Health Protection Surveillance Centre

Annual Report 2004

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Foreword

The National Disease Surveillance Centre became the Health Protection Surveillance Centre on moving into the Health Service Executive on 1st January 2005.

The establishment of the HSE - which is responsible for the running of the health services in Ireland - has meant that it is no longer necessary to have a board at HPSC. It has been a great honour for me to have served on the board since the foundation of the centre in 1998. On behalf of all those who have served on the board over the last seven years, I wish HPSC well within the new structures.

Since its foundation in 1998 the centre has worked tirelessly in partnership with health service providers and sister organisations around the world, to provide up to date information for the effective control of infectious diseases. During this time the HPSC has rightly won the respect of the international medical community through sheer hard work and strict adherence to best practice. I am confident that it can continue to enhance its well-earned reputation for excellence at the forefront of the global fight against communicable disease.

HPSC will continue to make a valuable contribution to public health in Ireland, through the provision of expert advice, epidemiological investigation, scientific research, data collection and participation in health promotion and training.

As in previous years this report reflects the diligence, vision and professionalism of the Director, Dr Darina O'Flanagan and her staff.

The health services in Ireland are facing an exciting and challenging future. HPSC can face the future with great confidence and will continue to make a significant contribution to improving the health of the Irish population.

It remains for me to thank the outgoing Board members, our Director, and all the staff whose efforts have made such a huge contribution to the ongoing success of HPSC.

Dr Elizabeth Keane
Chairperson
Board of the National Disease Surveillance Centre

Introduction

Since the 1st January 2005 the newly established Health Services Executive has been responsible for the running of the health services in Ireland. The National Disease Surveillance Centre welcomed the opportunity to lend our expertise to the new body and as our agency is now part of the Health Protection division, it was appropriate that our name reflected the key role we have to play in improving the health of the Irish population.

The publication of this annual report marks our transition from the National Disease Surveillance Centre to the Health Protection Surveillance Centre. Our role and responsibilities remain the same.

This is the centre's sixth annual report.

2004 saw the emergence of the H5N1 strain of avian influenza which has spread rapidly amongst birds in Asia and has now reached Eastern Europe. While it shows no sign of becoming humanly transmissible its emergence re-enforces the need to remain vigilant for any indications of a new influenza pandemic.

There was a marked decrease in illness due to Norovirus, because of a combination of short-term immunity amongst the population and the use of guidelines - produced by NDSC - to combat the disease. There were 1744 outbreak cases in 2003, compared with 7650 in 2002. Unfortunately 2004 saw the emergence of a new strain across Europe. The so-called 'jam strain', a new variant of Norovirus, was originally detected from an outbreak at an international scout jamboree in the Netherlands in the summer of 2004. This led again to an increase in Ireland in 2004 up to 2388 outbreak cases.

Untreated water supplies, particularly from private wells may pose a significant threat to public health. During 2004, they continued to be associated with outbreaks of VTEC such as E.coli O157. Two of the four VTEC associated HUS cases in children in 2004 were caused by non O157 VTEC. This highlights the importance for clinicians to look closely for other types of VTEC apart from E.coli O157 in cases of severe illness such as HUS.

Data supplied to the European Antimicrobial Resistance Surveillance System (EARSS) in 2004 covered 98% of the Irish population providing information on MRSA and other pathogens which are associated with resistance concerns both in the hospital and the community setting. This coverage of population in this European surveillance system compares favourably with other EU countries (e.g.16% coverage in the UK and 19% coverage in Spain). Extensions of surveillance of MRSA and other hospital acquired infections needs to be resourced at both national and local levels. Antibiotic usage in 2004 increased and the trend is rising year on year. It is crucial to link in the data on antibiotic usage to the problem of increasing antimicrobial resistance.

Ireland had the second highest rate of measles among 16 other EU countries which reported complete data for 2004. We also suffered a mumps outbreak which saw a 10-fold increase highlighting the need for investment in approved infrastructure, especially the development of a national computerised childhood immunisation registry. However the continued rise in immunisation uptake was very welcome and reached 89% in 2004 for the five primary antigens and 81% for MMR. MMR uptake in particular is still far below the internationally recommended level of 95% and the deficit needs to be tackled through a catch-up campaign.

There were 1154 cases of Hepatitis C notified in 2004, which was the first year that Hepatitis C became a notifiable disease in its own right. The development of a comprehensive strategy to respond to this serious problem is urgently required.

The number of new HIV diagnoses in 2004 highlights the need for maintaining harm reduction measures. There continues to be a need for culturally appropriate messages for heterosexual transmission. 38 of the 356 cases newly diagnosed were late diagnosis in that AIDS was diagnosed at the time of HIV diagnosis. This reinforces the need for members of the general public to seek testing if they consider they may have placed themselves at risk.

Between August and December 2004 there was an increase in the number of Hib vaccine failures in children. Six failures occurred in 2004 compared with three in 2003 and four in 2002. This increase continued into 2005 and a catch up campaign with the introduction of a booster dose has begun to address the problem. The national immunisation schedule is prioritised according to the epidemiology of diseases occurring in the country. Surveillance of infectious disease is one of the cornerstones of all immunisation programs.

Finally, I would like to thank everyone who serves voluntarily on HPSC's scientific advisory committees. They are a great example of what can be achieved through multi disciplinary collaboration between professionals working to reduce the burden of illness from communicable disease. Thanks also to all the staff at HPSC whose commitment and professionalism is reflected in this report.

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Epidemiology of Cryptosporidiosis in Ireland, 2004

Key Points

- **In 2004, under S.I.707, Cryptosporidiosis became a notifiable disease**
- **The crude incidence rate in Ireland in 2004 was 11.0 per 100,000 population**
- **The highest reported incidence was in children under the age of 5 years**
- **A large proportion of the cases were reported between April and June**
- **The lowest incidence was reported by the ERHA.**

Introduction

Cryptosporidium is a protozoal parasite that causes a diarrhoeal illness in humans known as cryptosporidiosis. In 2004, under the Infectious Diseases (Amendment) (No 3) Regulations 2003 (S.I. 707 of 2003), cryptosporidiosis became a notifiable disease in Ireland in all age groups, permitting us for the first time to report on the national incidence of cryptosporidiosis in Ireland.

Cryptosporidium was first recognised in the 1980s as a cause of severe diarrhoeal illness in patients with AIDS, but more recently it has been established that it is a major cause of diarrhoeal illness in healthy individuals. In immunocompetent patients it causes watery non-bloody diarrhoea, sometimes accompanied by abdominal pain, nausea, anorexia, fever and weight loss. In immunocompromised individuals, especially those with AIDS, diarrhoea can be chronic and persistent, causing clinically significant fluid and electrolyte depletion. Weight loss, wasting and abdominal pain may be severe.

C. parvum (formerly known as *C. parvum* type II) and *C. hominis* (formerly known as *C. parvum* type I) are the main species associated with human infection, although a minority of infections have been linked with other species such as *C. felis* and *C. meleagridis*. The primary reservoir for *C. hominis* is humans while both livestock (calves and lambs in particular) and humans serve as reservoirs for *C. parvum*. Thus, speciation can be used to indicate a likely source of infection for individual cases.

With both humans and animals serving as potential reservoirs, multiple routes of transmission are possible. The consumption

Table 1. Number of notified cases and crude incidence rates of cryptosporidiosis by health board, 2004

Health Board	No. of notifications	CIR (95% C.I.)
ERHA	23	1.6 (0.9-2.3)
MHB	62	27.5 (20.7-34.3)
MWHB	45	13.3 (9.4-17.2)
NEHB	30	8.7 (5.6-11.8)
NWHB	41	18.5 (12.8-24.2)
SEHB	80	18.9 (14.8-23.0)
SHB	74	12.8 (9.9-15.7)
WHB	77	20.2 (15.7-24.7)
Total	432	11.0 (10.0-12.0)

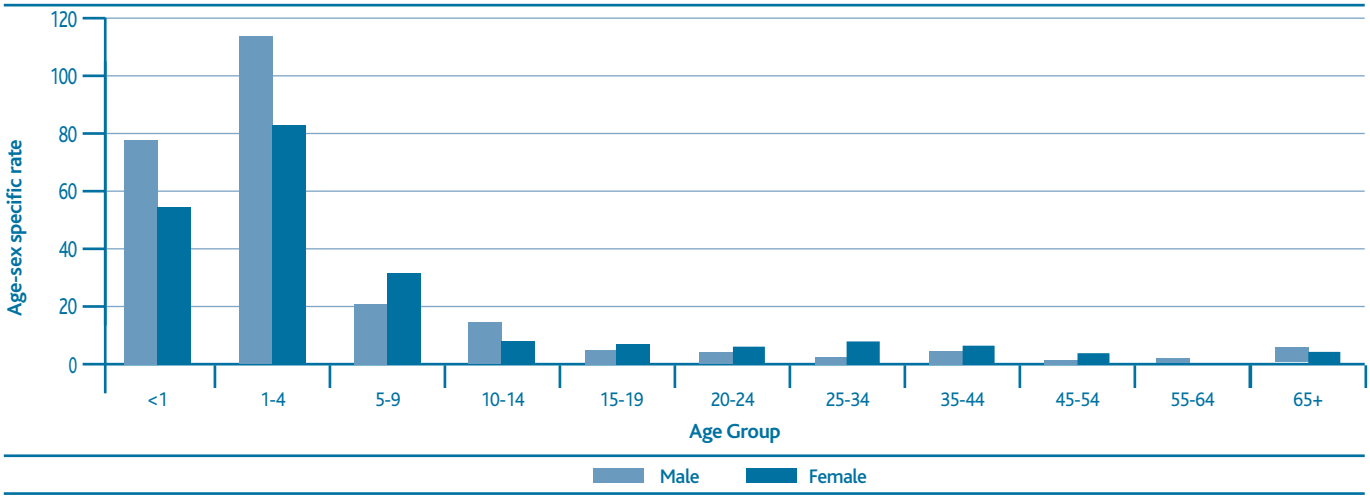

Figure 1. Age and sex-specific incidence rates for cryptosporidiosis in Ireland, 2004

of contaminated water is regarded as being an important transmission route,[1] but infection can also occur as a result of recreational bathing,[2] consumption of contaminated foods, and animal-person[3] and person-to-person transmission. A primary public health concern regarding *Cryptosporidium* is its relative resistance to chlorination.

Several reports have indicated the importance of cryptosporidiosis as a cause of gastroenteritis in Ireland.[4 5 6] A number of outbreaks in Ireland have also served to heighten concerns regarding cryptosporidiosis.[7 8]

Methods

Cases of cryptosporidiosis were notified by both clinicians and laboratory directors to the medical officer of health in each health board, and data were collated and forwarded to HPSC on a weekly basis. These weekly notifications form the basis of the analyses presented here. The case definition for cryptosporidiosis in Ireland is based on the EU case definition and is as follows:

Clinical description
Clinical picture compatible with cryptosporidiosis, characterised by diarrhoea, abdominal cramps, loss of appetite, nausea and vomiting.

Laboratory criteria for diagnosis
One of the following:
- Demonstration of *Cryptosporidium* oocysts in stool
- Demonstration of *Cryptosporidium sp*. in intestinal fluid or small-bowel biopsy specimens
- Demonstration of *Cryptosporidium* antigen in stool

Case classification
Possible: N/A
Probable: A clinically compatible case with an epidemiological link
Confirmed: A case that is laboratory confirmed.

Census data from 2002 (CSO) were used to calculate incidence rates.

Results

Incidence
In 2004, 432 cases of cryptosporidiosis were notified, an incidence rate of 11.0 per 100,000 population.

Geographical distribution
The crude incidence rates by health board for 2004 are reported in table 1. There was a wide variation in rates reported between health boards that, in addition to a true difference in incidence, may also reflect regional variation in laboratory screening and case-finding policies. An outbreak in the MHB in May 2004 contributed in part to it being the health board with the highest incidence rate in 2004 (27.5 per 100,000). Other health board that had incidence rates higher than the national rate were the WHB, SEHB, NWHB, MWHB and SHB. The lowest rate was reported by the ERHA.

Age distribution
The highest reported incidence was in children under the age of 5 years (figure 1).

The majority of health boards reported a similar age profile for cases. However, the age profile for the ERHA was atypical

Table 2. Number of cryptosporidiosis notifications by health board and age group in 2004

Age Group (years)	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
Less than 1	1	3	1	3	3	9	8	10	38
1-4	1	36	29	15	21	30	44	45	221
5-9	0	11	10	5	8	10	10	15	69
10-14	2	3	2	2	2	2	5	3	21
>=15	18	9	2	5	6	29	7	3	79
N/K	1	0	1	0	1	0	0	1	4
Total	**23**	**62**	**45**	**30**	**41**	**80**	**74**	**77**	**432**
% <15	**18%**	**85%**	**95%**	**83%**	**85%**	**64%**	**91%**	**96%**	**80%**

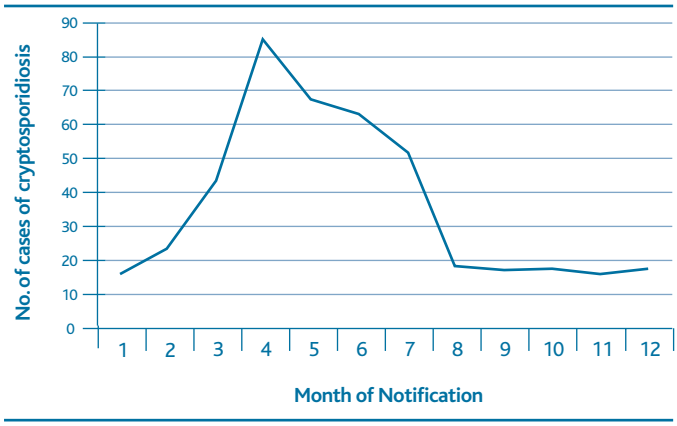

Figure 2. Seasonal distribution of cryptosporidiosis cases 2004

with a much larger proportion of adult cases. The SEHB also reported a higher proportion of adult cases (table 2).

Seasonality
The largest number of cases was notified during the month of April, and 49% of all cases were reported during the 3 months April to June (figure 2).

Outbreaks of cryptosporidiosis in Ireland 2004
Five outbreaks of cryptosporidiosis were reported in 2004: four general outbreaks [SEHB (2), MHB (1) and NEHB (1)] and one family outbreak (SEHB). The suspected mode of transmission for all four general outbreaks was waterborne. In the MHB, epidemiological evidence was obtained linking the outbreak with tap water consumption.[8] The family outbreak was reported as being due to person-to-person transmission.

Discussion

The establishment of cryptosporidiosis as a notifiable disease in 2004 was an important first step in understanding the epidemiology of cryptosporidiosis in Ireland, providing a baseline against which subsequent data can be evaluated. In 2004, *Cryptosporidium* imposed a considerable burden of illness in Ireland, with over 400 cases notified (CIR=11.0/100,000) making it the most common protozoal gastrointestinal pathogen notified. This is slightly higher than in the UK, where the rates were 6.8/100,000 in England and Wales (personal communication HPS, London), and 9.1 per 100,000 in Scotland,[9] in 2004.

There is a large variation in incidence between health boards. Some of the difference may reflect different diagnostic policies and case finding procedures between regions. In two studies of cryptosporidiosis in Irish children, a higher incidence among children from rural backgrounds was noted.[10 11] The low rate of cryptosporidiosis among the ERHA population is consistent with this observation. In the UK, London has historically also had a low rate of cryptosporidiosis reported.[12] The age profile of cases in the ERHA was also distinctive, with only 4/22 (18%) reported cases being less than 15 years, compared to 64-96% in other parts of the country. It was reported that many of these cases were travel-associated.

The seasonal effect reported here is consistent with that reported previously for Ireland[6] but differs significantly from the pattern reported in England and Wales where between 1996 and 2000, there was a bimodal pattern in human cryptosporidiosis cases with a peak in the number of cases in early May and late September.[13] *C. parvum* was more common in the spring while *C. hominis* was significantly more common in patients infected during late summer/autumn.[14] The spring peak in human infections in the UK concurred with that of infection in farm animals, co-incident with calving and lambing. This pattern changed significantly in 2001 and subsequent years when the May peak in human infections was considerably reduced.[13] Initially the observed reduction in England and Wales in 2001 was thought to be due to the restrictions imposed during the foot and mouth outbreak that year.[12] However, the sustained reduction in the number of spring cases in the North West of England, an area that had contributed a disproportionate number of cases to national surveillance during quarter 2 1997 to 2000,[13] has more recently been attributed to a major programme of development in a public water supply in that region.

From the seasonal distribution of cases reported here, it is likely that the epidemiology of the disease differs from that seen currently in England and Wales. For outbreaks, water has been shown to be an important transmission route here. However, the transmission route for sporadic cases remains unconfirmed. It is likely that transmission from animal reservoirs is of primary importance for sporadic cases, with perhaps animal contact and water source contamination by livestock being central.

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References

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Tuberculosis in Ireland, 2003

Key Points

- **There were 407 new cases of TB notified in 2003, giving a crude incidence rate of 10.4 per 100,000 population**
- **Two hundred and sixty two (64.4%) of the cases were culture confirmed. *M. tuberculosis* was isolated in 250 cases and *M. bovis* in five cases**
- **Of the 407 cases reported in 2003, 299 cases (73.4%) had a pulmonary component of which 146 (48.8%) were smear positive**
- **Eighty nine (21.9%) of the cases were born outside Ireland**
- **Outcome data were reported in 84.8% of TB cases (345 cases)**
- **Six deaths were attributed to TB in 2003**
- **There were 437 cases of TB provisionally notified in 2004**

Introduction

Since 1998, all information concerning TB notifications in Ireland has been reported by each of the health boards to the Health Protection Surveillance Centre (HPSC), known formerly as the National Disease Surveillance Centre (NDSC) for analysis. Beginning on January 1st 2000, this information has included enhanced surveillance data based on the minimum dataset reported to EuroTB, the European agency that collates national TB data within Europe and contributes that data to the WHO global TB control programme.[1] The resulting National Tuberculosis Surveillance System (NTBSS) was set up following consultation between HPSC, the eight health boards and the National Tuberculosis (TB) Advisory Group.

Materials and Methods

For each individual case of tuberculosis notified in 2003, an enhanced notification form was completed by public health doctors, using the available clinical, microbiological, histological and epidemiological data. These forms were then collated in the regional Departments of Public Health. In each regional Public Health department, data were also entered onto an Epi Info 2000 database. From this database, an anonymised dataset was submitted to HPSC on a quarterly basis where the data were collated nationally. Reports summarising results were produced on a quarterly basis by the HPSC. Information on all 2003 cases was updated in early/mid 2005 by each health board to include outcome data.

Population figures, used as the denominator, were taken from the 2002 census of population. In order to compare rates between groups of interest, 95% confidence intervals were

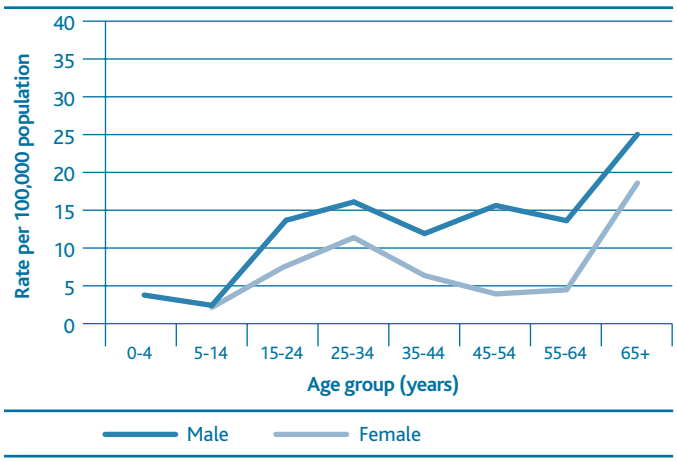

Figure 1: Age- and sex-specific TB incidence rates in Ireland, 2003

used. Direct methods of standardisation were used to allow comparison of rates between geographical areas using the Irish population as the standard population.

As in previous years, the case definitions used were as recommended by the National Tuberculosis (TB) Working Group.[2]

A **notified case** of TB refers to clinically active disease due to infection with organisms of the *Mycobacterium tuberculosis* complex (*M. tuberculosis*, *M. bovis*, *M. africanum*). Active disease is presumed if the patient is commenced on a full curative course of anti-tuberculosis chemotherapy. Persons placed on chemoprophylaxis for preventive treatment or infected by mycobacteria other than *M. tuberculosis* complex are not included as cases.

Pulmonary TB is defined as a laboratory-confirmed case – either a positive smear, histology or culture of a respiratory sample – with or without radiological abnormalities consistent with active pulmonary TB *or* a case where the physician takes the decision that the patient's clinical symptoms and/or radiological signs are compatible with pulmonary TB.

Extrapulmonary TB is defined as a patient with a smear, culture or histological specimen, from an extrapulmonary site, that is positive for *M. tuberculosis* complex *or* a case with clinical signs of active extrapulmonary disease in conjunction with a decision taken by the attending physician to treat the patient with a full curative course of anti-tuberculosis chemotherapy.

Multi drug resistance (MDR) is defined as resistance to at least isoniazid and rifampicin with or without resistance to other antituberculosis drugs.

Results

Four hundred and seven cases of TB were notified in 2003 in Ireland, giving a notification rate of 10.4/100,000 population. This compares to 408 cases notified in 2002 and 381 cases notified in 2001 (table 1).

Age standardised rates by health board are provided in table 2. The highest age standardised TB incidence rate was reported in the SHB at 16.0 per 100,000 population. This was significantly higher than the national age standardised incidence rate (10.3/100,000). The next highest rates were reported in the MWHB (12.3/100,000) and the ERHA (11.8/100,000). The NWHB had the lowest rate at 3.8 per 100,000 population. The rates in the NWHB, MHB and WHB were significantly lower than the national age standardised incidence rate.

Age and sex distribution

Two hundred and fifty two cases were male (61.9%) and 154 were female (37.8%), giving a male to female ratio of 1.6:1. The gender of one case was not recorded. The average age of those diagnosed with TB was 43.1 years with a range from less than one year of age to 98 years. Approximately 6% of cases were aged less than 15 years and 23% of cases occurred in those aged 65 and over. The highest rates were observed in those aged 65 years and older (21.3/100,000 population). The age- and sex-specific incidence rates per 100,000 population in Ireland, in 2003 are illustrated in figure 1.

