net collects data on antiviral and antiprotozoal agents which HPSC currently do not provide.

More detailed analyses of antimicrobial usage data can be found on the www.hpsc.ie website, through "Topics A-Z", under "Antibiotic Consumption Surveillance". Details of the WHO ATC/DDD system of classifying and measuring drug consumption can be found at www.whocc.no/atc_ddd_index/. The figures presented in this report may vary from previously published levels owing to methodological changes.

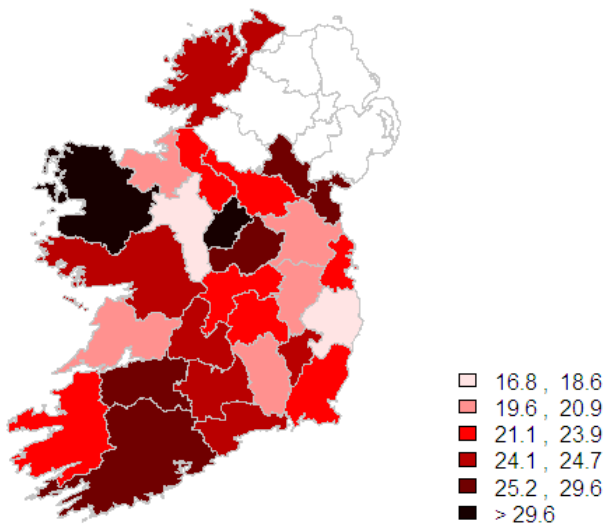


Figure 2. Outpatient antibiotic consumption in Ireland by county, in DDD per 1000 inhabitants per day for 2014.

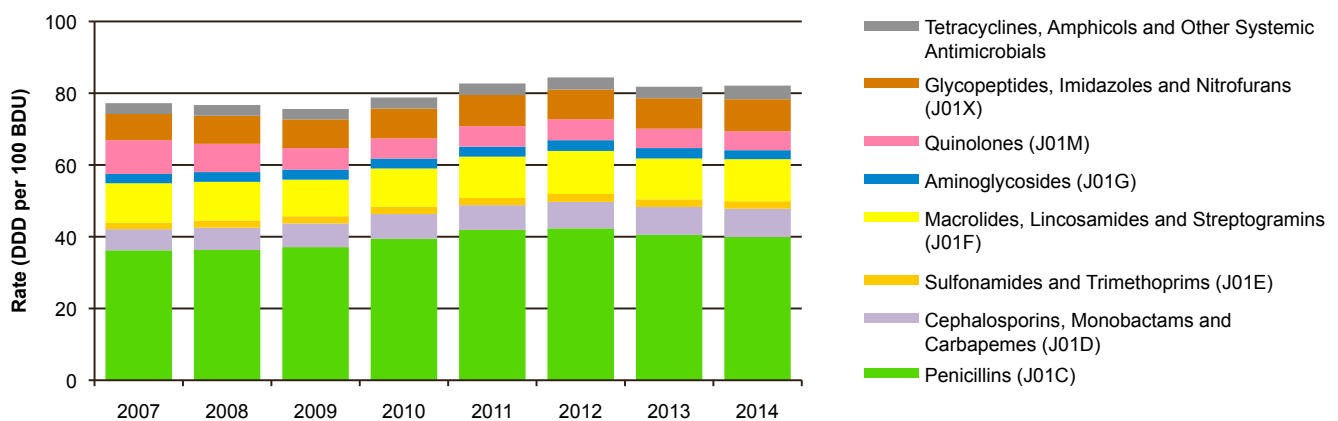


Figure 3. Overall hospital antibiotic consumption rate in DDD per 100 BDU by pharmacological subgroup (ATC level 3) by year.

9.5 Antimicrobial Resistance

Key Points

- There were 2,771 reports of invasive *E. coli* infection, an increase of 9.5% from 2,530 in 2013:
 - The proportions of invasive *E. coli* resistant to 3rd generation cephalosporins (3GCs) (12.9%), ciprofloxacin (26.2%) and aminoglycosides (14.5%) and those that exhibited multi-drug resistance (15.0%) were at their highest levels since surveillance began
- There were 1,118 reports of *S. aureus* bloodstream infection (BSI), an increase of 2.2% from 1,094 in 2013:
 - Of those, 218 (19.5%) were methicillin-resistant *S. aureus* (MRSA), which is the lowest annual proportion reported to date
 - For acute hospitals, the rate of MRSA BSI was 0.055 cases per 1,000 bed days used (BDU), a slight decrease from 0.056 in 2013. Conversely, the rate of methicillin-susceptible *S. aureus* (MSSA) BSI increased from 0.218 in 2013 to 0.227 in 2014
- There were 404 reports of *E. faecium* BSI, a slight decrease of 1.2% from 409 in 2013:
 - Vancomycin-resistant *E. faecium* (VREfm) accounted for 46.0%, which is the highest annual proportion reported to date
- There were 358 reports of invasive *K. pneumoniae* infection, an increase of 9.8% from 326 in 2013:
 - The proportions of invasive *K. pneumoniae* resistant to 3GCs (12.8%) and those that were ESBL-positive (11.0%) decreased from 2013 (21.2% and 18.4%, respectively) when they were at their highest levels reported to date
 - Two predominant clones have been identified among *K. pneumoniae* that are both ESBL-positive and non-susceptible to ciprofloxacin and gentamicin. Some also produce carbapenemases. Together, these are termed multi-drug resistant *K. pneumoniae* (MDRKP). An outbreak control team was established in October 2013 to investigate this emerging threat. The proportion of invasive *K. pneumoniae* that were MDRKP decreased between 2013 (12.3%, or 40 of 325 isolates) and 2014 (8.1%, or 29 of 358 isolates)
 - Two invasive *K. pneumoniae* isolates were carbapenemase-producers, also known as carbapenem-resistant *Enterobacteriaceae* (CRE)
- There were 331 reports of invasive *S. pneumoniae* infection, an increase of 6.4% from 311 in 2013:
 - Of those, 56 (17.1%) were penicillin non-susceptible *S. pneumoniae* (PNSP), a decrease from 20.7% in 2013
 - The national rate of invasive infection was 7.2 per 100,000 population, an increase compared to 6.8 in 2013
 - Serotype data were available for 298 (or 90%) of 331 invasive *S. pneumoniae* isolates. Results indicate good coverage (68%) for the 23-valent pneumococcal polysaccharide vaccine (PPV23) in its target population (adults ≥65 years)
- There were 182 reports of invasive *P. aeruginosa* infection, a decrease of 12% from 207 in 2013 and resistance to all indicator antimicrobials, except for piperacillin-tazobactam, decreased
- Enhanced surveillance data were provided on 2,202 records (cases or isolates under the EARS-Net definition) from 21 laboratories, representing 40% of all reported cases in 2014
- See <http://www.hpsc.ie> for further details of EARS-Net, antimicrobial resistance and enhanced BSI surveillance in Ireland
- European data are available at <http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx>

Introduction

The European Antimicrobial Resistance Surveillance Network (EARS-Net), previously the European Antimicrobial Resistance Surveillance System (EARSS), collects routinely-generated antimicrobial susceptibility testing data on seven important bacterial pathogens using the EARS-Net case definition. Participating laboratories in Ireland submit data on the “primary” or first isolate from blood or cerebrospinal fluid (CSF) per patient per quarter. EARS-Net does not distinguish clinically significant isolates from contaminants, nor does it distinguish between hospital-acquired, healthcare-associated and community-acquired infections. EARS-Net primarily serves as a surveillance system to measure national levels of antimicrobial resistance (AMR). In 2014, all 39 microbiology laboratories participated in EARS-Net resulting in complete coverage of the Irish population.

Escherichia coli

There were 2,771 reports of invasive *E. coli* infection (2,765 from blood and six from CSF) from 2,705 patients, an increase of 9.5% from 2,530 reports in 2013. **Table 1** displays the annual trends since 2005 in the proportion of *E. coli* isolates resistant to the five “indicator” antimicrobials/antimicrobial classes [ampicillin, third-generation cephalosporins (3GCs); cefotaxime, ceftriaxone, ceftazidime or cefpodoxime, fluoroquinolones (ciprofloxacin or ofloxacin), aminoglycosides (gentamicin, amikacin or tobramycin) and carbapenems (meropenem or ertapenem)]:

- Of 2,769 isolates, 357 (12.9%) were resistant to 3GCs and of those, 268 were extended-spectrum beta-lactamase (ESBL)-positive and 87 ESBL-negative
- Of 2,769 isolates, 725 (26.2%) were resistant to ciprofloxacin
- Of 2,771 isolates, 310 (11.2%) were resistant to gentamicin [403 (14.5%) of 2,771 were aminoglycoside-resistant (i.e. resistant to gentamicin, tobramycin or amikacin)]
- Two (0.1%) of 2,270 isolates were resistant to carbapenems, one of which was confirmed to be a carbapenemase-producer (an NDM)

In 2014, resistance to 3GCs, ciprofloxacin and aminoglycosides were at their highest levels since surveillance began (**Figure 1**). The trend in 3GC resistance was upwards between 2004 and 2014, which is highly significant ($P<0.001$), although there appeared to be a levelling off in 2014.

In 2014, Ireland had moderately high levels (10 to <25%) of resistance to 3GCs (**Figure 2**) and aminoglycosides (ranking 13th and 11th, respectively, out of 30 countries reporting to EARS-Net) and a higher level (25 to <50%) of resistance to ciprofloxacin (ranking 13th). The median proportions for resistance among EARS-Net countries was 11.3% for 3GCs, 22.5% for ciprofloxacin and 12.3% for aminoglycosides.

ESBLs are enzymes that confer resistance to most penicillins and cephalosporins (including 3GCs). ESBL-positive bacteria (including *E. coli* and *K. pneumoniae*) are also often resistant to other classes of antimicrobials and have emerged as important causes of healthcare-associated infection (HCAI). ESBLs were detected in 280 (10.2%) of 2,757 isolates tested. In 2014, ESBL production amongst invasive *E. coli* isolates was at its second highest level (after 2013) since surveillance began. The trend in ESBL production was upwards between 2004 and 2013, which was highly significant ($P<0.001$). In 2014, ESBL production appeared to level off.

Of 2,766 isolates tested against all five “indicator” antimicrobials, 416 (15.0%) reported from 50 hospitals/institutions were identified as multi-drug resistant (MDR) *E. coli*, defined as resistance to three or more of the indicator antimicrobials OR any isolate with resistance to carbapenems), a slight increase from 14.8% in 2013:

- 153 resistant to ampicillin, 3GCs, ciprofloxacin and aminoglycosides (of which 137 ESBL-positive and 15 ESBL-negative)
- 119 resistant to ampicillin, 3GCs and ciprofloxacin (of which 108 ESBL-positive and 11 ESBL-negative)
- 134 resistant to ampicillin, ciprofloxacin and aminoglycosides (of which 4 ESBL-positive and 129 ESBL-negative)
- Eight resistant to ampicillin, 3GCs and aminoglycosides (of which 5 ESBL-positive and 3 ESBL-negative)
- One resistant to ampicillin, 3GCs and carbapenems (ESBL not reported)
- One resistant to ampicillin and carbapenems (ESBL-negative)

In 2014, MDR *E. coli* was at its highest level since surveillance began. Since 2009, the trend in MDR *E. coli* has been upwards, which is highly significant ($P<0.001$).

Females were slightly more likely (1.1-times) to have an invasive *E. coli* infection than males (highly significant, $P<0.001$). The frequency of invasive *E. coli* infection increased with age, with the majority ($n=2,134$; 77%) occurring in adults aged over 60. The median age was 74 years (95%CI, 73-74).

Staphylococcus aureus

There were 1,118 reports of *S. aureus* BSI from 1,072 patients, an increase of 2.2% from 2013 ($n=1,094$). Of those, 218 (19.5%) were MRSA, which represents the lowest annual proportion since surveillance began in 1999 (**Table 1** shows data from 2005). In 2010, the proportion was 24.4%, the first year that MRSA accounted for <25% of *S. aureus* BSI in Ireland, thus changing from red to orange on the EARS-Net map and 2014 was the eighth successive year in which a decrease was observed. The overall downward trend over this time period is highly significant ($P<0.001$) (**Figure 3**). Overall, there was a 1.8% reduction in the

Table 1. Summary of EARS-Net data by pathogen and year, 2005-2014

Pathogen	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number laboratories by year-end	41	42	44	42	43	40†	41†	41	41	39†
<i>E. coli</i>										
Number of isolates	1445	1656	1785	1926	2064	2170	2210	2450	2530	2771
%Ampicillin-R*	67.6	70.7	68.3	70.4	68.7	68.4	71.9	69.6	70.9	69.9
%3GC-R*	4.1	4.2	6.7	7.4	7.5	8.3	9.5	10.8	12.8	12.9
%ESBL-producers*	2.4	2.5	4.1	5.0	5.8	6.1	7.5	8.8	10.5	10.2
%Ciprofloxacin-R*	17.3	21.5	22.1	23.3	22.3	23.6	23.8	25.2	25.3	26.2
%Gentamicin-R*	8.5	7.7	9.9	10.2	7.7	9.4	8.7	9.7	9.8	11.2
%Gentamicin/Amikacin/Tobramycin-R*	8.6	8.6	10.6	11.0	9.3	11.8	12.2	12.6	12.8	14.5
%Carbapenem1-R*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
%MDR*	7.7	9.0	11.3	12.1	10.4	11.7	13.0	13.4	14.8	15.0
Number laboratories by year-end	42	42	44	43	43	40†	41†	41	41	39†
<i>S. aureus</i>										
Number of isolates	1424	1412	1393	1303	1309	1251	1095	1060	1094	1118
Number Meticillin-R (or MRSA)	592	592	536	439	355	305	263	242	222	218
%Meticillin-R (or MRSA)	41.6	41.9	38.5	33.7	27.1	24.4	24.0	22.8	20.3	19.5
Number laboratories by year-end	41	42	44	42	43	40†	41†	41	41	39†
<i>E. faecium</i>										
Number of isolates	224	265	330	406	397	392	364	392	409	404
%Ampicillin-R*	92.3	93.9	93.1	95.1	92.9	95.6	95.9	92.9	93.2	95.3
%Vancomycin-R (VREfm)	31.7	37.1	33.4	35.7	38.3	39.3	37.4	45.4	43.1	46.0
%HLG-R*	51.4	44.3	35.2	28.1	39.1	39.6	36.8	39.3	41.4	44.1
%MDR*	25.6	25.6	22.7	16.2	26.7	24.9	21.1	20.3	19.6	22.2
Number laboratories by year-end		36	39	41	42	40†	41†	41	41	39†
<i>K. pneumoniae</i>										
Number of isolates	No data	217	244	310	323	326	312	345	326	358
%Ampicillin-R*	No data	97.7	99.2	99.7	99.7	99.1	100.0	98.5	99.1	100.0
%3GC-R*	No data	10.2	9.9	11.4	11.2	10.5	8.0	11.9	21.2	12.8
%ESBL-producers*	No data	8.6	3.7	7.7	8.2	5.0	5.6	8.8	18.4	11.0
%Ciprofloxacin-R*	No data	15.3	18.1	12.8	13.0	10.5	13.2	11.9	20.9	17.3
%Gentamicin-R*	No data	7.8	9.9	10.7	11.1	6.8	7.4	9.9	16.9	12.6
%Gentamicin/Amikacin/Tobramycin-R*	No data	9.2	11.1	10.7	11.1	7.1	8.3	9.6	17.5	13.2
%Carbapenem1-R*	No data	0.0	0.6	0.0	0.0	0.0	1.6	0.3	1.2	1.1
%MDRKP2*	No data	1.7	2.9	3.9	4.3	2.2	4.6	5.3	12.3	8.1
%MDR*	No data	11.2	11.9	10.6	11.9	8.0	8.4	9.9	19.7	13.7
Number laboratories by year-end	42	42	44	42	43	40†	41†	41	41	39†
<i>S. pneumoniae</i>										
Number of isolates	401	407	438	447	356	314	327	321	311	331
%Penicillin-NS*	11.7	15.7	17.4	23.1	20.2	18.2	19.6	19.6	20.8	17.1
of which: %HLR	3.0	2.9	5.7	6.0	5.6	4.8	6.1	4.7	2.3	2.4
%Int	8.7	12.5	11.0	16.8	13.8	12.7	13.5	15.0	18.3	14.5
%Erythromycin-R*	12.1	16.1	16.4	16.7	17.3	15.7	18.9	16.9	17.9	13.8
%Penicillin-NS/Erythromycin-R	3.2	7.4	7.9	10.2	11.9	12.6	13.8	12.1	13.3	10.4
Number laboratories by year-end	41	42	44	42	43	40†	41†	41	41	39†
<i>E. faecalis</i>										
Number of isolates	290	294	280	301	289	298	265	298	336	316
%Ampicillin-R*	3.5	4.5	2.2	0.7	2.1	0.7	0.8	4.0	2.7	1.9
%Vancomycin-R (VREfa)	2.5	3.7	2.9	3.7	0.7	0.3	4.9	3.0	2.1	2.8
%HLG-R*	44.4	42.4	36.9	30.5	36.7	29.7	29.1	32.9	33.6	33.0
Number laboratories by year-end		36	39	41	42	40†	41†	41	41	39†
<i>P. aeruginosa</i>										
Number of isolates	No data	128	177	199	248	222	184	219	207	182
%Piperacillin/tazobactam-R*	No data	9.4	12.6	9.7	8.9	10.0	2.8	17.4	15.2	16.5
%Ceftazidime-R*	No data	10.6	11.8	8.7	11.8	9.2	8.2	15.2	10.7	8.9
%Imipenem/meropenem-R*	No data	11.8	12.2	9.3	10.2	8.3	12.0	19.6	12.1	11.6
%Ciprofloxacin-R*	No data	18.0	22.9	21.8	12.1	13.2	12.6	20.6	15.0	13.7
%Gentamicin-R*	No data	10.2	13.3	9.0	7.7	8.7	6.5	11.9	11.6	4.9
%Gentamicin/Amikacin/Tobramycin-R*	No data	10.2	13.3	9.0	7.7	8.7	6.5	11.9	11.6	5.5
%MDR*	No data	9.5	12.4	11.1	6.4	6.5	4.0	13.0	9.4	6.7
Number laboratories by year-end									41	39†
<i>Acinetobacter</i> spp.										
Number of isolates	No data	No data	No data	No data	No data	No data	No data	No data	91	93
%Ciprofloxacin-R*	No data	No data	No data	No data	No data	No data	No data	No data	3	8
%Gentamicin-R*	No data	No data	No data	No data	No data	No data	No data	No data	0	3
%Gentamicin/Amikacin/Tobramycin-R*	No data	No data	No data	No data	No data	No data	No data	No data	1	3
%Carbapenem1-R*	No data	No data	No data	No data	No data	No data	No data	No data	4	4
%MDR*	No data	No data	No data	No data	No data	No data	No data	No data	0	2

