Annual Report 2011

Health Protection Surveillance Centre

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

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Table of Contents

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Introduction

It is with great pleasure that I present the annual report of the HSE Health Protection Surveillance Centre for 2011.

There have been encouraging trends in some areas of infectious disease prevention and control affecting those living in Ireland in 2011. Ireland is now ranked a low incidence tuberculosis country due to a continued decline in the number of cases here. This is very welcome but we need to remain vigilant as outbreaks continue to be detected, investigated and managed by public health departments. We also need to be alert to the higher incidence of disease among vulnerable groups like homeless people, prisoners, substance mis-users and immigrants from countries of high endemicity. This situation is reflected in other countries worldwide and we need to focus on strategies to prevent TB in these groups.

Immunisation uptake continued to improve during 2011. Children aged 24 months reached the target uptake of 95% for the 6 in 1 vaccine while coverage for the first dose of MMR reached 92%. There was some slippage for the booster dose of Hib vaccine and the third dose of Men C vaccine. Good work has been done by the HSE National Immunisation Office to address this and we need to continue to remind parents of the need to bring their children for the fifth visit at 13 months of age.

The number of cases of meningococcal infection continues to decline. This is good news and is partly due to the success of the Men C vaccination programme but is also due to a welcome reduction in Men B disease.

There were no confirmed cases of Rubella in 2011 indicating that MMR vaccination campaigns are working. If rubella is on the decline then the work with MMR may also lead to the elimination of measles in Ireland. The current school based MMR campaign offers children an extra dose of the vaccine in case they did not receive the necessary two doses of MMR previously. Thankfully the vaccine also covers mumps as it may help reduce the number of cases of this disease which is now common in young adults.

There has been an unwelcome increase in cases of Pertussis (Whooping cough), particularly in young infants. This disease is on the increase in many parts of the world, partly due to better surveillance, but mainly because there has been a real increase in the disease. Evidence is emerging that the newer acellular pertussis vaccine done not provide protection for as long as the older whole cell vaccine. The new vaccine was introduced in 1996 as it causes fewer side effects than the previously used vaccine. The increase in circulating pertussis now requires new strategies to protect vulnerable young infants, such as vaccinating pregnant women and vaccinating those who come into contact with young infants.

We had a mild influenza season in 2011 for most of the population. However, the season was unusual due to the number of influenza outbreaks in nursing homes and long stay units for the elderly. Outbreaks in the very elderly can be difficult to diagnose because of atypical clinical presentations. New guidelines have been circulated to help manage these kinds of outbreaks and are available on the HPSC website. Click http://www.hpsc.ie/hpsc/A-Z/Respiratory/Influenza/SeasonalInfluenza/Guidance/ResidentialCareFacilitiesGuidance/

In common with most other countries, the uptake of influenza vaccine in health care workers is poor. The uptake of influenza vaccine in these long stay units for

both staff and residents should be used as an indicator of the quality of care provided.

Ireland continues to have the highest rate in Europe of gastrointestinal illness caused by organisms like cryptosporidiosis and Verocytotoxigenic E.coli. Both of these pathogens can be spread through water and people using private water supplies in Ireland have a higher risk of acquiring infections. High rainfall can lead to contamination of unprotected or inadequately maintained private water sources and such water supplies need to be looked after properly.

There was an increase in the number of new cases of *Clostridium difficile* infection in 2011. The *C.difficile* subcommittee of the Scientific Advisory Committee of HPSC reconvened in 2011 to update the guidance on *C.difficile*. The draft updated document is currently out for consultation. In June 2011 a national pilot study was carried out in critical care units to examine the prevalence of carbapemem resistant *Enterobacteriaceae* (CRE). While CRE was not detected in any participating unit during this four week study, 39 cases of CRE colonisation or infection were notified to HPSC during 2011.

A further study examined the prevalence of healthcare-associated infection in long term care facilities (LTCF) and reported that 4% of residents had an infection on the day of the study. Antimicrobial guidelines for primary care and guidelines on the diagnosis and management of urinary tract infection in LTCF were also published in 2011. Unfortunately, antimicrobial consumption increased in both hospital and community settings during 2011. The HSE ran an education campaign on prudent antibiotic use in 2011 and have recently launched another one for 2012. This good work needs to continue to educate both health care professionals and patients about prudent and appropriate antimicrobial prescribing.

The trends in relation to anti-microbial resistance in key pathogens causing blood stream infections, are mixed. 2011 saw a very welcome reduction in the proportion of *Staphylococcus aureus* that are resistent to methicillin, also known as MRSA. but also an increase in the proportion of *Streptococcus pneumoniae* and *Enterococcus faecium* blood stream infections that are resistent to multiple antmicrobial classes. Much of the increased resistence among *E.coli* blood stream infections was due to extended spectrum beta-lactamase (ESBLs) producing strains. It is critical that comprehensive infection prevention and control and antimicrobial stewardship programmes continue to be developed, maintained and supported by resourced reference laboratory services.

The Scientific Advisory Committee of HPSC worked on developing new guidelines during 2011. Guidelines for the emergency management of injuries, such as needlesticks, sexual exposure and human bites, are now available at www.emitoolkit.ie. The guidelines relate mainly to injuries where there is a risk of transmission of bloodborne viruses such as hepatitis B, hepatitis C and HIV. The guidance may be particularly useful in settings like emergency departments, occupational health departments, STI clinics, sexual assault units, dental practices, and general practice. The management guidelines cover first aid, risk assessment, testing, treatment, patient information and follow-up, records and documentation. The appendices include patient management forms, algorithms to guide management of specific incidents, guidelines on post-exposure prophylaxis (PEP) for HIV and hepatitis B, testing schedules, patient information leaflets and sample referral letters. They also contain detailed background information on the epidemiology and transmission risks of hepatitis B and C and HIV.

I would like to thank all those who worked on the HPSC Scientific Advisory Committee and gave voluntarily of their time and expertise. I would also like to thank all staff at HPSC for their hard work and enthusiasm and also all those working throughout the HSE who provided surveillance data for this report.

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01

Vaccine Preventable Diseases

1.1 *Haemophilus influenzae* (invasive)

Summary

Number of cases, 2011: 44
Number of cases, 2010: 28
Number of cases, 2009: 43
Crude incidence rate, 2011: 1.0/100,000

In 2011, 44 cases of invasive *Haemophilus influenzae* disease were notified in Ireland (1.0/100,000 total population). This is a sharp increase compared to 2010 when 28 cases were notified, but is very similar to that reported in 2009 (figure 1).

The main change in 2011, when compared to 2010, is the marked increase in the number of non-typeable/non-capsular strains from 20 to 34 (figure 1). No other noteworthy change in the overall number of cases due to other serotypes has been observed since 2004 apart from the decline in the proportion of type b cases and the rise of non-typeable/non-capsular strains (figure 1).

Non-typeable/non-capsular cases accounted for the majority of the invasive *H. influenzae* cases notified in 2011 (77.3%, n=34/44). The remaining cases were due to *H. influenzae* type b (10.7%, n=3), type e (2.3%; n=1), type f (2.3%; n=1), not type b (4.5%; n=2) and isolates that were not typed (6.8%; n=3). The cases ranged in age from four days to 93 years. The incidence rates were highest in infants <1 year (5.5/100,000) and those aged 55-64 years (0.7/100,000) (table 1).

Cases occurring in children <10 years of age (n=10) and elderly adults over 65 years of age (n=20) accounted for 68.2% of all invasive *H. influenzae* notifications in 2011 (table 1). One notable trend since 2004 is the increase in the overall proportion of cases over 65 years of age from 26% to 45% compared to the declines in those aged less than five years from 26% to 18% and those aged between 5 and 64 years from 47% to 36%.

In 2011, male cases (n=25) exceeded female cases (n=19), resulting in a male to female ratio of 1.32:1.0.

The clinical manifestations of invasive *H. influenzae* disease in the ten children <10 years of age in 2011 were three cases of septicaemia, two cases

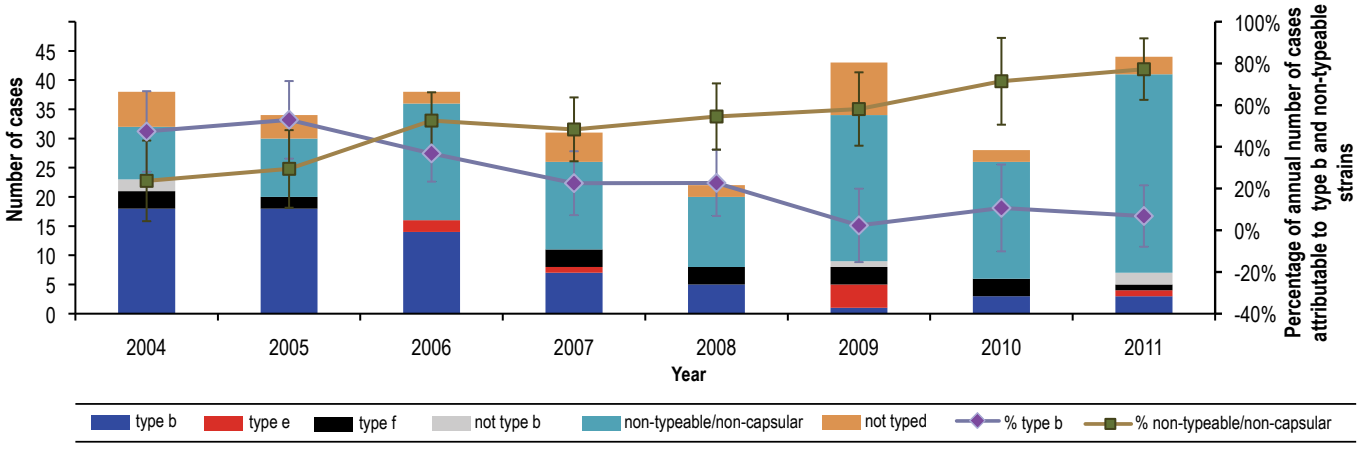


Figure 1. Number of invasive H. influenzae cases notified in Ireland and proportion of annual cases attributable to type b and non-typeable strains with 95% confidence intervals, 2004-2011

of meningitis, one pneumonia, one meningitis and septicaemia combined, two 'other' conditions and one where the clinical diagnosis was not reported.

A breakdown by clinical diagnosis for all age groups by year between 2004 and 2011 is presented in table 2. Of note is the proportion of cases notified each year with an unknown clinical diagnosis, accounting for an annual average of 38.1% since 2004.

Death was reported in four cases: the cause was unknown in two cases; one death was not attributable to infection and another is still awaiting a coroner's report at the time of writing. No imported cases occurred in 2011.
In 2011 three cases of *H. influenzae* type b (Hib) occurred, all of whom were > 65 years of age; two were unvaccinated and both were greater than 75 years of age and another case, who was 67 years of age, had an unknown vaccine status. In 2010, three cases of Hib occurred, one in a completely vaccinated ten year-old child who had received three doses of Hib vaccine and in two other unvaccinated adults (age range 23-76 years).

Between Q3-2007 and Q4-2011, only one true Hib vaccine failure was reported, highlighting the positive impact 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

Table 1. Number and incidence rates of invasive H. influenzae cases by serotype, 2011

Age Group	Type b	Type e	Type f	Not type b	Non-typeable/ non-capsular	Not Typed*	Total	ASIR of Hib	ASIR of all *H. influenzae*
<1	0	0	0	0	3	1	4	0.00	5.52
1-4	0	0	0	1	2	1	4	0.00	1.25
5-9	0	0	0	1	1	0	2	0.00	0.66
10-14	0	0	0	0	0	0	0	0.00	0.00
15-19	0	0	0	0	1	0	1	0.00	0.34
20-24	0	0	0	0	0	0	0	0.00	0.00
25-34	0	0	0	0	4	0	4	0.00	0.58
35-44	0	0	0	0	4	0	4	0.00	0.69
45-54	0	0	0	0	1	0	1	0.00	0.22
55-64	0	0	0	0	4	0	4	0.00	0.75
65+	3	1	1	0	14	1	20	0.07	0.44
All Ages	3	1	1	2	34	3	44	0.07	0.96
CIR	0.07	0.02	0.02	0.04	0.74	0.07	0.96	-	-

CIR, crude incidence rate per 100,000 total population
ASIR, age specific incidence rate per 100,000 population
TVFs, true Hib vaccine failures
*No isolate available for typing in two of three *H. influenzae* not typed cases, as PCR positive (culture negative) only

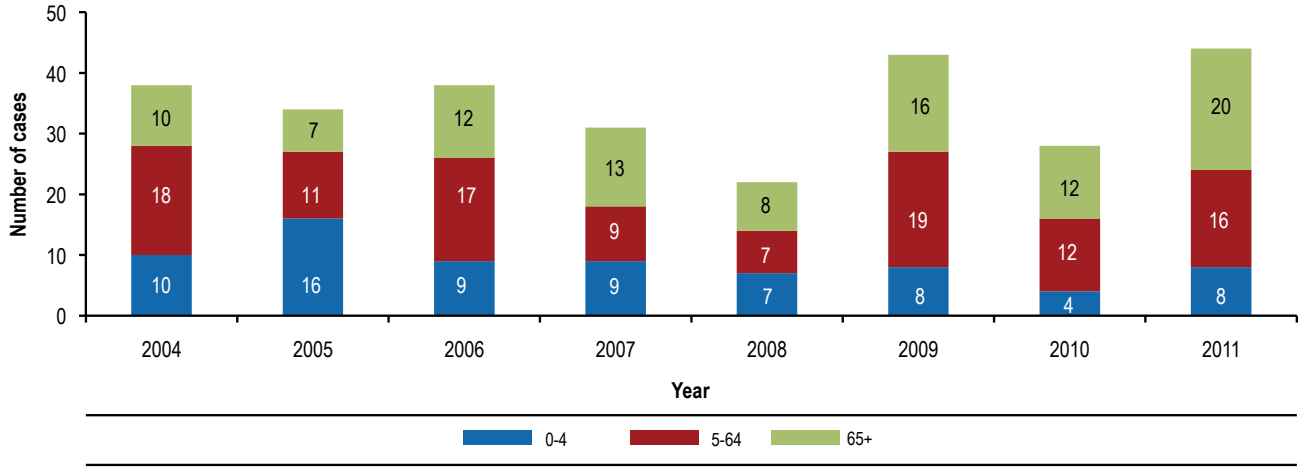


Figure 2. Number of invasive H. influenzae cases notified in Ireland annually by age group (years), 2004-2011

Table 2. Number of invasive H. influenzae cases by clinical diagnosis, 2004- 2011

Clinical Diagnosis	2004	2005	2006	2007	2008	2009	2010	2011	Total	% of Total
Septicaemia	8	14	13	6	3	9	9	11	73	26.3%
Pneumonia	5	0	3	6	3	8	5	12	42	15.1%
Meningitis	3	9	3	2	2	2	1	3	25	9.0%
Epiglottitis	1	3	3	1	1	0	2	0	11	4.0%
Cellulitis	1	1	2	1	1	0	0	1	7	2.5%
Meningitis & septicaemia	1	0	1	0	1	1	1	1	6	2.2%
Bacteraemia (without focus)	0	0	0	0	0	0	0	3	3	1.1%
Other	0	0	0	0	0	0	0	3	3	1.1%
Septic arthritis	0	1	0	0	1	0	0	0	2	0.7%
Osteomyelitis	1	0	0	0	0	0	0	0	1	0.4%
Unknown	18	6	13	15	10	23	10	10	105	37.8%
Total	**38**	**34**	**38**	**31**	**22**	**43**	**28**	**44**	**278**	**100%**

Table 3. Incidence rates per 100,000 population of invasive H. influenzae by HSE area, 2004-2011

HSE Area	2004	2005	2006	2007	2008	2009	2010	2011
E	1.1	1.0	0.9	0.8	0.5	0.7	0.6	1.1
M	1.2	1.2	0.4	1.2	0.8	1.1	0.4	1.1
MW	0.8	0.3	0.8	0.6	0.8	2.1	0.5	0.5
NE	0.3	1.3	0.3	0.0	0.0	0.2	0.5	1.6
NW	0.4	0.0	2.1	0.4	0.0	0.4	0.4	0.8
SE	1.1	0.4	0.9	1.1	0.7	1.0	1.0	0.8
S	1.1	0.3	1.3	0.3	0.6	1.2	1.1	0.3
W	0.5	1.4	0.7	1.4	0.5	1.1	0.2	1.3
Ireland	0.9	0.8	0.9	0.7	0.5	0.9	0.6	1.0

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.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 29th August, 2012. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

1.2 Measles

Summary

Number of cases, 2011: 267
Number of confirmed cases, 2011: 211
Crude incidence rate, 2011: 5.8/100,000
Crude confirmed incidence rate, 2011: 4.6/100,000

In 2011, there were 267 measles cases (5.8/100,000) notified in Ireland compared to 403 cases in 2010. There was a measles outbreak in the HSE-E during 2011; the majority (87%, n=232/267) of cases notified in Ireland in 2011 and the highest crude incidence rate was in the HSE-E (table 1). Measles cases by HSE Area and week and month of notification are shown in figure 1. Forty-nine percent (n=130/267) of cases in 2011 were notified from early August to mid-October (Weeks 32-41). This increase in cases was mainly due to a measles cluster in school-aged children attending a residential summer camp in north Dublin which then spread to the north inner city and Ballymun areas of Dublin. The HSE-E outbreak and control measures are described in detail in Epi-Insight.[1]

Of the 267 measles cases notifed in 2011, 21% (n=56) were classified as possible while 79% (n=211) were classified as confirmed, giving a crude confirmed incidence rate of 4.6 per 100,000 population. Of the confirmed cases, it was known that 69% (n=146) were

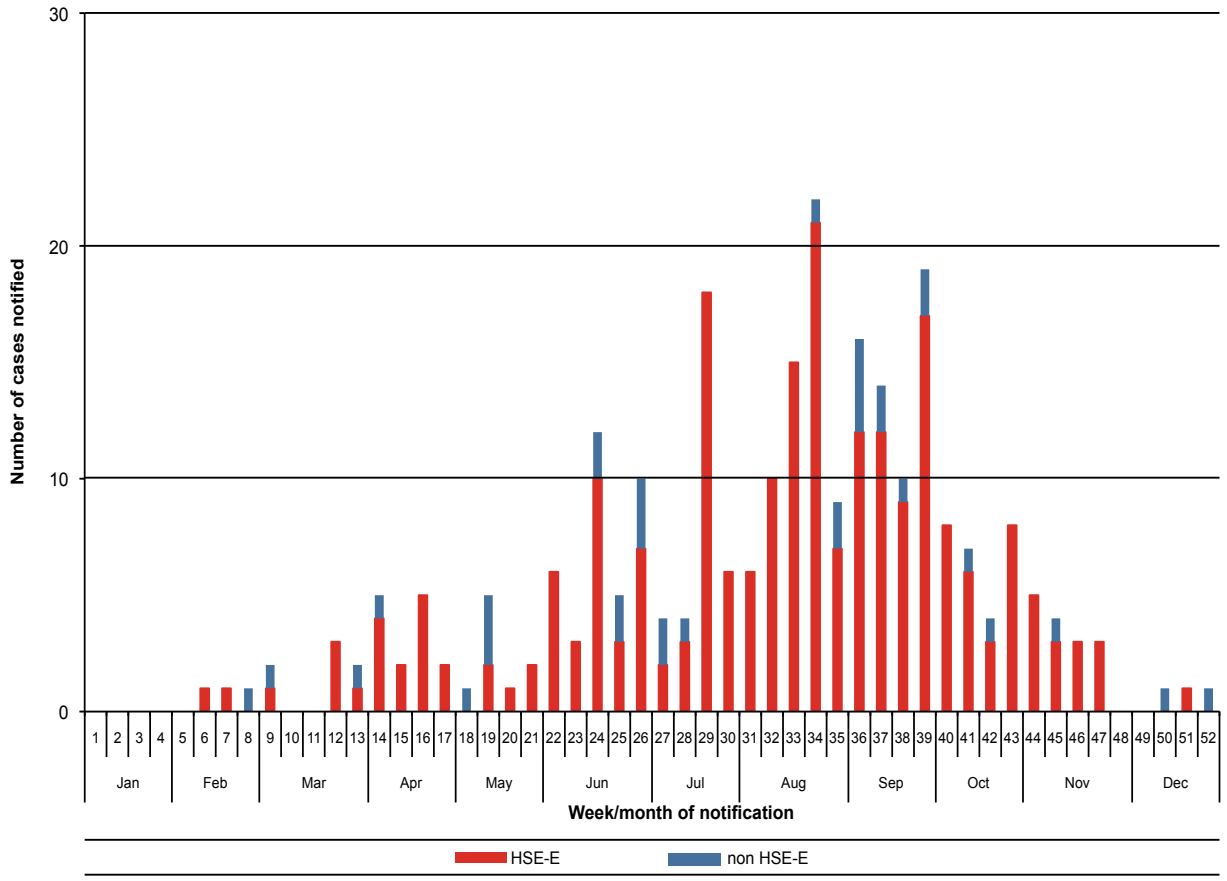


Figure 1. Number of notified measles cases by week and month in 2011 and by HSE Area
HSE-E indicates measles cases notified in the HSE-E
Non HSE-E indicates measles cases notified in the HSE-M, MW, NE, NW, SE, SA and WA

laboratory confirmed and 31% (n=65) were classified as confirmed because they were epidemiologically linked to a laboratory confirmed case.

In 2011, measles cases ranged in age from three months to 41 years; with a mean age of seven years and a median age of five years (age was unknown for one case). The number of cases by age group and the age specific incidence rates are shown in figures 2 and 3. The largest number of cases was in those aged 1-2 years (figure 2) and the highest age specific incidence rate was in those aged <1 year (figure 3). Of the 267 measles cases, 55% (n=147) were male, 45% (n=119) were female while gender was not reported for one case.

Laboratory results were provided for 69% (n=184/267) of cases in 2011. Fifty-five percent (n=146/267) of cases were laboratory test positive for measles. A further three percent (n=8/267) were specified as serology positive for measles; however, as these cases were recently vaccinated, these positive results may have represented serological responses to the measles vaccine. The laboratory results for three percent (n=9/267) were recorded as inconclusive/weakly positive.

Eight percent (n=21/267) of cases were laboratory negative for measles, however, for forty-three percent (n=9/21) of these the specimens were not taken at the optimal time following disease onset or the date of specimen collection in relation to disease onset was unknown (the optimal time following disease onset for collecting oral fluid specimens for measles IgM testing is greater than seven days to two months and the optimal time for collecting serum specimens for measles IgM testing is greater than four days to two-three months). Fifty-seven percent (n=12/21) of the cases that were laboratory negative for measles were known to have a specimen collected at the optimal time. Ninety-two percent (n=11/12) of these were classified as possible cases and eight percent i.e. one case (n=1/12) was classified as confirmed as it was epi-linked to laboratory confirmed case.

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.

Vaccination data were reported for 85% (n=226/267) of measles cases in 2011. Fifty-seven percent (n=152/267) of cases were unvaccinated; of these 20% (n=30/152) were less than 12 months of age.

Twenty-four percent (n=64/267) of cases were reported to have one dose of MMR vaccine; the majority (70%, n=45/64) of these were less than six years of age. Seventy percent (n=45/64) of those reported to have one dose of MMR were classified as confirmed. Sixty-three percent (n=40/64) with one dose of MMR had a vaccination date reported, 20% (n=13/64) were vaccinated <14 days before onset of illness and were probably incubating measles at the time of vaccination.

Four percent (n=10/267) of cases were reported as having received two doses of MMR. Sixty-percent (n=6/10) of these cases were classified as confirmed and only a third (n=2/6) of these cases had both vaccination dates reported.

Thirty cases were reported as hospitalised, representing 11% (n=30/267) of all cases. The median age of hospitalised cases was four years and the mean age was nine years (range six months to 33 years). The majority (97%, n=29/30) of hospitalised cases were classified as confirmed. Length of hospitalisation was reported for 67% (n=20/30) with a median duration of stay of four days (range one to 14 days). Of the 30 hospitalised cases, 17% (n=5) had no MMR details reported while

Table 1. Number of notified measles cases and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2011

HSE Area	Number	CIR
HSE-E	232	14.3
HSE-M	5	1.8
HSE-MW	5	1.3
HSE-NE	8	1.8
HSE-NW	1	0.4
HSE-SE	2	0.4
HSE-S	6	0.9
HSE-W	8	1.8
Total	**267**	**5.8**

53% (n=16) were unvaccinated. Twenty-three percent (n=7/30) were reported to have one dose of MMR; 57% (n=4/7) of these had a vaccination date recorded, one (25%, n=1/4) of these was vaccinated six days prior to onset and may have been incubating measles at the time of vaccination. The two remaining hospitalised cases (7%, n=2/30) was reported to have had two doses of MMR; however the vaccination dates and other vaccination details were only reported for one of these cases.

Reported complications of measles included pneumonia (2%, n=3/160), seizures (1%, n=1/161), chest infection (n=1), near cot death (n=1), extremely high temperature (n=1), tonsillitis and chest infection (n=1) and vomiting and diarrhoea resulting in dehydration (n=1).

Of the 267 cases, the setting where the case most likely acquired measles was reported as home (31%, n=82), daycare or pre-school (7%, n=19), summer camp/school (3%, n=7), overseas (2%, n=6), secondary school (2%, n=6), hospital in-patient (2%, n=5), hospital out-patient (2%, n=5), primary school (2%, n=5), third level (1%, n=2), work (1%, n=2), after school club/community club (0.4%, n=1), other healthcare facility (0.4%, n=1) and was unreported for the remainder (47%, n=126).

Twenty-six localised measles outbreaks were notified during 2011, with 152 associated cases of illness. The outbreak locations included four community outbreaks (with 47 ill), four crèche outbreaks (with 25 ill), four outbreaks occurring among extended families (with 25 ill), six private houses (with 19 ill), three school outbreaks (with 16 ill), one hospital outbreak (with four ill), one associated with an after school youth club (with eight ill), one university/college (with two ill), one workplace (with two ill) and for one outbreak the location was not specified but was reported to have cases (with four ill) that had links to a separate outbreak.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 13th September 2012. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

Reference

1. Ward M, Ennis O, Fitzgerald M on behalf of the outbreak control team. Measles outbreak in Eastern Ireland, 2011. Epi-Insight. 2011;12(11). Available online: http://ndsc.newsweaver.ie/epiinsight/17vq05l54uf?a=1&p=18519355&t=17517774

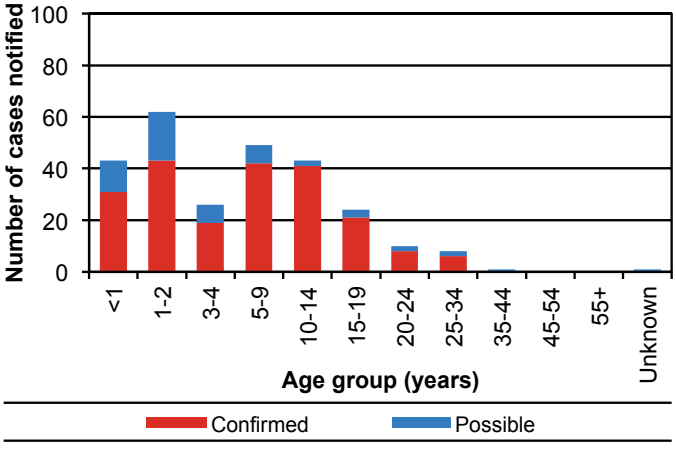


Figure 2. Number of notified measles cases in 2011 by age group and case classification

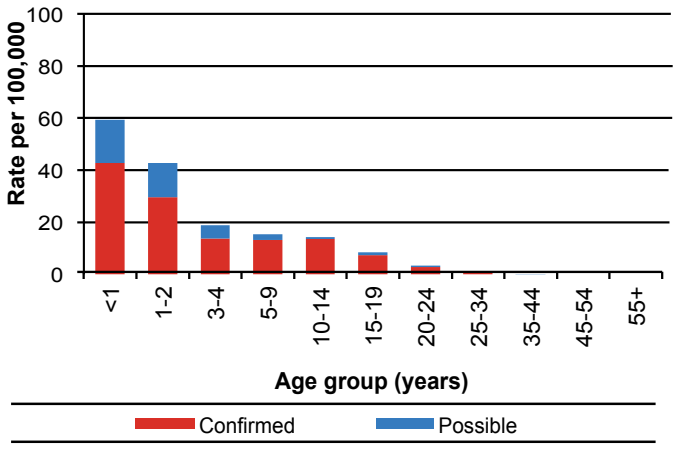


Figure 3. The age specific incidence rate (per 100,000) of notified measles cases in 2011 by case classification

1.3 Meningococcal Disease

Summary

Number of cases, 2011: 94
Number of cases, 2010: 114
Number of cases, 2009: 147
Crude incidence rate, 2011: 2.0/100,000

In 2011, 94 cases (2.0/100,000) cases of invasive meningococcal disease (IMD) were notified in Ireland. This continues a downward trend observed over the past decade since 1999, when the rate was 14.8/100,000 population, a decline of more than 86%.

Based on the current meningococcal disease case definition, 88 of the 94 cases (93.6%) notified in 2011 were case classified as definite, one (1.1%) as presumed and five (5.3%) as possible. Laboratory confirmation of cases has improved with time. In 2011 93.6% (n=88/94) of cases were laboratory confirmed in comparison to 78.7% (n=422/536) in 1999.

Typically, most cases are laboratory confirmed (93.6%; n=88/94) by means of blood/CSF culture testing, PCR testing, blood serology, detection of Gram negative diplococci in skin lesions/culture or in CSF specimens, and by screening of nasal, throat and eye swabs. In 2011, fifty-nine percent of all confirmed cases (n=52/88) were laboratory tested by PCR testing alone of specimens from sterile sites. Confirmation of the remaining 36 cases was by culture of sterile specimens only (10.2%; n=9/88); culture and PCR testing of sterile specimens (27.3%; n=24/88); by CSF microscopy, but not exclusively (1.1%; n=1/88); and by culture of specimens from non-sterile sites such as the eye, nose and throat, but not exclusively (4.5%; n=4/88). None were laboratory confirmed by detection of Gram negative diplococci in skin lesion microscopy or by serology exclusively.

In 2011, male cases (n=57) exceeded female cases (n=37), resulting in a male to female ratio of 1.54:1.0.

Cases ranged in age from one month to 83 years (median age of 2.1 years). The incidence of IMD was highest in infants and young children. Age specific incidence rate (ASIR) was highest among infants <1 year of age (41.4/100,000; n=30), followed by children in the 1-4 year (9.5/100,000; n=27), and 5-9 year age groups (2.8/100,000; n=9) (table 1).

In 2011 the overall incidence of IMD in Ireland was highest in the HSE-NW area (3.1/100,000) with the lowest in the HSE-W area (1.3/100,000) (table 2). There were no imported cases in 2011.

Neisseria meningitidis serogroup B was the pathogen most commonly associated with IMD in 2011 and accounted for 84 (89.4%) of the 94 notifications (figure 1). Since 2003 serogroup B has accounted for more than 80% of annual IMD notifications (figure 1).

IMD due to serogroup C has remained at very low levels over the last nine years with no more than five cases occurring annually. In 2011, only two (0.04/100,000) serogroup C cases were notified, neither of which were

Table 1. Number of cases, deaths, age-group specific incidence rates per 1000,000 population and case fatality ratios of IMD in Ireland, 2011

Age Group	No. Cases	ASIR	No. Deaths	%CFR
<1	30	41.4	0	0.0%
1-4	27	9.5	1	3.7%
5-9	9	2.8	0	0.0%
10-14	4	1.3	0	0.0%
15-19	7	2.5	0	0.0%
20-24	4	1.3	0	0.0%
25+	13	0.4	1	7.7%
All ages	**94**	**2.0**	**2**	**2.1%**

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

reported to be fatal (figure 1). These two cases occurred in patients aged between 50 and 64 years, one of whom was unvaccinated and had chronic meningococcaemia (a rare, low grade bloodstream infection), the vaccination status of the other was unknown. As in in 2011 there were no true vaccine failures in 2010, 2004 and 2003, but there were three failures in 2009 and one each in 2008, 2007, 2006 and 2005.

The absence of MenC vaccine failures in the past two years is a measure of the positive impact with which the MenC conjugate vaccine continues to have since first introduced in October 2000. Prior to the introduction of this vaccine, the serogroup C incidence rate in 1999 was 3.7 per 100,000 total population. The National Immunisation Advisory Committee (NIAC) has recommended a booster dose of the MenC vaccine for close contacts of cases that have completed a course more than one year before, details of which are available at http://www.ndsc.ie/hpsc/A-Z/VaccinePreventable/Vaccination/Guidance/

There were two IMD related notified deaths in 2011 (case fatality ratio (%CFR) of 2.1%), the fewest number on record compared to an average of 6.2 deaths between 2005 and 2010. In 2011, the %CFR was highest amongst cases 25+ years of age (7.7%) as a result of one death among 13 cases (table 1). The next highest %CFR at 3.7% in children aged 1-4 years (table 1).

Both IMD deaths in 2011 were due to serogroup B disease (age range 18 months to 40 years). 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. The decline in deaths associated with meningococcal disease since 2000 has been significant, due in part to the decline in MenC as a result of the vaccination programme and also in part due to decline in meningococcal B disease (table 3).

Despite a marked decline in the overall incidence over the past decade, IMD is still an important public health concern due to its associated severity, high mortality rate and serious adverse sequelae.

Effective vaccination is necessary for the complete prevention and control of IMD. Although effective vaccines are available against serogroups A, C, W135 and Y forms of the disease, a suitable vaccine against

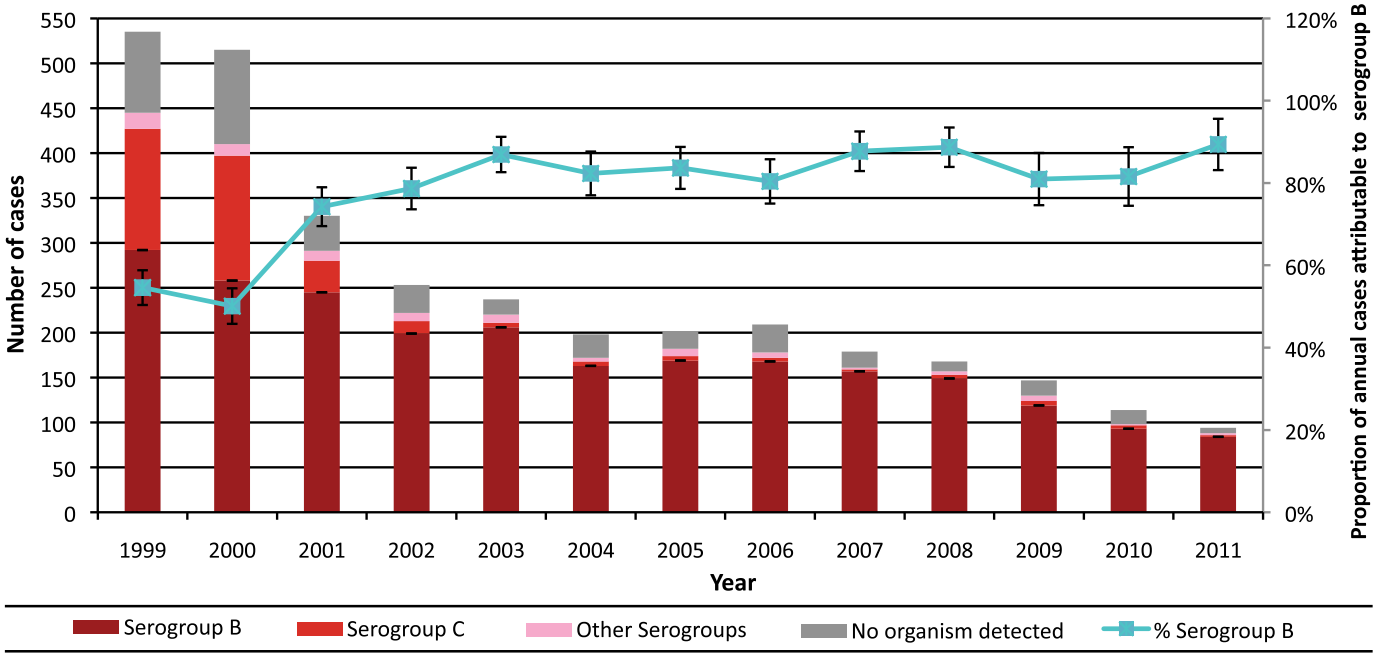


Figure 1. Number of invasive meningococcal disease (IMD) notifications in Ireland by serogroup and proportion of cases attributable to serogroup B with 95% confidence intervals, 1999-2011

Table 2. Age specific incidence rates per 100,000 population of IMD by HSE area and age group, 2011

HSE area	<1	1-4	5-9	10-14	15-19	20-24	25+	Total
E	46.2	4.1	1.9	2.0	3.1	2.5	0.6	2.0
M	20.7	15.7	13.6	0.0	0.0	0.0	0.6	2.6
MW	87.7	8.8	3.8	0.0	4.1	0.0	0.4	2.7
NE	52.0	16.0	0.0	0.0	0.0	0.0	0.0	1.8
NW	51.4	25.2	5.3	0.0	0.0	0.0	0.6	3.1
SE	39.2	9.7	2.8	0.0	6.4	0.0	0.3	1.7
S	10.0	10.0	2.2	2.3	2.5	2.4	0.5	2.0
W	30.2	7.6	0.0	3.4	0.0	0.0	0.3	1.4
Ireland	**41.4**	**9.5**	**2.8**	**1.3**	**2.5**	**1.3**	**0.4**	**2.0**

serogroup B disease, the most common form of IMD in Ireland, is not yet available although developmental work is ongoing.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 29th August, 2012. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

Table 3. Number of cases, deaths and case fatality ratios (%CFR) by year of meningococcal serogroups B and C disease in Ireland, 1999-2011

	Meningococcal B			Meningococcal C		
Year	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%

% CFR, case fatality ratio

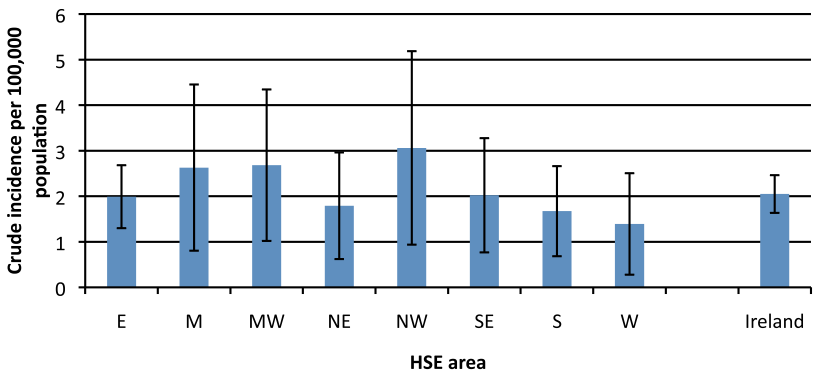


Figure 2. Crude incidence rates per 100,000 population with 95% confidence intervals for IMD notifications by HSE area, 2011

1.4 Mumps

Summary

Number of cases, 2011: 165
Number of cases, 2010: 292
Crude incidence rate, 2011: 3.6/100,000

In total, there were 165 (3.6/100,000) mumps cases notified in 2011. This is a decline compared to 2010 when 292 cases were notified and to the years 2008/2009 and 2004/2005 when large outbreaks occurred (figure 1). The number of cases notified in 2011, however, is still higher compared to the years 1998 to 2003 when there was an average of 43 cases notified each year.

In 2011, of the 165 mumps cases notified 42% (n=70) were classified as confirmed, two percent (n=3) were classified as probable and 56% (n=92) were classified as possible.

The largest number of cases was notified in the HSE-E followed by the HSE-NW, while the highest crude incidence rates were in the HSE-NW followed by the HSE-E (table 1).

In 2011, the median age of cases was 26 years (range one to 86 years). The number of cases by age group and the age specific incidence rates are shown in figures 2 and 3. The highest age specific incidence rates were in those 0-4 years followed by those 15-19 years. In contrast, during 2004-2006 and 2008-2010 the highest age specific incidence rates were in those 15-19 years and 20-24 years. Of the 165 mumps cases, 54% (n=89) were male and 46% (n=76) were female.

Of the 165 mumps cases, 22% (n=36) were unvaccinated, 15% (n=24) had one dose of the measles-mumps-rubella vaccine (MMR), 18% (n=29) were reported to have received two doses of MMR while for 46% (n=76) of cases the number of doses of MMR was not reported. The vaccination date was reported for 71% (n=17/24) of cases reported to have received one dose of MMR. Both vaccination dates were reported for 28% (n=8/29) of cases vaccinated with two doses of MMR. Fourteen percent (n=4/29) of the cases reported to have received two doses of MMR were classified

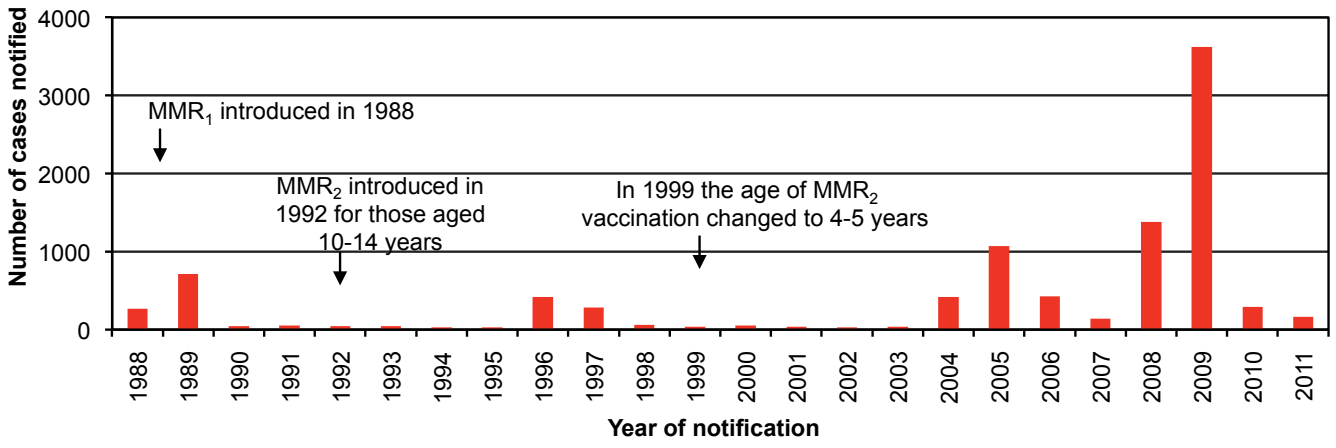


Figure 1. Number of mumps notifications by year and year of introduction of the measles-mumps-rubella (MMR) vaccine in Ireland

MMR_1- first dose of MMR
MMR_2- second dose of MMR
1988-June 2000 data collated by DoHC
July 2000-2011 data collated by HPSC

as confirmed; only two of these cases had MMR vaccination details such as vaccination dates reported.

Thirteen cases were hospitalised, representing eight percent (n=13/165) of all cases and twelve percent (n=13/112) of cases where hospitalisation data were provided. The number of days hospitalised was reported for ten of the hospitalised cases; the median number of days hospitalised was four days (range one to 13 days).

Reported complications of mumps included orchitis (10%, n=5/50), deafness (4%, n=4/93), mastitis (3%, n=3/94), pancreatitis (2%, n=2/90) and encephalitis (1%, n=1/95).

The setting where the case most likely acquired mumps was reported for 22% (n=36/165) of cases. The identified settings for these cases were: social setting for 58% (n=21/36) of cases; school/university/college for 19% (n=7/36); day-care/preschool for eight percent (n=3/36); international travel for eight percent (n=3/36); and family/household for six percent (n=2/36) of these cases.

Three localised outbreaks of mumps were notified during 2011 with seven associated cases of illness. The outbreak locations included two private houses (with four ill) and a community outbreak (with three ill).

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 7th September 2011. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

Table 1. Number of mumps cases notified and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2011

HSE Area	Number	CIR
HSE-E	72	4.4
HSE-M	11	3.9
HSE-MW	15	4.0
HSE-NE	11	2.5
HSE-NW	20	7.7
HSE-SE	12	2.4
HSE-S	7	1.1
HSE-W	17	3.8
Total	**165**	**3.6**

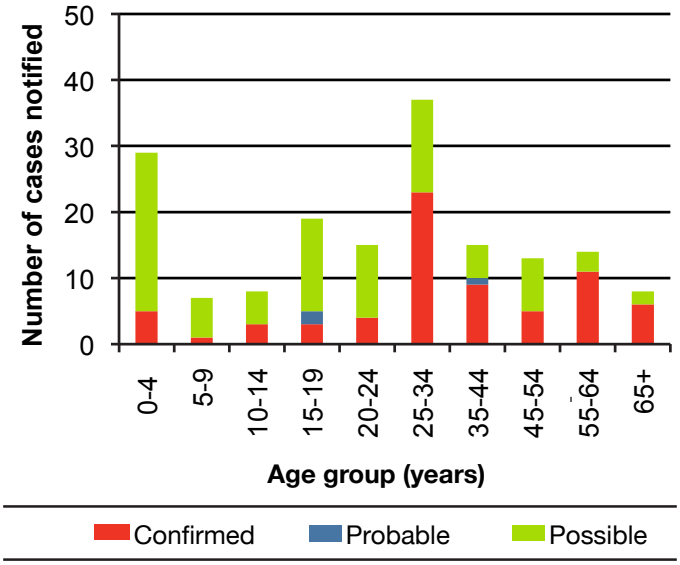


Figure 2. Number of notified mumps cases in 2011 by age group and case classification

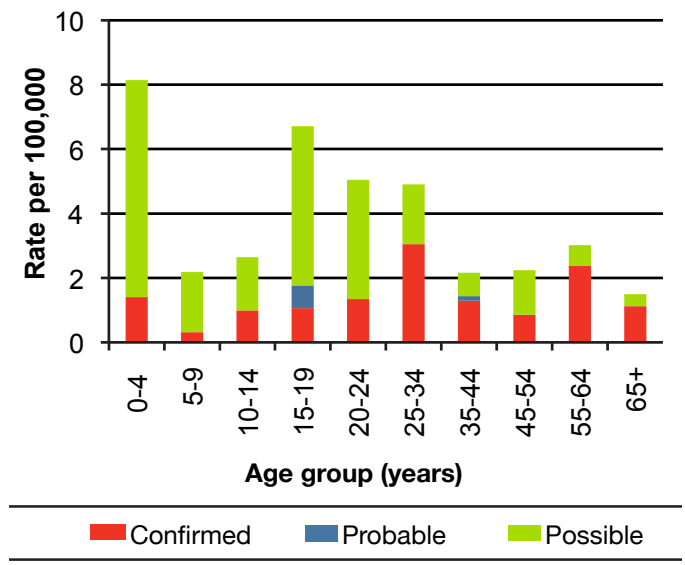


Figure 3. The age specific incidence rates (per 100,000) of notified mumps cases in 2011

1.5 Other Forms of Bacterial Meningitis*
(*excluding meningococcal disease)

Summary

Number of cases, 2011:35
Number of cases, 2010:42
Number of cases, 2009:40
Crude incidence rate, 2011: 0.8/100,000

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, details of which are presented below. For information on invasive meningococcal disease (*Neisseria meningitidis*), see other chapter within this report. Information on bacterial meningitis caused by notifiable diseases is summarised below and further data are available in the organism specific chapter. The figures presented in this chapter are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 29th August, 2012. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

Bacterial meningitis caused by diseases not otherwise specified:
In total, 35 cases of meningitis under this disease category were notified in 2011, among which two patients, aged less than four months, died. The causative pathogens were identified in 57% (n=20) of cases. No causative pathogen was identified in the remaining 43% (n=15) cases, a decrease compared to that recorded during the previous year with 50% (n=21/42).

Among the bacterial meningitis (not otherwise specified) cases notified in 2011 were 15 cases of Beta Haemolytic Streptococcus Group B (*Streptococcus agalactiae),* 14 of which were infants aged 4 months or less, one of whom died and also in one adult aged between 50 and 54 years.

Staphylococcus aureus occurred in two patients (age range 11 months to 76 year). Other meningitis notifications include one caused by *Escherichia coli* in an infant eight months of age, one caused by *Klebsiella oxytoca* in an infant five months of age and another caused by *Streptococcus* species in an infant aged four weeks.

Bacterial meningitis caused by specified notifiable diseases:
Haemophilus influenzae
Four cases of meningitis due to *H. influenzae* were notified in 2011. The age range was 17 months to 17 years, two of which were caused by non-typeable strains and another two caused by strains that were not type b. No deaths were reported. See the chapter on invasive *H. influenzae* disease for further details.

Leptospira species

In 2011, one case of leptospirosis meningitis was reported in a male aged more than 65 years, which may have been work-related. See a separate chapter on non-IID zoonotic diseases for further details.

Listeria species

Two cases of listeriosis meningitis were notified in 2011: one in a woman aged between 80-84 years with an underlying medical condition, and the other in a neonate. See the chapter on listeriosis disease for further details.

Streptococcus pneumoniae

In 2011, 24 cases of pneumococcal meningitis were notified, compared to 25 in 2010 and 34 in 2009. Cases in 2011 ranged in age from three months to 80 years. One pneumococcal meningitis related death in 2011 was reported in an adult aged 45-49 years. This adult had an immunosuppressive condition, but was unvaccinated and developed a serotype 19F infection (a serotype that is included in both the PCV7 and PCV13 vaccines). See a separate chapter on invasive pneumococcal disease for further details.

Mycobacterium species

In 2011, three tuberculosis meningitis cases were notified (provisional). Cases ranged in age from 41 to 71 years. One tuberculosis meningitis death was reported. See the chapter on tuberculosis for further details.

Table 1. Annual notifications of bacterial meningitis other than meningococcal disease, 2009-2011

Notified under	Causative organism	2009	2010	2011	2009-2011
Haemophilus influenzae disease (invasive)	*Haemophilus influenzae*	3	2	4	9
Leptospirosis	*Leptospira* species	1	0	1	2
Listerosis	*Listeria* species	1	3	2	6
Salmonellosis	*Salmonella enteritidis*	1	0	0	1
Streptococcus pneumoniae infection (invasive)	*Streptococcus pneumoniae*	34	25	24	83
Streptococcus Group A infection (invasive)	*Streptococcus pyogenes* (Group A strep)	0	1	0	1
Tuberculosis*	*Mycobacterium* species	8	9	3*	20
Total Bacterial Meningitis, Specified		**48**	**40**	**34**	**122**
	Escherichia coli	3	2	1	6
	Enterobacter species	1	0	0	1
	Klebsiella oxytoca	0	0	1	1
	Mycoplasma pneumoniae	0	1	0	1
Bacterial Meningitis, Not Otherwise Specified	*Streptococcus agalactiae* (Group B strep)	7	10	15	32
	Staphylococcus aureus	2	6	2	10
	Streptococcus bovis	1	0	0	1
	Staphylococcus capitis	0	1	0	1
	Streptococcus species	1	1	1	3
	Not reported	25	21	15	61
Total Bacterial Meningitis, Not Otherwise Specified		**40**	**42**	**35**	**117**
Total Bacterial Meningitis		**88**	**82**	**69**	**239**

*Notes: *Tuberculosis meningitis figure for 2011 is provisional*

1.6 Pertussis

Summary

Number of cases, 2011: 229
Number of cases, 2010: 114
Crude incidence rate, 2011: 5.0/100,000

Following the introduction of pertussis vaccine in the 1950s the number of pertussis cases notified declined, however, following a pertussis vaccine scare in the mid-1970s with decline in pertussis vaccination uptake the notifications started to increase again (figure 1). This trend was reversed in the 1990s as notifications decreased again to a low of 40 cases in 2003 (figure 1). Between 2004 and 2010 there was on average 87 cases notified each year. In 2011, the number of pertussis cases notified doubled compared to 2010 with two hundred and twenty nine cases (5.0/100,000) notified in 2011 compared to 114 cases in 2010 (figure 2).

Of the 229 cases in 2011, 113 (49%) were classified as confirmed, 31 (14%) were classified as probable and 85 (37%) were classified as possible.

In 2011, the largest number of cases (n=85, 37%) and the highest age-specific incidence rate (117/100,000) were in children aged less than one year with a third (n=79/229, 34%) of all cases aged less than six months (figures 3 and 4). One death occurred in a one month old. One hundred and thirty six cases (59%) were female and 92 (40%) were male while gender was unknown for one.

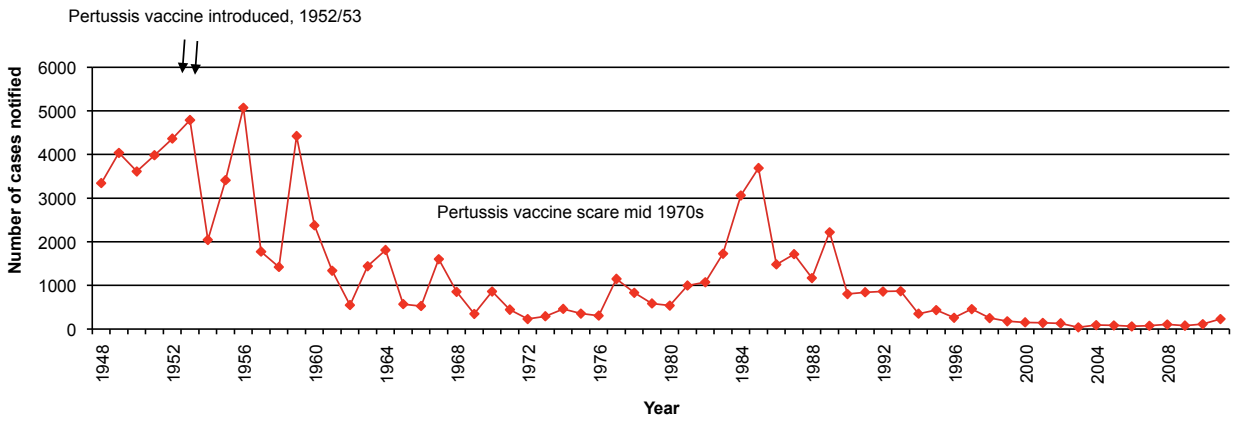


Figure 1. Number of notified pertussis cases in Ireland by year, 1948-2011
1948-June 2000 data collated by DoHC
July 2000-2011 data collated by HPSC

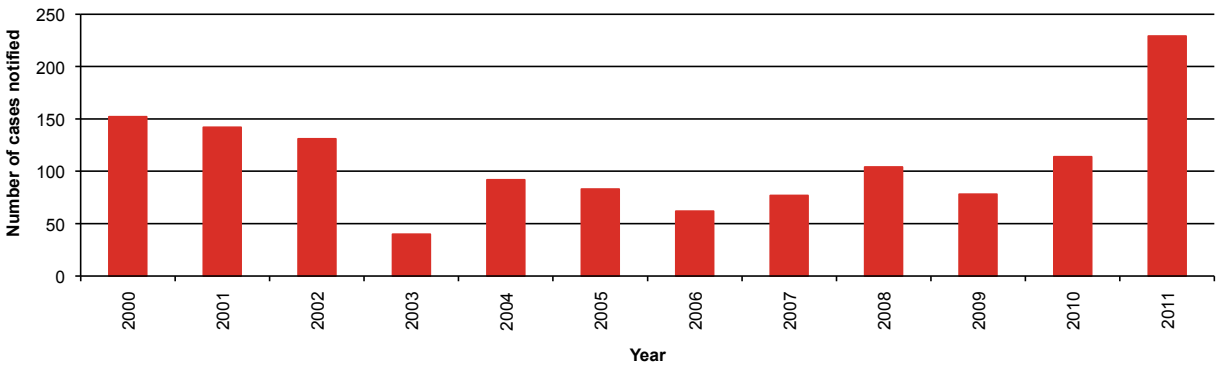


Figure 2. Number of notified pertussis cases in Ireland by year, 2000-2011

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 the National Immunisation Advisory Committee (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 parts of the country) in 2011 and is being rolled out to all schools in 2012.

In 2011, the vaccination status was reported for 148 (65%) pertussis cases. Nearly one third of cases (n=74/229, 32%) were unvaccinated; these cases ranged in age from three weeks to 74 years, with over a half (n=42/74, 57%) of these cases aged less than six months. Nearly one third of the unvaccinated cases (n=23/74, 31%) were less than two months of age and were therefore not eligible for pertussis vaccine in the Irish schedule. Thirty-six (n=36/229, 16%) cases were reported as incompletely vaccinated, but these included 21 cases (n=21/36, 58%) who were less than six months of age and were therefore not eligible for three doses of pertussis vaccine in the Irish schedule. Thirty-eight (n=38/229, 17%) cases were reported as completely vaccinated for their age; 16 of these were reported to have had three doses of pertussis vaccine, 14 were reported as having four doses, one was known to have the booster dose while the number of doses was not specified for the remainder. Of the 14 cases reported as having four doses, four (29%) were classified as confirmed.

Twenty-two localised pertussis outbreaks were notified during 2011, with 90 associated cases of illness. Eighteen were family outbreaks (with 69 ill), two were community outbreaks (with 12 ill) and two were school outbreaks (with nine ill).

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 4th September 2012. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

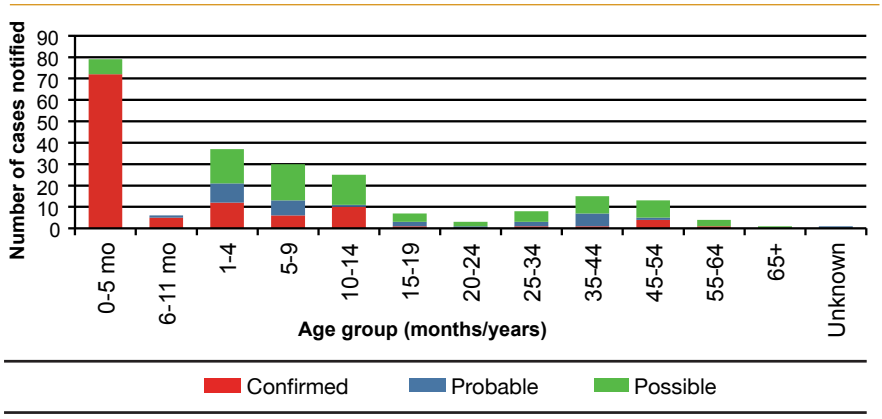


Figure 3. Number of notified pertussis cases in 2011 by age group and case classification.
"Mo" in graph indicates months i.e. 0-5 months and 6-11 months, the remaining age groups are in years

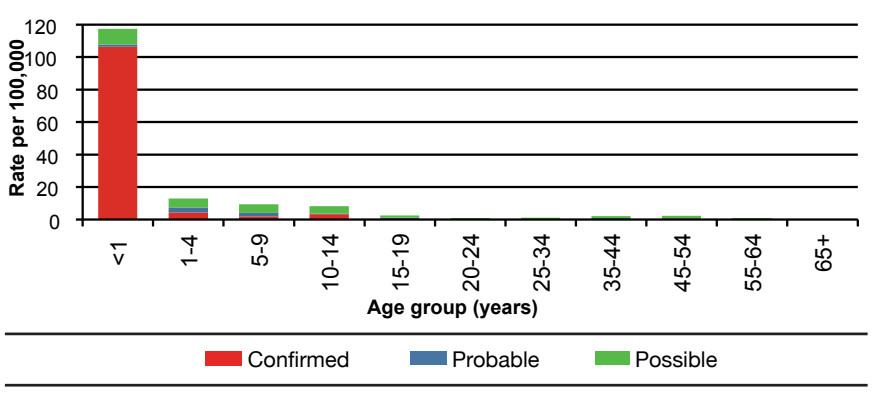


Figure 4. The age specific incidence rate (per 100,000 population) of notified pertussis cases in 2011 by case classification

1.7 Rubella

Summary

Number of cases, 2011: 4
Number of confirmed cases, 2011: 0
Crude incidence rate, 2011: 0.1/100,000
Crude confirmed incidence rate, 2011: 0.0/100,000

In 2011, four cases (0.1/100,000) of rubella were notified in Ireland compared to 24 cases in 2010 (table 1).

All four cases in 2011 were classified as possible and the age profile of the cases ranged from one to six years of age, as shown in figure 1. The age specific incidence rates by case classification are shown in figure 2.

Of the four rubella cases, two (50%) were male and two (50%) were female.

Rubella 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 for all children at twelve months of age and the second dose at four to five years of age. Vaccination status was reported for all four (100%) of the rubella cases in 2011. Three cases (75%) were reported as completely vaccinated for their age, each having had only one dose of MMR. All three were less than five years of age. One case was reported as incompletely vaccinated.

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, diagnostic samples (serum, oral fluid, urine) should always be obtained from patients in order to accurately diagnose rubella. In 2011 the laboratory diagnosis of rubella required the identification of rubella IgM antibodies or IgG seroconversion or a fourfold or greater rise in titre to rubella virus in the absence of recent vaccination. Detection of rubella virus RNA in an appropriate specimen or a positive culture for rubella virus (not routinely performed) can also be done (following consultation with the laboratory). Vaccination with a rubella-containing vaccine eight days to eight weeks before sample collection makes interpretation of laboratory results difficult as vaccination induces similar serologic results. Therefore laboratory results always need to be interpreted according to vaccination status and history of recent vaccination.

In 2011 one case was serology positive for rubella, but had been vaccinated with one MMR dose just prior to

Table 1. Number of rubella cases notified and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2011

HSE Area	Number	CIR
HSE-E	1	0.1
HSE-M	0	0.0
HSE-MW	0	0.0
HSE-NE	1	0.2
HSE-NW	0	0.0
HSE-SE	2	0.4
HSE-S	0	0.0
HSE-W	0	0.0
Total	**4**	**0.1**

disease onset and as such could not be considered a confirmed case. Accurate information on vaccination dates in relation to disease onset is needed to accurately interpret serology test results.

Accurate and detailed information on all notified rubella cases is needed to monitor progress towards the WHO European Measles and Rubella Elimination Strategy (for 2015). HPSC is currently working with the HSE Areas to improve rubella surveillance data and is in the process of expanding the enhanced surveillance of this disease, recorded using the Computerised Infectious Disease Reporting (CIDR) system.

The figures presented in this summary are based on data extracted from CIDR on 14th September 2012. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

Guidance on tests used to diagnose rubella is available on the NVRL website at http://www.ucd.ie/nvrl and on the HPSC website www.hpsc.ie/ under the disease name, see Topics A-Z.