Table 1. Notified TB cases in Ireland, 1991 – 2003, with 3-year moving averages, 1992 - 2002

Year	Number	Crude rate per 100,000pop.	3 year moving average
1991	640	18.2	
1992	604	17.1	612
1993	598	17.0	581
1994	524	14.5	526
1995	458	12.6	469
1996	434	12.0	436
1997	416	11.5	423
1998	424	11.7	433
1999	469	12.9	439
2000	395	10.1	410
2001	381	9.7	391
2002	408	10.4	401
2003	407	10.4	

Table 2: Number of cases of TB in Ireland and age standardised incidence rates with 95% confidence intervals (CI) by health board , 2003

Health Board	TB cases	Age standardised incidence rate	95% CI
ERHA	167	11.8	10.0-13.6
MHB	12	5.4	2.3-8.5
MWHB	42	12.4	8.6-16.1
NEHB	26	7.7	4.8-10.7
NWHB	9	3.8	1.3-6.4
SEHB	35	8.3	5.6-11.1
SHB	93	16.0	12.7-19.3
WHB	23	5.9	3.4-8.3
Ireland	407	10.3	9.3-11.4

Age was unknown for one case in the WHB and one case in the ERHA

Geographic origin

Of the 407 patients diagnosed with TB in 2003, 300 (73.7%) were born in Ireland, 89 (21.9%) were born outside Ireland and for the remaining 18 cases, the country of birth was unknown. Of the 89 born outside Ireland in 2003, 38 cases were born in Asia, 22 in Europe, 21 in Africa, two in North America and one in South America. The country of birth was unknown for five of the cases born outside Ireland. The crude rate of TB notifications in the indigenous population only in 2003 was 8.7/100,000 population while the national crude rate for all cases notified in 2003 was 10.4/100,000 population.

Diagnostic details

Of the 407 TB notifications, 262 (64.4%) were definite cases which were culture confirmed. Of the 262 culture-confirmed cases, 250 (95.4%) of the isolates were *M. tuberculosis* and five (1.9%) were *M. bovis*. The isolate was not specified in seven culture positive cases.

Two hundred and sixty five cases were pulmonary (65.1%), 105 cases were extrapulmonary (25.8%) and 34 cases were pulmonary and extrapulmonary TB (8.4%). In three cases, the TB site was unspecified (0.7%). The diagnostic breakdown in each health board is shown in table 3. Of the 299 TB cases with a pulmonary disease component, 211 (70.1%) were culture positive and 150 (50.2%) were sputum positive by microscopy. One hundred and forty six (48.8%) of the pulmonary TB cases were smear positive.[1]

TB meningitis

There were eight cases of TB meningitis reported in 2003 giving an incidence rate of 2.0 per million. Between 1998 and 2003, 35 cases of TB meningitis have been reported giving a cumulative incidence rate of 8.9 per million population. Four of the 35 TB meningitis cases reported between 1998 and 2003 were in children aged 0-4 years.

Resistance

Resistance was documented in 12 cases out of a total of 250 *M. tuberculosis* isolates (4.8% of *M. tuberculosis* isolates). There was one multi-drug resistant TB (MDR-TB) case, which was resistant to isoniazid, rifampicin, pyrazinamide, ethambutol and streptomycin. Mono-resistance to isoniazid was recorded in eight cases and mono-resistance to streptomycin in one case. Two further cases were resistant to both isoniazid and streptomycin. Five of the 12 drug-resistant cases were born outside Ireland.

Outcome

Of the 407 cases notified in 2003, the outcome was recorded in 345 cases (84.8%). Of the 345 cases, 264 (76.5 %) completed treatment, 32 (9.3%) died, 30 (8.7%) were recorded as being lost to follow up, treatment was interrupted in 12 cases (3.5%) and seven cases were continuing to receive treatment at time of reporting (2.0%). Of the 32 deaths reported, six were attributed to TB.

Of the 146 smear positive cases of pulmonary TB notified in 2003, 92 completed treatment, 12 died, seven were lost to follow up, treatment was interrupted in five cases and two were still on treatment at time of reporting. The outcome was unknown in 28 of the cases.

Table 3: Diagnostic categories of TB cases notified in 2003, by health board

Health Board	Pulmonary	Extrapulmonary	P+E	Unknown	Total
ERHA	102	43	22	-	167
MHB	9	2	-	1	12
MWHB	29	12	1	-	42
NEHB	18	6	1	1	26
NWHB	8	1	-	-	9
SEHB	21	11	3	-	35
SHB	60	26	7	-	93
WHB	18	4	-	1	23
Total	265	105	34	3	407

Table 4. Summary of epidemiology of TB in Ireland, 2000 – 2003

	2000	2001	2002	2003
Total number of cases	395	381	408	407
Notification rate per 100,000 population	10.1	9.7	10.4	10.4
Foreign born TB patients	44	63	123	89
% Culture positive patients	58	58.8	61.0	64.4
M. tuberculosis	222	204	234	250
M. bovis	2	7	5	5
M. africanum	3	1	0	0
% smear positive pulmonary cases	47.2	44.4	38.4	48.8
Monoresistance to isoniazid	2	4	8	8
Monoresistance to streptomycin	1	3	1	1
Monoresistance to pyrizinamide	1	1	0	0
Multi drug resistant cases	2	2	0	1
Deaths attributed to TB	6	5	5	6

A summary profile of the epidemiology of TB in Ireland from 2000 to 2003 is shown in table 4.

Provisional 2004 data

There were 437 cases of TB provisionally notified in 2004. It is important to note that these data are provisional and may change significantly following validation and some cases may also be denotified.

- Of the 437 cases provisionally notified, pulmonary TB was diagnosed in 274 cases (62.7%), extrapulmonary TB in 117 cases (26.8%) and pulmonary and extrapulmonary TB in 26 cases (6.0%).
- Provisionally, of the 300 TB cases with a pulmonary component, 165 (55.0%) were culture positive and 134 (44.7%) were sputum smear positive.
- One hundred and twenty (27.5%) of the cases were born outside Ireland, 282 cases (64.5%) were born in Ireland and country of birth was unavailable for 35 cases (8.0%).
- Of the 437 cases, 258 (59.0%) were male and 175 (40.0%) were female. The gender was unknown for four cases.
- One hundred and seventeen (26.8%) of the cases provisionally notified in 2004 were aged between 25 and 34 and 101 (23.1%) were aged 65 years and older.
- There were six cases of TB meningitis provisionally notified in 2004

Discussion

In 2003, 407 cases of TB were notified to HPSC giving a national crude incidence rate of 10.4 per 100,000 population. This compares to 408 cases notified in 2002 (10.4/100,000) and 381 cases in 2001 (9.7/100,000). The three year moving average, which removes some of the fluctuation from year to year, showed an increase (table 1).

Differences in age standardised TB incidence rates persist between health board areas. In 2003, the SHB had the highest rate of TB followed by the MWHB and the ERHA. In 2002, the highest rates were seen in the SHB, the SEHB and the ERHA while in 2001, TB rates were highest in the ERHA and the SHB. In 2003, the NWHB reported the lowest age standardised incidence rate.

Those aged 65 and over had the highest age specific rate in 2003. This was similar to the rate observed in this age group in 2002 (20.6/100,000 population). The male to female ratio reported in 2003 was also comparable with the rate reported in 2002 (1.8:1).

Eighty nine of the TB cases (21.9%) diagnosed in 2003 were born outside Ireland compared to 123 cases (30.1%) in 2002, 63 cases (16.5%) in 2001 and 45 cases (11.1%) in 2000. In 2002, among the 24 countries in the EU who reported data to the EuroTB network, 28% of notifications were in foreign born patients.[3] In the United Kingdom, France, Germany and Belgium, where crude incidence rates are similar to those reported in Ireland, the percentage of cases of foreign origin in 2002 ranged from 38-56%.[3]

In recent years, the quality of the data, and in particular data on treatment outcome, has improved. In 2003, information on treatment outcome was provided for 84.8% of cases as compared to 77.2% in 2002 and 59.8% in 2001. It is critical to TB control in Ireland that surveillance of TB and reporting

of outcome data be maintained at a high level, particularly in monitoring multi-drug resistant tuberculosis. In 2003, there was one multi-drug resistant case of TB reported in Ireland (0.3% of TB cases in 2003). In Western Europe, 1.8% of new cases of TB in 2003 were multi drug resistant.[4]

Acknowledgements
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HIV and AIDS in Ireland, 2004

Key Points

- **During 2004, there were 356 newly diagnosed cases of HIV infection, a 10% decrease on the number of cases diagnosed in 2003**
- **Of the 356 cases, 178 were among heterosexuals, 71 among IDUs and 64 among MSM. Incomplete data were received for 42 (11.7%) of the newly diagnosed cases**
- **Of the 356 cases, 192 (53.9%) were male and 161 (45.2%) were female. Information on gender is unavailable for three cases**
- **Of the 356 cases, 136 were born in Ireland, 130 were born in sub-Saharan Africa and 25 were born in other countries in Western Europe. Information on geographic origin is unavailable for 51 of the newly diagnosed cases**
- **Thirty eight of the 356 cases newly diagnosed with HIV in 2004 were late diagnoses, i.e. they were diagnosed with AIDS at the time of HIV diagnosis**
- **The cumulative total of HIV infections reported in Ireland to the end of December 2004 is 3,764**
- **A total of 38 AIDS cases and four deaths among HIV/AIDS cases were reported to the HPSC during 2004. A total of 855 AIDS cases and 393 deaths among HIV/AIDS cases have been reported to the HPSC up to the end of June 2005**

Introduction

Worldwide, HIV kills more than 8,000 people every day. Nearly 5 million people are newly infected with the HIV virus every year and the vast majority of these people live in developing countries.[1]

AIDS surveillance was introduced in Ireland in the mid 1980s and HIV case based reporting was introduced in mid 2001. The aims of HIV case based reporting are to ensure the collection of timely data on the distribution and mode of transmission of HIV infection, to accurately monitor trends in the epidemic and to enable linkage between reports of HIV infection and AIDS.

Methods

HIV and AIDS surveillance in Ireland is voluntary and anonymous and operates in cooperation with laboratories, clinicians and Departments of Public Health. For every newly diagnosed HIV infection, a HIV/AIDS surveillance report form is sent by the laboratory which confirms the diagnosis, to the treating clinician. Forms are completed by the clinician and forwarded to the appropriate Department of Public Health who in turn forwards them to the HPSC where national figures are collated. Analysis of HIV data is carried out by the HPSC every six months and a report is published on the HPSC website and sent to a large mailing list including clinicians, microbiologists, public health personnel, DoHC, non-governmental organizations (NGOs) and other interested parties. Clinicians are also asked to report all cases of AIDS and deaths among HIV/AIDS patients to the HPSC using the HIV/AIDS surveillance report forms. A summary of the HIV and AIDS data are forwarded twice yearly to the European

Table 1: HIV infected patients in Ireland by probable route of transmission (up to end December 2004)

Probable route of transmission	2004	Cumulative Total (to end Dec. 2004)
Heterosexual	178	1344
IDU	71	1204
MSM	64	828
Haemophiliac	-	106
Children	5	82
Transfusion Recipient	-	7
Occupational/Hospital Staff	-	8
Haemophiliac contact	-	4
Other	3	80
Unknown	35	101
Total	**356**	**3764**

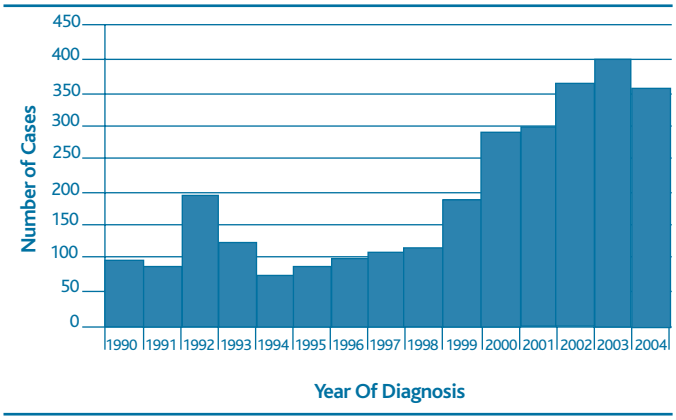

Figure 1: Annual number of HIV infections (1990 to 2004)

Centre for the Epidemiological Monitoring of AIDS (EuroHIV).

Results

Newly diagnosed HIV infections

During 2004, a total of 356 HIV infections were newly diagnosed. This compares to 399 diagnosed in 2003 and represents a 10.8% decrease. The cumulative total number of HIV infections reported up to the end of December 2004 is 3,764. Table 1 shows HIV infections newly diagnosed in 2004 by probable route of transmission. The cumulative total of cases by probable route of transmission is also provided. Figure 1 shows the number of cases diagnosed annually in Ireland from 1990 to 2004.

Probable route of transmission

Figure 2 shows the trends in newly diagnosed cases among the three major risk groups, heterosexual contact, men who have sex with men (MSM) and injecting drug users (IDUs) since 1994.

Between 1998 and 2002, there was a steep increase in the number of newly diagnosed cases acquired through heterosexual contact, from 47 in 1998 to 232 in 2002. Between 2002 and 2004, the number of cases acquired through heterosexual contact decreased but still remains the most common route of transmission. Information on probable route of transmission was unavailable for 10% of the cases diagnosed in 2004.

There were 64 new HIV infections diagnosed among MSM during 2004. This compares with 75 during 2003 and 46 in 2002.

Among IDUs, there were 71 HIV infections newly diagnosed during 2004 compared to 49 in 2003 and 50 in 2002.

HIV infection was newly diagnosed in five children during 2004. Of the five, three were infected through Mother-to-Child transmission (MCT). During 2004, there were 113 babies born to HIV positive mothers. Of the 113 babies, one was diagnosed with HIV infection and the status of the remaining 112 is indeterminate (they do not meet the criteria for HIV infection and are <18 months at time of test).

Sex and Age Distribution

Of the 356 cases newly diagnosed in 2004, 192 (53.9%) were male and 161 (45.2%) were female. Information on gender is unavailable for three cases. Among females, the most frequent route of transmission was heterosexual contact, which accounted for 72% of newly diagnosed infections. Among males, the most frequent routes of transmission were sex between men (33%) and heterosexual contact (32%).

Of the 161 females who were diagnosed with HIV infection in 2004, 46 were reported to be pregnant at HIV diagnosis. Information relating to pregnancy status is unavailable for 30 of the female cases.

Most of the newly diagnosed cases (78.1%) were aged between 20 and 40 years. The mean age at HIV diagnosis was 31.5 years. The mean age at HIV diagnosis was 28.8 years in females and 33.7 years in males, a difference of 4.9 years. The mean age at HIV diagnosis was 30.1 years in IDUs, 31.3 years in heterosexuals and 35.7 years in MSM.

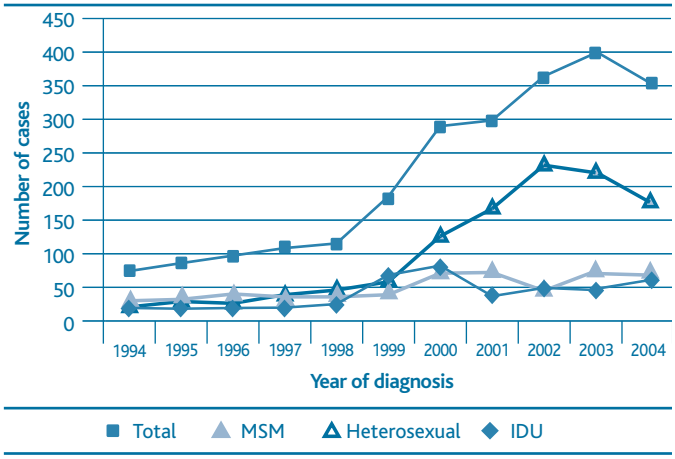

Figure 2: Newly diagnosed HIV infections in Ireland among heterosexuals, MSM and IDUs (1994 to 2004)

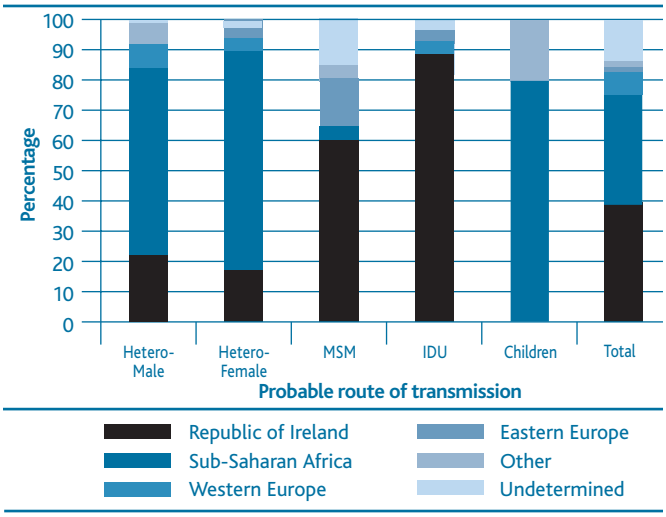

Figure 3: Newly diagnosed HIV infections in Ireland by probable route of transmission and geographic origin (2004)

Geographic Origin

Analysis of 2004 cases by geographic origin is presented in figure 3. Classification by geographic origin is as used by EuroHIV. Geographic origin is based on country of birth for adult cases and country of birth of the mother for children.

Of the 356 cases diagnosed in 2004, 136 were born in Ireland, 130 were born in sub-Saharan Africa and 25 were born in other countries in Western Europe. Information on geographic origin is unavailable for 51 of the newly diagnosed cases.

Of the 178 cases acquired through heterosexual contact, 122 were born in sub-Saharan Africa (85 female and 37 male) and 35 were born in Ireland (20 female and 15 male).

Area of residence

Of the 356 cases newly diagnosed in 2004, 223 were resident in the Eastern Region (i.e. Dublin, Kildare and Wicklow) and 73 were resident elsewhere in the country at the time of HIV diagnosis. Information on area of residence is unavailable for 60 of the 356 cases. By category, 84.5% of IDUs, 63% of heterosexuals and 58% of MSM were resident in the Eastern region at HIV diagnosis.

Stage of infection

Information on stage of infection at time of HIV diagnosis was available for 305 of the newly diagnosed cases. Of the 305 cases, 232 were asymptomatic at HIV diagnosis and 38 were diagnosed with AIDS at the time of HIV diagnosis. Of the 38 late diagnoses, 24 were among heterosexuals, six among IDUs and four among MSM. Of the 24 heterosexuals, 13 were born in sub-Saharan Africa, nine were born in Ireland and two were born in Western Europe.

AIDS cases and deaths among HIV/AIDS cases

A total of 38 AIDS cases and four deaths among HIV/AIDS cases were reported to the HPSC during 2004. The cumulative total of AIDS cases reported to the HPSC up to the end of June 2005, is 855. A total of 393 deaths among HIV/AIDS cases have also been reported to the HPSC up to the end of June 2005.

Figure 4 shows the number of AIDS cases and deaths among HIV/AIDS cases by year of diagnosis and year of death (includes all cases reported up to the end of June 2005). AIDS cases are analysed by year of diagnosis as recommended by NASC.[2] It is important to note that there is significant underreporting and delays in reporting of AIDS cases and deaths among HIV/AIDS cases. It is likely that further reports particularly relating to recent years, will be received and the number of cases of AIDS and deaths among HIV/AIDS cases will be revised upwards for some years, in particular for the later years.

Figure 5 shows AIDS cases by probable route of transmission and year of diagnosis.

Discussion

Between 1998 and 2003, there was a dramatic increase in the number of newly diagnosed HIV infections in Ireland, from 116 cases in 1998 to 399 cases in 2003 (a 3.4 fold increase). While there has been a decrease in the overall number of HIV infections diagnosed in 2004, the data should be interpreted with caution as the downward trend may not continue in

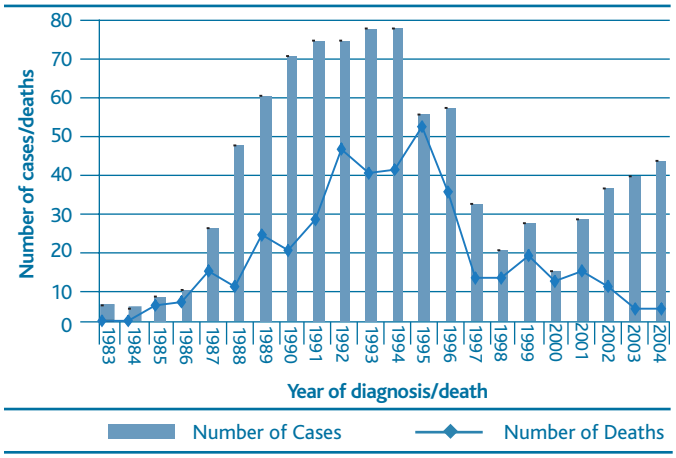

Figure 4: AIDS cases and HIV/AIDS related deaths, 1983 to 2004 (reported up to June 2005)

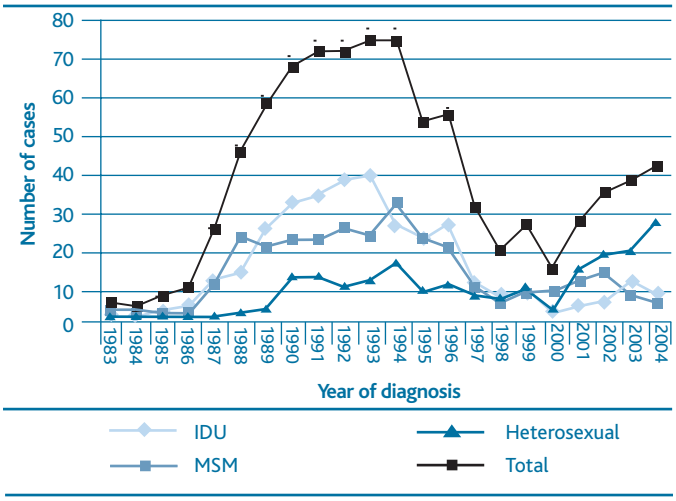

Figure 5: AIDS cases by year of diagnosis and probable route of transmission, 1983 to 2004 (reported up to June 2005)

future years. It is also important to note that data for reported HIV diagnoses do not represent HIV incidence. The data includes individuals who were infected in previous years and depend on uptake of HIV testing. In addition, incomplete data were received for 42 (11.8%) of the newly diagnosed cases, which makes analysis of the data and interpretation of trends difficult.