R, Resistant; NS, Non-Susceptible [includes isolates with intermediate (Int) and high-level resistance (HLR)]
 MRSA, Meticillin-Resistant *S. aureus*; VREfm, Vancomycin-Resistant *E. faecium*; VREfa, Vancomycin-Resistant *E. faecalis*
 HLG, High-Level Gentamicin; 3GC, 3rd-Generation Cephalosporin (includes cefotaxime, ceftriaxone, ceftazidime and cefepime); ESBL, Extended-Spectrum Beta-Lactamase; MDR, Multi-Drug Resistant

* Not all isolates tested

† The number of laboratories processing blood cultures has changed a number of times between 2006 and 2014; however, coverage of acute hospitals has remained at 100%

1 Carbapenems include imipenem, meropenem and ertapenem

2 MDRKP, MDR *K. pneumoniae* phenotype (ESBL-producer plus non-susceptibility to Ciprofloxacin and Gentamicin) OR carbapenemase-producer (e.g. KPC, OXA-48)

number of reported MRSA BSI compared with 2013 (218 versus 222). In contrast, the total number of MSSA BSI increased by 3.2% compared with 2013 (900 versus 872).

Despite the decrease in numbers and proportion of MRSA BSI in 2014, Ireland still had one of the higher proportions of MRSA in Europe (see <http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx> for more detailed European data, including EARS-Net tables, charts and maps) (Figure 4). Ireland ranked 12th out of 30 countries reporting to EARS-Net (compared to 11th of 30 countries in 2013), with the median proportion of MRSA BSI at 13.1%. All countries with MRSA proportions higher than Ireland are located in Southern and Central/Eastern Europe. The MRSA rate for all acute hospitals in 2014 was 0.055

cases per 1,000 BDU, a slight decrease from 0.056 in 2013, whilst the MSSA rate increased from 0.219 to 0.227 [rates are calculated from denominator data (bed days used) obtained from the HSE Business Intelligence Unit (BIU) for all acute public hospitals; and directly from private hospitals where available, where both numerator (*S. aureus* numbers) and denominator data have been provided].

Males were approximately 1.8-times more likely to have invasive *S. aureus*, MRSA or MSSA infection than females (highly significant; $P < 0.001$). The frequency of invasive *S. aureus* infection increased with age, with the majority of infections ($n=678$; 61%) occurring in adults aged over 60. The median age for MRSA infection was 73 years (95%CI, 71-76) and for MSSA infection was 64 years (95%CI, 62-65). This was considered to be a

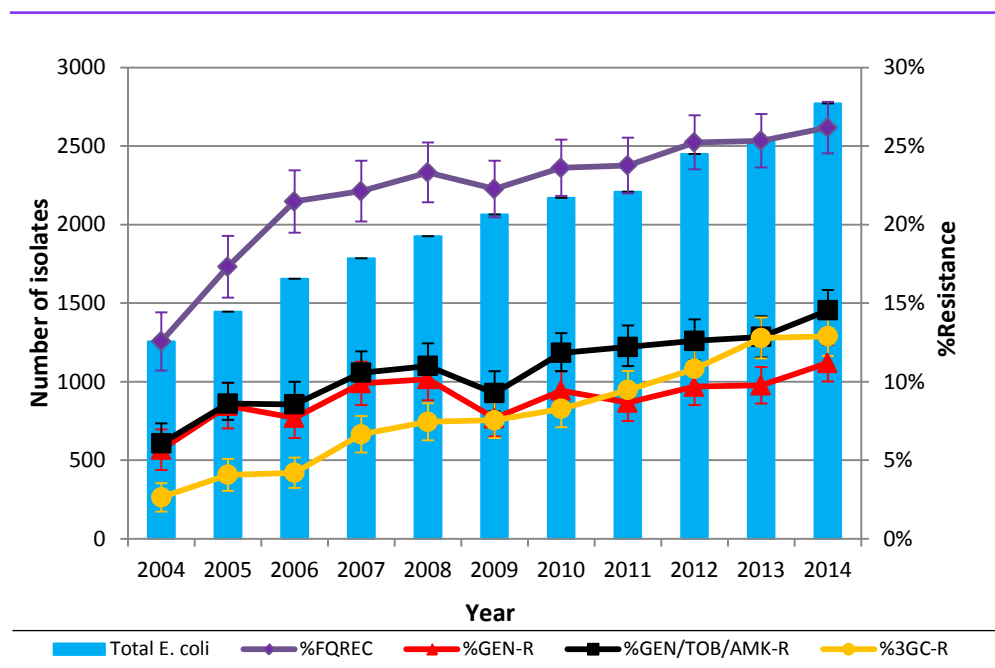


Figure 1. Trends for *E. coli* – total numbers of *E. coli* and percentage resistance to 3rd generation cephalosporins (3GCs), ciprofloxacin/ofloxacin (CIP/OFX), gentamicin (GEN) and gentamicin/amikacin/tobramycin (GEN/AMK/TOB) with 95% confidence intervals

Table 2. Age and gender breakdown of patients by organism with major resistance profiles (data from laboratories participating in enhanced surveillance for 2014). The proportion of isolates detected <48 hours and >5 days post-admission is also shown

		Total for 2014	Percent female	Mean age in years	Detected <48 hours after admission	Detected >5 days after admission
<i>Staphylococcus aureus</i>	Meticillin-resistant (MRSA)	92	42%	71.5	57%	32%
	Meticillin-susceptible	378	35%	56.5	62%	25%
<i>Streptococcus pneumoniae</i>	Penicillin-non-susceptible	21	52%	53.9	90%	5%
	Penicillin-susceptible	111	51%	61.2	95%	2%
Enterococci	Vancomycin-resistant	77	40%	65.5	9%	81%
	Vancomycin-sensitive	221	46%	67.3	40%	48%
<i>Escherichia coli</i>	Fluoroquinolone-resistant	273	45%	76.2	73%	22%
	Fluoroquinolone-susceptible	819	56%	68.5	74%	19%
<i>Klebsiella pneumoniae</i>		139	45%	66.7	51%	35%
<i>Pseudomonas aeruginosa</i>		71	44%	69.0	68%	23%

significant difference, as the confidence intervals did not overlap.

Enterococcus faecium

There were 404 reports of *E. faecium* BSI from 390 patients, a decrease of 1.2% from 2013 (n=409). **Table 1** displays the annual trends since 2005 in the proportion of *E. faecium* isolates resistant to the three “indicator” antimicrobials (ampicillin, vancomycin and high-level gentamicin):

- Of 404 isolates, 186 (46.0%) were resistant to vancomycin, with an increase in the proportion of vancomycin-resistant *E. faecium* (VREfm) from 43.1% (2013) (**Figure 5**)
- Of 392 isolates, 173 (44.1%) were resistant to high-level gentamicin (**Figure 5**)
- Of 392 isolates tested against the three “indicator” antimicrobials, 87 (22.2%) reported from 20 hospitals [with the majority (71; or 82%) coming from the nine tertiary hospitals] were resistant to all three and termed MDR *E. faecium*, which represents an increase from 19.6% in 2013

Since 2008, Ireland has had the highest proportion of VREfm in Europe. In 2014, countries with the next highest proportions of VREfm were: Cyprus (40%), Greece (27.3%) and Romania (25%) (**Figure 6**), whilst the median proportion of VREfm in EARS-Net countries was just 4.5%.

Males were approximately 1.4-times more likely to have invasive *E. faecium* infection than females (approaching borderline significance; P=0.06). The frequency of

invasive *E. faecium* infection increased with age, with the majority of infections (n=299; 74%) occurring in adults aged over 60. The median age was 69 years (95%CI, 67-71).

Klebsiella pneumoniae

There were 358 reports of invasive *K. pneumoniae* infection (354 from blood and four from CSF) from 356 patients, an increase of 9.8% from 2013 (n=326). **Table 1** displays annual trends since 2006 in the proportion of *K. pneumoniae* isolates resistant to the five “indicator” antimicrobials (as for *E. coli* above):

- Of 358 isolates, 46 (12.8%) were resistant to 3GCs, of which 37 were ESBL-positive and nine were ESBL-negative
- Of 358 isolates, 62 (17.3%) were resistant to ciprofloxacin
- Of 357 isolates, 45 (12.6%) were resistant to gentamicin [47 (13.2%) of 357 were aminoglycoside-resistant (i.e. resistant to gentamicin, tobramycin or amikacin)]
- Of 354 isolates, four (1.1%) were resistant to carbapenems, with two confirmed to be carbapenemase-producers (from different hospitals; one OXA-48 and one KPC-type CRE) and two confirmed not to be carbapenemase-producers. The two invasive carbapenemase-producing *K. pneumoniae* isolates in 2014 followed two isolates in 2013 (both OXA-48) and four isolates in 2011 (3 OXA-48 and one KPC)

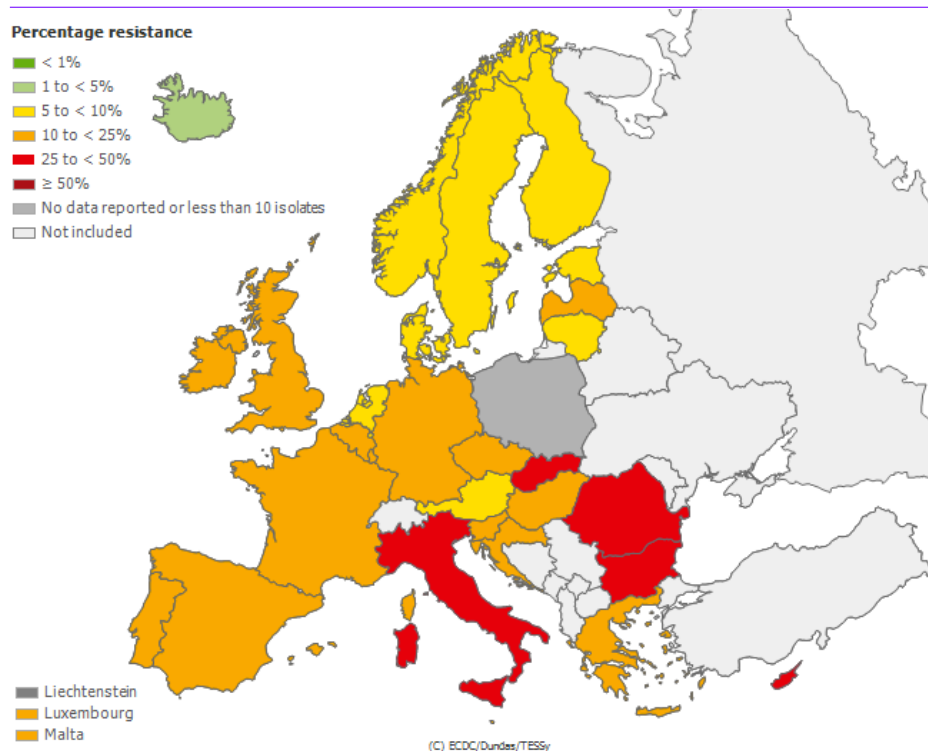


Figure 2. Distribution of 3rd-generation cephalosporin resistant *E. coli* in EARS-Net countries in 2014

Map downloaded from ECDC’s TESSy database on 21/10/2015:

<http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx>

Resistance to 3GCs, ciprofloxacin and gentamicin/aminoglycosides all decreased in 2014 compared with 2013 when they were at their highest levels since surveillance began (Figure 7).

No invasive *K. pneumoniae* isolates were reported as susceptible to ampicillin, which is as expected as *K. pneumoniae* are inherently resistant to ampicillin.

ESBLs were detected in 39 (11.0%) of 354 isolates tested. In 2014, ESBL production amongst invasive *K. pneumoniae* isolates was at its second highest level (after 2013) since surveillance began.

Of 357 isolates, 49 (13.7%) reported by 22 hospitals that were tested against all five "indicator" antimicrobials were identified as MDR *Klebsiella pneumoniae*, a decrease from 19.7% in 2013:

- Three resistant to ampicillin, 3GCs, ciprofloxacin, aminoglycosides and carbapenems (of which one ESBL-positive and two ESBL-negative)
- 30 resistant to ampicillin, 3GCs, ciprofloxacin and aminoglycosides (of which 28 ESBL-positive and two ESBL-negative)
- One resistant to ampicillin, 3GCs, aminoglycosides and carbapenems (ESBL-positive)
- Three resistant to ampicillin, 3GCs and ciprofloxacin (of which two ESBL-positive and one ESBL-negative)
- Two resistant to ampicillin, 3GCs and aminoglycosides (both ESBL-positive)
- 10 resistant to ampicillin, ciprofloxacin and aminoglycosides (of which nine ESBL-negative)

In 2013, the Antimicrobial Resistance and Microbial Ecology (ARME) group at NUI Galway alerted HPSC to the presence of two predominant *K. pneumoniae* clones implicated in both patient infection and colonisation in a number of Irish hospitals. Both clones were

simultaneously ESBL-positive and non-susceptible to ciprofloxacin and gentamicin. Some were also found to produce carbapenemases. Together, these are termed multi-drug resistant *K. pneumoniae* (MDRKP). The proportion of invasive *K. pneumoniae* that were MDRKP increased from 5.3% (18 of 342 isolates) in 2012 to 12.3% (40 of 325 isolates) in 2013 as displayed in Figure 8. An outbreak control team was established in October 2013 to evaluate this emerging threat. In 2014, the proportion decreased to 8.1% (29 of 358 isolates).