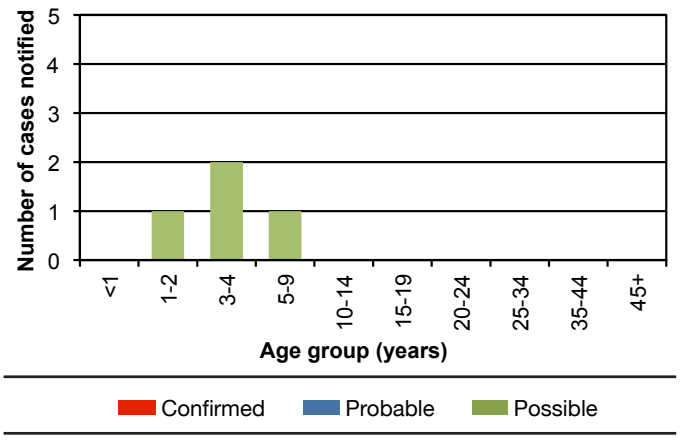


Figure 1. Number of notified rubella cases in 2011 by age group and case classification

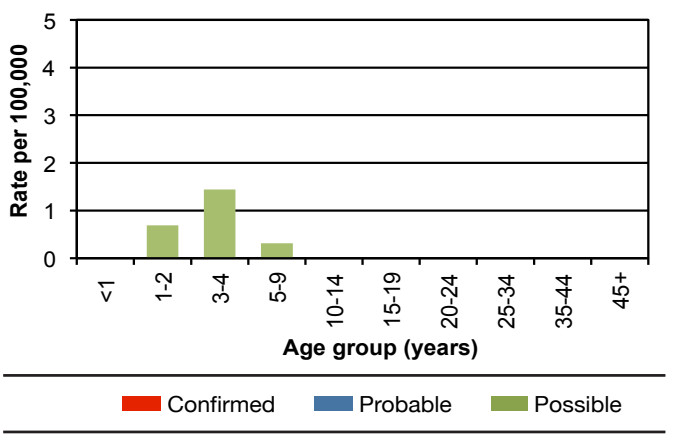


Figure 2. The age specific incidence rate (per 100,000 population) of notified rubella cases in 2011 by case classification

1.8 *Streptococcus pneumoniae* (invasive)

Summary

Number of cases in 2011: 425
Number of cases in 2010: 391
Number of deaths in 2011: 11
Number of deaths in 2010: 14
Crude incidence rate, 2011: 9.3/100,000

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 blood stream 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 on IPD notifications is undertaken by Departments of Public Health particularly on children born since 2000 and these data are also collated in CIDR. A separate surveillance system (EARS-Net) 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. Since April 2007, the National Pneumococcal Typing Project has been offering a typing service to Irish laboratories for all invasive *S. pneumoniae* isolates submitted. This is a collaborative project involving the RCSI/Beaumont Hospital, the Children's University Hospital, Temple Street and the HPSC.

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 is currently 91%.

IPD notification data was extracted from CIDR on 16th October 2012. These figures may differ slightly from those previously published due to ongoing updating of notification data on CIDR. For the 2011 notifications, the 2003 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 a normally sterile site was a probable case and a clinically

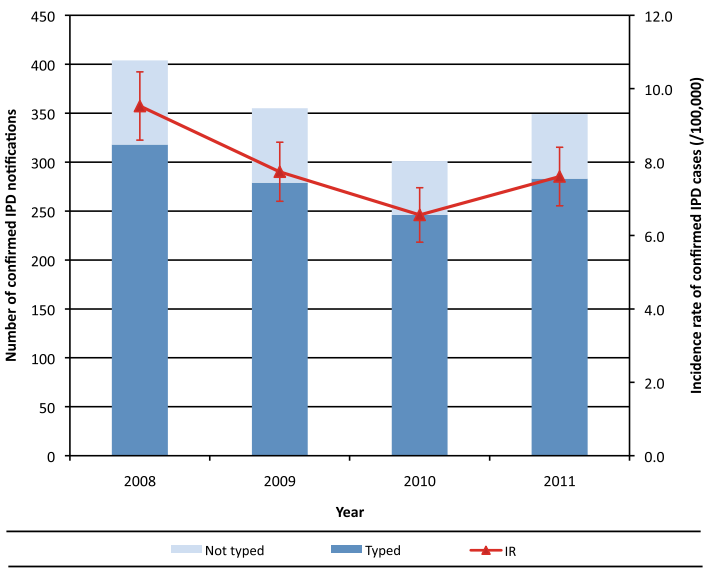


Figure 1. Number of confirmed invasive pneumococcal disease notifications by typing status and the incidence rate (IR) of confirmed IPD with 95% confidence intervals, 2008-2011
Data source: CIDR

compatible case without any laboratory confirmation or identification of *S. pneumoniae* from a non-sterile site (including urinary antigen positive) were classified as possible.

Results

All IPD notifications

In 2011, 425 cases of IPD (9.3/100,000) were notified in Ireland. This was an 8.7% increase in incidence compared with 2010 when 391 cases were notified (8.5/100,000). In 2011, 82% (n=349) of notifications were classified as confirmed, 1.9% (n=8) as probable and 16% as possible (n=68). The majority of the possible cases (85%, n=58/68) were notified by HSE-SE. These figures do not necessarily indicate a higher burden of IPD in this area relative to other areas, but rather it may reflect more consistent reporting of positive urinary antigen cases from that area.

Confirmed IPD notifications

For confirmed IPD notifications, 349 cases were notified in 2011 (7.6/100,000; 95% CI 6.8 - 8.4/100,000) (figure 1). Although this was a 16% increase in incidence compared with 2010 (6.6/100,000; 95% CI 5.3 – 7.3/100,000; 301 cases), overall the incidence of confirmed IPD in 2011 significantly declined by 20% compared with 2008 (9.5/100,000; 95% CI 8.6 – 10.5/100,000; 404 cases; p<0.05) (figure 1).
In 2011, 81% of the confirmed IPD notifications had an isolate submitted for serotyping which was similar to the proportion in 2010 and a slight improvement from 2008 and 2009 when 79% of notifications had an isolate typed (figure 1). In 2011 however, 41% of notifications (17/41) relating to children <5 years of age did not have an isolate submitted for serotyping. For 11 of the 17 an isolate was unavailable as the cases were confirmed by PCR only, while the remaining six did have an isolate from a sterile site.

Incidence rates by HSE area ranged from 5 per 100,000 in HSE-M and NE to 9 per 100,000 in HSE-MW, NW and S with the incidence highest in the HSE areas along the western seaboard (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 just 127 of the 349 confirmed cases (36%), which included meningitis (n=23), BSI with pneumonia (n=69) and other BSI for the remainder.

More cases occurred in males than in females, 55% of cases in the former (n=193).

Cases ranged in age from 5 days to 97 years, with an average age of 54.6 years and a median age of 62 years. Those aged 65 years and older accounted for almost half of the cases (46%, n=160). The age specific incidence rate was highest in those 85 years of age and older (70/100,000; n=41), followed by 75-84 years age group (34/100,000; n=58) and then those aged between 65 and 74 years (20/100,000; n=61) (figure 3). In children < 2 years of age the age-specific incidence rate was 16 cases per 100,000 population (n=23). A statistically significant decline (62%) in IPD incidence was seen in this age group when compared with 2008 (42.8/100,000; n=52; p<0.0001), highlighting the positive impact the introduction of PCV7 to the infant schedule in September 2008 has had on reducing the burden of IPD in young children (figure 3).

The medical risk factor field was completed for 132 (38%) confirmed cases; for the remainder this information was either unknown or not specified. Based on the 132 cases with information reported, 96 (73%) had an underlying medical risk factor, with some patients having multiple ones. The main risk factors reported included immunosuppressive condition or therapies (n=29), chronic heart disease (n=22), chronic lung disease (n=18) and chronic liver disease (n=13). It should also be noted that being elderly, aged 65 years and older is also a recognised IPD risk factor; 160 cases in 2011 were in this age group. Apart from being elderly, 51 cases in this age group also had a reported medical risk factor.

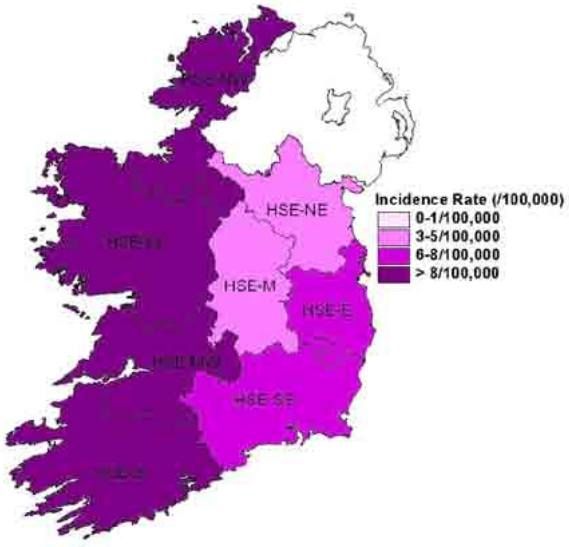


Figure 2. Incidence rate of confirmed invasive pneumococcal disease notifications by HSE area, 2011
Data source: CIDR

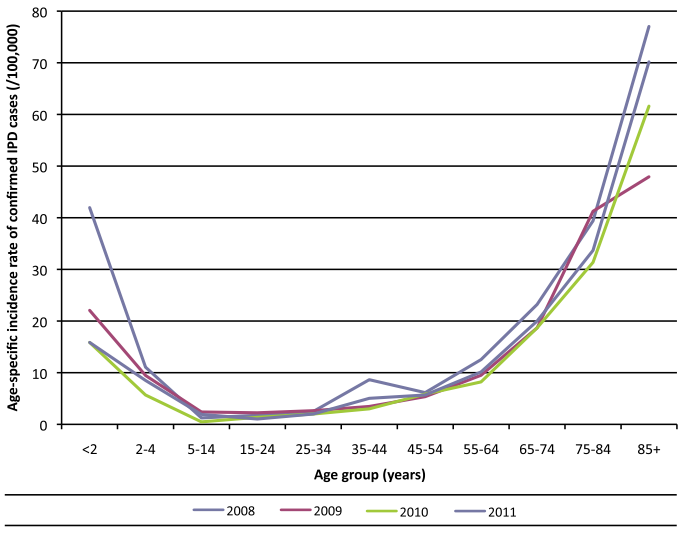


Figure 3. Age specific incidence rate of confirmed invasive pneumococcal disease notifications by age group, 2008-2011
Data source: CIDR

IPD death notifications

Outcome was reported on just 29% (n=123) of the IPD notifications in 2011. Therefore, these figures underestimate the burden of IPD in terms of mortality. Based on the data available, 19 deaths in individuals with IPD in 2011 were reported. The cause of death was reported as directly due to IPD in five cases, not due to IPD in eight cases and for the remaining six the cause of death was not specified or was unknown. Therefore, based on the outcome data available, IPD was potentially the cause of death in 11 patients, giving an IPD case fatality rate of 9%. All deaths occurred in adults, ranging in age from 49-94 years. Nine of the eleven deaths were in confirmed cases and one death each in a probable and possible IPD case.

Impact of pneumococcal conjugate vaccines (PCV)

Data from the National Pneumococcal Typing Project 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 2011, isolates relating to 296 cases of IPD were typed, 99% (n=293) of these records had a corresponding notification in CIDR. Twenty percent of IPD infections were due to serotypes covered by PCV7 (4, 6B, 9V, 14, 18C, 19F and 23F), 36% were associated with the six additional serotypes included in PCV13 (1, 3, 5, 6A, 7F and 19A) and the remaining 44% of infections were due to non-vaccine types (NVTs, serotypes excluding the 13 covered by PCV13).

Since introducing PCV7 to the Irish childhood immunisation schedule towards the end of 2008, there has been a 20% reduction in the overall burden of IPD disease. In particular 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 serotype has significantly declined in 2011 compared with 2008 (70% decline, $p<0.001$). The greatest impact was seen in children <2 years of age where the incidence of the disease due to PCV7 serotypes has declined by 93% ($p<0.01$) (figure 4a). In 2011, the early impact of PCV13 was observed; the incidence of disease due to the additional six serotypes in PCV13 declined by over half in the <2 year olds compared with 2008 (figure 4b). This decline was not observed in any of the other age groups and in actual fact the incidence of disease increased compared with previous years (figure 4b). An increase in incidence due to the NVTs was also seen in 2011, particularly in the elderly, those aged 65 years and greater (figure 4c).

The predominant serotypes in circulation in 2011, were 7F and 19A (both included in PCV13) and then followed by serotypes 22F and 8 (both NVTs). In children <2 years of age, the predominant serotype was 19A, accounting for a third 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/hpsc/A-Z/VaccinePreventable/PneumococcalDisease/PostersPresentations/

PCV vaccine failures

Based on data obtained through the IPD enhanced surveillance system, no PCV vaccine failures were reported in 2011. However, there were nine

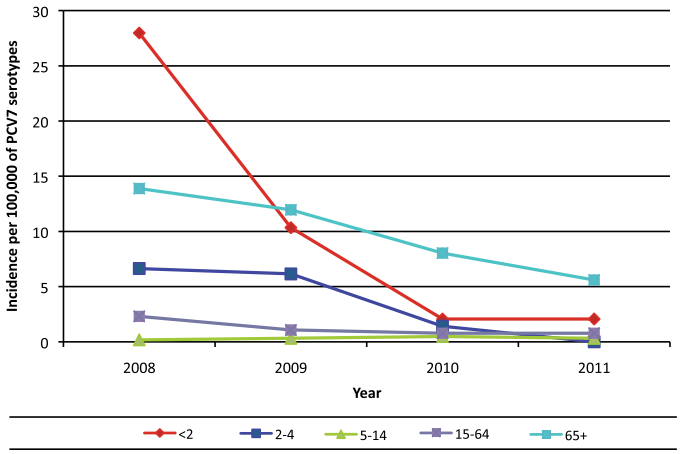


Figure 4a

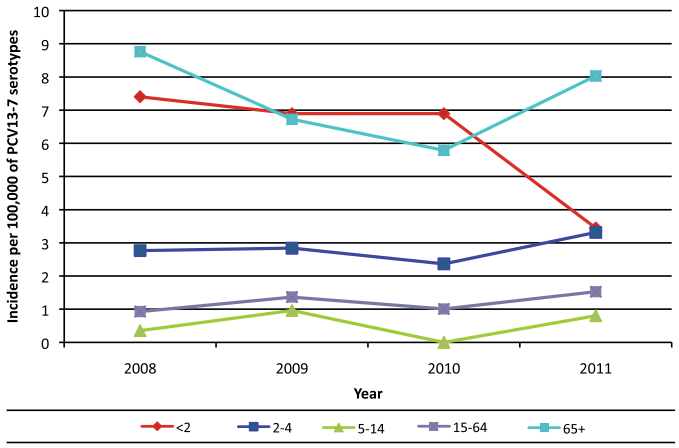


Figure 4b

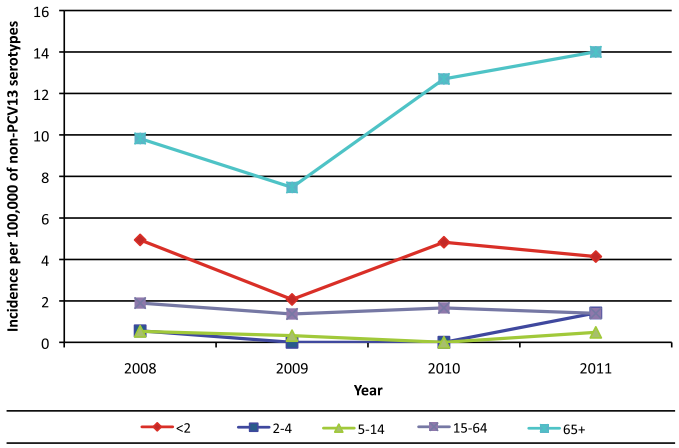


Figure 4c

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 (PCV13-7) and (c) non-vaccine types (non-PCV13 serotypes), 2008-2011
Data source: National Pneumococcal Typing Project

notifications where a child was reported as fully vaccinated but no serotype information was available to ascertain whether any of these cases were genuine vaccine failures or not. Since 2008, four vaccine failures have been reported, two due to serotype 14 and two due to 19F.

Penicillin non-susceptible S. pneumoniae (PNSP)

In 2011, the proportion of penicillin non-susceptible invasive *S. pneumoniae* (PNSP) was 19.6%, (6.1% and 13.5% with high and intermediate level resistance, respectively) while 18.9% of isolates were resistant to erythromycin (Data source: EARS-Net). In the UK, the PNSP proportion in 2011 was 5.5% (0.8% and 4.7%, with high and intermediate level resistance, respectively).

In 2011, Ireland had one of the highest proportions of PNSP in Europe ranking 7th out of 27 countries overall. Although, 35 different serotypes were identified in 2011, only 10 serotypes were associated with being penicillin non-susceptible. The predominant PNSP serotypes in 2011 were 19A and 6A whereas in 2008 serotypes 9V and 14 were the leading ones. For details on the antimicrobial resistance patterns of *S. pneumoniae*, please see the chapter on Antimicrobial Resistance within this report.

Discussion

Although the incidence of confirmed cases of IPD increased in Ireland in 2011 compared with 2010, 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 <2 years of age where the disease incidence due to PCV7 serotypes has been reduced by over 90%. Early indications that PCV13 introduced in December 2010, was beginning to have an impact was seen during 2011, when a reduction in the incidence of disease due to the additional six serotypes covered by PCV13 was observed in children <2 years of age.

However, despite these reductions in IPD burden, the incidence of disease due to non-PCV7 serotypes has increased in those > 2 years of age. There has been a shift in the prevalent serotypes associated with invasive disease. Serotypes 7F, 19A, and 22 have replaced 14, 4 and 9V (all covered by PCV7) as the predominant serotypes. The additional serotypes covered by PCV13 (particularly 7F and 19A) will hopefully tackle some of the serotype replacement issues observed in 2011.

To accurately assess the impact of PCV on immunisation programmes and to monitor for vaccine failures in Ireland, it is crucial that laboratories continue to send all invasive *S. pneumoniae* isolates for typing to the National Pneumococcal Typing Project. Although 81% of confirmed notifications had an isolate submitted for serotyping in 2011, 19% (n=66) did not, including 17 cases in children <5 years of age. In 11 of these 17 cases an isolate was not available for typing as confirmation was by PCR only. The overall concern is that serotype information is unavailable for 40% of confirmed notifications in this age group.

Continued good quality IPD surveillance including the monitoring of invasive *S. pneumoniae* serotypes is crucial in identifying any epidemiological changes in the disease, assessing the impact of PCV13 on public health and in guiding further vaccination strategies as newer expanded valency vaccines are made available. 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. A properly resourced national reference laboratory service for pneumococcal typing is urgently required.

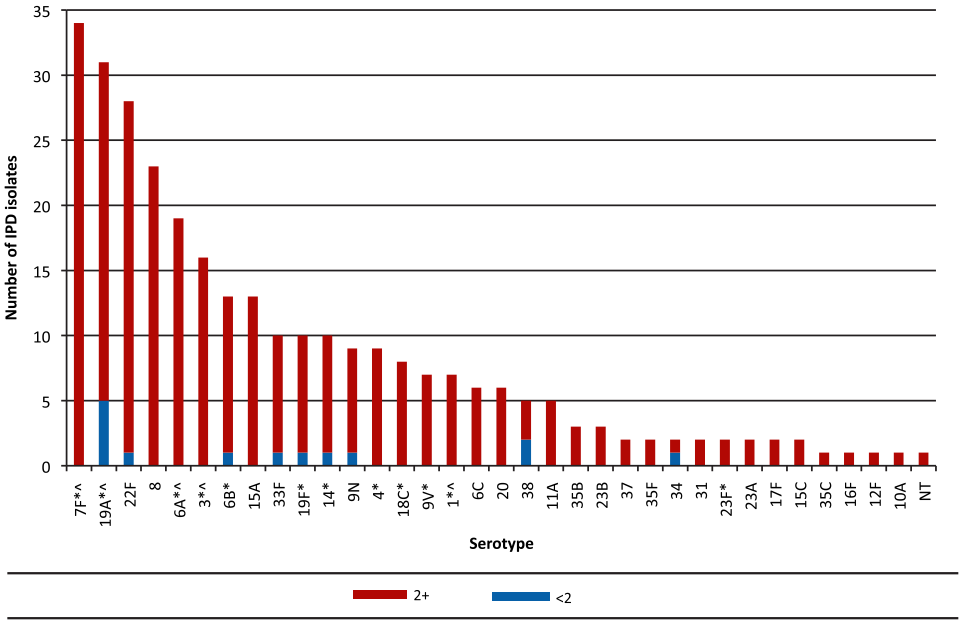


Figure 5. Serotype distribution of invasive Streptococcus pneumoniae isolates by age group (years) in Ireland, 2011
** Denotes serotypes included in PCV7*
**^ Denotes additional six serotypes included in PCV13 (PCV13-7)*
Data source: National Pneumococcal Typing Project

02

Respiratory and Direct Contact Diseases

2.1 Influenza

Summary

2011/2012 influenza season summary:
Peak influenza-like illness rate: 41.3 / 100,000
Total confirmed influenza cases hospitalised: 147
Total confirmed influenza cases admitted to ICU: 15
Total influenza-associated deaths: 13 (7 confirmed & 6 probable)

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. Sixty 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 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 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 and enhanced surveillance of all severe acute respiratory infections (SARI) in two pilot ICU sites.
- Enhanced surveillance of all confirmed influenza deaths.
- A network of sentinel hospitals reporting admissions data

The data presented in this summary were based on data reported to HPSC by the 16th November 2012. Due to legislation regarding the registration of deaths in Ireland; there can be significant delays between the date of death and the registration of deaths and subsequent reporting to HPSC.

Sentinel GP Clinical Data
Influenza activity in Ireland was low during the 2011/2012-influenza season, with sentinel GP ILI consultation rates peaking at 41.3 per 100,000 population during week 8 2012 (February) (figure 1). ILI rates first increased above baseline levels (25.9 per 100,000) during week 7 2012 and remained there for only three weeks. ILI age specific rates in all age groups during the 2011/2012 season, were the lowest recorded for a number of seasons. The highest age specific ILI rates were in the 0-4 year age group (peaking at 70.7/100,000), followed by those aged 5-14 years (51.4/100,000), 15-64 years (42.4/100,000) and those aged 65 years or older (34.7/100,000).

Virological Data
The NVRL tested 509 sentinel specimens for influenza virus during the 2011/2012 season. One hundred and eighty-six (36.5%) sentinel specimens were positive for influenza: 172 influenza A (169 A (H3), 1 A (H1)pdm09 and 2 A unsubtyped) and 14 influenza B. At the peak of influenza activity, the proportion of influenza positive sentinel specimens reached 69.7% (during week 9 2012).

The NVRL tested 4,499 non-sentinel respiratory specimens during the 2011/2012 season, 371 (8.2%) of which were positive for influenza: 355 influenza A (312 A (H3) and 43 A (unsubtyped)) and 16 influenza B. The proportion of influenza positive non-sentinel specimens peaked at 21.3% (during week 7 2012).

Influenza A (H3) was the dominant influenza virus circulating during the 2011/2012 season. Influenza A (H3), accounted for 86.4% of all positive influenza specimens and 99.8% of all positive influenza A subtyped specimens. Influenza A accounted for 94.6%

of all influenza positive specimens and influenza B for 5.4% during the 2011/2012 season.

Outbreaks, GP OOHs, Sentinel hospital & school data
Seventeen general ILI/influenza outbreaks were reported: one ILI outbreak, 15 influenza A (H3) outbreaks and one influenza B outbreak. Seven outbreaks were reported from HSE-E, two from HSE-M, four from HSE-NE, two from HSE-NW and two from HSE-W. All 17 outbreaks were associated with the elderly, either in community hospitals/long stay units, residential institutions/nursing homes or hospital units for the elderly. Twelve influenza-associated deaths were linked to these outbreaks, all of whom were in those aged 80 years of age or older.

The percentage of influenza-related calls to GP out-of-hours services in Ireland, peaked during week 52 2011 at 3.6% (coinciding with the peak in respiratory syncytial virus (RSV) activity) and peaked again during week 8 2012 at 3.2% (coinciding with influenza activity). These are the lowest peak proportions recorded for several seasons. During the peak of activity, each service only received on average, 1.2 calls per hour relating to influenza.

Hospital respiratory admissions in sentinel hospitals peaked during week 7 2012, one week prior to the peak in sentinel GP ILI consultation rates. Total emergency admissions reported from sentinel hospitals peaked during week 6 2012.

Influenza notifications
A total of 600 influenza notifications were reported on CIDR during the 2011/2012 influenza season. The peak of influenza notifications occurred during week 10 2012, two weeks following the peak in ILI consultation rates and GP OOHs flu calls. Of the 600 notifications, 333 (55.5%) were influenza A (H3), 1 (0.2%) was influenza A (H1)pdm2009, 222 (37.0%) were influenza A (unsubtyped) and 44 (7.3%) were influenza B.

Hospitalisation
One hundred and forty-seven cases with confirmed influenza were hospitalised during the 2011/2012 influenza season. The highest age specific rate in hospitalised cases for the 2011/2012 season was in those less than one year of age (42.8 per 100,000 population) (table 1). Of the 147 hospitalised cases, 74 (50.3%) were influenza A (H3), 64 (43.5%) were influenza A (unsubtyped) and 9 (6.1%) were influenza B.

Enhanced surveillance hospital data on 0-14 year age group
A total of 140 confirmed influenza cases aged between 0 and 14 years were notified on CIDR for the 2011/2012 influenza season, 66 (47.1%) of these cases were hospitalised. Sixty-five cases (98.5%) were positive for influenza A [18 A (H3) and 47 A (unsubtyped)] and one (1.5%) was positive for influenza B. The median age of cases was 1 year, ranging from 3 weeks to 14 years. Over 75% of cases were aged between 0 and 4 years, with almost one third of cases aged less than 6

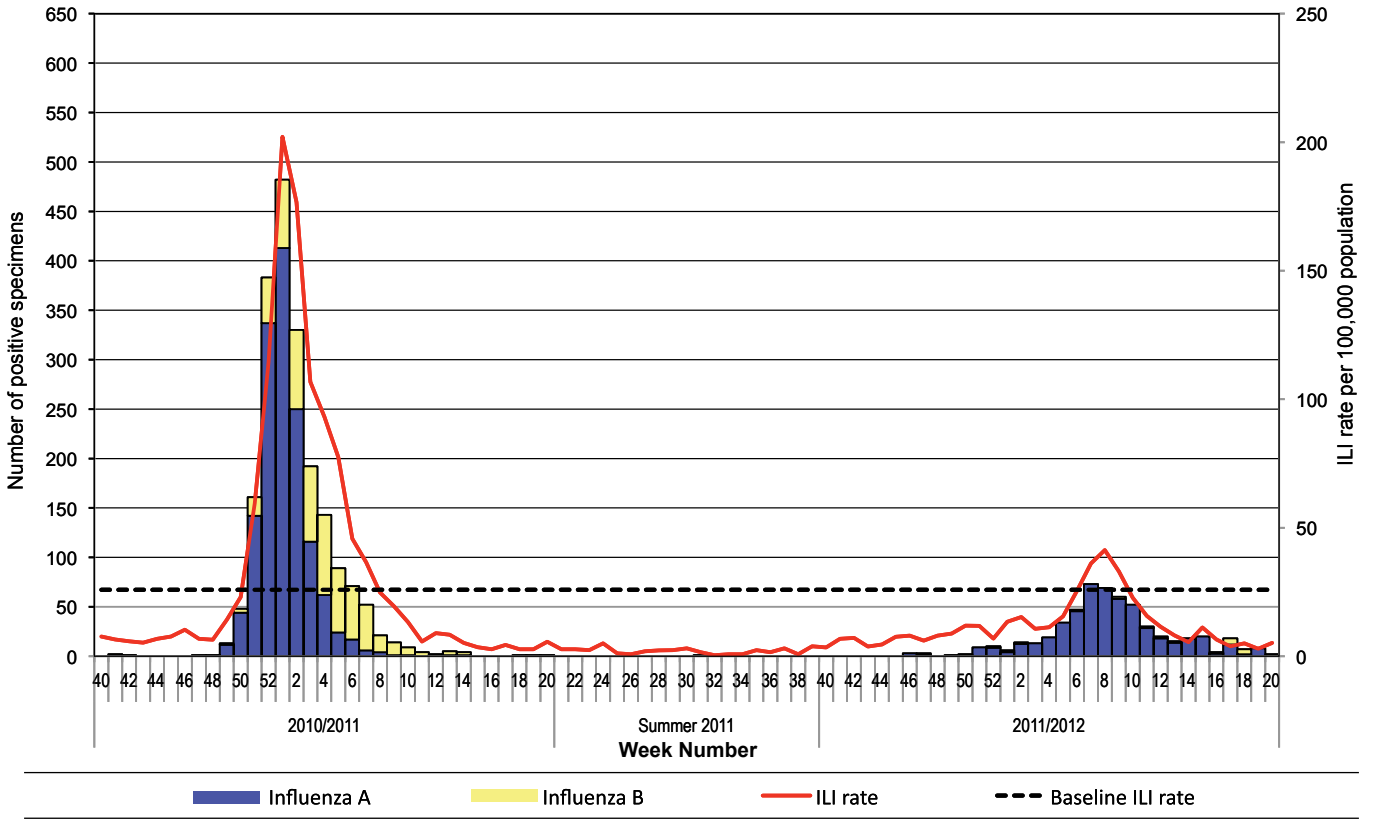


Figure 1: ILI sentinel GP consultation rates per 100,000 population, baseline ILI threshold rate, and number of positive influenza A and B specimens tested by the NVRL, by influenza week and season.

Source: Clinical ILI data from ICGP and virological data from the NVRL.

months old. Enhanced surveillance data was available for 58 (87.9%) cases. The most frequently reported symptoms included: fever (96.0%), cough (87.8%), sore throat (44.4%), fatigue (43.2%) and gastroenteric manifestations (21.6%). Complications were reported for 61.3% of cases; of these cases more than one complication was reported for 29.5% of cases. The most frequently reported complications included primary influenza viral pneumonia, secondary bacterial pneumonia, other respiratory complications, febrile convulsions and liver dysfunction. The median length of stay in hospital was 3 days (ranging from 1 - 14 days). Approximately 41.9% (18/43) of cases had underlying medical conditions, with chronic respiratory disease (including asthma) and immunosuppression being the most frequently reported. In total, vaccination status was known for 45 hospitalised paediatric cases, none of whom were vaccinated. Fourteen of the 18 cases with underlying medical conditions were not vaccinated (vaccination status was unknown for 4/18 cases). Approximately, 18% of cases (8/45) commenced antiviral treatment and 82.2% (37/45) of cases did not. Over one-fifth of cases were associated with an ILI/influenza outbreak. Five cases were admitted to critical care (for further details, see disease severity below).

Confirmed influenza cases admitted to ICU
Of the 147 hospitalised confirmed influenza cases, 15 (10.2%) were admitted to critical care (10 adults and 5 paediatric cases). Age specific rates for patients admitted to ICU were low in all age groups, with the highest rates in those aged less than 1 year of age (1.4 per 100,000 population) (table 1). The median age of paediatric cases was 14 months of age and the median age of adult cases was 66 years. Ten (100%) adults and three (3/4, 75.0%) paediatric cases had pre-existing medical conditions. The most frequently reported underlying medical condition for adults was chronic respiratory disease (7/10, 75.0%). Underlying medical conditions for paediatric cases were varied. Nine (9/10, 90.0%) adults and two (2/4, 50.0%) paediatric cases were ventilated during their stay in ICU. The median length of stay in ICU for adult cases was 4.5 days (ranging from 1 - 65 days) and for paediatric cases was 3.0 days (ranging from 2 - 3 days). Vaccination status was only known for four of the 15 cases admitted to ICU, two cases were vaccinated and two were not.

Mortality data
During the 2011/2012 influenza season, 13 influenza-associated deaths[1†] were reported. The case classification of influenza was confirmed for seven cases and probable for six cases. Of the seven cases with known virology, six were associated with influenza A (H3) and one with influenza B. The median age of cases who died during the 2011/2012 influenza season was 88 years, ranging from 81 – 98 years. Vaccination status was known for 12 of the 13 (92.3%) cases. Nine (75.0%) cases were vaccinated and three (25.0%) were not vaccinated with the 2011/2012 influenza vaccine (see below for further details on influenza vaccine effectiveness for the 2011/2012 season).

A summary table of confirmed influenza critical care cases and influenza-associated deaths for all ages is detailed in table 2.

Overview of the 2011/2012 influenza season
Influenza activity in Ireland during the 2011/2012 season started later than usual in February and was mild, with lower ILI consultation rates and lower influenza positivity rates than previous seasons. ILI rates only remained above baseline levels for three weeks, with the lowest peak rate recorded since the sentinel GP surveillance scheme began in 2000, with the exception of the 2001/2002 season (when ILI rates peaked at 29.1

Table 1: Age specific rate for confirmed influenza cases hospitalised and admitted to critical care during the 2011/2012 influenza season. Age specific rates are based on the 2011 CSO population census.

	Hospitalised		Admitted to ICU	
Age (years)	Number	Age specific rate per 100,000 pop.	Number	Age specific rate per 100,000 pop.
<1	31	42.8	1	1.4
1-4	20	7.0	3	1.1
5-14	15	2.4	1	0.2
15-24	5	0.9	1	0.2
25-34	15	2.0	1	0.1
35-44	10	1.3	0	0.0
45-54	2	0.3	0	0.0
55-64	13	2.8	2	0.4
65+	36	6.7	6	1.1
Total	147	3.2	15	0.3

[†]Influenza-associated deaths include all deaths where influenza is reported as the primary/main cause of death by the physician or if influenza is listed anywhere on the death certificate as the cause of death.

per 100,000 population). The predominant circulating influenza virus was influenza A (H3). There were fewer cases admitted to hospital or critical care units during the 2011/2012 season, compared to the previous two seasons which included the 2009 pandemic. The number of influenza-associated deaths reported was also lower than the previous two seasons. Of significance for the 2011/2012 season were the late season outbreaks associated with a number of deaths in residential institutions/nursing homes/units for the elderly. These outbreaks were reflected elsewhere in Europe [1, 2].

The WHO and ECDC reported that antigenic and genetic characterisations of circulating influenza viruses during the 2011/2012 season demonstrated an imperfect match with the A (H3N2) vaccine antigen used in the 2011/2012 influenza vaccine. Influenza B virus detections were from the Victoria and Yamagata lineages. These global data along with other vaccine effectiveness studies confirmed reduced vaccine effectiveness during the 2011/2012 influenza season[3]. These findings support the decision by WHO to recommend a change in the strains included in the 2012/2013 influenza vaccine.[4] Despite the imperfect match, early estimates of the efficacy of the 2011/2012 influenza vaccine in healthy adults was 43%, which although low is better than no vaccine. In addition to an imperfect match with the vaccine, the late start of the 2011/2012 influenza season in Europe with a resultant time lag between the beginning of the vaccination campaigns and the start of the influenza season may have resulted in waning immunity from the vaccine in the elderly population. [5]

2012/2013 influenza season

For the 2012/2013 influenza season, existing surveillance systems have been strengthened and a number of additional measures have been put in place in Ireland to improve the surveillance of ILI/influenza. Influenza/ILI outbreak surveillance forms and guidance have been updated following the late season outbreaks during the 2011/2012 season. Work is in progress to improve reporting of influenza vaccine uptake in risk groups for influenza. HPSC are participating in a WHO pilot project to automatically calculate the intensity of influenza each week using sentinel GP ILI consultation rates. The NVRL have introduced multiplex PCR testing for influenza A, B, RSV, adenovirus, parainfluenza virus types -1 and -3 and human metapneumovirus for all sentinel GP swabs. Surveillance of influenza notifications (including hospital status), ILI/influenza outbreaks and enhanced surveillance of confirmed hospitalised influenza cases (aged 0-14 years) and of confirmed influenza cases in critical care units (all ages) will continue for the 2012/2013 influenza season. Additional projects not detailed in this report include an all-cause mortality monitoring project associated with the European mortality monitoring group (EuroMOMO) and a pilot project on severe acute respiratory infections (SARI) cases admitted to two critical care units. Data from all of these surveillance systems will assist in guiding the management and control of influenza and any future epidemics or pandemics.

References

1. Surveillance of influenza and other respiratory pathogens in the UK 2011/12. HPA. Available at http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317134705939
2. Castilla J, Cía F, Zubicoa J, Reina G, Martínez-Artola V, Ezpeleta C. Influenza outbreaks in nursing homes with high vaccination coverage in Navarre, Spain, 2011/12. Euro Surveill. 2012;17(14):pii=20141.
3. Influenza in Europe, Season 2011-2012. Available at http://www.ecdc.europa.eu/en/publications/Publications/Influenza-Europe-2011-2012-surveillance-report.pdf
4. Recommended composition of influenza virus vaccines for use in the 2012-2013 northern hemisphere influenza season. Available at http://www.who.int/influenza/vaccines/virus/recommendations/201202_recommendation.pdf
5. Kissling E, Valenciano M, I-MOVE case–control studies team. Early estimates of seasonal influenza vaccine effectiveness in Europe among target groups for vaccination: results from the I-MOVE multicentre case–control study, 2011/12. Euro Surveill. 2012;17(15):pii=20146

Table 2: Summary table of confirmed influenza critical care cases and influenza-associated deaths for all ages for the pandemic period, 2010/2011 and 2011/2012 seasons. It should be noted that risk factor data was not available for all age groups for the 2011/2012 season. Rates are based on the 2011 CSO population census.

	Admitted to ICU			Influenza-associated deaths		
	Pandemic period	2010/2011	2011/2012	Pandemic period	2010/2011	2011/2012
Total cases	100	121	15	29	38	13
Crude rate per 100,000 pop.	2.2	2.6	0.3	0.6	0.8	0.3
Age range (years)	0-79	0-80	0-80	8-83	2-83	81-98
Median age (years)	34	49	60	54	57	88
Females	50	64	12	15	18	5
	50.0%	52.9%	80.0%	51.7%	47.4%	38.5%
Cases with risk factor	81	90	13	27	32	7*
	81.0%	74.4%	86.7%	93.1%	84.2%	87.5%

**Risk factor data for influenza-associated deaths for the 2011/2012 season were only known for 7/8 cases.*

2.2 Legionellosis

Summary

Number of cases in 2011: 7
Crude incidence rate: 1.5 per million

In 2011, there were seven cases of Legionnaires' disease notified in Ireland, a rate of 1.5 per million population. No deaths associated with Legionnaires' disease were reported.

Three cases were reported from HSE East, three from HSE South (South East), and one from HSE South (Cork and Kerry).

The majority of cases were male (85.7%). The median age was 68 years with a range from 57 to 91 years.

One of the seven cases was classified as probable. All six confirmed cases were diagnosed by urinary antigen test (UAT) and two had the organism cultured. The organism involved in the six cases confirmed by UAT was *Legionella pneumophila* serogroup 1. One of the cases where the organism was cultured was found to be monoclonal subtype Benidorm.

Five cases were travel-associated. Countries of travel included Indonesia (2), Ireland (1) and Italy (2). All five cases were linked to various travel related clusters. Of the two remaining cases, one was healthcare-associated and the other was assumed to be community acquired.

The peak month for notifications was November when three cases were notified.

Table 1. Number of legionnaires' disease cases per million population in Ireland, 2004-2011

Age group (years)	2004	2005	2006	2007	2008	2009	2010	2011
<30	0	0	0	1	0	0	1	0
30-39	0	2	0	3	0	0	0	0
40-49	1	3	7	4	2	0	2	0
50-59	1	1	2	2	3	2	1	1
60-69	1	1	1	3	4	3	3	4
70+	1	1	2	2	2	2	4	2
Total	**4**	**8**	**12**	**15**	**11**	**7**	**11**	**7**
CIR	**0.9**	**1.9**	**2.8**	**3.5**	**2.6**	**1.5**	**2.4**	**1.5**

For details of denominator data used, please see Explanatory Notes section at the end of this document

2.3 Invasive Group A Streptococcal Disease

Summary

Number of cases, 2011: 67
Crude incidence rate, 2011: 1.46 per 100,000 population

Notifications

Sixty-seven cases of invasive Group A streptococcal (iGAS) disease were notified in 2011. This corresponds to 1.46 iGAS cases per 100,000 population [95% confidence interval (CI), 1.13 to 1.85 per 100,000], which is similar to 2010 when the iGAS rate was 1.48 per 100,000 population (95% CI, 1.15 to 1.88 per 100,000). Sixty-five cases were confirmed, defined as patients with Group A streptococcus (GAS), or *Streptococcus pyogenes*, isolated from a sterile site. Two cases were probable, defined as patients with streptococcal toxic shock syndrome (STSS) and GAS isolated from a non-sterile site (e.g. throat, sputum, vagina).

Patient demographics

Of the 67 cases, 28 (42%) were males and 39 (58%) were females, with ages ranging from 3 months to 97 years (mean, 46 years; median, 39 years). iGAS was more common in young children and older adults (Figure 1).

Geographic spread and seasonal variation

Table 1 outlines the numbers and crude incidence rates (CIRs) of iGAS disease by HSE area from 2005 to 2011. Of note, the highest number of cases in 2011 occurred in the HSE-East (n=29; CIR, 1.79 per 100,000 population) while the highest CIR occurred in the HSE-South (n=12; CIR, 2.41 per 100,000 population).
In 2011, the peak periods were February/March (17 cases) and May-July (20 cases), which is broadly similar to previous years with the peak occurring during the first half of the year. Note, the number of monthly cases (based on the date the case was positive for GAS and not the date the case was reported) is small, ranging from one to eleven.

Enhanced surveillance data

Enhanced data fields were entered for 61 (90%) of the iGAS cases, which is similar to 2010 (88%, 60 of 68 cases). The source laboratory could be ascertained for all cases. As in previous years, a wide variation in completed fields was observed.

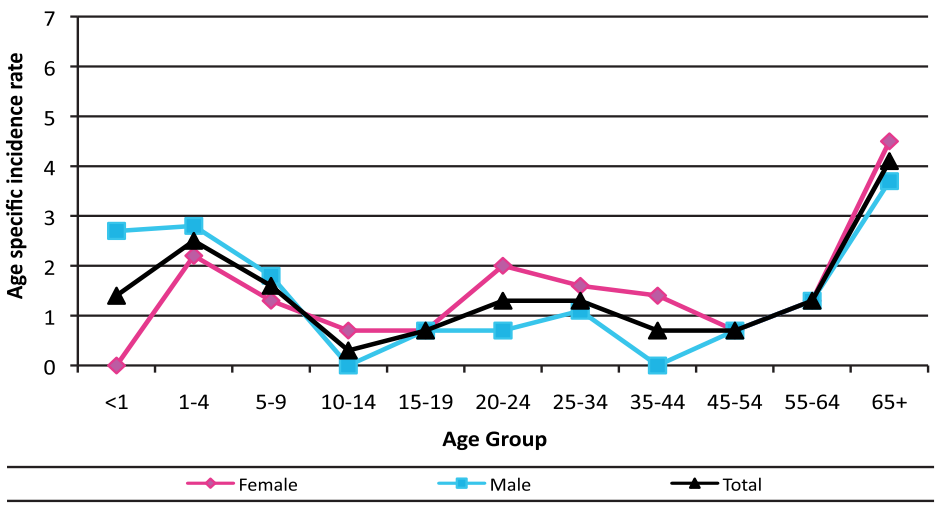


Figure 1. Age and sex specific rates of iGAS disease in 2011

Isolate details
GAS was isolated from a sterile site in 58 of 65 confirmed cases (no data on the source were available for seven cases), primarily from blood cultures (n=53 isolates, 91%), but also deep tissue (n=2), an abscess (n=1), a joint (n=1) and cerebrospinal fluid (CSF) (n=1). For the two probable cases, GAS source was provided for one: as a vaginal swab.

Serological typing data, based on the detection of M and T-proteins, were available on 16 isolates submitted from five laboratories: *emm*/M12 (n=6), M1 (n=5) and M3, M4, M5.3, M63 and M89 (one isolate of each). Of these, enhanced data were available on 13 patients with iGAS, none of whom presented with STSS or necrotising fasciitis.

Clinical details
As in 2010 and previous years, bacteraemia (n=53 cases, including cases where bacteraemia was not specifically stated but GAS was isolated from blood) and cellulitis (n=24) were the most common clinical presentations, followed by pneumonia (n=8), STSS (n=5; one of which was implied based on the information provided on the clinical presentation), necrotising fasciitis (n=3), peritonitis (n=3), septic arthritis (n=2), puerperal sepsis (n=2) and meningitis (n=1). Note that cases could have more than one clinical manifestation of infection.

Risk factors
Risk factors associated with iGAS disease included age ≥65 years (n=22), presence of skin and wound lesions (n=20), diabetes mellitus (n=8), intravenous drug use (IVDU) (n=7), malignancy (n=6), non-steroidal anti-inflammatory drug (NSAID) use (n=1), childbirth (n=5), injecting drug use (n=1), varicella infection (n=3), alcoholism (n=1) and steroid use (n=1). Note that cases could have one or more associated risk factors: 27 cases had one risk factor, 16 had two risk factors, two had three risk factors and one had four risk factors. No risk factors were identified for eight cases. Among the five cases with STSS, skin/wound lesions and age 65 years and over was identified as a risk factor in two, and childbirth in one. No risk factors were identified for the other two STSS cases.

Clinical management
Surgical intervention was required for eight patients ranging in age from 26 to 86 years (compared to 12 in 2010).

Eleven patients ranging in age from 26 to 87 years were admitted to an intensive care unit (ICU) (compared to 13 in 2010). This included two patients with STSS, one patient with necrotising fasciitis and two patients with both STSS and necrotising fasciitis.

Risk factors for patients admitted to an ICU included skin and wound lesions (n=4), age over 65 years (n=2), diabetes mellitus (n=1), childbirth (n=2), alcoholism (n=1), injecting drug use (n=1) and malignancy (n=1). Four patients had one and four had two risk factors. No risk factors were identified in two patients. No risk factor data were available for one patient.

Length of ICU stay was provided for eight cases ranging from one to seven days (mean, 3.3 days; median, 3 days).

Other epidemiological information
Two cases (both bacteraemia, one with necrotising fasciitis and puerperal sepsis and the other with peritonitis) were reported as hospital-acquired, compared to three in 2010.

As in 2010, no outbreaks of iGAS were notified in 2011.

Outcome
Outcome at seven-days following GAS isolation was reported for 43 cases:
- 37 were still alive
- Six patients died: GAS was the main or contributory cause of death for five patients

Table 1. Numbers (n) and Crude Incidence Rates (CIRs) per 100,000 population of iGAS disease by HSE Area, 2005-2011

HSE Area	2005		2006		2007		2008		2009		2010		2011	
	n	CIR	n	CIR	n	CIR	n	CIR	n	CIR	n	CIR	n	CIR
HSE-E	19	1.27	37	2.47	28	1.87	31	2.07	32	1.98	22	1.36	29	1.79
HSE-M	1	0.40	2	0.79	0	0.00	0	0.00	2	0.71	2	0.71	5	1.77
HSE-MW	3	0.83	2	0.55	2	0.55	3	0.83	5	1.32	6	1.58	6	1.58
HSE-NE	3	0.76	5	1.27	3	0.76	10	2.54	3	0.68	7	1.59	1	0.23
HSE-NW	3	1.27	1	0.42	3	1.27	3	1.27	1	0.39	8	3.10	2	0.77
HSE-SE	1	0.22	4	0.87	10	2.17	8	1.74	8	1.20	5	0.75	7	1.05
HSE-S	1	0.16	3	0.48	4	0.64	5	0.80	5	1.00	12	2.41	12	2.41
HSE-W	18	4.34	7	1.69	7	1.69	10	2.41	4	0.90	6	1.35	5	1.12
IRELAND	49	1.16	61	1.44	57	1.34	70	1.65	60	1.31	68	1.48	67	1.46

CIRs for 2005-2008 calculated using the 2006 census; CIRs for 2010-2011 calculated using the 2011 census [note: CIRs for 2009 and 2010 updated from last year's (2010) report]

The seven-day case fatality rate (CFR) for iGAS disease was 12% in 2010, which is similar to that in 2009 (10%).

In addition to the above, the overall outcome was stated for a further 12 cases:
- Three patients were reported to have died but it was not stated if these were directly attributable to iGAS
- Six patients were recovering or recovered
- One patient was still ill

Of the five STSS cases, one patient died due to GAS resulting in a CFR of 20%. One other patient with STSS died but GAS was not identified as the cause of death.

Antimicrobial susceptibility
Antimicrobial susceptibility data were reported on 42 iGAS isolates (39 from blood, two from wounds and one from a joint) by 14 laboratories in 2011 (note: these were reported via the EARS-Net Antimicrobial Resistance Surveillance Network, of which 38 (90%) were also notified to public health via CIDR). All isolates tested were susceptible to penicillin (n=41), clindamycin (n=13) and vancomycin (n=31). Resistance to erythromycin was reported in four (10%) of 41 isolates and to tetracycline in one (6%) of 16 isolates.

Conclusion
In 2011, iGAS infection remains an uncommon but potentially severe disease in Ireland. 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. Between 2006 and 2011, the number of cases of iGAS has fluctuated from 57 to 70, while the incidence has fluctuated from 1.3 to 1.65 per 100,000 population. Over the last two years (2010 and 2011), the number of cases and incidence of iGAS have stabilised at 67 cases and 1.5 per 100,000 population, respectively. Antimicrobial susceptibility data confirm that iGAS remains susceptible to penicillin and that penicillin should continue to be the first line treatment where iGAS is suspected.

HPSC would like to thank participating microbiology laboratories for their contribution to iGAS enhanced surveillance scheme.

All microbiology laboratories are encouraged:
- to return enhanced iGAS surveillance forms for all patients with iGAS
- to submit all iGAS isolates to the Epidemiology and Molecular Biology Unit (EMBU) at the Children's University Hospital, Temple Street for emm-typing
- to submit antimicrobial susceptibility data on all iGAS cases along with their 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 and national guidelines, is available at: http://www.ndsc.ie/hpsc/A-Z/Other/GroupAStreptococcalDiseaseGAS/

The figures presented in this summary are based on data extracted from the Computerised Infectious Diseases Reporting (CIDR) System on 5th October 2012.

2.4 Tuberculosis, 2010

Summary

Number of cases in 2010: 420
Number of culture confirmed cases: 281
Crude incidence rate in 2010: 9.2/100,000
Number of TB deaths in 2010: 8
Number of cases in 2011*: 424
Crude incidence rate in 2011*: 9.2/100,000

In 2010, 420 cases of tuberculosis (TB) were notified in Ireland, corresponding to a crude notification rate of 9.2 per 100,000 population, which is a decrease compared to 2009 (10.4/100,000 population) and 2008 (11.0/100,000 population). A summary of the epidemiology of TB in Ireland during 2010 is shown in table 1 while the number of cases and crude incidence rates from 1991 to 2011* with three-year moving averages are shown in figure 1.

The highest crude incidence rates were reported by HSE-S (13.5/100,000 population) and HSE-E (11.1/100,000 population) while the lowest rates were reported by HSE-W (4.7/100,000 population) and HSE-SE (5.4/100,000 population).

Table 1: Summary of the epidemiology of TB in Ireland, 2010

Parameter	Number	% of Total cases
Total number of cases	420	
Crude notification rate per 100,000	9.2	
Cases in indigenous population†	246	58.6
Cases in foreign-born persons†	171	40.7
Culture positive cases	281	66.9
Pulmonary cases	270	64.3
Smear positive pulmonary cases	111	26.4
Multi-drug resistant cases	2	0.5
Mono-resistant to isoniazid	10	2.4
Deaths attributable to TB	8	1.9
Outcomes reported in cases	370	88.1
TB meningitis cases	9	2.1

*Data for 2011 are provisional data which may change significantly following validation
†Country of birth was unknown for 3 cases

The highest age-specific rate in 2010 occurred among those aged 65 years and over (14.8/100,000 population) followed by those aged 25-34 years (13.9/100,000 population). The rate among males (11.5/100,000 population) was higher than that among females (6.9/100,000 population). Rates among males were higher than females for all age groups except in the 15-24 year age group where the rate in males was lower (13.1/100,000 population in females compared to 11.0/100,000 population in males). The highest rate among males (21.0/100,000 population) was in the group aged 65 years and older while the highest rate in females (13.1/100,000 population) was in the 15-24 year age group. The male to female ratio (1.6:0.6) reported in 2010 was consistent with the ratio reported in previous years.

Geographic origin

During 2010, 40.7% (171 cases) of TB cases were born outside Ireland. This is similar to the proportion of foreign-born cases reported annually since 2007 (range: 40%-43%). The crude rate in the indigenous population was 6.5 per 100,000 population, a slight decrease compared to 2009 (7.2/100,000 population). Similarly, the crude rate in the foreign-born population decreased to 22.3 per 100,000 population compared to 26.9 per

100,000 population reported in 2009. There was a notable difference in age between those born in Ireland and those born outside Ireland, with a median age of 49 years and 30 years respectively. In 2010, among countries in the EU and Western Europe who reported data to the European Centre for Disease Prevention and Control (ECDC), 25.1% of notifications were in foreign-born cases. In Belgium, Slovakia and Slovenia, where crude incidence rates are similar to those reported in Ireland, the percentage of cases of foreign origin in 2010 ranged from 1.8%-54.6%.[†]

Site of infection

Pulmonary TB was reported in 270 (64.3%) cases and 150 (35.7%) had exclusively extrapulmonary disease. Of the extrapulmonary cases reported in 2010, there were nine cases of TB meningitis corresponding to a rate of 0.2/100,000 population (1.96/million population).

Microbiology

Of the 420 cases reported in 2010, 66.9% (281 cases) were culture confirmed. Of the 281 culture confirmed cases, species identification showed *M. tuberculosis* in 94.3% (265 cases), *M. bovis* in 4.3% (12 cases) and *M. africanum* in 1.1% (3 cases) while organism was not reported for the remaining culture confirmed case. The number of *M. bovis* isolates detected in 2010 was higher than the number detected during 2009 (n=8) and also higher than the mean annual number reported between 2002 and 2009 (n=6). Of the 270 cases with a pulmonary component, 206 (76.3%) were reported as culture confirmed, and 111 (41.1%) were reported as smear positive.

Drug sensitivity

Information on antibiotic sensitivity testing was available for 257 (91.5%) of the 281 culture confirmed cases. Of these, resistance was documented in 26 (9.3%) cases, two (0.5% of total cases) of which were MDR-TB cases. Mono-resistance to isoniazid was recorded in 10 cases, to streptomycin in five, to rifampicin in two cases, to pyrazinamide in one case and to ethambutol in one. Further details on the resistance profiles of TB cases reported in 2010 will be available in the HPSC Report on the Epidemiology of TB in Ireland, 2010 (www.hpsc.ie).

Outcome

In 2010, information on treatment outcome was provided for 88.1% (370) of cases, an increase compared to 82.3% in 2009. Treatment outcome was reported as completed for 304 (72.4%) cases, 30 (7.1%) were lost to follow up, 27 (6.4%) cases died, seven (1.7%) had treatment interrupted and two were still on treatment (0.5%). Eight (29.6%) of the 27 deaths were attributable to TB. During 2010, the reported treatment success rate was 72.6% for new culture confirmed pulmonary TB cases and 70.6% for new smear-positive pulmonary TB cases.

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 2010, seven outbreaks of TB were reported to HSPC, with 41 cases of active TB, 60 with latent TB infection (LTBI) and 20 hospitalisations. Two outbreaks were reported by HSE-M and five by HSE-S. There were five general outbreaks, three of which occurred in schools and one each in a community setting and a

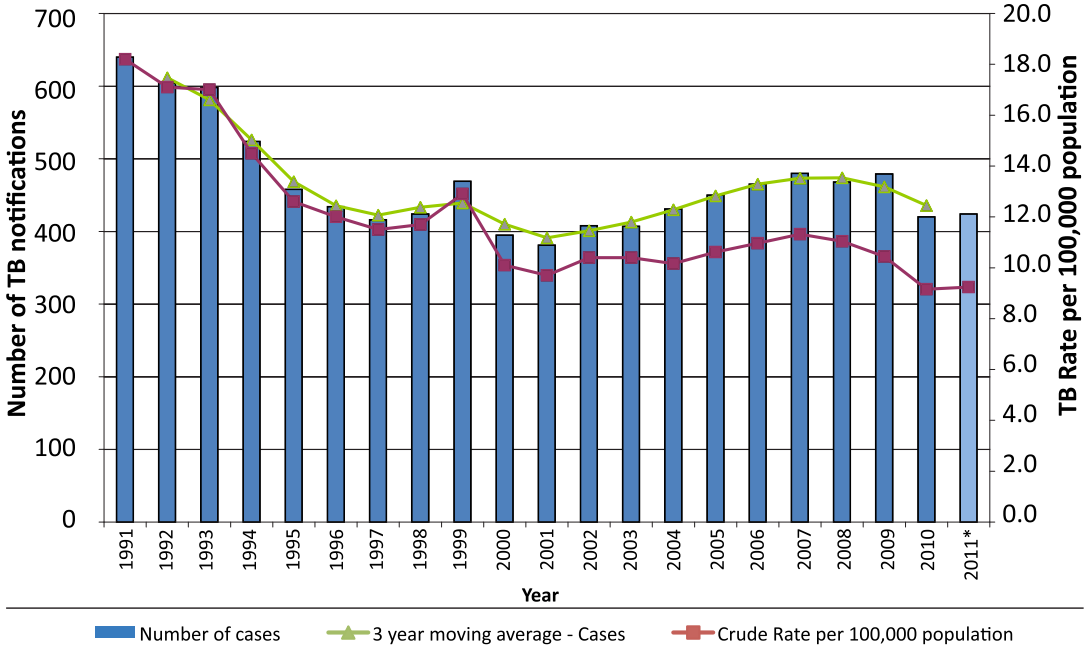


Figure 1: Notified cases of TB in Ireland with crude rates per 100,000 population, 1991 to 2011 and 3-year moving averages, 1992-2010*

workplace. There were also two family outbreaks, both of which occurred across extended families. The number of outbreaks reported during 2010 remained stable in comparison to 2009, however the number of active TB cases and cases of LTBI associated with the outbreaks increased. Figure 2 shows a summary of TB outbreaks from 2004 to 2011 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 2011 are provisional and may increase as outbreak investigations continue.

Summary:
In comparison to recent years, the crude notification rate of TB for 2010 (9.2/100,000 population) has decreased. Rates were higher in males for almost all age groups with the highest age specific rates reported in males aged 65 years and over. Over 40% of all TB cases notified were foreign born which is comparable to other European countries with similar crude incidence rates to Ireland. The rate in the indigenous population showed a slight decline at 6.5 per 100,000 population. Irish born cases were older than foreign born which is also reflected in other European countries.[1]

Of the 270 cases with a pulmonary component 76.3% were culture confirmed, a slight decrease from 77.4% in 2009. The proportion of new culture confirmed cases with a pulmonary component, also decreased to 77.4%, a decrease compared to 2009 (80.1%), and also falls below the EU monitoring framework target of ≥ 80% culture confirmation among new pulmonary TB cases.[2]

Two MDR-TB cases were reported for 2010 which remains stable compared to recent years with one reported in 2009 and two in 2008. The proportion of new culture confirmed pulmonary cases with reported DST results increased from 94.7% in 2009 to 98.8% in 2010, almost achieving the EU monitoring framework action plan target of 100% of new culture confirmed pulmonary cases with DST results.[2] Continuous vigilance is needed in relation to drug resistance especially with the global emergence of XDR-TB.

There was an increase in the level of outcome data reported during 2010 compared to 2009. The proportion of total cases where outcome was reported as completed (72.4%) also increased during 2010 compared to 2009 (64.6%). The proportion of new culture-confirmed pulmonary TB cases where outcome was reported as completed was 72.6%, falling short of EU monitoring framework action plan targets of successfully treating 85% or more of all new culture-confirmed pulmonary TB cases.[2] It is of critical importance to TB control in Ireland that surveillance of TB and reporting of outcome data be maintained at a high level especially with the global threat of resistant strains.

Guidelines on the Prevention and Control of Tuberculosis in Ireland were published in April 2010.[3] The recommendations in these guidelines are based on a review of international literature, expert opinion and an extensive consultation process. They provide advice on the diagnosis and treatment of active TB and latent TB Infection (LTBI), outbreak management

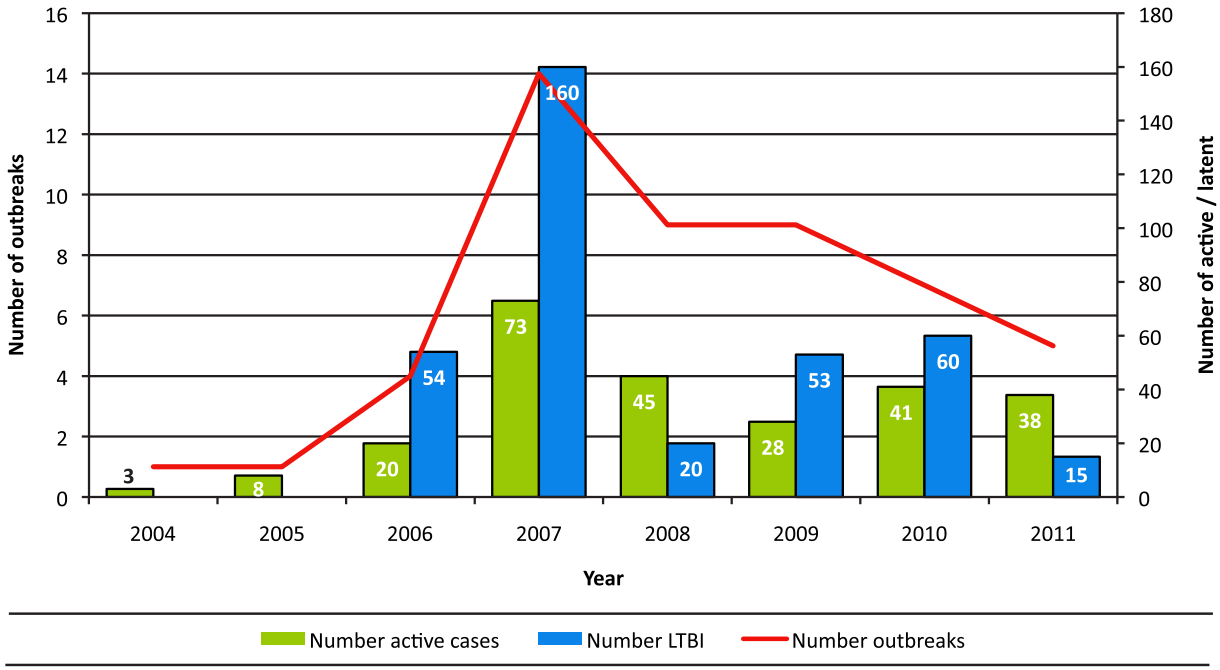


Figure 2: TB outbreak summary by year

and contact tracing procedures and screening for TB in special situations e.g. healthcare settings, new entrants to Ireland, prison and homeless settings. The guidelines aim to improve the prevention and control of the disease and to help Ireland meet World Health Organization (WHO) targets for the elimination of TB. Stop TB partnership aims to reduce the global incidence of TB to less than one case per million population by 2050, which will eliminate the disease as a global health problem.[4] The importance of good surveillance data cannot be underestimated in this context as they will help guide where resources should be directed e.g. risk groups in order to implement effective TB prevention and control strategies in Ireland and in order to reach the elimination target by 2050.

Provisional 2011 data

There were 424 cases of TB provisionally notified in 2011, corresponding to a crude rate of 9.2 per 100,000 population. It is important to note that these data are provisional and **may change significantly following validation**.

Of the 424 cases provisionally notified in 2011,

- Pulmonary TB was diagnosed in 262 cases (61.8%), extrapulmonary TB in 121 cases (28.5%) and pulmonary and extrapulmonary TB in 30 cases (7.1%). Diagnostic type was not reported for 11 cases (2.6%).
- Of the 292 cases with a pulmonary disease component, 220 (75.3%) were culture positive and 122 (41.8%) were smear positive.
- There were three cases of TB meningitis provisionally notified corresponding to a rate of 0.07 per 100,000 population (0.65/million population).
- There were 188 (44.3%) cases born in Ireland and 179 (42.2%) were foreign-born. Country of birth was not reported for 57 (13.4%) cases.
- There were 181 cases (42.7%) notified in females and 243 cases (57.3%) in males.
- The mean age of cases was 42.7 years (range: 1 to 91 years).
- Resistance was reported in 26 cases, nine of which were mono-resistant to isoniazid. Three cases of MDR-TB were reported during 2011. Seventeen (65.4%) of the 26 resistant cases (including two MDR cases) were born outside Ireland.
- There were five TB outbreaks reported to HPSC during 2011, with 38 active TB cases, 15 cases of latent TB infection and 6 hospitalisations. No deaths were reported from these outbreaks. Please note that numbers of LTBI for outbreaks reported during 2011 are provisional and may increase as outbreak investigations continue.