The number of new diagnoses among IDUs increased in 2004 and highlights the need for maintaining harm reduction measures in order to prevent transmission of blood borne viruses among needle sharing drug users. The number of newly diagnosed infections reported among MSM, while showing a slight downward trend on the 2003 data, is an increase on the numbers reported in 2002. This is of concern in the context of the continuing endemicity of syphilis in Ireland following the syphilis outbreak among MSM which began in Dublin in 2000.[3] Syphilis and other genital ulcer diseases facilitate the transmission and acquisition of HIV.[4]

It has been clearly shown that vertical transmission of HIV from mother to child can be dramatically reduced or prevented by appropriate intervention and treatment measures.[5] However, such measures can only be offered if HIV infection is diagnosed before or during pregnancy. A policy to recommend and offer routine antenatal HIV testing to all women was introduced in Ireland in 1999. Since 2002, the HPSC has collected quarterly data on the uptake of the antenatal HIV test from all maternity hospitals/units in Ireland. Further information on the antenatal HIV screening programme can be found on the HPSC website (www.hpsc.ie). During 2004, a total of 113 babies were born to HIV infected mothers and of these, only one was diagnosed with HIV infection. The status of the remaining 112 is indeterminate (they do not meet the criteria for HIV infection and are <18 months at time of test). This illustrates the effectiveness of the antenatal screening programme in Ireland.

Of the 178 cases acquired through heterosexual contact, the majority (122) were born in sub-Saharan Africa and 35 were born in Ireland. The number of cases of HIV infection in Ireland diagnosed among people of sub-Saharan African origin is not unexpected, considering the prevalence of HIV in that region of the world. There is a need for culturally appropriate prevention messages to be developed in partnership with ethnic minority communities in Ireland.

The usefulness of AIDS surveillance data depends on the extent to which case reporting is complete and it is felt that there is considerable under-reporting and late reporting of AIDS cases and HIV/AIDS related deaths in Ireland. Highly active antiretroviral therapy (HAART) was introduced in Ireland in 1996. The efficacy of the treatment led to a fall in the number of patients who develop AIDS-defining conditions and has improved outcomes for those who do develop such conditions. Clinicians may no longer consider it meaningful to define patients in terms of their disease stage and consequently may be less likely to report an AIDS diagnosis. As a result, the analysis of AIDS surveillance data and interpretation of trends is difficult. However, it is possible that reporting of AIDS cases, particularly where HIV and AIDS are diagnosed simultaneously, has improved since the introduction of HIV case based reporting in 2001.

Of concern, 38 of the 356 cases newly diagnosed with HIV in 2004 were late diagnoses, i.e. they were diagnosed with AIDS

at the time of HIV diagnosis. These individuals would not have had the opportunity to benefit from early diagnosis and treatment. In a recent review of newly diagnosed HIV infections in the UK and Ireland, the authors concluded that a substantial number of people are being diagnosed as having HIV infection at a late stage of disease and that many patients do not have their HIV infection diagnosed on routine screening.[6] This report highlights the need for provision of routine HIV testing in all the appropriate settings and for culturally information and support services to be put in place which would encourage people to avail of testing, as diagnosis at an early stage in the course of HIV infection facilitates early intervention and treatment.

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Sexually Transmitted Infections in Ireland, 2003

Key Points

- **In 2003, 11,153 cases of STIs were notified in Ireland. This represents an increase of 6.5% when compared to 2002 (n=10,471).**
- **The three most commonly notified STIs in 2003 were ano-genital warts (n=3981), non-specific urethritis (n=2332) and *Chlamydia trachomatis* (n=2258).**
- **A total of 112 cases of hepatitis B were notified through the STI surveillance system in 2003, compared to 57 cases in 2002. This increase is likely to be due to an increase in the number of people attending STI clinics with chronic infections, from areas of the world where Hepatitis B infection is endemic.**
- **Genital *Chlamydia trachomatis* notifications increased by 17.5% in 2003 compared to 2002.**
- **Notifications of syphilis and gonorrhoea decreased by 22.4% and 13.1%, respectively in 2003 compared to 2002.**

Introduction

Sexually transmitted infections (STIs) are a major global cause of illness, infertility and death. Both ulcerative and non-ulcerative STIs have been found to increase the risk of sexual transmission of HIV and co-infections with HIV may increase the clinical morbidity caused by each infection. Early detection and treatment of curable STIs and management of chronic infections is vital. Good quality surveillance data is essential in planning public health, clinical and laboratory service provision and in determining if prevention and screening programmes are necessary and, if implemented, successful.

During 2003, 14 STIs were legally notifiable in Ireland: ano-genital warts, candidiasis, chancroid, *Chlamydia trachomatis*, genital herpes simplex, gonorrhoea, granuloma inguinale, infectious hepatitis B, lymphogranuloma venereum, molluscum contagiosum, non-specific urethritis, Pediculosis pubis, syphilis and trichomoniasis. This list of notifiable STIs was updated in January 2004 (Infectious Diseases (Amendment) (No. 3) Regulations 2003, S.I. No. 707 of 2003), however this report details the 14 STIs that were notifiable during 2003. An additional comprehensive report on STIs notified in Ireland in 2003 is available on the HPSC website.[1]

The incidence of STIs in Ireland has increased significantly in recent years. This trend continued in 2003, with a 6.5% increase in the total number of notified STIs, compared to 2002. However, significant decreases were seen in syphilis (22.4%) and gonorrhoea notifications (13.1%). This may be attributable to interventions put in place to control the syphilis outbreak in MSM in Dublin between 2000 and 2002.

Table 1: Notified sexually transmitted infections for 2003 and 2002

Sexually Transmitted Infection	2003	2002	Increase	% Increase
Ano-Genital Warts	3981	3932	49	1.2
Candidiasis	1370	1351	19	1.4
Chancroid	0	1	-1	-100
Chlamydia Trachomatis	2258	1922	336	17.5
Genital Herpes Simplex	375	358	17	4.7
Gonorrhoea	186	214	-28	-13.1
Granuloma Inguinale	0	0	0	0
Infectious Hepatitis B	112	57	55	96.5
Lymphogranuloma Venereum	0	1	-1	-100
Molluscum Contagiosum	169	150	19	12.7
Non-Specific Urethritis	2332	2025	307	15.2
Pediculosis Pubis	76	84	-8	-9.5
Syphilis	235	303	-68	-22.4
Trichomoniasis	59	73	-14	-19.2
Total	**11153**	**10471**	**682**	**6.5**

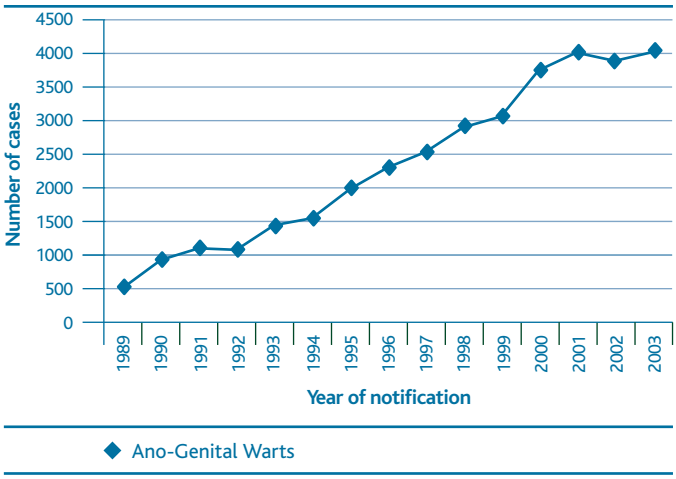

Figure 1a

Figure 1(a-e): Number of notifications of ano-genital warts, non-specific urethritis, C. trachomatis, genital herpes simplex, gonorrhoea, syphilis and infectious hepatitis B, by year between 1989 and 2003.

Although some notifications are currently received from primary care, STI surveillance in Ireland is mainly clinic-based. This data is sufficient to display the general trends in STIs, but is an underestimate of true incidences. It is also likely that the number of cases of gonorrhoea and chlamydia notified represent a substantial underestimate due to the largely asymptomatic nature of these diseases.

Methods

Aggregate data on the number of notified STIs from Departments of Public Health is collated quarterly. Departments of Public Health are notified of STIs by STI clinics and some GPs. The number of STIs notified by quarter, health board, age group and gender for 2003 are presented in this report. Rates per 100,000 population are based on the 2002 population census, unless otherwise stated. It should be noted that cases of infectious hepatitis B may also be reported through the weekly infectious disease report published by HPSC and although they are identified in STI clinics may not have been sexually transmitted. Quarterly STI data is only available from 1995 and annual STI data is only available from 1989.

In response to a dramatic increase in syphilis amongst men who have sex with men (MSM) in Dublin in early 2000, an enhanced surveillance system was introduced to capture data on all syphilis cases since January 2000.[2] Case-based demographic data, clinical data and data on sexual practices have been collected since then. This enhanced syphilis data is briefly summarised in this report, but has been reported more comprehensively elsewhere.[2]

Results

Notified STIs between 1989 and 2002

During 2003, 11,153 STIs were notified compared to 10,471 in 2002 (6.5% increase) (table 1). Notified STIs have been increasing each year since 1994, with an increase of 173.8% seen between 1994 and 2003. The number of STIs notified in 2003 is the highest number reported in any year on record. Notified cases of infectious hepatitis B, *C. trachomatis*, non-specific urethritis, molluscum contagiosum, genital herpes simplex, candidiasis and ano-genital warts increased during 2003, compared to 2002. The most significant increase was in infectious hepatitis B notifications, which increased from 57 cases in 2002 to 112 cases in 2003. Notifications of syphilis, trichomoniasis, gonorrhoea, and pediculosis pubis, decreased in 2003, compared to 2002, syphilis by 22.4% and gonorrhea by 13%. No cases of granuloma inguinale, chancroid or lymphogranuloma venereum were notified in 2003 (table 1). The cumulative rate per 100,000 population for all notified STIs increased to 284.7 per 100,000 population in 2003, compared to a rate of 267.3 per 100,000 in 2002. Annual trends for ano-genital warts, non-specific urethritis, *C. trachomatis*, genital herpes simplex, gonorrhoea, syphilis and infectious hepatitis B are presented in figure 1(a-e) and table 4.

Notified STIs by health board, 2003

During 2003, 48.4% (n=5402) of all STI notifications were from the ERHA, 16.3% (n=1822) were from the SHB, 13.5% (n=1511) were from the MWHB, 9.2% (n=1021) were from the WHB, 7.0% (n=779) were from the SEHB, 5.4% (n=599) were from the NWHB, 0.15% (n=17) were from the NEHB and 0.02% (n=2) were from the MHB (table 2). It is

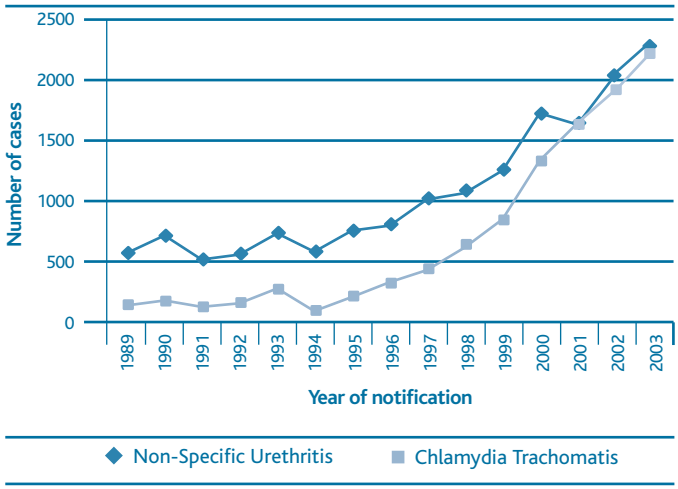

Figure 1b

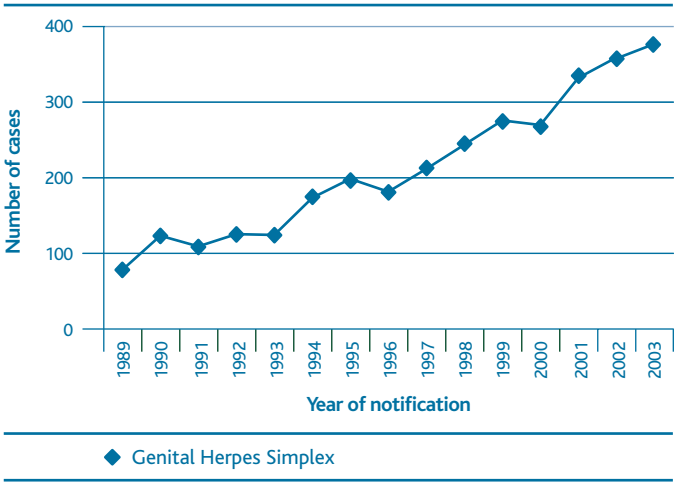

Figure 1c

important to note that STI surveillance is mainly clinic based and there are currently no STI clinics in the MHB and NEHB. Additionally, many people use STI clinics outside their area of residence so this data does not necessarily reflect cases resident in each health board. The majority of most notifiable STIs in 2003 were notified by the ERHA: ano-genital warts (n=1879; 47.2%), *C. trachomatis* (n=1278; 56.6%), non-specific urethritis (n=975; 41.8%), candidiasis (n=587; 42.9%), genital herpes simplex (n=225; 60%), syphilis (n=170; 72.3%), gonorrhoea (n=106; 57%), molluscum contagiosum (n=69; 40.8%), infectious hepatitis B (n=58; 51.8%) and trichomoniasis (n=37; 62.7%). The majority of notifications of pediculosis pubis (n=20, 26.3%) in 2003 were from the SHB. STI notifications increased in the ERHA (21.8%), NEHB (750%) and the SHB (12.7%) in 2003, compared to 2002. Decreases were seen in the MHB (71.4%), MWHB (12.2%), NWHB (6%), SEHB (14%) and the WHB (11%).

Notified STIs by age group and gender, 2003

Fifty-one point four percent (n=5734) of all notified cases of STIs were male during 2003 and 48.1% (n=5366) were female (table 3). Gender data were not reported for 0.5% (n=53) of notifications. The majority of cases of gonorrhoea (78.5%), non-specific urethritis (78.1%), pediculosis pubis (64.5%), molluscum contagiosum (62.1%), infectious hepatitis B (58.9%), syphilis (58.3%) and ano-genital warts (52.3%) were males. The majority of notifications of candidiasis (87.2%), trichomoniasis (83.1%), genital herpes simplex (59.2%) and *C. trachomatis* (54.7%) were females (table 3).

In 2003, 11% (n=1226) of notified cases of STIs were 0 to 19 years old, 61.6% (n=6870) were 20 to 29 years, 17.8% (n=1987) were 30 to 39 years, 6.6% (n=734) were aged 40 years of age or older and the age of 3% of cases was unknown (n=336). For all of the notifiable STIs, the highest number of cases were seen in the 20-29 year age group (table 3).

Disease-specific trends

Ano-genital warts

Notifications increased each year between 1992 and 2001 and levelled off in 2002 and 2003. During 2003 notifications (n=3981, rate=101.6 per 100,000 population) increased by 1.2%, compared to 2002. Males accounted for 52.3% of cases and females for 47.4% of cases (gender was not reported for 0.3% cases). Eleven point seven percent of cases were aged 0-19, 63.1% of cases were 20-29, 16.5% were 30-39, 5.6% were aged 40 years or older and the age of 3.2% of cases was not reported. Ano-genital warts accounted for the majority (35.7%) of all STI notifications in 2003.

Chancroid

No cases of chancroid were notified in 2003. With the exception of the year 2000 (when 16 cases were notified), the number of notifications of chancroid has ranged from no cases to three cases per year since 1989.

Chlamydia trachomatis

From 1989 to 1995, the number of cases of *C. trachomatis* notified remained stable fluctuating around a mean of 205 cases per year (standard deviation: 55.8). Since 1995 the number of cases increased steadily every year, with notifications increasing by 822% between 1995 and 2003.

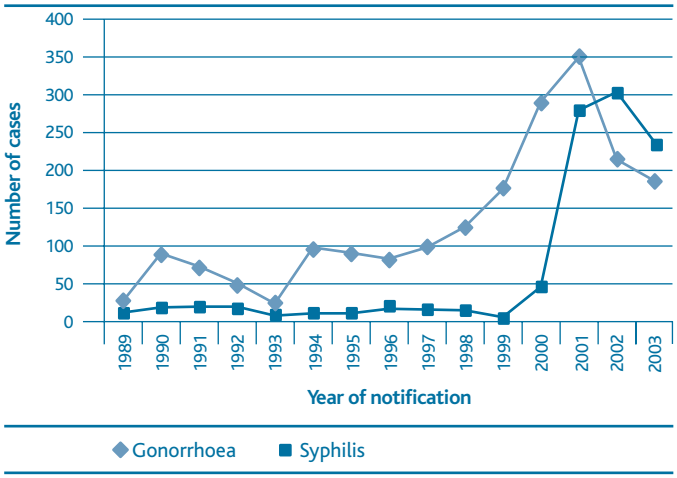

Figure 1d

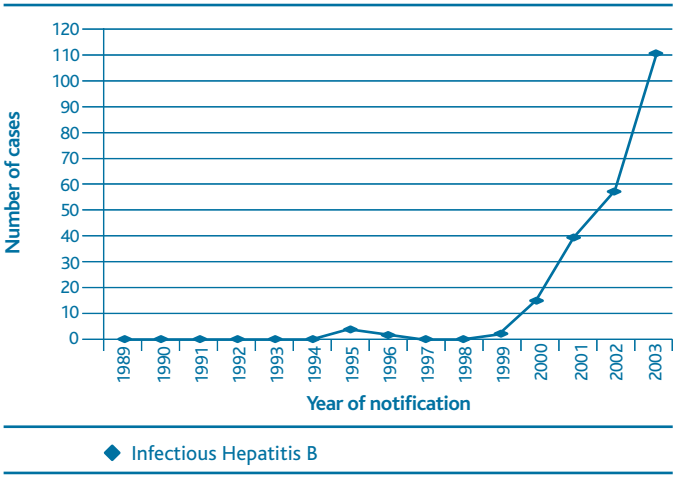

Figure 1e

Two thousand two hundred and fifty-eight cases (57.6 per 100,000 population) were notified in 2003, representing an increase of 17.5% compared to 2002. *C. trachomatis* accounted for 20.2% of all STI notifications in 2003. Forty-four percent of cases were male and 54.7% were female (gender was not reported in 1.4% cases). Twelve point one percent of cases were aged 0-19 years, 69.3% of cases were 20-29, 13.6% were 30-39, 2.8% were aged 40 years or older and the age of 2.2% of cases was not reported.

Genital herpes simplex

Genital herpes simplex notifications increased by 381% between 1989 and 2003. Three hundred and seventy-five cases (9.6 per 100,000 population) were notified in 2003, representing an increase of 4.7% compared to 2002. Forty point three percent of cases were male and 59.2% were female (gender was not reported in 0.5% cases). Eight point three percent of cases were aged 0-19, 52% of cases were 20-29, 26.1% were 30-39, 9.1% were aged 40 years or older and the age of 4.5% of cases was not reported.

Gonorrhoea

Gonorrhoea notifications increased consistently between 1996 (n=83, rate=2.3 per 100,000 population) and 2001 (n=349, rate=8.9 per 100,000 population). Numbers have declined in the past two years, with notifications decreasing by 38.7% in 2002 (compared to 2001) and 13.1% in 2003 (compared to 2002). One hundred and eighty-six cases of gonorrhoea (4.8 per 100,000 population) were notified in 2003. Seventy-eight point five percent of cases were male and 20.4% were female (gender was not reported 1.1% cases) in 2003. Eight point six percent of cases were aged 0-19, 52.2% of cases were 20-29, 23.7% were 30-39, 13.4% were aged 40 years or older and the age of 2.2% of cases was not reported.

Granuloma Inguinale

No cases of granuloma inguinale were notified during 2003. The number of notifications has ranged from no cases to six cases per year since 1989.

Infectious Hepatitis B

Between 1989 and 1999, infectious hepatitis B cases reported through the STI quarterly notification system ranged from no cases to four cases per year. The number of notifications increased steadily from 1999 to 2003 and 112 cases were notified in 2003 (2.9 per 100,000 population). This is the highest yearly total on record and represents an increase of 96.5% compared to 2002. Fifty-eight point nine percent of cases notified were male and 41.1% were female. The number of male cases increased by 266.7% and the number of female cases increased by 17.9% in 2003, compared to 2002. Five point four percent of cases were aged 0-19, 48.2% of cases were 20-29, 31.3% were 30-39, 14.3% were aged 40 years or older and the age of 0.9% of cases was not reported.

Lymphogranuloma venereum

No cases of Lymphogranuloma venereum were notified during 2003. The number of cases of Lymphogranuloma venereum has ranged from no cases to five cases per year since 1989.

Table 2: Notified sexually transmitted infections by health board for 2003

Sexually Transmitted Infection	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
Ano-Genital Warts	1879	0	383	5	257	347	644	466	3981
Candidiasis	587	0	215	0	73	37	248	210	1370
Chancroid	0	0	0	0	0	0	0	0	0
Chlamydia Trachomatis	1278	0	187	5	74	144	396	174	2258
Genital Herpes Simplex	225	0	18	1	3	22	71	35	375
Gonorrhoea	106	1	15	0	15	17	24	8	186
Granuloma Inguinale	0	0	0	0	0	0	0	0	0
Infectious Hepatitis B	58	0	27	6	0	1	18	2	112
Lymphogranuloma Venereum	0	0	0	0	0	0	0	0	0
Molluscum Contagiosum	69	0	17	0	4	23	36	20	169
Non-Specific Urethritis	975	0	619	0	169	177	317	75	2332
Pediculosis Pubis	18	0	14	0	2	5	20	17	76
Syphilis	170	1	14	0	2	5	33	10	235
Trichomoniasis	37	0	2	0	0	1	15	4	59
Total	**5402**	**2**	**1511**	**17**	**599**	**779**	**1822**	**1021**	**11153**

Molluscum contagiosum

Notified cases of molluscum contagiosum ranged between 31 and 59 cases per year between 1989 and 1996. Since then the number of cases has either remained stable or increased every year. One hundred and sixty-nine cases were notified in 2003 (4.3 per 100,000 population). This represents an increase of 12.7%, compared to 2002. Sixty-two point one percent of cases notified were male and 37.3% were female (gender was not reported 0.6% cases). Fourteen point two percent of cases were aged 0-19, 66.9% of cases were 20-29, 11.8% were 30-39, 1.8% were aged 40 years or older and the age of 5.3% of cases was not reported.