Antimicrobial resistance in invasive *K. pneumoniae* isolates in Ireland have been among the lowest in Europe, but this appeared to be changing as of 2013 (Figure 7). However, resistance to 3GCs, fluoroquinolones and aminoglycosides all decreased in 2014 (perhaps in response to implementation of measures recommended by the MDRKP outbreak control team) with Ireland ranking 21st, 20th and 19th, respectively, among 29 countries reporting to EARS-Net indicating that resistance levels in Ireland are still relatively low. The median proportions among EARS-Net countries were 30.7% for 3GCs, 33.3% for fluoroquinolones and 22.3% for aminoglycosides. With only two reports of carbapenemase-producing *K. pneumoniae*, Ireland ranked 23rd of 28 countries in 2014, with the median proportion among EARS-Net countries being 1.3% (Figure 9).

Males were approximately 1.5-times more likely to have an invasive *K. pneumoniae* infection than females (highly significant, $P=0.001$). The frequency of invasive *K. pneumoniae* infection increased with age with the majority of infections ($n=252$; 70%) occurring in adults aged over 60. The median age was 69 years (95%CI, 67-71).

Streptococcus pneumoniae

There were 331 reports of invasive *S. pneumoniae* infection (322 from blood and nine from CSF) from 310 patients, an increase of 6.4% from 2013 ($n=311$). Table

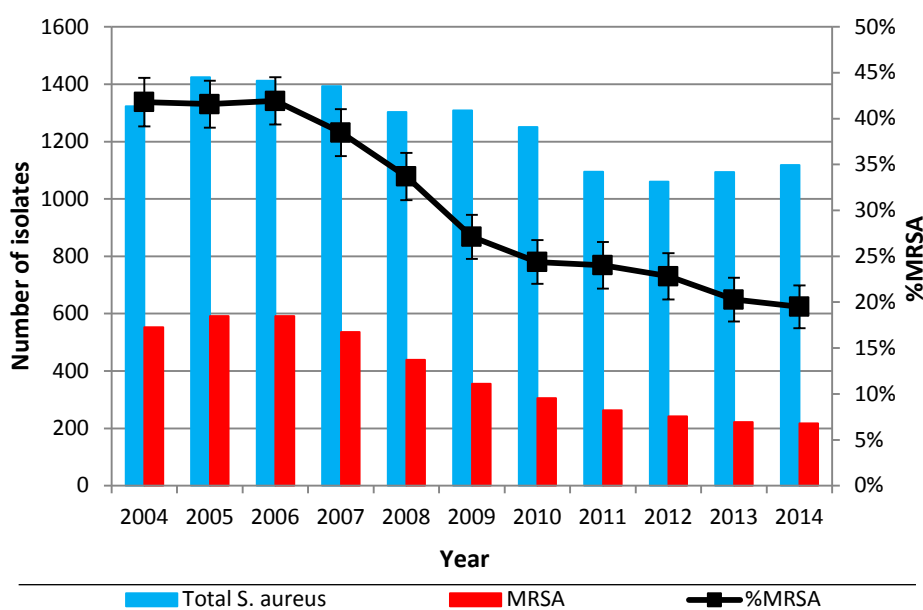


Figure 3. Trends for *S. aureus* – total numbers of *S. aureus*/MRSA and percentage MRSA with 95% confidence intervals

1 displays annual trends since 2005 in the proportions of *S. pneumoniae* isolates non-susceptible/resistant to penicillin and erythromycin.

Penicillin non-susceptible *S. pneumoniae* (PNSP) accounted for 17.1% (n=56) of all isolates tested against penicillin (n=328) in 2014. Of the PNSP isolates, 48 were intermediately-resistant (Int; MIC=0.1-1 mg/L for laboratories following the Clinical Laboratory Standards Institute (CLSI) guidelines (for non-meningitis syndrome via oral administration) and MIC=0.1-2mg/L for those following European Committee on Antimicrobial Susceptibility Testing (EUCAST) non-meningitis guidelines) and eight were high-level resistant (HLR;

MIC >1.0mg/L for CLSI and >2mg/L for EUCAST) to penicillin. Penicillin susceptibility was not determined for three isolates. Forty-four (13.8%) of 319 isolates were resistant to erythromycin.

There was a decrease in the proportion of PNSP isolates from 20.8% in 2013 to 17.1% in 2014 as displayed in **Figure 10**. The proportion that displayed penicillin HLR remained stable at 2.5%. In 2014, Ireland remained among European countries with the highest proportions of PNSP ranking 8th of 28 countries overall; and 4th of 20 countries reporting ≥50 isolates. In 2014, the median proportion amongst EARS-Net countries was 8.9%. However, it is important to consider that comparison

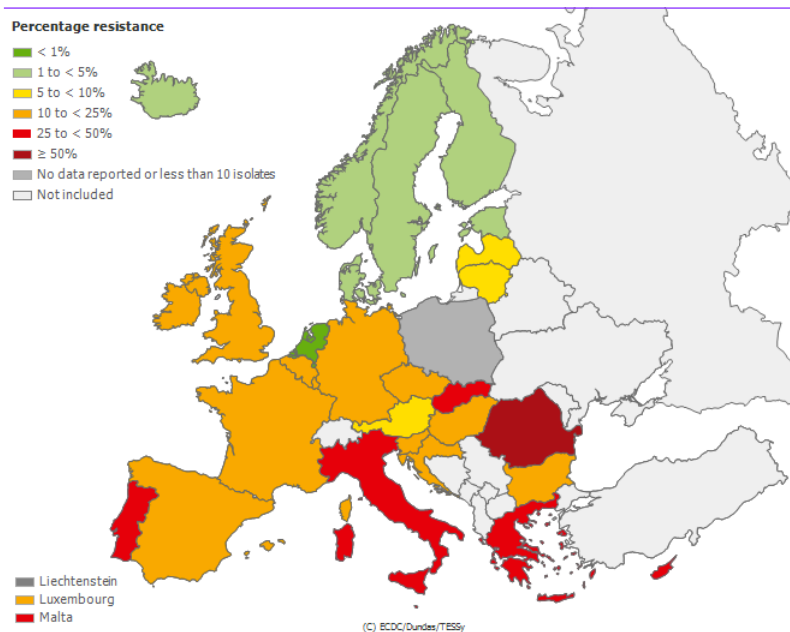


Figure 4. Distribution of MRSA in EARS-Net countries in 2014
Map obtained from ECDC on 21/10/2015:
<http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx>

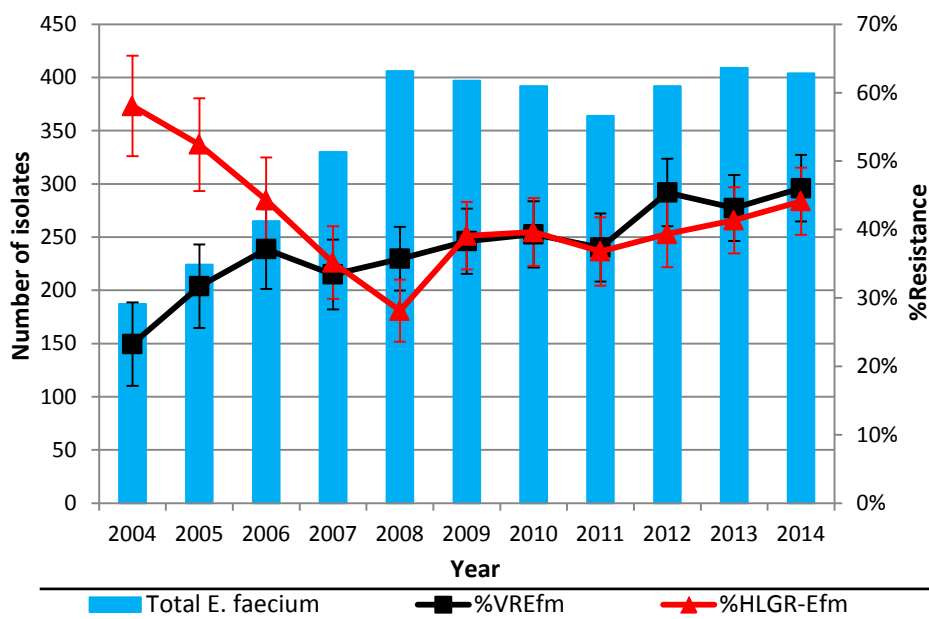


Figure 5. Trends for *E. faecium* – total numbers of *E. faecium* and percentage resistance to vancomycin (VREfm) and high-level gentamicin (HLG) with 95% confidence intervals

with other EARS-Net countries can be problematic due to the possibility of different interpretive criteria being applied to the data from different countries (and indeed from different laboratories within a country):

- CLSI provides three sets of breakpoints for interpreting penicillin susceptibility of *S. pneumoniae* isolates: meningitis, non-meningitis and oral
- EUCAST provides two sets of breakpoints: meningitis and infections other than meningitis

Many Irish microbiology laboratories have already switched, or are currently in the process of switching, from CLSI to EUCAST guidelines: 33 laboratories had switched by the end of 2014, an increase from 27 by the end of 2013. In Ireland, EARS-Net data are reported using the EUCAST breakpoints for infections other than meningitis or the CLSI breakpoints for "oral administration" (which correspond to the original CLSI breakpoints), as these are broadly similar for epidemiological purposes and thus facilitate a more meaningful analysis of the data. This also permits a relatively consistent approach for comparing historical data.

Moderately high levels of erythromycin resistance were seen, with Ireland ranking 16th of 28 countries overall and 14th of 21 countries reporting 50 or more isolates. This is similar to the situation observed in much of Southern and Central/Eastern Europe. In 2014, the median proportion amongst EARS-Net countries was 14.3%.

Of 317 isolates tested against both penicillin and erythromycin in 2014, 33 (10.4%) were simultaneously PNSP (28 Int, 5 HLR) and erythromycin-resistant, which is the lowest proportion in the last six years.

In early 2007, a national pilot project was established

as a collaborative initiative between RCSI/Beaumont Hospital, Children's University Hospital, Temple St and HPSC, with the aim of providing baseline serotyping data on invasive *S. pneumoniae* isolates. This project pre-dates the introduction of the 7-valent pneumococcal conjugate vaccine (PCV7) into the childhood immunisation schedule in September 2008. PCV13 replaced PCV7 from September 2010.

In 2014, serotype data were available for 298 pneumococcal isolates reported by 32 of the 34 laboratories reporting pneumococcal isolates to EARS-Net, representing 90% of all pneumococcal isolates reported:

- Of 154 isolates from patients aged ≥ 65 years, 105 (68%) belonged to serotypes included in the PPV23 vaccine
- Only 13 isolates were referred for typing from patients aged < 2 years (the target population for the PCV13 vaccine) and all 13 were non-vaccine serotypes

The most common serotypes identified were: 7F (n=31), 15A and 22F (n=25 each), 3 (n=24), 8 (n=22), 19A (n=19), 10A (n=14) and 6C and 33F (n=12 each) representing 62% of all isolates typed.

Of the 56 PNSP isolates, 51 (91%) were serotyped:

- Of 32 isolates from patients age ≥ 65 years, 16 (50%) belonged to serotypes included in the pneumococcal polysaccharide vaccine (PPV23) vaccine
- Of two isolates from children < 2 years, one belonged to a serotype included in the PCV13 vaccine

Ongoing surveillance of the predominant serotypes is required, as strains with non-vaccine serotypes have

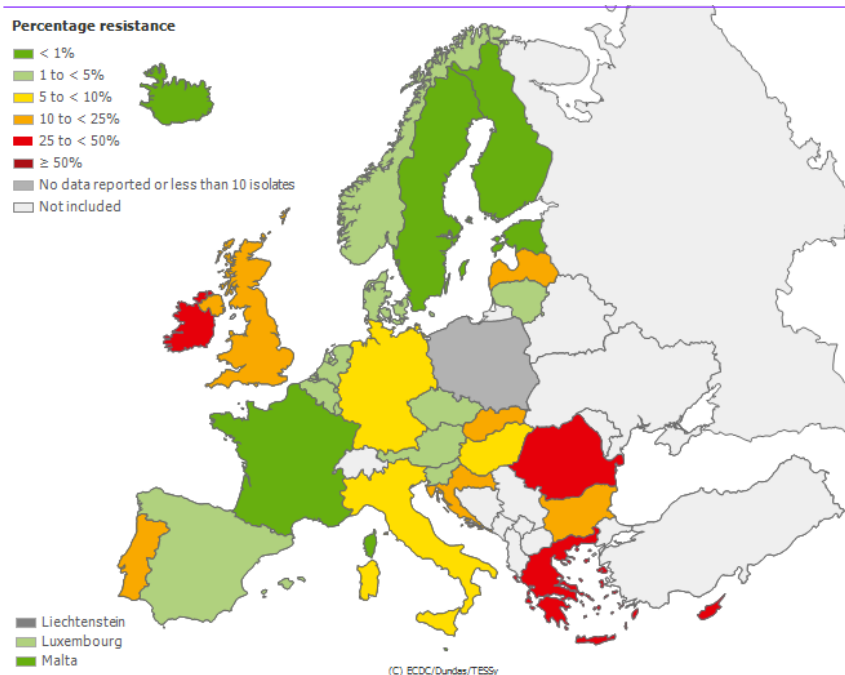


Figure 6. Distribution of vancomycin-resistant *E. faecium* (VREfm) in EARS-Net countries in 2014
Map downloaded from ECDC's TESSy database on 21/10/2015:
<http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx>

been reported to increase in prevalence following the introduction of conjugate vaccines in other countries, hence the need for a fully-resourced Irish pneumococcal reference laboratory. The separate chapter on invasive pneumococcal disease (IPD) in Ireland in 2014 contains additional information on pneumococcal serotyping.

In 2014, the rate of IPD in Ireland was estimated at 7.2 cases per 100,000 population, an increase compared with 6.8 in 2013 (note that both rates were calculated using 2011 census data). The highest rates of IPD were observed in the older age groups [adults aged 65-74 (23.9 per 100,000), 75-79 (36.3 per 100,000) and ≥80 (47.5 per 100,000)] with a smaller peak in young children [aged <1 year (12.4 per 100,000) and 1 year (9.0 per 100,000)] as displayed in **Figure 11**. The IPD rates in all age groups were broadly similar to 2013.

Males were approximately 1.1-times more likely to have an invasive *S. pneumoniae* infection than females, but this was not statistically significant (P=0.41). The frequency of invasive *S. pneumoniae* infection increased with age, with the majority (n=200; 60%) occurring in adults aged over 60. The median age was 66 years (95%CI, 62-68).

Enterococcus faecalis

There were 316 reports of *E. faecalis* BSI from 308 patients, a decrease of 6.0% from 2013 (n=336). Table 1 displays annual trends since 2005 in the proportions of *E. faecalis* isolates resistant to the three "indicator" antimicrobials (as for *E. faecium*):

- Of 316 isolates, nine (2.8%) were resistant to vancomycin (VREfa), with Ireland ranking 5th amongst European countries for resistance. The median

proportion in Europe was 0.2%, although the proportion of VREfa in Ireland has decreased from the highest reported proportion of 4.9% in 2011

- Of 300 isolates, 99 (33.0%) were resistant to high-level gentamicin

Six isolates were reported resistant to ampicillin, which is suggestive of misidentification of species or misclassification, as resistance to ampicillin is rare in *E. faecalis*.