Further details on the epidemiology of TB cases reported in 2010 will be available in the HPSC Report on the Epidemiology of TB in Ireland, 2010 (www.hpsc.ie).

References:

1. European Centre for Disease Prevention and Control/WHO Regional Office for Europe: Tuberculosis surveillance and monitoring in Europe. Stockholm, European Centre for Disease Prevention and Control, 2012. Available at: http://ecdc.europa.eu/en/publications/Publications/Forms/ECDC_DispForm.aspx?ID=841
2. European Centre for Disease Prevention and Control. Progressing Towards TB Elimination. A follow up to the Framework Action Plan to Fight Tuberculosis in the European Union. ECDC Stockholm, November 2010. Available at: http://ecdc.europa.eu/en/publications/Publications/101111_SPR_Progressing_towards_TB_elimination.pdf
3. Health Protection Surveillance Centre. *Guidelines on the Prevention and Control of Tuberculosis in Ireland 2010.* National TB Advisory Committee. April 2010. Available at: http://www.hpsc.ie/hpsc/A-Z/VaccinePreventable/TuberculosisTB/Publications/File,4349,en.pdf
4. Stop TB Partnership. The Global Plan to Stop TB 2011-2015. World Health Organisation. Geneva, 2011. Available at: http://www.stoptb.org/global/plan

03

Infectious Intestinal Diseases

3.1 Campylobacter

Summary

Number of cases:	2,427
Crude incidence rate:	52.9/100,000

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. In the EU it is estimated that 9.2 million cases occur annually, resulting in a public health impact of 0.35 million disability adjusted life years (DALYs) per year and an annual cost of approximately €2.4 billion.[1]

During 2008, a European Union-wide baseline survey of *Campylobacter* in broiler batches and broiler carcasses was carried out by The European Food Safety Authority (EFSA). This survey found that 75.8% of broiler carcasses sampled were contaminated with *Campylobacter* while 98% of Irish broiler carcasses sampled were positive for *Campylobacter*.[2] EFSA currently estimates that handling, preparation and consumption of broiler meat may account for 20-30% of human campylobacteriosis while 50-80% of cases may be attributed to the broiler reservoir as a whole.[3] The importance of poultry meat as a source of human *Campylobacter* infection was supported by the food-borne outbreak data reported to EFSA during 2010, where 63.0% of food-borne outbreaks of campylobacteriosis (with strong evidence and a specified food item) were poultry related.[4] In response to such evidence, the food Safety Authority of Ireland (FSAI) published "Recommendations for a Practical Control Programme for *Campylobacter* in the Poultry Production and Slaughter Chain" during 2011.[5]

Findings of a national case control study conducted in Ireland that investigated risk factors for sporadic *Campylobacter* infections, showed that consuming chicken, lettuce and eating in takeaways were important risk factors for contracting the disease in Ireland. Contact with sheep, peptic ulcer, hiatus hernia and lower bowel problems were also independently associated with infection. However mains water supply showed protective effect from contracting the illness.[6]

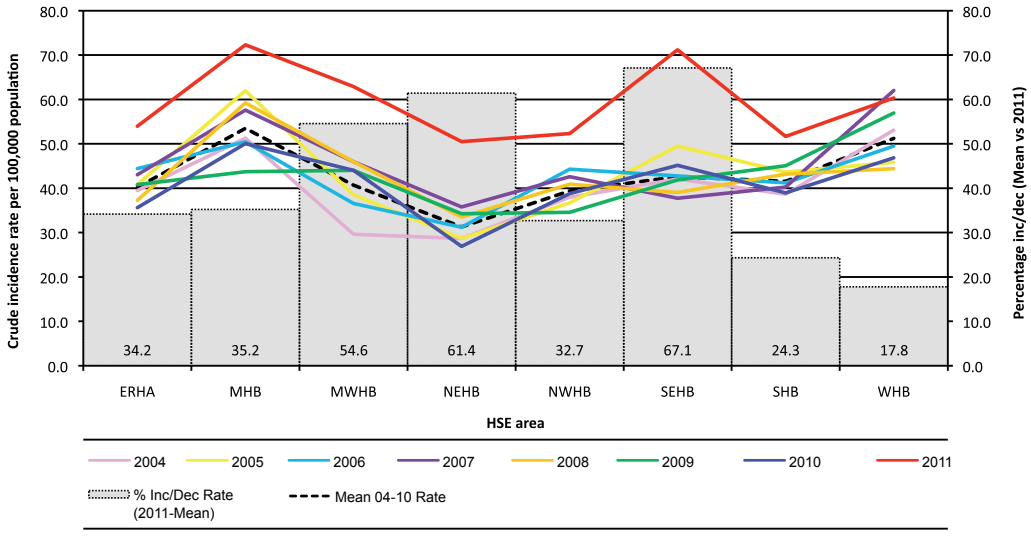


Figure 1: Campylobacteriosis crude incidence rates per 100,000 population by HSE area, 2004- 2011

During 2011, 2,427 campylobacteriosis notifications were reported to HPSC, corresponding to a crude incidence rate of 52.9/100,000 population. This rate represents an increase of 46.2% compared to 2010, and is comparable with the 2010 European crude incidence rate of 48.6 per 100,000 population.[7] Previously in Ireland, the annual percentage increase/decrease observed in campylobacteriosis notifications has ranged between -8.2% to +6.1%.

Historically, variation in campylobacteriosis crude incidence rates (CIRs) has been reported between HSE areas. Between 2004 and 2010, the highest CIRs have usually occurred in HSE-M and HSE-W. A comparison of the mean annual incidence rate of notifications in each HSE area between 2004 and 2010 and the incidence rate of notifications in 2011 showed an increase of >50% in HSE-MW, HSE-NE and HSE-SE. No HSE area showed a decrease in the number of notifications reported during 2011. Figure 1 compares the campylobacteriosis CIRs between 2004 and 2011 by HSE area with the mean campylobacteriosis incidence rates for 2004 to 2010. This figure also shows the associated percentage increase in campylobacteriosis CIRs during 2011 compared to the mean for 2004 to 2010.

Campylobacteriosis occurs in all age groups with the highest burden of illness experienced 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. The highest European notification rate during 2009 was reported in males in the 0-4 year age group (144.3/100,000 population) and in females of the same age (114.7/100,000 population).[7]

In Ireland between 2004 and 2010, the highest mean ASIR occurred in the 0-4 year age group (103.3/100,000 population) followed by the 25-34 year age group (23.8/100,000 population). However, a comparison of the mean age-specific incidence rate between 2004-2010 and the number of notifications in 2011 showed an increase of >40% in the 5-14 year (41.0%), 15-24 year (47.6%) and the 55-64 year (40.4%) age groups. Figure 2 compares the campylobacteriosis age specific rates (ASIR) between 2004 and 2011 with the mean campylobacteriosis ASIR for 2004 to 2010. This figure also shows the associated percentage increase in campylobacteriosis ASIR during 2011 compared to the mean for 2004 to 2010.

In females, increases of >50% were seen in the 5-14 year (57.5%), 45-54 year (63.3%) and the 65+ years (53.3%) age groups. In males, increases of >50% were also seen in the 5-14 year (56.0%) and the 55-64 year (67.4%) age groups. Overall, the age groups with highest increases within the sexes were broadly similar to the age groups with the highest increases for all notifications.

During 2011, 46.1% of all cases were female, 53.6% of cases were female and sex was not reported for 0.2% of cases. Further analysis of the age-sex distribution of campylobacteriosis cases shows that the highest ASIRs for both males and females were observed in the 0-4 year and 20-24 years age groups.

Campylobacteriosis has a well documented seasonal distribution with a peak in summer. In Ireland, campylobacteriosis notifications typically peak during June and July. While campylobacteriosis notifications did peak as usual during June 2011, large increases were also seen outside this period. A comparison of the mean monthly number of notifications between 2004 and 2010 and the monthly number of notifications in 2011 showed an increase of >50% in February (54.9%), March (72.8%), June (75.6%), August (50.5%) and November (52.1%).

Figure 3 compares the monthly number of campylobacteriosis notifications between 2004 and 2011 to the mean monthly number of

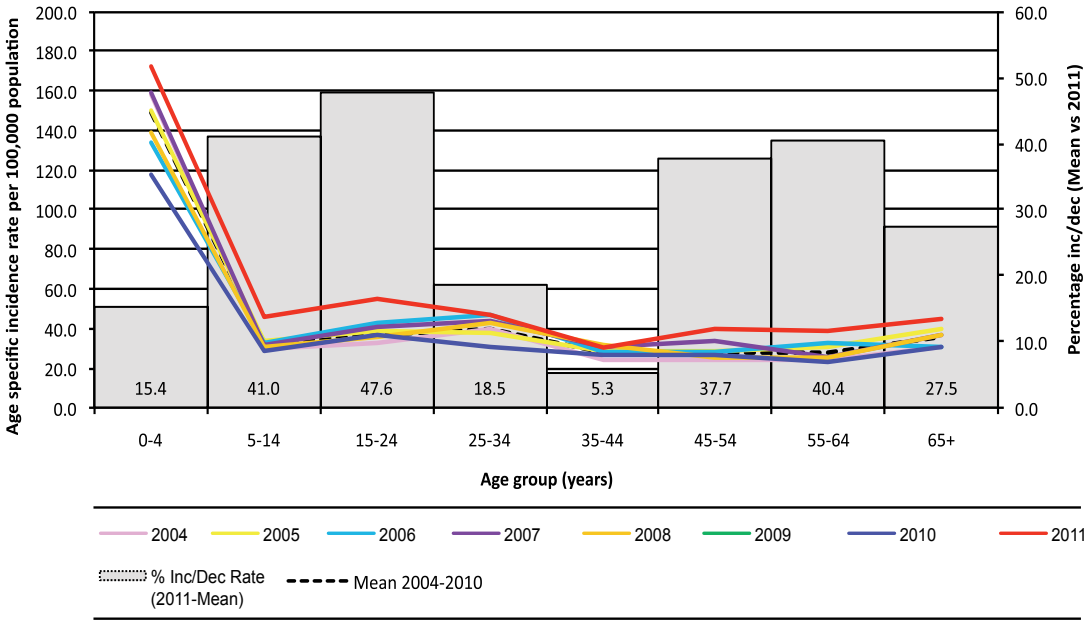


Figure 2: Campylobacteriosis age specific incidence rate per 100,000 population by age group (years), 2004-2011 (CIDR)

campylobacteriosis notifications between 2004 and 2010. This graph also shows the percentage increase in campylobacteriosis notifications by month observed during 2011 compared to the monthly mean 2004-2010.

Of the cases notified in Ireland during 2011, 99.9% 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 2011, 34.0% (n=830) of isolates were speciated. Of the 830 speciated isolates, 93.1% of isolates were *C. jejuni*, 6.4% were *C. coli*, 0.2% were *C. fetus*, 0.1% were *C. lari* and 0.1% were *C. laridis*. The remaining 66.0% (n=1,610) of *Campylobacter* isolates identified were not further speciated. This compares with 51% of *Campylobacter* isolates in Europe reported to ECDC during 2009 remaining unspeciated.[7]

During 2011, there were seven outbreaks of campylobacteriosis reported to HPSC with 16 associated cases of illness, one of whom was hospitalised. This is the same as the average number of outbreaks per annum between 2004 and 2010. All seven outbreaks were family outbreaks occurring in private houses. Three reported mode of transmission as person to person spread while mode of transmission was unknown for the remaining four outbreaks. During 2010, 19 European countries reported 470 food-borne outbreaks of campylobacteriosis which accounted for 9% of the total food-borne outbreaks reported to EFSA. These outbreaks comprised 1,789 associated cases of illness and 132 hospitalisations.[4]

References:

1. European Food Safety Authority (EFSA), *Scientific opinion on Campylobacter in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain* The EFSA Journal (2011); 9 (4): 2105. Available at: http://www.efsa.europa.eu/en/efsajournal/pub/2105.htm
2. European Food Safety Authority (EFSA), *Analysis of the baseline survey on the prevalence of Campylobacter in broiler batches and of Campylobacter and Salmonella on broiler carcasses ni the EU, 2008.* The EFSA Journal (2010); 8 (03): 1503. Available at: http://www.efsa.europa.eu/en/efsajournal/pub/1503.htm
3. European Food Safety Authority (EFSA), *Scientific Opinion of the Panel on Biological Hazards (BIOHAZ) related to Campylobacter in animals and Foodstuffs.* The EFSA Journal (2010); 8 (1): 1437. Available at: http://www.efsa.europa.eu/en/efsajournal/pub/173.htm
4. 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 2010.* The EFSA Journal (2012); 10 (3):2597. Available at: http://www.efsa.europa.eu/en/efsajournal/pub/2597.htm
5. Food Safety Authority of Ireland (FSAI), *Recommendations for a Practical Control Programme for Campylobacter in the Poultry Production and Slaughter Chain.* 2011 Available at: www.fsai.ie
6. Danis K et al., *Risk factors for sporadic Campylobacter infection: an all-Ireland case-control study.* Euro-Surveillance. 2009 Feb 19;14(7). pii: 19123
7. European Centre for Disease Prevention and Control. *Annual epidemiological report Reporting on 2009 surveillance data and 2010 epidemic intelligence data.* Stockholm, European Centre for Disease Prevention and Control. Available at: http://www.ecdc.europa.eu/en/publications/Publications/Forms/ECDC_DispForm.aspx?ID=767

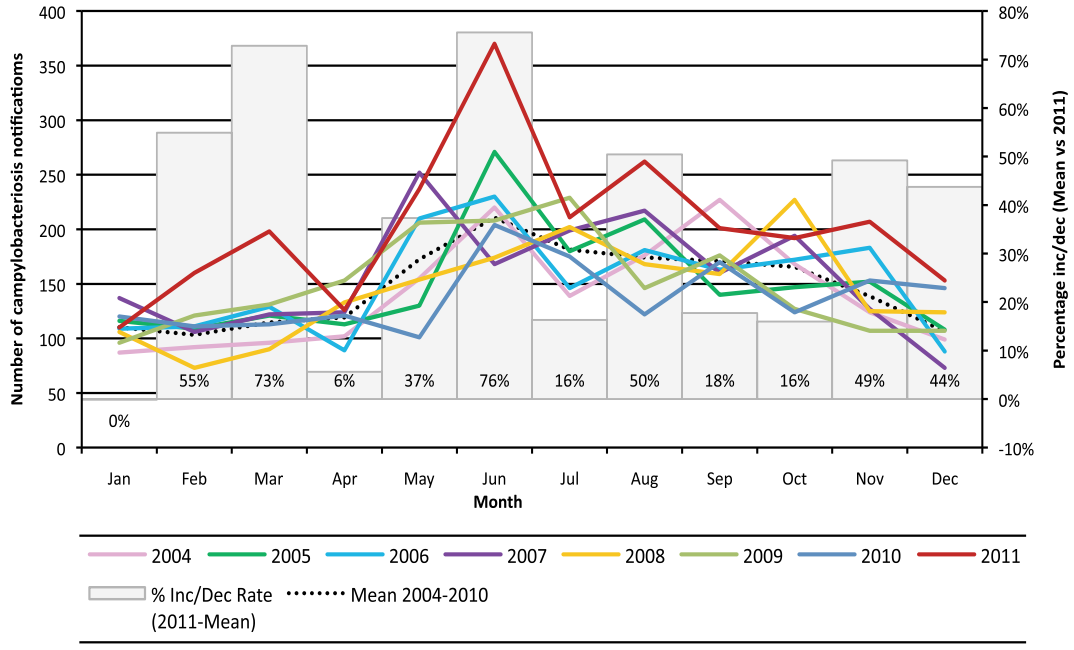


Figure 3: Number of campylobacteriosis notifications by month, 2004-2011

Table 1: Campylobacteriosis outbreaks summary, 2011 (CIDR)

Mode of transmission	Outbreak location	Number outbreaks	Number ill	Number hospitalised	Number dead
Person-to-person	Private house	3	8	0	0
Unknown	Private house	4	8	1	0
Total		**7**	**16**	**1**	**0**

3.2 Cryptosporidiosis

Summary

Number of cases, 2011: 428
Number of cases, 2010: 294
Crude incidence rate, 2011: 9.3/100,000

Cryptosporidium is a protozoal parasite that causes a diarrhoeal illness in humans known as cryptosporidiosis. It is transmitted by the faecal-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 in the HPSC case definition booklet.

In 2011, 428 cases of cryptosporidiosis were notified in Ireland, a crude incidence rate (CIR) of 9.3 per 100,000 population (95% CI 8.4-10.2), with 40% of notified cases reported as hospitalised for their illness. There were no reported deaths.

This was a 46% increase on the number of cases notified in 2010 (Figure 1), being closer to the rate reported in 2009. In 2009 (the most recent year for which data are available), the ECDC reported an incidence rate overall of 2.74 per 100,000 population in the European Union, with Ireland reporting the highest rate among those countries reporting on this disease at the time (ECDC Annual Epidemiological Report). The second highest incidence rate among EU Member States in 2009 was reported by the United Kingdom at 9.1 per 100,000.

Consistent with previous years, the highest reported incidence was in children under 5 years, with around 70 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.

The crude incidence (CIR) rates by HSE area for 2011 are reported in Figure 3. As in previous years, there was a strong urban-rural divide, with the HSE-E having a much lower reported incidence rate (0.7 per 100,000) than all other HSE areas. The HSE- W reported the highest crude incidence rate (23.1 per 100,000) –over twice the national rate. Compared to 2010, six areas reported increased rates, aligning more closely with the regional distribution of cases reported in 2009.

As in previous years, the highest number of cases was recorded in spring (Figure 4).

Risk factors

The first complete calendar year for which enhanced surveillance data were available at a national level for cases of *Cryptosporidium* was 2011. 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 were common among cases; 42.7% and 36.1% reported these exposures respectively (Table 1). This is

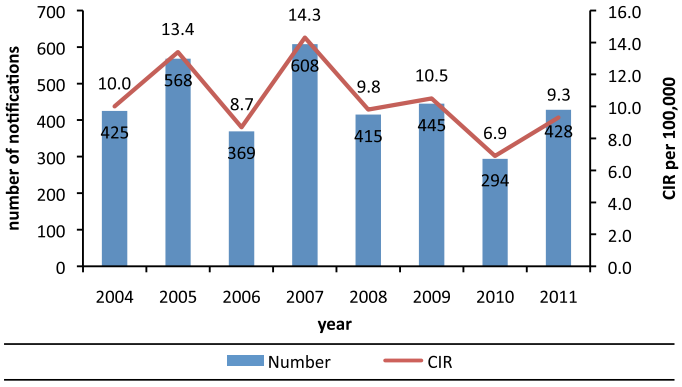


Figure 1: Annual number and crude incidence rate cryptosporidiosis, Ireland 2004-2011

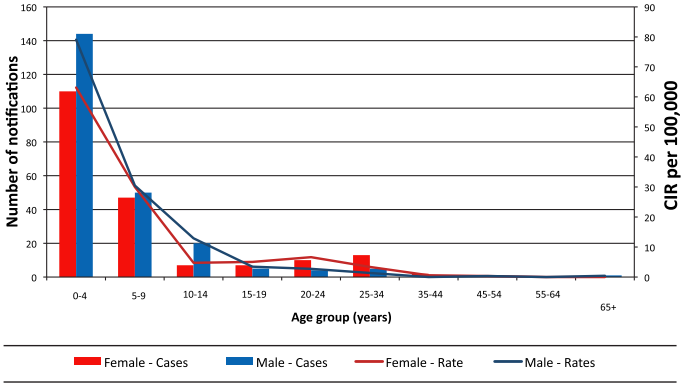


Figure 2: Age-specific incidence rate cryptosporidiosis, Ireland 2011

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. Unlike salmonellosis, foreign travel plays only a minor role in cryptosporidiosis in Ireland, with the majority of infections acquired indigenously (93.1%).

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, although 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 who may also have a higher likelihood of exposure to farm animals and rural environments which is also likely to increase their risk.

Outbreaks

There was a large increase in the number of cryptosporidiosis outbreaks reported in 2011; in total there were three general and 27 family outbreaks (Figure 5). The increase in outbreaks is most likely due to increased recognition of outbreaks (in particular small family outbreaks) following the introduction of enhanced surveillance for cryptosporidiosis cases late in 2010.

The most common mode of transmission reported was person-to-person spread (11 outbreaks due solely to person-to-person transmission resulted in 35 illnesses), with animal contact being the second most common transmission route reported (contact with animals contributed to transmission in nine outbreaks resulting in 36 cases) (Table 3 and Figure 6).

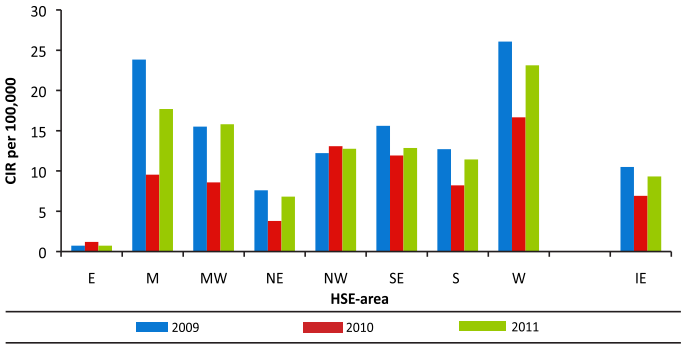


Figure 3: Regional crude incidence rates cryptosporidiosis, Ireland 2009-2011.

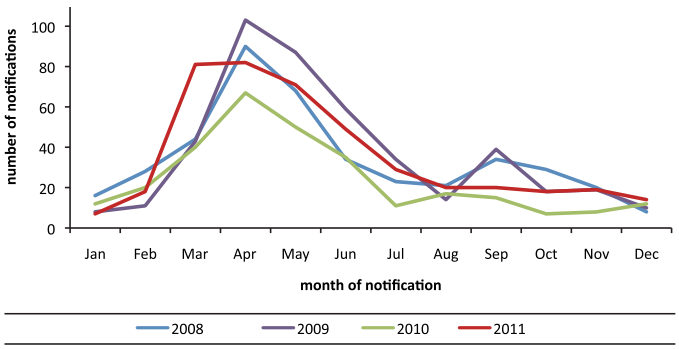


Figure 4. Seasonal distribution of cryptosporidiosis cases 2008-2011

Table 1: Number of cases (and percentage of cases where information available) where selected risk factors were reported for cryptosporidiosis cases, Ireland 2011

Risk factor	Yes (% of known)	No	Unknown	Not Specified	Total
Travel	27(6.9%)	367	1	33	428
Lives/cared for on farm	135 (42.7%)	181	3	109	428
Visited farm	122 (36.1%)	216	4	86	428
Lives/works on or visited farm[a]	*231 (70.6%)*	*96*	*3*	*98*	*428*
Swimming pool visit	68 (19.9%)	274	4	82	428
Pets	221 (68.0%)	104	8	95	428
Other water based activities	16 (6.2%)	244	4	164	428

[a]*Composite of 2 previous variables*

Table 2: Number of cases (and percentage of cases where information available) for cryptosporidiosis cases compared to the number and percentage of households in Ireland by home water supply type, Ireland 2011

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	X^2 and P value
Group water scheme (private)	24	6.8%	45,774	2.9%	
Group water scheme (public)	51	14.4%	144,428	9.0%	
Other	9	2.5%	2,080	0.1%	
Private well	101	28.5%	161,532	10.1%	X^2=347.1, P<.001
Public water supply	170	47.9%	1,247,185	77.9%	
Unknown	5				
Not specified	68		48,409		
Total	428	100%	1,649,408	100%	

Comparing the proportion of cases and households served by public water supplies versus all other supply types: X^2=185.7, P<.001

Moreover, two of the three general outbreaks were reported to be due to animal contact. In the first, fifteen third-level students out of a group of 43 developed gastrointestinal symptoms following exposure to farm animals as part of their training. Two were confirmed positive for *Cryptosporidium* and one was hospitalised. In a second general outbreak, two schoolchildren developed cryptosporidiosis.

The third general outbreak was reported in a child care facility (CCF); six children were ill in total and two were laboratory confirmed. *Cryptosporidium* was not detected in the water serving the premises, although the small public water supply to which the CCF was connected had a history of being sub-optimal. It was concluded that while the most likely transmission route was person to person (which is a common method of spread among young children), waterborne transmission could not be definitively outruled as the initial source of the infection. The water supply serving the CCF has since been upgraded.

Summary

The overall incidence of cryptosporidiosis in Ireland has remained similar in the eight years since surveillance began in 2004, with no reliable trend up- or downwards. The seasonal and regional incidence reported in 2011 was typical of previous years; consistently there has been a higher incidence in springtime and in non HSE-E areas.

Person-to-person spread appears to be an important mode of transmission within families, 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 or swimming pools.

While there are fewer general waterborne outbreaks reported relative to earlier years, water from non-public supplies may present a risk of cryptosporidiosis; from the enhanced dataset, persons who are not served by public water supplies were over-represented among the cases relative to the distribution of households by water supply type nationally. The EPA drinking water reports provide information on improvements in the public water supply sector in relation to *Cryptosporidium*.[1]

1. EPA. 2011. The Provision and Quality of Drinking Water in Ireland A Report for the Year 2010. http://www.epa.ie/downloads/pubs/water/drinking/name,31739,en.html

Table 3: Number of outbreaks, number ill and number laboratory-confirmed cases by transmission route, Ireland 2011

Transmission mode	Number of outbreaks	Total number ill	Number lab confirmed
Animal contact	6	26	8
Person-to-person	11	35	22
P-P and Animal	3	10	8
P-P and Waterborne	3	11	6
Waterborne	1	2	2
Unknown	3	6	6
Not Specified	3	4	4
Total	**30**	**94**	**56**

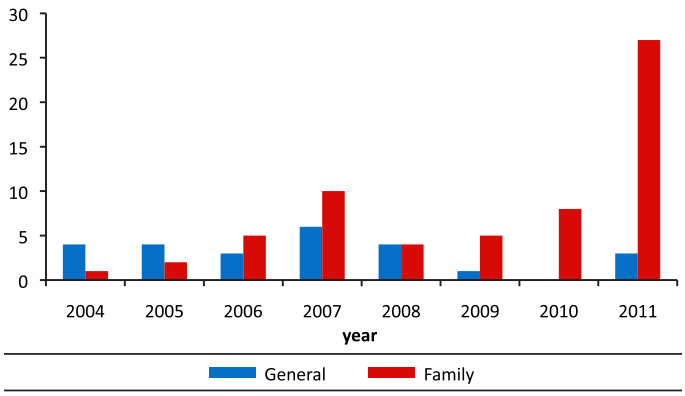


Figure 5: Number of cryptosporidiosis outbreaks notified by type, Ireland 2004-2011

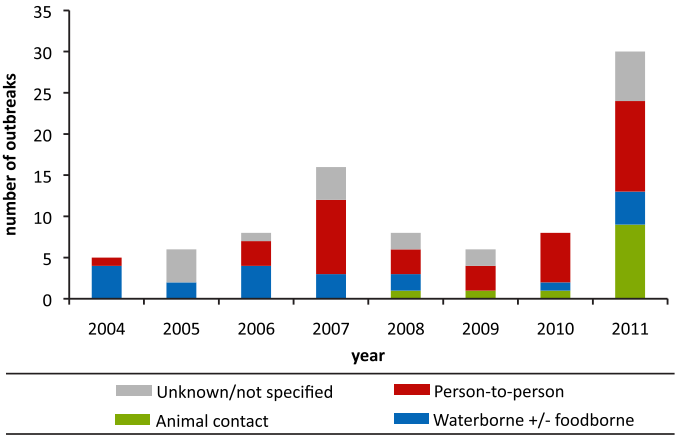


Figure 6: Number of cryptosporidiosis outbreaks notified by reported transmission route, Ireland 2004-2011

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.

3.3 Verotoxigenic *E. coli*

Summary

Number of VTEC cases, 2011: 283
Crude incidence rate, 2011: 6.2/100,000
Number of VTEC-associated HUS 2011: 19
Number of VTEC cases, 2010: 199

Introduction

One of the most serious outbreaks of foodborne disease ever reported in the European Union was a verotoxigenic *E. coli* O104 outbreak identified in Germany in May 2011. Cases related to this outbreak were detected in several European countries, including a cluster of cases which were exposed in the Bordeaux region of France. As of 27/07/2011, a total of 782 HUS cases, including 29 deaths, and 3,128 non-HUS cases, including 17 deaths, were reported to the European Centre for Disease Prevention and Control (ECDC).[1] A Task Force of the European Food Safety Authority (EFSA) reported on 5/7/2011 that fenugreek seeds imported from Egypt were the most likely source of the outbreaks in Germany and France.[2] This outbreak is a reminder of the potential severity of disease associated with VTEC infections, and the magnitude of outbreaks that can result from contamination of food produced and distributed on a large scale.

Table 1. Number and crude incidence rates confirmed and probable VTEC, Ireland 2004-2011

Year	Confirmed cases	Probable cases	Total VTEC	CIR VTEC[a] (95% CI)
2004	61	0	61	1.4 (1.1-1.8)
2005	125	0	125	3.0 (2.4-3.5)
2006	153	5	158	3.7 (3.2-4.3)
2007	115	52	167	3.9 (3.3-4.5)
2008	213	13	226	5.3 (4.6-6.0)
2009	238	3	241	5.7 (5.0-6.4)
2010	197	2	199	4.7 (4.0-5.4)
2011[b]	272	11	283	6.2 (5.5-6.9)

[a] Data from the 2011 census were used to calculate rates in 2011, and 2006 to calculate incidence rates for 2004-2010
[b] Confirmed cases include 194 VTEC O157 cases, 48 VTEC O26 cases, 25 VTEC strains of other serogroups, and five mixed infections. Nine probable cases were reported on the basis of being epidemiologically linked to laboratory confirmed cases of VTEC O157, and one VTEC O26 and one VTEC O145 probable case were reported on the basis of detection of vt genes only.

Fortunately, there were no cases related to this outbreak identified in Ireland, however, the reported verotoxigenic *E. coli* (VTEC) incidence rate in Ireland is generally high relative to other European countries. In 2010 (the latest year for which data are published), the overall VTEC incidence rate in the European Union was 0.83 per 100,000. For several years, Ireland has reported the highest VTEC incidence rate of any Member State in the EU, although Denmark and Sweden also reported relatively high incidence rates of >3.0 per 100,000 in 2010.[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, 8-10]

Materials and Methods

Infection due to Enterohaemorrhagic *E. coli* (EHEC) is a notifiable disease (S.I. 707 of 2003) since 2004 by clinicians and laboratory directors. This report focuses

on cases that conform to the case definition used for VTEC enhanced surveillance (http://www.ndsc.ie/hpsc/A-Z/Gastroenteric/VTEC/SurveillanceForms/). Enhanced epidemiological information was supplied as in previous years by HSE personnel, and VTEC confirmation and typing data were provided by the HSE Dublin Mid Leinster Public Health Laboratory at Cherry Orchard Hospital (DML-PHL). 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 regional public health departments.

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

Results

Incidence

In 2011, there were 283 confirmed and probable cases of VTEC notified, equating to a crude incidence rate (CIR) of 6.17 per 100,000 (Table 1). If only confirmed VTEC cases are considered, the 272 cases (CIR=5.93 [5.22-6.63]) notified this year represent a 38% increase overall on the number of confirmed cases notified in 2010, and a 14% increase on the number reported in 2009, the year with the highest number of confirmed cases prior to this (Table 1 and Figure 1). One additional suspected case of VTEC was reported. An elderly female in HSE-E developed HUS, but was not confirmed as VTEC.

For comparison, in England and Wales there was a 49% increase in *E. coli* O157 numbers in 2011 compared to 2010, however, the reported incidence rate for 2010 was lower than usual, and the increase in *E. coli* case numbers in 2011 was only 14% on 2009 case numbers[11]. *E. coli* O157 case numbers were reported to be 19% higher in Scotland in 2011 relative to 2010, but it was stated that 2011 incidence was closer to the historical average than to 2010, again because case number in 2010 were relatively low[12].

Of 268 cases where information was available on symptoms, 192 (72%) were symptomatic, 78 (41%) of which developed bloody diarrhoea. Nineteen individuals (6.7%) developed HUS, the same number as last year. One elderly HUS case with VTEC O157 VT2 infection died but death was not due to VTEC infection. The elderly patient reported as a suspected VTEC case also died; the cause of death in this case was reported as unknown. Where reported (n=250), 76 (30%) of notified cases required hospitalisation (38% of symptomatic cases).

Seasonal distribution

Typically, VTEC cases are most commonly associated with late summer, however in 2011, the highest

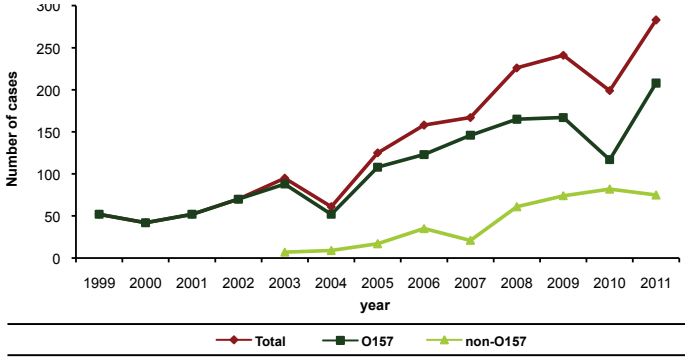


Figure 1. Annual number of confirmed and probable VTEC cases by serogroup, Ireland 1999-2011
Note: For simplicity in this figure, cases with mixed VTEC O157/other serogroup infections are included in the data for O157.

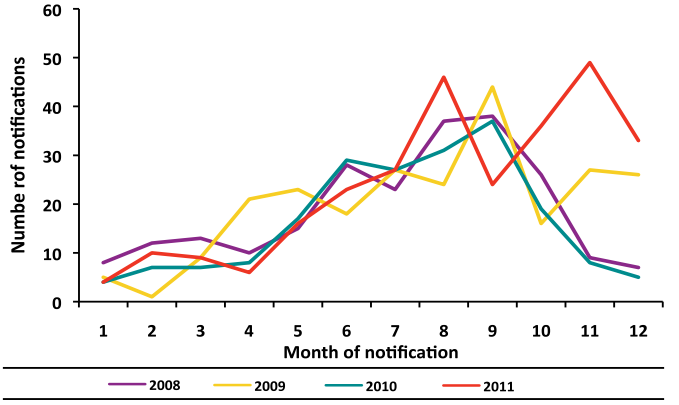


Figure 2. Seasonal distribution of VTEC cases, Ireland 2008-2011

Table 2. Number and crude incidence rate confirmed and probable VTEC by serogroup and HSE area, and number and crude incidence rate VTEC-associated HUS by HSE area, Ireland 2011

HSE-area	Number [CIR (95% CI)] VTEC O157	Number [CIR (95% CI)] non-O157 VTEC	Number [CIR (95% CI)] all VTEC	Number [CIR (95% CI)] VTEC-associated HUS
East	18 [1.1 (0.6-1.6)]	11 [0.7 (0.3-1.1)]	**29 [1.8 (1.1-2.4)]**	4 [0.3 (0.0-0.5]
Midlands	57 [20.2 (14.9-25.4)]	7 [2.5 (0.6-4.3)]	**64 [22.7 (17.1-28.2)]**	4 [1.4 (0.0-2.8)]
Mid-West	17 [4.5 (2.4-6.6)]	39 [10.3 (7.1-13.5)]	**56 [14.8 (10.9-18.6)]**	1 [0.3 (-0.3-0.8)]
North-East	21 [4.8 (2.7-6.8)]	2 [0.5 (-0.2-1.1)]	**23 [5.2 (3.1-7.4)]**	2 [0.5 (-0.2-1.1)]
North-West	17 [6.6 (3.5-9.7)]	7 [2.7 (0.7-4.7)]	**24 [9.3 (5.6-13.0)]**	0 [0.0 (0.0-0.0)]
South-East	22 [4.4 (2.6-6.3)]	1 [0.2 (-.0.2-0.6)]	**23 [4.6 (2.7-6.5)]**	5 [1.0 (0.1-1.9)]
South	37 [5.6 (3.8-7.4)]	4 [0.6 (0.0-1.2)]	**41 [6.2 (4.3-8.1)]**	2 [0.3 (-0.1-0.7)]
West	19 [4.3 (2.4-6.2)]	4 [0.9 (0.0-1.8)]	**23 [5.2 (3.0-7.3)]**	1 [0.2 (-0.2-0.7)]
Ireland	208 [4.5 (3.9-5.2)]	75 [1.6(1.3-2.0)]	**283 [6.2 (5.5-6.9)]**	19 {0.4 (0.2-0.6)]

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

proportion of cases was in quarter 4; overall this year, 42% of cases were reported in quarter 4 with 34% of cases in quarter 3. Figure 2 shows the seasonal distribution in 2011 relative to previous years.

Regional distribution

The highest VTEC incidence rates were reported in the HSE-M followed by the HSE-MW, where the rates were over three times and twice the national crude rate respectively (Table 2). The HSE-M rate was significant higher than the rates for all other areas except the HSE-MW, while the HSE-MW rate was significantly higher than five other HSE-areas. As in previous years, the HSE-E reported the lowest overall crude incidence rate (Table 2), around 30% of the national rate this year.

The particularly high rate for VTEC incidence in the HSE-M was largely due to one community waterborne VTEC O157 outbreak described in detail later in this chapter (Table 2 and Figure 3). The elevated overall incidence rate in the HSE-MW was strongly influenced by a high reported incidence rate for non-O157 infections (Figure 3). Historically, the HSE-MW have reported relatively high numbers of non-O157 VTEC infections; it is likely that much of the regional variation in non-O157 VTEC incidence reflects regional differences in laboratory diagnostic practice for non-O157 infections.

Reviewing the VTEC-associated HUS incidence rates by region, the HSE-M reported the highest rate, however, the numbers of HUS cases in all regions were too low to establish if there was any statistically significant difference in rates (Table 2).

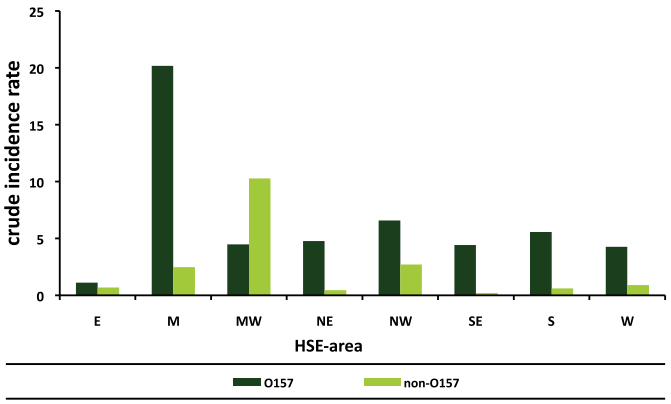


Figure 3: Crude incidence rate VTEC O157 and non-O157, Ireland 2011

Table 3. Serotype and verotoxin (VT) profiles for VTEC isolates as determined at the PHL HSE Dublin Mid Leinster, Cherry Orchard Hospital in 2011

Serogroup	VT1	VT1+VT2	VT2	Total
O157[a]	0	60	138	198
O26	29	19	1	49
O5	5	2	0	7
Ungroupable	1	1	4	6
O128	0	3	0	3
O146	0	3	0	3
O145	0	0	2	2
O111	0	1	0	1
O150	0	1	0	1
O185	0	0	1	1
O44	0	0	1	1
O76	1	0	0	1
Total	**36**	**90**	**147**	**273**[b]

[a]For one confirmed *E. coli* O157 case diagnosed in another jurisdiction, no vt typing data were available.
[b] Nine notifications were reported on the basis of being epidemiologically linked to laboratory confirmed cases, and thus no isolates were available for inclusion in this table.

Table 4. Number of cases (and percentage where known) for selected risk factors, Ireland 2011

Risk factor	Number 'Yes' and % where reported	Number 'No' and % where reported	Number where risk factor was unknown or not reported
Food suspected	23 (17.8%)	106 (82.2%)	155
Exposure to farm animals or their faeces	74 (43.3%)	97 (56.7%)	113
Exposure to private well water[a]	69 (36.9%)	118 (63.1%)	96
Travel-associated[b]	4 (1.8%)	215 (98.2%)	64
Attendance at a CCF	51 (32.3%)	107 (67.7%)	125
Attendance at a CCF (among <5 yrs)	49 (67.1%)	24 (32.9%)	57

[a]Composite variable recoded from two different water supply exposure enhanced variables in CIDR
[b]Based on CIDR core variable *Country of Infection*
[c] *Childcare Facility*

Laboratory typing

In 2011, the serogroup and verotoxin profiles of VTEC isolates referred to the HSE PHL Dublin Mid Leinster, Cherry Orchard Hospital are displayed in Table 3. As usual among VTEC O157 in Ireland, isolates containing the genes for verotoxin 2 (*vt2*) were more common (70%) than strains containing both *vt1* and *vt2*. VTEC O26 strains containing only *vt1* made up 59% of all VTEC O26 reported, with 39% of VTEC O26 containing the genes for both *vt1* and *vt2*.

Risk factors

Under enhanced surveillance for VTEC, risk factor information is routinely collected on VTEC notifications (Table 4).

Exposure to farm animals or their faeces and exposure to private well water were relatively common among cases; 43.3% and 36.9% reported these exposures respectively. This is consistent with the low incidence of VTEC infection among residents in the largely urban HSE-E population and the higher incidence recorded in more rural parts of the country. 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 is likely 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 majority of infections acquired indigenously. The countries where the four travel-associated Irish VTEC cases had travelled to during their incubation periods were Portugal (n=2), Spain (n=1) and Hungary (n=1).

Where the information was available, around a third of VTEC cases in 2011 were reported to attend a Childcare Facility (CCF). When these analyses were restricted to notified VTEC under five years of age, around two-thirds reported attendance at a childcare facility. In the absence of knowing the proportion of the general population less than 5 years of age who attend a CCF, it is not possible to estimate if attendance at a CCF increases a child's risk of VTEC infection.

Outbreak and environmental investigations

The outbreak surveillance system plays a key role in our understanding of VTEC transmission in Ireland. Fifty-one VTEC outbreaks were notified in 2011, which included 198 of the 283 VTEC notifications. Thirty-eight outbreaks were due to VTEC O157, seven to VTEC O26, two were mixed VTEC strain outbreaks, and four were caused by other VTEC strains. The suspected modes of transmission are listed in Table 5.

Person-to-person spread is an important mode of VTEC transmission particularly between young children, and was suspected to have played a role in 24 (47%) VTEC outbreaks in 2011 in which 85 persons were reported ill (Table 5 and Figure 4). Seventeen of these outbreaks were reported as being solely due to person-to-person transmission. The second most common transmission route reported was waterborne transmission, which was reported to have contributed to six outbreaks (12%) with 31 persons ill. Microbiological evidence was obtained implicating private water sources in three of these outbreaks (further details below on a general waterborne outbreak). Two family outbreaks were reported as being suspected to be foodborne, but no suspected foods were reported and animal/environmental contact was reported as the suspected mode of transmission in three family outbreaks. For 43% (n=22) of VTEC outbreaks in 2011, the transmission route was reported as unknown or not specified (Table 5 and Figure 4).

Table 5. VTEC outbreaks by suspected mode of transmission, Ireland 2011

Suspected mode of transmission	Number of outbreaks	Number ill	Number confirmed cases
Animal contact	1	4	3
Environmental / Fomite	1	2	2
Person-to-person	17	65	59
Person-to-person and possibly Waterborne	1	3	3
P-P and Animal contact	1	1	4
P-P and Foodborne	2	9	3
P-P and Waterborne	2	5	3
Unknown/P-P	1	2	3
Waterborne	3	23	37
Not Specified	1	1	2
Unknown	21	63	61
Total	51	178	180

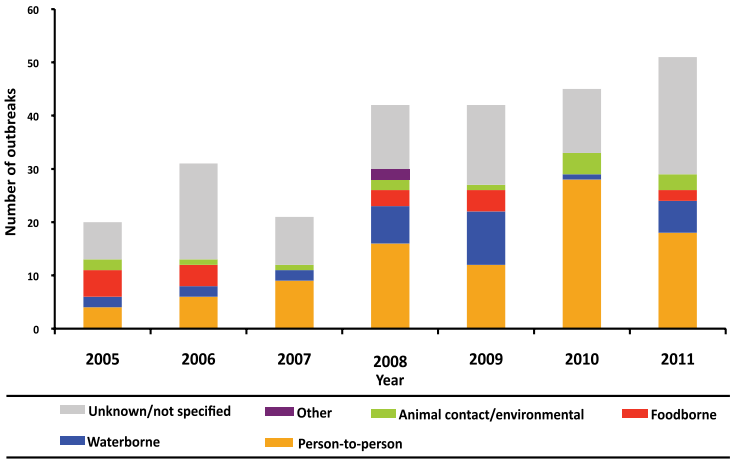


Figure 4. Number of VTEC outbreaks by suspected transmission route and year, Ireland 2004-2011

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 majority of outbreaks (76%) were family outbreaks, with twelve general outbreaks notified. The 39 family outbreaks resulted in 82 persons becoming ill, an average of 2.1 persons per outbreak, while the twelve general outbreaks resulted in 96 persons becoming ill, an average of 8 persons per outbreak.

Nine general outbreaks were associated with childcare facilities/arrangements (CCFs), two were reported as community outbreaks and one small general outbreak was linked to a hotel. This is the highest number of general VTEC outbreaks reported in a single year since surveillance for VTEC infection commenced in 1999.

Four of the outbreaks associated with CCFs were reported as being due to person-to-person spread. The mode of transmission for a fifth outbreak was waterborne transmission within a private house followed by person-to-person transmission to a CCF contact, while the transmission routes for the remaining four CCF outbreaks were unknown. The number of persons ill within these outbreaks ranged from 1 to 29 (median 5).

Among the community VTEC outbreaks, a large waterborne outbreak was reported in the HSE-M associated with two VTEC O157 strains (one VT2 and one VT1+2). There were 38 cases in total, 23 of whom were symptomatic. Seven cases required hospitalisation and one developed HUS. Epidemiological and microbiological evidence pointed towards drinking water from a private group water scheme serving around 300 homes as being the most likely source of illness. Both outbreak strains were detected in a water sample from the group water scheme, and 89% of cases had a definite epidemiological link to this supply[13]. Two days in advance of the first outbreak cases coming to the attention of health authorities, a boil water notice had been already been put on the supply following detection of *E. coli* and coliforms in a water sample.

In the second community outbreak, two geographically and temporally linked adult HUS cases were notified, however, no definite epidemiological link was established between the cases. In the hotel related outbreak, two visitors to a hotel developed illness; the mode of transmission was not established.

Summary

There was an increase in the reported incidence of VTEC infection in Ireland in 2011 reversing the downward trend observed in 2010. Notably the incidence rates in the United Kingdom reported by the Health Protection Agency and Health Protection Scotland were also higher in 2011 following reporting of low VTEC incidence rates in 2010. It is possible that the low rates reported in 2010 reflected a reduction in some common risk factor between the three jurisdictions that year.

In 2010, HPSC had noted a decrease in the number of waterborne VTEC outbreaks reported, and this would be consistent with the reported low rainfall in Ireland in 2010[14]. A common effect such as a change in climate could explain an international change in the trend such as was observed in 2010.

In 2011, person-to person spread and drinking water were significant transmission routes for VTEC outbreaks in Ireland. Person-to person spread was important both in CCFs and private households, and exclusion of children with infectious gastrointestinal disease symptoms from CCFs remains an important control measure in the prevention of outbreaks in these settings[15].

The large waterborne outbreak in the HSE-M associated with a private group scheme was particularly significant. Private wells serve around 10% of households in Ireland, with private group water schemes serving a further 3% of homes [16]. According to the latest EPA drinking water report[17], there were improving levels of compliance with the drinking water quality standards in the group water scheme sector during 2010 but it was also reported that the microbiological water quality in a significant proportion of group water schemes continued to be inferior to that in public water supplies, in particular in privately-sourced group water schemes. Exposure to untreated or poorly treated private supplies have long been recognised as a risk factor for VTEC infection in Ireland, however, outbreaks to date have generally been smaller and mostly confined to household settings. This outbreak highlights the vulnerability of some larger private water supplies in Ireland, and the potential for a high impact on human health when a vulnerable supply serves a large population.

References

1. ECDC. 2011. Epidemiological updates on the VTEC O104 outbreak. http://ecdc.europa.eu/en/healthtopics/escherichia_coli/whats_new/Pages/epidemiological_updates.aspx
2. EFSA Tracing seeds, in particular fenugreek (*Trigonella foenum-graecum*) seeds, in relation to the Shiga toxin-producing *E. coli* (STEC) O104:H4 2011 Outbreaks in Germany and France. 2011. http://ecdc.europa.eu/en/press/news/Lists/News/ECDC_DispForm.aspx?List=32e43ee8%2De230%2D4424%2Da783%2D857421240 29a&ID=455&RootFolder=%2Fen%2Fpress%2Fnews%2FLists%2F News
3. EFSA and ECDC. 2012. The European Union Summary Report on Trends and Sources of Zoonoses,Zoonotic Agents and Food-borne Outbreaks in 2010. . Accessible online at http://www.efsa.europa.eu/en/efsajournal/pub/2597.htm
4. Garvey, P. et al. 2010. Epidemiology of verotoxigenic E. coli in Ireland, 2007. Epi-Insight: 11(9)
5. Locking et al. 2010. Escherichia coli O157 Infection and Secondary Spread, Scotland, 1999–2008 EID 17(3): 524 http://www.cdc.gov/eid/content/17/3/pdfs/524.pdf
6. O'Sullivan et al. 2008. Increase in VTEC cases in the south of Ireland: link to private wells? Eurosurveillance 13(39) http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=18991
7. HPSC. 2008. Press release. Householders must properly maintain private water supplies following increase in contamination – HPSC. http://www.hpsc.ie/hpsc/PressReleases/2008PressReleases/MainBody,3127,en.html
8. Locking et al. 2001. Risk factors for sporadic cases of Escherichia coli O157 infection: the importance of contact with animal excreta. Epidemiol Infect. 127(2):215-20. http://journals.cambridge.org/download.php?file=%2FHYG%2FHYG127_02%2FS0950268801006 045a.pdf&code=6ed8f62e070b25379a01ec5fab104dCd
9. Griffin. 2010. Review of the major outbreak of *E. coli* O157 in Surrey, 2009 http://www.griffininvestigation.org.uk/
10. CDC. Ongoing multistate outbreak of Escherichia coli serotype O157:H7 infections associated with consumption of fresh spinach—United States, September 2006. MMWR 2006; 55(38): 1045-6.
11. HPA. 2011. *E. coli* O157 Annual Totals http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1249113624846.
12. HPS. 2012. *Gastro*-intestinal and foodborne infections: Escherichia coli O157, Salmonella and Campylobacter - laboratory reports, 2011 http://www.hps.scot.nhs.uk/ewr/article.aspx
13. McNamara A. on behalf of the Outbreak Control Team. 2011. An outbreak of VTEC linked to a drinking water supply. Proceedings of the 1st Annual meeting of the safefood (VTEC) Network. October 2011.
14. Met Eireann –Annual Summary of the weather in 2010. http://www.met.ie/climate/monthly_summarys/year10sum.pdf
15. HPSC Preschool and Childcare Facility Subcommittee. 2012. Management of Infectious Disease in Childcare Facilities and Other Childcare Settings. Accessible at http://www.hpsc.ie/hpsc/A-Z/LifeStages/Childcare/
16. CSO. 2012. Census 2011 Profile 4 The Roof over our Heads - Housing in Ireland Accessible at http://www.cso.ie/en/census/census2011reports/census2011profile4theroofoverourheads-housinginireland/
17. EPA. 2011. The Provision and Quality of Drinking Water in Ireland A Report for the Year 2010 http://www.epa.ie/downloads/pubs/water/drinking/name,31739,en.html

3.4 Hepatitis A

Summary

Number of cases, 2011: 19
Crude notification rate, 2011: 0.4/100,000 population
Number of cases, 2010: 46

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 2011, with 19 cases notified. This corresponds to a crude notification rate of 0.4/100,000 population. This represents a considerable decrease in cases compared to 2010 when 46 cases were notified (figure 1). Case classification was reported for all cases. Eighteen cases were laboratory confirmed and one case was classified as possible.

Fifty three percent of cases were male (n=10) and 47% were female (n=9). Only two cases (11%) of hepatitis A were detected in children, while the remaining 17 cases (89%) were in adults (figure 2).

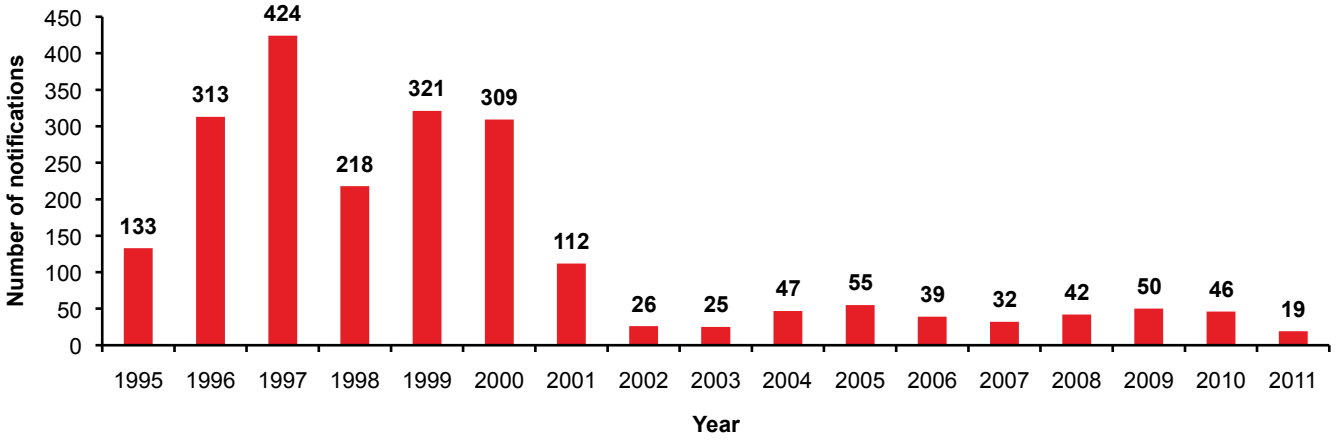


Figure 1. Number of hepatitis A notifications, 1995-2011

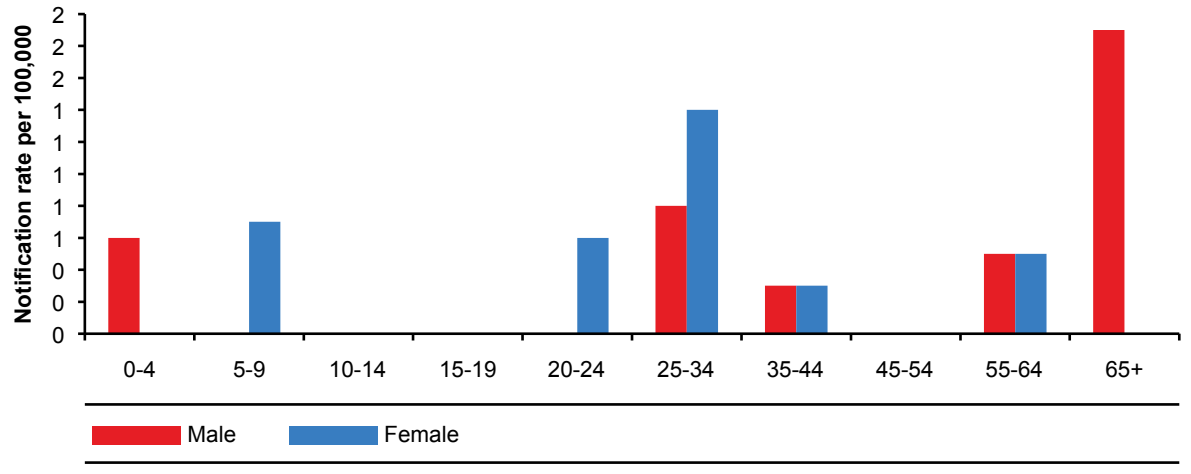


Figure 2. Age and sex-specific notification rates/100,000 population for hepatitis A, 2011

Five cases were linked to travel outside of Ireland and six cases were infected in Ireland. Country of infection was not known for the remaining eight cases.

There were no hepatitis A outbreaks recorded in Ireland for 2011.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 27th July 2012.

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

3.5 Rotavirus

Summary

Number of cases: 2,450
Crude incidence rate: 53.4/100,000 population

Rotavirus is the commonest 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. In developed countries, mortality due to rotavirus is low; however, the morbidity and economic costs associated with infection are significant. Three primary serogroups of rotaviruses infect humans; A, B and C; A being the commonest infecting serogroup. Given the universal distribution of rotavirus, the numbers of notifications will always represent an underestimate of the true incidence and are likely to be more reflective of habits of presentation to medical practitioners and of styles of investigation, notification and testing.

Since 2004, rotavirus, although not specifically listed, has been a notifiable disease in Ireland under the Acute Infectious Gastroenteritis (AIG) disease category. Prior to 2004, rotavirus cases were notified in the former notification category of "Gastroenteritis in children under two years". In April 2008 the case definition of AIG was amended specifying definitions for both rotavirus and the newly notifiable *Clostridium difficile* associated disease. On 4th May 2008 these amended definitions formally replaced the previous AIG case classification.

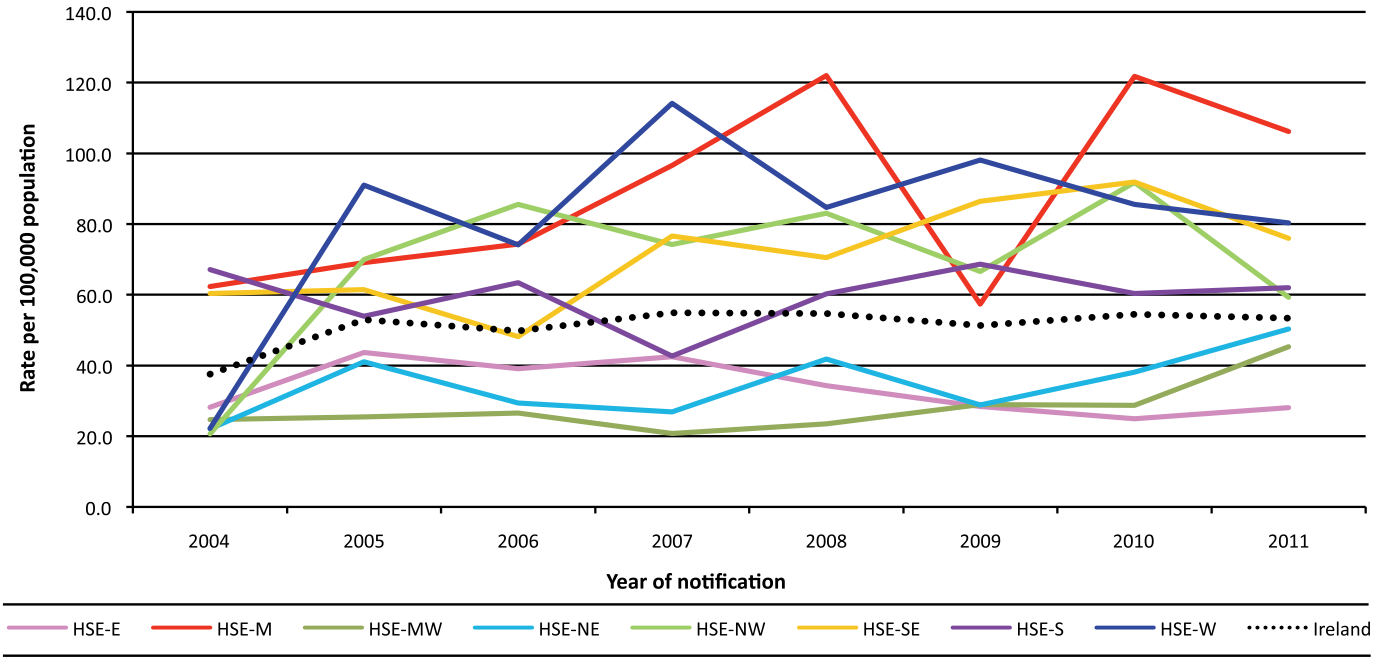


Figure 1: Rotavirus crude incidence rate by HSE area and year, 2004-2011 (CIDR).

Rotavirus case definition:
A case of rotavirus infection is a patient with acute onset of vomiting followed by watery diarrhea with fever, which typically lasts between three and eight days, AND one of the following laboratory criteria for diagnosis:

- Detection of rotavirus by antigen assay
- Detection of rotavirus-specific RNA
- Detection of rotavirus by electron microscopy
- Isolation of rotavirus

During 2011, there were 2,450 cases of rotavirus notified in Ireland, corresponding to a national crude incidence rate (CIR) of 53.4 per 100,000 population and representing a decrease of 2.1% compared to 2010.

Significant geographical variation was observed in regional rotavirus CIR. The highest regional CIR was observed in HSE-M at 106.2 per 100,000 population and in HSE-W at 80.4 per 100,000 population. The lowest regional CIR was observed in HSE-E at 28.1 per 100,000 and HSE-MW at 45.3 per 100,000 population. Figure 1 illustrates the rotavirus CIR by HSE area and year. Rotavirus infection has a well documented seasonal pattern in Ireland with the number of cases peaking each year in early spring. During 2011, this pattern was evident with rotavirus notifications peaking during March (n=705) and April (n=478). Figure 2* illustrates the seasonal variation in rotavirus cases by month of notification from 2004 to 2011.