Non-specific urethritis

Non-specific urethritis notifications fluctuated around a mean of 640 per year between 1989 and 1994 (standard deviation: 78.4). Since then, the number of cases has either increased or remained stable every year. In 2003, 2332 cases of non-specific urethritis were notified (59.5 per 100,000 population). This represents an increase of 15.2%, compared to 2002. Seventy-eight point one percent of cases notified were male and 21.8% were female (gender was not reported 0.04% cases). Eight point eight percent of cases were aged 0-19, 58.4% of cases were 20-29, 21.3% were 30-39, 8.5% were aged 40 years or older and the age of 3.0% of cases was not reported. Non-specific urethritis accounted for 20.9% of all STI notifications in 2003.

Pediculosis pubis

Pediculosis pubis notifications fluctuated around a mean of 73.8 (standard deviation: 7.3) cases per year between 1989 and 1997. Notifications increased over the subsequent three years, with 138 cases (3.5 per 100,000 population) notified in 2000. Numbers have decreased every year since then. Seventy-six cases of pediculosis pubis (1.9 per 100,000 population) were notified in 2003. This represented a 9.5% decrease when compared to 2002. Sixty-four point five percent of cases notified were male and 34.2% were female (gender was not reported 1.3% cases). Nine point two percent of cases were aged 0-19, 59.2% of cases were 20-29, 14.5% were 30-39, 13.2% were aged 40 years or older and the age of 4.0% of cases was not reported.

Syphilis

There was a dramatic increase in syphilis amongst men who have sex with men (MSM) in Dublin in early 2000.[2] This was against a low incidence of syphilis nationally between 1989 and 1999, when the mean number of annual notifications was 14.1 (standard deviation: 4.6). Notifications peaked in 2002 at 303 cases and syphilis has remained endemic since. Two hundred and thirty-five cases were notified in 2003 (6 per 100,000 population). This represents a decrease of 22.4% when compared to 2002. Fifty-eight point three percent of cases notified were male and 41.3% were female (gender was not reported 0.4% cases). The number of male cases decreased by 36.3% and the number of female cases increased by 11.5%, compared to 2002. Three point eight percent of cases were aged 0-19, 38.7% of cases were 20-29, 35.3% were 30-39, 19.2% were aged 40 years or older and the age of 3.0% of cases was not reported. An enhanced surveillance system was introduced by HPSC to capture data on all syphilis cases from January 2000.

Table 3: Notified sexually transmitted infections by age group (years) & gender for 2003

Sexually Transmitted Infection	0-19	20-29	30-39	40+	Age unknown	Male	Female	Gender unknown	Total
Ano-Genital Warts	464	2510	658	223	126	2082	1887	12	3981
Candidiasis	184	811	223	108	44	173	1195	2	1370
Chancroid	0	0	0	0	0	0	0	0	0
Chlamydia Trachomatis	274	1564	307	63	50	993	1234	31	2258
Genital Herpes Simplex	31	195	98	34	17	151	222	2	375
Gonorrhoea	16	97	44	25	4	146	38	2	186
Granuloma Inguinale	0	0	0	0	0	0	0	0	0
Infectious Hepatitis B	6	54	35	16	1	66	46	0	112
Lymphogranuloma Venereum	0	0	0	0	0	0	0	0	0
Molluscum Contagiosum	24	113	20	3	9	105	63	1	169
Non-Specific Urethritis	205	1362	497	197	71	1822	509	1	2332
Pediculosis Pubis	7	45	11	10	3	49	26	1	76
Syphilis	9	91	83	45	7	137	97	1	235
Trichomoniasis	6	28	11	10	4	10	49	0	59
Total	1226	6870	1987	734	336	5734	5366	53	11153

Trichomoniasis

Trichomoniasis notifications fluctuated significantly between 1989 and 2003. The highest number of cases on record occurred in 1991 when 163 notifications were made (4.6 per 100,000 population). The mean number of notifications for all years between 1989 and 2003, excluding 1991, was 60.9. During 2003, 59 cases (1.5 per 100,000 population) were notified. This represents a decrease of 9.5% compared to 2002. Seventeen percent of cases notified were male and 83% were female. Ten point two percent of cases were aged 0-19, 47.5% of cases were 20-29, 18.6% were 30-39, 17% were aged 40 years or older and the age of 6.8% of cases was not reported.

Enhanced surveillance of syphilis 2003

A total of 195 cases of syphilis were reported to the HPSC through the syphilis enhanced surveillance system for 2003. Of the total cases reported, 87% (n=170) were reported by the ERHA. Forty-eight percent of the 195 cases were early (infectious)* syphilis and 35% were late† syphilis cases. Over 60% (62.1%) of cases were male and 37.4% were female. This differs from 2002 and 2001 when 73.5% and 81.2% of cases were male, respectively. The mean age for male and female cases was 36 and 28 years, respectively. Forty percent of all syphilis cases were amongst MSM: 88% were homosexual and 12% were bisexual. Thirty-four percent of cases were heterosexual (45.5% male and 54.5% female) and sexual orientation was unknown for 26% of cases (figure 2). Twenty-five (12.8%) syphilis cases were HIV positive, 15 of which, were early (infectious) syphilis cases, 8 were late syphilis cases and staging was unknown for two cases. Thirty-two percent (n=8) of syphilis cases with HIV were newly diagnosed in 2003. Twelve percent of all syphilis cases, and 17% of early (infectious) syphilis cases, had one or more concurrent STIs (excluding HIV). Seventy percent of all female cases (n=23) were identified through antenatal screening (5 early (infectious) cases, 14 late syphilis cases and 4 unknown stage). Seventeen of the cases identified through antenatal screening were non-nationals, two were Irish nationals and four were of unknown nationality.

***Early (infectious) syphilis cases refer to primary, secondary and early latent syphilis cases.**

†Late syphilis cases refer to late latent and tertiary syphilis cases

Discussion

The increase in STIs in Ireland during 2003 is likely to be associated with a number of factors. Between 2000 and 2003 over 60% of STIs occurred in 20-29 year olds. This age group is more likely to have higher numbers of sexual partners, change partners more frequently and engage in high-risk behaviour such as unprotected sex with new sex partners. It is also likely that case identification is improving. Media attention and public health education initiatives have lead to increased awareness of STIs, it has become more socially acceptable to attend STI clinics and improvements have been made in laboratory testing for STIs. The introduction of screening programmes such as voluntary health screening for asylum seekers and antenatal screening in maternity hospitals are also likely to have contributed to the observed increases.

Dramatic increases in hepatitis B (96.5%) were seen in 2003. Hepatitis B is known to affect certain subgroups of the population, namely intravenous drug users, prisoners and

Table 4: Notified sexually transmitted infections from 1989 to 2003

Sexually Transmitted Infection	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Ano-Genital Warts	505	917	1089	1066	1432	1532	1972	2286	2514	2886	3049	3735	3993	3932	3981
Candidiasis	688	1056	1257	1157	1400	1360	1271	1321	1521	1277	1105	1095	1150	1351	1370
Chancroid	2	0	0	2	0	2	3	1	1	0	1	16	1	1	0
Chlamydia Trachomatis	174	215	164	192	315	133	245	364	462	646	869	1343	1649	1922	2258
Genital Herpes Simplex	78	123	109	125	124	173	198	181	211	243	275	269	331	358	375
Gonorrhoea	27	90	73	51	24	98	91	83	98	125	175	290	349	214	186
Granuloma Inguinale	0	0	0	0	6	0	0	1	1	0	1	0	0	0	0
Infectious Hepatitis B	0	0	0	0	0	0	4	2	0	0	2	15	39	57	112
Lymphogranuloma Venereum	0	0	0	0	0	0	0	0	5	1	2	0	0	1	0
Molluscum Contagiosum	31	39	43	44	34	56	59	34	74	84	83	118	111	150	169
Non-Specific Urethritis	600	738	549	585	756	610	781	823	1034	1083	1265	1726	1634	2025	2332
Pediculosis Pubis	60	70	72	70	77	69	86	79	81	105	113	138	103	84	76
Syphilis	12	19	20	20	8	11	11	17	16	15	6	46	279	303	235
Trichomoniasis	51	86	163	41	57	29	60	71	94	38	47	78	64	73	59
Total	**2228**	**3353**	**3539**	**3353**	**4233**	**4073**	**4781**	**5263**	**6112**	**6503**	**6993**	**8869**	**9703**	**10471**	**11153**

chronically infected immigrants from endemic areas of the world such as Sub-Saharan Africa, Asia and parts of Eastern and Central Europe.[3] It is important to note that case classification data was not collected prior to 2004 and we do not know whether the reported cases of infectious hepatitis B were acute or chronic nor do we know the country of origin of notified cases. However, anecdotally we have learnt that there are increasing numbers of people attending STI clinics from countries where hepatitis B is endemic. STI clinic attendees are routinely screened for hepatitis B markers and it is likely that the increase in notifications in 2003 is largely attributable to people from endemic countries who are tested in STI clinics and whose chronic hepatitis B co-infection is a co-incidental finding and is a result of infection acquired in the past. Demographic, risk factor, clinical and microbiological data are required in order to characterise the epidemiology of this infection and to better inform prevention and control strategies.

C. trachomatis notifications continued to increase in 2003. In addition to a true underlying increase in the number of people infected, this increase reflects increased testing and the use of highly sensitive and specific DNA amplification techniques (NAATS), which can be used on non-invasively collected specimens, particularly urine. The numbers reported are likely to represent a substantial underestimate of the true burden of disease as *C. trachomatis* infection is asymptomatic in at least 70% of women and 50% of men.[4] In women, if chlamydia is not treated it can cause pelvic inflammatory disease (PID), which can lead to ectopic pregnancy, chronic pelvic pain and tubal-factor infertility.[5] Due to the "silent" nature of *C. trachomatis* infections and the severity of possible complications of untreated infection, some countries routinely screen sexually active men and women under the age of 25 and other risk groups, for infection.[6,7] The STI subcommittee of Scientific Advisory Committee (SAC) of the HPSC is currently examining the need for chlamydia screening in Ireland.

Between 2000 and 2002, there was a dramatic increase in syphilis amongst men who have sex with men (MSM) in Dublin. Similar increases were seen in the UK, several other European countries and the US. Syphilis, like other genital ulcer diseases, increases the risk of transmitting and acquiring HIV. In response to this increase the Director of Public Health in the Eastern Regional Health Authority (ERHA) established an outbreak control team in October 2000. Intervention measures included the provision of additional resources for clinical services, contact tracing, educational materials, onsite testing in MSM venues and information campaigns targeted at the MSM community.[2] These interventions may have had an impact, as the outbreak amongst MSM in Dublin peaked in 2002 and notifications decreased by 22.4% in 2003. However, notifications have not returned to their previous levels and syphilis remains endemic in Ireland. The increase observed in the number of female syphilis cases in 2003 is partly due to cases identified through antenatal screening. Over 30% of female cases reported through the syphilis enhanced surveillance system between 2000 and 2003 were identified through antenatal screening. The numbers identified in this manner may be even higher as the reasons for attending an STI clinic were not known for a further 52.5% of female cases and some of these women may have been referred following antenatal screening.

The peak in gonorrhoea notifications observed in 2001

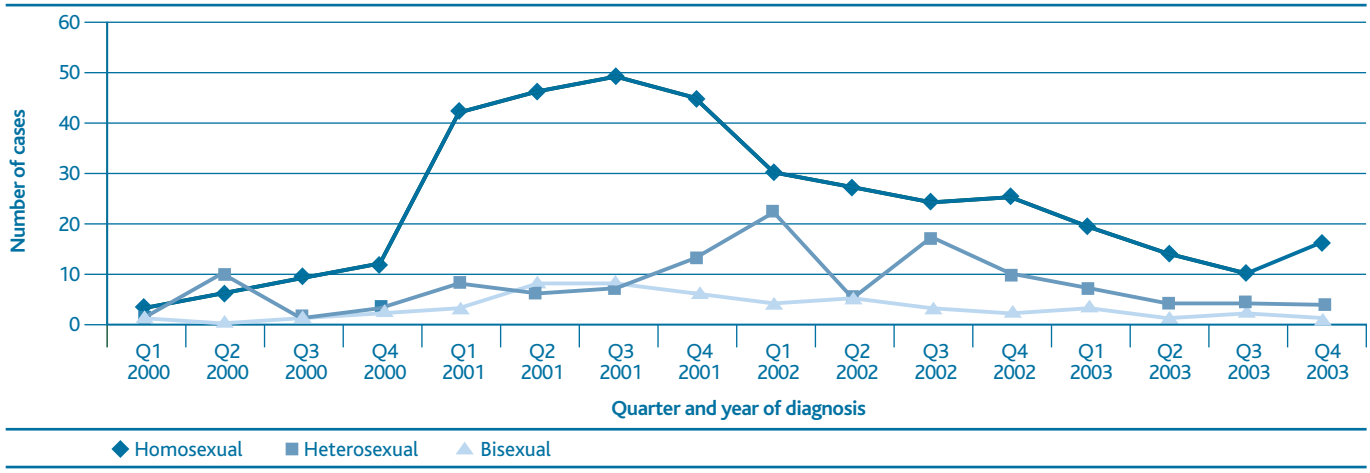

Figure 2: Infectious syphilis cases by sexual orientation and quarter and year of diagnosis as reported through the syphilis enhanced surveillance system (n=558)

coincided with the outbreak of syphilis amongst MSM. Gonococcal infections tend to be concentrated in core risk groups, such as MSM and this may be reflected in the 2003 data, in that 78% of notifications were male. The 13.1% decrease in reported cases observed in 2003 compared to 2002, may have resulted from the interventions put in place to control the syphilis outbreak. However, the numbers reported are likely to represent an underestimate of the true incidence of infection as gonorrhoea can be asymptomatic in up to 86% of women and 55% of men.[8]

Ano-genital warts, the clinically visible manifestations of infection with human papilloma virus (HPV), was the most commonly notified STI in Ireland in 2003, with similar numbers of cases reported to 2002. These numbers represent a very small percentage of the overall burden of HPV infection in the community. It is estimated that many more people without warts have subclinical disease or latent infection with HPV. Most visible anogenital warts are benign and caused by HPV types 6 and 11. Infection with some other HPV types, especially 16, 18, 31 and 45 may lead to the development of invasive cervical cancer and other cancers of the anogenital tract.[9]

STI control, prevention and policy-making requires timely surveillance data that includes a range of. demographic, behavioural, clinical and microbiological information. Ideally data should be collected from all sites where STIs are identified. Although some notifications are currently received from primary care physicians, STI surveillance in Ireland is mainly clinic-based. This data is sufficient to display the general trends in STIs, but is an underestimate of true incidences as significant proportions of specimens received by laboratories to be tested for STIs come from sources other than STI clinics.

The amendment to the Infectious Diseases Regulations 1981 (Infectious Diseases (Amendment) (No. 3) Regulations 2003, S.I. No. 707 of 2003) introduced a requirement for laboratory directors to report infectious diseases from January 2004. This should substantially improve the accuracy with which national data reflects the true numbers of STIs diagnosed in Ireland. The STI subcommittee of Scientific Advisory Committee (SAC) of HPSC is also working on agreeing a dataset for the collection of patient-based disaggregate STI data. The collection of this data and laboratory reporting will be facilitated by the development of a internet-based system (CIDR) to manage the surveillance and control of infectious diseases in Ireland.[10] It will be used by public health, laboratory and surveillance personnel for reporting and disseminating disaggregate infectious disease data in a timely manner.

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Invasive Pneumococcal Disease (IPD) in Ireland, 2004

Key Points

- ***Streptococcus pneumoniae* is commonly associated with pneumonia, meningitis, bacteraemia, sinusitis or otitis media**
- **400 cases of invasive pneumococcal disease (IPD) were reported in Ireland through EARSS during 2004**
- **Highest incidence rates of IPD were found among the elderly and the very young**
- **Pneumococcal vaccine is recommended for individuals at increased risk of infection, including all individuals 64 years of age or older**

Introduction

Invasive pneumococcal disease (IPD) is caused by the organism *Streptococcus pneumoniae*. *S. Pneumoniae* is one of the most common bacterial causes of acute otitis media and invasive bacterial infections in children. It is commonly associated with sinusitis, community acquired pneumonia and conjunctivitis. It is also the second most common organism (after *N. Meningitidis*) causing bacterial meningitis in Ireland (accounting for 8% of all bacterial meningitis cases in 2004). Those most at risk of meningitis are young children and older age groups.

More than 90 serotypes of *S. pneumoniae* have been described since the organism was first identified by Pasteur in 1881. Although most serotypes have been shown to cause serious disease, only a few serotypes produce the majority of pneumococcal infections. The 10 most common serotypes are estimated to account for over 60% of invasive disease worldwide.

The true burden of disease associated with IPD in Ireland is evident with the information available from European Antimicrobial Resistance Surveillance System (EARSS). EARSS started in Ireland in 1999 and provides information on the number of isolates of *S. pneumoniae* from participating laboratories (see chapter on EARSS for additional information). EARSS participating laboratories are now estimated to cover approximately 98% of the Irish population. Additionally, since January 1st 2004 all invasive *S. pneumoniae* infections or laboratory confirmed diagnoses (isolation of *S. pneumoniae* or detection of *S. pneumoniae* nucleic acid from

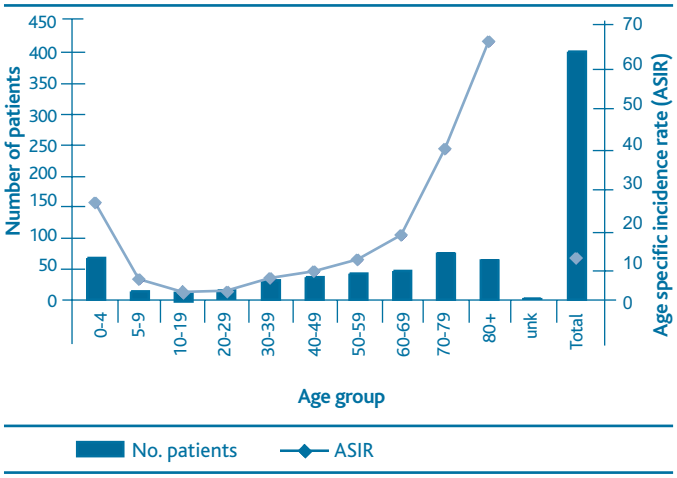

Figure 1. Invasive Streptococcus pneumoniae cases and age specific incidence rates (ASIR), by age group, notified in 2004

a normally sterile site) should be notified to the medical officer of health. A detailed description of the case definition is provided in the HPSC Case Definitions booklet.[1]

Information on the number of isolates of invasive *S. pneumoniae* during 2004 is more accurately reported through EARSS, therefore, the EARSS data is used in the following discussion of the epidemiology of IPD in Ireland during 2004. Reference is made to IPD notifications reported through the weekly notification system. Incidence rates are calculated using population data taken from the 2002 census.

Results

In 2004, four hundred cases of IPD were reported through EARSS. In contrast, 159 cases were reported through the weekly notification system. EARSS data clearly provides a more accurate reflection of disease incidence in the country than weekly IPD notifications made to the medical officer of health.

The 400 IPD cases reported through EARSS during 2004 represents an estimated crude incidence rate of 10.4 cases per 100,000 population (extrapolated from EARSS laboratories covering 98% of the population).

Males and females were similarly affected (ratio 1.06:1). The highest age specific incidence rates (ASIR) were reported among those greater than 64 years of age (37.6 per 1000,000; 164 cases) and among children in the 0-4 year age (24.1 per 100,000 population; 67 cases). Incidence rates are highest in the oldest age groups (≥ 85 years of age, ASIR of 64.6 per 100,000). The number of cases of IPD and the ASIRs are presented in Figure 1.

No serotype data was provided on any of the *S. pneumoniae* isolates in 2004.

Discussion

During 2004, IPD caused substantial morbidity, with 400 IPD cases reported through EARSS. The weekly notification system only identified 159 IPD cases, demonstrating substantial under-reporting to Medical Officers of Health (MoH). The reason for this under-reporting to the MoH is unclear. It may reflect either 1) lack of awareness among clinicians that all IPD cases should be reported or 2) inaccurate belief amongst clinical directors of laboratories that by reporting IPD isolates to EARSS that they are fulfilling their statutory obligation. It is most likely that under-reporting is related to a combination of these two factors.

IPD rates reported in Ireland in 2004, although less than those reported in the United States prior to introduction of a 7-valent pneumococcal conjugate vaccine for children (average 24.3/100,000 for 1998 and 1999)[2], are similar to those reported from the UK (9.9/100,000) in 2003/04.[3]

Two age groups are found to have the highest incidence of IPD, the 0-4 year age group and the over 64 year age group, a finding reported in other countries.[2,3] In recognition of the increased risk of infection among the elderly population, all individuals 65 years of age or older in Ireland are recommended pneumococcal vaccine to protect against IPD and its complications.

Other groups are also recognised at being at increased risk of infection or its complications and are recommended pneumococccal vaccination.[4] Those considered to be most at risk are those with the following conditions: no spleens or splenic dysfunction; chronic renal disease or nephrotic syndrome; chronic heart, lung or liver disease; diabetes mellitus; sickle disease; CSF leaks; cochlear implants; as well as the elderly (65 years of age or older). Two types of pneumococcal vaccine are available, 23-valent polysaccharide pneumococccal, recommended for those 24 months and older, and a 7-valent conjugate vaccine, recommended for infants and children at risk.

Currently in Ireland there are no national data available on vaccination uptake rates amongst these risk groups. Nor do current surveillance systems in place routinely identify whether or not an IPD case belongs to a risk group, or whether they were vaccinated. As information on serotypes was not available for any of the IPD isolates in 2004 it is difficult to estimate the potential vaccine efficacy in the Irish population even if vaccine uptake data were available.