Males were approximately 1.5-times more likely to have invasive *E. faecalis* infection than females (highly significant; P<0.001). The frequency of invasive *E. faecalis* infection increased with age, with the majority of infections (n=211; 67%) occurring in adults aged over 60. The median age was 68 years (95%CI, 67-71).

Pseudomonas aeruginosa

There were 182 reports of invasive *P. aeruginosa* infection (179 from blood and three from CSF) from 176 patients, a decrease of 12.0% from 2013 (n=207). **Table 1** displays annual trends since 2006 in the proportion of *P. aeruginosa* isolates resistant to the five "indicator" antimicrobials/antimicrobial classes [piperacillin-tazobactam, ceftazidime, carbapenems (meropenem or imipenem), fluoroquinolones (ciprofloxacin or ofloxacin) and aminoglycosides (gentamicin, amikacin or tobramycin)]:

- Of 182 isolates, 30 (16.5%) were resistant to piperacillin-tazobactam
- Of 179 isolates, 16 (8.9%) were resistant to ceftazidime

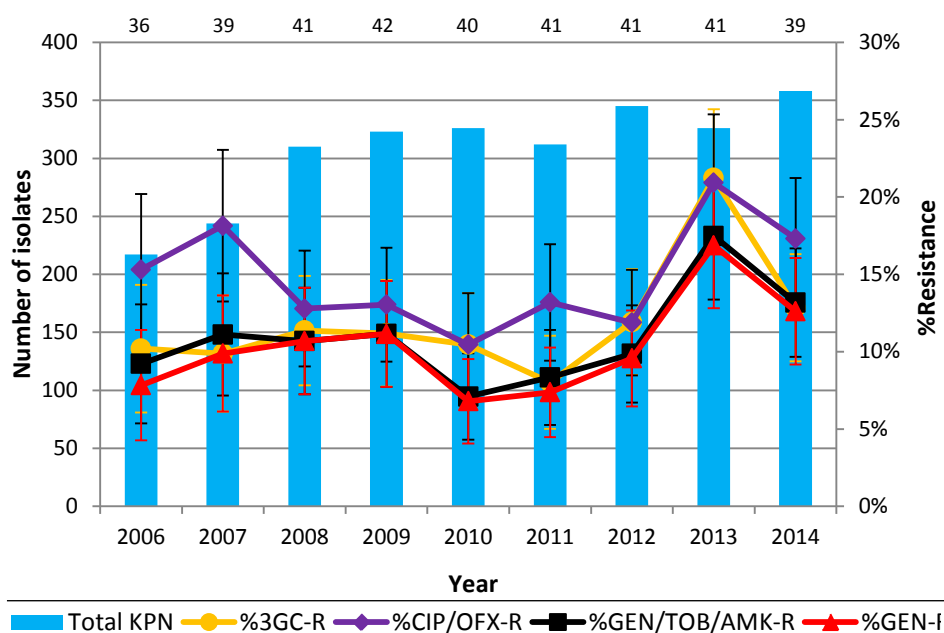


Figure 7. Trends for *K. pneumoniae* – total numbers of *K. pneumoniae* and percentage resistance to 3rd generation cephalosporins (3GCs), ciprofloxacin/ofloxacin (CIP/OFX), gentamicin (GEN) and gentamicin/amikacin/tobramycin (GEN/AMK/TOB) with 95% confidence intervals

Number of participating laboratories indicated above the bars

- Of 181 isolates, 21 (11.6%) were resistant to imipenem or meropenem
- Of 182 isolates, 25 (13.7%) were resistant to ciprofloxacin
- Of 182 isolates, 9 (4.9%) were resistant to gentamicin [10 (5.5%) of 182 were aminoglycoside-resistant (i.e. resistant to gentamicin, tobramycin or amikacin)]

In 2014, resistance to all but one of the indicator antimicrobials (piperacillin-tazobactam) decreased compared with 2013.

Twelve (6.7%) of 179 isolates reported from 10 hospitals that were tested against all five “indicator” antimicrobials were identified as MDR *Pseudomonas aeruginosa*, defined as resistance to three or more of the indicator antimicrobials:

- Three resistant to all five antimicrobial classes
- Two resistant to four of five antimicrobial classes
- Seven resistant to three of five antimicrobial classes

Antimicrobial resistance levels amongst *P. aeruginosa* isolates in Ireland are at moderately low levels in comparison with other European countries, with Ireland ranking between 16th and 24th of 29 countries for all five indicator antimicrobials.

Males were approximately 1.5-times more likely to have invasive *P. aeruginosa* infection than females (significant; P=0.01). The frequency of invasive *P. aeruginosa* infection increased with age, with the majority of infections (n=130; 71%) occurring in adults aged over 60. The median age was 68 years (95%CI, 66-72).

Acinetobacter spp.

There were 93 reports of invasive infection caused by *Acinetobacter spp.* (90 from blood and one from CSF) from 91 patients, a slight increase from 2013 (n=91). **Table 1** displays annual trends since 2013 in the proportion of *Acinetobacter spp.* isolates resistant to the three “indicator” antimicrobials/antimicrobial classes [carbapenems (meropenem or imipenem), fluoroquinolones (ciprofloxacin or ofloxacin) and gentamicin]:

- Of 83 isolates, three were resistant to imipenem or meropenem
- Of 88 isolates, seven were resistant to ciprofloxacin
- Of 91 isolates, three were resistant to gentamicin [no additional isolates were resistant to the other aminoglycosides (amikacin or tobramycin)]

Two of 83 isolates reported from two hospitals were identified as MDR *Acinetobacter spp.*, i.e. resistant to all three “indicator” antimicrobials.

Enhanced Surveillance

The voluntary EARS-Net enhanced surveillance programme was established in 2004. Laboratories that participate in EARS-Net are invited to provide additional demographic and clinical data on invasive pathogens causing BSI.

In 2014, enhanced surveillance data on 2,202 individual records (cases or isolates under the EARS-Net definition) were submitted from 21 participating laboratories, representing 40% of all reports to EARS-Net. **Table 2** displays demographic and other basic data for the major resistance profiles of pathogens reported to EARS-Net enhanced surveillance.

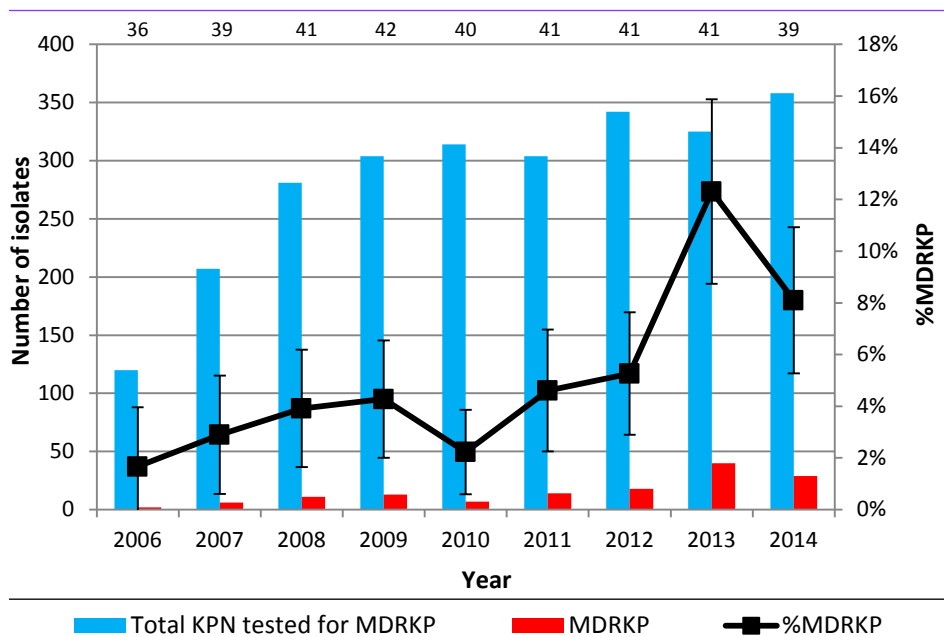


Figure 8. Trends for *K. pneumoniae* isolates with the MDRKP phenotype (simultaneously ESBL-producers and non-susceptible to both ciprofloxacin and gentamicin and/or a carbapenemase-producer) — numbers and percentage with MDRKP phenotype with 95% confidence intervals
Number of participating laboratories indicated above the bars

1. *S. aureus* BSI

- 51% of MRSA BSIs and 51% of MSSA BSIs were reported as healthcare-associated infection
- 18% of MRSA BSIs were reported as device-associated with
 - 10% CVC/CVC-PICC-associated and 3% PVC-associated BSIs specifically reported
- 26% of MSSA BSIs were reported as device-associated with
 - 11% CVC/CVC-PICC-associated, 7% PVC-associated and 5% dialysis catheter-associated BSIs specifically reported
- 27% of patients with MRSA and 21% of patients with MSSA BSIs were noted as having recent exposure to antibiotics

2. Enterococcal BSI

- All of the vancomycin-resistant enterococcal BSIs (VRE) and 67% of the vancomycin-susceptible enterococcal (VSE) BSIs were reported as healthcare-associated infection
- 31% of VRE BSIs were reported as device-associated with
 - 24% specifically reported as CVC/CVC-PICC-associated BSIs
- 17% of VSE BSIs were reported as device-associated with
 - 11% specifically reported as CVC/CVC-PICC-associated BSIs
- 29% of patients with VRE BSIs and 19% of patients with VSE BSIs were noted as having recent exposure to antibiotics

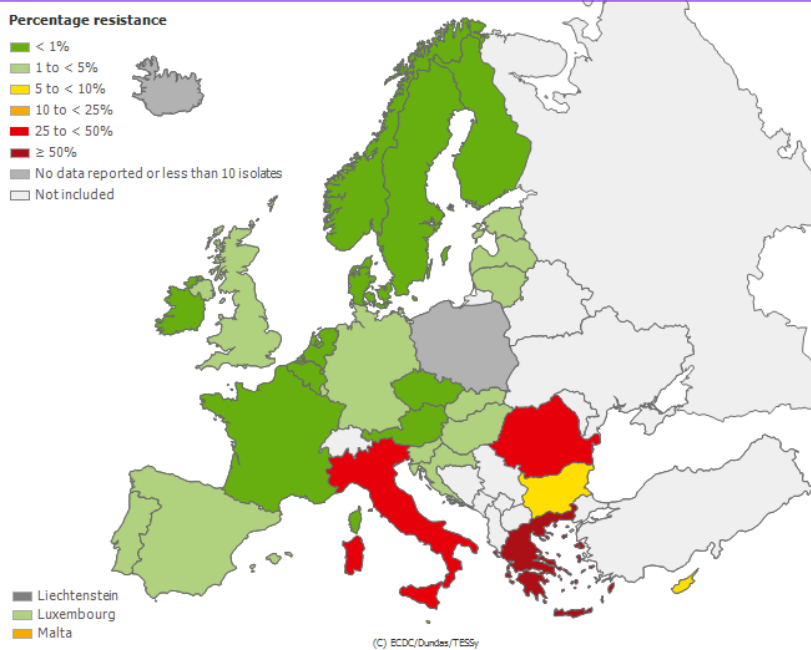


Figure 9. Distribution of carbapenem-resistant *K. pneumoniae* in EARS-Net countries in 2014
 Map downloaded from ECDC's TESSy database on 21/10/2015:
<http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx>

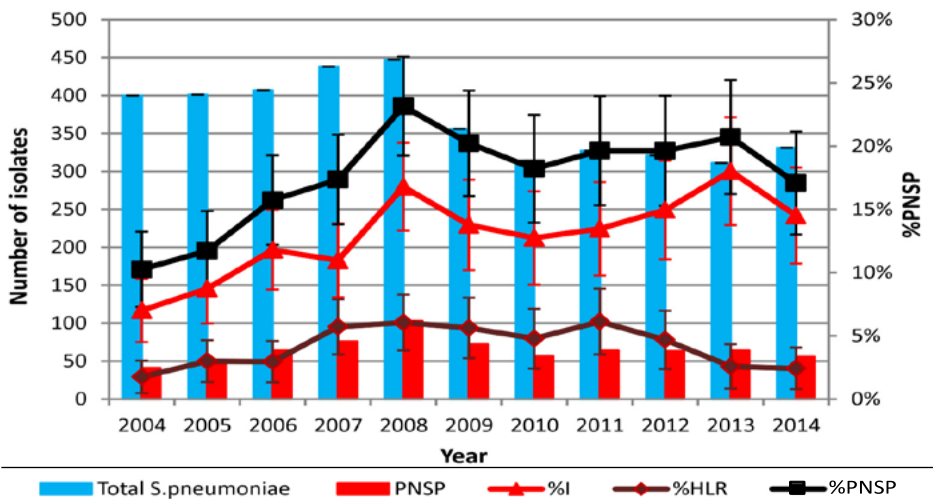


Figure 10. Trends for *S. pneumoniae* – total numbers of *S. pneumoniae*/PNSP and percentage PNSP with 95% confidence intervals
 HLR, High-level resistant; I, Intermediately resistant

3. *S. pneumoniae* BSI

- The majority of both PNSP and PSSP BSIs were community-acquired
- Respiratory tract infection remained the most common source of pneumococcal BSI

4. *E. coli* BSI

- The majority (52%) of fluoroquinolone-resistant *E. coli* (FQREC) BSIs were reported as healthcare-associated infection, which contrasts with 36% for fluoroquinolone-susceptible *E. coli*
 - The most common source of *E. coli* bloodstream infection was urinary tract infection, with 11% FQREC BSI reported in association with the presence of a urinary catheter
 - Recent antibiotic exposure was noted in 23% of cases of *E. coli* BSI

Conclusion

For the eighth consecutive year, the proportion of *S. aureus* BSI attributable to MRSA further declined to 19.5%, the lowest reported level since Ireland joined EARS-Net in 1999. Unfortunately, antimicrobial resistance in other important BSI causative pathogens increased further and remains a cause for concern.

For the eighth consecutive year, Ireland remained the European country with the highest proportion of VREfm BSI (46.0%), with Cyprus, Greece and Romania now also reporting proportions over 25% and therefore appearing red on the map.

Following the establishment of the national multidrug resistant *K. pneumoniae* (MDRKP) outbreak control team (OCT) in 2013 to look at the emerging problem of MDRKP, initial recommendations were made to try to control the spread of MDRKP strains in healthcare settings. Due to the wide-reaching nature

of this outbreak and the growing threat posed by antimicrobial resistance, the OCT proposed that a national task force should be established with greater powers to influence and implement changes in policy and infrastructure needed. Between 2012 and 2013, EARS-Net data revealed a large increase in invasive *K. pneumoniae* that were MDRKP (from 5.3% to 12.3% of isolates), supporting the hypothesis of emergence and dissemination of MDRKP in Ireland. A reduction in MDRKP was seen in 2014 (to 8.1% of isolates) and this may be in part due to some of the control measures put in place during 2014. However, many of the recommendations have still not been fully implemented due to resource issues: screening for carriage of MDRKP (and other resistant organisms) is still not widely carried out and there is an overall lack of isolation facilities.