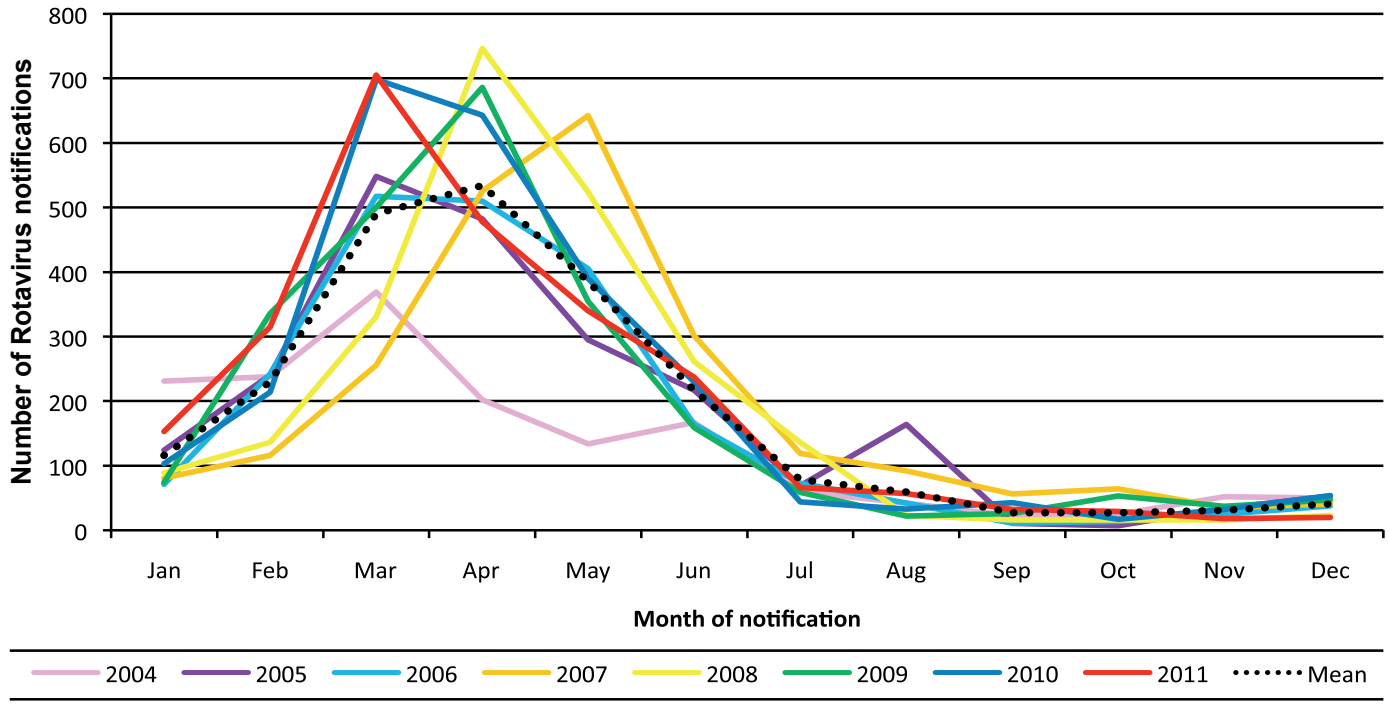


Figure 2: Number of rotavirus notifications by month, 2004-2011 (CIDR).

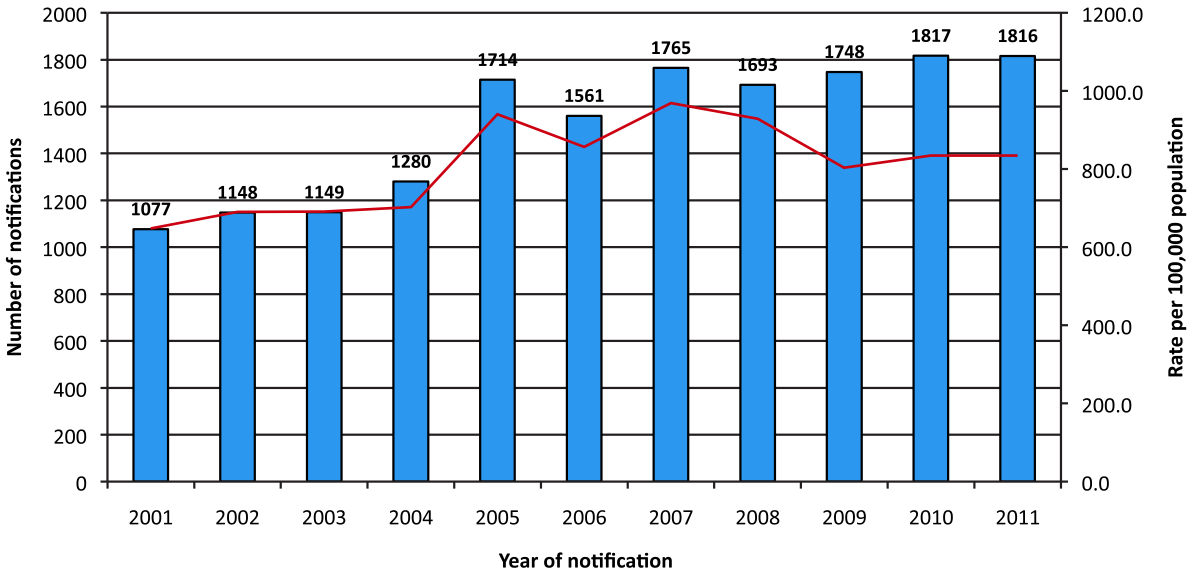


Figure 3: Number of cases of rotavirus in children less than two years of age by year, 2001 to 2011

* There is a 'false' second peak seen in 2005 during week 33, 2005 caused by bulk uploading of notifications for the HSE-W

Rotavirus is the most common cause of acute gastroenteritis in children worldwide with children generally affected in the first 2-3 years of life. In 2011, 74.1% (n=1,816) of cases were aged two years or under. Data from 2004 to 2011 show that the peak incidence of clinical disease occurred in the 6-18 month age group, with 68.4% of notifications in this age group. Figure 3 presents the number of cases of rotavirus in children less than two years of age by year, 2001 to 2011.

During 2011, 1,188 cases (48.5%) were female and 1,246 (50.9%) were male. Sex was not reported for 16 (0.6%) cases. This represented a ratio of females: males of 0.95:1.05, which was similar to the ratio observed in previous years.

There were five outbreaks of rotavirus notified during 2011 with 25 cases of associated illness and seven cases were hospitalised. Of the five outbreaks, three were family outbreaks occurring in private homes while two general outbreaks occurred in a crèche and a private house. Mode of transmission was reported as person to person spread for all five outbreaks. Table 1 summarises the number of rotavirus outbreaks by location and month during 2011.

Table 1: Summary of rotavirus outbreaks by location and month, 2011

Month	Location	Number of outbreaks	Number ill	Number hospitalised	Number dead
January	Private house	2	4	4	0
February	Crèche	1	17	0	0
April	Private house	1	2	2	0
June	Other	1	2	1	0
Total		5	25	7	0

3.6 Salmonella

Summary

Number of confirmed cases: 311
Number of probable cases: 0
Crude incidence rate: 6.8/100,000

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 this is not common in Ireland and is almost invariably travel-associated.

Notification data (CIDR)

There were 311 cases of salmonellosis in reported in 2011, all of which were laboratory confirmed. The national crude incidence rate (CIR) for salmonellosis in 2011 was 6.8 per 100,000 population which was a slight decrease compared to 2010 (7.8/100,000) as shown in figure 1. Figure 2 illustrates the regional variation in CIR during 2011. The highest CIR occurred in HSE-MW (10.5/100,000), representing an increase of 3.2 per 100,000 population compared to 2010. This was the only region to experience an increase in the regional CIR during 2011. The lowest CIR occurred in HSE-S (4.1/100,000), which is a decrease compared to 6.0 per 100,000 population during 2010. The largest decrease in regional CIR during 2011 was observed in HSE-M, with a decrease of 8.1 per 100,000 population.

The female:male ratio for 2011 was 0.93:1.08. In terms of age distribution, 27.7% of cases occurred in children under five. This is likely to be, at least in part, a reflection of clinicians more readily seeking clinical samples in that age group. This is also reflected in the age specific incidence rate (ASIR) with the 0-4 age group having the highest ASIR nationally (28.1/100,000 in females and 19.8/100,000 in males) in both sexes (figure 3).

The seasonality of salmonellosis notifications in Ireland during 2011 is shown in figure 4, with the highest number of notifications occurring between June and

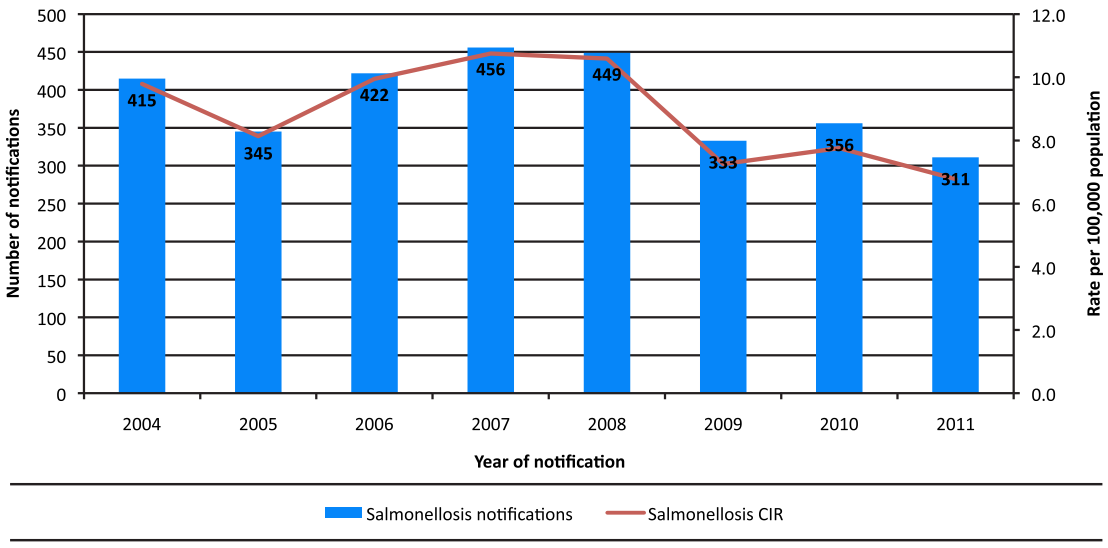


Figure 1: Salmonellosis notifications and crude incidence rate per 100,000 population by year of notification (CIDR)

October. During 2011, the peaks observed during July and August were largely due to travel associated salmonellosis notifications, which are anticipated seasonal increases that correlate with peak holiday periods and resultant increase of people travelling abroad. However, a peak in indigenous notifications was also observed during August due to a mixed strain outbreak of *S.* Newport and monophasic *S.* Typhimurium.

Of the 311 cases notified on CIDR during 2011, travel history was provided for 241 cases (77.5%). Of the 241 cases where travel history was reported, 124 (51.5%) of salmonellosis cases were indigenous to Ireland and 117 cases (48.5%) reported a recent history of travel. Where travel history was documented, the three countries with highest occurrence of recent travel and subsequent development of salmonellosis were; Spain (n=13), Turkey (n=13) and Thailand (n=12). When serotyping data were analysed by travel history, 31.6% of all travel associated cases were *S.* Enteritidis whereas 40.3% of cases indigenous to Ireland are *S.* Typhimurium (table 1).

There is a considerable degree of underreporting of salmonellosis. A study undertaken in Sweden in which reviewers ascertained the degree of underreporting of salmonellosis cases amongst Swedish holidaymakers returning to Sweden from a range of European countries indicated that when compared with national statistics, salmonellosis cases were underreported by a factor of four. Given the high degree of sensitivity and specificity of the Swedish national surveillance system, this is probably an reasonable accurate estimation signifying that for every sporadic case of salmonellosis that is notified nationally in Ireland, there are a further four cases that go un recognised in the community.[2]

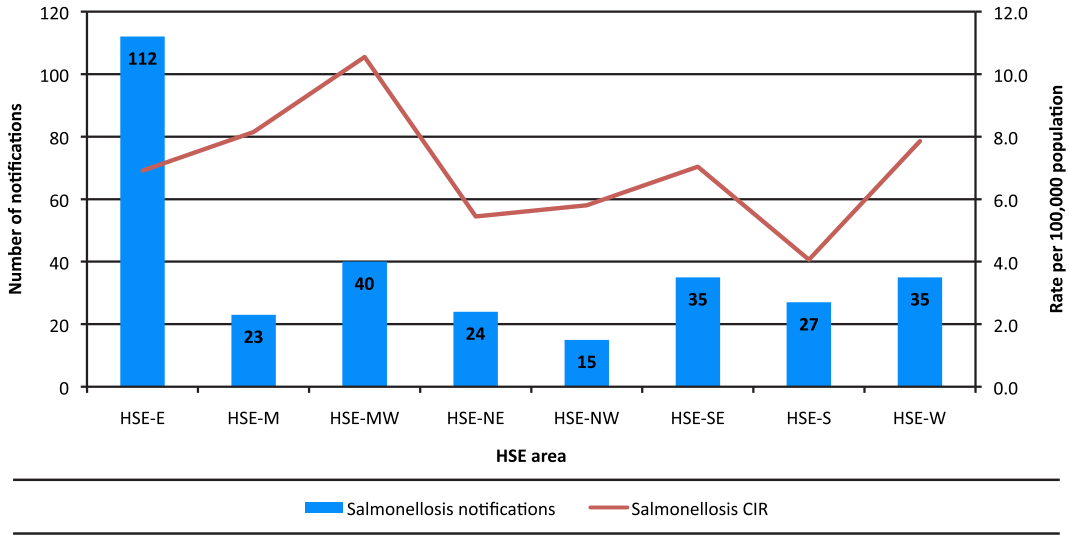


Figure 2: Salmonellosis notifications and crude incidence rate per 100,000 population by HSE area, 2011 (CIDR)

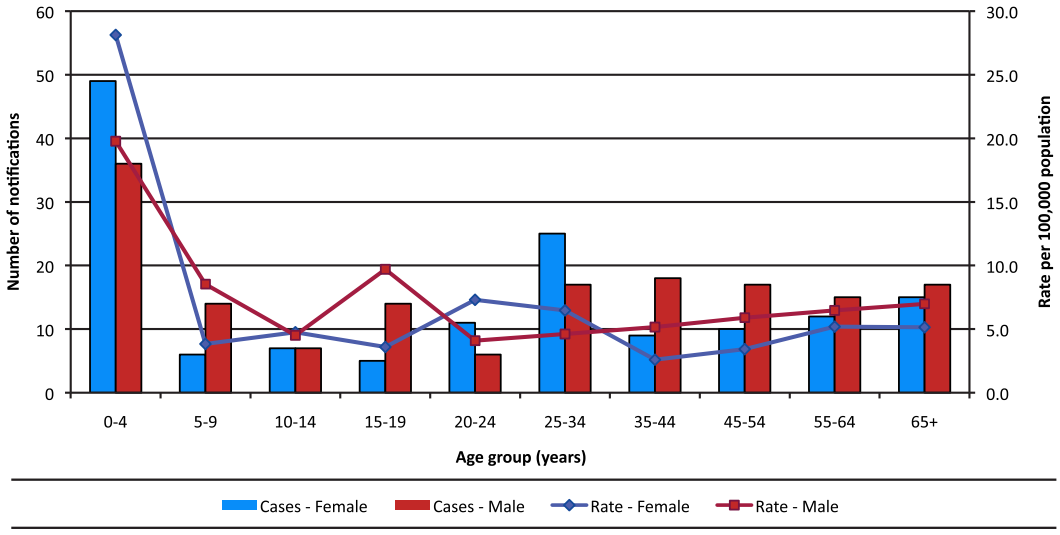


Figure 3: Salmonellosis notifications and age specific incidence rate per 100,000 population by age group (years) and sex, 2011 (CIDR)

NSSLRL data:
The National Salmonella, Shigella and Listeria Reference Laboratory (NSSLRL) based in Galway has been providing reference services nationally since 2000. In 2011, the NSSLRL analysed 321 human *Salmonella* isolates referred for further typing, identifying 54 serotypes. Table 2 presents the most dominant serotypes detected during 2011. *S.* Typhimurium* (n=116) was the most common serotype, followed by *S.* Enteritidis (n=58).

The NSSLRL conducted phage typing analysis on all 116 *S.* Typhimurium and all 58 *S.* Enteritidis isolates. Phage types DT104 (23.3%) and DT193 (19.8%) were the commonest phage types observed among *S.* Typhimurium isolates while phage types PT1 (17.2%), RDNC (17.2%) and PT21(10.3%) were the dominant types observed among *S.* Enteritidis isolates.[1]Of the 321 human isolates analysed by the NSSLRL, 168 (52.3%) were fully susceptible to all antimicrobials tested. The remaining 153 isolates exhibited some degree of antimicrobial resistance. The three commonest resistance patterns§ seen were resistance to ampicillin, chloramphenicol, streptomycin, sulphadiazine and tetracycline (ACSSuT, n=30, 9.3% of total and 19.6% of resistant isolates), resistance to nalidixic acid (Na, n=29, 9.0% of total and 19.0% of resistant isolates), followed by resistance to ampicillin, streptomycin, sulphadiazine and tetracycline (ASSuT, n=24, 7.5% of total and 15.7% of resistant isolates). Over 98% of human isolates with a resistance profile of ACSSuT or ASSuT were *S.* Typhimurium (including 19 monophasic isolates) while 51.7% of human isolates with a resistance profile of Na were *S.* Enteritidis.

Four isolates of *S.* Concord and one *S.* Stanley were resistant to nine antibiotics tested; two *S.* Concord and one *S.* Typhimurium isolates were resistant to eight antibiotics tested while one isolate each of *S.* Kentucky and *S.* Worthington were resistant to seven antibiotics tested. Please refer to the NSSLRL's Annual Report 2011 for more detailed analysis of results[1]. The pattern of antimicrobial resistance observed is broadly similar to previous years. To date carbapenemase production in salmonella has not been detected in Ireland.

Outbreaks:
There were 13 outbreaks of *Salmonella* during 2011 which is similar to the number of salmonellosis outbreaks reported in 2010. These outbreaks resulted in 49 cases of illness and an associated hospitalisation rate of 20.4% (n=10 cases). Table 3 outlines the number of salmonellosis outbreaks and number ill by outbreak location and outbreak transmission mode during 2011.

There were eight family outbreaks during 2011, six of which were in private houses and two were

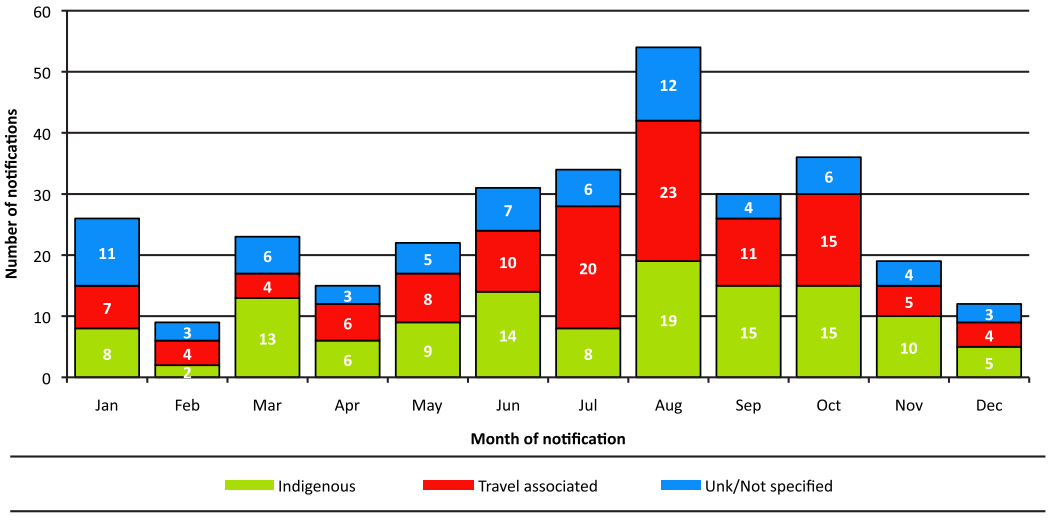


Figure 4: Salmonellosis notifications by month of notification and travel history, 2011 (CIDR)

Table 1: Percentage of Salmonellosis notifications by serotype and travel history, 2011 (CIDR)

Salmonella serotype	Travel associated	Indigenous	Travel history unknown	Total
***S.* Enteritidis (%)**	31.6	9.7	12.9	18.6
***S.* Typhimurium (%)**	11.1	40.3	27.1	26.4
Other serotypes (%)	47.9	32.3	47.1	41.5
Serotype not specified (%)	9.4	17.7	12.9	13.5
All serotypes (n)	**117**	**124**	**70**	**311**
All serotypes (%)	**37.6**	**39.9**	**22.5**	**100.0**

* This includes 28 *S.* Typhimurium isolates with serotype 4,5,12:1
§ Where A= Ampicillin, C= Chloramphenicol, Na = Naladixic acid, S= Streptomycin, Su= Sulphonamide and T= Tetracycline

travel associated. Of the two travel associated family outbreaks, one reported exposure in Turkey and the other reported exposure in the UK. Three family outbreaks were reported as person to person transmission while two were reported as food-borne transmission. Transmission was unknown for the remaining three outbreaks. Of the two food-borne outbreaks, suspected food items reported included a buffet meal.

There were five general outbreaks during 2011, two were national travel related outbreaks, one was a national outbreak in a community setting and the remaining two were local outbreaks occurring in a hotel and a community setting.

One national general outbreak involving 25 cases associated with a flight from Tanzania was reported in 2011. Cases were identified from Ireland, Netherlands, Norway, US and Canada. All cases had travelled to Tanzania at the beginning of July 2011. A descriptive study strongly suggested that the flight was the location of this outbreak with 98% of total cases and 100% of confirmed cases are explained by the flight. In two analytical studies two food items served on board the flight were significantly associated with illness.
One national general outbreak of *S.* Napoli, consisting of two associated cases in a community setting , was detected by NSSLRL during 2011. No history of recent travel was reported by the cases and the route of transmission remains unknown for this outbreak.

One national general outbreak was caused by *S.* Enteritidis RDNC was detected by NSSLRL during 2011. This outbreak resulted in six cases of illness, three of whom were hospitalised. All cases reported a history of recent travel to Turkey. Route of transmission remains unknown for this outbreak.

One local general outbreak in HSE-MW was caused by *S.* Umbilo with three confirmed cases, one of whom was hospitalised. Mode of transmission was reported as unknown for this outbreak.

One local general outbreak in HSE-E was caused by *S.* Newport and monophasic *S.* Typhimurium. This outbreak resulted in 13 cases of illness and was reported as food-borne transmission associated with a meal eaten in a hotel.

Table 2: Number and percentage of human Salmonella isolates by serotype, NSSLRL 2011

Salmonella serotype	Number of isolates	*% Isolates*
Typhimurium†	116	*36.1*
Enteritidis	58	*18.1*
Typhi	13	*4.0*
Unnamed‡	12	*3.7*
Newport	10	*3.1*
Heidelberg	9	*2.8*
Stanley	9	*2.8*
Braenderup	7	*2.2*
Concord	7	*2.2*
Infantis	6	*1.9*
Agona	5	*1.6*
Other	*69*	*21.5*
Total	**321**	*100.0*

Table 3: Number of salmonellosis outbreaks and number ill by outbreak location and outbreak transmission mode, 2011 (CIDR)

Location	Food-borne**		Person-to-person††		Unknown		Total	
	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill
Community outbreak	0	0	0	0	2	5	2	5
Hotel	1	13	0	0	0	0	1	13
Private house	1	1	3	10	2	4	6	15
Travel related	2	6	0	0	2	10	4	16
Total	**4**	**20**	**3**	**10**	**6**	**19**	**13**	**49**

†This includes 28 (8.7%) S. Typhimurium isolates with serotype 4,5,12:1
‡ Unnamed is not a serotype. The term refers to a very diverse group of isolates where the complete antigenic formula cannot be determined and which therefore can not be formally designated as belonging to any specific serovar
**Includes 1 outbreak reported as person to person and foodborne
††Includes 1 outbreak reported as person to person and animal contact

Typhoid/Paratyphoid:
The number of *S.* Typhi and *S.* Paratyphi cases diagnosed in Ireland remains elevated when compared to previous years. In 2011 there were 14 cases of *S.* Typhi reported and two cases of *S.* Paratyphi.
Ten of the *S.* Typhi reported a recent history of travel, with three travelling to Bangladesh, two to Pakistan, two to India and one each to Philippines, Ghana and Cameroon. Two cases reported country of infection as Ireland, following secondary transmission from a recently returned traveller to an endemic area. The remaining two cases did not report country of infection, however one was born in an endemic area and identified on contact tracing. In the *S.* Paratyphi cases one had known recent travel history to Bangladesh and one to Pakistan.

References:

1. National *Salmonella* Reference Laboratory of Ireland, Annual Report for 2011. Available at: http://www.nuigalway.ie/research/salmonella_lab/reports.html
2. De Jong B and Ekdahl K. *The comparative burden of salmonellosis in the European Union member states, associated and candidate countries.* BMC Public Health 2006, 6:4. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1352352/pdf/1471-2458-6-4.pdf

3.7 Less common gastroenteric infections

Listeriosis

Seven cases of human listeriosis were notified in 2011, lower that the ten cases reported in 2010. This equates to a crude incidence rate of 0.15 (95% CI 0.04-0.27) per 100,000, below the EU average of 0.35 per 100,000 in 2010.

Among these, there were two pregnancy-related and two neonatal cases. This is equivalent to the number of pregnancy-associated cases reported in 2010 (Figure 1).

There were also three adult cases, one female and two males, with ages ranging from 62 to 80 years. All three cases were reported as suffering from an underlying illness that predisposed them to listeriosis.

There was one miscarriage and one adult death reported in 2011, although it was not known if the adult death was due to listeriosis.

One case was reported as being acquired abroad.

Since 2007, the National *Salmonella, Shigella* and *Listeria* Reference Laboratory in Galway has offered a national service for typing of *Listeria* strains. In 2011, isolates from six of the seven notified cases were referred. The serotypes for these six cases are listed in table 1 below.

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

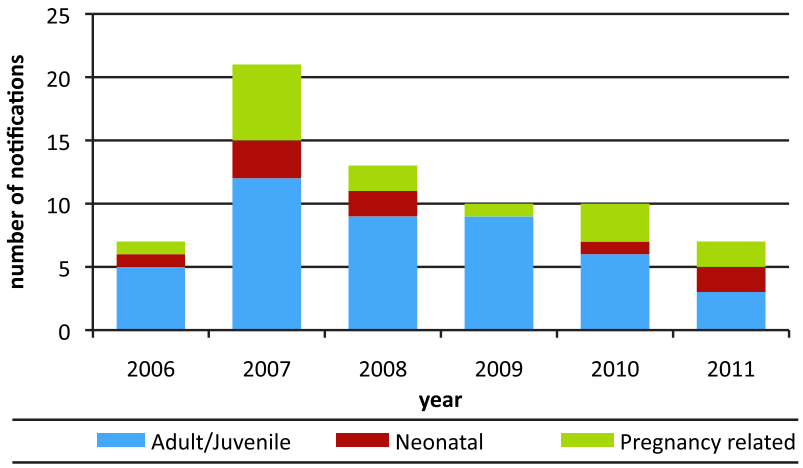


Figure 1: Number listeriosis notifications by case type, Ireland 2006-2011

Table 1. Listeriosis notifications by case type and serotype, Ireland 2011 -typing data provided courtesy of Prof Martin Cormican and staff at the NSSLRL

Type	Serotype 1/2	Serotype 4b	Not referred for serotyping	Total
Adult or juvenile	2	1	0	**3**
Pregnancy-related	0	1	1	**2**
Neonatal	1	1	0	**2**
Total	**3**	**3**	**1**	**7**

Giardiasis

In 2011, there were 57 cases of giardiasis notified; the same number as was notified in 2010. This equates to a crude incidence rate of 1.24 (95% CI 0.92-1.56) per 100,000.

Cases ranged in age from 0-84 years (median age=32 years) with only 12 cases reported in children under 15 years of age. 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 [1]. Lower numbers of males (n=21) were affected than females (n=35) –sex was unknown for one case. Hospitalization rates were low with five cases admitted out of 46 (11%) for which this information was available.

The number of cases for which travel status was reported has increased markedly over the last five years from 11% of cases in 2006 to 54% of cases this year (Figure 2). Twenty-four cases (42%) were reported as being associated with foreign travel: the countries of infection reported were India (n=14), Ethiopia (n=3), Nepal (n=2), and there was one case each reported associated with travel to Spain, Turkey, Morocco, Mauritius and Chile. Seven cases were reported as being acquired in Ireland, and for the remaining 26 cases, country of infection was unknown or not specified.

In 2011, there were three small family outbreaks with eight persons ill; exposure abroad was reported for some or all of the cases in all three outbreaks.

Giardiasis in Ireland is mainly identified among adults, unlike countries such as the US, Australia and the UK where children are mainly affected. And if the travel histories of those with known *Country of infection* are representative of all reported giardiasis cases in Ireland, then as many as three-quarters may be related to foreign travel. Among these cases, Asia figures most prominently as a travel destination.

[1] http://www.cdc.gov/parasites/giardia/epi.html

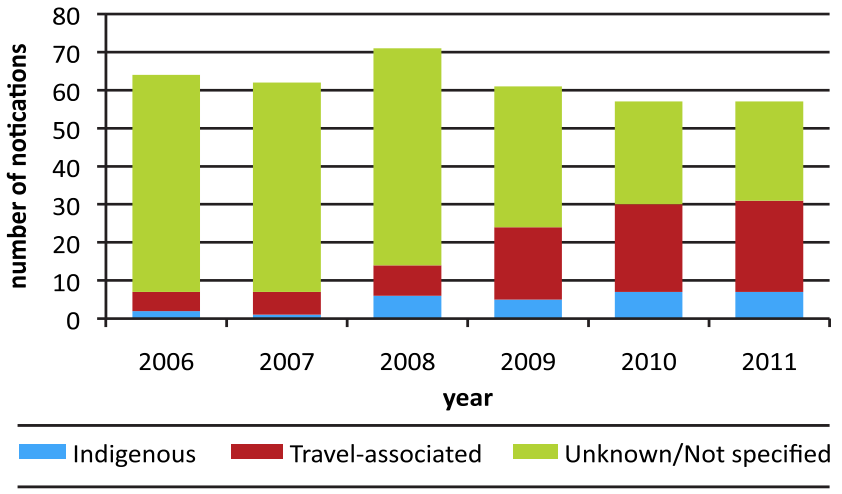


Figure 2: Number Giardiasis Notifications by Travel Status, Ireland 2006-2011
Note: Travel status is inferred from Country of Infection variable on CIDR

Yersiniosis

In 2011, there were six cases of yersiniosis, double the number in 2010 and 2009. Three were male and three were female, and four were less than 15 years of age. All were reported as *Y. enterocolitica*. The reported incidence of yersiniosis in Ireland is low relative to the EU as a whole, and to Northern Europe in particular.

Yersiniosis is commonly associated with consumption of pork products however, in Spring 2011, an outbreak was reported in Norway associated with salad leaves.[1]

[1] E MacDonald et al. 2011. *Yersinia enterocolitica* O:9 infections associated with bagged salad mix in Norway, February to April 2011. Eurosurveillance, Volume 16, Issue 19, 12 May 2011

Foodborne intoxications

Notifications of foodborne intoxications in Ireland are uncommon. In 2011, there were no cases or outbreaks of *Clostridium perfringens* (type A) food-borne disease, staphylococcal food poisoning or *Bacillus cereus* food-borne infection/intoxication notified.

There was one case of infant botulism notified in Ireland in 2011; exposure to turtles or to turtle feed was identified as being the most likely source in this case of infant botulism. http://www.hpsc.ie/hpsc/A-Z/Zoonotic/ReptilesandRisksofInfectiousDiseases/

3.8 Shigellosis

Summary

Number of cases, 2011: 42
Crude Incidence rate, 2011: 0.92 per 100,000
Number of cases, 2010: 60

In the last twenty years, the number of cases of shigellosis in Ireland has been low in comparison to the number of cases notified in the early 1990s (Figure 1). Shigellosis, however, remains a common cause of gastrointestinal illness in developing countries, and many cases notified in Ireland are now identified as being travel-associated.

While person-to-person spread is an important transmission route between children, risks also remain from food, with at least four general outbreaks having been reported in Scandinavia in 2009 associated with imported fresh produce.[1-5] Transmission between men who had sex with men (MSM) has been reported.[6, 7]

Forty-two cases of shigellosis were notified in Ireland in 2011 (CIR 0.92 per 100,000, 95% CI 0.64-1.19), all of which were laboratory confirmed. This compares to 60 cases in 2010 and 70 cases in 2009 (Figure 1). Of 35 cases where hospitalisation status was recorded, 5 (14%) were reported as hospital in-patients.

Cases ranged in age from 11 months to 65 years (median age=26 years). Like 2009 and 2010, more males (n=25) than females (n=17) were notified (Figure 2). This differs to the three years previous to that when there were more females than males reported each year.

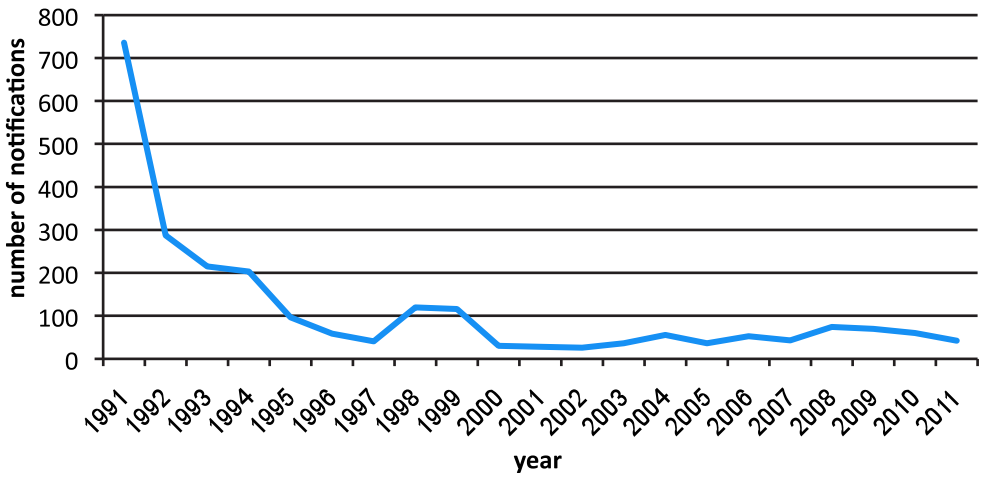


Figure 1: Annual number of notifications shigellosis, Ireland 1991-2011

Table 1: Number of notifications shigellosis by species and country of infection, Ireland 2011

Organism	S. America	Africa	Asia	Europe	Ireland	Not specified	Total
Shigella boydii	0	2	0	0	0	0	2
Shigella flexneri	1	3	1	2	1	2	10
Shigella sonnei	1	8	5	1	9	5	29
Shigella species	0	0	1	0	0	0	1
Total	2	13	7	3	10	7	42

(Data source: CIDR)

Information on travel history is very valuable when reviewing surveillance data for possible indigenous clusters, and data on country of infection in the national dataset continues to improve, being available for 83% of shigellosis notifications this year. Twenty-five cases were reported associated with foreign travel (Table 1). The countries of infection reported were India (n=4), Morocco (n=3), with two cases each associated with Spain, Gambia, Egypt and Ghana, and one case associated each with travel to Argentina, Timor-Leste, Panama, Thailand, Sudan, Nigeria, Belgium, Ethiopia, Kenya and Lebanon. Ten infections were reported as being acquired in Ireland, while no country of infection information was available for seven cases.

Shigella sonnei was the most common species reported (n=29), followed by *S. flexneri* (n=10). There were also two *S. boydii* and one confirmed case for which the species was not reported. The species distribution of cases by country of infection is reported in Table 1.

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) in University College Hospital, Galway can provide laboratory services for speciation, serotyping, antimicrobial resistance profiling, and where appropriate, Pulsed Field Gel Electrophoresis (PFGE) of *Shigella* isolates.

In 2010, 30 human *Shigella* isolates were referred to the NSRL, three-quarters of the isolates from all confirmed cases. The species/serotype distribution of these cases is reported in Table 2.

There were two shigellosis outbreaks notified in 2011, details of which are provided in Table 3. Both were caused by *Shigella sonnei*.

Table 2: Species/serotypes of Shigella isolates referred to NSRL in 2011 (Data courtesy of Martin Cormican, Niall de Lappe and Jean O Connor at NSSLRL)

Strain	Number of isolates
Shigella flexneri 1a	1
Shigella flexneri 2a	5
Shigella flexneri 3a	1
Shigella flexneri 3b	1
Shigella flexneri 6	2
Shigella sonnei	20
Total	30

[Data source: NSSLRL]

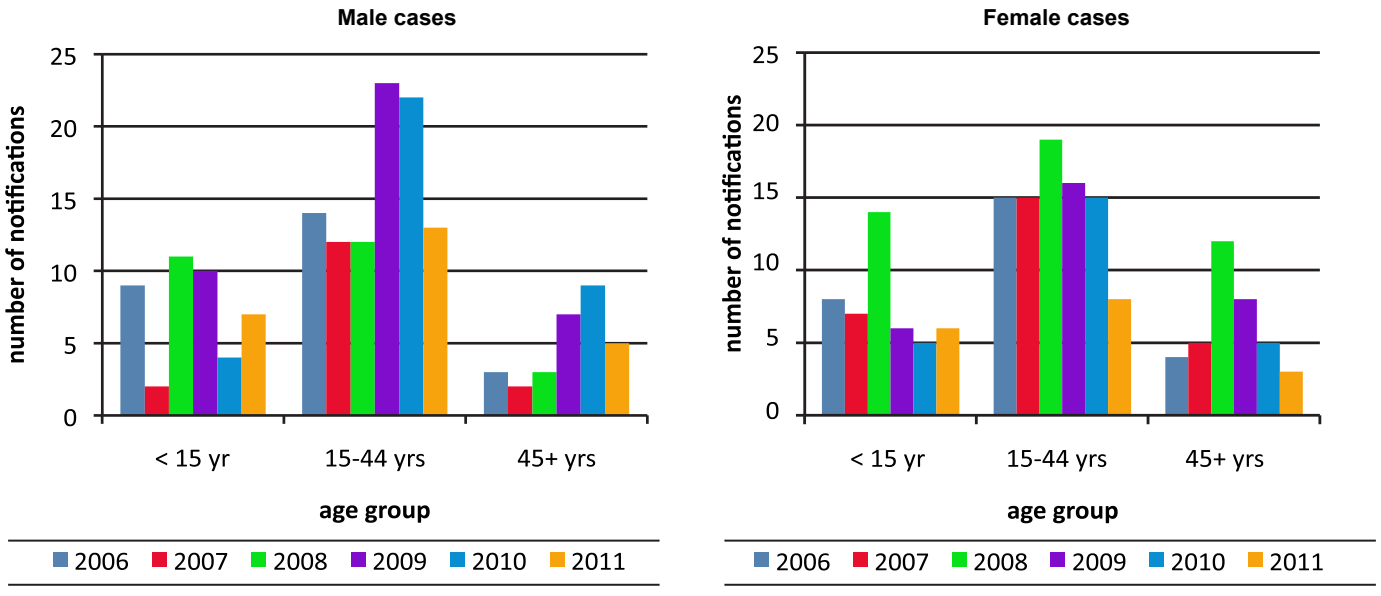


Figure 2: Age-sex distribution shigellosis notifications, Ireland 2011 relative to 2006-2011

Although foreign travel is a major risk factor for shigellosis among Irish residents, indigenous risks are likely to be through person-to-person spread (in some instances from persons who have contracted shigellosis abroad), and from food as demonstrated by the Scandinavian outbreaks associated with imported foods in recent years.

References

1. *Shigella sonnei* infections in Norway associated with sugar peas, May – June 2009. B T Heier , K Nygard, G Kapperud, B A Lindstedt, G S Johannessen, H Blekkan http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19243
2. Imported fresh sugar peas as suspected source of an outbreak of *Shigella sonnei* in Denmark, April – May 2009. L Müller, T Jensen, R F Petersen, K Mølbak, S Ethelberg http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19241
3. Lewis HC, Ethelberg S, Olsen KE, Nielsen EM, Lisby M, Madsen SB, et al. Outbreaks of *Shigella sonnei* infections in Denmark and Australia linked to consumption of imported raw baby corn. Epidemiol Infect 2009;137(3):326-34.
4. Lewis HC, Kirk M, Ethelberg S, Stafford R, Olsen KE, Nielsen EM, Lisby M, Madsen SB, Mølbak K. Outbreaks of shigellosis in Denmark and Australia associated with imported baby corn, August 2007 – final summary. Euro Surveill. 2007;12(40):pii=3279. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=3279
5. M Löfdahl, S Ivarsson, S Andersson, J Långmark, L Plym-Forshell 2009. An outbreak of *Shigella dysenteriae* in Sweden, May–June 2009, with sugar snaps as the suspected source. Eurosurveillance 14:28 http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19268
6. Gournis, E. 2010. SHIGELLOSIS, CHANGING EPIDEMIOLOGY - CANADA: (ONTARIO) REQUEST FOR INFORMATION. http://www.promedmail.org/pls/apex/f?p=2400:1001:68757656463 9::NO::F2400_P1001_BACK_PAGE,F2400_P1001_PUB_MAIL_ID:1010,81401
7. HPA. 2011. Outbreak of UK acquired *Shigella flexneri* in men who have sex with men. Volume **5** No **40**; 7 October 2011 http://www.hpa.org.uk/hpr/archives/2011/news4011.htm#shgflx

Table 3: Shigellosis outbreaks, Ireland 2011

Month	HSE-area	Transmission Route	Location	Type	Number ill
Sep	MW	Person to person	Creche	General	3
Oct	E	Person to person	Extended family	Family	3

04

Vectorborne and Zoonotic Diseases

4.1 Malaria

Summary

Number of cases 2011: 61
Crude incidence rate 2011: 1.3 per 100,000 population
Number of cases 2010: 82

In 2011, the number of malaria cases in Ireland declined by 25% to 61 cases, the lowest level since 2005 (Figure 1). The incidence rate now stands at 1.3 per 100,000 population. Among EU Member States reporting malaria data to the European Centre for Disease Control, Ireland had the second highest incidence rate for imported malaria in 2009 (the latest year for which comparative data are available) -only the United Kingdom had a higher reported incidence rate. Despite the decreased incidence in 2011, it is likely that Ireland will continue to have one of the highest reported incidence rates in the EU for 2011. [1]

Among the 61 cases, males predominated (n=41), with the highest numbers of cases among males aged between 35 and 55. The eight paediatric cases reported this year represent a 70% decrease on 2006 (n=26), the year in which notifications of paediatric malaria cases peaked (Figure 1). Six of these reported 'visiting family in country of origin' as their reason for travel, and one was a 'new entrant'; there was no information on reason for travel for the remaining paediatric case.

The group most affected in Ireland continued to be African immigrants and their families who were exposed while returning to 'visit family in country of origin' (Table

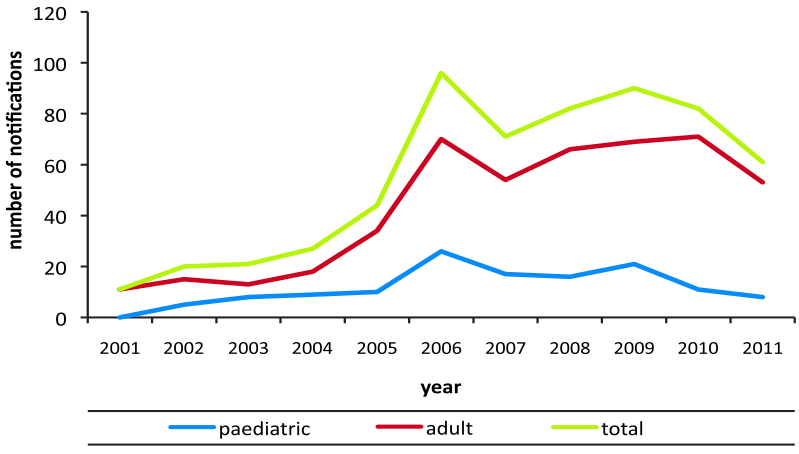


Figure 1. Annual number of notifications malaria by age, Ireland 2001-2011

Table 1. Number of cases malaria by reason for travel and country of birth, Ireland 2011

Reason for travel	Country of birth						
	Nigeria	Other Africa	Asia	Ireland	Other	Not specified	Total
Visit family country origin	15	7	6	3		1	32
Business/Professional Travel	1			3			4
Holiday travel				1			1
Irish citizen living abroad				1		1	2
New entrant to Ireland		2					2
Other				2	2		4
Not reported	1	1				14	16
Total	17	10	6	10	2	16	61

Other includes: aid/volunteer workers (n=2), and child visiting parents (n=2)

1). This almost certainly reflects the greater frequency with which this group travels to malarious areas; and also reflects Ireland's importance as a destination for those emigrating from English speaking West Africa. Seventy-one per cent of cases with a known reason for travel in 2011 cited 'visiting family in country of origin', with at least 69% of these being of African origin (Table 1).

The second most common reason for travel this year was 'Business/professional travel' (4 cases -9% of cases with known reason for travel). This compares with a total of 13 cases listing this as their reason for travel over the previous ten years. All four travelled to Africa for periods varying from 2 weeks to 12 months.

A welcome finding was that there was only one case associated with holiday travel in 2011, down from a high of thirteen holiday-related cases in 2006.

Nigeria remained the country most frequently visited -33% of all cases, or 43% of those with country of infection reported (Table 2). The second most common destination reported was Pakistan with eight reported cases (five were reported in one family group). This compares with a total of nine cases related to travel to Pakistan in the previous 10 years.

The majority of cases who reported travel to Nigeria and Pakistan were 'visiting family in country of origin' (25/28), whereas visitors to other parts of Africa reported a variety of reasons for travel.

P. falciparum cases numbers declined, making up 70% of cases in 2011, while *P. vivax* case numbers increased (10 cases versus 1-7 cases annually in the previous 10 years). This increase was strongly correlated with the increased number of cases reporting exposure in Pakistan. As expected, the median interval between arrival from a malarious country and onset of symptoms was lower for *P. falciparum* cases -9 days (n=20) -and *P. vivax* cases-8 days (n=8) - relative to the interval reported for the one *P. ovale* case with this information -251 days.

Several factors could have contributed to this decline in cases in 2011. It could reflect improved awareness of the risk of malaria, and better uptake of travel advice, but it is probably at least in part due to fewer journeys by Irish residents to Africa in recent years, following Ireland's economic contraction –data from the CSO quarterly household survey shows that travel to Africa by Irish residents peaked in 2007-2008, and declined in 2009, the latest complete year for which these data are available.[2]

It may also be due to global efforts to reduce the incidence of malaria across affected regions. The WHO report that '*in Africa, malaria deaths have been cut by one third within the last decade, and that outside of Africa, 35 out of the 53 countries, affected by malaria, have reduced cases by 50% in the same time period*'.[3] The measures taken to reduce incidence among residents of these countries are also likely to be effective for travellers, in particular those travelling to 'visit family in country of origin'.

While this report has highlighted the high incidence among immigrants travelling to 'visit family in their country of origin', malaria prevention messages should also be targeted at tourists and other travellers with little previous exposure to malaria. A recent study in the United Kingdom has shown that while the highest numbers of cases may be among those of African heritage visiting family and friends, that the highest risk of dying among those who acquired malaria was among the elderly, among tourists and among those presenting to health professionals in areas where malaria is uncommon, making these important groups to target in pre-travel advice.[4] Children can be particularly at risk; it is important that those born in Western and Central Africa who take up residence in Ireland and who return to their country of origin with their Irish-born children are made aware of the fact that their children have no innate immunity to malaria (and their own immunity will likely have waned considerably) and must complete their full course of advised chemoprophylaxis while taking steps to ensure they avoid mosquito bites.

References

1. ECDC. Annual epidemiological report 2011 - Reporting on 2009 surveillance data and 2010 epidemic intelligence data http://ecdc.europa.eu/en/publications/Publications/Forms/ECDC_DispForm.aspx?ID=767 access 30th March 2012
2. CSO. Household travel survey. Q1 2010. http://www.cso.ie/en/media/csoie/releasespublications/documents/tourismtravel/current/hotra.pdf accessed 4th April 2012
3. WHO. http://www.rbm.who.int/worldmalariaday/ accessed 30th March 2012
4. Anna M Checkley, Adrian Smith,Valerie Smith, ,Marie Blaze, David Bradley, Peter L Chiodini, Christopher J M Whitty, Risk factors for mortality from imported falciparum malaria in the United Kingdom over 20 years: an observational study BMJ 2012;344:e2116 http://www.bmj.com/content/344/bmj.e2116 Accessed 30th March 2012

Table 2. Number of cases malaria by infecting species and country of infection, Ireland 2011

Organism	Country of Infection				Total
	Nigeria	Pakistan	Other Africa[a]	Not specified	
P.falciparum	20		11	12	43
P.ovale			2	1	3
P.vivax		8	1	1	10
Not Specified			4	1	5
Total	20	8	18	15	61

[a]*Includes cases associated with Congo (n=5), Ghana (n=3), Uganda(n=3), Sudan (n=2), and one each with Benin, DRC, Kenya, Somalia, and Western sahara*

4.2 Leptospirosis

Summary

Number of cases, 2011: 16
Crude incidence rate, 2011: .035/100,000
Number of cases, 2010: 17

Sixteen cases of leptospirosis were notified in Ireland in 2011, similar to the 17 cases notified in 2010 (Figure 1). This equates to a crude incidence rate of 0.35 per 100,000 (95% CI 0.18-0.52). The latest year for which data is available across the European Union is 2009. Among the 25 countries that reported leptospirosis incidence in 2009, Ireland reported the third highest incidence rate. The incidence in the EU as a whole was 0.14 per 100,000.

The leptospirosis notification dataset is typically dominated by adult males, and this year is no exception (Table 1). Fourteen cases (87.5%) were male and the age range was 20-68 (mean age =42 years, median age=42 years). This is consistent with the exposures most commonly associated with leptospirosis in temperate regions, e.g. occupational contact with farm animals, and watersports.

Among the 15 cases for which hospital admission status was reported, 12 (80%) required hospitalization. No deaths were reported.

Seven cases (44%) were believed to have acquired their illness occupationally –all were either farmers or reported contact with farm environments. Four (25%) cases were reported as being associated with recreational activities: two with travel to a tropical destination, and one each with kayaking, and freshwater swimming. Two cases (13%) may have been exposed while gardening, while for one case (6%), no obvious risk factors were identified. No risk factor information was available for the remaining two (13%) cases.

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.

A recent study reviewed the available information on *Leptospira* serovar data on CIDR compared to the typing data available at LRU on Irish cases. This study established that there had been under-reporting of serovar information to CIDR (Garvey et al –submitted for publication). In consequence, Departments of Public Health were encouraged to make a special effort to improve the reporting of *Leptospira* serovar data to CIDR. In 2011, species information was available on CIDR for seven cases (44%) in 2011–three *Leptospira icterohaemorrhagiae*, two *L. hardjo*, and one each *L. saxkoebing* and *L. grippotyphosa*. This is a substantial improvement on serovar reporting relative to the previous two years when linked serovar data was reported for only two cases in each year. For many of the remaining cases, it was reported that serovar was not determined. Failure to provide follow-up samples is one contributory factor in this.

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.

Table 1: Leptopirosis notifications by age and sex, Ireland 2011

Age group	Male	Female	Total
<5 yr	0	0	**0**
5-14 yrs	0	0	**0**
15-24 yrs	1	1	**2**
25-44 yrs	7	1	**8**
45-64 yrs	4	0	**4**
65+ yrs	2	0	**2**
Total	**14**	**2**	**16**

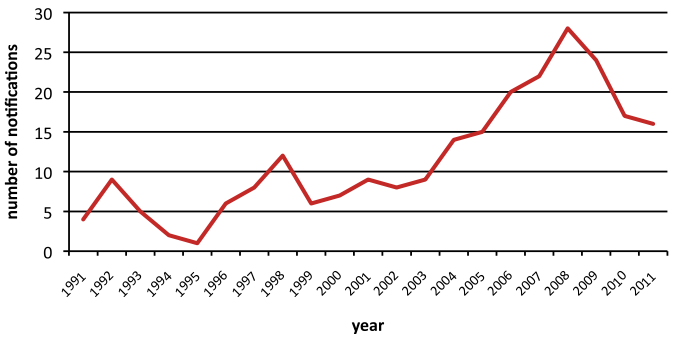


Figure 1: Annual number of leptospirosis notifications, Ireland 1991-2011
(data source: CIDR)

4.3 Other Non-IID Zoonotic Diseases

Toxoplasmosis

During 2011, 32 cases of toxoplasmosis were notified compared to 36 in 2010 and 37 in 2009.

One congenital case was reported. The remaining 31 cases ranged in age from 1 year to 77 years (median, 33 years). As in previous years, female cases dominated (75%). The high number of cases reported among women of child-bearing age may reflect enhanced testing during pregnancy (Table 1).

Q Fever

One probable and four confirmed cases of Q fever were notified during 2011, two of which were reported to have been hospitalized (40%). This is a decrease compared to 9 notifications in 2010 and 17 notifications in 2009.

Three cases occurred in males and two in females (Table 2). The cases ranged in age from 39 to 81 years (median age, 58 years).

Cases were reported from five different HSE-areas: M, NE, SE, S and W. This distribution may reflect a regional difference in risk or variation in diagnostic policy/ practice in different parts of the country.

The disease is commonly acquired through occupational exposure to infected sheep and other small ruminants, e.g. by farmers, veterinarians, and abattoir workers.

Over the last number of years, the south of the Netherlands has been experiencing large community outbreaks of Q fever during the summer months. Some clusters have been linked with Q fever outbreaks on goat farms.[1]

1. Schwimmer *et al*, B. 2009. Sustained intensive transmission of Q fever in the South of the Netherlands, 2009. http://www.eurosurveillance.org/images/dynamic/EE/V14N19/art19210.pdf

Table 1: Toxoplasmosis notifications by age and sex, Ireland 2011

Age group	Male	Female	Total
<1 yr	0	1	**1**
1-4 yrs	0	1	**1**
5-14 yrs	1	0	**1**
15-24 yrs	1	3	**4**
25-44 yrs	5	15	**20**
45-64 yrs	0	4	**4**
65+ yrs	1	0	**1**
Total	**8**	**24**	**32**

Table 2: Q fever notifications by age and sex, Ireland 2011

Age group	Male	Female	Total
<5 yr	0	0	**0**
5-14 yrs	0	0	**0**
15-24 yrs	0	0	**0**
25-44 yrs	0	1	**1**
45-64 yrs	1	1	**2**
65+ yrs	2	0	**2**
Total	**3**	**2**	**5**

Brucellosis

During 2011, only one case of brucellosis was notified in an adult male. This compares to two notifications in total for brucellosis in 2010 and zero in 2009. The species reported for the 2011 case was *Brucella melitensis*, and infection was associated with travel to the Middle East.

The age and sex distribution for brucellosis in recent years in Ireland suggests that occupational exposure is likely to be the main transmission route for this disease.

The case definition permits inclusion of acute and chronic cases. In previous years, many cases were reported as chronic cases with only small numbers of acute cases reported.

Echinococcosis

In 2011, there were no notifications of echinococcosis. Prior to this there have only been four cases of echinococcosis notified in Ireland since the disease became notifiable in 2004; in 2008, two adult cases were notified, and one adult case was notified each in 2009 and 2010.

Because of the long incubation period for this disease, it is possible that these infections occurred many years ago.

Trichinosis

No cases of trichinosis were notified in Ireland in 2011.

05

Blood-borne and Sexually Transmitted Infections

5.1 Hepatitis B

Summary

Number of cases, 2011: 525
Crude notification rate, 2011: 12.4/100,000 population
Number of cases, 2010: 645

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. Over 90% of people infected in late childhood and adulthood clear the virus within a year of infection, but there is a high probability of developing chronic infection if hepatitis B is acquired in infancy (approx. 90%) or when aged under five years (approx. 30%).[1] Between 15 and 40% of people with chronic infection ultimately develop cirrhosis, liver failure or hepatocellular carcinoma (liver cancer).[2]

The prevalence of hepatitis B in the general population in Ireland is low (less than 1%) and 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 with intermediate (2-7%) or high (≥8%) hepatitis B endemicity.

The number of hepatitis B cases reported in Ireland decreased by 19% in 2011, with 525 cases (12.4/100,000 population) notified compared to 645 in 2010 (figure 1). Sixty two percent (n=327) of notifications were from the HSE-E, corresponding to a notification rate of 19.2/100,000 population.

All cases were laboratory confirmed and 96% contained information on acute/chronic status. Where status was known, 9% of cases were acute (n=45) and 91% were chronic (n=460).

Acute cases (recent infections)
Of the 45 acute cases notified in 2011, 84% (n=38) were male and 16% (n=7) were female. The highest notification rates were in young to middle aged adults, and 62% (n=28) of acute cases were aged between 20 and 44 years when notified (figure 2). Female cases were younger than males overall, with a median age of 26 years compared to 31 years for males.

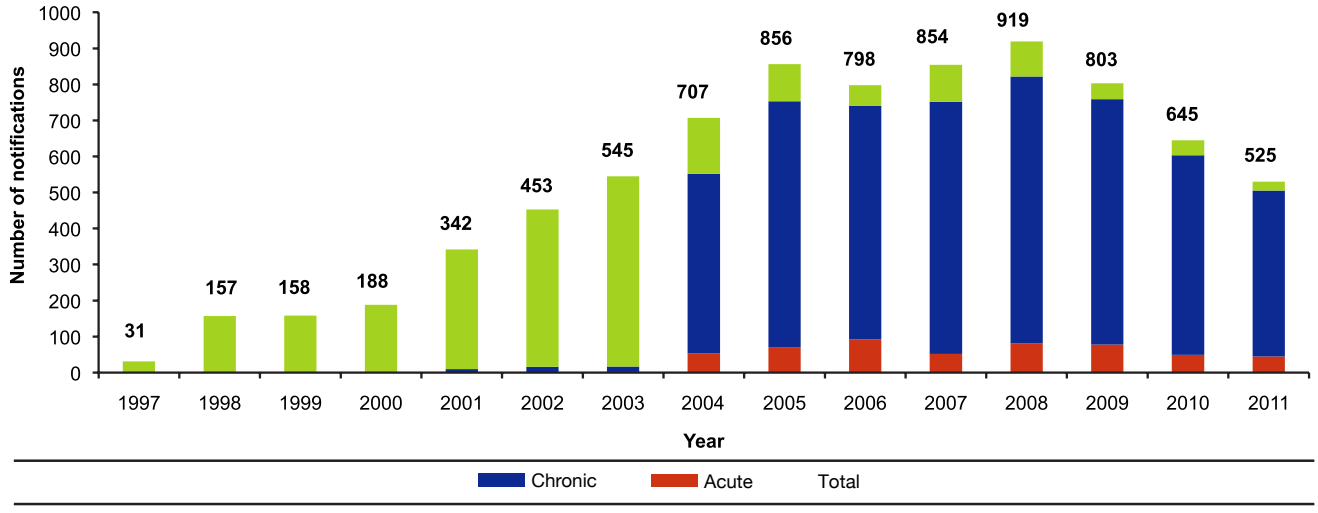


Figure 1. Number of hepatitis B notifications by acute/chronic status, 1997-2011

Information on risk factor was available for 89% (n=40) of acute cases. Of these, 78% (n=31) were likely to have been sexually acquired. Ten were men who have sex with men, ten were heterosexual and sexual orientation was not known for eleven cases. Four (10%) acute cases were acquired through surgical and/or tattoo body piercing procedures and two cases (5%) were born in hepatitis B endemic countries. No risk factors were identified for three cases (8%) despite follow up being carried out.

Country of birth was known for 89% (n=40) of acute cases. Of these, sixty eight percent (n=27) were born in Ireland, 15% (n=6) were born in Eastern or Central European countries, 5% (n=2) were born in Asia, 5% (n=2) were born in southern America and a further 5% (n=2) were born in western Europe. Where country of infection was known, 73% (n=22) of acute cases were infected in Ireland. Information on reason for testing was available for 42 acute cases (93%). Most were identified because they were symptomatic (81%, n=34) or through STI screening (12%, n=5).

The number of acute cases of hepatitis B notified in Ireland is generally relatively low and decreased by 8% in 2010 (n=45) compared to 2010 (n=49). The decrease is mostly attributable to decreases in sexually acquired cases of acute hepatitis B in both men who have sex with men and heterosexuals.

Chronic cases (long-term infections)

Of the 460 chronic cases notified in 2011, 50% (n=228) were female, 49% (n=224) were male and sex was not known for 1% (n=8). Eighty five percent (n=389) of chronic cases were aged between 20 and 44 years when notified (figure 2). The median age at notification for female cases was 30 years and the median age for males was 33 years.

Some data on risk factor, country of birth or asylum seeker status were available for 40% (n=185) of the chronic cases notified in 2011. Of these, 71% (n=132) were born in hepatitis B endemic countries or were identified as asylum seekers.

Other risk factors included sexual acquisition (11%, n=21), recipient of blood or blood products (3%, n=5), vertical transmission (2%, n=3), tattoo/body piercing (2%, n=3) and household contact with a known case (1%, n=2). Despite follow up been carried out, no risk

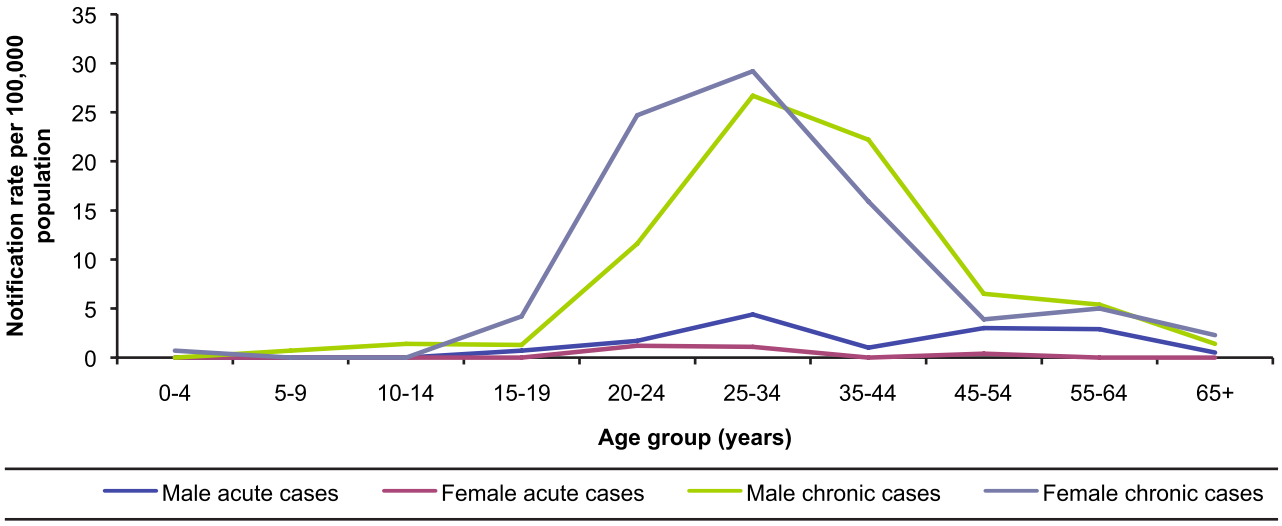


Figure 2. Age and sex-specific notification rates/100,000 population for hepatitis B by acute/chronic status, 2011

factor could be identified for 7% of these cases (n=13). Data on country of birth was available for 38% (n=173). The most common regions of birth were Eastern or Central Europe (44%, n=76), Asia (28%, n=48) and Sub-Saharan Africa (27%, n=46).

Reason for testing was known for 60% (n=275) of chronic cases. Thirty two percent (n=89) were identified through antenatal screening programmes,19% (n=52) were tested in STI settings, 17% (n=48) were diagnosed as a result of routine health screens and 11% (n=31) were identified through asylum seeker screening centres. Five per cent (n=15) represented cases that were previously diagnosed but not notified, 2% (n=6) were asymptomatic but had contact with a known case, 1% (n=4) were health care workers, 1% (n=3) were blood/organ donors, 1% (n=3) were vertically transmitted and 1% (n=3) were tested due to life assurance/mortgage policies.