IPD is a potentially vaccine preventable disease. Therefore, understanding the distribution of the disease, the risk factors for infection, vaccination uptake and the *S. pneumoniae* serotypes in circulation in Ireland is fundamental to improving control and preventing infection among those most at risk.

Recommendations

Improving information on IPD epidemiology will more accurately quantify the burden of disease, risk factors for infection and missed opportunities for immunisation.

All clinicians and laboratory directors should report IPD cases to the MoH. Additionally, laboratories should also report *S. pneumoniae* isolates to EARSS according to agreed protocols.

Developing laboratory capacity so that *S. pneumoniae* isolates can be serotyped is integral to any future surveillance programme.

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Information and Communications Technology

Information and Communication Technology staff are responsible for the management, purchase and support of information systems at HPSC.

Major IT developments, in conjunction with the CIDR/Health Informatics team and other HPSC staff, during 2004 included :

- Information governance certificiation
- On going website development
- Establishment of a business continuity solution
- Developments in health informatics

Information Governance
An information governance committee was formed 'to establish a framework to ensure the privacy, confidentiality and security of information within the agency and to ensure that the policies relating to these are implemented and complied with.'

The committee, made up of staff from all disciplines, meets monthly. It provides policy development and guidance in relation to information handling and information security in the context of the organisation's responsibilities under the Data Protection Acts (1988 & 2003) and Freedom of Information Acts (1997 & 2003).

During 2004 the centre obtained formal certification to the National Standards Authority of Ireland (NSAI) recognised Information Security standard IS17799. This certification audits Information Security Management Systems (ISMS) and the associated set of policies and procedures. Certification also confirms the implementation of the relevant policies and procedures. The centre ensures the confidentiality, integrity and availability of vital information, through compliance with this standard.

Website
The website (www.hpsc.ie) continues to be one of HPSC's most important communications tools. A wide range of information is published on the web site, including all reports produced by the centre, weekly and annual infectious disease statistics, disease specific factsheets, press releases and other general information.

Use of the web site continued to increase in 2004. At the end of 2003 the average number of log-ons to the site per day was 789. During the last quarter of 2004 it averaged 1032 users per day.

During 2004 a project was initiated to re-design and update the structure of the web site. A project team was established to oversee the changes. The new web site was launched in 2005.

A separate web project - to provide easily accessible anonymosied, summary data to medical professionals and the general public through tabular, graphic and map formats- also began in 2004.

Disaster Recovery / Business Continuity
During 2004, HPSC established a disaster recovery / business continuity system to protect its operational integrity.

The business continuity solution is based on use of off site facilities provided by Network Recovery Ltd., who are specialists in Business Continuity and Disaster Recovery. A scaled down IT network infrastructure providing the core communications and software functions has been configured and tested on the network recovery site. Eight staff can be supported directly by the system which can also be configured to allow remote access for additional staff as necessary.

An equivalent solution is being being developed for CIDR in 2005.

HeBE Messaging Subgroup

The HeBE Messaging subgroup (including HPSC) continued to work through 2004 producing HL7 version 2.4 national implementation guides for HL7 XML Batch File Protocol, Admission and Discharge Notifications, Appointment Scheduling and Message Acknowledgement for communications between primary and secondary care information systems.

Viral Hepatitis, 2004

Key Points

- **Hepatitis A incidence remained low, with 47 cases notified in 2004.**
- **The number of notifications of hepatitis B continued to increase with 797 cases reported in 2004, compared to 547 cases in 2003. Where acute/chronic status was known, 91% (n=553) of cases were reported as chronic and 9% (n=58) were reported as acute.**
- **2004 was the first year that hepatitis C was notifiable in Ireland and 1,154 cases were reported. The majority of cases occurred in young adults.**
- **Work is progressing on a national database for people infected with hepatitis C though administration of blood and blood products. By collecting medical and demographic information on consenting patients, this database will enable the natural history of hepatitis C to be studied in this cohort, and will facilitate health service planning and evaluation.**

Viral Hepatitis - Type A

Introduction

Hepatitis A is an acute, usually self-limiting disease of the liver caused by the hepatitis A virus (HAV). It is transmitted by person-to-person contact, primarily via the faecal-oral route and is associated with poor hygiene and sanitation and water that is contaminated with human faecal matter.[1] Blood borne transmission of hepatitis A can occur but is not as common.

In high- and intermediate-endemicity countries (Africa, the Middle East, Asia, Eastern Europe, Central and South America), most adults have serological evidence of past HAV infection. In developed countries, hepatitis A is most commonly seen among travellers to endemic countries, injecting drug users (IDUs), men who have sex with men (MSM) and household or sexual contacts of known cases. Sporadic food and waterborne outbreaks or outbreaks in crèches also occur. Hepatitis A in children is often asymptomatic or mild and usually resolves within a couple of weeks. Clinical severity tends to increase with age and adults can experience severe illness lasting several months. Symptoms include sudden onset of fever, fatigue, loss of appetite, nausea and abdominal pain. Jaundice usually occurs within a few days of onset of symptoms.[1,2]

A safe and effective vaccine is available for hepatitis A. In Ireland, vaccination is recommended for individuals in high-risk groups such as travellers to high endemicity countries, patients with chronic liver disease, individuals at occupational risk, close contacts of infected persons, individuals with haemophilia and recipients of plasma-derived clotting factors.[3]

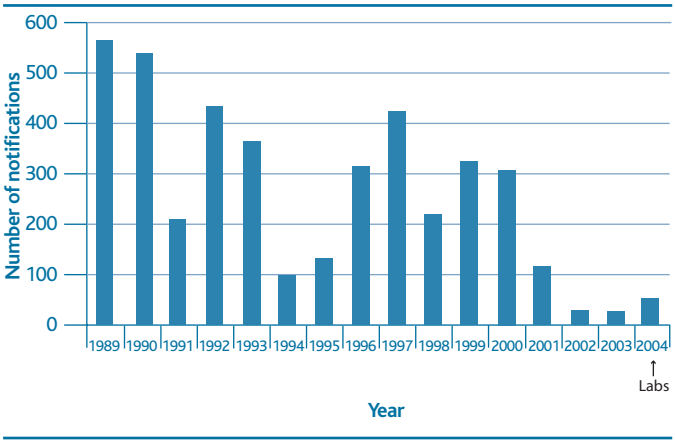

Figure 1. Number of cases of hepatitis A notified 1989-2004

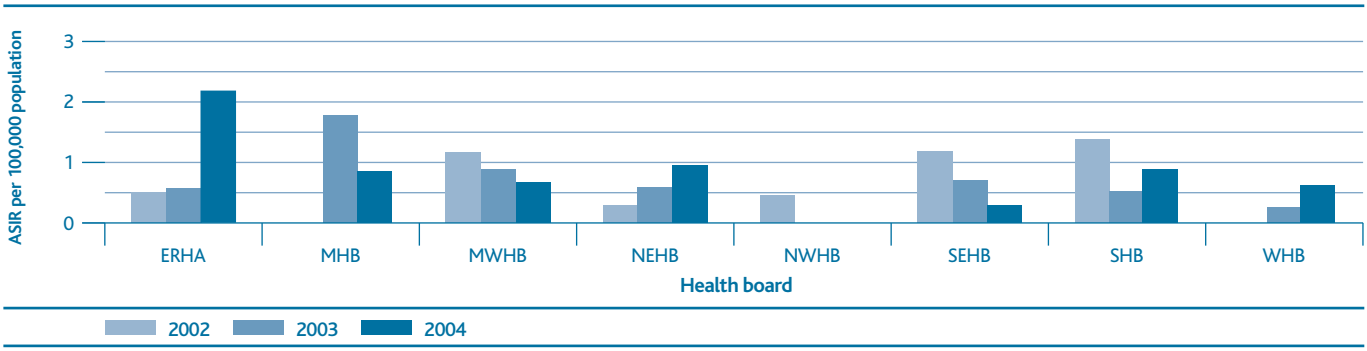

Figure 2. Age-standardised incidence rates of hepatitis A per 100,000 population by health board, 2002-2004

Materials and Methods

Hepatitis A is a notifiable disease under the Infectious Diseases Regulations 1981. Aggregate data on notifications are available from 1982 and disaggregate data are available since mid-2000. An amendment to the regulations implemented on 1st January 2004 (S.I. 707 of 2003) introduced case definitions for hepatitis A (Box 1).

Results

Hepatitis A incidence remained low, with 47 cases notified to the HPSC during 2004. This corresponds to an age-standardised incidence rate (ASIR) of 1.1 per 100,000 population and represents an increase of 88% compared to the number of notifications received in 2003 (n=25) (figure 1). Thirty-six cases were reported as confirmed, five were reported as possible and the case classification was not reported for six cases. The ERHA notified 64% of all cases (n=30), corresponding to an ASIR of 2.1 cases per 100,000 population (figure 2). Fifty-five percent of cases of hepatitis A notified in 2004 were female (n=26). Adults aged between 25 and 44 years (n=20) and children aged between 0 and 4 years (n=9) were most affected. The overall median age for hepatitis A notifications was 28 years (figure 3).

Discussion

Hepatitis A incidence remained low in Ireland in 2004. However cyclic recurrences of hepatitis A can occur in developed countries and the annual incidence of hepatitis A has varied considerably since 1989 (figure 1). Many hepatitis A cases occur in the context of family or local community outbreaks and two family outbreaks and one outbreak in a crèche were reported to the HPSC in 2004. The source of these infections was not identified but it was known that they were not travel-related.

Outside of Ireland, a large foodborne outbreak of hepatitis A was reported in European tourists who had stayed in a particular hotel in Egypt in the summer of 2004. Over 300 people were affected and the outbreak was ultimately linked to the consumption of fruit juice.[4] Outbreaks among MSM were reported in Norway, Copenhagen and London and an outbreak was reported among a homeless and drug user community in Rotterdam.[5,6,7,8] No outbreaks in either MSM or IDUs in Ireland were reported to the HPSC in 2004.

Although risk factor information is collected in the context of outbreaks there is currently no enhanced surveillance system for hepatitis A in Ireland. More detailed information would contribute to the prevention and control of hepatitis A and the efficient detection of outbreaks.

Viral Hepatitis – Type B

Introduction

Hepatitis B virus (HBV) is transmitted by contact with blood or body fluids of an infected person and is 50 to 100 times more infectious than HIV. Only 10% of children and 30-50% of adults develop clinical symptoms during the acute phase of hepatitis B infection and if the virus is cleared at this stage, the infection may never be recognised.[1,9]

The course and clinical symptoms of hepatitis B infection depend on the patient's age and immune status. Between one and ten percent of those infected as older children or

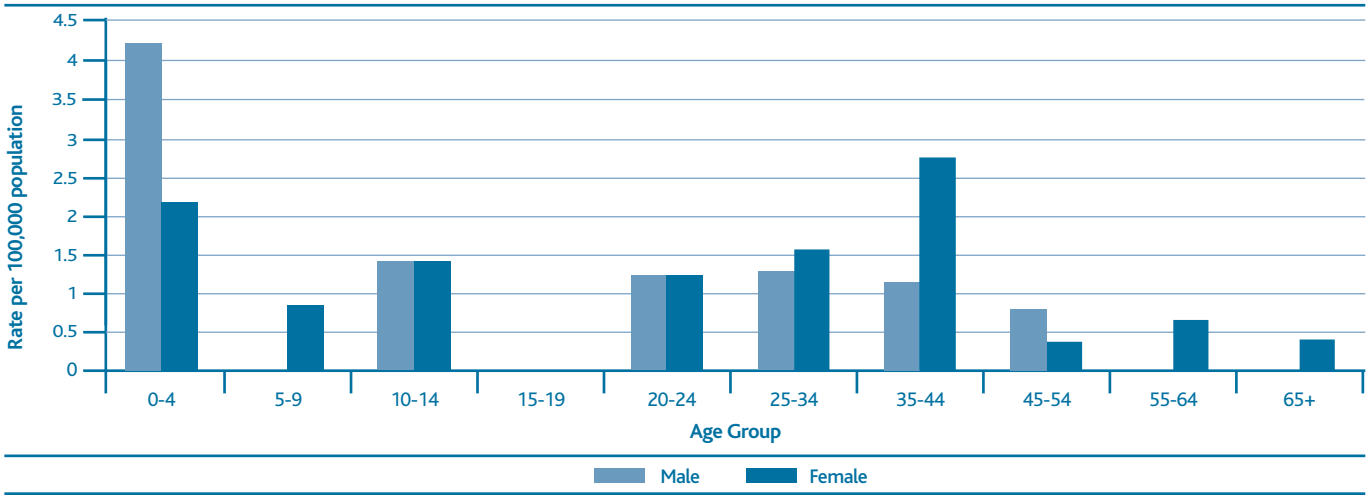

Figure 3: Age- and sex-specific incidence rates of hepatitis A per 100,000 population, 2004

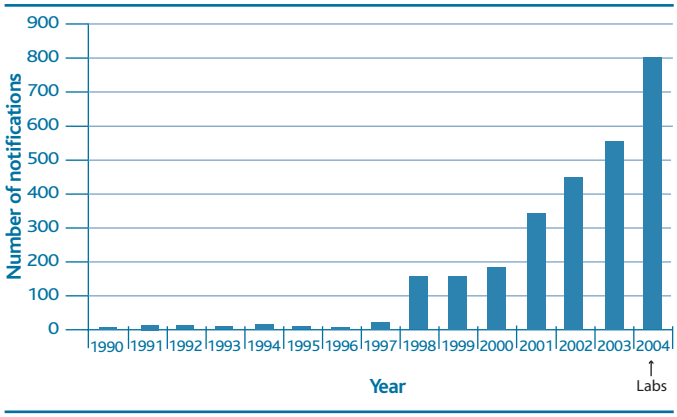

Figure 4. Number of cases of hepatitis B notified, 1990-2004

adults, and 90% of infants infected at birth, develop chronic hepatitis B infection. More than 350 million people worldwide are chronically infected with HBV. In Sub-Saharan Africa, South-East Asia and parts of China over 8% of the population have chronic HBV infections, most of which were contracted at birth or through child-to-child contact in household settings. Chronic infection is associated with an increased risk of developing cirrhosis and/or hepatocellular carcinoma, and premature death from chronic liver disease occurs in 15-25% of chronically infected people.[1,9] The prevalence of HBV infection in Ireland is low (<1%)[10], however infection is more prevalent in certain high-risk populations such as IDUs[11,12], prisoners[13] and immigrants from high endemicity countries.

Hepatitis B is a vaccine-preventable disease and in 1992 the WHO recommended that hepatitis B vaccine be included in routine immunisation programmes in all countries by 1997.[9] In Ireland, vaccination is currently recommended for individuals in high risk groups such as babies born to mothers with acute or chronic hepatitis B infections, patients with chronic renal failure or haemophilia, individuals at occupational risk, close contacts of infected persons, IDUs, prisoners, homeless people, heterosexuals with multiple partners and MSM.[3]

Materials and Methods

Hepatitis B is a notifiable disease under the Infectious Diseases Regulations 1981. An amendment to the regulations implemented on 1st January 2004 (S.I. 707 of 2003) introduced case definitions and differentiated between notifications of acute hepatitis B and chronic hepatitis B for the first time (Box 2). In addition, laboratory directors are now required to report cases of notifiable diseases identified in their laboratories.

Results

The increase in hepatitis B notifications seen in recent years continued in 2004, with 797 cases notified. This represents a 46% increase compared to 2003 (figure 4). The national age-standardised notification rate was 20 per 100,000 population, with the highest rates reported by the ERHA (ASIR: 33/100,000 population) (figure 5). Case classification was reported for 582 cases, with 569 cases reported as confirmed and 13 cases reported as probable.

Seventy-seven percent of notifications (n=611) contained information on acute/chronic status. Where status was known, 91% of cases were reported as chronic (n=553) and 9% were reported as acute (n=58).

The age and sex breakdown for acute and chronic cases differed substantially and is presented separately in figures 6a and 6b. Seventy-six percent of acute cases notified in 2004 were male (n=44), 22% were female and the sex of one case was unknown. The majority of cases (67%) were aged between 20 and 44 years. However, there were six acute hepatitis B notifications for males over the age of 65 years. In contrast to the acute cases, the percentage of male (54%) and female (46%) chronic cases was similar. Eighty-four percent of chronic cases were aged between 20 and 44 years.

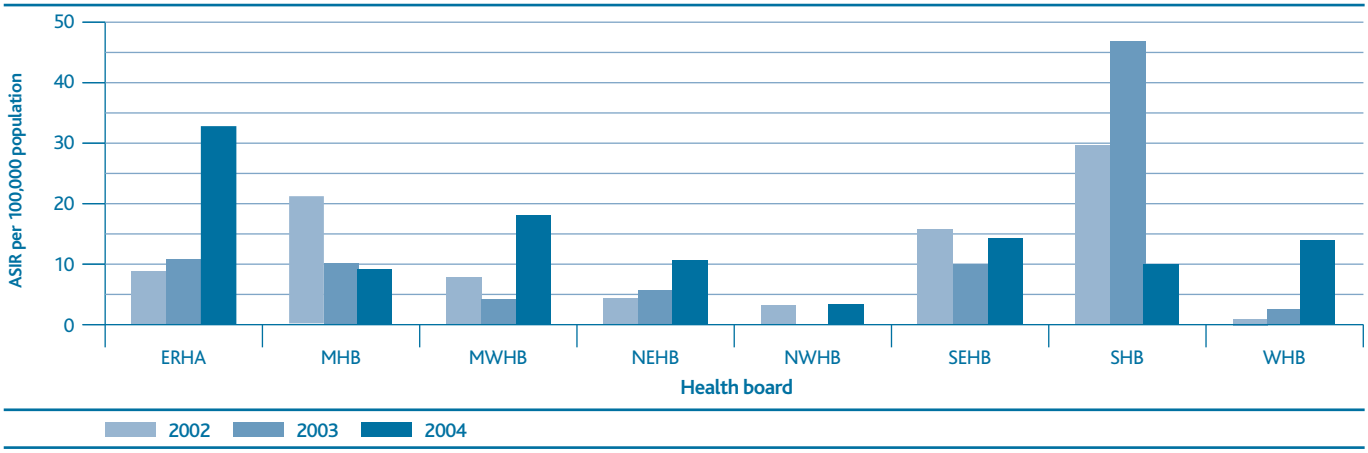

Figure 5. Age-standardised incidence rates of hepatitis B per 100,000 population by health board, 2002-2004

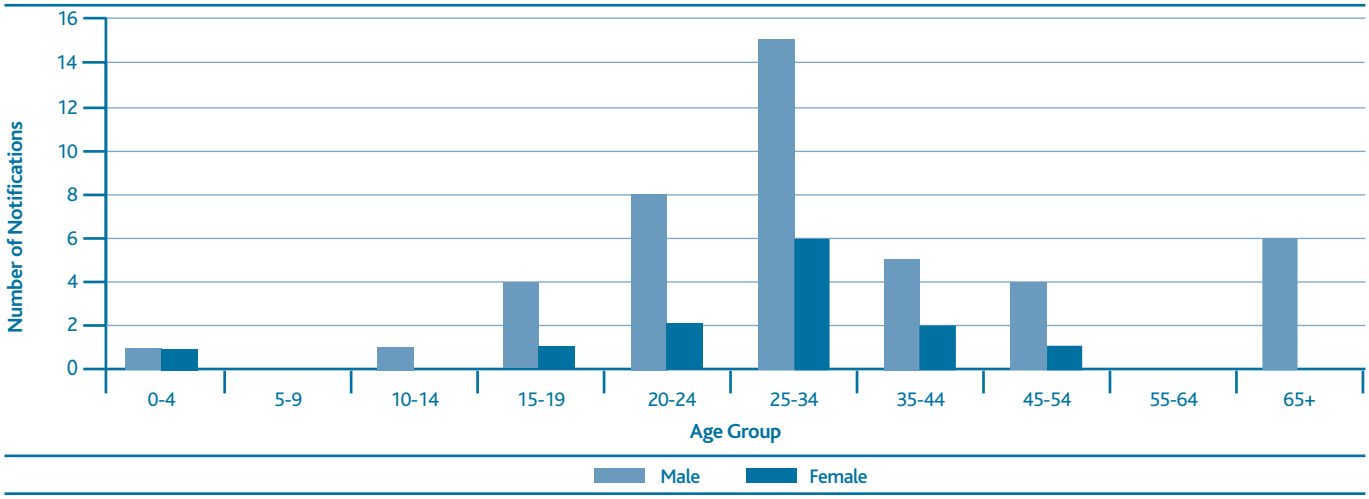

Figure 6a. Number of acute cases of hepatitis B notified in 2004 by age and sex

Risk factor information and region of birth also differed significantly between acute and chronic cases. Risk factor information was available for 30 of the 58 acute cases and the main risk factor for acute cases in Ireland in 2004 was sexual exposure. Where risk information was provided, 43% (n=13) of cases were MSM and a further 17% (n=5) were associated with possible sexual exposure. Other risk factors reported include household contact (n=2), injecting drug use (n=2), travel/living abroad (n=2) and being a baby of a hepatitis B surface antigen-positive mother (n=2). Of the six acute cases over the age of 65, one had multiple risk factors including sexual exposure but no risk factors were identified for the other five cases. Where region of birth was known for acute cases (n=25), 88% were born in Ireland.

Limited risk information was available for chronic cases, but where information was available, 120 out of 128 cases were identified as either asylum seekers or as having been born in a country where hepatitis B is endemic. Where region of birth was identified (n=48), 56% of chronic cases were born in Sub-Saharan Africa, 19% were born in Eastern Europe, 8.3% were born in East Asia and the Pacific and 6.3% were born in South and South-East Asia. Only 4.2% of chronic cases, where region of birth was known, were born in Western Europe. Where the reason for testing was reported (n=97), 80% (n=80) of chronic cases were identified through asylum seeker screening and 8% (n=8) were identified through antenatal screening.

Discussion

Hepatitis B data have improved significantly with the introduction of case definitions, laboratory reporting and differentiation between acute and chronic hepatitis B. Some enhanced surveillance data were also received for over 50% of acute cases and over 20% of chronic cases. These data clearly illustrate the differences in the epidemiology of acute and chronic hepatitis B in Ireland.