In 2014, there were two reported cases of invasive carbapenemase-producing *K. pneumoniae* (CRE) infection in Ireland. Greece (63%) and Italy (36%) remained the European countries with the largest proportions of invasive CRE infections (amongst *K. pneumoniae*). For the first time, all 29 EARS-Net participant countries that provided data reported one or more cases of invasive CRE with 16 of these reporting five or more cases. This clearly illustrates the successful dissemination of these highly resistant microorganisms in Europe. Suboptimal infection prevention and control practices and lack of antimicrobial stewardship programmes in both acute and non-acute healthcare settings may have contributed to this dissemination. To address the threat of MDR-*Enterobacteriaceae*, such as MDRKP, ESBLs and CRE to Ireland, it is vital that control measures are strengthened in both acute and non-acute healthcare settings, with implementation of the recommendations contained in the "Guidelines for the prevention and control of multi-drug resistant organisms, other than

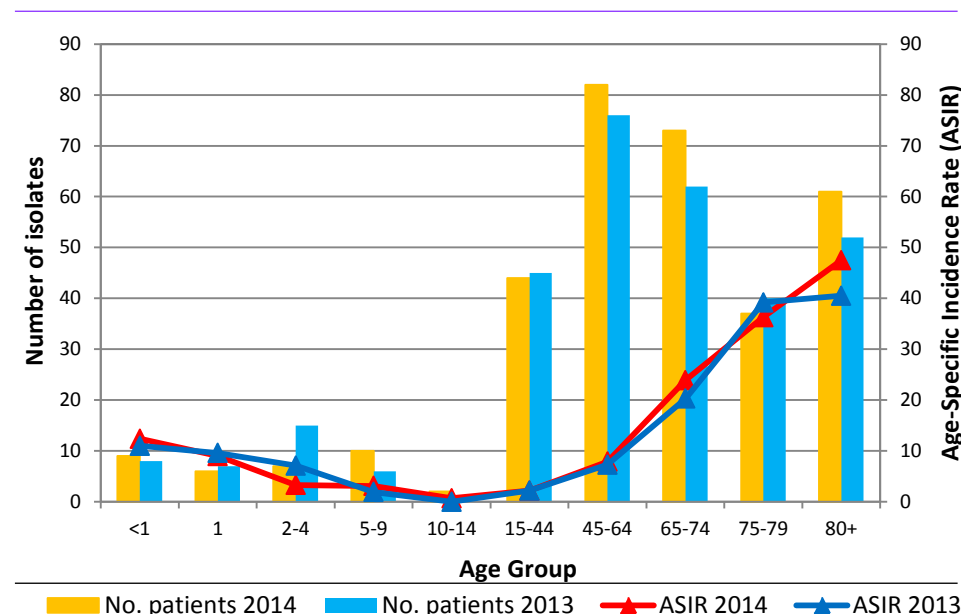


Figure 11. Numbers and age-specific incidence rates of patients with invasive *S. pneumoniae* infection in 2014 compared with 2013
ASIR, age-specific incidence rate

MRSA", published in 2013 (available at <http://www.hpsc.ie/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Guidelines/>) and the "Guidelines for antimicrobial stewardship in hospitals", published in 2009 (available at <http://www.hpsc.ie/A-Z/MicrobiologyAntimicrobialResistance/StrategyforthecontrolofAntimicrobialResistanceinIrelandSARI/AntibioticStewardship/Publications/>).

The decline in the burden of MRSA BSI in recent years may be partly attributable to improvements in infection prevention and control interventions, such as increased emphasis on and improved healthcare worker awareness of the importance of compliance with standard and contact precautions, screening of patients for MRSA carriage and the availability of decolonisation regimens to eradicate MRSA carriage. The development of and strengthening of hospital antimicrobial stewardship programmes and restricted prescribing of certain broad spectrum antimicrobials, particularly in response to other healthcare associated infections, such as *Clostridium difficile* infection, may also have positively contributed to the decreasing proportion of MRSA BSI.

Since 2008, pneumococcal conjugate vaccines have been a component of the childhood immunisation programme, an intervention which has already resulted in a reduction in the burden of paediatric invasive pneumococcal disease (IPD) in Ireland. However, pneumococcal antimicrobial resistance remains a major problem in Ireland. Clearly, IPD manifesting as BSI or meningitis reflects the most severe form of pneumococcal infection and data on other more common manifestations of infection (e.g., pneumonia, sinusitis and otitis media) are not captured by EARS-Net. While data from invasive infections is extremely valuable in comparing national levels of AMR, the true burden of infection caused by antimicrobial-resistant pneumococci may be underestimated.

The enhanced EARS-Net surveillance data are particularly useful in informing infection prevention and control programmes, both nationally and in those hospitals that participate in the surveillance scheme. Participation in enhanced surveillance can also help to identify risk factors and potentially preventable healthcare-associated infections that can be targeted as part of preventative programmes (e.g. invasive medical device-related infections).

Infections caused by antimicrobial-resistant bacteria result in excess patient mortality, morbidity and costs to the healthcare system. Rising levels of AMR threaten many aspects of healthcare that we currently take for granted. It is critical that comprehensive infection prevention and control and antimicrobial stewardship programmes continue to be developed and maintained at all levels and settings within the Irish health service. To this end, it is vital that recommendations and guidelines produced by the HSE RCPI Clinical Advisory Group on HCAI and AMR are implemented.

HPSC thanks all the microbiology laboratories for their continued participation and enthusiasm for the EARS-Net project.

The data presented in this report were taken from the EARS-Net database on 1st **October 2015**.

Enhanced surveillance of Carbapenem Resistant *Enterobacteriaceae* (CRE)

Summary:

- In 2014, enhanced surveillance data was received on 43 cases of CRE colonisation/ infection. This represented an increase compared with 2013 and 2012, when enhanced surveillance data was received on 24 and 32 CRE cases, respectively. In contrast, the National Carbapenemase Producing *Enterobacteriaceae* (CPE) Reference Laboratory Service (CPEaRLS) at Galway University Hospital confirmed carbapenemase production in 82 *Enterobacteriaceae* isolates in 2014
- Five patients (12%) had a history of hospitalisation abroad (Ghana, India, Libya/ Tunisia, Vietnam: OXA-48-type CRE isolated; Iraq: NDM-type CRE isolated)
- The clinical significance of the CRE isolate was reported for all patients, representing colonisation in the majority (n=32; 74%). CRE infection was reported for the remaining 11 patients

Introduction

Carbapenem-resistant *Enterobacteriaceae* (CRE) are multi-drug resistant Gram-negative bacteria and includes carbapenemase enzyme producers and those bacteria that are resistant to carbapenems (e.g. imipenem, meropenem) as a result of a combination of resistance mechanisms (such as broad-spectrum β -lactamases and bacterial cell porin loss). These bacteria can be easily spread between patients in healthcare settings and have the ability to cause infections for which effective antimicrobial therapy may be lacking. Carbapenemase production has spread worldwide in the past 15 years and is now a prominent resistance mechanism reported in many countries.

Detection of confirmed carbapenemase-producing CRE, hereafter known as CRE, became notifiable in Ireland in March 2011 under the category of "unusual cluster or changing pattern of illness". Upon amendment to the Infectious Diseases Regulations in September 2011, invasive CRE infection (blood, CSF or normally sterile site) became notifiable in its own category. The CRE enhanced surveillance scheme was established in June 2011 and reporting of CRE isolates from any site, whether colonisation or infection is encouraged.

Enhanced surveillance data

CRE cases reported to enhanced surveillance

In 2014, enhanced surveillance data was received from 9 laboratories on 43 confirmed cases of carbapenemase-producing CRE and one tertiary hospital reported a CRE outbreak. **Figure 1** displays annual trends in CRE cases and types reported to enhanced surveillance since 2011. Of the 43 patients, 23 were female (53%). The median age was 71 years (range: 1 – 94 years).

Patient location

At the time of CRE detection, 40 patients (93%) were hospitalised, two (4%) were in long-term care facilities and one (2%) was in the community. Of the 40 hospitalised patients, 10 (25%) had been admitted from home, seven (16%) were transfers from another acute hospital, three had been admitted from long-term care/nursing homes (7%) and the source of admission was not provided for the remaining 20 patients (45%). Of the seven patients who had been transferred from another acute hospital, two were repatriated from hospitals abroad (in Libya/Tunisia and Vietnam).

Time to CRE colonisation/infection (days from patient's admission to the time they became positive for CRE) could be calculated for 36 of 40 admitted patients. The median time to CRE colonisation/infection was 7.5 days (range: 0 – 42).

Presence of other multi-drug resistant organisms (MDROs)

At the time of CRE detection, 13 patients (30%) were already known to be colonised or infected with one or more other multi-drug resistant organisms (MDROs), including eight with MRSA, four with ESBL-producing *Enterobacteriaceae*, three with VRE and one with *Pseudomonas* (note: two patients were colonised with two and three other MDROs, respectively), and 11 of those were inpatients.

Travel history

Seven patients (16%) reported foreign travel (Ghana, India, Iraq, Libya/Tunisia, Norway, Philippines and Vietnam) in the last 12 months and 21 (48%) reported none. The travel history was unknown for the remaining 16 (36%).

Risk factors

Two patients had no identifiable risk factors for CRE colonisation or infection and risk factor data was unknown or not provided for four patients. Of the remaining 37 patients, 26 (70%) had more than one risk factor. Reported risk factors included: hospitalisation in the past 12 months (35; 95%); history of surgery in the past six months (12; 32%); and history of admission to intensive care in the last 12 months (8; 21%). Reported underlying co-morbidities included: diabetes mellitus (6 patients); chronic lung disease (6 patients); immunocompromise (5 patients); renal disease (5 patients); urological abnormality (4 patients); and liver disease (1 patient).

Prior antimicrobial exposure

Antimicrobial exposure history prior to isolation of CRE was provided for 29 patients (67%), 27 of whom were hospitalised and eight of whom received more than one antimicrobial class:

- β -lactam – β -lactamase inhibitor combination agents - 25 (86%)
- Carbapenems - 4 (14%)
- Aminoglycosides - 4 (14%)
- Fluoroquinolones - 3 (10%)
- Cephalosporins - 2 (7%)

- Colistin - 1 (3%)
- Co-trimoxazole - 1 (3%)

Clinical significance and source of infection

The clinical significance of the CRE isolate was reported for all patients, representing colonisation in the majority (n=32). CRE infection was reported for the remaining 11 patients, with three cases of respiratory tract infection, two cases each of bacteraemia, intra-abdominal infection and urinary tract infection, and one case each of skin/soft tissue infection and infection of prosthetic material.

Specimen type

The majority of CRE (n=33; 77%) were isolated from screening swabs (rectal or stoma) or faeces. Three isolates were detected from blood (7%), five from urine (11%), and one each from peritoneal fluid and a peritoneal swab.

Outcome

Outcome was reported for 36 of the 40 hospitalised patients (90%):

- Five died (14%)

For four of the five deaths, the patient was reported to have had CRE infection. The potential contribution of CRE infection to patient death was not collected. Date of death was provided for all five patients allowing the interval between CRE-positive specimen date and death to be calculated for all patients. These intervals were one, two, eight, 45 and 90 days, respectively

- 27 (75%) were discharged home
- Four (11%) remained inpatients at the time the surveillance form was returned, one of whom had already had CRE infection; however, it is not known if the remaining three CRE colonised patients subsequently went on to develop CRE infection later in the hospital admission

Outcome was also reported for the three non-hospitalised patients, all of whom survived.

Enterobacteriaceae species

Klebsiella pneumoniae accounted for the majority (n=27; 63%) of CRE isolates. In addition, there were eight cases of *Escherichia coli* CRE, 6 cases of *K. oxytoca* CRE and one case each of *Citrobacter freundii* CRE and *Enterobacter cloacae* CRE reported.

Carbapenemase types reported

The carbapenemase enzyme types reported to enhanced surveillance were: 20 KPC (47%), 12 NDM (28%), nine OXA48 (21%), one IMP and one VIM. This contrasts with 82 CRE confirmed by the CPEaRLS in 2014, subdivided as follows: 44 KPC (54%), 17 OXA48 (21%), 17 NDM-1 (21%), 2 IMP and 2 VIM. Therefore, a significant proportion of confirmed CPE cases (48%) in 2014 were not reported to the enhanced surveillance scheme.

Susceptibility of isolates

Susceptibility testing data was provided on all 43 isolates:

- Carbapenems
 - o Meropenem: reported on all 43 isolates, with 39 resistant (91%); minimum inhibitory concentrations ranged from 0.064 to >256 mg/L
 - o Ertapenem: reported on all 43 isolates, with all isolates resistant; minimum inhibitory concentrations ranged from 2 to >256 mg/L
- Aminoglycosides: reported on 40 isolates, with 29 (73%) resistant to one or more of the aminoglycosides listed below
 - o Gentamicin: reported on 38 isolates, with 14 resistant (37%)
 - o Tobramycin: reported on 38 isolates, with 13 resistant (34%)
 - o Amikacin: reported on 37 isolates, with 19 resistant (51%)
- Fluoroquinolones: reported on 31 isolates, with 23 resistant (74%)
- Tigecycline: reported on 34 isolates, with 10 resistant (29%)
- Colistin: reported on 33 isolates, with three resistant (9%)

Conclusion

In 2014, 43 cases of CRE colonisation/ infection were reported to the enhanced CRE surveillance system representing an increase of 80% from 24 cases in 2013; however, data from the CPEaRLS indicate that there were twice as many confirmed cases.

In response to the emergence of CRE, Irish "Guidelines for the prevention and control of multi-drug resistant organisms, excluding MRSA, in the healthcare setting" were developed under the auspices of the Royal College of Physicians of Ireland (RCPI) Clinical Advisory Group on Healthcare-Associated Infections and Antimicrobial Resistance and were first published in early 2013 (available at <http://www.hpsc.ie/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Guidelines/>). In response to the changing epidemiology of CRE and other types of multi-drug resistance in *Enterobacteriaceae* in Ireland, the guidelines on screening for carriage of resistant *Enterobacteriaceae* were further updated in July 2014. The latest versions of the guidelines are available at <http://www.hpsc.ie/A-Z/MicrobiologyAntimicrobialResistance/StrategyforthecontrolofAntimicrobialResistanceinIrelandSARI/CarbapenemResistantEnterobacteriaceaeCRE/ScreeningforCREinIreland/>

Acknowledgements:

Sincere thanks to colleagues working in microbiology laboratories and infection prevention and control teams across Ireland for submitting enhanced surveillance data on patients with CRE.

Sincere thanks also to colleagues in the CPEaRLS, Galway University Hospital for data on confirmed carbapenemase-producing *Enterobacteriaceae* in 2014 (Source: CPEaRLS annual report 2014).

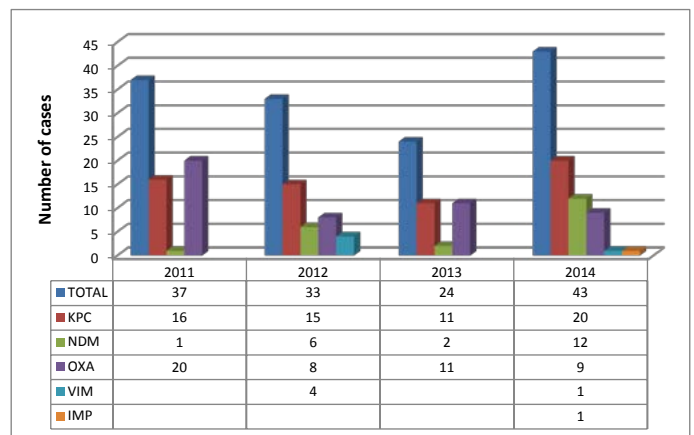


Figure 1. Annual trends in CRE cases and types reported to HPSC since enhanced surveillance of CRE commenced in 2011. Please note that the reduction in reported cases between 2012 and 2013 reflects under-reporting rather than a true decline in CRE. Approximately twice as many isolates were confirmed by the CPEaRLS, Galway University Hospital in 2013 (n=48) and 2014 (n=82) than were reported to the voluntary CRE enhanced surveillance scheme

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EPIDEMIOLOGICAL
REPORT



10

COMPUTERISED INFECTIOUS DISEASE
REPORTING SYSTEM (CIDR)

10. Computerised Infectious Disease Reporting (CIDR)

Summary

- The highest ever annual number of notifications was recorded on CIDR in 2014
- Virtual infrastructure security model and backup procedures developed and implemented
- IS27001 Information Security accreditation was retained
- The number of active CIDR users in 2014 was 269
- 25 new users were trained during 2014
- CIDR versions 3.1, 3.2, 3.2.1 and 3.2.2 were released
- CIDR Business Rules v3 were finalised and approved

and the new hardware and was configured to operate in parallel with the existing data backup system. The Disaster Recovery system was fully incorporated into the nightly backup process to increase resilience. This provides an independent fully functional copy of the entire production system nightly, to the Disaster Recovery system. The RSA Authentication software was also updated during 2014.