Chronic hepatitis B notifications continue to decline in 2011 compared to other years, with 460 chronic cases in 2011 compared to 554 cases in 2010 and 683 cases in 2009. The large numbers of hepatitis B notifications between 1997 and 2008 (figure 1) were mostly attributed to increased numbers of people immigrating to Ireland from hepatitis B endemic countries. The current economic climate has most likely contributed to reduced immigration to Ireland between 2009 and 2011, which correlates with a steady decrease in hepatitis B notifications over the same time period. The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 18th July 2012. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

References

1. Goldstein ST, Zhou F, Hadler SC, Bell BP, Mast EE, Margolis HS.A mathematical model to estimate global hepatitis B disease burden and vaccination impact. Int J Epidemiol. 2005 Dec;34(6):1329-39.
2. Wright TL. Introduction to chronic hepatitis B infection. Am J Gastroenterol. 2006;101 Suppl 1:S1-6.

5.2 Hepatitis C

Summary

Number of cases, 2011: 1,257
Crude notification rate, 2011: 29.6/100,000 population
Number of cases in 2010: 1,239

Hepatitis C is a major cause of liver disease worldwide. The hepatitis C virus is primarily transmitted through sharing contaminated equipment when injecting drugs or through receipt of unscreened blood or blood products. Sexual, occupational and perinatal 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] Effective treatment, which eradicates the virus in over 50% of cases, is available for hepatitis C.[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%. The prevalence in the general population is low and most cases fall into defined risk groups such as injecting drug users, people who received unscreened blood or blood products in the past and people who were born in hepatitis C endemic countries.[3]

The number of cases of hepatitis C reported in 2011 was very similar to 2010, with 1,257 notifications (29.6/100,000 population) compared to 1,239 in 2010 (figure 1). There was a strong predominance of males: 65% (n=824) of cases were male, 34% (n=428) were female and sex was not known for 5 cases (figure 1). The highest notification rates were in young to middle aged adults. Seventy three percent (n=917) of cases were aged between 25 and 44 years (figure 2). The median age for females was slightly younger (34 years) than that for males (36 years).

The geographic distribution of cases was skewed, with the HSE-E reporting 76% of all cases notified in 2011. The highest notification rates were in the HSE-E

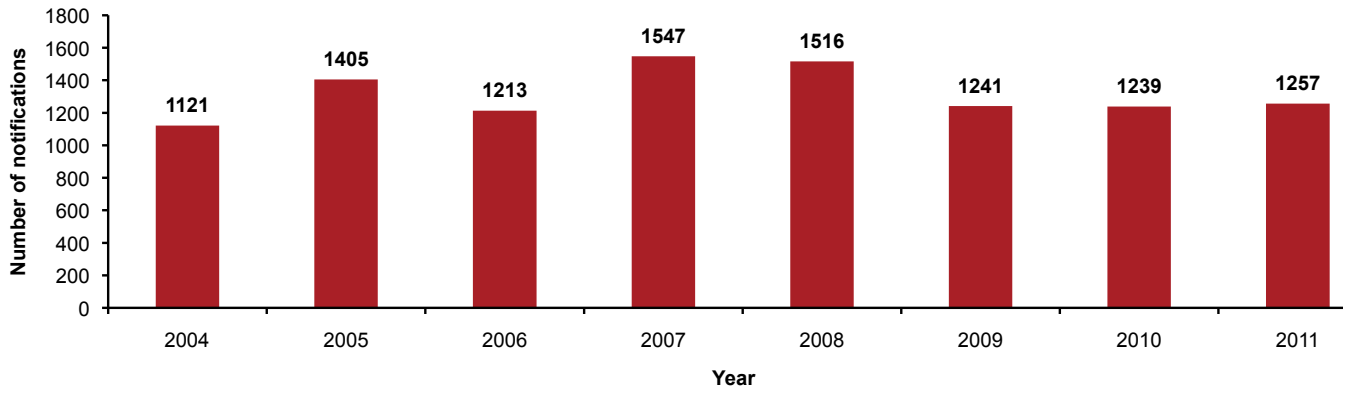


Figure 1. Number of hepatitis C notifications, 2004-2011

(68/100,000 population, n=957) and the HSE-M (18.7/100,000 population, n=47) (figure 3).
Data on most likely risk factor were available for 59% of cases (n=741). The most common risk factors reported were injecting drug use (83%, n=616), being an asylum seeker/born in an endemic country (6%, n=43), sexual exposure (3%, n=24), receipt of blood or blood products (3%, n=19), vertical transmission (1%, n=11), tattoo/body piercing procedures (1%, n=6) and accidental needlestick exposure (0.5%, n=4). Although information on risk factor was not available for 41% of cases, the age and sex profile of these cases did not differ significantly from those for whom information was available.

Where sexual orientation was known, men who have sex with men (MSM) represented 42% (n=10) of sexual exposure cases. Of the nineteen cases acquired through blood or blood products, six were infected in Ireland, six were infected outside Ireland and country of infection was not known for seven. All cases acquired in Ireland were infected many years in the past, but were notified for the first time in 2011.

Data on country of birth and country of infection were too incomplete to allow for reporting.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 18th July 2012.

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

References

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. National Institute for Clinical Excellence. NHS. Interferon alpha (pegylated and non-pegylated) and ribavirin for the treatment of chronic hepatitis C. Technology appraisal 75. London:NICE;2004
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

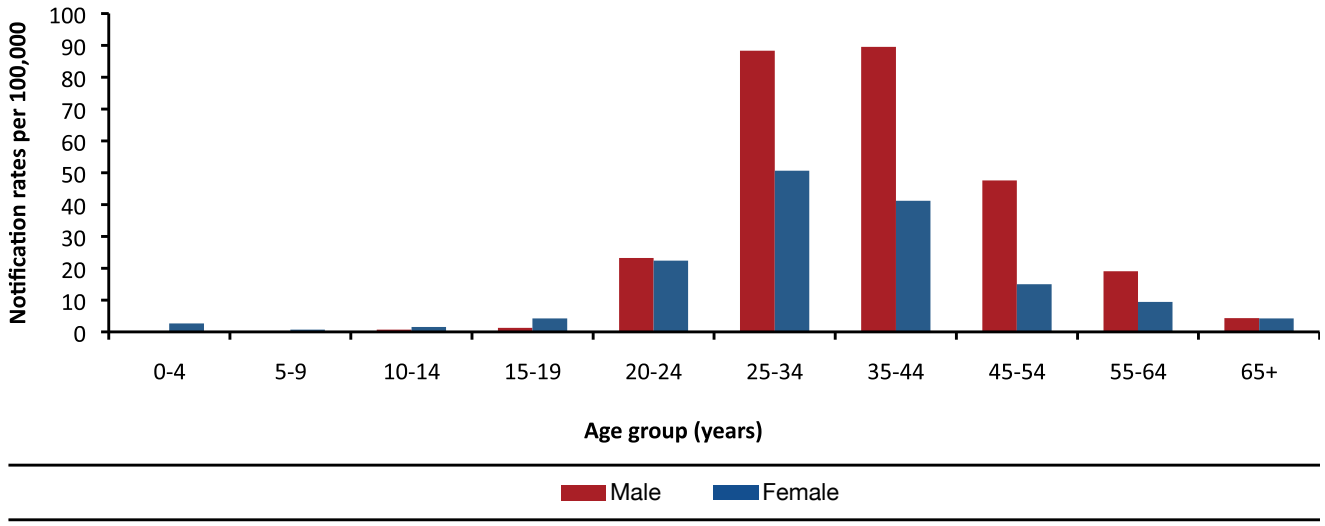


Figure 2. Age and sex-specific notification rates/100,000 population for hepatitis C, 2011

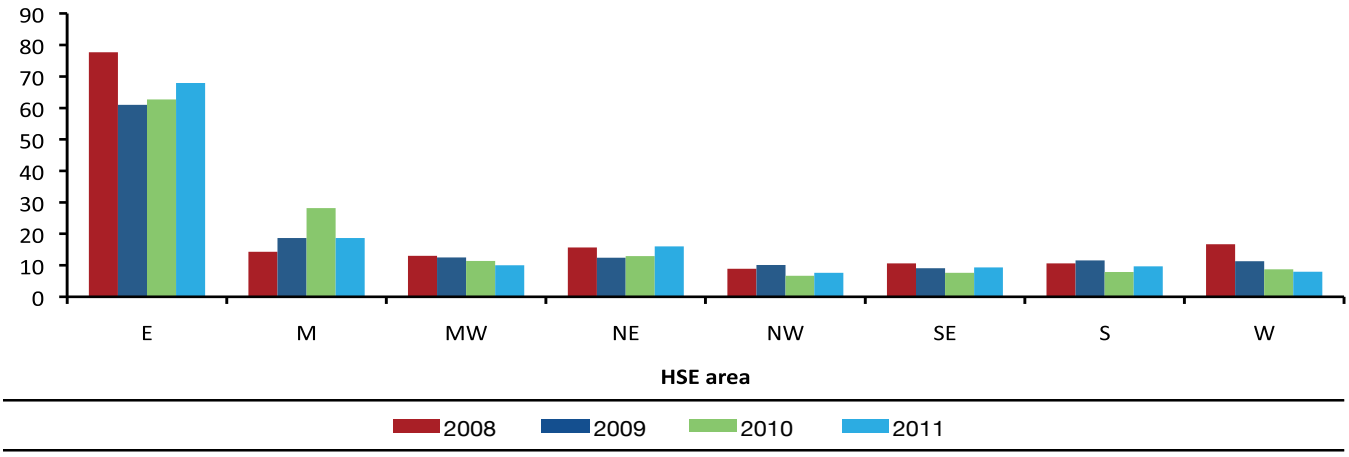


Figure 3. Notification rates/100,000 population for hepatitis C by HSE area, 2008-2011

5.3 HIV and AIDS

Summary – 2011 cases

Number of HIV cases: 320

Rate per 100,000: 7.0

Male to female ratio: 235:85

Median Age: 34 yrs

% with AIDS defining illness at diagnosis: 10.6%

Probable route of transmission

MSM: 136 (42.5%)

Hetero: 108 (33.8%)

IDU: 16 (5.0%)

A total of 320 new HIV diagnoses (235 men and 85 women) were reported to HSPC during 2011. This compares with 330 in 2010 and represents a 3% decrease. The rate of newly diagnosed HIV infection in Ireland in 2011 was 7.0 per 100,000 population (10.3 per 100,000 in men and 3.7 per 100,000 in women).

Since the early 1980's, 6,287 people have been 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 into account factors such as death and migration. A recent study identified that 3,254 patients accessed HIV outpatient care in six centres in Ireland over a 12 month period in 2009/2010[1]. The number of people living with HIV in Ireland is not known.

There were 46 new AIDS diagnoses reported in 2011. Of these, 33 were simultaneously diagnosed with an AIDS defining illness at the time of their HIV diagnosis.

There were seven deaths among AIDS cases reported in 2011.

HIV testing data from 14 laboratories (14/16 laboratories who test for HIV responded to a survey on HIV testing) showed that 184,521 HIV tests were performed in 2011 giving a testing rate of 40.2 per 1000 population.

Figure 1 shows the number of HIV cases diagnosed annually in Ireland from 2000 to 2011, in males and females.

Probable route of transmission

The predominant route of transmission of HIV in Ireland in 2011 was sex between men. Heterosexuals accounted for 34% and Injecting Drug Users (IDUs) for 5%. There were three cases where the route of transmission was identified as Mother to Child transmission (MTCT). The probable route of transmission was unknown or unreported for 56 cases (17.5%).

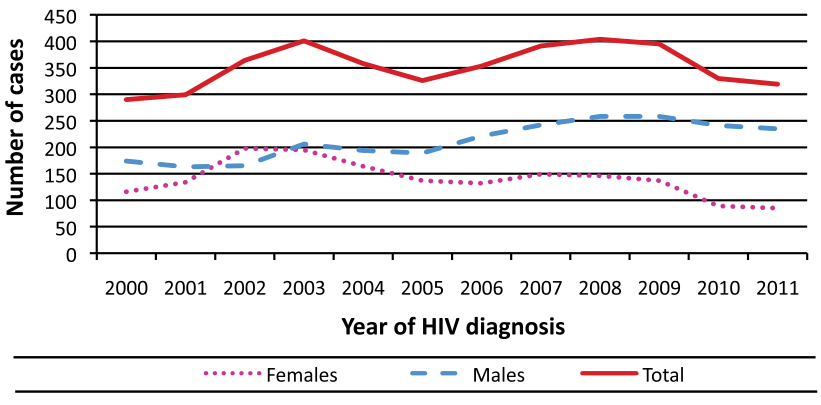


Figure 1: New HIV diagnoses by year of diagnosis (2000 to 2011)

Figure 2 shows probable route of transmission among the three major risk groups; MSM, heterosexual contact and IDUs between 2000 and 2011.

Men who have sex with men (MSM)
Of the 136 new diagnoses among MSM in 2011

- Median age was 33 years (range: 18-77 years). The largest number of new diagnoses among MSM occurred in those aged 30-39 years, followed by those aged 40-49 years. 12% of new diagnoses in MSM were aged over 50.
- 54% were born in Ireland, 14% were born in South America, 8% in Western Europe and 8% in Central and Eastern Europe.
- The probable country of infection was Ireland for 58% of cases and South America for 10% of cases.
- 72% were white (54% white Irish, 18% white other).
- Where CD4 count was reported (in 115 of 136 cases; 84.5%), 40% of MSM were diagnosed late (CD4 count <350 cells/mm^3) including 23% who were severely immune-compromised (CD4 count <200 cells/mm^3).
- 13 MSM (10%) were diagnosed with an AIDS defining illness at the time of their HIV diagnosis.

Heterosexual transmission
Of the 108 cases diagnosed in 2011,

- 59 were female and 49 were male.
- Median age was 33 years (range: 16 to 63), 34 years in men (range: 22 to 63 years) and 32 years in women (range: 16 to 61 years).
- The probable source of the infection was unknown for 40% of the heterosexually acquired cases. Of the remaining 60%, 43% were among individuals originating from countries with generalised epidemics, 11% had a high-risk partner or a partner known to be HIV positive and 7% had a partner originating from a country with a generalised epidemic.
- 45% cases were born in sub-Saharan Africa and 31% were born in Ireland. Of the 33 Irish born cases, 22 were male and 11 were female. The probable source of infection was unknown or undetermined for 73% (24) of the Irish born cases.
- 45% were white and 45% were black African.
- The probable country of infection was Ireland for 38% of cases and Sub-Saharan Africa for a further 38%.
- Where CD4 count was available (84 of 108 cases; 77.8%), 62% of heterosexual cases were diagnosed late including 40% who were severely immune-compromised. The proportion diagnosed late was higher in male heterosexuals (70%) than female heterosexuals (53%).
- 14 cases (13%) were diagnosed with an AIDS defining illness at the time of their HIV diagnosis.

Injecting Drug Users (IDUs)
Of the 16 IDU cases,

- 13 were men and 3 were women.
- Median age was 37 years (range: 22 to 48 years).
- 50% were born in Ireland, 19% were born in Central and Eastern Europe and 13% were born in sub-Saharan Africa.
- 63% were White (50% were white Irish and 13% were white other).
- Where CD4 count was reported (13 of 16 cases; 81.3%), 85% of IDUs in 2011 were diagnosed late including 62% who were severely immune-compromised.
- Three IDUs (19%) were diagnosed with an AIDS defining illness at the time of their HIV diagnosis.

Discussion
HIV infection is of major public health importance with evidence of continuing transmission in Ireland and Europe. In 2011, a total of 320 individuals were newly diagnosed, corresponding to a crude rate of 7.0 per 100,000 population. This compares with a rate of 6.6 in the WHO European West region in 2010[2].

MSM are the most affected by HIV in Ireland and new diagnoses in this group increased sharply between 2005 and 2009 (from 60 to 138; 130%) and has remained high in 2010 and 2011. Among heterosexuals, the number of new diagnoses has decreased from a peak of 232 cases in 2002. This decline in the number of heterosexual

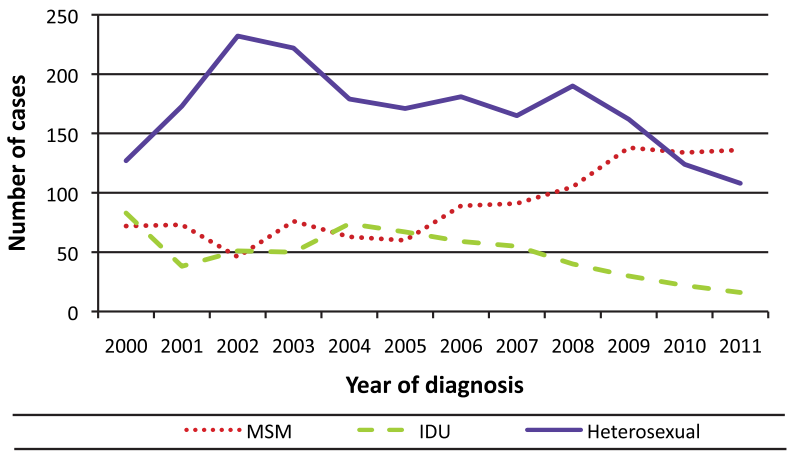


Figure 2: New HIV diagnoses in Ireland by probable route of transmission (2000 to 2011)

cases is largely due to a decrease among people born in countries with a generalised HIV epidemic. The number of new diagnoses among IDUs has been steadily decreasing from 74 in 2004 to 16 in 2011 (a decline of 78%).

Late HIV diagnosis, where a person is unaware of their HIV status for many years, carries an increased risk of HIV-related illness and death[3,4]. In addition, prompt HIV diagnosis prevents further HIV transmission by ensuring that the patient's viral load is low. During 2011, 52% of cases (where CD4 count was available) presented at a late stage of infection including 33% who were severely immune-compromised at diagnosis. The proportion diagnosed late was highest among IDUs (85%) and heterosexual males (70%) compared with heterosexual females (53%) and MSM (40.0%). By ethnicity, late diagnosis was highest among black Africans (72%).

More detailed reports can be found at www.hpsc.ie.

References

1. Tuite H, Horgan M, Mallon PWG, McConkey S, Mooka B, Mulcahy F, Walsh C, O'Hora A, O'Flanagan D, Bergin C, Fleming C. Antiretroviral treatment and viral load responses in HIV-infected patients accessing specialist care in Ireland. In: 22nd European Congress of Clinical Microbiology and Infectious Diseases (ECCMID); 2012 March 31st -April 3rd ; London. Available at http://registration.akm.ch/einsicht.php?XNABSTRACT_ID=145623&XNSPRACHE_ID=2&XNKONGRESS_ID=161&XNMASKEN_ID=900
2. European Centre for Disease Prevention and Control/WHO Regional Office for Europe. HIV/AIDS surveillance in Europe 2009. Stockholm: European Centre for Disease Prevention and Control; 2010.
3. The UK Collaborative Cohort (UK CHIC) Steering Committee. Late diagnosis in the HAART era: proposed common definitions and associations with mortality. AIDS 2010; 24(5): 723-727.
4. Hanna DB, Pfeiffer MR, Torian LV, Sackoff JE. Concurrent HIV/AIDS diagnosis increases the risk of short-term HIV-related death among persons newly diagnosed with AIDS, 2002-2005. AIDS Patient Care STDS 2008; 22(1): 17-28

5.4 Voluntary antenatal HIV testing in Ireland: 2011

Key Points

- National reported uptake rate: 98.6%
- Number HIV positive cases: 109
- Prevalence rate: 0.16%
- Number new HIV positive cases: 17

Background

A HIV infected mother can transmit the virus to her baby during pregnancy, delivery, or breastfeeding. It has been clearly shown that the risk of mother-to-child transmission (MTCT) of the virus can be dramatically reduced by treatment of the mother, management of the delivery and avoidance of breastfeeding. The combined effect of these interventions is reported in some studies to reduce the transmission risk from 15-30% to 2% or less.[1, 2, 3] However, measures to prevent transmission of HIV from mother to child can only be offered if HIV infection is diagnosed prior to delivery.

In April 1999, the Department of Health and Children (DoHC), on the advice of the National AIDS Strategy Committee (NASC), introduced a policy of voluntary antenatal HIV testing in Ireland. As part of this programme, it is recommended that antenatal screening for HIV is offered routinely to all pregnant women. Antenatal HIV testing commenced in all health boards during 1999, with the exception of the North Western Health Board where it commenced in 2000. On a recommendation from NASC, as outlined in the AIDS Strategy 2000 report,[4] a system for monitoring and evaluating the routine antenatal testing programme was established by the Health Protection Surveillance Centre (HPSC) in July 2001. The voluntary testing replaced an anonymous unlinked testing scheme.

Methods

HPSC collect aggregate data on a quarterly basis from 20 maternity hospitals. Forms are completed on paper or electronically, usually by a clinic midwife, and are then posted, faxed or emailed to HPSC. In the HSE-Northwest and HSE-Southeast, data are collated at regional level prior to sending on to HPSC.

Results

All 20 maternity hospitals/units provided antenatal HIV screening data for 2011. Table 1 describes the data collected from maternity hospitals between 2002 and 2011.

Table 1: Results of the antenatal screening programme, 2002 to 2011

Parameter	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of hospitals participating	20/22	21/22	20/22	21/22	19/21	19/20	18/20	19/20	19/20	20/20
Number of live births per year (from CSO)	60,503	61,529	61,972	61,372	65,425	71,389	75,065	74,728	na	na
Number of women booked	51,777	45,259	40,171	44,874	52,434	60,111	66,558	68,378	70,024	68,111
Number offered test	51,777	45,259	40,171	44,874	52,434	60,052	66,558	68,026	69,615	67,849
Number tested	48,922	43,815	39,049	44,292	51,649	59,522	66,210	67,694	69,292	67,135
Uptake of HIV antenatal test (%)	94.5	96.8	97.2	98.7	98.5	99.0	99.5	99.0	99.0	98.6
Number HIV positive	157	144	103	118	113	117	123	140	118	109
% HIV positive	0.32	0.33	0.26	0.27	0.22	0.20	0.19	0.21	0.17	0.16
Number newly diagnosed HIV positive	112	93	39	43	34	38	34	32	21	17
% Newly diagnosed HIV positive	0.23	0.21	0.10	0.10	0.07	0.06	0.05	0.05	0.03	0.03

- All 20 maternity hospitals/units provided data on HIV antenatal screening for 2011. However only 52.6% of hospitals reported information on private patients.
- The national reported uptake of HIV antenatal screening was 98.6% in 2011. The uptake rate ranged from 75% to 100% among participating hospitals.
- In 2011, 109 pregnant women tested HIV positive at their antenatal screen, giving a prevalence of 0.16%. This is the lowest prevalence rate since screening began in 2002.
- In 2011, the prevalence of HIV infection among pregnant women varied among HSE areas, ranging from 0.04% in HSE West to 0.27% in Dublin Northeast.
- In 2011, 17 pregnant women were newly diagnosed with HIV at antenatal screening. This is the lowest number since screening began and has decreased on an annual basis. The prevalence of newly diagnosed HIV infection among pregnant women was 0.03% in 2011.
- Between 2002 and 2011, 1,242 antenatal HIV screening tests were positive. Of these 463 (37.3%) were not previously known to be HIV positive and were first diagnosed at antenatal screening.

Key limitations of the antenatal screening data

In order to investigate some of the limitations of the antenatal screening data, hospitals were asked four key questions:

1. Does the data refer to (i) public patients or (ii) public and private patients?

   Nine hospitals stated that the 2011 data related to public patients only and nine stated that the data related to all patients. One hospital was a private hospital and one did not respond.
2. Do you record the reason for refusal?

   Twelve hospitals record the reason for refusal and six do not. Two hospitals did not respond.
3. Where do you derive the booking data?

   Seven hospitals used maternity IT systems, four used laboratory systems, four used patient administrations systems and four extracted the data manually. One hospital did not respond
4. Do you have a computerised system for recording the antenatal data? Fifteen hospitals do not have a computerised system and four do. One hospital did not respond

Discussion

HIV antenatal screening is vital to identify women who are HIV positive and to ensure they can avail of appropriate treatment and care, to decrease the risk of mother to child transmission and to help prevent transmission of HIV to sexual partners of pregnant women.

The number of women newly diagnosed with HIV infection at antenatal screening has decreased over time. The prevalence rate in 2011 (0.16%), is the lowest prevalence rate since the screening program began. In 2011, prevalence of HIV infection among pregnant women varied among different HSE areas ranging from 0.04% to 0.27%. Throughout Europe, pockets of higher prevalence among pregnant women have been reported in major urban areas.[6] The prevalence of newly diagnosed HIV infection has decreased steadily from 0.23% in 2002 to 0.03% in 2011.

Data from the national HIV case based reporting system shows that there were reports of 23 new diagnoses in pregnant women in 2011.[5] This difference between the number of women reported through the HIV case based reporting system, and the antenatal surveillance system demonstrate that coverage of the antenatal programme is incomplete. It is not possible to link these two stand alone systems.

As highlighted in this report, there are some limitations to the antenatal screening data. In particular, information on the uptake of screening should be interpreted with care as some hospitals could only provide estimates or proxy measures for the numbers offered testing and some hospitals could not provide data relating to their private patients.

More detailed reports can be found at www.hpsc.ie

Technical notes:

1. Uptake was calculated as the number of women tested divided by the number of women booked.
2. Prevalence of HIV infection was calculated as the number of women testing positive divided by the number of women tested.

References

1. European Collaborative Study. Mother-to-child transmission of HIV infection in the era of highly active antiretroviral therapy. CID 2005: 40
2. Sharland M, Gibb DM, Tudor-Williams G. Advances in the prevention and treatment of paediatric HIV infection in the United Kingdom. Sex Transm Infect 2003; 79 (1)
3. Duong T, Ades AE, Gibb DM, Tookey PA, Masters J. Vertical transmission rates for HIV in the British Isles: estimates based on surveillance data. BMJ 1999; 319
4. Department of Health and Children. AIDS Strategy 2000, Report of the National AIDS Strategy Committee (NASC).
5. HIV & AIDS in Ireland 2011. HPSC. Available at http://www.hpsc.ie/hpsc/A-Z/HIVSTIs/HIVandAIDS/SurveillanceReports/
6. Giraudon I, Forde J, Maguire H, Permalloo N. Antenatal screening and prevalence of infection: Surveillance in London, 2000-2007. Eurosurveillance 2009; 14 (9)

5.5 Sexually Transmitted Infections (STIs), 2010-2011

Summary

Total number of STI notifications in 2010: 11,815
Total number of STI notifications in 2011: 13,259
Crude incidence rate, 2010: 257.5/100,000
Crude incidence rate, 2011: 289.0/100,000

There were 13,259 notifications of STIs in 2011, an increase of 12.2% when compared with 2010 (n=11,815) and continuing an upward trend since 1995 (figure 1). The crude incidence rate (CIR) for total STI notifications in 2011 was 289.0 per 100,000 population compared with 257.5/100,000 in 2010. The impact of poor sexual health is occurring in young adults, with more than half of notifications among those aged 20 to 29 years in both 2010 (61.3%) and 2011 (59.3%).

In line with previous years, *Chlamydia trachomatis* was the most frequently notified STI in 2010 and 2011, accounting for 45.7% and 48.3% of notifications, respectively.

Chlamydia, 2010-2011

Following decreases in the CIR for Chlamydia in 2009 (126.0/100,000) and 2010 (117.7/100,000), the CIR increased in 2011 to 139.6 per 100,000 population; this rate is still lower than the peak CIR of 148.4/100,000 recorded in 2008 (figure 2).

Chlamydia was more frequently reported among women in 2010 and 2011, continuing the trend seen in previous years (figure 2). Chlamydia was most frequently reported in those aged 20-29 years (2010: 65.5%; 2011: 65.1%); there has been a slight increase in notifications in those aged 30 years and older since 2009.

Table 1. Number of notifications and percentage change, 2010-2011

Sexually transmitted infection	2010	2011	% change
Ano-genital warts	2556	2459	-3.8
Chancroid	0	0	-
Chlamydia trachomatis infection	5399	6407	+18.7
Gonorrhoea	625	834	+33.4
Granuloma inguinale	0	0	-
Herpes simplex (genital)	877	1226	+39.8
Lymphogranuloma venereum	3	2	-33.3
Non-specific urethritis	1657	1603	-3.3
Syphilis	614	653	+6.4
Trichomoniasis	84	75	-10.7
Total	**11815**	**13259**	**+12.2**

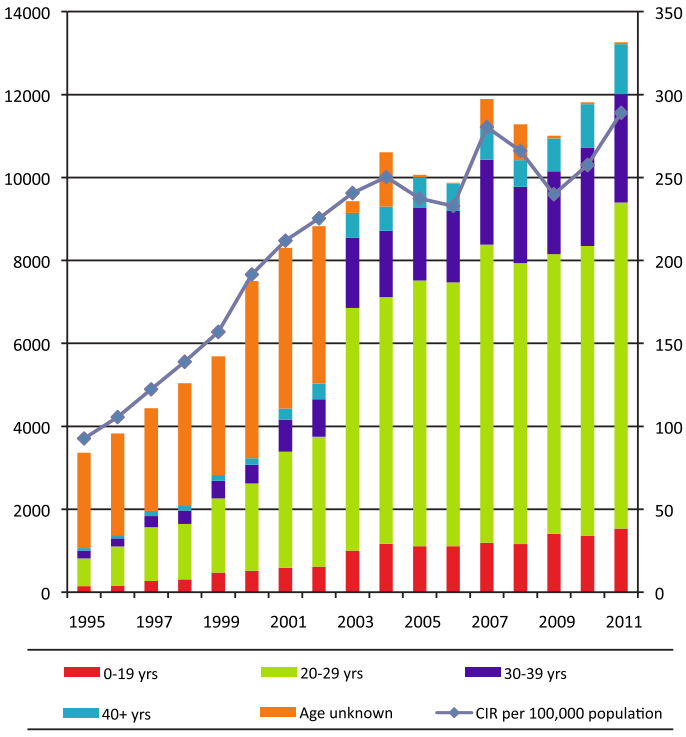


Figure 1.Number of notifications by age group and crude incidence rate per 100,000 of all sexually transmitted infections by year, 1995-2011*

Gonorrhoea, 2010-2011
The number of gonorrhoea notifications continued to increase (+33.4%) in 2011 (table 1). The CIR now stands at 18.2 per 100,000 population, the highest rate ever recorded for gonorrhoea (figure 4).

The majority of gonorrhoea notifications continue to be reported in men in 2011 (n=650; 77.9%). Between 2006 and 2010, there was an increase in notifications in women. This increase was reversed somewhat in 2011 with the male-to-female ratio increasing to 4:1 from 3:1 in 2010.

In line with previous years, the majority of gonorrhoea notifications in 2010 and 2011 were reported in those aged 20-29 years (52.6% and 55.6%, respectively). Notifications among the 0-19 year age group decreased in both 2010 (12.5%) and 2011 (11.5%). This follows a peak in 2009 when 16.1% of gonorrhoea notifications were among those aged 19 years or younger.

Ano-genital warts, 2010-2011
After Chlamydia, ano-genital warts was the second most frequently reported STI in 2010 and 2011, accounting for 21.6% and 18.5%, respectively, of all STI notifications. The number of notifications in 2011 (n=2,459) was largely unchanged from 2010 when there were 2,556 notifications (table 1). Full annual data returns from one large STI clinic are outstanding and quarter 4 data are missing from another so the true incidence of ano-genital warts in the population is likely to be higher. As seen in previous years, there were slightly more notifications among men (58.1%in 2010; 55.4% in 2011) and almost two-thirds of cases in 2010 and 2011 were aged 20-29 years (62.2% in 2010; 63.4% in 2011).

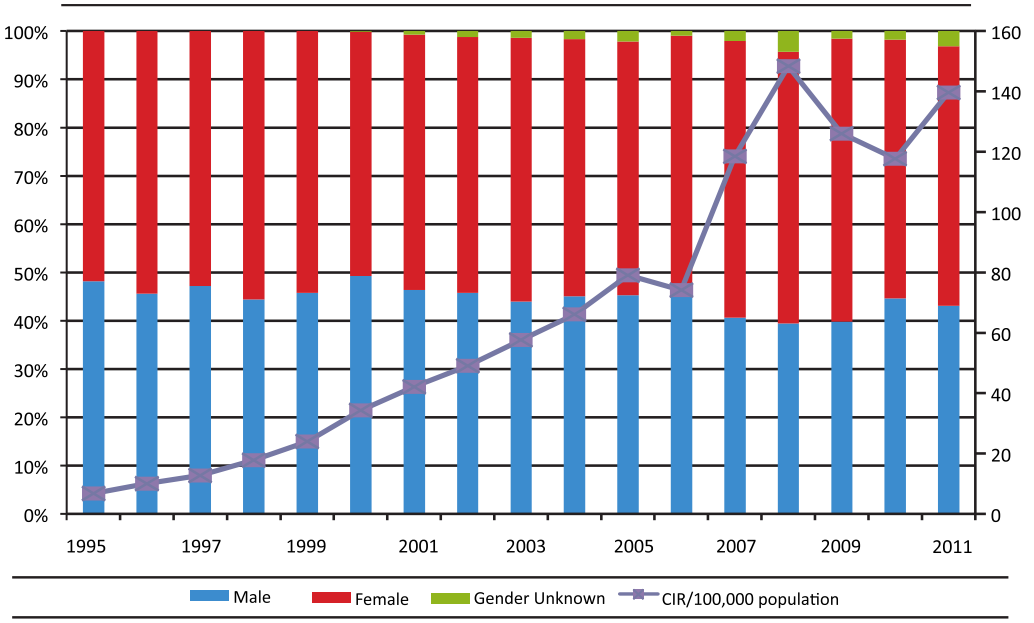


Figure 2. Percentage of Chlamydia trachomatis notifications by gender and crude incidence rate per 100,000, 1995-2011

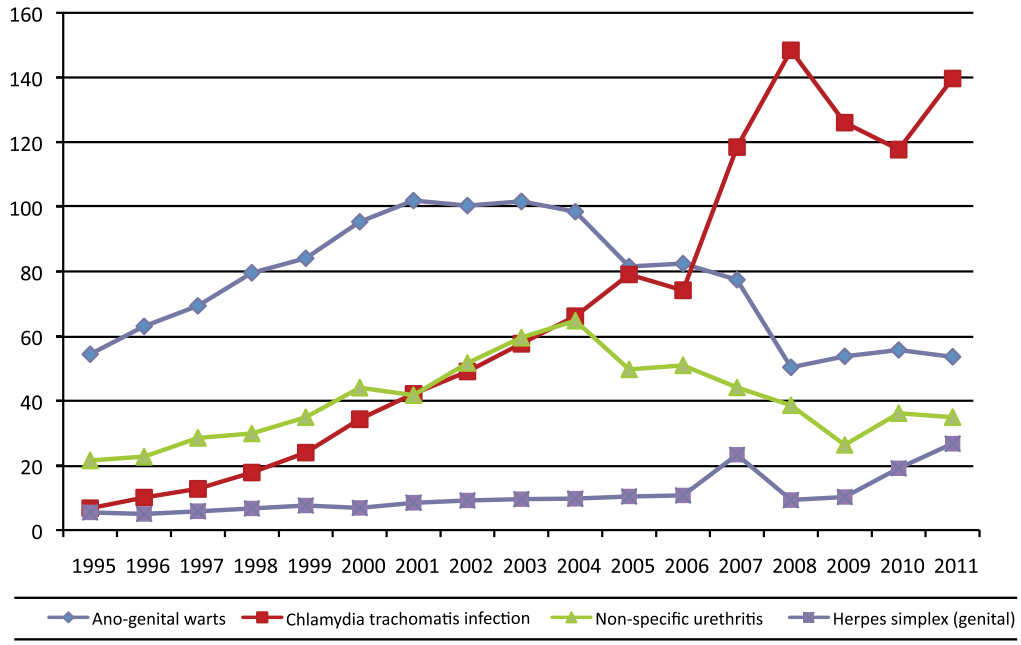


Figure 3. Crude incidence rate of sexually transmitted infections (>1,000 notifications per year) by year, 1995-2011*

Herpes simplex (genital), 2010-2011
Notifications of herpes simplex (genital) increased by 39.8% between 2010 and 2011 (table 1). The CIR was 26.7 per 100,000 in 2011, the highest rate recorded for herpes simplex (genital) since it was added to the list of notifiable diseases in 1985 (figure 2). The increase in notifications may be due to improved detection as a result of the introduction of molecular testing which is more sensitive than viral culture. Almost two-thirds of herpes simplex (genital) notifications were reported in women (61.1% in 2010; 64.8% in 2011). The most frequently reported age group was 20-29 years old (48.6% in 2010; 47.4% in 2011).

Non-specific urethritis, 2010-2011
There was little change in the number of notifications of non-specific urethritis (NSU) in 2011 (n=1,603) compared with 2010 (n=1,657) (table 1). Full annual data returns from one large STI clinic are outstanding and quarter 4 data are missing from another so the true incidence of NSU in the population is likely to be higher. While the case definition for NSU notifications in 2011 specifies "any male meeting the clinical criteria" NSU continues to be reported among women (9.4% in 2010, 6.2% in 2011).

Trichomoniasis, 2010-2011
Notifications of trichomoniasis decreased from 84 in 2010 to 75 in 2011. Notifications were almost exclusively among women (96.0% in both 2010 and 2011). Trichomoniasis continues to be reported more commonly among older age groups, with just 31.0% and 28.0% of cases in 2010 and 2011 reported in those aged 20-29 years.

Data on syphilis, HIV and Hepatitis B are presented elsewhere in this report. More detailed reports on STIs in 2010 and 2011 are available on the HPSC website (www.hpsc.ie).

*Crude incidence rate has been calculated using data from Census 1996 (1995-1999), Census 2002 (2000-2003), Census 2006 (2004-2008) and Census 2011 (2009-2011)

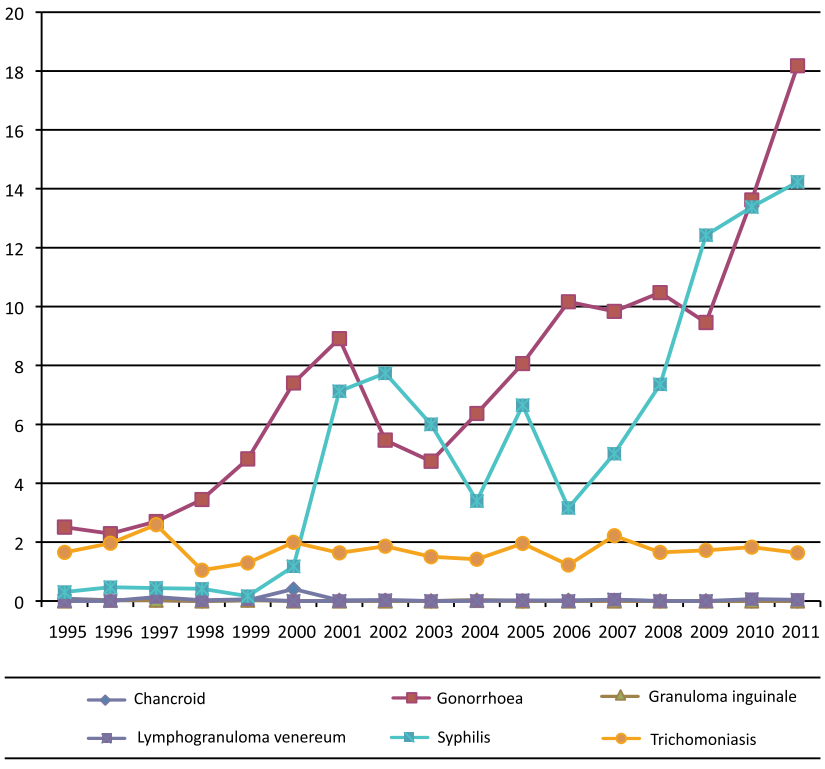


Figure 4. Crude incidence rate of sexually transmitted infections (<1,000 notifications per year) by year, 1995-2011*

5.6 Syphilis, 2010

Summary

Number of case-based syphilis reports, 2010: 260
Number of early syphilis cases, 2010: 139
Crude incidence rate of early syphilis, 2010: 3.0 per 100,000 population

Case-based syphilis records have been collated nationally since 2000. Case-based syphilis data provided by some clinicians is a subset of aggregate syphilis notification data. Forms are completed by Departments of Public Health in conjunction with the clinician and are then forwarded to HPSC. The data presented in this chapter relate to case-based reports received on syphilis which are held on a national database at HPSC. The syphilis figures presented are not comparable with the aggregate counts of syphilis notifications provided by HSE areas as part of the routine quarterly reporting of sexually transmitted infections (see Sexually Transmitted Infections, 2010-2011, for more details).

Syphilis case reports, 2010

In 2010, case-based reports were received on 260 syphilis notifications, a decrease of 8.1% compared with 2009 (n=283). One-hundred-and-thirty-nine (3.0/100,000 population) cases (53.5%) were diagnosed with early, infectious syphilis (i.e. primary, secondary and early latent stages) and 97 (37.3%) cases were latent, late latent or tertiary, syphilis. The stage of infection was not recorded for 24 (9.2%) cases.

The crude incidence rate (CIR) for all stages of syphilis was 5.7 per 100,000 population a slight decrease compared with 2009 (6.1/100,000). The CIR for early syphilis also decreased in 2010 to 3.0 per 100,000.

For all cases the age range was 18 years to 70 years, and the median was 32 years. The age range among early cases was also 18 years to 70 years but the median age was 33 years. More than eighty per cent (81.5%) of cases were in men and fifty per cent of cases were among 25-39 year olds.

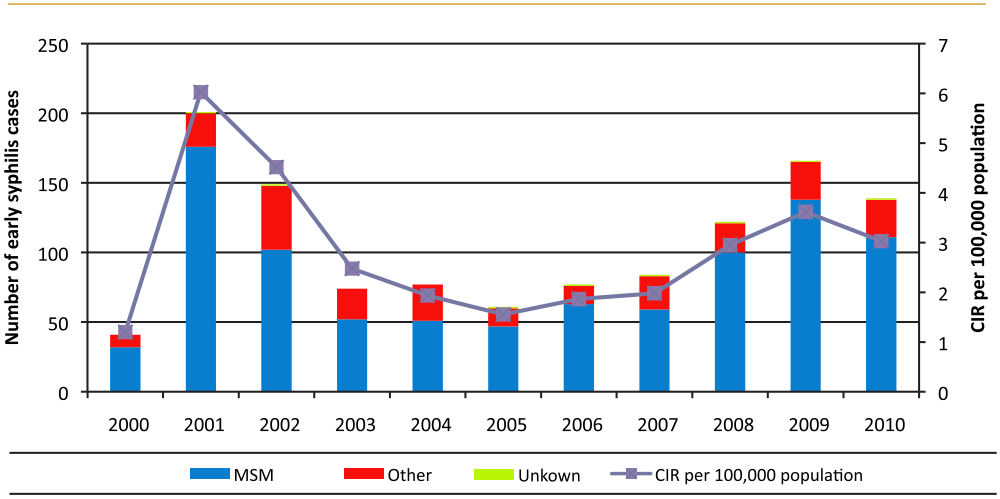


Figure 1 Crude incidence rate (CIR) per 100,000 population and number of early syphilis cases by sexual orientation, 2000-2010, based on completed case-based surveillance forms*

**CIR calculated using data from Census 2002 (2000-2003), Census 2006 (2004-2008) and Census 2011 (2009-2010)*

Syphilis cases were reported from just five HSE areas: East (n=204), Midlands (n=1), South East (n=19), South (n=14) and West (n=22). This is a reflection of the areas in which STI services are located as well as reporting practices. Analysis of the 2010 cases by area of residence shows that these cases are from all eight HSE areas.

Early syphilis was diagnosed more frequently amongst MSM while heterosexual men and women were more likely to be diagnosed with late syphilis (table 1).

Just over thirteen per cent (n=35) of all cases were re-infections, with the majority being diagnosed as early syphilis (n=28). Almost all cases recorded as re-infections were among MSM (n=32).

Early syphilis case reports, 2010

Just over half of all reported cases were classified as early syphilis (n=139, 53.5%). Cases of early syphilis continues to be predominantly among MSM (n=111, 79.1%) in particular those aged 30-34 years (n=25/111, 22.5%). Among heterosexuals, cases of early syphilis were reported most frequently in those aged 20-24 years (n=9/27).

As in previous years, the majority of early cases continue to be resident in the East, though the proportion has decreased to 68.3% in 2010, from 80.6% in 2009. Most cases of early syphilis were among those born in Ireland (69.1%); the second most frequently reported country of birth was Brazil (5.0%).Eighty per cent of early cases were acquired in Ireland. Spain and the United Kingdom were the most frequently reported countries of infection outside of Ireland (5.8%).

HIV status was provided for 130 cases of early syphilis; 24.5% of early syphilis cases were HIV positive (n=34). The proportion of early cases reported as re-infections increased slightly in 2010 to 20.1%. Ninety per cent of re-infections were in MSM and 10% among heterosexuals.

There were 4 cases of early syphilis in pregnancy, accounting for a third of the cases in women. Two of these cases were primary syphilis and two were secondary.

A more detailed report Epidemiology of Syphilis in Ireland, 2010, is available on the HPSC website www.hpsc.ie.

Table 1 Number of syphilis cases by stage of infection and sexual orientation, 2010

Stage of infection	Sexual Orientation			Total
	MSM	Non-MSM	Unknown	
Early syphilis	111	27	1	139
Late syphilis	42	54	1	97
Unknown	16	8	0	24
Total	**169**	**89**	**2**	**260**
% All cases	**65.0**	**34.2**	**0.8**	**100.0**

5.7 Syphilis, 2011

Summary

Number of case-based syphilis reports, 2011: 653
Number of early syphilis cases, 2011: 171
Crude incidence rate of early syphilis, 2011: 3.7 per 100,000 population

Since 1st May, 2011, the Computerised Infectious Disease Reporting (CIDR) system has been used to record notifications of syphilis, thereby allowing the replacement of the case-based and aggregate syphilis databases previously in use in Departments of Public Health and at HPSC. Collating syphilis notifications from all sources in a standard database has enabled timely weekly reporting of syphilis, as well as providing a more accurate assessment of the burden of syphilis nationally, based on area of residence.

A total of 653 cases of syphilis were notified in 2011. Of these 653 cases, case-based data were available for 466 cases (71.4%), including some cases notified before 1st May, 2011. Stage of infection was reported for less than 40% of all cases notified in 2011. There were 171 cases of early syphilis, 22 cases of late syphilis and 59 cases were classified as latent of undetermined duration. One case of probable congenital syphilis was also reported.

The crude incidence rate (CIR) for all stages of syphilis reported in 2011 was 14.2 per 100,000 population, continuing the upward trend which began in 2006 (figure 1). The CIR for early syphilis was 3.7/100,000 in 2011, a slight increase from 2010 (3.0/100,000) but similar to the rate for 2009 (3.6/100,000; figure 1).

Three-quarters of all cases were reported in men (n=491) and the largest number were reported in the 30-39 years age group (n=249).

Early syphilis

A total of 171 cases of early syphilis were reported in 2011; 89 (52.0%) were classified as primary syphilis, 54 (31.6%) as secondary syphilis and 28 (16.4%) as early latent syphilis (table 1).

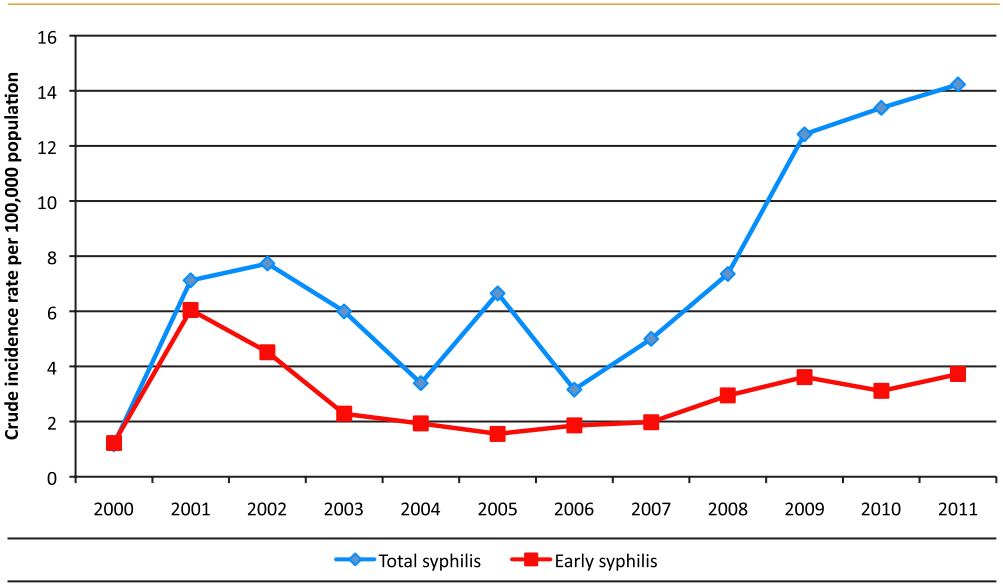


Figure 1. Crude incidence rate per 100,000 of early syphilis and total syphilis by year, 2000-2011*

**Crude incidence rate has been calculated using data from Census 1996 (1995-1999), Census 2002 (2000-2003), Census 2006 (2004-2008) and Census 2011 (2009-2011)*

There is considerable geographic variation in the distribution of early syphilis, with CIR in the HSE East area (8.0/100,000) higher than elsewhere in the country, confirming that this region remains a centre of transmission within Ireland. The majority of early syphilis (69.0%) was acquired in Ireland.

There were 154 cases among men and 17 cases among women, giving a male-to-female ratio of 9:1. The majority of cases (79.5%) were among men who have sex with men (MSM). The most frequently reported age groups were 25-29 years (n=42; 24.6%). The age range was 17 years to 68 years (median 31 years).

The proportion of re-infections was 13.5% overall with the proportion amongst MSM (15.4%) more than double the proportion among heterosexuals (7.1%) in 2011.

HIV status was reported for 91.8% of early cases (n=157); 32 cases of early syphilis were reported as HIV positive. Of these 32 cases, 12 (37.5%) were diagnosed with HIV in 2011. HIV status was reported as positive for 22.1% of early cases among MSM, compared to 7.1% of cases among heterosexuals.

A more detailed analysis of syphilis in Ireland in 2011 is available in the report Sexually Transmitted Infections in Ireland, 2011, which is available on the HPSC website www.hpsc.ie.

Table 1. Summary of early syphilis cases, 2011

Early syphilis cases	n	%
Total number of early cases	171	-
Primary syphilis	89	*52.0*
Secondary syphilis	54	*31.6*
Early latent syphilis	28	*16.4*
Re-infections	23	*13.5*
Number of early cases who are MSM	136	*79.5*
Number who are HIV positive	32	*18.7*
Number who are pregnant	9	*5.3*
Number acquired in Ireland	118	*69.0*
Number born in Ireland	97	*56.7*

06

Other infections

6.1 Viral Encephalitis

Summary

Number of cases 2011: 23
Number of cases 2010 22
Number of cases 2009: 5
Crude incidence rate, 2011: 0.5/100,000

Encephalitis due to viruses not otherwise specified (NOS) in the Irish Infectious Disease (Amendment) (No. 3) Regulations 2003 (SI No. 707 of 203) are notifiable under the disease viral encephalitis. (Details of viral encephalitis cases caused by other notifiable diseases are presented in other chapters in this report). Clinicians and laboratories (the latter since 2004) are legally obliged to notify all cases of viral encephalitis.

In 2011, 23 cases of viral encephalitis (NOS) were notified in Ireland (0.5/100.000 population). This was just one case more than that reported in the previous year (2010) which was substantially more than the five cases reported in both 2008 and 2009 (figure 1).

Fewer viral encephalitis (NOS) cases occurred in males (n=9) than females (n=14), giving a male to female ratio of 1.0:1.6. Cases ranged in age from 21 to 84 years with a median age of 58 years. The majority of the notifications occurred in the elderly aged 65 years and over (48%; n=11; 2.1/100,000 population) followed by the 25-44 years age group (30%; n=7; 0.5/100,000 population) (table 1).

In 2011, six HSE areas notified cases of viral encephalitis (NOS) (range 1-12), with HSE-E accounting for 52% (n=12/23) of cases. The national crude incidence rate in 2011 was 0.5 (95% CI 0.3–0.7) cases per 100,000 population with the rate in HSE-E being 6.7 (95%CI 0.3–1.1) cases/100,000 population.

Of the 23 cases reported in 2011, 21 were confirmed (91.3%) and one each was classified as probable and as possible (4.3%).

In recent years herpes simplex virus and varicella virus have been the two main causative agents of viral encephalitis notifications in Ireland (figure 2). Notifications due to herpes simplex virus have doubled between 2010 and 2011, but in contrast, only one varicella virus-related case was reported in 2011 compared to 11 in 2010. Of the 20 herpes simplex virus (HSV) encephalitis cases notified in 2011, 13 were reported as HSV type 1, six were type 2 and the typing

Table 1. Number, age-specific incidence rates and proportion of viral encephalitis (NOS) cases by age group, 2011

Age Group	Causative pathogen			Total	ASIR	% Proportion
	Herpes simplex virus	Unknown	Varicella virus			
<1	0	0	0	0	0.00	0.0
1-4	0	0	0	0	0.00	0.0
5-14	0	0	0	0	0.00	0.0
15-24	1	0	0	1	0.17	4.3
25-44	6	1	0	7	0.48	30.4
45-64	3	0	0	3	0.29	13.0
65+	9	1	1	11	2.05	47.8
All ages	**20**	**2**	**1**	**23**	**0.50**	**100**
% total cases	**87.0**	**8.7**	**4.3**	**100.0**	**138.1**	

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

details of the remaining case was not reported.

One patient with viral encephalitis in 2011 died with the cause of death not specified.

In summary the numbers of viral encephalitis notifications in Ireland in 2011 were similar to 2010. There was a marked decline in viral encephalitis notifications associated with varicella virus but a marked increase in those caused by HSV.

The figures presented in this report are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 29th August, 2011. These figures may differ from those published previously due to ongoing updating of notification data in CIDR.

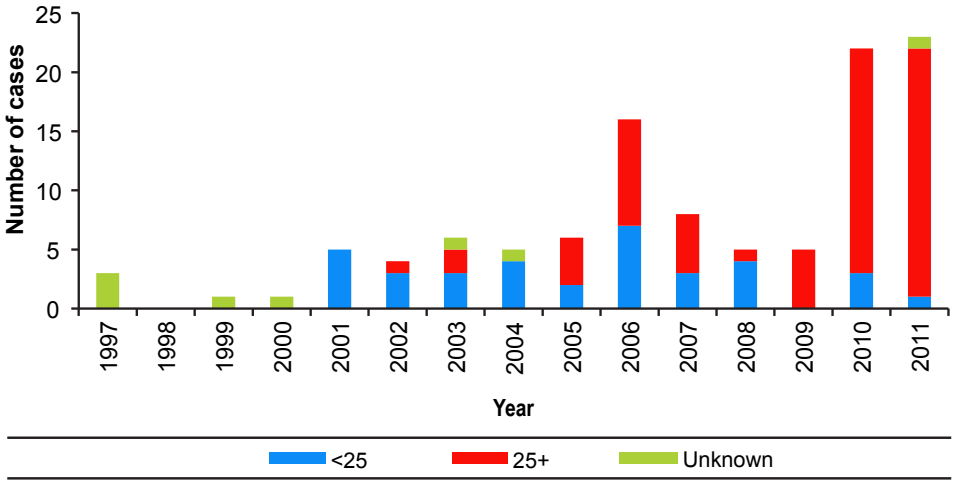


Figure 1. Annual number of viral encephalitis (NOS) cases by age group, 1997-2011

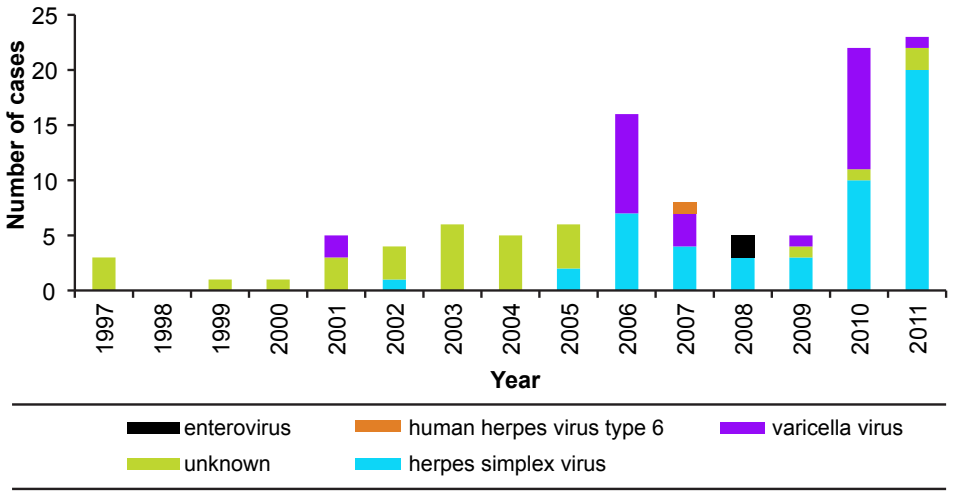


Figure 2. Annual number of viral encephalitis (NOS) cases by causative pathogen, 1997-2011

6.2 Viral Meningitis

Summary

Number of cases 2011: 220
Number of cases 2010 168
Number of cases 2009: 142
Crude incidence rate, 2011: 4.8/100,000

Meningitis due to viruses not otherwise specified (NOS) in the Irish Infectious Disease (Amendment) (No. 3) Regulations 2003 (SI No. 707 of 203) are notifiable under the disease viral meningitis. (Details of viral meningitis cases caused by other notifiable diseases are presented in other separate chapters in this report). Clinicians and laboratories (the latter since 2004) are legally obliged to notify all cases of viral meningitis.

In 2011, 220 cases of viral meningitis (NOS) were notified in Ireland, the highest number recorded since 1997 (figure1). No deaths as a direct cause by viral meningitis (NOS) were reported in 2011.

Of the 220 cases notified, 207 were classified as confirmed (94.1%), ten as probable (4.5%) and three as possible (1.4%). A similar number of cases occurred in males (n=114) as in females (n=105), giving a male to

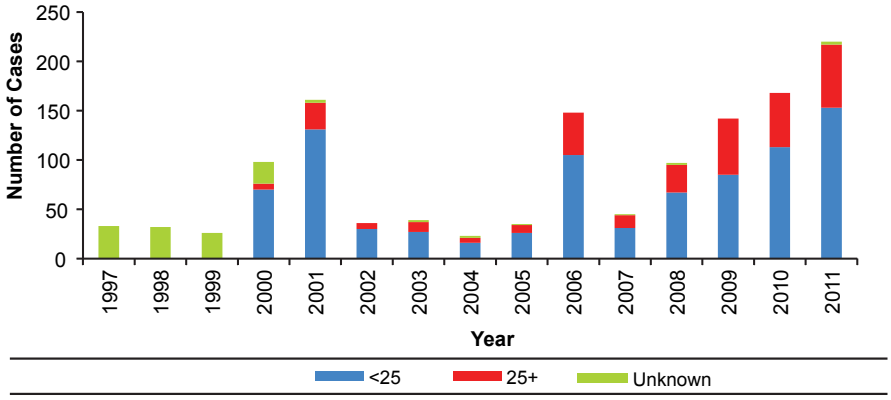


Figure 1. Number of viral meningitis (NOS) cases by age group and year, 1997-2012

Table 1. Number, age-specific incidence rates and proportion of viral meningitis (NOS) notifications by age group and type, 2011

	Causative pathogen								
Age Group	Enterovirus	Human Herpes virus type 6	Unknown	Herpes Simplex virus	Varicella zoster virus	Echovirus	Total	ASIR	% Proportion
<1	68	22	3	1	0	1	94	129.8	42.7
1-4	5	4	0	0	0	0	9	12.4	4.1
5-14	13	1	0	1	0	0	15	20.7	6.8
15-24	26	0	2	2	3	1	34	47.0	15.5
25-44	44	0	6	3	1	0	54	74.6	24.5
45-64	3	0	1	1	0	0	5	6.9	2.3
65+	3	0	1	1	0	0	5	6.9	2.3
All ages*	**164**	**28**	**13**	**9**	**4**	**2**	**220**	**303.8**	**100**
% total cases	**74.5**	**12.7**	**5.9**	**4.1**	**1.8**	**0.9**	**100.0**	**138.1**	

ASIR, age specific incidence rate per 100,000 population of total case
** Includes three cases with unknown age details*

female ratio of 1.0:1.09. One case was reported with unknown gender details.

Children and young adults were most commonly affected with a median age of seven years (range one week to 72 years). Nearly 70% of cases occurred in those age under 25 years of age (figure 1, table 1).

The highest age specific incidence rate (ASIR) was in infants <1 year of age (129.8/100,000; n=94). The next highest ASIR was in the 25-44 years age group (74.6/100,000; n=54). Lowest rates were reported in the older age groups (2.3/100,000; n=5 each) (table 1).

The national crude incidence rate in 2011 was 4.8 (95% CI 4.2 – 5.4) cases per 100,000 population. This was a 24% increase compared with 2010 when 168 cases were notified (3.7/100,000). The incidence rate in 2011 was highest in HSE-E at 6.7/100,000 (95%CI 5.5–7.9) cases and lowest in HSE-W at 2.9/100,000 (95%CI 1.3-4.5) (figure 2).

In 2011, enterovirus was the most common pathogen associated with viral meningitis, accounting for nearly 75% (n=164/220) of all notifications (figure 3, table 1). Human herpes virus 6 (HHV6) was the causative pathogen for 12.7% (n=28) notifications; herpes simplex virus (HSV) accounted for 4.1% (n=9) of notifications (figure 3, table 1).

Enterovirus meningitis was also most common in infants under one year of age with 68 of the 94 viral meningitis (NOS) cases in this age group in 2011 caused by this pathogen (72%) (figure 4). Between 2007 and 2011

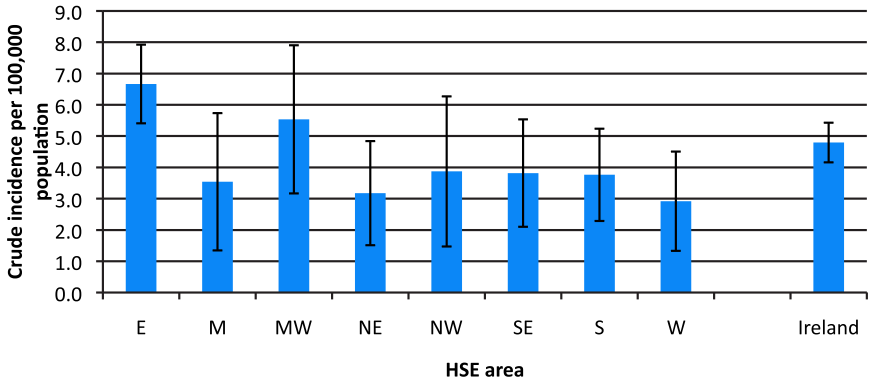


Figure 2. Crude incidence rates per 100,000 population with 95% confidence intervals for viral meningitis (NOS) cases by HSE area, 2011

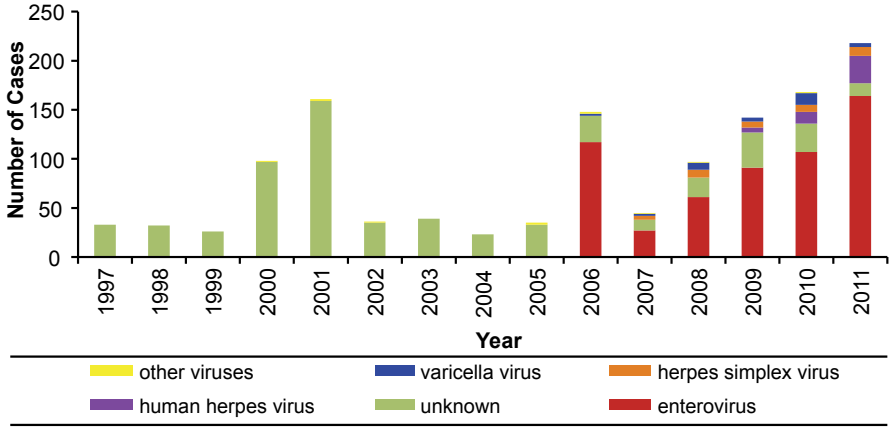


Figure 3. Number of viral meningitis (NOS) cases by organism type and year, 1997-2011

enteroviruses have accounted for 67% (n=450/672) of all viral meningitis (NOS) cases, with a distinct seasonal peak observed in the period June to August (figure 5).