Although Ireland is considered a low endemicity country, hepatitis B notifications have increased substantially in recent years. This is partly due to changes in immigration patterns to Ireland. The number of asylum seeker applications increased from 1,179 in 1996 to a peak of 11,634 in 2002, and decreased to 4,766 in 2004. Large numbers of work permits have also been issued in recent years.[14] Many of these immigrants come from countries of intermediate- or high-endemicity for hepatitis B. It is also likely that case identification and notification have improved with the introduction of laboratory reporting and screening programmes such as voluntary health screening for asylum seekers and some antenatal screening in maternity hospitals. Where the reason for testing was reported, the majority of chronic cases were identified through asylum seeker screening.

Limited information is available on the actual risk factors for cases with chronic infections but it is likely that a large proportion of infections were acquired at birth or in early childhood where individuals were born in countries where hepatitis B is endemic. A large proportion of acute cases were in the 20-34 year age group and where risk exposure

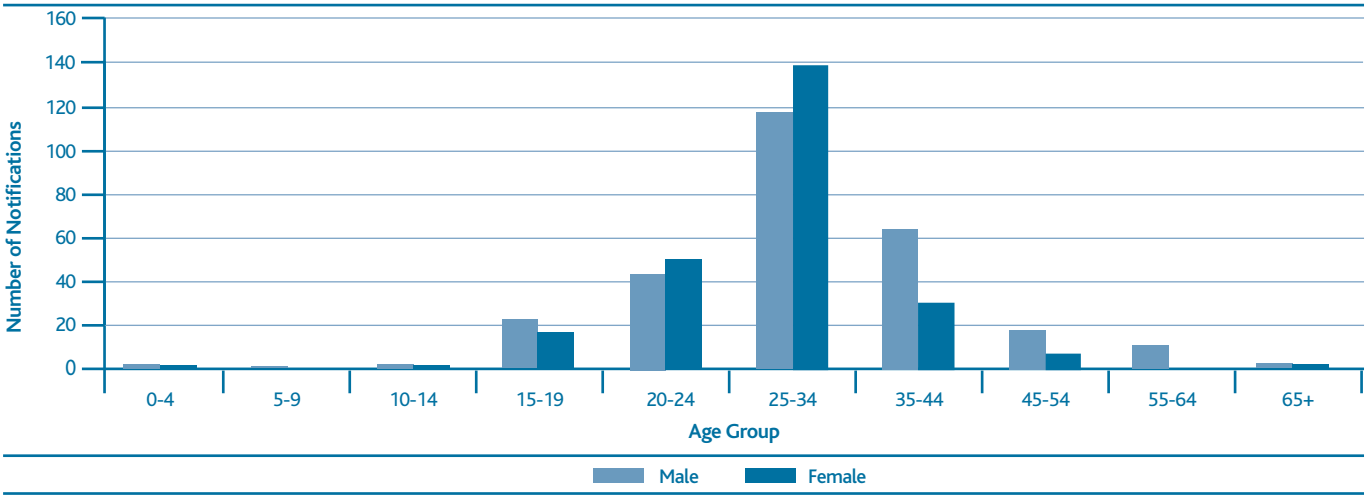

Figure 6b. Number of chronic cases of hepatitis B notified in 2004 by age and sex

information was known, most infection's had been acquired sexually.

Good quality surveillance data are essential in order to follow trends, inform vaccination policy and plan public health initiatives and service provision for the prevention and control of hepatitis B. Given the serious nature of HBV infection, particularly when acquired in infancy, and the potential for prevention with a safe and effective vaccine, the planned introduction in 2005 of a programme of universal antenatal screening is to be welcomed.

Viral Hepatitis-Type C

Introduction

The hepatitis C virus (HCV) was first identified in 1989. Prior to this, hepatitis C was usually labelled non-A non-B hepatitis. HCV is transmitted primarily via exposure to contaminated blood or blood products. The main causes of infection are sharing infected needles or other drug paraphernalia, and the receipt of unscreened blood or blood products. Occupational exposure to infected blood and mother-to-baby and sexual transmission also occur but are less common. In developed countries, it is estimated that 90% of people with chronic hepatitis C are current or former injecting drug users or have received unscreened blood or blood products. The WHO estimates that about 170 million people worldwide are infected with hepatitis C, with prevalence ranging from 1% in Europe to 4.6% in the Eastern Mediterranean and 5.3% in Africa. [1,15]

Over 90% of cases are asymptomatic in the acute phase of the disease but between 50 and 80% progress to chronic infection. Of those chronically infected about 10-20% develop cirrhosis and between 1 and 5% develop hepatocellular carcinoma over a period of 20-30 years. There is currently no vaccine available for hepatitis C. [1,15]

Materials and Methods

Hepatitis C became a notifiable disease under the Infectious Diseases Regulations amendment introduced on the 1 January 2004 (S.I. 707 of 2003). Previously hepatitis C could be notified under the category "viral hepatitis, type unspecified", but was not a notifiable disease in its own right. Since the HPSC started collecting disaggregate data in mid-2000, many of the notifications of viral hepatitis type unspecified have included information on the causative agent and most of these were hepatitis C. The case definitions for hepatitis C can be seen in Box 3.

Results

2004 was the first year that hepatitis C was notifiable in Ireland and 1,154 cases were notified, compared to 85 cases of viral hepatitis, type unspecified in 2003 (figure 7). This corresponds to an ASIR of 29/100,000 population. Over 80% (82.7%) of cases were notified by the ERHA, corresponding to an ASIR of 62/100,000 population (figure 8). There was a large disparity between the sexes: 61% of cases were male (n=706), 37% were female (n=426) and sex was reported as unknown for 2% (n=22). Young adults were most affected, with over 83% of male cases (n=586) and over 80% of female cases (n=355) aged between 20 and 44 years. The age and sex-specific incidence rates can be seen in figure 9.

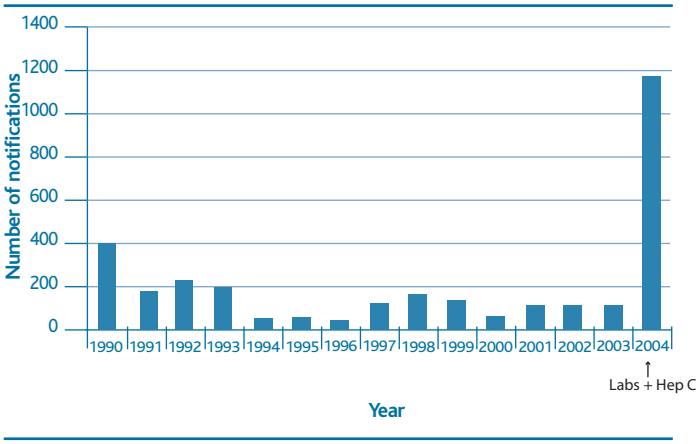

Figure 7. Number of notifications of hepatitis (type unspecified) 1990-2003, and number of notifications of hepatitis C in 2004

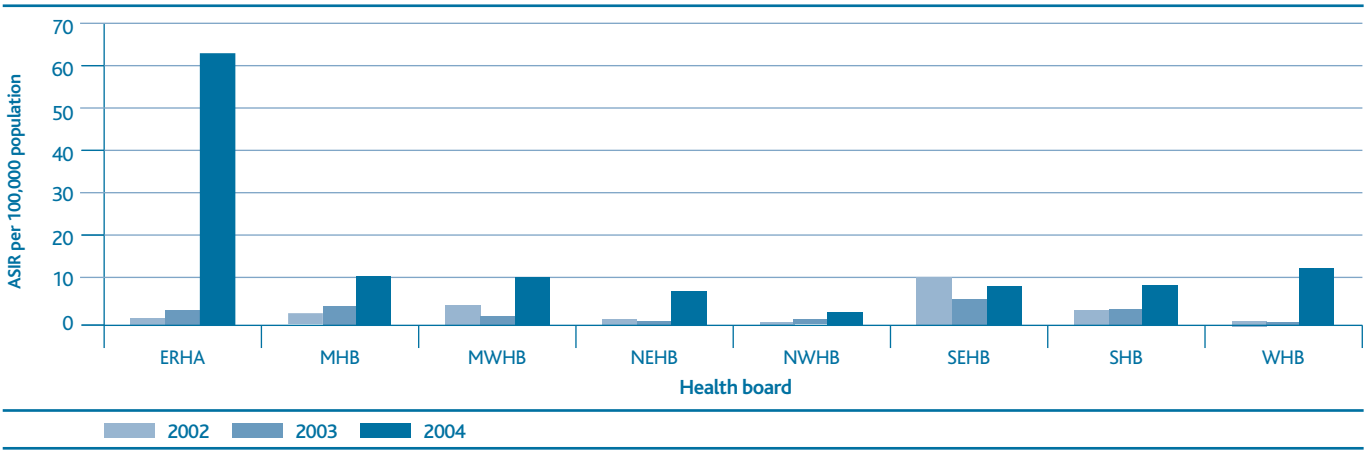

Figure 8. Age-standardised incidence rates of hepatitis type unspecified per 100,000 population 2002-2003, and hepatitis C per 100,000 population 2004, by health board

Discussion

Prior to 2004, there was very little routine information available to describe the epidemiology of hepatitis C in Ireland. The 2004 data indicate that the incidence of hepatitis C is higher than that of hepatitis B (29.5 compared to 20/100,000 population) and that the geographic distribution is skewed towards the ERHA. There is currently no enhanced surveillance system for hepatitis C in Ireland. However, previous studies in Irish settings indicate that the hepatitis C epidemic in Ireland is mainly occurring in injecting drug users and is strongly associated with sharing syringes or other drug paraphernalia.[11,12,13] A cross-sectional study of blood-borne infections in clients attending addiction treatment centres in the ERHA, found that 66% had antibodies to the hepatitis C virus, and a national study of individuals entering prisons found that 72% of injecting drug users had antibodies to the hepatitis C virus.[12,13] Enhanced surveillance is essential for the identification of risk factors and for planning public health strategies for hepatitis C prevention and future health service provision.

National Hepatitis C Database

A national database of people infected with hepatitis C through the administration of blood or blood products has been set up by HPSC in association with the eight designated hepatology units. This project was recommended by the Consultative Council on Hepatitis C[16] and is supported financially by the Department of Health and Children.

The objectives of the database are:

1. To follow the natural history of infection in this group of people
2. To evaluate the impact of various host factors on the progression of the disease
3. To evaluate the outcomes of treatment
4. To monitor the uptake of services
5. To provide information for the planning and evaluation of health services.
6. To serve as a resource for future research into hepatitis C

Any person who has contracted hepatitis C infection through the administration of blood or blood products within the State is eligible to be included in the database. It is estimated that about 1,600 persons have been infected with hepatitis C in this way. These include women infected through anti-D immune globulin, persons with haemophilia, recipients of blood transfusion and persons who received treatment for renal disease.

Data collection commenced at the end of 2004 and is based on data contained in the medical records of patients who have attended any of the eight designated hepatology units. It is estimated that baseline data collection will take 9 to 12 months to complete. Follow-up information will be collected annually thereafter. Only patients who have given written consent are included in the database. The database does not contain names or addresses. Ethical approval for the database has been received from the ethics committees of the eight hospitals. Patient support groups are represented on the Steering Committee, which oversees the project.
An annual report will be prepared. There will be an annual call for research based on the data contained in the database. This process will be overseen by the Steering Committee.

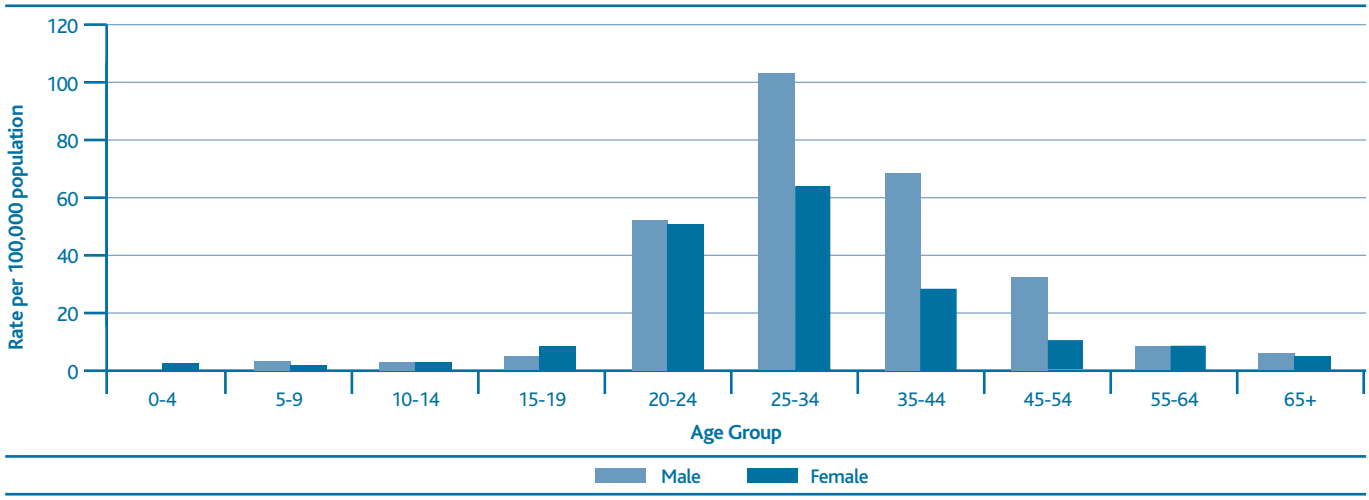

Figure 9. Age- and sex-specific incidence rates of hepatitis C per 100,000 population, 2004

Acknowledgments

HPSC would like to thank staff in the Departments of Public Health and all the laboratories and clinicians who provided data. Special thanks are also due to the staff in the hepatology units for all their work for the hepatitis C database. In particular, we would like to thank the NVRL, with whom we are working closely in order to more fully describe the epidemiology of hepatitis C in Ireland.

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Box 1. Case definition for Hepatitis A[17]

Hepatitis A (acute)
Clinical description
In symptomatic cases, clinical picture compatible with hepatitis, i.e. discrete onset of symptoms and/ or jaundice or elevated serum aminotransferase levels. Asymptomatic cases are common.

Laboratory criteria for diagnosis
One of the following:
IgM-class to hepatitis A virus (anti-HAV) positive
Detection of antigen in stool
Detection of nucleic acid in serum

Case classification

Possible:	A case that meets the clinical case definition but has no epidemiological link
Probable:	A case that meets the clinical case definition and has an epidemiological link
Confirmed:	A case that meets the clinical case definition and is laboratory confirmed

Box 2. Case definition for Hepatitis B[17]

Hepatitis B (acute and chronic)
Clinical description
In symptomatic cases, clinical picture compatible with hepatitis, i.e. discrete onset of symptoms and/ or jaundice or elevated serum aminotransferase levels. Asymptomatic cases are common.

Hepatitis B (acute)
Laboratory criteria for diagnosis
One of the following:
IgM antibody to hepatitis B core antigen (anti-HBc) positive
Detection of hepatitis B virus (HBV) nucleic acid in serum

Case classification

Possible:	N/A
Probable:	A symptomatic case that is HBsAg positive and has a clinical picture compatible with an acute hepatitis
Confirmed:	A case that is laboratory confirmed

Hepatitis B (chronic)
Laboratory criteria for diagnosis
One of the following:
Hepatitis B surface antigen (HBsAg) positive and antibody to hepatitis B core antigen (anti-HBc) positive and IGM antibody to hepatitis B core antigen negative
Persistence for more than 6 months of either HBsAg or HBV nucleic acid in serum

Case classification

Possible:	N/A
Probable:	N/A
Confirmed:	A case that is laboratory confirmed

Box 3. Case definition for Hepatitis C[17]

Hepatitis C
Clinical description
In symptomatic cases, clinical picture compatible with hepatitis, i.e. discrete onset of symptoms and/ or jaundice or elevated serum aminotransferase levels. Asymptomatic cases are common.

Laboratory criteria for diagnosis
One of the following:
Detection of hepatitis C virus (HCV) specific antibodies
Detection of HCV nucleic acid from clinical samples

Case classification

Possible:	N/A
Probable:	N/A
Confirmed:	A case that is laboratory confirmed.

Meningococcal Disease in Ireland, 2004

Key Points

- **Meningococcal disease became a notifiable disease in its own right on 1st January 2004**
- **Incidence of meningococcal disease declined in 2004 compared with previous years**
- **In 2004, 199 cases of meningococcal disease were notified**
- **Only five serogroup C cases occurred in 2004, which was identical to 2003. This was a 96% reduction compared with pre MenC vaccine era**
- **There were 10 meningococcal disease related deaths in 2004**

Introduction

In the late 1990s, Ireland had one of the highest incidence rates of meningococcal disease in Europe with >14 cases per 100,000 total population being notified per annum. This was equivalent to over 500 cases per year. Approximately 80% of these cases were laboratory confirmed. Serogroup C disease accounted for 30% of laboratory confirmed cases, with infants, children under five years of age and young adults mostly affected. In October 2000, the MenC conjugate vaccine was introduced in Ireland to the infant schedule at 2, 4 and 6 months. A catch-up campaign targeting those under 23 years of age was also run at the time. Since then the incidence of serogroup C disease had substantially declined in Ireland, with very few cases now occurring each year. The overall incidence of meningococcal disease has also been on the decline in recent years, from the high of 14.8 cases per 100,000 in 1999, to 8.4 cases per 100,000 in 2001, to 6.1 cases per 100,000 in 2003.

Materials & Methods

Meningococcal disease became a notifiable disease in its own right on the 1st January 2004 with the implementation of the Infectious Disease (Amendment) (No. 3) Regulations 2003 (SI No. 707 of 2003).[1] Prior to this, it was notifiable under the category bacterial meningitis (including meningococcal septicaemia). Most forms of bacterial meningitis are now notifiable under the specific disease pathogen name as listed in the legislation. For bacterial meningitis pathogens not listed, these forms of meningitis are notifiable under the disease bacterial meningitis (not otherwise specified).
The case definitions used are described in the NDSC Case Definitions for Notifiable Diseases booklet.[2]

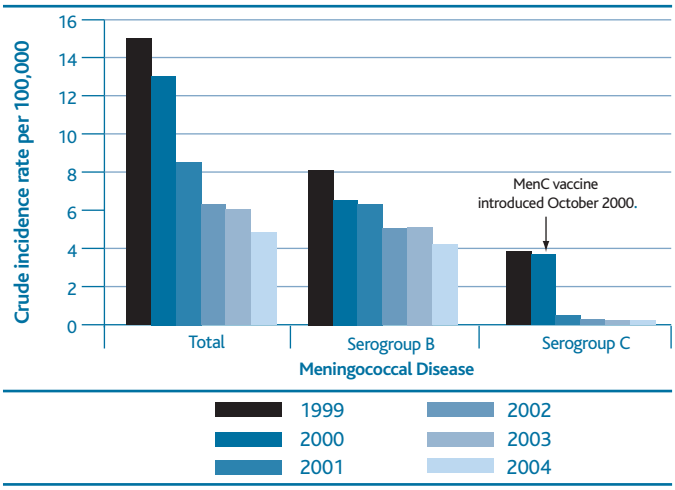

Figure 1. Crude incidence rate of meningococcal disease in Ireland, 1999-2004

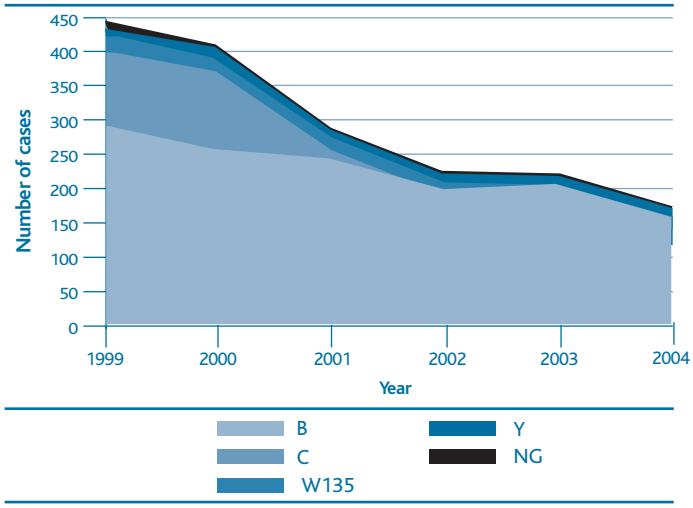

Figure 2. Meningococcal disease notifications by seogroup, 1999-2004

An enhanced surveillance system has been in operation in Ireland since 1997 for bacterial meningitis, which also includes meningococcal septicaemia. Cases are notified daily to HPSC since 1999. When a clinician or diagnostic laboratory reports any case of meningococcal disease/bacterial meningitis, the medical officer notified of the case completes part one of the enhanced surveillance form on the day of notification. This form is then faxed to local Department of Public Health and to HPSC. Part two of the form is completed once final laboratory and epidemiological data becomes available.

At HPSC, meningococcal disease notifications in 2004 were entered on an MS Access database. The Irish Meningococcal and Meningitis Reference Laboratory (IMMRL) maintains an active national surveillance system for laboratory confirmed cases of meningococcal disease. Throughout 2004, the HPSC meningococcal disease database was reconciled monthly with the IMMRL database and a few times a year with the Departments of Public Health databases.

In February 2005, HPSC commenced using the Computerised Infectious Disease Reporting (CIDR) system for handling the majority of the notifiable infectious disease notifications, which included meningococcal disease. At this time meningococcal disease notifications since 1999 (including all the enhanced information available) held at HPSC were migrated from the MS Access system to CIDR. Final data cleaning and validation checks on the 2004 notifications were performed in conjunction with the Departments of Public Health and IMMRL following year-end. Any updates to these data were made directly to the events on the CIDR system.

For the purposes of this report, data analysis was performed using both Business Object Reporting in CIDR and MS Excel. Incidence rates were calculated using population data taken from 2002 Census of Population as the denominator.
The direct method of age standardisation was used to control for the confounding effect of age so that incidence rates between health boards can be compared. The Irish population was used as the standard population.

Results

Total meningococcal disease notifications

In 2004, 199 cases of meningococcal disease were notified in Ireland (5.1/100,000 total population). This was a 16% decrease from 2003 when 237 cases were notified (6.1/100,000) (figure 1). The incidence of meningococcal disease in Ireland has steadily declined since 1999, when it was almost treble the incidence rate it is now (figure 1). One hundred and seventy one (86%) of the meningococcal disease notifications were classified as definite, three as presumed and 25 as possible. Eighty eight percent of these notifications (175/199) were laboratory confirmed. Detection of *N. meningitidis* in normally sterile sites by PCR alone was the technique most commonly used in the diagnosis of the laboratory confirmed cases (59%, 103/175 cases). This was followed by culture and PCR (n=63) and culture alone (n=5). For three cases that were laboratory confirmed, *N. meningitidis* was cultured from non-sterile sites while for another case confirmation was based on microscopy results.