INFORMATION SECURITY ACCREDITATION

Following two maintenance audits in March and September 2014, HPSC and CIDR retained ISO 27001 accreditation. The HPSC Information Governance Framework, which includes CIDR, provides re-assurance to users and partners of the CIDR system, the Data Protection Commissioner and the data subjects relating to sensitive data stored and managed by the system. Maintenance of this accreditation standard is vital to information security.

CIDR OPERATIONS

INFRASTRUCTURE AND SOFTWARE UPGRADES FOR CIDR

A new security model for the CIDR virtual infrastructure was developed, implemented and independently audited in 2014. The backup system was updated to incorporate the new virtual system software versions

CIDR USER TRAINING

25 new CIDR users were trained during 2014. There were 16 public health and 9 laboratory users trained.

CIDR APPLICATION SOFTWARE UPDATES

There were two major functional releases (v3.1 and v3.2) and two minor maintenance releases (v3.2.1 and

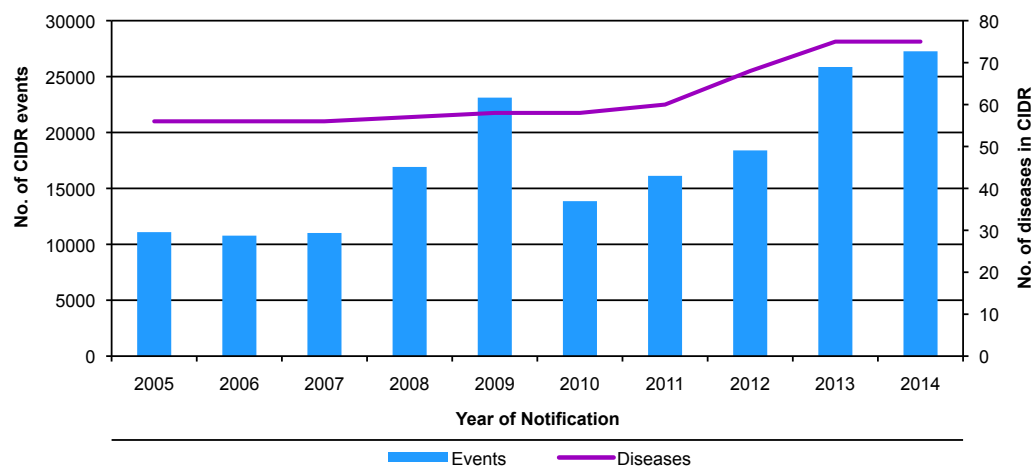


Figure 1. The volume of statutory infectious disease notifications and corresponding number of diseases in CIDR per year, since 2005 when national implementation commenced (as of 14th September, 2015)

3.2.2) of the CIDR Application software during 2014. The outbreak management functionality was improved significantly in release v3.2.

GOVERNANCE AND COMMUNICATIONS

The National CIDR Steering Group continued to provide guidance and oversight of CIDR through 2014 and met by teleconference on two occasions during the year. The National CIDR User Group convened on four occasions throughout the year, also by teleconference, to discuss the ongoing use of CIDR and associated developments.

CIDR BUSINESS RULES

The CIDR National Business Rules Review Group met on six occasions by teleconference to review and update the CIDR Business Rules. CIDR Business Rules v3 were finalised and approved during 2014.

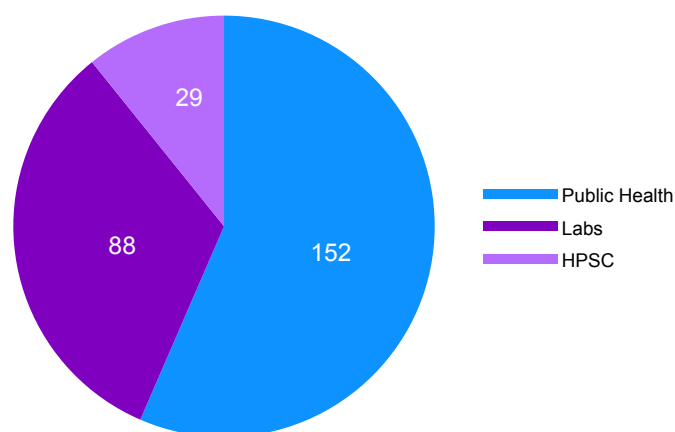


Figure 2. The number of users of the CIDR system in Departments of Public Health, in diagnostic and reference laboratories and in HPSC in 2014 (total=269)

2014

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APPENDIX 1 NOTIFIABLE INFECTIOUS DISEASES IN IRELAND

Notes:

Figures for the year 2014 presented in this appendix were extracted from the Computerised Infectious Disease Reporting (CIDR) system on the 4th September, 2015. Please note that some figures may differ from figures published previously for other chapters in this report, due to on-going updating of notification data on CIDR.

Figures on EARS-Net pathogens and certain sexually transmitted infections (specifically, ano-genital warts and non-specific urethritis) are not presented here, since these diseases were not reported via the CIDR system during 2014; separate databases are used to collate data on these diseases.

Table A1.1. List of notifiable infectious diseases and their respective causative pathogens (relevant to 2014) under Infectious Diseases (Amendment) (No. 3) Regulations 2011 (S.I. No. 452 of 2011)

Infectious Disease	Causative Pathogen(s)
Acute anterior poliomyelitis	Polio virus
Ano-genital warts	Human papilloma virus
Anthrax	<i>Bacillus anthracis</i>
<i>Bacillus cereus</i> food-borne infection/intoxication	<i>Bacillus cereus</i>
Bacterial meningitis (not otherwise specified)	
Botulism	<i>Clostridium botulinum</i>
Brucellosis	<i>Brucella</i> spp.
Campylobacter infection	<i>Campylobacter</i> spp.
Carbapenem-resistant <i>Enterobacteriaceae</i> infection (invasive)	Carbapenem-resistant <i>Enterobacteriaceae</i> (blood, CSF or other normally sterile site)
Chancroid	<i>Haemophilus ducreyi</i>
Chickenpox – hospitalised cases	Varicella-zoster virus
Chikungunya disease	Chikungunya virus
<i>Chlamydia trachomatis</i> infection (genital)	<i>Chlamydia trachomatis</i>
Cholera	<i>Vibrio cholerae</i>
<i>Clostridium difficile</i> infection	<i>Clostridium difficile</i>
<i>Clostridium perfringens</i> (type A) food-borne disease	<i>Clostridium perfringens</i>
Creutzfeldt Jakob disease	
variant Creutzfeldt Jakob disease	
Cryptosporidiosis	<i>Cryptosporidium parvum, hominis</i>
Cytomegalovirus infection (congenital)	Cytomegalovirus
Dengue fever	Dengue virus
Diphtheria	<i>Corynebacterium diphtheriae</i> or <i>ulcerans</i> (toxin producing)
Echinococcosis	<i>Echinococcus</i> spp.
Enterococcal bacteraemia	<i>Enterococcus</i> spp. (blood)
<i>Escherichia coli</i> infection (invasive)	<i>Escherichia coli</i> (blood, CSF)
Giardiasis	<i>Giardia lamblia</i>
Gonorrhoea	<i>Neisseria gonorrhoeae</i>
Granuloma inguinale	<i>Klebsiella granulomatis</i>
<i>Haemophilus influenzae</i> disease (invasive)	<i>Haemophilus influenzae</i> (blood, CSF or other normally sterile site)
Hepatitis A (acute) infection	Hepatitis A virus
Hepatitis B (acute and chronic) infection	Hepatitis B virus
Hepatitis C infection	Hepatitis C virus
Herpes simplex (genital)	Herpes simplex virus
Human immunodeficiency virus infection	Human immunodeficiency virus
Influenza	Influenza A and B virus
<i>Klebsiella pneumoniae</i> infection (invasive)	<i>Klebsiella pneumoniae</i> (blood or CSF)
Legionellosis	<i>Legionella</i> spp.
Leprosy	<i>Mycobacterium leprae</i>
Leptospirosis	<i>Leptospira</i> spp.
Listeriosis	<i>Listeria monocytogenes</i>
Lyme disease (neuroborreliosis)	<i>Borrelia burgdorferi</i>
Lymphogranuloma venereum	<i>Chlamydia trachomatis</i>
Malaria	<i>Plasmodium falciparum, vivax, knowlesi, ovale, malariae</i>
Measles	Measles virus
Meningococcal disease	<i>Neisseria meningitidis</i>
Mumps	Mumps virus
Non-specific urethritis	
Noroviral infection	Norovirus
Paratyphoid	<i>Salmonella</i> Paratyphi
Pertussis	<i>Bordetella pertussis</i>
Plague	<i>Yersinia pestis</i>
<i>Pseudomonas aeruginosa</i> infection (invasive)	<i>Pseudomonas aeruginosa</i> (blood or CSF)
Q Fever	<i>Coxiella burnetii</i>
Rabies	Rabies virus

Table A1.1. List of notifiable infectious diseases and their respective causative pathogens (relevant to 2014) under Infectious Diseases (Amendment) (No. 3) Regulations 2011 (S.I. No. 452 of 2011)
(Continued)

Infectious Disease	Causative Pathogen(s)
Respiratory syncytial virus infection	Respiratory syncytial virus
Rotavirus infection	Rotavirus
Rubella	Rubella virus
Salmonellosis	<i>Salmonella</i> spp. other than <i>S. Typhi</i> and <i>S. Paratyphi</i>
Severe Acute Respiratory Syndrome (SARS)	SARS-associated coronavirus
Shigellosis	<i>Shigella</i> spp.
Smallpox	Variola virus
Staphylococcal food poisoning	Enterotoxigenic <i>Staphylococcus aureus</i>
<i>Staphylococcus aureus</i> bacteraemia	<i>Staphylococcus aureus</i> (blood)
Streptococcus group A infection (invasive)	<i>Streptococcus pyogenes</i> (blood, CSF or other normally sterile site)
Streptococcus group B infection (invasive)	<i>Streptococcus agalactiae</i> (blood, CSF or other normally sterile site)
<i>Streptococcus pneumoniae</i> infection (invasive)	<i>Streptococcus pneumoniae</i> (blood, CSF or other normally sterile site)
Syphilis	<i>Treponema pallidum</i>
Tetanus	<i>Clostridium tetani</i>
Toxoplasmosis	<i>Toxoplasma gondii</i>
Trichinosis	<i>Trichinella</i> spp.
Trichomoniasis	<i>Trichomonas vaginalis</i>
Tuberculosis	<i>Mycobacterium tuberculosis</i> complex
Tularemia	<i>Francisella tularensis</i>
Typhoid	<i>Salmonella Typhi</i>
Typhus	<i>Rickettsia prowazekii</i>
Verotoxigenic <i>Escherichia coli</i> infection	Verotoxin producing <i>Escherichia coli</i>
Viral encephalitis	
Viral haemorrhagic fevers	
Viral meningitis	
West Nile fever	West Nile virus
Yellow fever	Yellow fever virus
Yersiniosis	<i>Yersinia enterocolitica</i> , <i>Yersinia pseudotuberculosis</i>

Table A1.2 Number of notifiable infectious diseases, 2012-2014 and crude incidence rates of diseases, 2014

Infectious Disease	2012*	2013	2014	CIR ² 2014
Acute anterior poliomyelitis	0	0	0	0.0
Anthrax	0	0	0	0.0
<i>Bacillus cereus</i> food-borne infection/intoxication	0	0	0	0.0
Bacterial meningitis (not otherwise specified)	29	21	23	0.5
Botulism	0	1	1	0.0
Brucellosis	2	1	3	0.1
Campylobacter infection	2388	2276	2616	57.0
Carbapenem-resistant Enterobacteriaceae infection (invasive)	0	0	5	0.1
Chancroid	NA	0	0	0.0
Chickenpox - hospitalised cases	80	53	61	-
Chikungunya disease	0	0	1	0.0
<i>Chlamydia trachomatis</i> infection (genital)†	NA	6257	6697	146.0
Cholera	0	0	0	0.0
<i>Clostridium difficile</i> infection‡	1822	1813	1802	39.3
<i>Clostridium perfringens</i> (type A) food-borne disease	0	1	0	0.0
Creutzfeldt Jakob disease	5	5	2	0.0
Creutzfeldt Jakob disease (variant)	0	0	0	0.0
Cryptosporidiosis	556	514	394	8.6
Cytomegalovirus infection (congenital)	8	7	12	0.3
Dengue fever	7	15	21	0.5
Diphtheria	0	0	0	0.0
Echinococcosis	0	1	0	0.0
Giardiasis	54	44	71	1.6
Gonorrhoea	NA	1286	1319	28.8
Granuloma inguinale	NA	0	0	0.0
<i>Haemophilus influenzae</i> disease (invasive)	41	41	61	1.3
Hepatitis A (acute)	29	50	21	0.5
Hepatitis B (acute and chronic)	563	425	445	9.7
Hepatitis C	885	761	710	15.5
Herpes simplex (genital)	NA	1127	1235	26.9
Human immunodeficiency virus infection	339	341	377	8.2
Influenza	743	1602	1757	38.3
Legionellosis§	15	14	8	0.2
Leprosy	0	2	0	0.0
Leptospirosis	15	14	23	0.5
Listeriosis	11	8	15	0.3
Lyme disease	8	13	18	0.4
Lymphogranuloma venereum	NA	5	35	0.8
Malaria	65	71	80	1.7
Measles	103	51	33	0.7
Meningococcal disease	66	81	82	1.8
Mumps	163	223	742	16.2
Noroviral infection†	1704	1486	808	17.6
Paratyphoid	5	2	5	0.1
Pertussis	458	173	73	1.6
Plague	0	0	0	0.0
Q fever	6	0	0	0.0
Rabies	0	0	0	0.0
Respiratory syncytial virus infection†	1972	1283	2479	54.0
Rotavirus infection†	2651	2512	2061	44.9
Rubella	9	0	3	0.1
Salmonellosis	313	324	260	5.7
Severe Acute Respiratory Syndrome (SARS)	0	0	0	0.0
Shigellosis	29	49	57	1.2
Smallpox	0	0	0	0.0
Staphylococcal food poisoning	0	0	0	0.0
Streptococcus group A infection (invasive)	122	168	164	3.6
Streptococcus group B infection (invasive)¶	76	66	68	1.5
<i>Streptococcus pneumoniae</i> infection (invasive)	427	637	681	14.8
Syphilis**	494	551	281	6.1
Tetanus	1	1	1	0.0
Toxoplasmosis	36	32	20	0.4

Table A1.2 Number of notifiable infectious diseases, 2012-2014 and crude incidence rates of diseases, 2014
(Continued)

Infectious Disease	2012*	2013	2014	CIR ² 2014
Trichinosis	0	0	0	0.0
Trichomoniasis	NA	74	92	2.0
Tuberculosis	359	370	318	6.9
Tularemia	0	0	0	0.0
Typhoid	8	10	7	0.2
Typhus	0	0	0	0.0
Verotoxigenic <i>Escherichia coli</i> infection	554	701	707	15.4
Viral encephalitis	18	6	68	1.5
Viral haemorrhagic fevers	0	0	0	0.0
Viral meningitis	235	281	435	9.5
West Nile fever	0	1	0	0.0
Yellow fever	0	0	0	0.0
Yersiniosis	2	4	5	0.1
Total	17476	25855	27263	

Notes:

1. NA: Indicates that data not available in CIDR for the diseases and years indicated above

2. CIR, Crude incidence rate per 100,000 total population

*In 2012, new notifiable diseases were introduced on January 1st 2012 along with the revised versions of case definitions of certain diseases at that time

†Since 17/03/2013, figures for *Chlamydia trachomatis*, noroviral infection, respiratory syncytial virus infection and rotavirus infection may refer to notifications from HSE E rather than events. Such notifications from HSE E may also refer to area of laboratory testing rather than patient's area of residence

‡Since 01/01/2012 both new and recurrent cases of *Clostridium difficile* infection are notifiable, prior to this only new cases were notifiable; please interpret comparisons between current and historical data with caution

§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

||Table excludes two measles notifications in 2013 that are on CIDR, but were laboratory negative for measles and were not epidemiologically linked to a confirmed measles case

¶*Streptococcus* group B infection (invasive) infections in infants <90 days old or stillborn infants

**The Irish case definition for syphilis changed on 1st January 2014, and from this date, syphilis notifications include early (infectious) syphilis only. Direct comparison of 2014 syphilis notification data with 2012 or 2013 syphilis notification data (which includes non infectious cases) is not valid.