The figures presented in this report are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 29th August, 2012. These figures may differ from those published previously due to ongoing updating of notification data in CIDR.

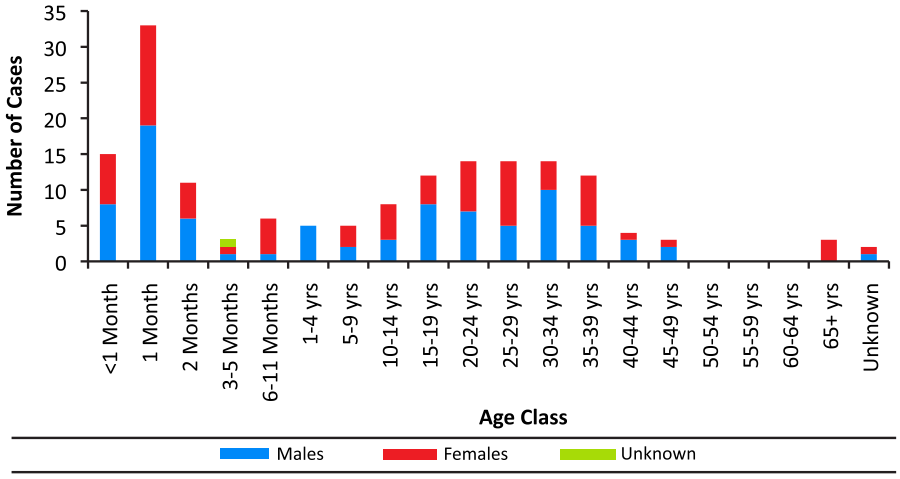


Figure 4. Number of enterovirus cases notified by age group and gender, 2011

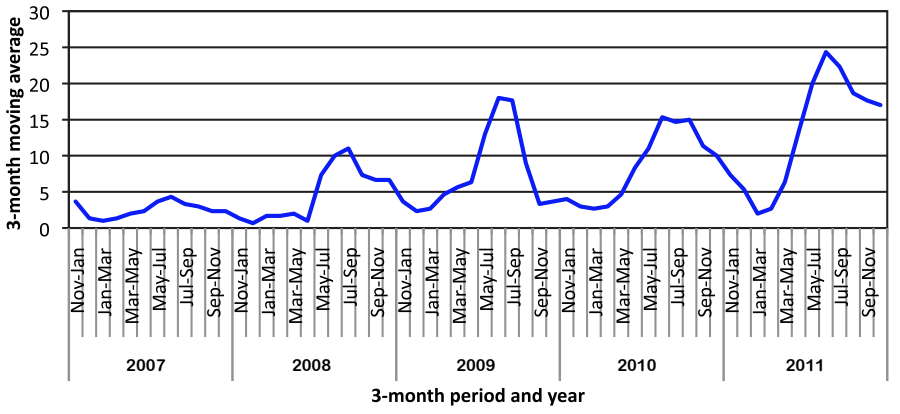


Figure 5. Three-month moving average of the annual number of enterovirus notifications, 2007-2011

6.3 Creutzfeldt-Jakob disease

Summary

Number of cases, 2011: 7
Number of cases, 2010: 3

Seven cases of Creutzfeldt-Jakob disease (CJD) were notified in 2011 compared to three cases in 2010. All cases in 2011 were sporadic CJD cases. The age profile of the cases is shown in figure 1. Two cases were male and five were female.

In total, 58 cases of CJD were notified since CJD was first specified as a notifiable disease in December 1996. Figure 2 shows the 58 CJD notifications by age group. The majority (83%, n=48) of the cases were aged greater than 54 years. Of the 58 cases, 31 were male and 27 were female. Fifty-five cases were sporadic CJD, two were familial CJD and one was iatrogenic CJD.

Variant CJD (vCJD) is specified as a separate notifiable disease. No cases of vCJD were notified in 2011. 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.

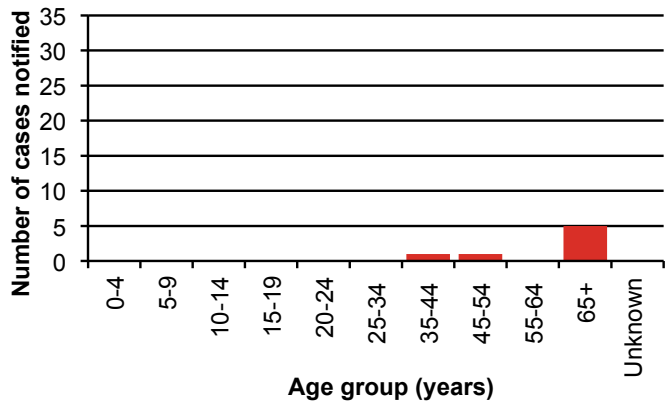


Figure 1. Number of CJD notifications (n=7) in 2011 by age group

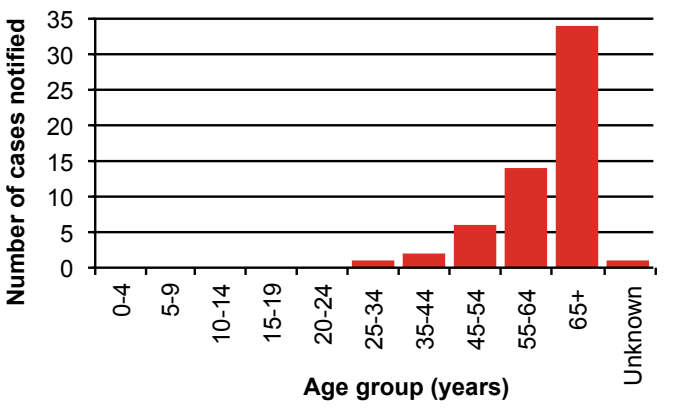


Figure 2. Number of CJD notifications (n=58) from December 1996 to 2011 by age group

07

Infectious Disease Outbreaks

7. Outbreaks

Summary

Number of outbreaks: 379
Number of IID outbreaks: 282
Number of non-IID outbreaks: 97

During 2011, 379 outbreaks of infectious diseases were reported with 4,418 associated cases of illness, including 874 (19.8%) cases hospitalised and seven deaths. Regional variation in outbreaks was observed between HSE areas with the highest rates observed in HSE-M (12.4/100,000 population) and HSE-NW (10.1/100,000 population) while the lowest rate was observed in HSE-MW at 6.1 per 100,000 population. Table 1 details the regional distribution of all outbreaks of infectious disease, outbreaks of infectious intestinal disease (IID) and outbreaks of non-IID.

General outbreaks accounted for 66.2% (n= 251) of all outbreaks notified during 2011. The remaining outbreaks (33.8%, n= 128) were reported as family/ household outbreaks. Similar to previous years, person-to-person spread* was reported as the mode of transmission for the majority of outbreaks in 2011 (68.6%, n=260). Most of these outbreaks were due to norovirus, AIG, measles and VTEC.

Private houses were the most frequently reported outbreak location in 2011, accounting for 28.5% (n=108) of all outbreaks while hospitals were the second most common outbreak location, accounting for 17.4% (n=66) of all outbreaks. The highest numbers ill were reported from outbreaks in hospitals (n=1,174), residential institutions (n=874), hotels (n=696) and community hospital/long stay units (n=693). Table 2 details the number of IID and non-IID outbreaks and numbers ill by outbreak location for outbreaks reported during 2011.

Infectious intestinal disease (IID) outbreaks:
IID outbreaks accounted for 74.4% (n=282) of all outbreaks reported during 2011. This remains stable compared to the number of IID outbreaks reported during 2010 (n=286).Table 3 details the regional distribution of outbreaks of infectious intestinal disease (IID)

Norovirus/ suspected viral outbreaks, accounted for 57.4% of all IID outbreaks reported in 2011. Figure 1 compares norovirus/ suspected viral outbreaks with non-norovirus IID outbreaks by year from 2001 to 2011. Norovirus/ suspected norovirus was also responsible for the 10 largest outbreaks during 2011. Numbers ill ranged from two cases to 584 cases.

Table 1: Number of outbreaks by HSE area, 2011

HSE area	Number of outbreaks	Outbreak rate per 100,000	Number ill	Number hospitalised	Number of deaths	Number of IID outbreaks	Number of Non-IID outbreaks
HSE-E	129	8.0	2,447	519	5	71	58
HSE-M	35	12.4	287	15	0	29	6
HSE-MW	23	6.1	106	68	0	21	2
HSE-NE	29	6.6	226	93	0	25	4
HSE-NW	26	10.1	139	42	0	25	4
HSE-SE	39	7.8	426	16	1	20	6
HSE-S	54	8.1	537	27	0	33	6
HSE-W	43	9.7	244	91	1	42	12
HPSC	1	-	6	3	0	1	0
Total	379	8.3	4,418	874	7	282	97

* Including 79 outbreaks reported as person to person and airborne transmission and 4 person-to-person and animal contact

Table 2: Number of IID and non-IID outbreaks and number ill by outbreak location, 2011

Outbreak location	IID		Non-IID		Total outbreaks	
	Number of outbreaks	Number ill	Number of outbreaks	Number ill	Number of outbreaks	Number ill
Private house	84	198	24	77	**108**	**275**
Hospital	57	1,119	9	55	**66**	**1,174**
Comm. Hosp/ long-stay unit	48	664	1	29	**49**	**693**
Residential institution	45	852	3	22	**48**	**874**
Crèche	11	102	17	128	**28**	**230**
Hotel	9	696	0	0	**9**	**696**
Extended family	6	23	10	47	**16**	**70**
Community outbreak	5	53	8	67	**13**	**120**
Other	5	35	5	43	**10**	**78**
Travel related	4	16	2	7	**6**	**23**
School	2	10	13	84	**15**	**94**
Coach tour	1	6	0	0	**1**	**6**
University/ college	1	15	1	2	**2**	**17**
Restaurant / cafe	1	7	0	0	**1**	**7**
Workplace	1	30	1	2	**2**	**32**
Public house	0	0	1	3	**1**	**3**
Unknown	1	2	1	3	**2**	**5**
Not specified	1	13	1	8	**2**	**21**
Total	282	3,841	97	577	379	4,418

Table 3: IID outbreak summary by HSE area 2011

HSE area	Number of outbreaks	Outbreak rate per 100,000	Number ill	Number hospitalised	Number of deaths
HSE-E	71	4.4	2,107	474	1
HSE-M	29	10.3	270	14	0
HSE-MW	21	5.5	99	66	0
HSE-NE	25	5.7	213	85	0
HSE-NW	20	7.7	107	38	0
HSE-SE	33	6.6	386	8	0
HSE-S	42	6.3	422	24	0
HSE-W	40	9.0	231	88	1
HPSC	1	-	6	3	0
Total	282	6.1	3,841	800	2

ǂ Includes all norovirus outbreaks and AIG outbreaks where organism was suspected norovirus, suspected viral or not specified

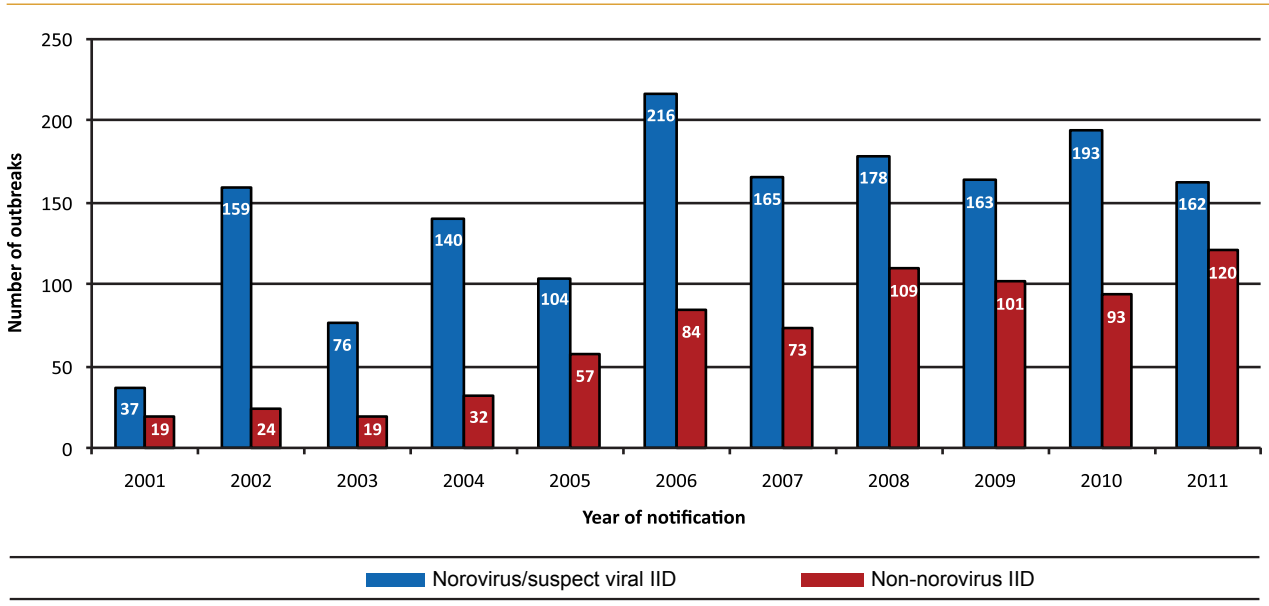


Figure 1: Number of norovirus/suspected viral outbreaksǂ and number of non-norovirus IID outbreaks by year, 2001-2011

After noroviral infection (n=103), the next most commonly reported IID outbreaks during 2011 were acute infectious gastroenteritis (not otherwise specified) (n=59), VTEC (n=51) and cryptosporidiosis (n=30). The number of general and family outbreaks of IID and numbers ill, are outlined in Table 4.

The most frequently reported locations for IID outbreaks were private houses (n=84), hospitals (n=57), community hospital/long stay facilities (n=48) and residential institutions (n=45). The most commonly reported outbreak in hospitals was noroviral infection (n=45). In community hospital/long stay facilities the most commonly reported outbreaks were of AIG (n=24) and noroviral infection (n=22). In residential institutions the most commonly reported outbreaks were of norovirus (n=25) and AIG (n=18).

Table 4: Number of general and family IID outbreaks by disease, 2011

Outbreak disease/pathogen	Family outbreak		General outbreak		Total IID outbreaks	
	Number of outbreaks	Number ill	Number of outbreaks	Number ill	Number of outbreaks	Number ill
Acute infectious gastroenteritis (unspecified)	1	9	58	800	59	809
Campylobacter infection	7	16	0	0	7	16
Clostridium difficile infection	0		8	35	8	35
Cryptosporidiosis	27	71	3	23	30	94
Enterohaemorrhagic *Escherichia coli* (VT negative)	1	0	0	0	1	0
Giardiasis	3	8	0	0	3	8
Noroviral infection	1	4	102	2617	103	2621
Rotavirus infection	3	6	2	19	5	25
Salmonellosis	8	22	5	27	13	49
Shigellosis	1	3	1	3	2	6
Verotoxigenic *Escherichia coli* infection	39	82	12	96	51	178
Total	91	221	191	3620	282	3841

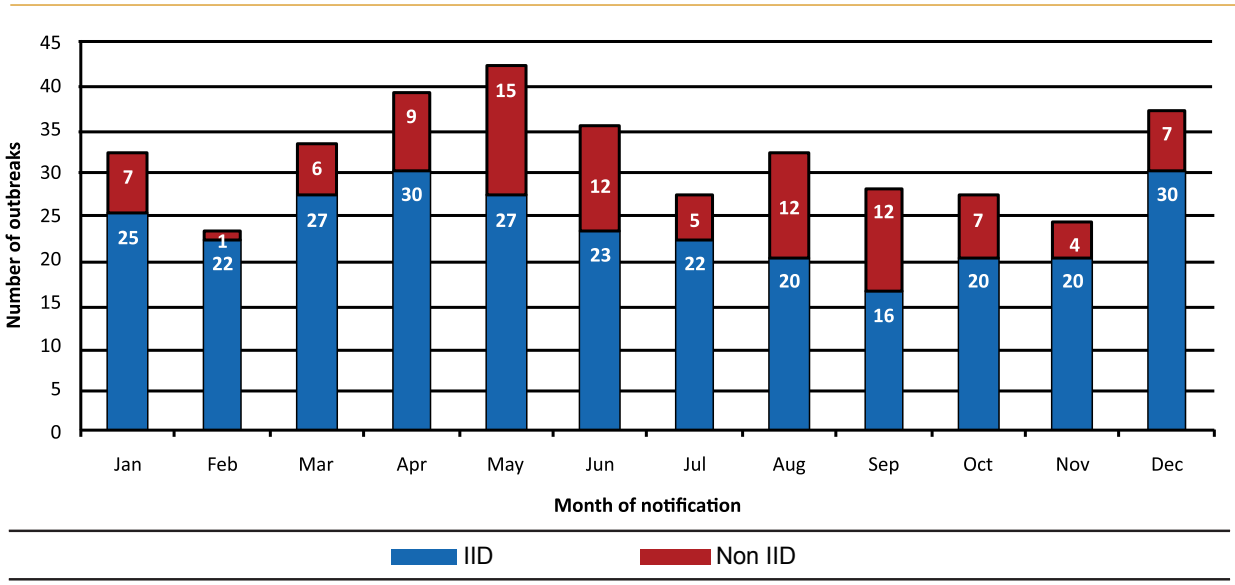


Figure 2: Number of IID and non-IID outbreaks by month of notification, 2011

Table 5: Non-IID outbreak summary by HSE area, 2011

HSE area	Number of outbreaks	Outbreak rate per 100,000	Number ill	Number hospitalised	Number of deaths
HSE-E	58	3.6	340	45	4
HSE-M	6	2.1	17	1	0
HSE-MW	2	0.5	7	2	
HSE-NE	4	0.0	13	8	0
HSE-NW	6	2.3	32	4	0
HSE-SE	6	1.2	40	8	1
HSE-S	12	1.8	115	3	0
HSE-W	3	0.7	13	3	0
Total	97	2.1	577	74	5

† Including 53 IID outbreaks reported as person to person and airborne transmission and 4 reported as person-to-person and animal transmission
§ Includes all norovirus outbreaks and AIG outbreaks where organism was suspected norovirus, suspected viral or not specified

Person-to-person (P-P) spread[†] was the most frequently reported mode of transmission implicated in IID outbreaks during 2011 (65.2%, n=184).

In 2011, the number of IID outbreaks peaked during March, April and May with a second peak during December. The first peak was mainly due to high numbers of norovirus/ suspected norovirus outbreaks, with 19 norovirus/ suspected norovirus outbreaks reported during March, 14 during April and 16 during May. The second peak in December was also mainly due to norovirus/ suspected norovirus outbreaks (n=17) but also included eight VTEC outbreaks. Figure 2 illustrates the number of IID and non-IID outbreaks by month of notification during 2011.

Non-IID outbreaks:
During 2011, 97 outbreaks of non-IID diseases were reported, representing 25.6% of all outbreaks notified nationally. The most common non-IID outbreak diseases were measles (26.8%, n=26), pertussis (22.7%, n=22) and hand, foot and mouth disease/suspected HFMD (11.3%, n=11). Table 5 details the regional distribution of non-IID outbreaks while the number of general and family outbreaks of non-IID disease and numbers ill are outlined in Table 6.

The number of non-IID outbreaks also peaked during May and June and was due to was due to high numbers of hand, foot and mouth disease (HFMD)/ suspected HFMD outbreaks, measles and pertussis outbreaks reported. A smaller secondary peak was also observed in August and September which was due to measles and pertussis (figure 2).

The most frequently reported locations for non-IID outbreaks were private houses (n=24), crèches (n=17) and schools (n=13) as shown in table 2. Non-IID outbreaks in these locations were most frequently caused by pertussis, measles and hand, foot and mouth disease (HFMD)/ suspected HFMD.

Person-to-person (P-P) spread[§] was the most frequently reported mode of transmission implicated in non-IID outbreaks during 2011 (78.4%, n=76).

The information gathered from outbreaks reported is used to inform public health professionals on the causes and factors contributing to outbreaks, to target prevention strategies and to monitor the effectiveness of prevention programmes.

For further information on disease specific outbreaks, please refer to the individual disease chapter.

Table 6: Number of family and general non–IID outbreaks by disease, 2011

Outbreak disease/pathogen	Family outbreak		General outbreak		Total Non-IID outbreaks	
	Number outbreaks	Number ill	Number outbreaks	Number ill	Number outbreaks	Number ill
Measles	9	38	17	114	**26**	**152**
Pertussis	18	69	4	21	**22**	**90**
Hand, foot and mouth disease/ suspected HFMD	0	0	11	83	**11**	**83**
Tuberculosis	2	8	3	19	**5**	**27**
Influenza	1	3	3	25	**4**	**28**
Influenza-like illness	0	0	4	46	**4**	**46**
Enterovirus/ suspected enterovirus	0	0	4	19	**4**	**19**
Mumps	2	4	1	3	**3**	**7**
Varicella/ suspected varicella	1	2	2	7	**3**	**9**
Carbapenem resistant Enterobacteriaceae (CRE)	0	0	2	10	**2**	**10**
Scabies/ suspected scabies	0	0	2	49	**2**	**49**
Legionellosis	1	2	0	0	**1**	**2**
Viral meningitis	1	2	0	0	**1**	**2**
Malaria	1	5	0	0	**1**	**5**
Meningococcal disease	1	2	0	0	**1**	**2**
Staphylococcus aureus infection	0	0	1	10	**1**	**10**
Vancomycin Resistant Enterococci (VRE)	0	0	1	3	**1**	**3**
Suspected Coxsackie 16	0	0	1	15	**1**	**15**
Human metapneumovirus	0	0	1	11	**1**	**11**
Scarlet Fever	0	0	1	2	**1**	**2**
Klebsiella pneumoniae KPC	0	0	1	2	**1**	**2**
MRSA	0	0	1	3	**1**	**3**
Total	37	135	60	442	97	577

[†] Including 53 IID outbreaks reported as person to person and airborne transmission and 4 reported as person-to-person and animal transmission
[§]Including 26 non-IID outbreaks reported as person to person and airborne transmission

08

Immunisation Uptake

8. Immunisation Uptake

Summary

Among children 12 months of age in 2011 uptake of:

D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2 was 90%

Among children 24 months of age in 2011 uptake of:

D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ reached the target of 95% for the first time

MMR_1 was 92%

PCV_3 was 90%

Hib_b was 88%

$MenC_3$ was 84%

$MenC_3$ and Hib_b uptake are considerably lower than the uptake of the other recommended vaccines, both of which should be given to children at 13 months of age, suggesting that children are less likely to get the necessary vaccines at this age.

In 2011, 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 2011 quarterly data. The proportion of children who completed the recommended childhood immunisation schedule by 12 months (born between 01/01/2010 and 31/12/2010) and 24 months (born between 01/01/2009 and 31/12/2009) of age in 2011 are reported.

Since September 1st 2008 the new primary childhood immunisation schedule has been implemented for children born on or after July 1st 2008 (table 1). These children should receive one dose of vaccine against tuberculosis (BCG vaccine) at birth or by one month of age; three doses of vaccines against diphtheria (D_3), tetanus (T_3), pertussis (P_3), *Haemophilus influenzae* type b (Hib_3), polio ($Polio_3$) and Hepatitis B ($HepB_3$) with one dose of each given at two, four and six months of age; three doses of pneumococcal conjugate vaccine (PCV_3) given at two, six and 12 months of age and three doses of meningococcal group C ($MenC_3$) vaccine given at four, six and 13 months of age. Also at 12 months of age a dose of MMR (MMR_1) is recommended and at 13 months a booster dose of Hib (Hib_b) is recommended. Further vaccinations are recommended for older children and adults; please see www.immunisation.ie for complete information on the Irish immunisation schedule.

In children who reached 12 months of age in 2011 (born between 01/01/2010 and 31/12/2010) uptake of BCG, D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$ and two doses of PCV (PCV_2) and MenC ($MenC_2$) were measured. In children who reached 24 months of age in 2011 (born between 01/01/2009 and 31/12/2009) uptake of D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_3$, PCV_3, MMR_1 and Hib_b were measured.

The immunisation uptake rates are reported here by HSE Area and LHO. 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 2010 and 2011 data

Not all HSE Areas were able to provide data during 2010 and 2011.

- BCG uptake data were available for the HSE-MW, HSE-NW and HSE-SE Areas in Quarters 1-4 2010 and 2011, for the HSE-M in Quarters 3 and 4 2010 and Quarters 1-4 2011, for the HSE-S in Quarter 4 2010 and in Quarters 1-4 2011 and the HSE-W in Quarters 3-4 2011. In Quarters 3 and 4 2011 the HSE-W reported BCG uptake data (4%), for children at 12 months of age for the first time, resulting in a low national uptake rate (85%) compared to previous years. This is not a true decline as uptake rates are based on available data and the HSE-W BCG data were not available previously. Traditionally BCG was given at age 10 - 12 years in the HSE-W. HSE-W BCG data were not available by LHO. The available national BCG cohort data may be around 31% of the national birth cohort in 2010 and 48% of the national birth cohort in 2011 (these figures are estimates only).

- Data in 2011 are compared here to data in 2010. As a new childhood immunisation schedule was introduced in 2008, for those born on or after July 1st 2008, the 2010 $HepB_3$ and PCV_3 data at 24 months are for those born between July 1st and December 31st 2008 (i.e. Quarters 3 and 4 2010 data) only. As not all HSE Areas were able to provide data for each quarter in 2010 a number of figures in 2010 are incomplete, this is detailed in the 2010 annual report. For both these reasons some figures for 2010 may reflect data from less than four quarters and in some cases reflect data from one quarter only. The available 2010 national 12 month D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$ and PCV_2 cohort data may be around 87% (this figure is an estimate only) of the 2010 national birth cohort and the available $MenC_2$ cohort may be around 85% (this figure is an estimate only) of the 2010 national birth cohort. The available 2010 national 24 month cohort data may be around 89-90% (this figure is an estimate only) of the 2010 national birth cohort.

Immunisation uptake rates at 12 months

National immunisation uptake rates, in children 12 months of age in 2011, were 90% for D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2 and 85% (based on available data) for BCG (table 2). Compared with 2010, the uptake rates for D_3, P_3, T_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2 increased by one percent in 2011. In Quarters 3 and 4 2011, the HSE-W reported BCG uptake data (4%) for the first time, resulting in a low national uptake rate (85%) compared to the national uptake in 2010 (95%). This is not a true decline as national uptake rates are based on available data and the HSE-W BCG data were not available previously.

Among the HSE Areas, uptake rates for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ ranged from 89% to 95%, $MenC_2$ ranged from 86% to 94% and PCV_2 ranged from 85% to 94% (table 2). The target uptake of 95% was reached during 2011 in the HSE-M for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$. This is the first time a HSE Area has reached the target of 95% for these vaccines in children at 12 months of age. Among the LHOs, uptake rates for D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$ and $MenC_2$ ranged from 81% to 96% and PCV_2 ranged from 81% to 97% (appendix 2.1). The target uptake of 95% was reached or exceeded in Longford/Westmeath and Roscommon for D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2 and reached in Sligo/Leitrim for PCV_2 (appendix 2.1). The target uptake of 95% was reached or exceeded for BCG in ten LHOs reporting data (appendix 2.1).

Immunisation uptake rates at 24 months

National immunisation uptake rates, in children 24 months of age in 2011, reached the target of 95% for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ for the first time and were 92% for MMR_1, 90% for PCV_3, 88% for Hib_b and 84% for $MenC_3$ (table 2). Compared with 2010, the uptake rates for $MenC_3$ declined by two percent, Hib_b increased by three percent, MMR_1 and PCV_3 increased by two percent and D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ increased by one percent (figure 1).

Since September 1st 2008 the new primary childhood immunisation schedule has been implemented for children born on or after July 1st 2008 (table 1); children who were 24 months of age in Quarter 3 2010 were born between July 1st and September 31st 2008 and were the first children recommended the new immunisation schedule. Under the new immunisation schedule children are now recommended HepB vaccine and PCV. In addition, there is a change in timing of the MenC and Hib_b vaccines (table 1). The changes to the schedule mean that three injections (6 in 1, PCV and MenC vaccines) are now recommended at six months of age and two GP visits are required on or after 12

Table 1. Change in primary childhood immunisation schedule (introduced on September 1st 2008)

Age	Children born before 01/07/2008	Children born on or after 01/07/2008
Birth	BCG	BCG
2 months	DTaP/Hib/IPV (5 in 1) + MenC	DTaP/Hib/IPV/HepB (6 in 1) + PCV
4 months	DTaP/Hib/IPV (5 in 1) + MenC	DTaP/Hib/IPV/HepB (6 in 1) + MenC
6 months	DTaP/Hib/IPV (5 in 1) + MenC	DTaP/Hib/IPV/HepB (6 in 1) + PCV + MenC
12 months	MMR + Hib	MMR + PCV
13 months	-	MenC + Hib

Please see www.immunisation.ie for complete information on the Irish childhood immunisation schedule including vaccinations for older children and adults

BCG	Bacille Calmette Guerin vaccine
DTaP	Diphtheria, Tetanus and acellular Pertussis vaccine
Hib	*Haemophilus influenzae* type b vaccine
IPV	Inactivated Polio Virus vaccine
MenC	Meningococcal group C vaccine
HepB	Hepatitis B vaccine
PCV	Pneumococcal Conjugate Vaccine
MMR	Measles, Mumps and Rubella vaccine

months; the first dose of MMR and the third dose of PCV should be given at 12 months of age and at 13 months of age the third dose of MenC vaccine and Hib_b should be given (table 1). $MenC_3$ uptake was 93% in Quarter 1 2010 but declined to 80% in Quarter 3 2010 and was 82% in Quarter 4 2010 (figure 2). During 2011, $MenC_3$ increased from 83% in Quarters 1 and 2 to 85% in Quarters 3 and 4. Hib_b was 87% in Quarters 1 and 2 2010 but declined to 84% in Quarters 3 and 4 2010 (figure 2). During 2011 Hib_b uptake increased from 86% in Quarter 1 to 90% in Quarter 4. There was also low uptake of PCV_3 in 2010 (combined Quarters 3 and 4

Table 2. Annual immunisation uptake rates (based on available data) by HSE Area for children 12 and 24 months of age in 2011

	% Uptake at 12 months Cohort born 01/01/2010 - 31/12/2010					% Uptake at 24 months Cohort born 01/01/2009 - 31/12/2009					
	D_3	$HepB_3$	$MenC_2$	PCV_2	BCG	D_3	Hib_b	$HepB_3$	$MenC_3$	PCV_3	MMR_1
HSE-E	89	89	89	89	na	94	87	94	82	89	90
HSE-M	95	95	94	94	94	97	95	97	89	94	96
HSE-MW	92	92	92	93	97	96	89	96	86	92	93
HSE-NE	90	90	89	89	na	96	88	96	85	92	92
HSE-NW	94	93	93	94	95	97	93	96	86	90	94
HSE-SE	92	92	92	92	96	95	94	95	86	91	93
HSE-S	89	89	86	85	90	96	82	95	84	91	93
HSE-W	91	91	91	91	4	94	81	94	81	89	90
Ireland	**90**	**90**	**90**	**90**	**85**	**95**	**88**	**95**	**84**	**90**	**92**

na=not available
Since T_3, P_3, Hib_3 and $Polio_3$ uptake identical to D_3 uptake only D_3 uptake figures presented

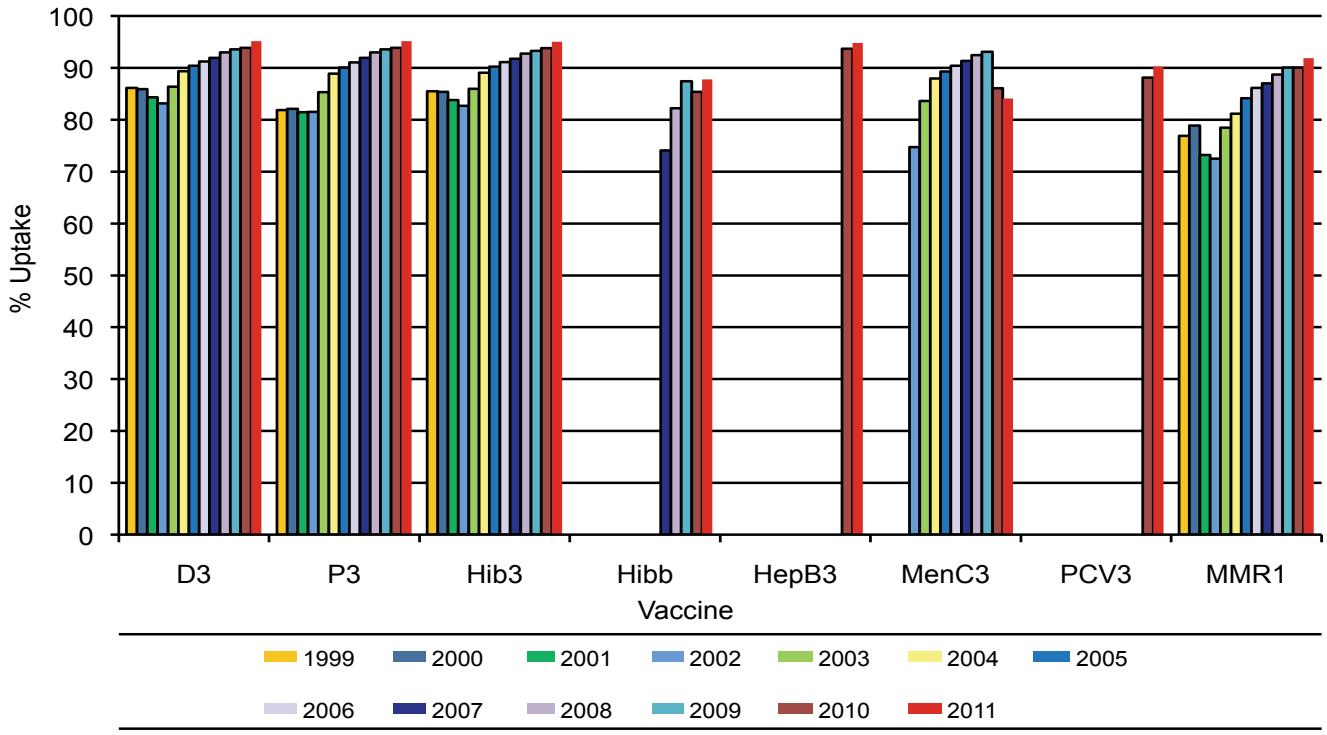


Figure 1. National annual immunisation uptake rates (based on available data) at 24 months, 1999-2011

Since T_3 and $Polio_3$ uptake identical to D_3 uptake only D_3 uptake figures presented.
P_3 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 $MenC_3$ figure is based on uptake rates for Quarter 3 and Quarter 4 2002 only. The 2005 MMR_1 uptake figure is incomplete as the HSE-E was unable to provide MMR data for Quarter-4 2005, due to technical problems with extraction of MMR_1 data from the HSE-E database. The 2006 MMR_1 figure includes the Quarter-1 2006 HSE-E figure, which is an estimate only due to technical problems with extraction of MMR_1 data from the HSE-E database. 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 $MenC_3$ figure is incomplete as the HSE-E and HSE-MW $MenC_3$ data for Quarter 3 2008 were not available. The 2009 data are incomplete as the following were unavailable: the Quarter 1 2009 HSE-E D_3, T_3, P_3 and $Polio_3$ 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 $HepB_3$ and PCV_3 data at 24 months are for those born between July 1st and December 31st 2008 (i.e. Quarters 3 and 4 2010 data) only.

data was 88%). During 2011, PCV_3 increased from 90% during Quarters 1 and 2 to 91% during Quarters 3 and 4.

Uptake rates among the HSE Areas, for children at 24 months of age in 2011, for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ ranged from 94% to 97%, MMR_1 ranged from 90% to 96%, PCV_3 ranged from 89% to 94%, Hib_b ranged from 81-95% and $MenC_3$ ranged from 81% to 89% (table 2). The target uptake of 95% was reached or exceeded during 2011 in the HSE-M for D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, Hib_b and MMR_1 and in the HSE-MW, HSE-NE, HSE-NW, HSE-SE and HSE-S for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ (table 2).

D_3, Hib_b, $MenC_3$ and MMR_1 uptake rates are mapped by LHO in figure 3. Among the LHOs the uptake rates ranged from 90% to 98% for D_3, T_3, P_3 and $Polio_3$, 89% to 98% for Hib_3 and $HepB_3$, 85% to 97% for MMR_1, 83% to 98% for PCV_3, 76% to 96% for $MenC_3$ and 75% to 97% for Hib_b (appendix 2.2). The target uptake of 95% was reached or exceeded in 22 LHOs for D_3, T_3, P_3 and $Polio_3$, in 21 LHOs for Hib_3, in 19 LHOs for $HepB_3$, in six LHOs for MMR_1, in four LHOs for Hib_b and in one LHO for $MenC_3$ and PCV_3 (appendix 2.2). Roscommon was the only LHO to reach and exceed the target of 95% for all vaccines at 24 months.

There was a large decline in $MenC_3$ and a decline in Hib_b uptake at 24 months in Quarters 3 and 4 2010 i.e. children who were born between July 1st and December 31st 2008 and were the first recommended the new immunisation schedule. There is a change in timing of the MenC and Hib_b vaccines under the new immunisation schedule (table 1). During 2011 a joint study was carried out in four of the HSE Areas to identify reasons for the apparent decline in uptake. As part of the study work was done to determine if the local immunisation databases accurately reflected immunisation uptake for the group of children who were 24 months of age in Quarter 3 2010 as well as to identify possible reasons for children missing the recommended vaccines.[1] A key finding of this study was that most parents did not know their children were incompletely vaccinated and were unaware of the need for their child to visit the GP at 13 months for the MenC and Hib_b vaccination. The findings were used to inform communication to GPs and practice nurses as well as the development of new information materials by the National Immunisation Office for parents.[2] The information campaign highlighted the importance of completing five GP visits to ensure children are fully vaccinated. While the quarterly uptake of these vaccines increased in 2011 compared to 2010 $MenC_3$ and Hib_b uptake are still considerably lower than the uptake of the other recommended vaccines, both of which should be given at 13 months of age suggesting that children are less likely to get the necessary vaccines at this age. In addition, MMR_1 (92%) and PCV_3 (90%) uptake are lower than the target uptake of 95%.

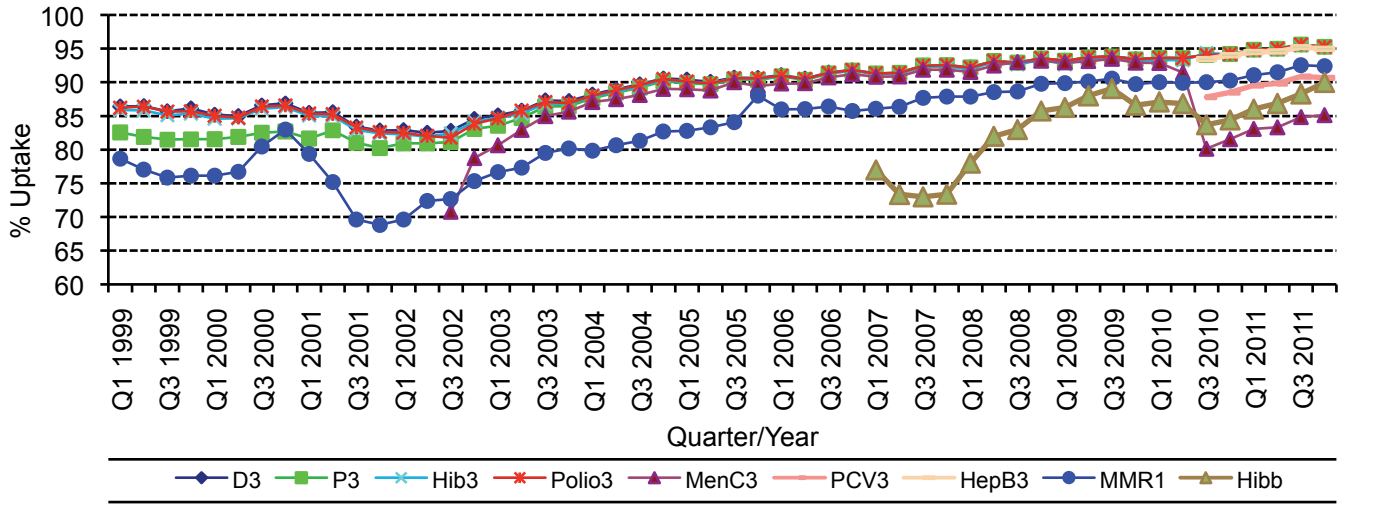


Figure 2. National quarterly immunisation uptake rates at 24 months

Note scale ranges from 60-100%

P_3 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 Q4-2005 MMR_1 figure is based on data from seven of the eight HSE-Areas. The Q1-2006 MMR_1 figure includes the HSE-E figure that is an estimate only. The Q1-2007, Q3-2007, Q2-2008 and Q3-2008 Hib_b figures are based on data from seven of the eight HSE Areas. In Q1-2008 the HSE-SE changed their Hib_b data extraction method compared to previous quarters; in Q1-2008 the uptake of Hib_b in the HSE-SE was 83% compared to 53% in Q4-2007. The Q3-2008 $MenC_3$ figure is based on data from six of the eight HSE Areas. The Q1-2009 HSE-E D_3, P_3, T_3, $Polio_3$ and MMR_1 uptake figures exclude those born on the 31/03/2007. The Q2-2009 HSE-E Hib_b uptake figures exclude uptake figures from Dublin North. The Q4-2009 figures are based on data from seven of the eight HSE Areas. The Q4-2009 Hib_b figures also exclude uptake figures from Dublin North 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 Q1-2010 figures are based on data from six of the eight HSE Areas. The Q1-2010 Hib_b figures also exclude uptake figures from HSE-E Dublin North. The Q2-2010 and Q4-2010 figures are based on data from seven of the eight HSE Areas.

In contrast in 2011, national uptake rates at 24 months for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ reached the target rate of 95% for the first time. Among the HSE Areas the target uptake of 95% was reached or exceeded for those at 24 months during 2011 in the HSE-M for D_3, T_3, P_3, Hib_3, Hib_b, $Polio_3$, $HepB_3$ and MMR_1 and in the HSE-MW, HSE-NE, HSE-NW, HSE-SE and HSE-S for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$. Roscommon exceeded the target of 95% for all vaccines at 24 months.

The 2011 immunisation uptake rates for each LHO are presented in appendix 2. The immunisation reports for Quarters 1 to 4 2011 are available on the HPSC website in *Topics A-Z* under the heading *vaccination*.

References

1. **Rebolledo J, Cotter S, Gee S, Corcoran B (on behalf of the HSE $MenC_3$ decline investigation team).** Study examines decline in $MenC_3$ and Hib booster vaccination uptake. *Epi-Insight* 2011; **12**(10). Available on-line: http://ndsc.newsweaver.ie/epiinsight/1vgnwz0l64n1cyivlh5r33?a=1&p=17742945&t=17517774
2. **HSE National Immunisation Office** http://www.immunisation.ie/

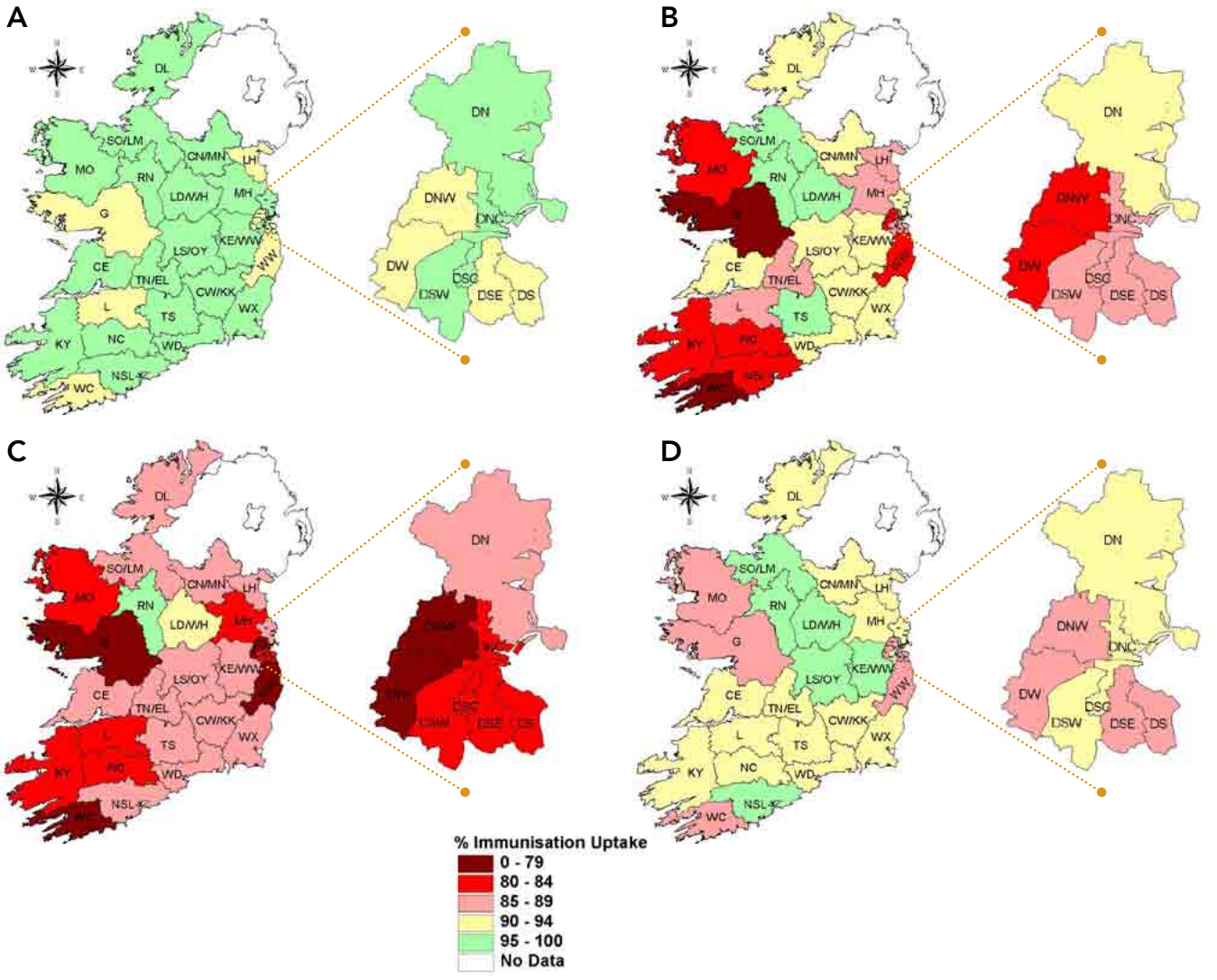


Figure 3. D_3 (A), Hib_b (B), $MenC_3$ (C) and MMR_1 (D) immunisation uptake rates (%) in those 24 months of age in 2011 by Local Health Office (LHO)

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 appendix 2.3 to translate LHO codes

09

Healthcare-Associated Infections
Antimicrobial Consumption
Antimicrobial Resistance

9.1.0 Healthcare-associated infections (HCAI)

Key Points

- In 2011, 1,848 new cases of *Clostridium difficile*-infection (CDI) were notified. This represents a national crude incidence rate of 40.3 new cases per 100,000 population, an increase of 9.2% from 2010
- Of the 1,848 new CDI cases, 1,223 (66%) were reported from patients aged over 65 years
- In the voluntary enhanced surveillance scheme, 1,511 CDI cases [1,396 (92.3%) new and 107 (7.1%) recurrent] were reported from 41 acute hospitals. The national CDI incidence rate was 3.1 cases per 10,000 bed days used, which represents an increase from 2.8 in 2010. Twenty percent of all CDI cases were associated with the community and 9.5% were associated with nursing homes. While the majority of patients experienced onset of symptoms in healthcare facilities, 27% had onset of symptoms in the community
- Of the 204 specimens (14% of all samples) for which ribotyping data were available (from ten hospitals), the most common ribotypes reported were: 027 and 078 (n=26, 13% each), 014 (n=23, 11%), 005 (n=21, 10%), and 002 (n=17, 8%)

9.1.1 *Clostridium difficile* Infection

Notifiable *C. difficile* infection: New cases
New cases of CDI in persons two years or older have been notifiable in Ireland under the disease category "acute infectious gastroenteritis" (AIG) since May 2008. In 2011, recurrent CDI cases were not notifiable.

There were 1,848 cases of new CDI notified to Public Health Departments via the Computerised Infectious Diseases Reporting (CIDR) system in 2011. All cases were laboratory confirmed. This represents a national crude incidence rate (CIR) of 40.3 new CDI cases per 100,000 population, an increase of 9.2% from 36.9 cases per 100,000 population reported in 2010 (**Table 1**). Regional variation was observed in the incidence of CDI (Table 1). However, this most likely reflects differences in laboratory diagnosis and reporting rather than true variation in disease incidence. Identification of seasonal patterns in the CIDR data is hindered by late and batch notifications from laboratories.

As in 2010, the majority of new cases were in female patients (60.2%) and in older age groups. The mean age of cases was 67.6 years (range 2-98 years) (**Figure 1**) with 1,223 cases (66%) reported in patients aged over 65 years. Of note, the 75-84 year age group had the highest number of cases (n=504), representing 40.8% of the over 65 year age group.

The majority of cases were classified as 'hospital inpatient' (76%), with 11% classified as general practice patients, 3.8% as hospital outpatients or day patients,

Table 1. Number of notified cases, crude incidence rate of CDI in Ireland by HSE area, 2011, and total number with crude incidence rate for 2010 (Source, CIDR)

HSE Area	No. of cases	*CIR incl. 95% C.I.
East	781	48.2 (44.8 - 51.6)
Midlands	50	17.7 (12.8 - 22.6)
Mid West	96	25.3 (20.2 - 30.4)
North East	81	18.4 (14.4 - 22.4)
North West	79	30.6 (23.9 - 37.3)
South East	262	39.4 (34.6 - 44.2)
South	293	58.9 (52.2 - 65.6)
West	206	46.3 (40 - 52.6)
Total 2011	**1848**	**40.3 (38.5 - 42.1)**
Total 2010	**1693**	**36.9 (35.1 - 38.7)**

* Rates calculated using 2011 census data

5% as Emergency Department patients, and 4.1% as either 'other', 'not specified' or 'unknown'. However, this data does not provide information on the origin or onset of CDI, rather it represents the location of the patient at the time of CDI diagnosis. Information on the origin and onset of CDI cases is collected as part of the enhanced surveillance system.

Notifiable *C. difficile* infection: Outbreaks

In 2011, eight outbreaks of *C. difficile* infection, all healthcare-associated and involving 35 patients, were notified to Public Health Departments (**Table 2**). Four were linked to hospitals, two to nursing homes and two to long-term care facilities.

Enhanced surveillance of *C. difficile* infection

Although the notifiable CDI data provides important preliminary information on the burden of new cases of CDI in Ireland in 2011, it represents an underestimate of the true burden of CDI, as recurrent CDI cases are not captured and it does not capture information on the origin, onset or severity of CDI. National collation of *C. difficile* enhanced surveillance commenced on a voluntary basis on 1st August 2009. Information on case type, origin, onset and severity of CDI is collected using the European Society for Clinical Microbiology and Infectious Diseases Study Group on *C. difficile* (ESCMID-ESGCD) case definitions. By the end of 2011, 41 hospitals participated in the voluntary enhanced surveillance CDI scheme, comprising 35 acute public hospitals (24 general, eight tertiary and three specialist hospitals) and six private hospitals.

In 2011, 1,511 cases of CDI were reported to the enhanced surveillance scheme. Of these, 1,396 (92.3%) were classified as new CDI cases (representing 76% of all the new CDI cases notified to Public Health Departments via CIDR) and 107 (7.1%) as recurrent with eight (0.6%) of unknown case type. Of the reported cases, 57% (n=862) originated within the reporting healthcare facility, which corresponds to an overall national CDI incidence rate of 3.1 cases per 10,000 bed days used. The CDI rate has remained relatively stable since August 2009 with small fluctuations that are likely to be largely as a result of changes in laboratory testing protocols for *C. difficile* (**Figure 2**). (See Laboratory Survey of *C. difficile* Diagnostic and Reporting Practices below). The rate is based only on the number of new and recurrent CDI cases that originated in the participating healthcare facility and is calculated using acute public hospital activity data from the Business Intelligence Unit, Corporate Planning and Corporate Performance (CPCP) at the Health Services Executive (HSE). There was a wide range in the incidence of CDI among participating hospitals in 2011 (range, 0 – 7.8 cases per 10,000 bed days used; median, 2.2 cases). Tertiary hospitals (n=8) showed a higher median incidence rate compared to general hospitals (n = 24) (CDI rate = 2.8 versus 1.75 CDI cases per 10,000 BDU)). These differences in CDI median incidence rates may reflect inter-hospital variations in patient case mix, *C. difficile* ribotypes, laboratory testing protocols, antimicrobial prescribing policies, antimicrobial stewardship interventions and surveillance resources. No obvious seasonal trend for CDI in Ireland is distinguishable for 2011.

Table 2. CDI outbreaks reported in Ireland in 2011 by HSE area (Source, CIDR)

HSE Region	Outbreak location	Total number ill
East	Residential Home	3
East	Community Hospital/ Long Stay Unit	4
East	Hospital	6
East	Residential Home	2
East	Hospital	8
North East	Community Hospital/ Long Stay Unit	2
South	Hospital	2
West	Hospital	8

Severe CDI

A severe case of CDI is defined as a patient requiring admission to an intensive care unit (ICU) for treatment of CDI or its complications, a patient requiring colectomy or death within 30 days after diagnosis, if CDI is either the primary or contributory cause of death. Twenty-one (1.4%) severe cases were reported in 2011, which is similar to 2010 (1.6%); three patients required both surgery and ICU admission, five required surgery only and 13 required ICU admission without surgery. As for notifiable CDI, most cases reported through the enhanced surveillance scheme were female (61%) and in the over 65 age group (69%). Forty-three deaths were reported, of which two were directly attributed to CDI and 24 were not directly attributed to CDI. The cause of death for the remainder was either unknown or not specified.

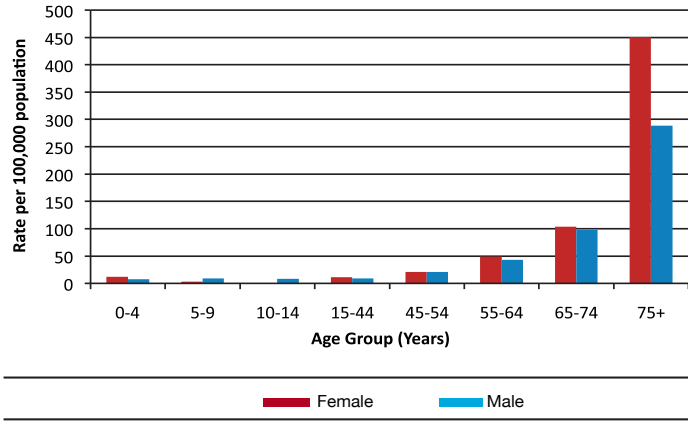


Figure 1: Age and Sex distribution of CDI in Ireland, 2011 (Source, CIDR)

** Rates calculated using 2011 census data*

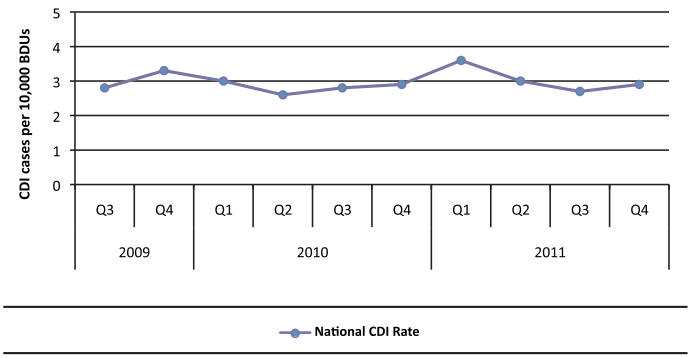


Figure 2. The quarterly rate of C. difficile infection in Ireland: 2009 - 2011)

Onset & origin of CDI

Onset: Patient location when symptoms of CDI commenced

Seventy-one percent (n=1,078) of patients had onset of CDI symptoms in a healthcare facility – healthcare onset (HCO), with 78% (n=841) of these occurring in the reporting hospital, 6% (n=69) in another hospital and 14% (n=149) in a nursing home (**Figure 3**). The remainder (n=19) had onset in another unspecified healthcare facility or of unknown onset. However, 27% (n=405) of all CDI cases had onset of symptoms in the community – community onset (CO), with 92% of these reported as unknown location of onset. A similar profile was reported in 2010 (**Figure 3**).

Origin: Location where the patient acquired the CDI

The majority of CDI cases, 74% (n=1,112) were healthcare-associated (HCA). Community-associated (CA) cases accounted for 20% (n = 300). The origin of 3% (n = 44) of CDI cases was unknown (i.e. the patient had been discharged from a healthcare facility between 4 and 12 weeks prior to CDI onset) and for the remaining 3% (n = 55) cases no information on case origin was provided.

Of the 1,112 HCA CDI cases, 76% (n=862) originated in the reporting hospital, 8% (n=89) originated in other hospitals, 13% (n=143) originated in nursing homes and 3% (n=18) originated in another unspecified healthcare facility or were of unknown origin (**Figure 3**).

Of the 1,112 HCA CDI patients:

- 92% (n=1,025) experienced onset of CDI symptoms at least 48 hours following admission to a healthcare facility (healthcare-onset, healthcare-associated)
- 7.5% (n=81) patients experienced symptom onset in the community within four weeks of discharge from a healthcare facility (community-onset, healthcare-associated)
- 0.5% (n = 6) of patients had no information recorded on symptom onset

Of the 300 CA CDI cases:

- 88% (n=265) patients experienced onset of CDI symptoms while outside a healthcare facility and without a history of discharge from a healthcare facility within the previous 12 weeks
- 11% (n=33) patients 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

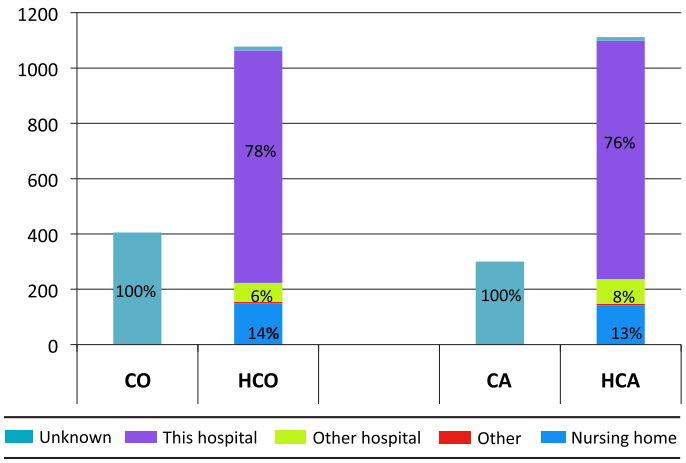


Figure 3. CDI Origin and Onset by Location where CDI Case Originated, 2011

CO: Community-onset; HCO: Healthcare-onset; CA: Community-associated CDI; HCA: Healthcare-associated CDI

No origin facility information was collected on the community-associated cases as this information is too resource-intensive to follow up on outside of the accute hospital setting.

In the second half of 2011, information was captured on the location where the patient's faecal specimen was taken. The reporting hospital accounted for the majority (65%) of patient specimens (n=483), whilst 3.5% (n=26) were taken in the GP practice, 5% (n=38) were taken in nursing homes, and 4% (n=21) were taken in a hospital other than the reporting hospital. For the remaining 24% (n=177) of specimens, no information was provided.

The collation of national data on *C. difficile* through CIDR notifications of new CDI cases and the enhanced CDI surveillance system, which captures both new and recurrent cases has provided a valuable insight into the burden of CDI in Ireland. There was an increase in the number of new CDI cases reported in 2011 compared to 2010. However, this underlying reason for this may be due to changes in laboratory testing protocols for *C. difficile*. (See Laboratory Survey of *C. difficile* Diagnostic and Reporting Practices below). In 2011, 7% of all CDI cases reported through the enhanced surveillance scheme were recurrent infections compared with 8% in 2010 and 14% in 2009. This may represent an improvement in infection prevention and control strategies and management of patients with CDI. However, it may also reflect changes in laboratory testing protocols. Recurrent CDI is difficult to manage clinically and just like new CDI, can result in severe infection, places a burden on limited isolation resources and results in significant patient morbidity. Therefore, knowledge of the burden of recurrent CDI in Ireland is essential to help guide preventative strategies.

During 2011 and 2010, 20% of all CDI cases were associated with the community and 10% of cases were associated with nursing homes, an increase from 8% in 2010. Moreover, 27% of all CDI cases had onset of symptoms in the community, consistent with the figure reported in 2010. This indicates that *C. difficile* infection is not confined to hospitals and is increasingly common in community and nursing home settings. It is essential that CDI is considered in the differential diagnosis of all patients presenting with diarrhoea and that specimens are sent in a timely fashion for laboratory diagnosis. Patients with CDI in healthcare facilities must be isolated with contact precautions as outlined in national guidelines. http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/Clostridiumdifficile/Publications/File,2936,en.pdf. All healthcare professionals must promote practices known to reduce the incidence of CDI including; compliance with infection prevention and control measures, awareness of local CDI surveillance data and prudent use of antimicrobials. The national guidelines for antimicrobial stewardship in hospitals in Ireland are available at: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/strategyforthecontrolofAntimicrobialResistanceinIrelandSARI/AntibioticStewardship/Publications/

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 have a national *C. difficile* reference laboratory or ribotyping service. Therefore, laboratories submit specimens abroad for ribotyping. In 2011, ribotyping data was provided for 204 *C. difficile* isolates (14% of all samples) submitted from ten hospitals. The most common ribotypes reported were: 027 and 078 (n=26, 13% each), 014 (n=23, 11%), 005 (n=21, 10%), and 002 (n=17, 8%). In 2011, one hospital reported that 74% of healthcare-associated *C. difficile* isolates from 2011 were ribotyped. The most common ribotypes reported from that hospital were: 005 (n=14), 014 (n=12), 002 and 078 (n=11 each), 020 (n=8) and 027 (n=5).

Laboratory Survey of *C. difficile* diagnostic and reporting practices: 2011

Twenty-five of 29 Irish microbiology laboratories responding to a 2006 laboratory survey on *C. difficile* diagnostic practices performed on-site testing for *C. difficile* and all 25 reported use of an enzyme immunoassay for toxin detection. In all but one laboratory, the assay in use detected both toxin A and toxin B.