Meningococcal disease by age and gender

As in previous years, the incidence of meningococcal disease

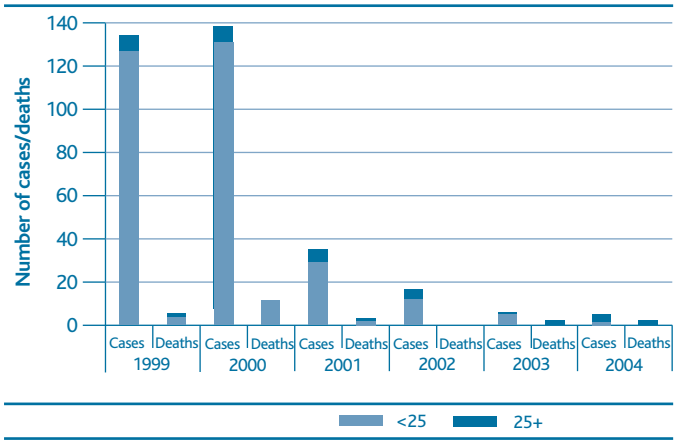

Figure 3. Serogroup C cases and deaths in under and over 25 year olds, 1999-2004

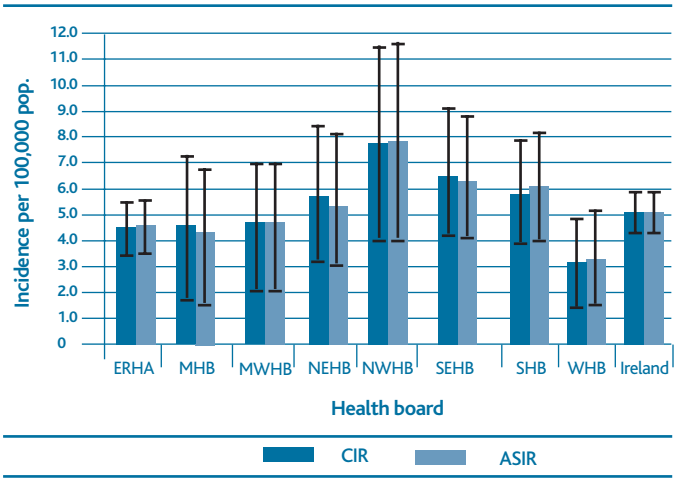

Figure 4. Age standardised and crude incidence rates with 95% confidence intervals by health board for meningococcal disease in 2004.

in 2004 remained highest in infants and young children. The age specific incidence rate was 90 per 100,000 in infants <1 year of age, 36 per 100,000 in children aged 1-4 years, followed by incidences of 6.7 and 6.1 per 100,000 for the 15-19 and 5-9 year old age groups, respectively. The male:female ratio for meningococcal disease was 1.05:1.0.

Meningococcal disease by serogroup

The incidence of both serogroup B and serogroup C disease has been on the decline. In 2004, 163 serogroup B cases (4.2/100,000) were notified, compared to 206 cases (5.3/100,000) in 2003 (figure 1). Serogroup B now accounts for 82% of the meningococcal disease notifications, while serogroup C accounts for just 3% of these (figure 2). Serogroup C disease therefore continued to remain low in 2004, with just five cases notified (0.1/100,000). This was identical to the number notified in 2003. The age range of the five cases in 2004 was 16-80 years. Two of these cases were in the age group eligable for MenC vaccination but were unvaccinated. The remaining three cases were in older adults and therefore would not have received the MenC vaccine. The pronounced decline in serogroup C cases was seen soon after the MenC conjugate vaccine was introduced in Ireland in October 2000 and this decline has continued over the last four-year period (figure 2 and figure 3). The incidence of serogroup C meningococcal disease declined by 96% in 2004 when compared with that in 2000.

The incidence of non-B/non-C serogroups of *Neisseria meningitidis* has not changed in recent years and their incidence remains low (figure 2). Therefore, in 2004, in addition to the 163 serogroup B and five serogroup C cases notified there were two serogroup Y, one serogroup W135 and one non-groupable case. No organism was detected for the remaining 27 cases of meningococcal disease.

Meningococcal disease by Health Board

Following direct age standardisation of the meningococcal disease data to control for the confounding effect of age across health boards the highest incidence rate occurred in NWHB (7.7/100,000; 95% CI 4.0-11.4/100,000) while the lowest rate was in WHB (3.2/100,000; 95% CI 1.4-5.1/100,000). However, none of these rates were regarded as significantly different from the national rate (5.1/100,000; 95% CI 4.4-5.8 /100,000) since their confidence intervals overlapped. The crude incidence rates and age standardised incidence rates by health board are presented in figure 4.

Meningococcal disease deaths

There were 10 meningococcal disease deaths in 2004, which is a case fatality rate (CFR) of 5%. Seven were due to serogroup B, one serogroup C and no organism was detected for the two remaining deaths, both of these were classified as possible meningococcal disease cases. The serogroup B deaths were all in children under five years of age, while the serogroup C related death was in an elderly adult. In 2003, there were 12 meningococcal disease deaths, 11 due to serogroup B and one to serogroup C. There have been no serogroup C deaths in those <25 years of age since 2001, when two deaths occurred. In 2000, there were 11 serogroup C related deaths in this age group (figure 3).

Imported cases of meningococcal disease

Four cases of meningococcal disease were imported in 2004, three serogroup B (ERHA, SEHB, WHB) and one serogroup Y (MWHB). All imported cases were in individuals aged <20 years. The cases were imported from Portugal, Latvia, Spain and England. There were no deaths amongst these cases. For

the purposes of this report imported cases have been included at all stages of the analysis.

Other forms of bacterial meningitis

Meningococcal disease accounts for the vast majority of bacterial meningitis cases notified in Ireland. However, other forms do occur and in 2004 the breakdown was as follows: 37 cases of bacterial meningitis (not otherwise specified), 22 cases of *Streptococcus pneumoniae* meningitis, six TB meningitis (provisional figure), four *Haemophilus influenzae* type b (Hib) meningitis and one case of meningitis due to *Listeria monocytogenes*. There are separate chapters in this report that cover invasive *H. influenzae* disease, invasive *Streptococcus pneumoniae* infection and tuberculosis in more detail.

Regarding the 37 bacterial meningitis (not otherwise specified) cases, notified in 2004, eight were classified as confirmed (6 group B streptococci, 1 *Escherichia co*li and 1 *Pseudomonas aeruginosa*), six as probable and 23 as possible. There was one death reported due to bacterial meningitis (not otherwise specified) in 2004, this was the confirmed *E. coli* case.

Discussion

Although meningococcal disease continues to be the most common form of bacterial meningitis notified in Ireland, the incidence of this disease has been declining in recent years. It has fallen from over 14 cases per 100,000 total population in 1999 to 5 per 100,000 in 2004. The introduction of the MenC conjugate vaccine in October 2000 had a major impact in this decline. Serogroup C disease now only accounts for 3% of the notifications compared to 30% in 1999 and morbidity and mortality due to this form of the disease have declined substantially. The epidemiology of non-B/non-C serogroups of meningococcal disease has not changed over this period and their incidence continues to be low. The incidence of serogroup B disease has also been on the decline over the last number of years, suggesting that Ireland is emerging from the hyper-endemic period experienced at the end of the last decade. Serogroup B disease is now by far the most predominant serogroup occurring and accounts for 93% of the laboratory confirmed cases. The highest incidence rates are occurring in young children. In 2004, 69% of all serogroup B cases occurred in children <5 years of age, while all (100%, n=7) of serogroup B related deaths occurred in this age group. Despite a decline in the incidence of serogroup B disease, the burden of illness due to this serogroup is still substantial in Ireland. The development of a suitable and effective MenB vaccine targeting a broad spectrum of serosubtypes would be very much welcomed.

Acknowledgements

HPSC wish to thank all those who have contributed to the data presented in this report, including the Medical Officers, Specialists in Public Health Medicine and Surveillance Scientists in Public Health, Consultant Microbiologists and Medical Scientists in the laboratories and the staff of the Irish Meningococcal and Meningitis Reference Laboratory.

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

Salmonella in Ireland, 2004

Key Points

- **In 2004, the incidence rate of human salmonellosis decreased (10.6/10^5) compared to 2003 (11.5/10^5)(from analysis of the clinical notification data)**
- **The highest rate was observed in children under 5 years of age**
- **After *S.* Enteritidis (n=172) and *S.* Typhimurium (n=125), the next most common serotypes were *S.* Bredeney (n=11), and *S.* Virchow (n=10)**
- **18% of cases were reported to be associated with travel outside of Ireland in 2004**

Background

Salmonella is a ubiquitous gram-negative bacteria that is a common cause of foodborne illness in Ireland and worldwide. At present, over 2,460 serotypes of *Salmonella* have been identified. Two serotypes, however, *S. enterica* serotype Enteritidis and *S. enterica* serotype Typhimurium have accounted for the majority of cases of human salmonellosis in recent years.

Salmonellosis presents clinically as an acute enterocolitis, with sudden onset of headache, abdominal pain, diarrhoea, nausea and occasionally vomiting. Fever is almost always present. Dehydration, especially amongst vulnerable populations such as infants, the immunocompromised and the elderly, may be severe. *S.* Typhi and *S.* Paratyphi can cause enteric fever, a severe systemic life threatening condition, but this is very rare in Ireland and mainly travel-associated.

Salmonella is a zoonoses and a wide range of domestic and wild animals, as well as humans can act as the reservoir for this pathogen. Prevention, surveillance and control of *Salmonella* infections is of major public health importance.

Methods

The National Salmonella Reference Laboratory (NSRL) was established in 2000 in the Department of Medical Microbiology, University College Hospital, Galway. This laboratory accepts *S. enterica* isolates from all clinical and food laboratories for serotyping, phage typing and antimicrobial sensitivity testing.

This report reviews data available from the National

Table 1. Analysis of clinical isolates of S. enterica (n=419) referred to NSRL, (2004) by age-group and gender.

Age group (years)	No. of isolates (%)	Male	Female	Unknown
0-4	81 (19)	40	35	6
5-9	30 (7)	11	17	2
10-14	15 (4)	4	11	0
15-19	19 (5)	8	11	0
20-24	42 (10)	19	22	1
25-34	72 (17)	30	37	5
35-44	46 (11)	18	28	0
45-54	39 (9)	17	22	0
55-64	36 (9)	14	21	1
65+	30 (7)	20	10	0
Unknown	9 (2)	5	3	1
Total	419	186	217	16

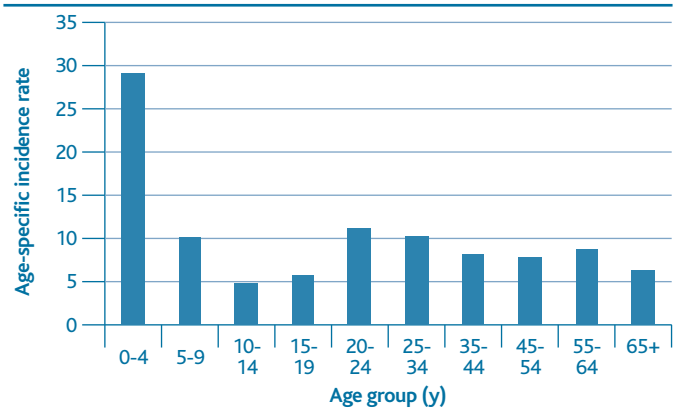

Figure 1. Age-specific incidence rate of human salmonellosis in Ireland, 2004.

Salmonella Reference Laboratory (NSRL) and weekly events of salmonellosis extracted from the CIDR system for the year 2004. These data enable us to provide an overview of the epidemiology and burden of disease caused by *Salmonella* infections in Ireland today.

Results

Demographic information

There were 419 clinical isolates of *S. enterica* referred to NSRL in 2004. The male: female ratio was 1.2:1. The age groups and sex of those affected are shown in Table 1. The highest number of cases was seen in children under five years of age. When age-specific incidence rates were calculated (Figure 1), the burden of illness in this age group was even more evident.

Seasonality

Analysis of the number of salmonellosis events notified to HPSC by week in 2004, revealed a rise in cases in late August/ early September. A seasonal peak is typically seen each year at this time.

Serotyping, phage typing and antibiotic susceptibility results from NSRL

Serotyping

The breakdown of *Salmonella* serotypes by health board is shown in Table 2. It should be noted however that for the NSRL data, health board location refers to the location of the clinical laboratory that the isolate was originally sent to, and may not always correspond with the geographic location of the case.

As has been the trend in recent years, the predominant serotype causing human illness in 2004 was *S.* Enteritidis (n=172), followed by *S.* Typhimurium (n=125).
Table 3 depicts the changing shift in the more common serotypes in the past number of years. In 2004, after *S.* Enteritidis and *S.* Typhimurium, the next most commonly isolated serotypes were *S.* Bredeney (n=11), *S.* Virchow (n=10), *S.* Kottbus (8) and *S.* Kentucky (7). There were just five cases of *S.* Typhi detected, which was a decrease on 2003 when there were nine cases reported.

Phage typing

The predominant phage types of *S.* Typhimurium and *S.* Enteritidis are summarised in Tables 4 and 5. The commonest phage type of *S.* Typhimurium reported in 2004 was DT104 (38%), followed by DT104b (18%). This trend was the reverse seen in 2003 when DT104b was the most commonly detected type.

An interesting trend was noted with *S.* Enteritidis phage typing, with PT1 becoming the predominant phage type of this serovar for the first time since 1998, replacing PT4 as the previously most common phage type detected.

Travel-association

75 out of 419 isolates (18%) reported to NSRL in 2004 were found to be associated with travel outside of Ireland. The most commonly reported countries were Spain (n=26), Greece (n=5), Thailand (n=4), and India (n=3).

Antimicrobial resistance

The antimicrobial susceptibility patterns of the most

Table 2. Serotypes of Salmonella enterica by health board, 2004.

Serotype	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
Adelaide	0	0	0	0	1	1	0	0	2
Agona	0	0	0	0	0	1	0	1	2
Albany	2	0	0	0	0	0	0	0	2
Anatum	0	0	0	1	0	0	0	0	1
Berkeley	0	0	0	0	0	0	1	0	1
Bredeney	10	0	0	0	0	0	0	1	11
Chester	0	0	0	0	0	1	0	1	2
Corvallis	1	0	0	0	0	0	0	0	1
Derby	0	0	0	0	1	1	0	0	2
Dublin	1	0	1	0	1	0	1	0	4
Enteritidis	80	21	4	11	6	15	24	11	172
Goldcoast	0	0	0	0	0	0	1	0	1
Hadar	1	0	0	0	1	1	0	1	4
Haifa	1	0	0	0	0	1	0	0	2
Havana	4	1	0	0	0	0	0	0	5
Heidelberg	1	0	0	0	0	0	0	0	1
Hvittingfoss	1	0	0	0	0	0	0	0	1
Indiana	0	0	0	0	0	1	0	0	1
Infantis	0	0	0	0	0	1	0	0	1
Kentucky	5	0	0	0	1	0	1	0	7
Kottbus	1	4	0	1	0	0	0	2	8
Mbandaka	0	1	0	0	0	0	1	0	2
Montevideo	1	0	0	0	0	0	0	1	2
Muenster	1	0	0	0	0	0	0	0	1
Newport	2	0	1	0	1	0	1	1	6
Othmarschen	1	0	0	0	0	0	0	0	1
Panama	1	0	0	0	1	0	0	0	2
Paratyphi A	1	0	0	0	0	1	1	0	3
Poona	0	0	0	0	0	0	0	1	1
Potsdam	1	0	0	0	0	0	0	0	1
Reading	1	0	0	0	0	0	0	0	1
Richmond	0	0	0	0	1	0	0	0	1
Rissen	0	0	0	0	0	1	0	0	1
Rubislaw	0	0	1	0	0	0	0	0	1
Saintpaul	3	0	0	0	0	0	0	0	3
Senftenberg	1	0	0	0	0	0	0	0	1
Shangani	1	0	0	0	0	0	0	0	1
Stanley	0	0	1	0	0	1	0	1	3
Thompson	0	0	0	0	1	0	2	1	4
Typhi	3	0	0	0	1	0	0	1	5
Typhimurium	27	24	9	12	10	15	23	5	125
Virchow	3	0	1	0	0	5	0	1	10
Weltvreden	0	0	0	1	1	0	1	0	3
Wien	0	0	0	0	0	0	0	1	1
Zanzibar	0	0	0	0	0	0	0	1	1
Unknown	3	0	0	0	1	0	2	1	7
Total	**158**	**51**	**18**	**26**	**28**	**46**	**59**	**32**	**418***
CIR	**11.3**	**22.6**	**5.3**	**7.5**	**12.6**	**10.9**	**10.2**	**8.4**	**10.7**

CIR: Crude incidence rate per 100,000 population

** 1 case of S. Enteritidis was known to be resident in UK*

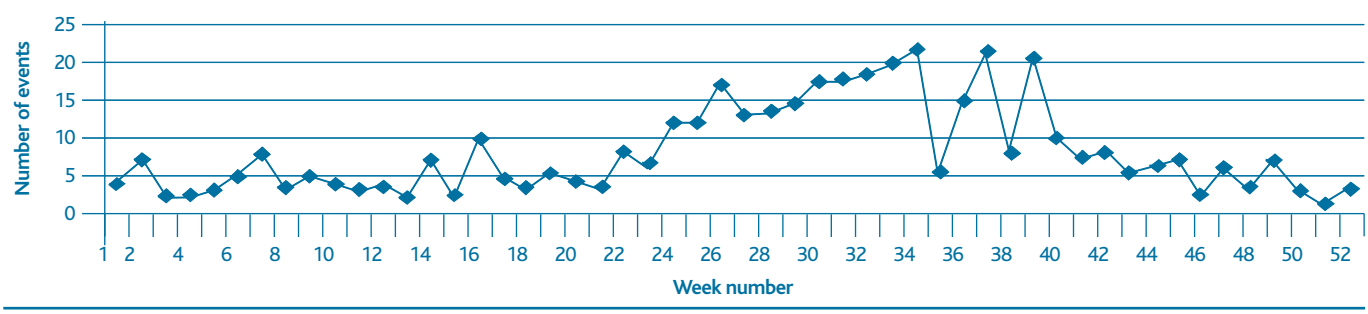

Figure 2. Number of salmonellosis notifications by week, 2004 (data from CIDR).

Table 3. Serotypes of S. enterica referred to NSRL (1998-2004) (%).

Serotype	1998	1999	2000	2001	2002	2003	2004
S. Enteritidis	60 (8)	155 (33)	239 (36)	248 (46)	165 (40)	205 (42)	173(41)
S. Typhimurium	578 (80)	200 (42)	286 (43)	165 (30)	140 (34)	135 (28)	125 (30)
S. Bredeney	15 (2)	55 (12)	24 (4)	11 (2)	2 (0.5)	3 (1)	11 (3)
S. Kentucky	14 (2)	12 (3)	15 (3)	4 (1)	1 (0.2)	10 (2)	7 (1)
All others	54 (7)	52 (11)	101 (15)	115 (21)	108 (26)	133 (27)	103 (25)
Total	**721**	**474**	**665**	**543**	**416**	**486**	**419**

Table 4. Phage types of S. Typhimurium in human isolates (2004)

Phage type	No. of isolates (%)
DT104	48 (38)
DT104b	23 (18)
DT49	10 (8)
DT1	4 (3)
DT104c	4 (3)
DT120	3 (2)
DT193a	3 (2)
DT208	3 (2)
U310	3 (2)
Other	15 (12)
No type	9 (7)
Total	125

Table 5. Phage types of S. Enteritidis in human isolates (2004)

Phage type	No. of isolates (%)
PT1	48 (28)
PT4	43 (25)
PT21	18 (10)
PT6a	11 (6)
PT14b	11 (6)
PT8	10 (6)
PT6	10 (6)
PT24var	4 (2)
PT4b	3 (2)
Other	13 (7)
No type	2 (1)
Total	173

commonly isolated serotypes in 2004 are presented in Table 6. High levels of resistence among *S.*Typhimurium isolates, particularly DT104 isolates, was again noted in 2004.

Clinical notification data

Salmonellosis is a notifiable disease. Medical practitioners have a statutory obligation to report all suspected cases. There were 415 cases notified to HPSC through the weekly notification system in 2004, giving a crude incidence rate of 10.6 per 100,000 population (see figure 3).

Outbreaks

In 2004, there were eight outbreaks of *S. enterica* notified to HPSC; one general, six family outbreaks, and one small cluster was reported as travel-associated. The general outbreak involving ten persons, occurred in a restaurant, and was caused by *S.* Typhimurium DT49. The food implicated epidemiologically in this outbreak was tiramisu dessert.

Discussion

Salmonella enterica continues to be an extremely significant cause of gastroenteritis in Ireland, despite a decrease in the rate of infections due to salmonellosis in 2004 ($10.6/10^5$) compared to 2003 ($11.5/10^5$). The highest incidence was reported in the Midland health board region. Higher rates were seen for the year 2004 in Northern Ireland[1] (26.3), England and Wales[2] (24.0) and Scotland[3] (22.5).

Similar trends regarding the epidemiology of this pathogen were noted in 2004 as in previous years. Males and females were equally affected. All age-groups were seen to be affected but the highest incidence was noted in children less than five years of age. It is likely that more specimens are submitted for testing from this age-group, so this should be borne in mind when interpreting these data.

National roll-out of the CIDR system commenced in 2005 and is continuing on a health board region by region phased approach. Once all regions are 'live' on the system, all data relating to human cases of salmonellosis in Ireland will be stored in the CIDR repository. This will prove invaluable as for the first time, a single dataset of clinical, epidemiological and laboratory data can be analysed for each individual case of illness.