Table A1.3 Number of notifiable infectious diseases by HSE area, 2014

Infectious Disease	HSE E	HSE M	HSE MW	HSE NE	HSE NW	HSE SE	HSE S	HSE W	Total
Bacterial meningitis (not otherwise specified)	7	1	0	2	2	5	5	1	23
Botulism	*	*	*	*	*	*	*	*	1
Brucellosis	*	*	*	*	*	*	*	*	3
Campylobacter infection	753	215	229	194	121	391	405	308	2616
Carbapenem-resistant Enterobacteriaceae infection (invasive)	3	0	1	0	0	0	0	1	5
Chickenpox - hospitalised cases	33	1	3	4	5	6	8	1	61
Chikungunya disease	*	*	*	*	*	*	*	*	1
<i>Chlamydia trachomatis</i> infection (genital)†	3444	207	445	339	294	649	758	561	6697
<i>Clostridium difficile</i> infection‡	715	76	182	106	72	195	231	225	1802
Creutzfeldt Jakob disease	*	*	*	*	*	*	*	*	2
Cryptosporidiosis	23	43	34	32	40	55	103	64	394
Cytomegalovirus infection (congenital)	8	0	2	0	0	0	0	2	12
Dengue fever	12	1	0	0	0	4	1	3	21
Giardiasis	31	8	3	1	0	5	15	8	71
Gonorrhoea	943	20	58	27	17	65	92	97	1319
<i>Haemophilus influenzae</i> disease (invasive)	16	5	8	7	1	12	8	4	61
Hepatitis A (acute)	10	2	2	1	1	0	3	2	21
Hepatitis B (acute and chronic)	253	31	21	37	11	25	43	24	445
Hepatitis C	493	19	38	41	8	37	53	21	710
Herpes simplex (genital)	725	24	81	68	20	121	107	89	1235
Human immunodeficiency virus infection	261	15	18	22	7	10	32	12	377
Influenza	733	60	185	143	72	211	184	169	1757
Legionellosis§	6	0	0	0	1	0	0	1	8
Leptospirosis	4	3	3	3	4	3	2	1	23
Listeriosis	2	0	0	2	0	2	4	5	15
Lyme disease	1	0	5	0	0	2	8	2	18
Lymphogranuloma venereum	34	0	0	1	0	0	0	0	35
Malaria	34	1	1	10	2	5	17	10	80
Measles	9	1	2	1	0	1	4	15	33
Meningococcal disease	25	10	1	14	4	8	8	12	82
Mumps	142	21	47	13	41	141	258	79	742
Noroviral infection†	441	56	57	72	27	40	59	56	808
Paratyphoid	3	1	0	0	0	0	1	0	5
Pertussis	25	1	9	5	5	8	9	11	73
Respiratory syncytial virus infection†	1357	125	153	181	116	232	189	126	2479
Rotavirus infection†	411	208	115	174	171	344	309	329	2061
Rubella	*	*	*	*	*	*	*	*	3
Salmonellosis	90	23	19	24	19	27	32	26	260
Shigellosis	27	1	7	4	0	5	3	10	57
Streptococcus group A infection (invasive)	65	4	13	12	3	18	27	22	164
Streptococcus group B infection (invasive)¶	33	3	2	10	4	5	6	5	68
<i>Streptococcus pneumoniae</i> infection (invasive)	207	26	124	47	30	158	56	33	681
Syphilis	203	4	15	8	5	8	26	12	281
Tetanus	*	*	*	*	*	*	*	*	1
Toxoplasmosis	5	1	1	0	0	4	2	7	20
Trichomoniasis	46	4	11	9	9	5	7	1	92
Tuberculosis	135	16	16	22	17	29	66	17	318
Typhoid	4	0	0	0	1	2	0	0	7
Verotoxigenic <i>Escherichia coli</i> infection	96	66	107	55	17	116	120	130	707
Viral encephalitis	18	6	5	11	4	7	14	3	68
Viral meningitis	218	18	16	35	14	35	56	43	435
Yersiniosis	2	0	0	0	0	1	1	1	5

Notes:

1. This table does not include details of diseases for which a zero number of cases were notified; see Appendix A1.1 for details of these diseases in 2014

*Data not reported to HSE area level when total number in Ireland <5 cases

†Since 17/03/2013, figures for *Chlamydia trachomatis*, noroviral infection, respiratory syncytial virus infection and rotavirus infection may refer to notifications from HSE E rather than events. Such notifications from HSE E may also refer to area of laboratory testing rather than patient's area of residence

‡*C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2014 epidemiological calendar year as shown here

§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

¶Streptococcus group B infection (invasive) infections in infants <90 days old or stillborn infants

Table A1.4 Number of notifiable infectious diseases by HSE region, 2014

Infectious Disease	Dublin Mid Leinster	Dublin North East	South	West	HSE E LHO area unspecified	Total
Bacterial meningitis (not otherwise specified)	5	5	10	3	0	23
Botulism	*	*	*	*	*	1
Brucellosis	*	*	*	*	*	3
Campylobacter infection	720	442	796	658	0	2616
Carbapenem-resistant Enterobacteriaceae infection (invasive)	3	0	0	2	0	5
Chickenpox - hospitalised cases	21	17	14	9	0	61
Chikungunya disease	*	*	*	*	*	1
<i>Chlamydia trachomatis</i> infection (genital)†	470	523	1407	1300	2997	6697
<i>Clostridium difficile</i> infection‡	532	365	426	479	0	1802
Creutzfeldt Jakob disease	0	0	0	2	*	2
Cryptosporidiosis	61	37	158	138	0	394
Cytomegalovirus infection (congenital)	5	3	0	4	0	12
Dengue fever	8	5	5	3	0	21
Giardiasis	28	12	20	11	0	71
Gonorrhoea	767	223	157	172	0	1319
<i>Haemophilus influenzae</i> disease (invasive)	17	11	20	13	0	61
Hepatitis A (acute)	10	3	3	5	0	21
Hepatitis B (acute and chronic)	165	156	68	56	0	445
Hepatitis C	338	215	90	67	0	710
Herpes simplex (genital)	547	270	228	190	0	1235
Human immunodeficiency virus infection	147	151	42	37	0	377
Influenza	467	469	395	426	0	1757
Legionellosis§	3	3	0	2	0	8
Leptospirosis	5	5	5	8	0	23
Listeriosis	1	3	6	5	0	15
Lyme disease	1	0	10	7	0	18
Lymphogranuloma venereum	24	11	0	0	0	35
Malaria	19	26	22	13	0	80
Measles	6	5	5	17	0	33
Meningococcal disease	26	23	16	17	0	82
Mumps	115	61	399	167	0	742
Noroviral infection†	78	83	99	140	408	808
Paratyphoid	4	0	1	0	*	5
Pertussis	16	15	17	25	0	73
Respiratory syncytial virus infection†	144	189	421	395	1330	2479
Rotavirus infection†	225	177	653	615	391	2061
Rubella	*	*	*	*	*	3
Salmonellosis	74	63	59	64	0	260
Shigellosis	17	15	8	17	0	57
Streptococcus group A infection (invasive)	53	28	45	38	0	164
Streptococcus group B infection (invasive)¶	26	20	11	11	0	68
<i>Streptococcus pneumoniae</i> infection (invasive)	104	176	214	187	0	681
Syphilis	152	63	34	32	0	281
Tetanus	*	*	*	*	*	1
Toxoplasmosis	5	1	6	8	0	20
Trichomoniasis	26	33	12	21	0	92
Tuberculosis	88	85	95	50	0	318
Typhoid	1	3	2	1	0	7
Verotoxigenic <i>Escherichia coli</i> infection	146	71	236	254	0	707
Viral encephalitis	15	20	21	12	0	68
Viral meningitis	167	104	91	73	0	435
Yersiniosis	1	1	2	1	*	5

Notes:

1. This table does not include details of diseases for which a zero number of cases were notified; see Appendix A1.1 for details of these diseases in 2014

*Data not reported to HSE region level when total number in Ireland <5 cases

†Since 17/03/2013, figures for *Chlamydia trachomatis*, noroviral infection, respiratory syncytial virus infection and rotavirus infection may refer to notifications from HSE E rather than events. Such notifications from HSE E may also refer to area of laboratory testing rather than patient's area of residence

‡*C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2014 epidemiological calendar year as shown here

§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

¶Streptococcus group B infection (invasive) infections in infants <90 days old or stillborn infants

Table A1.5 Number of notifiable infectious diseases by age group (years), 2014

Infectious Disease	0-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65+	Unknown	Total
Bacterial meningitis (not otherwise specified)	12	0	0	2	0	5	0	1	1	1	1	23
Botulism	1	0	0	0	0	0	0	0	0	0	0	1
Brucellosis	1	0	0	0	0	1	0	0	1	0	0	3
Campylobacter infection	586	177	91	126	199	336	259	261	202	375	4	2616
Carbapenem-resistant Enterobacteriaceae infection (invasive)	0	0	0	0	0	0	0	0	2	3	0	5
Chickenpox - hospitalised cases	32	12	4	0	4	2	3	2	0	2	0	61
Chikungunya disease	0	0	0	0	0	1	0	0	0	0	0	1
<i>Chlamydia trachomatis</i> infection (genital)*	11	11	11	741	2685	2544	516	132	42	9	15	6697
<i>Clostridium difficile</i> infection†	40	11	10	24	41	86	97	90	200	1202	1	1802
Creutzfeldt Jakob disease	0	0	0	0	0	0	0	0	1	1	0	2
Cryptosporidiosis	205	91	42	7	12	19	9	3	3	3	0	394
Cytomegalovirus infection (congenital)	12	0	0	0	0	0	0	0	0	0	0	12
Dengue fever	0	0	0	1	2	7	7	1	2	1	0	21
Giardiasis	13	3	0	1	11	20	10	2	7	4	0	71
Gonorrhoea	11	11	11	138	428	509	157	67	17	1	0	1319
<i>Haemophilus influenzae</i> disease (invasive)	22	1	1	1	1	2	4	2	6	21	0	61
Hepatitis A (acute)	1	5	2	1	2	4	1	3	2	0	0	21
Hepatitis B (acute and chronic)	1	0	1	10	38	195	116	51	18	15	0	445
Hepatitis C	7	0	0	2	30	220	238	135	58	17	3	710
Herpes simplex (genital)	11	11	11	153	323	425	204	88	28	7	2	1235
Human immunodeficiency virus infection	0	2	1	3	41	170	100	39	15	6	0	377
Influenza	158	55	41	39	63	245	219	146	176	615	0	1757
Legionellosis‡	0	0	0	0	0	0	2	1	2	3	0	8
Leptospirosis	0	0	0	3	2	4	3	3	5	3	0	23
Listeriosis	4	0	0	0	0	4	0	0	3	4	0	15
Lyme disease	0	0	0	2	1	3	1	4	4	3	0	18
Lymphogranuloma venereum	11	11	11	0	2	15	12	5	1	0	0	35
Malaria	4	1	5	3	5	16	26	17	1	2	0	80
Measles	9	1	2	8	7	4	2	0	0	0	0	33
Meningococcal disease	48	6	3	7	3	4	3	3	0	5	0	82
Mumps	27	27	42	283	192	76	37	25	21	9	3	742
Noroviral infection*	248	21	12	11	9	33	28	23	43	377	3	808
Paratyphoid	0	0	0	0	4	1	0	0	0	0	0	5
Pertussis	43	4	7	0	0	8	3	7	1	0	0	73
Respiratory syncytial virus infection*	2349	11	3	1	3	13	13	18	19	46	3	2479
Rotavirus infection*	1972	59	11	3	1	1	4	0	0	9	1	2061
Rubella	1	1	0	1	0	0	0	0	0	0	0	3
Salmonellosis	65	13	8	12	23	43	24	20	16	36	0	260
Shigellosis	7	2	4	1	4	19	7	9	2	2	0	57
Streptococcus group A infection (invasive)	19	18	6	6	5	12	17	10	15	56	0	164
Streptococcus group B infection (invasive)§	68	0	0	0	0	0	0	0	0	0	0	68
<i>Streptococcus pneumoniae</i> infection (invasive)	46	18	3	5	5	20	41	57	109	377	0	681
Syphilis	11	11	11	3	35	108	78	37	15	5	0	281

Table A1.5 Number of notifiable infectious diseases by age group (years), 2014
(Continued)

Infectious Disease	0-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65+	Unknown	Total
Tetanus	0	0	0	1	0	0	0	0	0	0	0	1
Toxoplasmosis	0	0	0	2	2	10	3	1	1	1	0	20
Trichomoniasis	11	11	11	7	19	27	19	14	2	2	2	92
Tuberculosis	0	3	4	10	21	72	58	42	38	70	0	318
Typhoid	0	2	0	0	2	2	1	0	0	0	0	7
Verotoxigenic <i>Escherichia coli</i> infection	327	53	33	19	24	57	42	30	31	91	0	707
Viral encephalitis	11	1	1	3	5	4	8	6	3	26	0	68
Viral meningitis	203	11	13	39	30	89	39	5	1	5	0	435
Yersiniosis	1	0	1	0	0	0	0	0	0	3	0	5
Total	6543	609	351	1679	4284	5436	2411	1360	1114	3418	38	27263

Notes:

1. This table does not include details of diseases for which a zero number of cases were notified; see Appendix A1.1 for details of these diseases in 2014

*Since 17/03/2013, figures for *Chlamydia trachomatis*, norovirus infection, respiratory syncytial virus infection and rotavirus infection may refer to notifications from HSE E rather than events. Such notifications from HSE E may also refer to area of laboratory testing rather than patient's area of residence†*C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2014 epidemiological calendar year as shown here

‡Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

§Streptococcus group B infection (invasive) infections in infants <90 days old or stillborn infants

||Data for the age groups 0-4 years, 5-9 years and 10-14 years are not presented here, but data for the age group 0-14 years are available in the STI annual slide-set at www.hpsc.ie

Table A1.6 Number of notifiable infectious diseases by gender, 2014

Infectious Disease	Male	Female	Unknown	Not Specified	Total
Bacterial meningitis (not otherwise specified)	8	13	2	0	23
Botulism	0	1	0	0	1
Brucellosis	1	2	0	0	3
Campylobacter infection	1428	1184	4	0	2616
Carbapenem-resistant Enterobacteriaceae infection (invasive)	3	2	0	0	5
Chickenpox - hospitalised cases	34	27	0	0	61
Chikungunya disease	0	1	0	0	1
<i>Chlamydia trachomatis</i> infection (genital)*	3043	3618	35	1	6697
<i>Clostridium difficile</i> infection†	710	1092	0	0	1802
Creutzfeldt Jakob disease	0	2	0	0	2
Cryptosporidiosis	191	203	0	0	394
Cytomegalovirus infection (congenital)	5	6	1	0	12
Dengue fever	13	8	0	0	21
Giardiasis	40	31	0	0	71
Gonorrhoea	1096	220	3	0	1319
<i>Haemophilus influenzae</i> disease (invasive)	38	22	0	1	61
Hepatitis A (acute)	10	11	0	0	21
Hepatitis B (acute and chronic)	267	168	10	0	445
Hepatitis C	497	211	2	0	710
Herpes simplex (genital)	304	925	6	0	1235
Human immunodeficiency virus infection	277	100	0	0	377
Influenza	717	1037	3	0	1757
Legionellosis‡	4	4	0	0	8
Leptospirosis	20	3	0	0	23
Listeriosis	8	7	0	0	15
Lyme disease	8	10	0	0	18
Lymphogranuloma venereum	35	0	0	0	35
Malaria	54	25	1	0	80
Measles	22	11	0	0	33
Meningococcal disease	44	38	0	0	82
Mumps	406	336	0	0	742
Noroviral infection*	375	429	4	0	808
Paratyphoid	3	2	0	0	5
Pertussis	30	42	1	0	73
Respiratory syncytial virus infection*	1354	1122	3	0	2479
Rotavirus infection*	1103	957	1	0	2061
Rubella	1	2	0	0	3
Salmonellosis	148	112	0	0	260
Shigellosis	39	17	1	0	57
Streptococcus group A infection (invasive)	94	70	0	0	164
Streptococcus group B infection (invasive)§	34	24	10	0	68
<i>Streptococcus pneumoniae</i> infection (invasive)	346	335	0	0	681
Syphilis	248	33	0	0	281
Tetanus	0	1	0	0	1
Toxoplasmosis	5	13	2	0	20
Trichomoniasis	2	90	0	0	92
Tuberculosis	174	144	0	0	318
Typhoid	4	3	0	0	7
Verotoxigenic <i>Escherichia coli</i> infection	314	393	0	0	707
Viral encephalitis	35	33	0	0	68
Viral meningitis	223	205	7	0	435
Yersiniosis	4	1	0	0	5
Total	13819	13346	96	2	27263