In May 2008, all new CDI cases became notifiable under the category of 'Acute Infectious Gastroenteritis' (AIG). In August 2009, the national voluntary *C. difficile* enhanced surveillance scheme commenced, collecting information on CDI case type (both new and recurrent cases), origin, onset and severity. Changes in the recommended *C. difficile* laboratory testing practice were proposed in 2009 and 2010 by the European Society for Clinical Microbiology and Infectious Diseases (ESCMID) and the United Kingdom (UK) National Health Service (NHS).

The Irish laboratory survey was repeated in 2011. Of the 37 laboratories responding, 33 performed on-site testing for *C. difficile* and 58% reported a change to their testing algorithm in the past two years. The majority of laboratories (74%) reporting changed testing had moved from a one-step to a two-step testing algorithm. Seventeen (52%) continued to use a one-step test, whilst 16 (48%) used a two-step testing algorithm. For two-step algorithms, a variety of testing methodologies were in use (Table 3). Owing to considerable variations in current Irish laboratory *C. difficile* testing methodologies, inter-hospital comparison of CDI rates is not recommended as the data in the national quarterly enhanced surveillance reports are not adjusted for differences in the sensitivities of the different diagnostic methodologies used across the different laboratories.

With regard to PCR ribotyping of *C. difficile* isolates, the 2006 laboratory survey found that none of the laboratories surveyed routinely requested ribotyping and only 28% requested ribotyping in the setting of a suspected CDI outbreak. The 2011 repeat laboratory survey reported that 24 of 33 (73%) laboratories performing *C. difficile* testing reported having referred specimens for ribotyping. The criteria for referral varied between laboratories with 15 (62.5%) doing so in the event of an outbreak, 11 (46%) upon request and nine for severe infection (38%). Only four of 24 (17%) laboratories responding to the 2011 survey reported routine referral of specimens abroad for PCR ribotyping.

Table 3: Two-step testing algorithms in use in Irish microbiology laboratories – 2011

Step One	Step Two	Number of Laboratories
GDH	TOXIN EIA	11
GDH	TOXIN GENE PCR	4
TOXIN EIA	TOXIGENIC CULTURE	1

The 2011 microbiology laboratory survey also sought information regarding reporting practices for positive *C. difficile* laboratory results. Of the 37 laboratories, 35 (95%) provided information. The responses indicated local variation in the approach to notification with 19 laboratories (51%) routinely notifying all positive *C. difficile* laboratory results. Sixteen laboratories (43%) indicated that positive results were checked to ensure that the patient met the CDI case definition prior to notification and, for 12 of those 16 laboratories (75%), there was also local discussion of patients with positive *C. difficile* laboratory results in conjunction with the infection prevention and control team prior to notification. Twenty laboratories (54%) reported the existence of a mechanism to ensure correlation between CDI cases notified via CIDR and cases reported via the voluntary CDI enhanced surveillance scheme.

Conclusion

The first national *C. difficile* guidelines were published in May 2008. Since publication, there have been new developments in diagnosis and patient management and thanks to CIDR notification of new cases of CDI and the excellent participation in the voluntary CDI enhanced surveillance scheme, there has been a significant amount of information collected regarding the burden of CDI on the Irish healthcare system. There was an increase in the number of new CDI cases notified to CIDR between 2010 and 2011, which may partly be due to changes in laboratory testing protocols. Of the 1,511 CDI cases notified via enhanced surveillance, 92% were new and 7% were recurrent CDI. Twenty-seven percent of patients with CDI had symptom onset in the community.

For the purposes of CDI notification to public health and CDI enhanced surveillance, it is important that all positive *C. difficile* laboratory results are discussed with the clinician responsible for the patient to ascertain the following information:

1. That the patient with the positive laboratory test result for *C. difficile* meets the CDI case definition – if the case definition is not met, the laboratory result is not notifiable
2. Whether the patient has previously had a positive *C. difficile* test result within the past eight weeks:
   a. If yes, and the patient's diarrhoea had resolved but has subsequently returned, this represents recurrent CDI
   b. If yes, and the patient's diarrhoea has not yet resolved, this is a repeat positive specimen from the same CDI episode

The *C. difficile* Sub-Committee of the Health Protection Surveillance Centre reconvened in October 2011 to commence work on updating the 2008 *C. difficile* guideline document.

9.1.2 HCAI Surveillance

Key Points

Key points:

- This study provided an important baseline for CRE epidemiology in Irish critical care units.
- Thirty-five acute hospitals (30 public and five private) representing all regions of Ireland and incorporating 40 critical care units (37 adult and three paediatric) participated in this voluntary four-week pilot study. Eighty-four percent of public hospital critical care beds were captured in this study.
- Patients admitted to critical care units were screened weekly for rectal carriage of CRE. There were 839 opportunities to perform weekly rectal swabs for CRE carriage and 760 rectal swabs were taken, reflecting a compliance rate of 91% with the study screening protocol.
- The CRE screening swabs were processed according to a common laboratory protocol at 27 microbiology laboratories. Suspected CRE isolates were referred for confirmatory testing to the Antimicrobial Resistance and Microbial Ecology (ARME) Laboratory at NUI, Galway.
- CRE was not detected in 40 Irish critical care units during this four-week study. Five suspected CRE isolates were referred to ARME and none were confirmed as CRE.

9.1.2.1 Carbapenem Resistant *Enterobacteriaceae* (CRE) in Critical Care Units in Ireland: National Pilot Study – June 2011

Carbapenem resistant *Enterobacteriaceae* (CRE) are multi-drug resistant organisms for which extremely limited treatment options exist. CRE have emerged in Ireland since late 2010, including case reports and outbreaks. In June 2011, a national prevalence study systematically examined if patients admitted to Irish critical care units were colonised with carbapenemase-producing, carbapenem resistant *Enterobacteriaceae*.

Recommendations

- It is of critical importance that all senior healthcare facility management and healthcare workers ensure that systems are in place to detect and screen patients who are at risk of CRE, in accordance with the national CRE screening guidelines.
- Appropriate antimicrobial prescribing and good infection prevention and control practices by all are essential to prevent the emergence of CRE and other multi-drug resistant organisms. Hospitals should ensure that they have active antimicrobial stewardship programmes in line with national guidelines.
- A national reference laboratory service for confirmation and typing of antimicrobial-resistant Gram-negative bacilli, including CRE, should be established as a matter of urgency. In the interim, it is recommended that a service level agreement with an Irish laboratory is established to ensure that suspected CRE specimens are investigated and reported in a timely fashion.

The complete national report is available on the HPSC website: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/strategyforthecontrolofAntimicrobialResistanceinIrelandSARI/CarbapenemResistantEnterobacteriaceaeCRE/Nationalpilotstudyof CREinCriticalCareUnitsJune2011/

9.1.2.2 Healthcare-Associated Infections in Long Term Care Facilities in Ireland: 2011 Study

Key Points

- In total 5,922 residents were surveyed in 108 LTCFs, 84 of which were public and 24 private, an increase from 69 LTCFs that participated in the 2010 survey (Table 1). The majority of the LTCFs were classified as general care type (63 LTCFs, 58%), with 14% classified as intellectually disabled (n = 15), 5% as psychiatric (n = 5) and 4% as either residential (n = 1, 1%), physical (n = 1, 1%), rehabilitation (n = 1, 1%) or palliative care (n = 1, 1%). Twenty - one were a mix of care types, (19%).
- The median number of beds per LTCF was 50 with a range of 10 to 226 beds. Only 21% (median) of the beds were in single rooms (range: 0 to 100%).
- Over a third of the residents (39.3%) were over 85 years of age, 48.6% were disorientated, 49.7% had impaired mobility and 59% were incontinent.

In May 2010, a national point prevalence survey (HALT) on healthcare-associated infection and antibiotic use in Irish long term care facilities (LTCFs) was conducted as part of a European initiative coordinated by the European Centre for Disease Prevention and Control. The 2010 national report and protocol can is available on the HPSC website.http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Surveillance/HCAIinlongtermcarefacilities/HALTproject2010/Results/ The HALT survey was repeated in Ireland in May 2011.

Healthcare-Associated Infection (HCAI):

- In total, 4.1% (242) of residents had an infection on the day of the survey, (range 0 – 26.1%, median = 4.3%) as defined by the adapted McGeer definitions (where physical diagnosis was included as a criterion in each category of infection). This represents an increase from 3.6% in 2010 (Table 2).
- The most common infections were respiratory (1.4%, 83 residents), urinary (1.3%, 79 residents) and skin infections (1%, 57 residents), (Table 2).
- Residents with an infection were more likely to be older (over 85 years), have a medical device (e.g., urinary catheter) in place and recently had surgery. Urinary infections were associated with the presence of a urinary catheter, skin infections with the presence of pressure sores and respiratory infections with older age (over 85 years).

Antimicrobial use:

- Antimicrobials were prescribed for 601 (10.1%) residents. Prescriptions were for treatment of infection in 340 residents, (58%), for prophylaxis in 244 residents, (39%), and for an unspecified reason in 22 residents (3%) of residents. This is a similar profile to 2010 (Figure 3).
- Co-amoxiclav and trimethoprim were the most frequently prescribed antibiotics.
- Respiratory, urinary and skin infections were the most common indications for therapeutic antibiotic prescriptions. Only 45% (n = 55) of residents that were prescribed antibiotics for a urinary infection had a specimen taken for culture.
- Prophylactic antibiotics were predominantly prescribed for the prevention of urinary infection (81% of all prophylactic antibiotics prescribed).

Medical Care and Coordination

- Medical care for residents was provided by general practitioners (GPs) in 46% (50) of LTCFs, by medical staff employed by the facility in 41% (43) and by both in 12% (13) of LTCFs.
- In 39% (42) of LTCFs, a designated medical doctor was responsible for standardisation of practices and policies and coordination of medical activities. This included staff education, development of infection prevention and control and antibiotic stewardship policies and coordination of medical rotas and staff vaccination.

Infection Prevention and Control:

- In 37% (40) of LTCFs there was no infection prevention and control practitioner in place whereas 63% (68) had. In 62% (42) of LTCFs with an infection prevention and control practitioner, this person was not working in the facility.

Table 1. Breakdown of LTCFs by region and ownership

Category	Number of LTCFs	Total residents surveyed	Median residents surveyed/LTCF (range)	Median single rooms/100 beds (range)	Median bed occupancy/100 beds
By Ownership					
Public	84	4400	35 (3 - 221)	18 (0 - 100)	93
Private	24	1522	57 (23 - 134)	64 (3 - 100)	96
By HSE Region					
HSE - Dublin North East	10	604	48 (20 - 126)	13 (0 - 100)	95
HSE - Dublin Mid-Leinster	35	2308	54 (8 - 221)	53 (3 - 100)	96
HSE - South	24	1530	57 (3 - 153)	18 (1 - 93)	93
HSE - West	39	1480	28 (9 - 133)	20 (4 - 90)	95
National	**108**	**5922**	**43 (3 - 221)**	**21 (0 - 100)**	**95**

Antibiotic Stewardship:

- Only 12% of LTCFs surveyed had an antibiotic committee, 8% of facilities provided regular training on appropriate antibiotic prescribing and 19% had written guidelines.
- Presence of a coordinating doctor was significantly associated with the availability of written antibiotic guidelines (P = 0.004) and presence of an antibiotic committee was more likely to occur in public rather than private LTCFs (P = 0.03).

This study provides an important baseline on HCAI, antimicrobial stewardship activities and antimicrobial consumption in Irish LTCFs to inform future preventative strategies. The prevalence of HCAI risk factors in the population surveyed reflects a high dependency level in Irish LTCFs. The low rate of pressure sores and urinary catheter use despite a high proportion of incontinent and/or immobile residents reflects high quality nursing and medical care provided within in the facilities.
The HCAI prevalence reported in this study increased from 3.6% in 2010 (69 LTCFs) to 4.1% (108 LTCFs) in 2011. This may be due to improved case finding and the increased number of participating LTCFs.

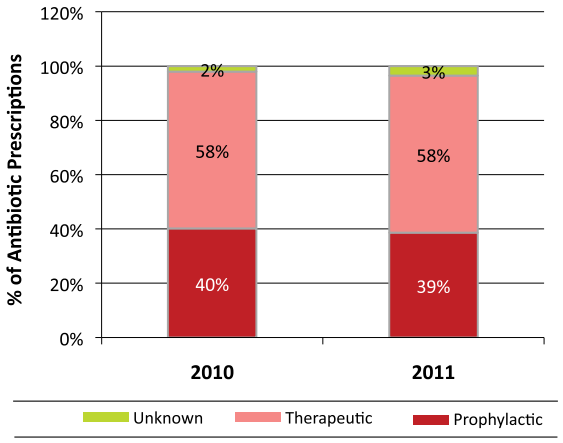


Figure 3: Breakdown of Antibiotics by Treatment type

The antibiotic use reported in both years of this survey (10.1%), corresponds with the 2009 Irish ESAC results (overall prevalence 10.9%), which is higher than the European overall prevalence of 5.9%.

The proportion of antibiotics that were prescribed for prophylactic use (39%) is of concern, specifically in the prevention of urinary tract infection highlighting the need for national antimicrobial stewardship guidelines for LCTFs and education of prescribers. Antimicrobial guidelines for primary care and guidelines on the diagnosis and management of urinary tract infection in elderly residents of LTCFs were published in 2011.
The HALT study will be repeated throughout Europe in May 2013 and will provide an opportunity for participating Irish LTCFs to assess local and national initiatives undertaken since 2011.

The national report for the Republic of Ireland was published in August 2011. http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Surveillance/HCAIinlongtermcarefacilities/HALTproject2011/Results/File,12869,en.pdf

Table 2. HCAI prevalence by infection type using the Adapted McGeer definition

Infection Type	2010		2011	
	Number of infections	% of residents with infectiona	Number of infections	% of residents with infection[a]
Urinary Tract Infection	**62**	**1.5%**	**79**	**1.3%**
Respiratory Tract Infection	**44**	**1%**	**88**	**1.4%**
Cold	*15*	*0.4%*	*32*	*0.5%*
Flu	*0*	*0%*	*2*	*0.03%*
Pneumonia	*6*	*0.1%*	*11*	*0.2%*
Other[b]	*23*	*0.6%*	*43*	*0.7%*
Skin	**31**	**0.7%**	**57**	**1%**
Cellulitis	*29*	*0.7%*	*54*	*0.9%*
Fungal	*2*	*0.05%*	*1*	*0.02%*
Herpes	*0*	*0%*	*2*	*0.03%*
Eye, Ear, Nose, Mouth	**11**	**0.3%**	**25**	**0.4%**
Eye	*6*	*0.1%*	*14*	*0.2%*
Ear	*2*	*0.05%*	*4*	*0.1%*
Mouth	*3*	*0.1%*	*7*	*0.1%*
Total	**149**	**3.6%**	**242**	**4.1%**

[a] The percentage of residents with an infection is calculated as the number of infected residents per total eligible residents.
[b] Other: Other lower respiratory tract infections (e.g. bronchitis, tracheobronchitis

9.1.3 Hand Hygiene

9.1.3.1 Alcohol Hand Rub Surveillance

Key Points

- The median rate of alcohol hand rub consumption in acute hospital in Ireland increased to 21.3 litres per 1,000 bed-days used in 2011, from the updated figure of 19.2 in 2010

Hand hygiene is one of the most important ways 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 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 Organisation (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 collected represent the total volume of AHR dispensed to wards, clinics and other hospital areas per quarter for hospitals that provide the data via their pharmacy department, and total volume purchased per quarter for hospitals that provide the data via their supplies department. Quantities used for peri-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 2011 the median rate of AHR consumption increased to 21.3 litres per 1,000 bed-days used, from the updated figure of 19.2 in 2010. This represents a 10% increase in national consumption since 2010. Although the rate has decreased since its peak in 2009 (22.1), it is now double the consumption rate since surveillance began in 2006 (Table 1). The peak in the rate in 2009 is probably related to the influenza pandemic in 2009, when there was an increased awareness of hand hygiene.

The wide variation in levels of AHR consumption between hospitals (10.6 - 129.4 litres per 1,000 bed-days used) may, in part, be explained by differences in methodologies for collecting and reporting the data, and difference in types and range of hand hygiene agents used. The main limitation of this surveillance system is that the data refer to the use of AHR only, and do not take account of other hand hygiene agents (e.g. medicated liquid soap) that may also be in use in hospitals (although the latter should account for only a small proportion of routine hand hygiene activity 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 nor distinguish between who has used the AHR (visitor, patient or healthcare worker).

The data are also prone to reporting artefacts, particularly for hospitals that report supplies (rather than pharmacy dispensing) data. For example, the hospital with the highest rate in 2011 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 outliers of this nature from time to time.
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.

Further information may be found at: http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/Handwashing/

Table 1. National data on AHR consumption in acute public hospitals in Ireland by year, 2006 – 2011.

	2006	2007	2008	2009	2010	2011
Number of participating hospitals	52	50	50	49	45	43
National consumption rate*	10.5	15	18.7	22.1	19.2	21.2
Range for participating hospitals in litres per 1,000 bed-days used	0.5 - 29.0	5.2 - 47.1	5.9 - 52.5	7.8 - 47.7	7.6 - 36.4	10.6 - 129.4

* 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.

9.1.3.2 Hand Hygiene Compliance Audit

Key Points

- Two national hand hygiene compliance audits took place in 2011, following the publication of a revised protocol and lead auditor training
- For Period 1 (June), 36 hospitals participated. In total, 7,515 opportunities for hand hygiene were observed; achieving an average compliance of 74.7%, range 54.8% to 91.9%
- For Period 2 (October), 42 hospitals participated. In total, 8,765 opportunities for hand hygiene were observed; achieving an average compliance of 79.6%, range 67.1% to 89.5%
- The overall compliance for the combined periods was 77.3%, which is significantly above the HSE target for 2011 of 75%, however, a few individual hospitals and a number of compliance measures were significantly below the target

Hand hygiene is one of the most important ways to prevent HCAI. Measuring hand hygiene compliance by direct observation is described by the World Health Organisation (WHO) as the gold standard. In 2009, a hand hygiene observational standard operating procedure (SOP) was developed by the HPSC and Infection Protection Society and used in acute hospitals. Following an evaluation, a multidisciplinary steering group was established and a revised SOP was published in 2011.

Healthcare workers were observed for their compliance against the WHO '5 moments of hand hygiene'.

National workshops for training lead auditors were held in March and September 2011, and each auditor's inter-rater reliability was assessed using the Kappa statistic. Two national audits were conducted in 2011, one in June 2011 (Period 1) and one in October (Period 2). Acute hospitals were required to measure healthcare worker 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.

For Period 1, 36 hospitals participated. In total, 7,515 opportunities for hand hygiene were observed; achieving an average compliance of 74.7%, range 54.8% to 91.9%. For Period 2, 42 hospitals participated. In total, 8,765 opportunities for hand hygiene were observed; achieving an average compliance of 79.6%, range 67.1% to 89.5%. Of the 34 hospitals with comparable results for both periods, 15 had significantly improved from one period to the next, two had significantly worst compliance and 17 had shown no significant change.

Results for the two periods are combined in a summary in Table 1 and Figure 1. The overall compliance was 77.3%, which is significantly above the HSE target for 2011 of 75%. Of the four HSE regions, HSE-West had the lowest compliance at 73.6% and HSE-Dublin Mid-Leinster had the highest at 79.4%. Of the four major healthcare worker categories, medical staff had the lowest compliance at 65.0% and nurse/midwife staff the highest at 82.3%. Based on the WHO '5 moments for hand hygiene', compliance for moment 5 (after touching patient surroundings) was the lowest at 72.2% and the highest for moment 3 (after body fluid

Table 1: Summary of hand hygiene compliance in acute hospitals in Ireland combined for the two national audit periods in 2011

	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Overall	16,280	12,585	77.3%	76.7%	77.9%
HSE – South	3,344	2,598	77.7%	76.2%	79.1%
HSE - Dublin North-East	3,547	2,770	78.1%	76.7%	79.4%
HSE - Dublin Mid-Leinster	5,250	4,170	79.4%	78.3%	80.5%
HSE – West	4,139	3,047	73.6%	72.2%	75.0%
Nurse/Midwife	9,340	7,691	82.3%	81.6%	83.1%
Auxiliary	2,363	1,747	73.9%	72.1%	75.7%
Medical	3,437	2,235	65.0%	63.4%	66.6%
Other	1,137	910	80.0%	77.6%	82.3%
Moment 1	4,205	3,185	75.7%	74.4%	77.0%
Moment 2	992	746	75.2%	72.4%	77.9%
Moment 3	1,631	1,382	84.7%	82.9%	86.4%
Moment 4	6,054	4,983	82.3%	81.3%	83.3%
Moment 5	4,612	3,329	72.2%	70.9%	73.5%
Intensive Care Unit Wards	1,829	1,482	81.0%	79.2%	82.8%

exposure risk) at 84.7%. Compliance within intensive care units was 81.0%. The proportion of hand hygiene actions that were undertaken using soap and water was 41.4% as opposed to hand rub at 58.6%. At individual hospital level, compliance for the combined periods ranged from 65.6% to 88.8%, with only five hospitals having compliance significantly below the target of 75%.

The results may not be reflective of healthcare worker compliance at all times. Compliance with hand hygiene is measured by auditors observing healthcare 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 healthcare workers under observation may not be aware of the presence of the auditor due to the many competing demands on their attention. In addition, the purpose of auditing is to improve practice, therefore any action that improves compliance increases patient safety. Auditors are requested to give immediate feedback to ward staff following an audit, thereby increasing awareness and knowledge of hand hygiene. Furthermore, all auditors measured compliance in the facility in which they work; therefore there may be an element of bias in the results. This risk of bias should be balanced by the benefits of increasing local staff's knowledge and awareness of hand hygiene.

While there was a significant improvement in hand hygiene compliance in 2011 from Period 1 to Period 2, meeting the target for 2011 of 75%, a few of the hospitals and a number of compliance measures were significantly below the target. There are many factors that can contribute to improving healthcare workers hand hygiene compliance including improved infrastructure (e.g. access to alcohol gel at the point of care), increased awareness through education, audit and feedback, support from senior management/ clinicians and an informed patient population.

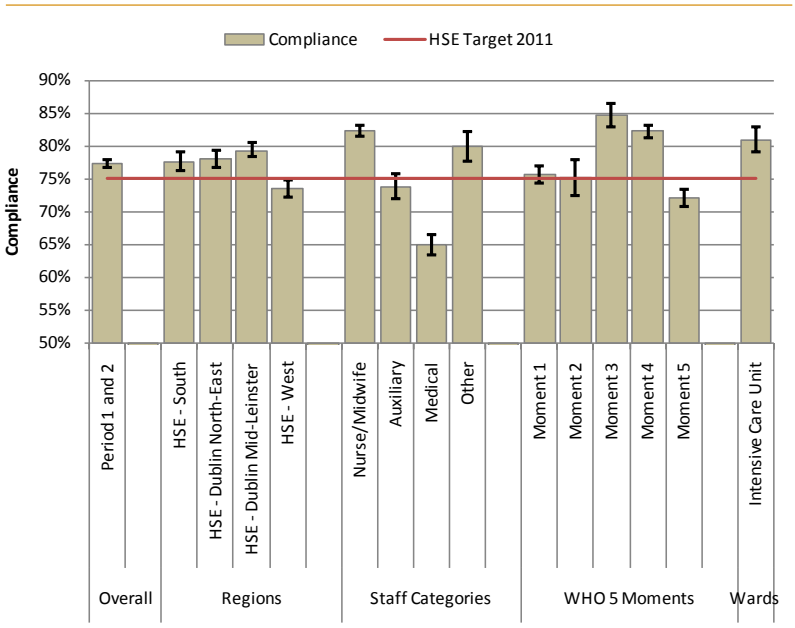


Figure 1: Summary of hand hygiene compliance in acute hospitals in Ireland combined for the two national audit periods in 2011. Vertical black bars represent the 95% confidence intervals.

Staff category: "Auxiliary" includes healthcare assistants, porters, catering and household services; "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

9.2.0 Antimicrobial Consumption

Key Points

- The overall outpatient antimicrobial consumption in Ireland for 2011 was 22.7 DID, a 15% increase from 2010. This rate is mid-to-high in comparison with other European countries.
- The median rate of hospital antimicrobial consumption in Ireland for 2011 was 83.7 DBD (range 22.7 – 135.4 DBD), a 6% increase from 2010. This rate is again mid-to-high in comparison with other European countries. Forty-two public acute hospitals contributed the data in 2011.
- Thirty-three hospitals participated in a point prevalence study in 2011, facilitated by the Irish Antimicrobial Pharmacists Group. The median prevalence of antimicrobial use in participating hospitals was 40.7% in 2011, compared with 36.5% in 2010 and 34.4% in 2009.

Ireland participates in the European Surveillance of Antimicrobial Consumption (ESAC) project which aims to collect systemic antimicrobial usage data from the outpatient (ambulatory, community or primary care) setting and from the hospital (inpatient) setting. The management of ESAC was taken over by ECDC in 2011 and the project is now called ESAC-Net. 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 2011 was 22.7 DID, a 15% increase from the previous year's rate of 19.8 DID. In the latest interim ESAC-Net report (2010 data), the reported range of outpatient antimicrobial usage among European countries was 11.1 to 39.4 DID. The median for all 26 European countries with reliable data was 18.3 DID.

Since outpatient antimicrobial usage in Ireland has been 19.2 – 22.7 DID for the last ten years, the overall rate in Ireland is mid-to-high in Europe. The underlying trend (Figure 1) showed that consumption increased steadily to a peak in 2007 and in 2009 declined to reach a level similar to that in 2004, however the rate has been increasing since 2009. There is still marked seasonal fluctuation in use, with highest levels occurring during periods of increased influenza activity. Consumption for 2011 was in line with expected use, as modelled on previous years' trend and seasonality (Figure 2).

In Ireland in 2011, outpatient consumption of penicillins accounted for the largest class used (54% of total at 12.2 DID), followed by macrolides (18%, 4.2 DID), tetracyclines (12%, 2.8 DID), cephalosporins (5%, 1.2 DID), sulphonamides (5%, 1.2 DID) and fluoroquinolones (4%, 0.9 DID). Other antimicrobial classes accounted for less than 2% of total use. Penicillin in combination with a beta-lactamase inhibitor (such as co-amoxiclav) accounted for the largest proportion of penicillins (54%) at 6.6 DID. Broad-spectrum penicillin (such as amoxicillin) usage was also high at 29% of all penicillins (3.6 DID).

There was considerable variability in the overall outpatient antimicrobial usage at county level (18.4 to 30.6 DID) as shown in Figure 3.

Hospital Antimicrobial Consumption

Forty-two public acute hospitals provided valid antimicrobial usage data for 2011. The median rate of antimicrobial consumption was 83.7 DBD (range 22.7 – 135.4 DBD). This was a 6% increase from the previous year's revised rate of 79.3 DBD. These levels are again mid-to-high in Europe.

The largest group of antimicrobials, penicillins, which represent 51% of all inpatient antimicrobial

usage, showed an increased in consumption by 7% in 2011 to 42.3 DBD. The use of fluoroquinolones such as ciprofloxacin (representing 7% of all inpatient antimicrobial usage) increased by 2% in 2011 to 5.8 DBD. Fluoroquinolone usage had been decreasing since 2007 however this trend reversed in 2011. Consumption of cephalosporins, monobactams and carbapenems (representing 8% of all inpatient antimicrobial usage) increased by 1% in 2011 to 6.9 DBD. Consumption of glycopeptides such as intravenous vancomycin, imidazoles such as intravenous metronidazole and nitrofurans (representing 10% of all inpatient antimicrobial usage) increased by 4% in 2011 to 8.4 DBD. Consumption of erythromycin and related agents (representing 14% of all inpatient antimicrobial usage) increased by 10% in 2011 to 11.8 DBD. Less frequently used agents in hospitals are tetracyclines, sulphonamides/trimethoprim, aminoglycosides and other systemic antimicrobials; collectively these drugs, representing 10% of all inpatient antimicrobial usage, increased by 6% in 2011 to 8.4 DBD.

Hospital function was the main driver for the differences in the rates of antimicrobial consumption between hospitals. The rates for regional/tertiary and general hospitals (medians 82.9 and 89.9 DBD) centred just above the median for Ireland, while the rate for single specialist facilities (maternity, orthopaedic or paediatric)

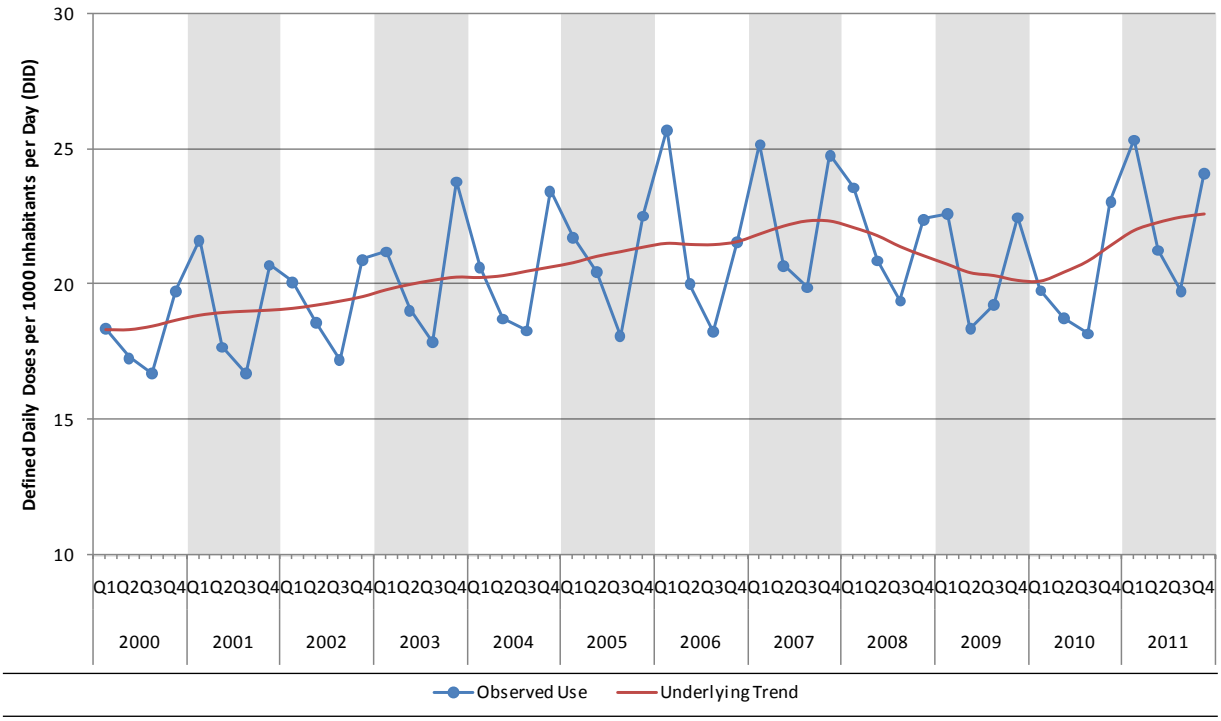


Figure 1. Outpatient antibiotic consumption in Ireland by quarter, 2000-2011.

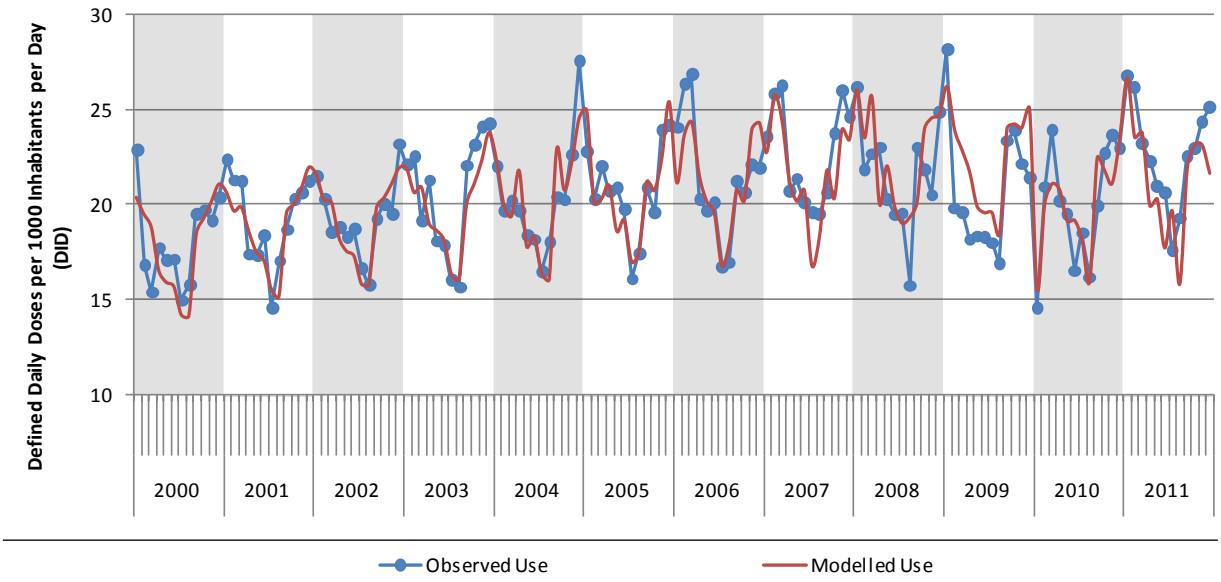


Figure 2. Outpatient antibiotic consumption in Ireland by month, 2000-2011.

was much lower (median 28.9 DBD). The lower median consumption in single speciality hospitals probably reflects differences in case-mix, compared to other hospitals. However it may also reflect the fact that DDDs are based on adult dosing and may therefore underestimate antimicrobial consumption in paediatric settings.

There was continued reduction in the proportionate use of intravenously administered specific antimicrobials (those with good oral bioavailability) over total use, from a median of 6.9% in 2010 to 6.6% in 2011. This measure reflects patient acuity and also the hospital function. The change in the level of this measure may also reflect local antimicrobial stewardship interventions.

Hospitals Care Point Prevalence Survey (PPS) 2011
Thirty-three hospitals participated in a point prevalence study in September and October of 2011 which was facilitated by the Irish Antimicrobial Pharmacists Group (IAPG). Similar surveys had previously been carried out in 2009 and 2010. Clinical records on 7,468 patients were reviewed, of whom 2,586 received systemic antimicrobial therapy. The median prevalence of antimicrobial use in participating hospitals was 40.7% in 2011 compared with 36.5% in 2010 and 34.4% in 2009.

The data collected included patient demographics and antibiotic allergy status, details of systemic antimicrobial therapy, diagnoses and indication, compliance with local guidelines and documentation of reason for therapy. In most respects practices in Ireland were broadly in line with other European hospitals in previous years, though the prevalence of antimicrobial use was much higher in 2011. The PPS in 2011 had taken place at a time (autumn) when antimicrobial use is expected to be higher than in the summer months, which is when it took place in 2009 and 2010. The increase in the number of participating hospitals in the 2011 study is an indication of the value of this methodology to monitor antimicrobial prescribing patterns and to identify targets for antimicrobial stewardship interventions.

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.

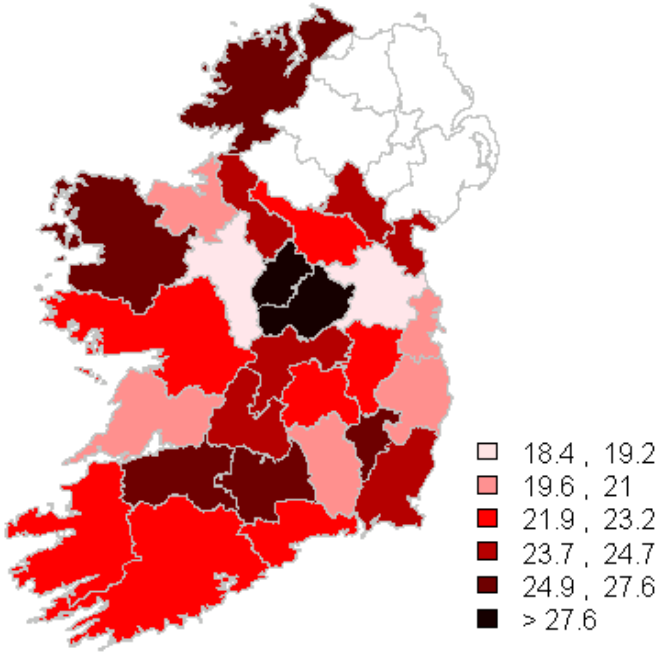


Figure 3. Outpatient antibiotic consumption in Ireland by county, in DDD per 100 inhabitants per day for 2011.

9.3.0 Antimicrobial Resistance

Key Points

- There were 2,210 reports of invasive *E. coli* infection submitted to the European Antimicrobial Resistance Surveillance Network (EARS-Net) in Ireland, an increase of 5% from 2,170 reports in 2010

  The proportions of reported invasive *E. coli* with resistance to 3rd-generation cephalosporins (3GCs) (9.3%), ciprofloxacin (23.8%) and aminoglycosides (12.2%), that produce extended-spectrum beta-lactamases (ESBLs) (7.5%) and with multi-drug resistance (13.0%) were at their highest levels since surveillance began

- There were 1,096 reports of *S. aureus* bloodstream infection (BSI), a decrease of 12%. Of these, 263 (24. 0%) were meticillin-resistant *S. aureus* (MRSA), a decrease of 14% from 305 reported in 2010

  For acute hospitals, the rate of MRSA BSI was 0.067 cases per 1,000 patient bed days used, a decrease from 0.078 in 2010. Over the same period, the rate of meticillin-susceptible *S. aureus* (MSSA) BSI decreased from 0.238 to 0.210

  Enhanced surveillance data revealed that 23% of the all *S. aureus* BSI isolates were associated with CVCs and 3% with peripheral venous catheters

- There were 364 reports of *E. faecium* BSI compared with 392 in 2010, a decrease of 7%

  Vancomycin-resistant *E. faecium* (VREfm) accounted for 37.4% of reports, which was the highest proportion among countries reporting to EARS-Net

- There were 312 reports of invasive *K. pneumoniae* infections compared to 326 in 2010, a decrease of 4%

  ******Five isolates (1.6%) were carbapenem-resistant. Of these, four were due to carbapenemase-producing enzymes (CPE) (three, from one hospital, with the OXA-48 enzyme and one, from another hospital, with a KPC) and one was due to a combination of ESBL production and impermeability. The four CPE carbapenem-resistant isolates represent the first reports of invasive infection due to these organisms in Ireland******

- There were 327 reports of invasive *S. pneumoniae* infection compared to 314 in 2010, an increase of 3%. Of these, 64 (19.6%) were penicillin-non-susceptible *S. pneumoniae* (PNSP), an increase from 18.2% in 2010; the proportion of isolates with high-level resistance to penicillin increased from 4.8% in 2010 to 6.1% in 2011

  The national rate of invasive infection was 7.1 compared to 6.8 per 100,000 population in 2010. A reduction in numbers of reports and rates of infection were seen in children <1year, the target population for the conjugate vaccines introduced since September 2008

  Serotype data were available on 295 of 327 isolates (90%) and results indicate good coverage for both the 23-valent polysaccharide (PPV23) and 13-valent conjugate (PCV13) vaccines in their target populations: 74% (adults ≥65 years) and 54% (children <2 years), respectively

- There were 184 reports of invasive *P. aeruginosa* infections compared to 222 in 2010, a decrease of 17%

- Enhanced surveillance data were provided on 1,875 cases from 12 laboratories, representing 40% of all cases submitted to EARS-Net in 2011

- 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), in Ireland collects routinely-generated antimicrobial susceptibility testing data on seven important bacterial pathogens using the EARS-Net case definition.

Participating laboratories 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 and primarily serves as a surveillance system to measure national levels of antimicrobial resistance (AMR). In 2011, all 41 microbiology laboratories participated in EARS-Net resulting in complete coverage of the Irish population.

Escherichia coli
There were 2,210 reports of invasive *E. coli* infection (2,209 from blood and one from CSF) from 2,169 patients, an increase of 5.1% from 2,170 reports in 2010. See table 1 for the proportion of *E. coli* isolates resistant to the four "indicator" antibiotics/antibiotic classes [ampicillin, third-generation cephalosporins (3GCs; cefotaxime, ceftriaxone, ceftazidime or cefpodoxime), fluoroquinolones (ciprofloxacin or ofloxacin) and aminoglycosides (gentamicin, amikacin or tobramycin)] by year since 2004.

Two hundred and six (9.3%) of 2,208 isolates were resistant to 3GCs, of which 155 were ESBL-positive and 50 were ESBL-negative; 524 (23.8%) of 2,203 were ciprofloxacin-resistant; and 191 (8.7%) of 2,203 were gentamicin-resistant [269 (12.2%) of 2,205 were aminoglycoside-resistant (i.e. resistant to gentamicin, tobramycin or amikacin)].

In 2011, resistance to 3GCs, ciprofloxacin and aminoglycosides were at their highest levels since surveillance began (figure 1). Between 2008 and 2011, the trend in 3GC resistance was upwards, however this was not significant (Chi^2 trend=6.386, P=0.094).

Ireland had moderately high levels (10 to <25%) of ciprofloxacin and aminoglycoside resistance (ranking 15th and 12th, respectively, out of 29 countries reporting to EARS-Net) and moderately low levels (5 to <10%) of 3GC resistance (ranking 19th out of 29 countries) in 2011.

Extended spectrum beta-lactamases (ESBLs) were detected in 164 (7.5%) of 2,196 isolates tested. In 2011, ESBL production among *E. coli* isolates was at its highest level since surveillance began. Between 2008 and 2011, ESBL production increased from 5.0% to 7.5%, which is statistically significant (Chi^2 trend=11.31, P=0.01). ESBLs are enzymes that confer resistance to most penicillins and cephalosporins (including 3GCs). ESBL-producing bacteria (including *E. coli* and *K. pneumoniae*) are often resistant to other classes of antibiotics and have emerged as important causes of infections in hospitals.

Of 2,199 isolates tested against all four "indicator" antibiotics, 286 (13.0%), from 49 hospitals/institutions, were identified as multi-drug resistant (MDR; defined as resistance to three or more of these), an increase from 11.7% in 2010:

- 95 with resistance to ampicillin, 3GCs, ciprofloxacin and aminoglycosides (81 ESBL-positive, 14-negative)
- 69 with resistance to ampicillin, 3GCs and ciprofloxacin (57 ESBL-positive, 12 -negative)
- 118 with resistance to ampicillin, ciprofloxacin and aminoglycosides (three ESBL-positive, 115 -negative)
- Four with resistance to ampicillin, 3GCs and aminoglycosides (two ESBL-positive, one -negative)

In 2011, MDR *E. coli* was at its highest level since surveillance began.

Females were approximately 1.2-times more likely to have an invasive *E. coli* infection than males (z=3.84, P=0.0001). The frequency of invasive *E. coli* infection increased with age with the majority of infections (n=1,607; 73%) occurring in adults over 60 years. The median age was 71 years (95%CI, 71-72).

Staphylococcus aureus
There were 1,096 reports of *S. aureus* bloodstream infection (BSI) from 1,058 patients, of which 263 (24.0%) were meticillin-resistant *S. aureus* (MRSA) (table 1). This represents the lowest annual proportion since surveillance began in 1999. In 2010, the proportion was 24.4%, which was the first time Ireland had <25% MRSA and thus changed from a red to an orange colour on the EARS-Net map. The decrease observed between 2010 and 2011 was not significant (z=0.217, P=0.83). This is the fifth successive year in which a decrease has been observed and the overall downward trend over this time period is highly significant (Chi^2_{trend}=164.4, P<0.0001) (figure 2). Overall, there was a 13.7% reduction in the number of MRSA BSI reports compared with 2010 (263 vs. 305). The total number of meticillin-susceptible *S. aureus* (MSSA) BSI reports decreased by 11.9% in 2011 compared to 2010 (833 vs. 946).

Despite the decrease in numbers and proportion of MRSA, Ireland still had one of the higher proportions of MRSA in Europe in 2011 (see http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx for European data, including EARS-Net tables, charts and maps) (figure 3). Ireland ranked 10th out of 28 countries reporting to EARS-Net. All of the countries with higher proportions of MRSA than Ireland are in Southern and Central Europe.

No MRSA isolates with reduced susceptibility to vancomycin were detected at the National MRSA Reference Laboratory.

The MRSA rate for all acute hospitals in 2011 was 0.067 cases per 1,000 patient bed days used, representing a decrease from 0.078 in 2010, while the MSSA rate also decreased from 0.238 in 2010 to 0.210 to 2011 [Note: the rates are calculated taking into account the denominator data (bed days used) obtained from the Business Intelligence Unit at the Health Services Executive for all acute public hospitals; and directly from the hospitals for private hospitals where available, where both numerator (MRSA numbers) and denominator data have been provided].

In patients with laboratory-confirmed *S. aureus* BSI, the probability that the infecting organism was MRSA as compared to MSSA was approximately 1.9-times

Table 1. Summary of EARS-Net data by pathogen and year, 2004-2011

Pathogen	2004	2005	2006	2007	2008	2009	2010	2011
Number laboratories by year-end	40	41	42	44	42	43	40†	41††
E. coli								
Number of isolates	1256	1445	1656	1785	1926	2064	2170	2210
Ampicillin-R*	65.0%	67.6%	70.7%	68.3%	70.4%	68.7%	68.4%	71.9%
3GC-R*	2.6%	4.1%	4.2%	6.7%	7.4%	7.5%	8.3%	9.3%
ESBL-producers*	1.1%	2.4%	2.5%	4.1%	5.0%	5.8%	6.1%	7.5%
Ciprofloxacin-R*	12.6%	17.3%	21.5%	22.1%	23.3%	22.3%	23.6%	23.8%
Gentamicin-R*	5.7%	8.5%	7.7%	9.9%	10.2%	7.7%	9.4%	8.7%
Gentamicin/Amikacin/Tobramycin-R*	6.1%	8.6%	8.6%	10.6%	11.0%	9.3%	11.8%	12.2%
Carbapenem‡-R*	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
MDR*	5.6%	7.7%	9.0%	11.4%	12.1%	10.4%	11.7%	13.0%
Number laboratories by year-end	41	42	42	44	43	43	40†	41††
S. aureus								
Number of isolates	1323	1424	1412	1393	1303	1309	1251	1096
Number Meticillin-R (or MRSA)	553	592	592	536	439	355	305	263
Meticillin-R (or MRSA)	41.8%	41.6%	41.9%	38.5%	33.7%	27.1%	24.4%	24.0%
Number VISA	0	0	2	1	0	0	0	0
VISA*	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
Number laboratories by year-end	40	41	42	44	42	43	40†	41††
E. faecium								
Number of isolates	187	224	265	330	406	397	392	364
Ampicillin-R*	95.7%	92.3%	93.9%	93.1%	95.1%	92.9%	95.6%	95.9%
Vancomycin-R	23.2%	31.7%	37.1%	33.4%	35.7%	38.3%	39.3%	37.4%
HLG-R*	58.0%	51.4%	44.3%	35.2%	28.1%	39.1%	39.6%	36.8%
MDR*	18.5%	25.6%	25.6%	22.7%	16.2%	26.7%	24.9%	21.1%
Number laboratories by year-end	41	42	42	44	42	43	40†	41††
S. pneumoniae								
Number of isolates	400	401	407	438	447	356	314	327
Penicillin-NS*	10.3%	11.7%	15.7%	17.4%	23.1%	20.2%	18.2%	19.6%
of which: HLR	1.8%	3.0%	2.9%	5.7%	6.0%	5.6%	4.8%	6.1%
Int	7.0%	8.7%	12.5%	11.0%	16.8%	13.8%	12.7%	13.5%
Erythromycin-R*	14.4%	12.1%	16.1%	16.4%	16.7%	17.3%	15.7%	18.9%
%Penicillin-NS/Erythromycin-R	3.1%	3.2%	7.4%	7.9%	10.2%	11.9%	12.6%	13.8%
Number laboratories by year-end			36	39	41	42	40†	41††
K. pneumoniae								
Number of isolates			217	244	310	323	326	312
Ampicillin-R*			97.7%	99.2%	99.7%	99.7%	99.1%	100.0%
3GC-R*			10.2%	9.9%	11.4%	11.2%	10.5%	8.0%
ESBL-producers*			8.6%	3.7%	7.7%	8.2%	5.0%	5.6%
Ciprofloxacin-R*	No data	No data	15.3%	18.1%	12.8%	13.0%	10.5%	13.2%
Gentamicin-R*			7.8%	9.9%	10.7%	11.1%	6.8%	7.4%
Gentamicin/Amikacin/Tobramycin-R*			9.2%	11.1%	10.7%	11.1%	7.1%	8.3%
Carbapenem‡-R*			0.0%	0.6%	0.0%	0.0%	0.0%	1.6%
MDR*			11.2%	11.9%	10.6%	11.9%	8.0%	8.4%
Number laboratories by year-end	40	41	42	44	42	43	40†	41††
E. faecalis								
Number of isolates	242	290	294	280	301	289	298	265
Ampicillin-R*	0.8%	3.5%	4.5%	2.2%	0.7%	2.1%	2.0%	0.8%
Vancomycin-R	1.3%	2.5%	3.7%	2.9%	3.7%	0.7%	0.3%	4.9%
HLG-R*	41.3%	44.4%	42.4%	36.9%	30.5%	36.7%	29.7%	29.1%
Number laboratories by year-end			36	39	41	42	40†	41††
P. aeruginosa								
Number of isolates			128	177	199	248	222	184
Pipericillin/tazobactam-R*			9.4%	12.6%	9.7%	8.9%	10.0%	2.8%
Ceftazidime-R*			10.6%	11.8%	8.7%	11.8%	9.2%	8.2%
Imipenem/meropenem-R*	No data	No data	11.8%	12.2%	9.3%	10.2%	8.3%	12.0%
Ciprofloxacin-R*			18.0%	22.9%	21.8%	12.1%	13.2%	12.6%
Gentamicin-R*			10.2%	13.3%	9.0%	7.7%	8.7%	6.5%
MDR*			9.5%	12.4%	11.1%	6.4%	6.5%	4.0%

R, Resistant; NS, Non-Susceptible [includes isolates with intermediate (Int) and high-level resistance (HLR)]
MRSA, Meticillin-Resistant *S. aureus*; VISA, Vancomycin-Intermediate *S. aureus*
HLG, High-Level Gentamicin; 3GC, 3rd-Generation Cephalosporin (includes cefotaxime, ceftriaxone, ceftazidime and cefpodoxime); ESBL, Extended-Spectrum Beta-Lactamase; MDR, Multi-Drug Resistant
* Not all isolates tested
† In 2010, 3 laboratories stopped processing blood cultures, however coverage of acute hospitals remained at 100%
†† In Q3 2011, one additional laboratory started reporting data
‡ Carbapenems include imipenem, meropenem and ertapenem

greater in patients aged ≥65years than in those aged <65 years (RR=1.9, z=5.312, P<0.0001).

Males were approximately 1.8-times more likely to get an invasive *S. aureus* infection (1.6-times for MRSA, z=3.87, P=0.0001; 1.8-times for MSSA, z=8.88, P<0.0001) than females (z=9.63, P<0.0001). The frequency of invasive *S. aureus* infection increased with age, with the majority of infections (n=646; 59%) occurring in adults over 60 years. The median age for patients with an MRSA infection was 72 years (95%CI, 69-74) while the median age for patients with MSSA was 63 years (95%CI, 61-65). This was considered to be a significant difference as the confidence intervals did not overlap.

Enterococcus faecium

There were 364 reports of *E. faecium* BSI from 354 patients, a decrease of 7% from 392 reports in 2010. See table 1 for the annual proportions of *E. faecium* isolates resistant to the three "indicator" antibiotics (ampicillin, vancomycin and high-level gentamicin) by year since 2004.

One hundred and thirty-six (37.4%) of 364 were resistant to vancomycin and 131 (36.8%) of 356 isolates were resistant to high-level gentamicin (figure 4). The proportion of isolates that were vancomycin-resistant *E. faecium* (VREfm) decreased from 39.3% in 2010, but this was not a significant finding (z=0.537; P=0.59).

Since 2008, Ireland has had the highest proportion of VREfm in Europe. This remained the case in 2011, with the next highest proportions reported by Greece (23%), Portugal (20%) and Germany (11%) (figure 5).

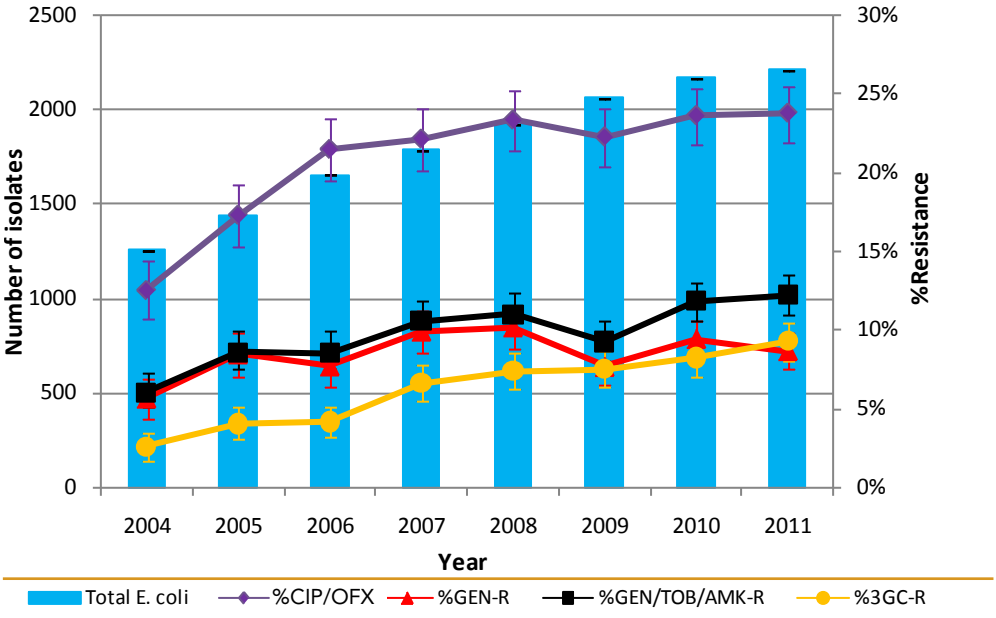


Figure 1. Trends for E. coli – total numbers of E. coli and percentage resistance to 3GCs, ciprofloxacin/ofloxacin (CIP/OFX) and gentamicin/amikacin/tobramycin (GEN/AMK/TOB), and percentage ESBL-positive with 95% confidence intervals.

Table 2. Age and gender breakdown of patients by organism with major resistance profiles (data from 12 laboratories participating in enhanced surveillance for 2011). Proportion of isolates detected <48 hours and >5 days post-admission is also shown.

		Total 2011	Female	Mean age (years)	Detected <48 hours after admission	Detected >5 days after admission
Staphylococcus aureus	Meticillin Resistant *Staphylococcus aureus* (MRSA)	109	32%	66	50%	38%
	Meticillin Susceptible *S. aureus*	307	33%	58	56%	25%
Streptococcus pneumoniae	Penicillin Non-Susceptible *S. pneumoniae*	21	33%	69	95%	0%
	Penicillin Susceptible *S. pneumoniae*	107	41%	60	93%	5%
Escherichia coli	Fluoroquinolone Resistant *E. coli*	199	41%	72	63%	30%
	Fluoroquinolone Susceptible *E. coli*	663	59%	66	69%	21%
Enterococci	Vancomycin Resistant Enterococci (VRE)	64	45%	61	17%	72%
	Vancomycin Sensitive Enterococci	198	38%	66	40%	54%
Klebsiella pneumoniae		137	39%	65	42%	43%
Pseudomonas aeruginosa		70	36%	70	57%	33%

Of 355 isolates tested against all three "indicator" antibiotics, 75 (21.1%), from 20 hospitals, were resistant to all three and therefore classed as MDR. This represents a decrease from 24.9% in 2010.

Males were approximately 1.4-times more likely to have an invasive *E. faecium* infection than females (z=3.08, P=0.002). The frequency of invasive *E. faecium* infection increased with age with the majority of infections (n=237; 65%) occurring in adults over 60 years. The median age was 67 years (95%CI, 65-69).

Klebsiella pneumoniae

There were 312 reports of invasive *K. pneumoniae* infection (311 from blood and one from CSF) from 304 patients, a decrease of 4% from 326 reports in 2010). See table 1 for the proportion of *K. pneumoniae* isolates resistant to the four "indicator" antibiotics (as for *E. coli* above), plus carbapenems (imipenem, meropenem or ertapenem), since 2006.

Twenty-five (8.0%) of 312 isolates were resistant to 3GCs, 15 of which were ESBL-positive; 41 (13.2%) of 311 were ciprofloxacin-resistant; and 23 (7.4%) of 312 were gentamicin-resistant [26 (8.3%) of 312 were aminoglycoside-resistant (i.e. resistant to gentamicin, tobramycin or amikacin)].

There were no significant changes in the proportions compared with 2010 and there were no significant trends over the past four years.

No isolates were reported as ampicillin-susceptible, which is as expected as all klebsiellae are inherently resistant to this antibiotic.

ESBLs were detected in 17 (5.6%) of 305 isolates tested, representing an increase from 5.0% in 2010.

Five carbapenem-resistant isolates were reported in 2011. Four of these were due to a carbapenemase-producing enzyme, or CPE - three OXA-48 from one hospital and one KPC from another hospital - while one was not due to a CPE, with the resistance due to a combination of ESBL production and porin loss resulting in impermeability. The four CPE carbapenem-resistant isolates represent the first reports of invasive infection due to these organisms in Ireland.

Twenty-six, or 8.4%, of 311 isolates tested against all four "indicator" antibiotics, from 14 hospitals, were identified as MDR, a slight increase from 8.0% in 2010:

- 16 with resistance to ampicillin, 3GCs, ciprofloxacin and aminoglycosides (9 ESBL-positive, 7 -negative)
- Three with resistance to ampicillin, 3GCs and ciprofloxacin (all ESBL-positive)
- one with resistance to ampicillin, 3GCs and gentamicin (ESBL negative)
- Six with resistance to ampicillin, ciprofloxacin and aminoglycosides (one ESBL-positive, 5 -negative)

Notably, the number with resistance to all four "indicator" antibiotics increased from 8 in 2010 to 16 in 2011.

Antimicrobial resistance levels among *K. pneumoniae* isolates in Ireland are among the lowest in Europe, with Ireland ranking 23rd or 24th out of 29 countries for 3GC, fluoroquinolone and aminoglycoside resistance. Ireland ranked 7th out of 28 countries reporting carbapenem resistance in 2011, however, this does not distinguish carbapenem resistance due to CPE from other resistance mechanisms.

Males were approximately 1.5-times more likely to have an invasive *K. pneumoniae* infection than females (z=3.37, P<0.001). The frequency of invasive *K. pneumoniae* infection increased with age with the majority of infections (n=153; 63%) occurring in adults over 60 years. The median age was 66 years (95%CI, 64-68).

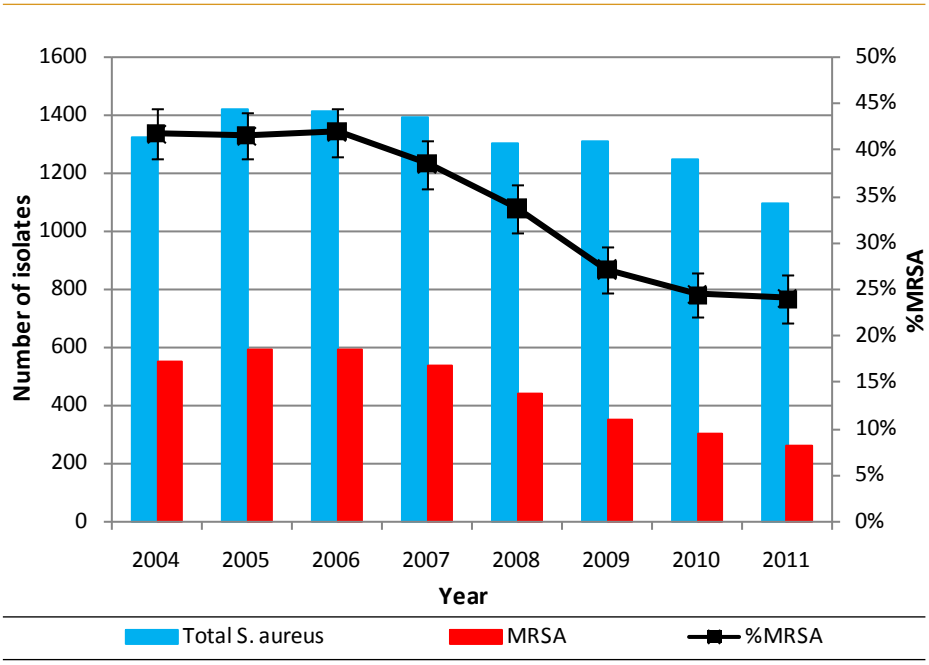


Figure 2. Trends for S. aureus – total numbers of S. aureus/MRSA and percentage MRSA with 95% confidence intervals

Streptococcus pneumoniae
There were 327 reports of invasive *S. pneumoniae* infection (322 from blood and five from CSF) from 324 patients, an increase of 2.8% from 314 reports in 2010. See table 1 for the annual proportions of *S. pneumoniae* isolates non-susceptible/resistant to penicillin and erythromycin by year since 2004.

Penicillin-non-susceptible *S. pneumoniae* (PNSP) accounted for 19.6% (n=64) of all isolates tested against penicillin (n=327) in 2010 (table 1). Of the 64 PNSP isolates, 44 were intermediately-resistant (Int; MIC=0.1-1.0mg/L) and 20 were high-level resistant (HLR; MIC >1.0mg/L) to penicillin. No antimicrobial susceptibility testing data were provided for one isolate. Fifty-nine (18.9%) of 312 isolates were resistant to erythromycin.

The proportion of PNSP in Ireland decreased from 23.1% in 2008 to 18.2% in 2010 but increased to 19.6% in 2011 (figure 6). The proportion of isolates that were HLR to penicillin increased from 4.8% in 2010 to 6.1% in 2011.

In 2011, Ireland once again had one of the highest proportions of PNSP (ranking 7th out of 27 countries, and 3rd out of 19 countries reporting 50 isolates or more) and high-level resistance to penicillin among *S. pneumoniae* (ranking 10th out of 27 countries, and 4th out of 19 countries reporting 50 isolates or more), in countries reporting to EARS-Net, although comparisons with other EARS-Net countries is problematic due to the possibility of different interpretive criteria being applied to the data [Note: The Clinical Laboratory Standards Institute (CLSI) now provides three sets of breakpoints for interpreting penicillin susceptibility of *S. pneumoniae* isolates: meningitis, non-meningitis and oral. In Ireland, EARS-Net data are reported using the "oral" breakpoints (which correspond to the original CLSI breakpoints) for epidemiological purposes, and thus consistency].

Moderately high levels of erythromycin resistance were seen (with Ireland ranking 11th out of 27 countries, and 7th out of 18 countries reporting 50 isolates or more), similar to the situation observed in much of Southern and Central Europe.

Of isolates tested against both penicillin and erythromycin (n=312), 43 (13.8%) were simultaneously PNSP (25 Int, 11 HLR, 1 NS) and erythromycin-resistant in 2011.

Prior to the introduction of the 7-valent pneumococcal conjugate vaccine (PCV7) into the childhood immunisation schedule in September 2008, a national pilot project was established early in 2007 as a result of 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. PCV13 replaced PCV7 as of September 2010. Serotype data were available on 295 pneumococcal isolates from 29 laboratories (of 32 that reported pneumococcal isolates to EARS-Net in 2011) representing 90% of all pneumococcal isolates reported in 2011. Overall, 232 (79%) isolates belonged to serotypes covered by the pneumococcal polysaccharide vaccine (PPV23; target population: adults ≥65 years and at risk groups), while 168 (57%) were covered by the conjugate vaccine (PCV13; target population: children <2 years). From adults ≥65 years, 108 of 146 (74%) isolates were covered by PPV23, while from children <2 years, 7 of 13 (54%) isolates were covered by PCV13. Of the 60 PNSP isolates for which serotyping data were available, 17 of 31 (55%) from adults ≥65 years were covered by PPV23 while the five isolates from children <2 years were covered by PCV13. On-going surveillance of the predominant serotypes is required as strains with serotypes other than those in the vaccine have been reported to increase in prevalence following

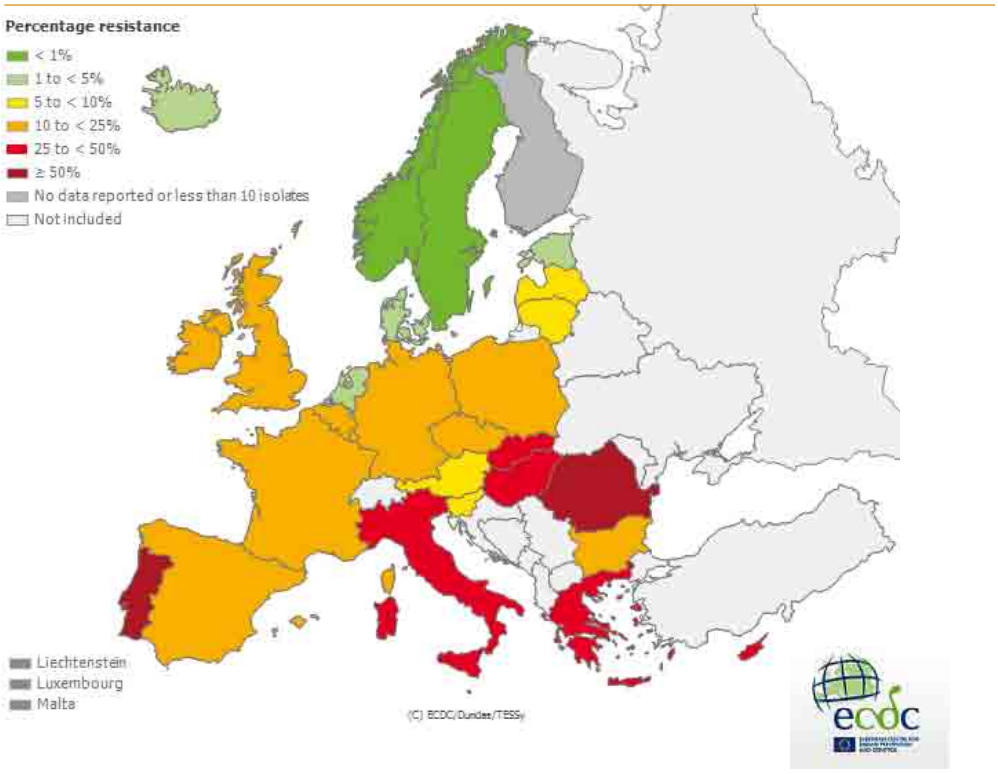


Figure 3. Distribution of MRSA in EARS-Net countries in 2011
Map downloaded from ECDC's TESSy database on 22/10/2012:
http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx

introduction of PCV7 in other countries, hence the need for a fully resourced reference facility.

The rate of invasive pneumococcal disease (IPD) in Ireland in 2011 was estimated to be 7.1 cases per 100,000 population compared with 6.8 in 2010 (note: both calculated using the 2011 census data). The highest rates of IPD were observed in children <1 year (13.1 cases per 100,000) and adults aged 65-74 years (22.9), 75-79 years (34.6) and ≥80 years (62) (figure 7). The rates in all age groups were broadly similar to the data for 2010 with the exception of the <1 year age group, which decreased from 24.6 to 13.1.

Males were approximately 1.2-times more likely to have an invasive *S. pneumoniae* infection [1.7-times for PNSP, z=2.07, P=0.04; 1.1-times for penicillin-susceptible *S. pneumoniae* (PSP), z=1.11, P=0.27] than females (z=1.95, P=0.05). The median age was 64 years (95%CI, 60-68).

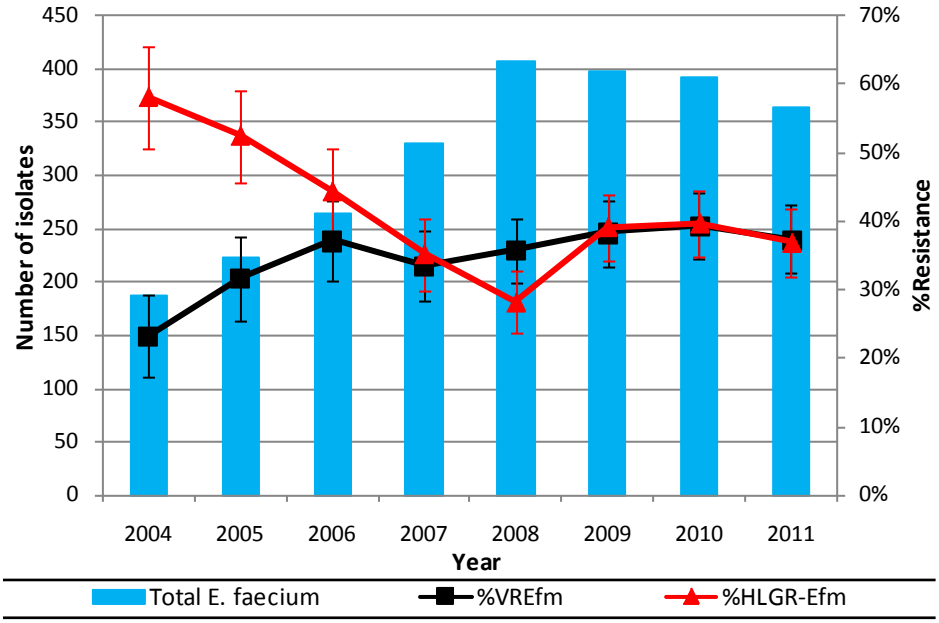


Figure 4. Trends for E. faecium – total numbers of E. faecium and percentage resistance to high-level gentamicin (HLG) and vancomycin (VAN) with 95% confidence intervals

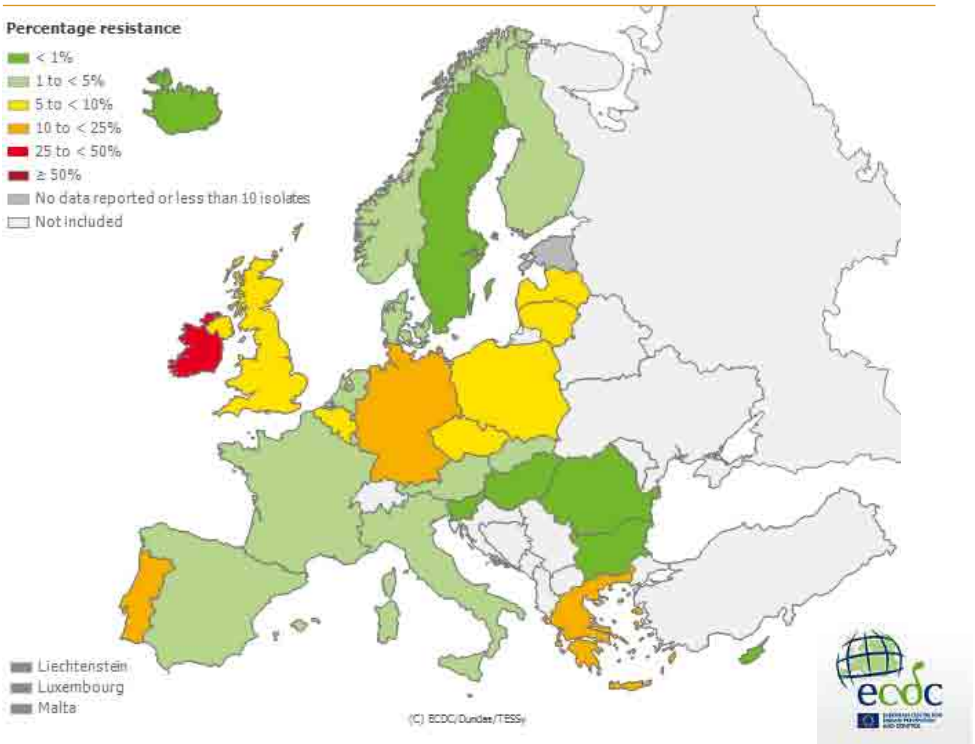


Figure 5. Distribution of Vancmycin-resistant E. faecium in EARS-Net countries in 2011
Map downloaded from ECDC's TESSy database on 22/10/2012: http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx

Enterococcus faecalis
There were 265 reports of *E. faecalis* BSI from 255 patients, a decrease of 11% from 298 reports in 2010. See table 1 for the annual proportions of *E. faecalis* isolates resistant to the three "indicator" antibiotics (as for *E. faecium* above) by year since 2004.

Thirteen (4.9%) of 264 isolates were resistant to vancomycin and 74 (29.1%) of 254 isolates were resistant to high-level gentamicin.

The increase in the proportion of isolates that were vancomycin-resistant *E. faecalis* (VREfa) from 0.3% in 2010 to 4.7% in 2011was found to be statistically significant (z=3.5; P=0.0005). This represents the highest proportion of VREfa since surveillance began in 2002. This is also one of the highest proportions in Europe, with Ireland ranking 4th out of 29 countries reporting to EARS-Net in 2011.

Two isolates were reported as ampicillin-resistant, which suggests that these isolates were either misidentified as *E. faecalis* or misclassified as ampicillin-resistant, as resistance to ampicillin is rare in *E. faecalis*.

Males were approximately 1.85-times more likely to have an invasive *E. faecalis* infection than females (z=5.08, P<0.0001). The frequency of invasive *E. faecalis* infection increased with age with the majority of infections (n=174; 66%) occurring in adults over 60 years. The median age was 68 years (95%CI, 65-71).

Pseudomonas aeruginosa
There were 184 reports of invasive *P. aeruginosa* infection (183 from blood and one from CSF) from 181 patients, a decrease of 17% from 222 reports in 2010. See table 1 for the proportion of *P. aeruginosa* isolates resistant to the five "indicator" antibiotics/antibiotic classes [piperacillin-tazobactam, ceftazidime, carbapenems (meropenem or imipenem), fluoroquinolones (ciprofloxacin or ofloxacin) and gentamicin] since 2006.

Five (2.8%) of 272 isolates were resistant to piperacillin-tazobactam; 15 (8.2%) of 184 were resistant to ceftazidime; 22 (12.0%) of 161 were resistant to imipenem or meropenem; 23 (12.6%) of 183 were resistant to ciprofloxacin; and 12 (6.5%) of 184 were resistant to gentamicin [no additional isolates were resistant to the other aminoglycosides (amikacin or tobramycin)].

In 2011, resistance to piperacillin-tazobactam, ceftazidime and gentamicin were at their lowest levels since surveillance began. Between 2008 and 2011, resistance to ciprofloxacin decreased significantly from 21.8% to 12.6% (Chi^2 trend=5.47, P=0.02).

Seven (4.0%) of 175 isolates tested against all five "indicator" antibiotics, from five hospitals, were MDR (2010, 6.5%), which is the lowest since surveillance began:

- Five with resistance to 4 of the 5 required antibiotics classes
- Two with resistance to 3 of the 5 required antibiotics classes

Antimicrobial resistance levels among *P. aeruginosa* isolates in Ireland are among the lowest in Europe, with Ireland ranking between 22nd and 24th out of 29 countries for 3GC, fluoroquinolone and aminoglycoside resistance.

Males were approximately 1.9-times more likely to have an invasive *P. aeruginosa* infection than females (significant; z=4.33, P<0.0001). The frequency of invasive *P. aeruginosa* infection increased with age with the majority of infections (n=136; 74%) occurring in adults over 60 years. The median age was 70 years (95%CI, 66-73).

Enhanced Bloodstream Infection Surveillance
The enhanced surveillance programme was established in 2004 and involves voluntary participation by hospitals

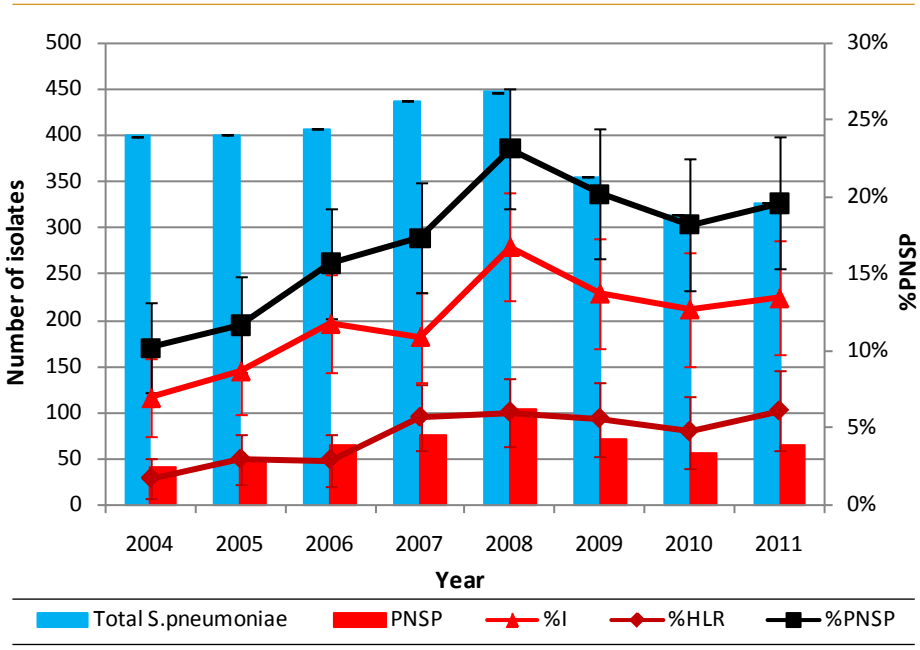


Figure 6. Trends for S. pneumoniae – total numbers of S. pneumoniae/PNSP and percentage PNSP with 95% confidence intervals
HLR, High-level resistant; I, Intermediately resistant

that provide additional demographic, risk factor and clinical data on invasive pathogens causing BSI. In 2011, there were 1,875 individual records (cases or isolates under the EARS-Net definition) submitted from 12 participating laboratories (compared to 2,562 submitted in 2010). The total number of records thus far for 2011 represents 40% of the total core EARS-Net dataset. Demographic and other basic data for the major resistance profiles of EARS-Net pathogens are shown in Table 2.

As vancomycin resistance among *E. faecium* BSI in Ireland is the highest reported in Europe, a detailed analysis of the changes over time of the factors affecting enterococcal BSI was undertaken in 2011. The six years' enhanced data (2006-2011) showed that most vancomycin-resistant enterococci (VRE) BSI were hospital-acquired: 87% of *E. faecium* VRE BSI and 67% of *E. faecalis* VRE BSI were acquired in the reporting hospital. The rate of hospital-acquired *E. faecium* VRE BSI rose during 2006-2010, and declined slightly in 2011, whilst the rate for vancomycin susceptible *E. faecium* (VSE) BSI generally increased. Intra-abdominal/ gastro-intestinal tract and central venous catheters accounted for about half of all primary sources for *E. faecium*. Urinary tract with or without catheter was also an important source for *E. faecalis*. The most common risk factors included underlying malignancy/ immunosuppression, intensive care unit stay and recent surgery. Recent surgery as risk factor had been increasing in VRE since 2006, however, this decreased sharply in 2011.

Of the MRSA BSI, 23% were noted as having central venous catheter and 3% as peripheral venous catheter as primary source. Of the fluoroquinolone-resistant *E. coli* BSI, 18% were noted as having urinary catheter as primary source of the bacteraemia.

For further details, go to the HPSC website (http://www.hpsc.ie) and click on "Topics A-Z", then "Enhanced Bacteraemia Surveillance".

Enhanced Surveillance of Carbapenem resistant *Enterobacteriaceae* (CRE) in Ireland

Key Points

- In 2011, 39 cases of CRE colonisation or infection were notified
- Only two patients had a history of hospitalisation abroad
- Detection of CRE represented colonisation in the majority of patients (68%) and CRE infection was reported for 30%

Carbapenem resistant *Enterobacteriaceae* (CRE) are multiple-drug resistant Gram-negative bacteria that can be easily spread between patients in healthcare settings and have the ability to cause infections for which effective antibiotic therapy may be lacking. Most CRE produce carbapenemase, an enzyme that breaks down the carbapenem class of antibiotics (e.g. imipenem, meropenem). Carbapenemase production has spread worldwide in the past 15 years and is now a prominent resistance mechanism reported in many countries.

In 2011, carbapenemase-producing CRE were confirmed and reported from 39 patients in Ireland. The reported carbapenemase enzyme types were OXA-48 (21 cases), KPC (17 cases) and NDM-1 (one case). There were four reported CRE outbreaks [KPC type (2) and OXA-48 type (2)]. Both KPC outbreaks were confirmed to be directly linked, using molecular methods.

Completed enhanced surveillance forms were received from seven laboratories on 37 patients (95%). The average patient age was 63 years (range – 6 months to 95 years). Twenty-seven patients (73%) had been admitted from home, eight (21%) were transfers from

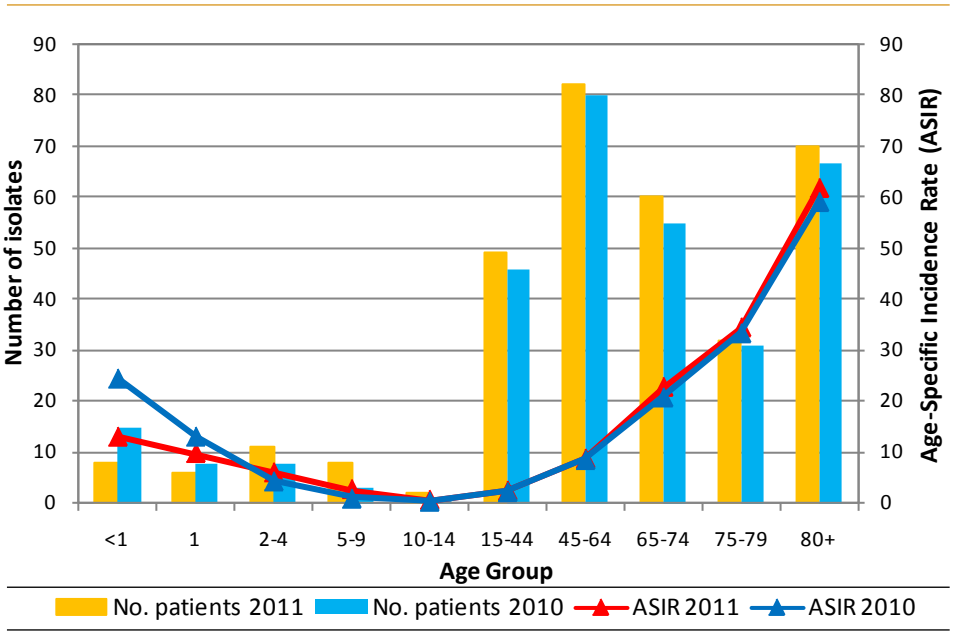


Figure 7. Numbers and age-specific incidence rates of patients with invasive S. pneumoniae infection in 2011 compared with 2010

another acute hospital, one patient (3%) had been admitted from a long-term care facility and one (3%) was not an inpatient.

At the time of detection of CRE, 16 patients (43%) were already known to be colonised or infected with one or more other multi-drug resistant organisms (MDRO). Two patients (5%) had a history of recent hospitalisation abroad. Nineteen patients (51%) reported no foreign travel in the last 12 months. Travel history was unknown for 15 patients (41%) and three patients had a history of foreign travel within the past 12 months [India [NDM-1], Greece [KPC] and Spain [OXA-48]. Of note, the latter patient had not been hospitalised abroad.

Twenty-eight patients (76%) had a history of hospitalisation in the past 12 months, 15 (41%) had a history of surgery in the past six months, nine (24%) had a history of admission to intensive care in the last 12 months. Thirteen patients (35%) had underlying co-morbidities [chronic lung, liver or renal disease, diabetes mellitus, urological abnormality or immunocompromise]. Four patients had no identifiable risk factors for CRE colonisation or infection.

Of the 37 patients, the antimicrobial exposure history prior to isolation of CRE was provided for 33 (89%). Twenty-six (79%) had received β lactam/β lactamase inhibitor combination agents, 11 (33%) had received fluoroquinolones, 9 (27%) had received carbapenems, 7 (21%) had received aminoglycosides and four had received cephalosporins (12%). One patient each had received co-trimoxazole and chloramphenicol respectively.

For 25 patients (68%), the isolation of CRE represented colonisation and 11 patients (30%) developed CRE infection. The significance of isolation of CRE was unknown for one patient (2%). Of the 11 CRE infections, six (55%) were classified as intra-abdominal, three (27%) as urinary tract and there were two bloodstream infections (18%).

The majority of the CRE (21; 57%) were detected from rectal screening swabs. One patient had CRE isolated from both sputum and urine. Two patients (5%) had CRE isolated from blood cultures.

Of the 37 patients, outcome was reported for 33 (89%) and of those, 15 (45%) were discharged home. Eleven patients (33%) died in hospital and seven (21%) remained inpatients at the time the surveillance form was returned. For five of the eleven deaths, the patient was reported to have had CRE infection. For the remaining six patients who died, CRE colonisation was reported. However, it is not known whether or not CRE colonised patients subsequently went on to develop CRE infection later in the hospital admission and the potential contribution of CRE was not reported for the eleven deaths.

Of the 15 patients who were discharged home, length-of-stay could be calculated for 14. The median length-of-stay was 44 days (range – 7 to 340 days).

Klebsiella pneumoniae accounted for all 37 CRE isolates reported by the seven laboratories. Reported minimum inhibitory concentrations for meropenem and ertapenem ranged from 0.25 to >32 mg/L. Gentamicin resistance was reported for 14 of 37 (38%) isolates and fluoroquinolone resistance for 21 of 29 (72%) isolates. Of the 25 isolates tested against tigecycline, 18 (72%) were reported to be either resistant or of intermediate susceptibility. Of the 16 isolates tested against colistin, 15 (94%) were reported as susceptible.

In response to the emergence of CRE in Ireland, interim CRE screening guidelines were issued and an enhanced surveillance scheme for CRE was launched.

Latest available information on CRE in Ireland is available on the HPSC website at the following link: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/strategyforthecontrolofAntimicrobialResistanceinIrelandSARI/CarbapenemResistantEnterobacteriaceaeCRE/

Conclusion

Improvements in infection prevention and control resources and interventions in recent years, along with hospital antibiotic stewardship programmes, have probably contributed to reducing the burden of MRSA BSI in Ireland since 2006. The introduction of pneumococcal conjugate vaccines into the childhood immunisation programme since September 2008 has already resulted in a reduction in the burden of invasive pneumococcal disease in children. Despite these successes, however, AMR remains a major problem this country, in particular VREfm, fluoroquinolone-resistant *E. coli*, penicillin non-susceptible and erythromycin-resistant *S. pneumoniae* and increases in ESBL-production in *E. coli* and *K. pneumoniae*. The increasing number of reported invasive infections due to multi-drug resistant strains of these pathogens is of particular concern. It should also be noted that AMR is an issue in other bacterial species as well as in infections occurring at sites other than blood and/or CSF for which national surveillance data are not currently available in Ireland. While data from invasive infections is extremely valuable in comparing national levels of AMR, it may underestimate the true burden of infections caused by drug-resistant pathogens.

Thirty nine cases of CRE colonisation or infection were reported in 2011. In addition, four cases of carbapenemase-producing *K. pneumoniae* bloodstream infection were reported in 2011, marking the first appearance of this emerging resistance mechanism from invasive infections in this country. In Greece, 71% and 1.4% of invasive *K. pneumoniae* and *E. coli* isolates, respectively, were resistant to carbapenems in 2011, both of which are the highest proportions in Europe. In Italy, the proportion of invasive *K. pneumoniae* isolates that are carbapenem-resistant increased from 3% in 2008 to 30% in 2011. The situation in Greece and Italy should act as a warning signal for countries where this particular resistance has yet to emerge or is still at a very low incidence. Increases in the prevalence of CRE

are largely related to broad spectrum antibiotic use, particularly in hospital and long-term care settings, and aggressive infection prevention and control interventions are required to prevent their spread between patients. In Ireland, initial steps have been taken to halt the spread of CRE and it is important that these are maintained and further initiatives are implemented, particularly in relation to hospital-based infection prevention and control and antimicrobial stewardship programmes.

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 infections that can be targeted as part of such programmes.

The high levels of penicillin non-susceptibility and erythromycin resistance among invasive pneumococcal infections in Ireland are also cause for concern. Pneumococcal infections are largely community-acquired, and AMR in this pathogen is largely related to antibiotic use outside of hospitals. As shown in countries such as France and Belgium, continued prescriber, patient and public education can reduce inappropriate antibiotic use in the community, and lead to reductions in the level of drug-resistant pneumococcal infections.

Infections caused by drug-resistant bacteria result in excess 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 health service, and that these are supported by appropriately resourced reference laboratory services. To this end, it is vital that recommendations and guidelines produced by the HSE/RCPI AMR and HCAI Clinical Advisory Group 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 19th October 2012.

For further details of EARS-Net and antimicrobial resistance in Ireland see http://www.hpsc.ie

European data are available at http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx

10

Computerised Infectious Disease Reporting System (CIDR)

10. Computerised Infectious Disease Reporting (CIDR)

Summary

- 2011 represented the 8th year of CIDR operation
- CIDR implementation in the last remaining regional Department of Public Health completed
- Implementation in all CIDR labs completed
- TB notifications on CIDR from the beginning of 2011
- Syphilis notifications on CIDR from May 2011
- CIDR ready for new notifiable diseases from the beginning of 2012

CIDR OPERATIONS

2011 saw an upgrade of the CIDR application at the end of March from version 2.3.1 to version 2.4. This upgrade included the addition of some new core CIDR data items and some minor application enhancements and bug fixes. The value of relocating the CIDR development environment from our support supplier to HPSC was underscored when a critical bug associated with one of the new data items needed to be fixed quickly and this was achieved by mid-April.

CIDR Implementation

2011 was a very significant year as it saw the completion of the national implementation of CIDR at both Public Health level and hospital microbiology laboratories and reference laboratories across the country.
This means that all eight Public Health Departments across the country now use CIDR on a daily basis to enter statutory notifications of infectious disease from clinicians and receiving notifications from 38 laboratories across the country electronically, including 5 reference laboratories.

The increase in the number of laboratories using CIDR has been accompanied by a similar increase in the volume of laboratory records reported through CIDR.

CIDR training

The completion of CIDR implementation was accompanied by a major training effort. The were six basic CIDR training courses held for Public Health staff resulting in 30 users being trained. Two advanced Public Health training courses were delivered to 3 trainees whilst two training courses on ad hoc reporting from the CIDR system were provided for 5 people. Three CIDR training courses for laboratory users were held for 15 trainees during 2011.

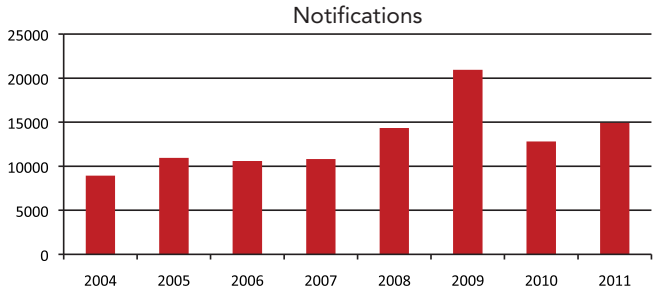


Figure 1. The volume of statutory infectious disease notifications since CIDR implementation commenced in 2004.

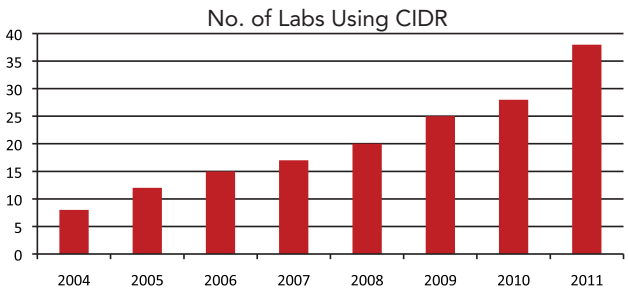


Figure 2. The increased number of laboratories using CIDR year on year.

MORE DISEASES REPORTED USING CIDR

TB

The go-live of TB notifications from January 2nd 2011 was achieved as planned. This involved all new TB notifications now being notified using CIDR and included an extensive enhanced disease-specific dataset in addition to the core CIDR data items. This extended dataset included 115 TB-specific questions in relation to additional patient, sociodemographic and clinical details as well as diagnostic, outcome, contact and outbreak information.

Syphilis

Clinical syphilis notifications using CIDR went live from May 3rd 2011. Like TB this involved both the core CIDR dataset as well as a significant number (32) of syphilis-specific enhanced data items.

New notifiable diseases (2011)

The new schedule of notifiable infectious disease was published in September and required extensive work to prepare for these notifications using CIDR. This included adding 18 new diseases to CIDR and a number of disease-specific enhanced data fields. It also involved assessing, in conjunction with the relevant HPSC disease-specific teams, how best to address those diseases such as Acute Infectious Gastroenteritis (AIG) with data already recorded within CIDR but now reportable separately as *Clostridium difficile* or as Rotavirus. This involved reclassifying historic notifications in line with the causative organism identified. Similarly Enterohaemorrhagic Escherichia coli (EHEC - E.coli of serogroup known to be toxin producing) had been notifiable since January 2004 but from September 2011, EHEC was no longer notifiable and verotoxigenic E.coli (VTEC) only notifiable under current legislation. In both instances there was a desire to ensure that it remained possible to analyse trends across years.

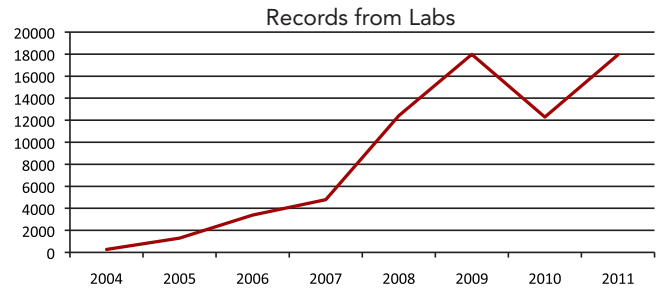


Figure 3. The number of laboratory records notified to Departments of Public Health through CIDR (the peak in 2009 was attributable in part to the influenza pandemic that year).

INFORMATION GOVERNANCE

HPSC, including CIDR, continued to be successfully audited through 2011 against the ISO 27001 standard for Information Security Management. This accreditation provides reassurance to both healthcare professionals and data subjects that the security and confidentiality of information recorded through CIDR is managed appropriately. This was especially helpful in enabling syphilis notifications to be implemented on CIDR and to allow HIV notifications to commence on CIDR from the beginning of 2012.

CIDR COMMUNICATIONS

The CIDR National Steering Group met on four occasions through 2011 and continues to provide oversight and governance for CIDR. Similarly the CIDR National User Group met four times in 2011 to discuss operational aspects of using CIDR to provide feedback to the CIDR team within HPSC.

11

Appendix 1
Notifiable Infectious Diseases in Ireland

Notes:

Figures for the year 2011 presented in this appendix were extracted from the Computerised Infectious Disease Reporting (CIDR) system in September 2012. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

Figures on EARS-Net pathogens and sexually transmitted infections are not presented here, since these diseases were not reported via the CIDR system during 2011. Separate databases are used to collate data on these diseases. Syphilis data were reported via CIDR from May 2011 but are excluded from this appendix as they represent only a portion of the cases notified in 2011.

Table A1.1. List of notifiable infectious diseases and their respective causative pathogens (relevant to 2011) under Infectious Diseases (Amendment) (No. 3) Regulations 2003 (S.I. No. 707 of 2003)

Infectious Disease	Causative Pathogen(s)
Acute anterior poliomyelitis	Polio virus
Acute infectious gastroenteritis	
Ano-genital warts	
Anthrax	*Bacillus anthracis*
***Bacillus cereus* food-borne infection/intoxication**	*Bacillus cereus*
Bacterial meningitis (not otherwise specified)	
Botulism	*Clostridium botulinum*
Brucellosis	*Brucella* species
Campylobacter infection	*Campylobacter* species
Chancroid	*Haemophilus ducreyi*
***Chlamydia trachomatis* infection (genital)**	*Chlamydia trachomatis*
Cholera	*Vibrio cholerae*
***Clostridium perfringens* (type A) food-borne disease**	*Clostridium perfringens*
Creutzfeldt Jakob disease	
Creutzfeldt Jakob disease (new variant)	
Cryptosporidiosis	*Cryptosporidium parvum*
Diphtheria	*Corynebacterium diphtheriae*
Echinococcosis	*Echinococcus* species
Enterococcal bacteraemia	*Enterococcus* species (blood)
Enterohaemorrhagic *Escherichia coli*	*Escherichia coli* of serogroup known to be toxin-producing
***Escherichia coli* infection (invasive)**	*Escherichia coli* (blood, CSF)
Giardiasis	*Giardia lamblia*
Gonorrhoea	*Neisseria gonorrhoeae*
Granuloma inguinale	
***Haemophilus influenzae* disease (invasive)**	*Haemophilus influenzae* (blood, CSF or other normally sterile site)
Hepatitis A (acute)	Hepatitis A virus
Hepatitis B (acute and chronic)	Hepatitis B virus
Hepatitis C	Hepatitis C virus
Herpes simplex (genital)	Herpes simplex virus
Influenza	Influenza A and B virus
Legionellosis	*Legionella* species
Leptospirosis	*Leptospira* species
Listeriosis	*Listeria monocytogenes*
Lymphogranuloma venereum	
Malaria	*Plasmodium falciparum, P. vivax, P. ovale, P. malariae*
Measles	Measles virus
Meningococcal disease	*Neisseria meningitidis*
Mumps	Mumps virus
Non-specific urethritis	
Noroviral infection	Norovirus
Paratyphoid	*Salmonella paratyphi*
Pertussis	*Bordetella pertussis*
Plague	*Yersinia pestis*
Q fever	*Coxiella burnetii*
Rabies	Rabies virus
Rubella	Rubella virus
Salmonellosis	*Salmonella enterica*
Severe Acute Respiratory Syndrome (SARS)	SARS-associated coronavirus
Shigellosis	*Shigella* species
Smallpox	Variola virus
Staphylococcal food poisoning	Enterotoxigenic *Staphylococcus aureus*
***Staphylococcus aureus* bacteraemia**	*Staphylococcus aureus* (blood)
Streptococcus group A infection (invasive)	*Streptococcus pyogenes* (blood, CSF or other normally sterile site)
***Streptococcus pneumoniae* infection (invasive)**	*Streptococcus pneumoniae* (blood, CSF or other normally sterile site)
Syphilis	*Treponema pallidum*
Tetanus	*Clostridium tetani*
Toxoplasmosis	*Toxoplasma gondii*
Trichinosis	*Trichinella* species
Trichomoniasis	*Trichomonas vaginalis*
Tuberculosis	*Mycobacterium tuberculosis* complex
Tularemia	*Francisella tularensis*
Typhoid	*Salmonella typhi*
Typhus	*Rickettsia prowazekii*
Viral encephalitis	
Viral haemorrhagic fevers	Lassa virus, Marburg virus, Ebola virus, Crimean-Congo haemorrhagic fever virus
Viral meningitis	
Yellow fever	Yellow fever virus
Yersiniosis	*Yersinia enterocolitica, Yersinia pseudotuberculosis*

Table A1.2 Number of notifiable infectious diseases, 2009-2011 and crude incidence rates of diseases, 2011

Infectious Disease	2009	2010	2011	CIR* 2011
Acute infectious gastroenteritis (unspecified)	108	95	88	1.92
Bacillus cereus food-borne infection or intoxication	1	0	0	0.00
Bacterial meningitis (not otherwise specified)	40	42	35	0.76
Botulism	0	0	1	0.02
Brucellosis	0	2	1	0.02
Campylobacter infection	1807	1660	2427	52.90
Clostridium difficile infection	1895	1693	1848	40.28
Clostridium perfringens (type A) food-borne disease	1	0	0	0.00
Creutzfeldt Jakob disease	5	3	7	0.15
Cryptosporidiosis	445	294	428	9.33
Echinococcosis	1	1	0	0.00
Enterohaemorrhagic *Escherichia coli* (VT negative)	14	25	23	0.50
Giardiasis	61	57	57	1.24
Haemophilus influenzae disease (invasive)	43	28	44	0.96
Hepatitis A (acute)	50	46	19	0.41
Hepatitis B (acute and chronic)	793	640	525	11.44
Hepatitis C	1236	1228	1257	27.39
Influenza	5055	275	2077	45.27
Legionellosis§	9	11	7	0.15
Leptospirosis	24	17	16	0.35
Listeriosis	10	10	7	0.15
Malaria	90	82	61	1.33
Measles	162	403	267	5.82
Meningococcal disease	147	114	94	2.05
Mumps	3619	292	165	3.60
Noroviral infection	1633	1926	990	21.58
Paratyphoid	10	5	2	0.04
Pertussis	78	114	229	4.99
Q fever	17	9	5	0.11
Rotavirus infection	2354	2501	2451	53.42
Rubella	19	24	4	0.09
Salmonellosis	332	356	311	6.78
Shigellosis	70	60	42	0.92
Staphylococcal food poisoning	1	0	0	0.00
Streptococcus group A infection (invasive)	60	68	67	1.46
Streptococcus pneumoniae infection (invasive)	432	391	425	9.26
Toxoplasmosis	37	36	32	0.70
Tuberculosis‡	-	-	424	9.24
Typhoid	9	8	14	0.31
Typhus	0	0	1	0.02
Verotoxigenic *Escherichia coli* infection	241	199	284	6.19
Viral encephalitis	5	22	23	0.50
Viral meningitis	142	168	220	4.79
Yersiniosis	3	3	6	0.13
Total	**21059**	**12908**	**14984**	

**CIR, Crude incidence rate per 100,000 total population*
‡Tuberculosis only notifiable in CIDR since 2011
§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

Table A1.3 Number of notifiable infectious diseases by HSE area, 2011

Infectious Disease	HSE-E	HSE-M	HSE-MW	HSE-NE	HSE-NW	HSE-SE	HSE-S	HSE-W	Total
Acute infectious gastroenteritis (unspecified)	50	0	2	0	15	20	0	1	88
Bacterial meningitis (not otherwise specified)	16	2	2	2	3	6	3	1	35
Botulism	*	*	*	*	*	*	*	*	1
Brucellosis	*	*	*	*	*	*	*	*	1
Campylobacter infection	804	182	227	193	124	327	320	250	2427
Clostridium difficile infection	781	50	96	81	79	262	293	206	1848
Creutzfeldt Jakob disease	0	0	0	3	0	1	2	1	7
Cryptosporidiosis	12	50	60	30	33	76	64	103	428
Enterohaemorrhagic *Escherichia coli* (VT negative)	1	0	15	0	5	1	0	1	23
Giardiasis	20	3	5	2	1	9	11	6	57
Haemophilus influenzae disease (invasive)	18	3	2	7	2	4	2	6	44
Hepatitis A (acute)	9	1	1	1	1	3	3	0	19
Hepatitis B (acute and chronic)	327	17	31	30	13	18	51	38	525
Hepatitis C	957	47	36	63	18	43	60	33	1257
Influenza	743	125	257	171	89	239	166	287	2077
Legionellosis§	3	0	0	0	0	3	1	0	7
Leptospirosis	3	1	5	2	0	0	5	0	16
Listeriosis	2	0	0	1	1	0	1	2	7
Malaria	32	6	1	7	0	1	9	5	61
Measles	232	5	5	8	1	2	6	8	267
Meningococcal disease	32	8	10	9	8	10	11	6	94
Mumps	72	11	15	11	20	12	7	17	165
Noroviral infection	398	70	149	140	14	98	69	52	990
Paratyphoid	*	*	*	*	*	*	*	*	2
Pertussis	108	15	7	12	32	12	24	19	229
Q fever	0	1	0	1	0	1	1	1	5
Rotavirus infection	456	300	172	222	153	378	412	358	2451
Rubella	*	*	*	*	*	*	*	*	4
Salmonellosis	112	23	40	24	15	35	27	35	311
Shigellosis	20	2	9	1	1	3	4	2	42
Streptococcus group A infection (invasive)	29	5	6	1	2	7	12	5	67
Streptococcus pneumoniae infection (invasive)	133	14	38	25	31	87	61	36	425
Toxoplasmosis	14	1	1	2	0	1	11	2	32
Tuberculosis	193	20	24	25	14	30	87	31	424
Typhoid	4	0	5	1	0	1	1	2	14
Typhus	*	*	*	*	*	*	*	*	1
Verotoxigenic *Escherichia coli* infection	30	64	56	23	24	23	41	23	284
Viral encephalitis	12	1	0	2	0	4	1	3	23
Viral meningitis	108	10	21	14	10	19	25	13	220
Yersiniosis	2	0	0	0	2	0	1	1	6

**Data not reported to HSE area level when total number in Ireland <5 cases*
§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

Table A1.4 Number of notifiable infectious diseases by HSE region, 2011

Infectious Disease	HSE Mid-Leinster	HSE-North East	HSE-West	HSE-South	Total
Acute infectious gastroenteritis (unspecified)	14	36	18	20	88
Bacterial meningitis (not otherwise specified)	9	11	6	9	35
Botulism	*	*	*	*	1
Brucellosis	*	*	*	*	1
Campylobacter infection	731	448	601	647	2427
Clostridium difficile infection	583	329	381	555	1848
Creutzfeldt Jakob disease	0	3	1	3	7
Cryptosporidiosis	62	30	196	140	428
Enterohaemorrhagic Escherichia coli (VT negative)	1	0	21	1	23
Giardiasis	18	7	12	20	57
Haemophilus influenzae disease (invasive)	13	15	10	6	44
Hepatitis A (acute)	7	4	2	6	19
Hepatitis B (acute and chronic)	172	202	82	69	525
Hepatitis C	618	449	87	103	1257
Influenza	568	471	633	405	2077
Legionellosis§	2	1	0	4	7
Leptospirosis	2	4	5	5	16
Listeriosis	2	1	3	1	7
Malaria	26	19	6	10	61
Measles	75	170	14	8	267
Meningococcal disease	27	22	24	21	94
Mumps	65	29	52	19	165
Noroviral infection	323	285	215	167	990
Paratyphoid	*	*	*	*	2
Pertussis	88	47	58	36	229
Q fever	1	1	1	2	5
Rotavirus infection	624	354	683	790	2451
Rubella	*	*	*	*	4
Salmonellosis	93	66	90	62	311
Shigellosis	13	10	12	7	42
Streptococcus group A infection (invasive)	18	17	13	19	67
Streptococcus pneumoniae infection (invasive)	91	81	105	148	425
Toxoplasmosis	9	8	3	12	32
Tuberculosis	143	95	69	117	424
Typhoid	1	4	7	2	14
Typhus	*	*	*	*	1
Verotoxigenic *Escherichia coli* infection	82	35	103	64	284
Viral encephalitis	8	7	3	5	23
Viral meningitis	84	48	44	44	220
Yersiniosis	2	0	3	1	6

**Data not reported to HSE region level when total number in Ireland <5 cases*
§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

Table A1.5 Number of notifiable infectious diseases by age group (years), 2011

Infectious Disease	0-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65+	Unknown	Total
Acute infectious gastroenteritis (unspecified)	46	6	8	0	0	4	2	1	2	16	3	88
Bacterial meningitis (not otherwise specified)	21	0	0	1	3	4	2	2	1	1	0	35
Botulism	1	0	0	0	0	0	0	0	0	0	0	1
Brucellosis	0	0	0	0	0	1	0	0	0	0	0	1
Campylobacter infection	609	178	104	121	194	353	209	229	181	240	9	2427
Clostridium difficile infection	36	20	13	17	36	83	74	120	213	1235	1	1848
Creutzfeldt Jakob disease	0	0	0	0	0	0	1	1	0	5	0	7
Cryptosporidiosis	254	97	27	12	14	18	2	2	0	1	1	428
Enterohaemorrhagic *Escherichia* coli (VT negative)	20	1	0	0	0	0	0	0	1	1	0	23
Giardiasis	9	3	0	1	7	15	8	8	2	2	2	57
Haemophilus influenzae disease (invasive)	8	2	0	1	0	4	4	1	4	20	0	44
Hepatitis A (acute)	1	1	0	0	1	8	2	0	2	4	0	19
Hepatitis B (acute and chronic)	1	1	3	9	67	233	127	43	29	11	1	525
Hepatitis C	4	1	3	8	78	507	410	164	58	20	4	1257
Influenza	259	134	124	131	172	488	282	185	169	127	6	2077
Legionellosis§	0	0	0	0	0	0	0	0	3	4	0	7
Leptospirosis	0	0	0	0	2	3	5	4	0	2	0	16
Listeriosis	2	0	0	0	1	0	1	0	1	2	0	7
Malaria	1	3	4	3	7	5	22	10	3	3	0	61
Measles	131	49	43	24	10	8	1	0	0	0	1	267
Meningococcal disease	57	9	4	7	4	4	1	4	1	3	0	94
Mumps	29	7	8	19	15	37	15	13	14	8	0	165
Noroviral infection	125	26	20	10	30	57	48	37	62	571	4	990
Paratyphoid	0	0	0	0	0	2	0	0	0	0	0	2
Pertussis	122	30	25	7	3	8	15	13	4	1	1	229
Q fever	0	0	0	0	0	0	1	1	1	2	0	5
Rotavirus infection	2373	45	7	3	0	2	2	3	0	10	6	2451
Rubella	3	1	0	0	0	0	0	0	0	0	0	4
Salmonellosis	86	20	14	19	17	42	27	27	27	32	0	311
Shigellosis	10	1	2	1	6	7	7	6	1	1	0	42
Streptococcus group A infection (invasive)	8	5	1	2	4	10	5	4	6	22	0	67
Streptococcus pneumoniae infection (invasive)	41	10	2	2	7	16	38	39	60	210	0	425
Toxoplasmosis	2	0	1	1	3	12	8	3	1	1	0	32
Tuberculosis	5	5	10	13	30	109	74	66	39	72	1	424
Typhoid	2	3	0	0	1	4	3	1	0	0	0	14
Typhus	0	0	0	0	0	0	0	1	0	0	0	1
Verotoxigenic *Escherichia coli* infection	132	36	10	10	7	29	27	7	13	13	0	284
Viral encephalitis	0	0	0	0	1	5	2	3	0	11	1	23
Viral meningitis	104	7	8	14	20	33	21	5	0	5	3	220
Yersiniosis	3	1	0	0	0	0	1	0	1	0	0	6
Total	**4505**	**702**	**441**	**436**	**740**	**2111**	**1447**	**1003**	**899**	**2656**	**44**	**14984**

§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

Table A1.6 Number of notifiable infectious diseases by gender, 2011

Infectious Disease	Male	Female	Unknown	Total
Acute infectious gastroenteritis (unspecified)	44	42	2	88
Bacterial meningitis (not otherwise specified)	15	20	0	35
Botulism	1	0	0	1
Brucellosis	1	0	0	1
Campylobacter infection	1302	1120	5	2427
Clostridium difficile infection	735	1112	1	1848
Creutzfeldt Jakob disease	2	5	0	7
Cryptosporidiosis	230	198	0	428
Enterohaemorrhagic *Escherichia coli* (VT negative)	11	12	0	23
Giardiasis	21	35	1	57
Haemophilus influenzae disease (invasive)	25	19	0	44
Hepatitis A (acute)	10	9	0	19
Hepatitis B (acute and chronic)	275	241	9	525
Hepatitis C	824	428	5	1257
Influenza	893	1172	12	2077
Legionellosis§	6	1	0	7
Leptospirosis	14	2	0	16
Listeriosis	2	5	0	7
Malaria	41	20	0	61
Measles	147	119	1	267
Meningococcal disease	57	37	0	94
Mumps	89	76	0	165
Noroviral infection	420	566	4	990
Paratyphoid	1	1	0	2
Pertussis	92	136	1	229
Q fever	3	2	0	5
Rotavirus infection	1246	1189	16	2451
Rubella	2	2	0	4
Salmonellosis	161	149	1	311
Shigellosis	25	17	0	42
Streptococcus group A infection (invasive)	28	39	0	67
Streptococcus pneumoniae infection (invasive)	230	195	0	425
Toxoplasmosis	8	24	0	32
Tuberculosis	243	181	0	424
Typhoid	6	8	0	14
Typhus	1	0	0	1
Verotoxigenic *Escherichia coli* infection	138	145	1	284
Viral encephalitis	9	14	0	23
Viral meningitis	114	105	1	220
Yersiniosis	3	3	0	6
Total	**7475**	**7449**	**60**	**14984**

§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

Table A1.7 Number of notifiable infectious diseases by case classification, 2011

Infectious Disease	Confirmed	Probable	Possible	Total
Acute infectious gastroenteritis (unspecified)	2	86	0	88
Bacterial meningitis (not otherwise specified)	19	3	13	35
Botulism	1	0	0	1
Brucellosis	1	0	0	1
Campylobacter infection	2425	2	0	2427
***Clostridium difficile* infection**	1848	0	0	1848
Creutzfeldt Jakob disease	7	0	0	7
Cryptosporidiosis	413	15	0	428
Enterohaemorrhagic Escherichia coli **(VT negative)**	23	0	0	23
Giardiasis	56	1	0	57
***Haemophilus influenzae* disease (invasive)**	44	0	0	44
Hepatitis A (acute)	18	0	1	19
Hepatitis B (acute and chronic)	525	0	0	525
Hepatitis C	1257	0	0	1257
Influenza	2067	1	9	2077
Legionellosis§	6	1	0	7
Leptospirosis	16	0	0	16
Listeriosis	7	0	0	7
Malaria	61	0	0	61
Measles	211	0	56	267
Meningococcal disease	88	1	5	94
Mumps	70	3	92	165
Noroviral infection	976	14	0	990
Paratyphoid	2	0	0	2
Pertussis	113	31	85	229
Q fever	4	1	0	5
Rotavirus infection	2451	0	0	2451
Rubella	0	0	4	4
Salmonellosis	311	0	0	311
Shigellosis	42	0	0	42
Streptococcus group A infection (invasive)	65	2	0	67
***Streptococcus pneumoniae* infection (invasive)**	349	8	68	425
Toxoplasmosis	32	0	0	32
Tuberculosis	288	50	86	424
Typhoid	14	0	0	14
Typhus	1	0	0	1
Verotoxigenic *Escherichia coli* infection	272	11	1	284
Viral encephalitis	21	1	1	23
Viral meningitis	207	10	3	220
Yersiniosis	6	0	0	6
Total	**14319**	**241**	**424**	**14984**

Case classifications are assigned to notifications as per the Case Definitions for Notifiable Diseases during 2011
The case definitions booklet, available at http://www.hpsc.ie has been updated since 2012

**As per the case definitions, meningococcal disease notifications are classified as definite, presumed and possible. For convenience they are reported in this table as confirmed, probable and possible, respectively*
§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

11

Appendix 2
Immunisation Uptake in Ireland

Table A2.1 Immunisation uptake (%) at 12 months of age in 2011 (i.e. cohort born 01/01/2010-31/12/2010)

HSE Area	Local Health Office/HSE Area	Number in co-hort 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	na	1733	na	91	91	91	91	91
	Dublin South East	na	1719	na	89	89	89	89	89
	Dublin South City	na	1834	na	94	94	94	94	94
	Dublin South West	na	2693	na	92	92	92	92	93
	Dublin West	na	2945	na	81	81	81	81	81
	Dublin North West	na	4078	na	82	82	82	82	82
	Dublin North Central	na	1827	na	90	90	90	89	89
	Dublin North	na	4431	na	92	92	92	92	92
	Kildare/West Wicklow	na	4409	na	91	91	91	91	91
	Wicklow	na	2147	na	89	89	89	89	89
	HSE-E Total	**na**	**27816**	**na**	**89**	**89**	**89**	**89**	**89**
HSE-M	Laois/Offaly	2840	2840	95	94	94	94	94	94
	Longford/Westmeath	2117	2117	94	96	96	96	96	96
	HSE-M Total	**4957**	**4957**	**94**	**95**	**95**	**95**	**94**	**94**
HSE-MW	Clare	1718	1740	98	92	92	92	93	92
	Limerick	2105	2072	97	91	91	91	92	92
	Tipperary NR/East Limerick	2069	2125	96	93	93	93	93	93
	HSE-MW Total	**5892**	**5937**	**97**	**92**	**92**	**92**	**92**	**93**
HSE-NE	Cavan/Monaghan	na	2218	na	92	92	92	90	90
	Louth	na	2131	na	91	91	91	90	90
	Meath	na	3690	na	88	88	87	87	87
	HSE-NE Total	**na**	**8039**	**na**	**90**	**90**	**90**	**89**	**89**
HSE-NW	Donegal	2378	2378	95	93	93	93	93	93
	Sligo/Leitrim	1438	1438	96	94	94	94	93	95
	HSE-NW Total	**3816**	**3816**	**95**	**94**	**94**	**93**	**93**	**94**
HSE-SE	Carlow/Kilkenny	2158	2158	96	90	90	90	90	91
	South Tipperary	1405	1405	95	94	94	94	93	93
	Waterford	2083	2083	96	93	93	93	93	93
	Wexford	2248	2248	97	91	91	91	91	92
	HSE-SE Total	**7894**	**7894**	**96**	**92**	**92**	**92**	**92**	**92**
HSE-S	North Cork	1627	1596	79	90	90	89	87	86
	North South Lee	6130	6049	92	90	90	89	86	86
	West Cork	761	763	89	86	86	86	82	81
	Kerry	1983	1939	92	87	87	86	83	83
	HSE-S Total	**10501**	**10347**	**90**	**89**	**89**	**89**	**86**	**85**
HSE-W	Galway	na	4129	na	90	90	90	90	90
	Mayo	na	1803	na	92	92	92	91	92
	Roscommon	na	952	na	96	95	96	96	97
	HSE-W Total	**3538***	**6884**	**4***	**91**	**91**	**91**	**91**	**91**
Ireland		**36598**	**75690**	**85***	**90**	**90**	**90**	**90**	**90**

na=not available

** In Quarters 3 and 4 2011 the HSE-W reported BCG uptake data (4%), for children at 12 months of age for the first time, resulting in a low national uptake rate (85%) compared to previous years. This is not a true decline as national uptake rates are based on available data and the HSE-W BCG data were not available previously. Traditionally BCG was given at age 10 - 12 years in the HSE-W. HSE-W BCG data were not available by LHO. The available national BCG cohort data may be around 48% (this figure is an estimate only) of the national birth cohort in 2011.*

†As the denominator/number in cohort varied slightly according to vaccine the most commonly used number is reported here.

Since T_3, P_3 and $Polio_3$ uptake identical to D_3 uptake only D_3 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 A2.2 Immunisation uptake (%) at 24 months of age in 2011 (i.e. cohort born 01/01/2009-31/12/2009)

HSE Area	Local Health Office/HSE Area	Number in cohort for D_3, T_3, P_3 & $Polio_3$*	Immunisation Uptake (%)						
			D_3	Hib_3	Hib_b	$HepB_3$	$MenC_3$	PCV_3	MMR_1
HSE-E	Dublin South	1724	93	93	86	92	81	87	89
	Dublin South East	1527	92	92	85	92	81	87	89
	Dublin South City	1737	96	96	88	96	83	90	93
	Dublin South West	2696	95	95	89	94	83	89	92
	Dublin West	2958	93	93	84	93	76	86	89
	Dublin North West	3935	91	91	81	91	77	85	85
	Dublin North Central	1734	95	95	89	95	82	87	90
	Dublin North	4508	95	95	91	95	87	91	92
	Kildare/West Wicklow	4241	97	97	93	97	88	93	95
	Wicklow	2100	93	93	81	93	77	87	88
	HSE-E Total	**27160**	**94**	**94**	**87**	**94**	**82**	**89**	**90**
HSE-M	Laois/Offaly	2828	97	97	94	97	89	94	96
	Longford/Westmeath	2101	97	97	95	97	90	94	96
	HSE-M Total	**4929**	**97**	**97**	**95**	**97**	**89**	**94**	**96**
HSE-MW	Clare	1912	96	96	93	96	89	93	94
	Limerick	2103	94	94	87	94	84	91	92
	Tipperary NR/East Limerick	2044	96	96	89	96	85	92	93
	HSE-MW Total	**6059**	**96**	**96**	**89**	**96**	**86**	**92**	**93**
HSE-NE	Cavan/Monaghan	2220	97	97	90	97	88	94	94
	Louth	2148	94	94	89	94	85	91	92
	Meath	3660	96	96	87	96	84	91	91
	HSE-NE Total	**8028**	**96**	**96**	**88**	**96**	**85**	**92**	**92**
HSE-NW	Donegal	2485	97	97	91	95	86	91	93
	Sligo/Leitrim	1469	97	97	95	96	86	88	96
	HSE-NW Total	**3954**	**97**	**97**	**93**	**96**	**86**	**90**	**94**
HSE-SE	Carlow/Kilkenny	2121	95	95	94	95	85	89	93
	South Tipperary	1569	97	97	97	96	86	92	93
	Waterford	2124	95	95	94	95	88	92	93
	Wexford	2406	95	95	94	95	87	91	93
	HSE-SE Total	**8220**	**95**	**95**	**94**	**95**	**86**	**91**	**93**
HSE-S	North Cork	1562	95	94	82	94	83	90	90
	North South Lee	5970	98	97	83	96	86	93	95
	West Cork	815	90	89	75	89	76	83	86
	Kerry	2148	96	95	82	94	84	91	92
	HSE-S Total	**10495**	**96**	**96**	**82**	**95**	**84**	**91**	**93**
HSE-W	Galway	4085	93	93	78	93	78	87	88
	Mayo	1793	95	95	80	95	80	89	89
	Roscommon	970	98	98	97	98	96	98	97
	HSE-W Total	**6848**	**94**	**94**	**81**	**94**	**81**	**89**	**90**
Ireland		**75693**	**95**	**95**	**88**	**95**	**84**	**90**	**92**

**As the denominator/number in cohort varied slightly according to vaccine the most commonly used number is reported here.*
Since T_3, P_3 and $Polio_3$ uptake identical to D_3 uptake only D_3 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 A2.3 Local Health Office (LHO) abbreviations used in the immunisation uptake chapter of this document

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*

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 2011, notification data were inputted directly by areas using the system. For areas not yet on CIDR, data were forwarded weekly to HPSC for input to CIDR. Enhanced surveillance was undertaken for certain diseases and these data collated on CIDR. Outbreak data were also collated on CIDR using the same process outlined above. Since 4th May 2008, new cases of *Clostridium difficile*-associated disease (CDAD) were notified on CIDR under the category 'acute infectious gastroenteritis' (AIG). Weekly Reports on infectious disease notifications (including a separate report for AIG with the emphasis on *C. difficile*) 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 July and October 2012. These figures may differ from those previously published due to ongoing updating of data on CIDR.

Data on the notifiable infectious diseases not yet on CIDR were collated as follows:

National Tuberculosis Surveillance System (NTBSS)

TB notification data (including enhanced information) for 2010 were collated in the regional Departments of Public Health, where data were entered on the Epi2000 NTBSS database. Each HSE Area provided finalised 2010 data (with outcome information). Data were validated and cleaned with each area and the national data were collated. Validation of the 2010 TB data was concluded during September 2012.

Sexually Transmitted Infections (STIs)

Clinicians and laboratories notified their respective Departments of Public Health of probable and confirmed cases of STIs. Data for 2010 and 2011 were collated and analysed by Departments of Public Health and aggregated data were reported to HPSC. National data were collated on an MS Access database, analysis preformed and reports produced by HPSC.

Case-based syphilis records have been collated nationally since 2000. Case-based syphilis data provided by some clinicians is a subset of aggregate syphilis notification data. Forms are completed by Departments of Public Health in conjunction with the clinician and are then forwarded to HPSC. An MS Access database was used at HPSC for collation and analysis of the national syphilis case-based data.

Since 1st May, 2011, the Computerised Infectious Disease Reporting (CIDR) system has been used to record notifications of syphilis, thereby allowing the replacement of the case-based and aggregate syphilis databases previously in use in Departments of Public Health and at HPSC.

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 general practices (located in all HSE-Areas and representing 5.7% 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.

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 annonymised data on confirmed influenza cases admitted to ICU and influenza-associated deaths were reported weekly to the European Centre for Disease Prevention and Control (ECDC).

HIV

HIV and AIDS surveillance in Ireland is voluntary and anonymised and operates in co-operation with laboratories, clinicians and Departments of Public Health. In 2011, clinicians completed surveillance forms on newly diagnosed HIV cases, AIDS cases and AIDS related deaths and forwarded these to the appropriate Department of Public Health who in turn forwarded them to HPSC where national data were collated on an MS Access database. Bi-annual analysis of these data were performed at HPSC and reports produced.

Immunisation Uptake

Each HSE Area maintains a childhood immunisation database. In 2011, 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.

European Antimicrobial Resistance Surveillance Network (EARS-Net)

Data were collected by participating EARS-Net (formerly the European Antimicrobial Resistance Surveillance System, EARSS) laboratories in 2011 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 stored at the HSPC in an MS Access database, and interpreted using the WHO Anatomical Therapeutic Chemicals index (www.whocc.no/atcddd/) in line with European Surveillance of Antimicrobial Consumption (ESAC) methodology. 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.
- **Healthcare associated infections in long term care facilities (HALT):** Participating Long Term Care Facilities (LTCFs) of the HALT project were asked to survey residents on one day only, thereby providing a snapshot of HCAI and antimicrobial use on that particular day. Data was entered by each LTCF onto a standalone Access-based IT tool developed by ECDC and sent to HPSC for analysis.
- 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 2009-2011 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 2011 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

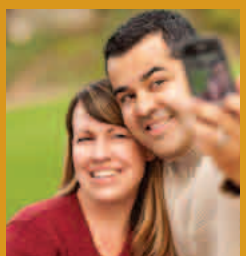
board regions/areas). This is because operationally the surveillance, prevention and control of infectious diseases are still managed by eight Departments of Public Health, one in each HSE Area.

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

CIDR	Computerised Infectious Diseases Reporting
DoHC	Department of Health and Children
EARS-Net	European Antimicrobial Resistance Surveillance Network
ECDC	European Centre for Disease Prevention and Control
EISN	European Influenza Surveillance Network
FSAI	Food Safety Authority of Ireland
FSPB	Food Safety Promotion Board
ICGP	Irish College of General Practitioners
IDU	Injecting Drug User
IMMRL	Irish Meningococcal and Meningitis Reference Laboratory
IPD	Invasive pneumococcal disease
HCAI	Healthcare associated infections
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
MRSA	Meticillin Resistant *Staphylococcus aureus*
MSM	Men who have Sex with Men
NSRL	National Salmonella Reference Laboratory
NVRL	National Virus Reference Laboratory
STIs	Sexually Transmitted Infections
TB	Tuberculosis
WHO	World Health Organisation



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This report is also available to download on the HPSC website at www.hpsc.ie