Notes:

1. This table does not include details of diseases for which a zero number of cases were notified; see Appendix A1.1 for details of these diseases in 2014

*Since 17/03/2013, figures for *Chlamydia trachomatis*, noroviral infection, respiratory syncytial virus infection and rotavirus infection may refer to notifications from HSE E rather than events. Such notifications from HSE E may also refer to area of laboratory testing rather than patient's area of residence

†*C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2014 epidemiological calendar year as shown here

‡Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

§Streptococcus group B infection (invasive) infections in infants <90 days old or stillborn infants

Table A1.7 Number of notifiable infectious diseases by case classification, 2014

Infectious Disease	Confirmed	Probable	Possible	Total
Bacterial meningitis (not otherwise specified)	13	8	2	23
Botulism	1	0	0	1
Brucellosis	3	0	0	3
Campylobacter infection	2614	2	0	2616
Carbapenem-resistant Enterobacteriaceae infection (invasive)	5	0	0	5
Chickenpox - hospitalised cases	42	0	19	61
Chikungunya disease	1	0	0	1
<i>Chlamydia trachomatis</i> infection (genital)*	6697	0	0	6697
<i>Clostridium difficile</i> infection†	1802	0	0	1802
Creutzfeldt Jakob disease	2	0	0	2
Cryptosporidiosis	391	3	0	394
Cytomegalovirus infection (congenital)	12	0	0	12
Dengue fever	21	0	0	21
Giardiasis	71	0	0	71
Gonorrhoea	1319	0	0	1319
<i>Haemophilus influenzae</i> disease (invasive)	61	0	0	61
Hepatitis A (acute)	21	0	0	21
Hepatitis B (acute and chronic)	445	0	0	445
Hepatitis C	710	0	0	710
Herpes simplex (genital)	1167	68	0	1235
Human immunodeficiency virus infection	377	0	0	377
Influenza	1742	5	10	1757
Legionellosis‡	8	0	0	8
Leptospirosis	22	1	0	23
Listeriosis	15	0	0	15
Lyme disease	18	0	0	18
Lymphogranuloma venereum	35	0	0	35
Malaria	80	0	0	80
Measles§	20	5	8	33
Meningococcal disease	80	0	2	82
Mumps	299	222	221	742
Noroviral infection*	808	0	0	808
Paratyphoid	5	0	0	5
Pertussis	63	3	7	73
Respiratory syncytial virus infection*	2479	0	0	2479
Rotavirus infection*	2061	0	0	2061
Rubella	0	1	2	3
Salmonellosis	260	0	0	260
Shigellosis	54	3	0	57
Streptococcus group A infection (invasive)	160	4	0	164
Streptococcus group B infection (invasive)§	68	0	0	68
<i>Streptococcus pneumoniae</i> infection (invasive)	350	0	331	681
Syphilis	278	3	0	281
Tetanus	0	1	0	1
Toxoplasmosis	20	0	0	20
Trichomoniasis	92	0	0	92
Tuberculosis	236	30	52	318
Typhoid	7	0	0	7
Verotoxigenic <i>Escherichia coli</i> infection	570	135	2	707
Viral encephalitis	68	0	0	68
Viral meningitis	428	7	0	435
Yersiniosis	5	0	0	5
Total	26106	501	656	27263

Notes:

1. This table does not include details of diseases for which a zero number of cases were notified; see Appendix A1.1 for details of these diseases in 2014
2. The case definitions booklet, available at www.hpsc.ie has been updated since 2012; case classifications are assigned to notifications as per the Case Definitions for Notifiable Diseases during 2014

*Since 17/03/2013, figures for *Chlamydia trachomatis*, noroviral infection, respiratory syncytial virus infection and rotavirus infection may refer to notifications from HSE E rather than events. Such notifications from HSE E may also refer to area of laboratory testing rather than patient's area of residence

†*C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2014 epidemiological calendar year as shown here

‡Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

§Streptococcus group B infection (invasive) infections in infants <90 days old or stillborn infants

20 14

ANNUAL
EPIDEMIOLOGICAL
REPORT



EXPLANATORY NOTES
GLOSSARY OF TERMS

Explanatory Notes

Notifiable Infectious Diseases

Computerised Infectious Disease Reporting (CIDR) system

For the majority of the notifiable infectious diseases (see Appendix 1), data were collated using the Computerised Infectious Disease Reporting (CIDR) system. During 2014, notification data were inputted directly by areas using the system. Enhanced surveillance was undertaken for certain diseases and these data are collated on CIDR. Outbreak data were also collated on CIDR using the same process outlined above. Weekly Reports on infectious disease notifications (including a separate report for *Clostridium difficile* associated disease, HIV & STIs) and outbreaks were produced by HPSC and published on the HPSC website, www.hpsc.ie. Throughout the year data were cleaned and validated on an ongoing basis and final data checks and cleaning were undertaken following year end by HPSC and the Departments of Public Health. Data analysis was performed using CIDR Business Objects Reporting and MS Excel. Figures for the relevant chapters within this report were extracted from CIDR between February and November 2015. These figures may differ from those previously published due to ongoing updating of data on CIDR.

HIV

HIV was made a notifiable disease in Ireland in September 2011. Since 1st January 2012, CIDR has been used to record notifications of HIV, thereby allowing the replacement of HIV case based reporting. Since 1st January 2012, AIDS diagnoses are only reported if they occur at the time of HIV diagnoses.

Sexually Transmitted Infections (STIs)

Data on ano-genital warts (AG) and non-specific urethritis (NSU) are not collated using the CIDR system. Instead, clinicians notified their respective Departments of Public Health of cases of ano-genital warts and non-specific urethritis. Data for 2014 were collated and analysed by Departments of Public Health and aggregated data were reported quarterly to HPSC. National data were collated on an MS Access database, analysis performed and reports produced by HPSC.

Data on all other STIs are collated using the CIDR system, including: chancroid, *Chlamydia trachomatis* infection, gonorrhoea, granuloma inguinale, herpes

simplex (genital), lymphogranuloma venereum, syphilis and trichomiasis.

Other Surveillance Systems

Influenza/Influenza-like illness Surveillance Systems

Since 2000, HPSC has worked in collaboration with the National Virus Reference Laboratory (NVRL), the Irish College of General Practitioners (ICGP) and the Departments of Public Health on the influenza sentinel surveillance project. Sixty-one general practices (located in all HSE-Areas and representing 5.8% of the population) were recruited to report electronically, on a weekly basis, the number of patients who consulted with influenza-like illness (ILI). ILI is defined using the Irish case definition for ILI which is sudden onset of symptoms AND at least one of the following four systemic symptoms: fever, malaise, headache, myalgia; AND at least one of the following three respiratory symptoms: cough, sore throat, shortness of breath. Sentinel GPs were requested to send a combined nasal and throat swab on one ILI patient per week to the NVRL. The NVRL also tested respiratory non-sentinel specimens, referred mainly from hospitals. Other surveillance systems set up to monitor influenza/ILI activity include a network of sentinel hospitals reporting admissions data. The Departments of Public Health also notified HPSC weekly of all cases of influenza (including hospitalisation status), all influenza/ILI outbreaks and enhanced surveillance data on all hospitalised cases of confirmed influenza in 0-14 year olds. HPSC was notified of all registered deaths on a daily basis from the General Register Office.

Several surveillance projects that were initiated/augmented during the 2009 influenza pandemic were continued during subsequent influenza seasons:

- Surveillance of all calls to GP out-of-hours (OOHs) centres were monitored for self-reported influenza. These data were provided by HSE-NE.
- Intensive Care Society of Ireland (ICSI) enhanced surveillance of all critical care patients with confirmed influenza in all critical care units and enhanced surveillance of all severe acute respiratory infections (SARI) in two pilot ICU sites.
- Enhanced surveillance of all confirmed influenza deaths.

Other routine surveillance include the monitoring of the uptake of the seasonal influenza vaccine among residents in long term care facilities (LTCFs) and that of the health care workers in both LTCFs and hospitals since the 2011/2012 season. Uptake levels by different categories of staff over time, along with other details are presented in the influenza chapter of this report.

At HPSC, data were collated from the various sources, analysed and routine reports were produced. Influenza surveillance reports were posted on the HPSC website www.hpsc.ie. Aggregated clinical and virological data and anonymised data on confirmed influenza cases admitted to hospital were reported weekly to the European Centre for Disease Prevention and Control (ECDC).

Immunisation Uptake

• Immunisation uptake among children at 12 and 24 months of age

Each HSE Area maintains a childhood immunisation database. In 2014, HSE Areas provided HPSC with immunisation uptake data for their area and for each of the Local Health Offices in their area on a quarterly basis. National data were collated and analysed at HPSC using a MS Excel database. Quarterly reports were produced and are available on the HPSC website. For further details on methods used, please see the immunisation uptake chapter within this report.

• HPV uptake

Following a recommendation from the National Immunisation Advisory Committee, that human papillomavirus (HPV) vaccine should be given to 12 year old girls, a routine HSE school HPV vaccination programme began in May 2010. HPV vaccinations provided through the schools immunisation programme are now collated on a national database. Uptake of HPV vaccine, provided through the school immunisation programme in the academic year 2013/2014 and recorded on the database, is reported in the HPV uptake chapter within this report. For further details please see the HPV uptake chapter.

• Other school immunisations excluding HPV

Since the 2011/2012 academic year, the uptake of the DTaP and MMR vaccines in 4-5 year old schoolchildren (at Junior Infant level) has been monitored across all Local Health Offices (LHOs) each year. Each LHO provides details of the cohort size and the number of vaccinated children and the returns collated to calculate uptake levels which are also presented in maps in the 'other school immunisations' chapter. Uptake of the Tdap vaccine, provided through the school immunisation programme in the academic year 2013/2014 and recorded on a national database, is also reported in this chapter.

European Antimicrobial Resistance Surveillance Network (EARS-Net)

Data were collected by participating EARS-Net (formerly the European Antimicrobial Resistance Surveillance

System, EARSS) laboratories in 2012 on the first invasive isolate per patient per quarter on *Staphylococcus aureus* and *Enterococcus faecalis* from blood only and on *Streptococcus pneumoniae*, *Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* from blood and cerebrospinal fluid (CSF). Data were reported quarterly to HPSC, via WHONET software, and collated in an MS Access database. Quarterly and annual reports were produced.

Note: Invasive infections due to *K. pneumoniae* and *P. aeruginosa* became notifiable as of 13th September 2011.

Antimicrobial consumption

Community (outpatient) consumption data were obtained from IMS Health and represent wholesaler to retail pharmacy sales figures for Ireland. Hospital (inpatient) consumption data were obtained directly from clinical pharmacies and validated with the support of the Irish Antimicrobial Pharmacists Association. Quarterly and annual consumption trends by named public acute hospitals are published on the HPSC website. All data were interpreted using the WHO Anatomical Therapeutic Chemicals index (www.whocc.no/atcddd/) in line with European Surveillance of Antimicrobial Consumption (ESAC-Net) methodology, which is now managed by the ECDC. See relevant section for notes on the denominator data.

Healthcare associated infections

- **Clostridium difficile:** Data on *C. difficile* enhanced surveillance were collected by participating hospitals, reported quarterly to the HPSC and stored in an MS Access database. Quarterly and annual reports were produced.
- Data were also collected on the total volume of alcohol-based hand rub used per hospital per year/quarter, excluding that used for pre-operative surgical "scrub". See relevant section for notes on the denominator data. The rate of usage per hospital was calculated as the total volume of hand rub consumed (in litres) per 1000 bed days used, and quarterly and annual reports were produced for publication on the HPSC website.

Denominator Data

To calculate disease incidence rates, Census of Population data were used as the denominator (available from the Central Statistics Office, <http://www.cso.ie>). Population figures were applied as follows:

- Census 2011 for analysis of 2009-2014 data
- Census 2006 for analysis of 2004-2008 data
- Census 2002 for 2000-2003 data
- Census 1996 for 1999 data

Monthly population changes were estimated between 1993 and 2014 using a curve interpolation method for the calculation of outpatient antibiotic consumption rate.

Bed-days used and other activity data for public acute hospitals were provided by the Performance Monitoring Unit of the HSE and used to calculate rates of MRSA, hospital antibiotic consumption and rates used in other hospital-based surveillance systems. Similar activity data were obtained directly from private acute hospitals.

HSE Areas

Although organisational changes have taken place in the Health Services, the term HSE Areas are used in this report when analysing and presenting data by geographical area (equating to the eight former health board regions/areas). This is because operationally the surveillance, prevention and control of infectious diseases are still managed by eight Departments of Public Health, one in each HSE Area.

Regional Directors of Operations (RDO's)

The range of health and personal social services provided by the HSE and its funded agencies are managed within four regions known as RDOs. Details of the four RDOs and their relationship with the eight HSE areas are shown below.

1. Dublin Mid Leinster (HSE-Midland plus CCA1-5 and CCA9-10 of HSE-East)
2. Dublin North East (HSE-North East plus CCA6-8 of HSE-East)
3. South (HSE-South and HSE-South East)
4. West (HSE-Midwest, HSE-North West and HSE-West)

Glossary of Terms

AHR	Alcohol hand rubs
CDI	<i>Clostridium difficile</i> infection
CIDR	Computerised Infectious Disease Reporting
CIR	Crude incidence rate
DoH	Department of Health
EARS-Net	European Antimicrobial Resistance Surveillance Network
ECDC	European Centre for Disease Prevention and Control
EISN	European Influenza Surveillance Network
ICGP	Irish College of General Practitioners
ILI	Influenza-like illness
IMMRL	Irish Meningococcal and Meningitis Reference Laboratory
IPD	Invasive pneumococcal disease
HCAI	Healthcare associated infections
HCWs	Healthcare Workers
HPSC	Health Protection Surveillance Centre
HSE	Health Services Executive
HSE E	HSE Eastern Region
HSE M	HSE Midland Area
HSE MW	HSE Mid-Western Area
HSE NE	HSE North Eastern Area
HSE NW	HSE North Western Area
HSE SE	HSE South Eastern Area
HSE S	HSE Southern Area
HSE W	HSE Western Area
LTCFs	Long term care facilities
MRSA	Meticillin Resistance <i>Staphylococcus aureus</i>
MSM	Men who have sex with men
NSSLRL	National <i>Salmonella</i> , <i>Shigella</i> and <i>Listeria</i> Reference Laboratory
NIO	National Immunisation Office
NVRL	National Virus Reference Laboratory
PWID	People who inject drugs
SIS	School Immunisation System
STIs	Sexually Transmitted Infections
TB	Tuberculosis
WHO	World Health Organization



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