The typing of all human Salmonella cases by the NSRL continues to be an extremely powerful discriminatory tool particularly for cluster/ outbreak detection and especially for the two most common serotypes *S.* Enteritidis and *S.* Typhimurium. NSRL currently employs serotyping, phage typing, antimicrobial sensitivity testing, and pulsed field gel electrophoresis (PFGE) methodologies. Early identification of clusters/ outbreaks of salmonellosis continue to be first detected by the reference laboratory in this way. In addition, rapid typing methods allow NSRL to identify if isolates diagnosed in Ireland are part of a larger, possibly international outbreak, and hence we can alert our international colleagues through the Enter-net network.

In 2004, an increase was noted in the number of cases of illness of salmonellosis reported as being associated with travel outside of Ireland, compared to 2003. It should be noted that undoubtedly the true burden of travel-associated cases is even higher. Every year, an increasing number of

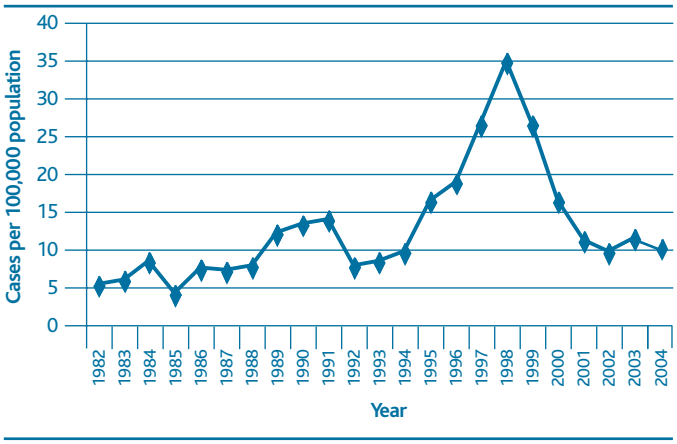

Figure 3. Crude rate of Salmonellosis in Ireland per 100,000 population 1982-2004.

Table 6. Antimicrobial susceptibilities of human Salmonella enterica serotypes isolated in Ireland in 2004.

	% Resistance						
Serotype (Number)	**Amp**	**Chl**	**Strep**	**Sulph**	**Tet**	**Trim**	**Nal**
Enteritidis (173)	10	0.5	2	2	6	2	33
Typhimurium (125)	68	62	64	71	71	10	7
Bredeney (11)	18	0	0	0	0	0	0
Virchow (10)	20	0	10	20	20	20	50
Kentucky (7)	28	0	14	28	28	0	14
Typhi (5)	20	20	20	20	20	20	20
Hadar (4)	25	0	100	0	75	0	50

Amp = Ampicillin, Chl = Chloramphenicol, Strep = Streptomycin, Sulph = Sulphonamide, Tet = Tetracycline, Trim = Trimethoprim, Nal = Naladixic acid

more 'unusual' serotypes are being detected and it is quite probable that many of these are acquired abroad. In addition a significant number of travel-associated typhoid cases are reported each year. It is important that travellers are made aware of the measures that can be taken to reduce the risk of developing food-/ water-borne illness whilst abroad and especially that typhoid vaccination is given when travelling to endemic countries.

Finally, analysis of the 2004 AMR data (antimicrobial resistance) of the various *Salmonella* serotypes again demonstrated high levels of resistance among *S.* Typhimurium isolates, particularly DT104 isolates.[4] A recently published review outlines that during the period 1992-2001, the incidence of MDR (multi-drug resistant) S. Typhimurium and DT104 increased on a continuous basis globally, although the problem affected primarily Europe and North America. The study highlighted that MDR *S.* Typhimurium constitute an increasing public health problem in many parts of the world, not alone Ireland, and emphasised the importance of surveillance and control programs.

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Acknowledgements

We wish to sincerely thank Prof. Martin Cormican and the staff of the National Salmonella Reference Laboratory, UCHG for providing the laboratory data for this report and also the clinical, food and veterinary microbiology laboratories that send isolates to NSRL for analysis. In addition, we would like to thank the Departments of Public Health and Community Care areas for providing the clinical notification data.

European Sero-Epidemiology Network 2 (ESEN 2)

Figure 1. Countries participating in ESEN2: Belgium, Bulgaria, Cyprus, Czech Republic, Finland, Germany, Greece, Hungary, Ireland, Israel (not shown), Italy, Latvia, Lithuania, Luxembourg, Netherlands, Malta, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom

Ireland was one of 22 European Countries participating in the European Sero-Epidemiology Network 2 (ESEN2) (figure 1). This project has now come to a close and the data are being analysed.

The aim of the project was to co-ordinate and harmonise the serological surveillance of immunity to communicable disease across Europe. The ESEN2 network focused on eight vaccine preventable diseases in particular: measles, mumps, rubella, pertussis, diphtheria, varicella zoster, hepatitis A and hepatitis B. By standardising both laboratory and epidemiological methodology, international comparisons can be made to evaluate the effectiveness of different immunisation programmes and to coordinate vaccine policy to ensure adequate levels of immunity exist throughout Europe.

In collaboration with the NDSC and the NVRL, laboratories from six health boards / authorities completed the collection of more than 2000 samples for the ESEN2 study in 2003. Testing of these samples began in 2003 and was completed in 2004. Testing for the measles, mumps, rubella, varicella zoster, hepatitis A and hepatitis B work-packages was carried out at the National Virus Reference Laboratory, Dublin. Testing for the diphtheria and pertussis work-packages was carried out at the Communicable Disease Surveillance Centre, Colindale, London.

Key information on the history and development of vaccination programmes and historic data on disease incidence in the ESEN2 participating countries was collected as part of the project. This information was central to the interpretation of the results generated from this study.

ESEN2 data - used for developing immunisation policy

Valuable information on the level of immunity in the Irish population to these serious preventable diseases has been provided by this project. This information has already proved useful for identifying age groups within the population that are most susceptible to these diseases and is being used to develop immunisation policy in Ireland.

During 2004, a mumps outbreak occurred in Irish colleges, mainly affecting students in their late teens or early twenties. Using the ESEN2 data the mumps outbreak control team were able to identify those age groups most susceptible to mumps infection, and make appropriate recommendations for targeting MMR vaccine towards those most at risk of infection.

These data have also been used to review vaccination policy in the areas of other vaccine preventable diseases such as measles, rubella and hepatitis B.

Additional work is ongoing in HPSC to analyse the sero-immunity to the other diseases (pertussis, diphtheria, varicella zoster, hepatitis A) and review vaccination policy in view of these findings.

HPSC is working with ESEN2 partners (national and international) to prepare this information for publication and dissemination to a wider audience in the near future.

Campylobacteriosis in Ireland, 2004

Key Points

- **Campylobacter remains the commonest cause of gastroenteritis of bacterial aetiology in Ireland**
- **In 2004, there were 1711 cases of campylobacteriosis notified (CIR 43.7/10^5) which is the highest number of cases reported since 1999 (2085 cases)**
- **The highest burden of illness was in children under 5 years of age**
- **In 2004, the highest incidence rate was reported from the Western health board region (63.1/ 10^5)**

Background

Campylobacteriosis is the commonest reported bacterial cause of infectious intestinal disease in Ireland. Two species account for the majority of infections: *C. jejuni* and *C. coli*. Illness is characterised by severe diarrhoea and abdominal pain. Symptoms may subside after a number of days or may persist for weeks. Rarely, more severe sequelae may develop such as reactive arthritis, Reiter's syndrome, or HUS and approximately 1 in every 1000 cases leads to a severe neurological disorder called Guillain-Barré Syndrome (GBS). Undercooked meat especially poultry is often associated with illness, as is unpasteurised milk and untreated water. The majority of infections, however, remain largely unexplained by recognised risk factors for disease.

Methods

Human campylobacter infection became a statutorily notifiable disease for the first time on 1.1.2004 under the Amendment to the Infectious Diseases Regulations.[1] Data for this report were extracted and analysed from the CIDR system.

Results

Incidence

In total, 1711 notifications of human campylobacteriosis were notified in 2004 in Ireland. This gives a crude incidence rate (CIR) of 43.7 cases per 100,000 population (table 1). This compared with a CIR of 39.9 cases per 100,000 in 2003. The annual number of cases by year since 1999 is shown in Figure 1.

Table 1: Number of cases and CIR per 100,000 population of human campylobacteriosis in Ireland by health board, 2004

Health Board	No. of cases	CIR - (incl. 95% C.I.)
ERHA	591	42.2 [38.8 - 45.6]
MHB	134	59.5 [49.4 - 69.6]
MWHB	107	31.5 [25.5 - 37.5]
NEHB	113	32.8 [26.8 - 38.8]
NWHB	92	41.5 [33.0 - 50.0]
SEHB	194	45.8 [39.4 - 52.2]
SHB	240	41.4 [36.2 - 46.6]
WHB	240	63.1 [55.1 - 71.1]
Total	**1711**	**43.7 [41.6 - 45.8]**

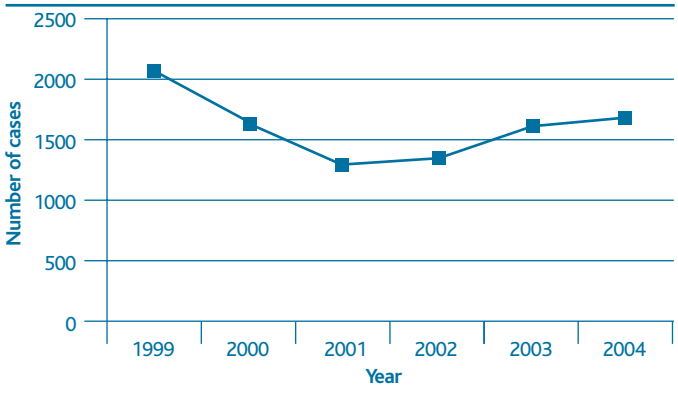

Figure 1. Annual number of cases of campylobacteriosis in Ireland, 1999-2004 (2004 data from CIDR)

Table 2. Gender distribution of campylobacter cases by health board region, 2004.

	Female	Male	Unknown	Total
ERHA	279	311	1	591
MHB	71	63	0	134
MWHB	45	62	0	107
NEHB	42	70	1	113
NWHB	42	49	1	92
SEHB	84	110	0	194
SHB	110	128	2	240
WHB	105	133	2	240
Total	**778**	**926**	**7**	**1711**

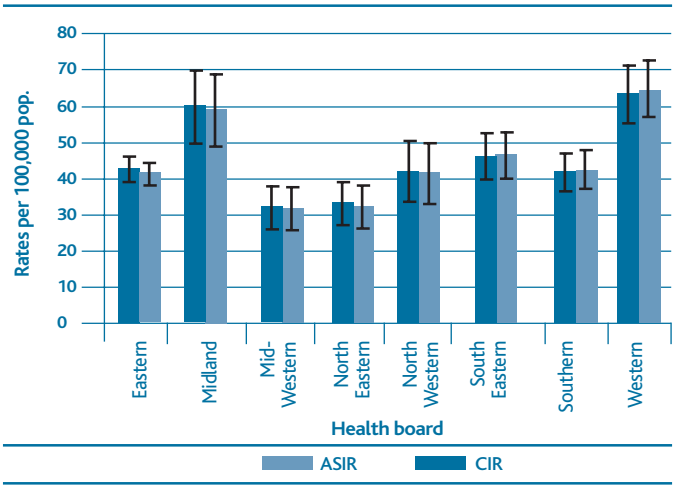

Figure 2: Age standardised incidence rates (ASIR) of human campylobacteriosis in Ireland, compared to crude incidence rates (CIR) in each health board, 2004.

Age standardised rates were calculated to allow comparisons to be made between health board regions without the confounding effects of age (Figure 2). In 2004, the highest incidence was reported from the Western health board region followed by the Midland health board. The lowest rate was reported from the Mid-Western region.

Seasonal distribution

Analysis of the data by week of notification is shown in Figure 3. A peak in cases is evident in week 24 and again in week 38.

Age

When the distribution of cases for each age group is examined, it is evident that by far the highest burden of illness is seen in children less than five years (Figure 4). This was also noted in previous years and is a well-reported feature of the illness worldwide.

Gender distribution

The variance in gender distribution that has been noted since 1999 was again evident from analysis of the data in 2004, with males accounting for 54.1% of cases and females 45.5% (0.5% unknown) (see Table 2). This is clearly evident in figure 5 when the data are adjusted for age and sex. In almost all age-groups there is a predominance of male cases.

Outbreak data

There was one small family outbreak of campylobacteriosis involving two persons notified in 2004. The mode of transmission was suspected to be foodborne.

Discussion

In 2004, human campylobacter infections became statutorily notifiable for the first time under the Amendment to the Infectious Diseases Regulations.[1] Therefore in 2004, the data on campylobacteriosis was collated directly from the notifiable disease data on CIDR and not as part of the Zoonoses Directive data collection (as had been the situation since 1999).

Analysis of the 2004 data reveals that campylobacteriosis still remains the most common cause of bacterial gastroenteric infection in Ireland (with over four times the number of salmonellosis cases reported in 2004).

The crude incidence rate (CIR) of campylobacteriosis increased in Ireland in 2004 (43.7 cases/100,000 persons) compared to 2003 (39.9/100,000). This was in fact the highest rate reported in Ireland since the year 1999. In most regions, an increase was seen in 2004, especially in the NWHB region.

For the same period, a slightly higher rate was noted for Northern Ireland[2] (49.6/100,000), but similar to 2003, much higher rates were observed for England and Wales[3]

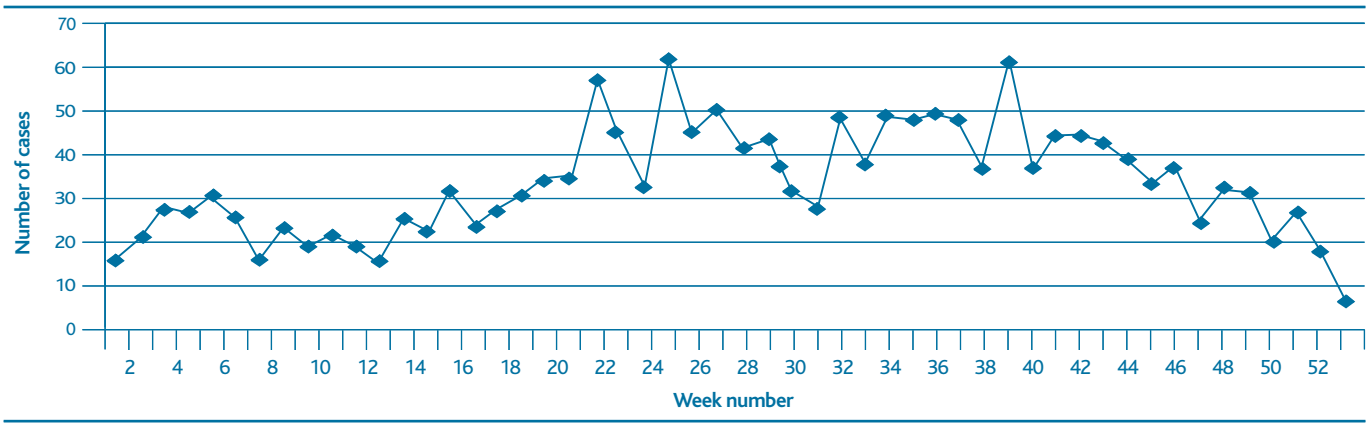

Figure 3: Total cases of campylobacteriosis events by week, 2004 (data from CIDR)

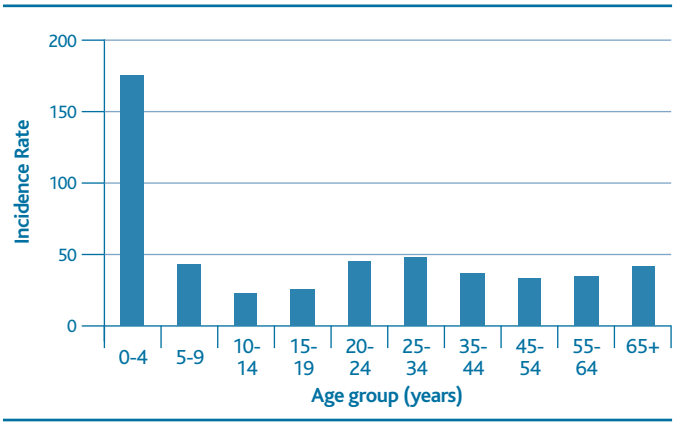

Figure 4: Age specific incidence rates for campylobacteriosis in Ireland, 2004 (data from CIDR)

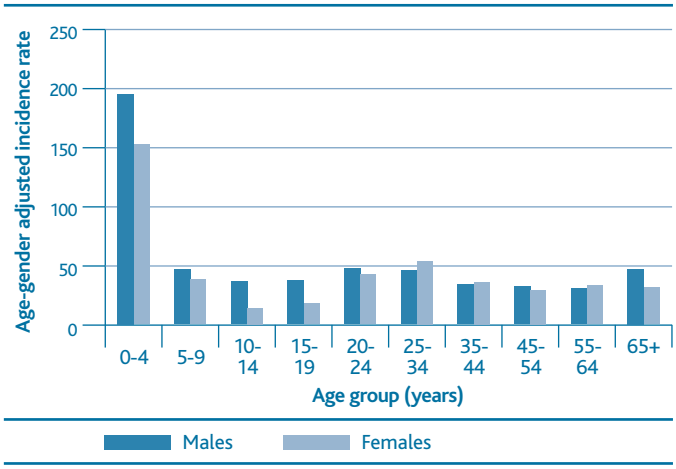

Figure 5: Age-gender adjusted incidence of campylobacteriosis according to age-group in 2004.

(79.5/100,000) and Scotland[4] (86.0/100,000) (*provisional data*).

As has been noted consistently since 1999, some interesting epidemiologic features of this pathogen have emerged in recent years. In particular, the higher incidence rate in young children and the bias towards male cases in almost all age-groups.

To try to address some of these questions, the first Irish case-control study was conducted in 2004 aiming to examine the risk factors that exist for campylobacter infection in the Irish population and help to unravel the aetiology of this disease in Ireland. The study took place on an all-island basis in the ERHA region in the ROI and in all four Health and Social Services Boards (HSSB) in NI. The study was completed in 2005. Preliminary findings from the study reveal that eating chicken, and lettuce, and eating out in restaurants/ takeaways are major risk factors for campylobacteriosis in Ireland, North and South.[5]

An important conference entitled "*Campylobacter* Surveillance and Research in Ireland – The Way Ahead?" was held in UCD in June 2005. This conference and accompanying workshop, involving international experts, was convened to highlight current knowledge gaps and views on the best way forward for research on *Campylobacter* in Ireland. It is hoped that the findings, due to be published shortly, will prioritise future strategies for *Campylobacter* prevention, control and surveillance and help to elucidate some of the complexities of this zoonotic agent.

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The Epidemiology of Verocytotoxigenic *E. coli* O157 in Ireland, 2004

Key points:

- **In 2004, there were 61 confirmed human VTEC infections, a decrease of 36% on the number reported for 2003**
- **Nine VTEC infections (15%) were caused by non-O157 VTEC, including two cases of HUS**
- **As in previous years, the highest number of VTEC cases was reported in late summer**
- **Untreated private wells were believed to be the source of infection in a number of outbreaks in 2004**

Introduction

Verotoxigenic *E. coli* (VTEC) are so-called because of their ability to produce one or both of two verotoxins (VT1 and VT2). They are an important cause of gastroenteric illness in Ireland with between 42 and 88 cases of VTEC O157 reported annually between 1999 and 2004.[1] Their relative significance lies not in their numbers but in the severity of illness they can cause, and in the requirement for prompt public health action to prevent further transmission. They cause a wide range of symptoms, from mild diarrhoea to haemorrhagic colitis with severe abdominal pain and bloody diarrhoea. Illness is usually self-limiting and resolves after about eight days. A proportion of patients however (approx. 9% of symptomatic Irish cases) develop haemolytic uraemic syndrome (HUS), a life-threatening complication.

E. coli O157 was the first *E. coli* serogroup to be associated with this distinctive illness but several other verotoxin-producing *E. coli* serogroups have been reported, including O26, O111, O103 and O145. The primary reservoir is believed to be cattle, although VTEC have been isolated from a variety of healthy animal carriers including sheep, horses, goats and wild birds, and while this organism was first recognized as a foodborne pathogen (the 'burger bug'), it is now known that it can also be transmitted through contaminated water, the environment and by direct contact with animal carriers. Person-to-person spread is an important mode of transmission in households, child-care facilities and institutions.

Table 1. Number and crude incidence rates (CIR) VTEC and VTEC O157 infection, Ireland 1999-2004

Year	No. of VTEC O157 cases	CIR VTEC O157* (95% CI)	No of all VTEC cases‡	CIR VTEC* (95% CI)
1999	51	1.4 (1.0-1.8)	N/A	N/A
2000	37(42)§	0.9 (0.6-1.3)	N/A	N/A
2001	50 (52)§	1.3 (0.9-1.6)	N/A	N/A
2002	68 (70)§	1.7 (1.3-2.2)	N/A	N/A
2003†	88	2.2 (1.8-2.7)	95	2.4 (1.9-2.9)
2004	52	1.3 (1.0-1.7)	61	1.6 (1.2-2.0)

*** Data from 1996 census was used to calculate the rate in 1999 while the 2002 census were used to calculate rates from 2000-2004, rates exclude non-residents.**
† Composite data from 2003 –see methods section.
N/A= Not available
‡ Includes serogroup O157
§ Brackets include non-resident case

Table 2. Number, crude incidence rate (CIR) and age-standardised incidence rat with 95% confidence intervals of confirmed cases of VTEC by health board of res Ireland, 2004

Health Board	No. of cases all VTEC	No. of cases VTEC O157	CIR VTEC (95% CI) per 100,000	ASIR VTE (95% CI) per
ERHA	12	11	0.9 (0.4-1.4)	0.9 (0.4-1.
MHB	2	2	0.9 (-0.3-2.1)	0.9 (-0.4-2
MWHB	6	4	1.8 (0.4-3.2)	1.8 (0.4-3.
NEHB	11	10	3.2 (1.3-5.1)	3.1 (1.3-5.
NWHB	3	2	1.4 (-0.2-2.9)	1.3 (-0.2-2
SEHB	6	5	1.4 (0.3-2.5)	1.4 (0.3-2.
SHB	11	8	1.9 (0.8-3.0)	1.9 (0.8-3.
WHB	10	10	2.6 (1.0-4.2)	2.6 (1.0-4.2
Total	61	52	1.6 (1.2-2.0)	

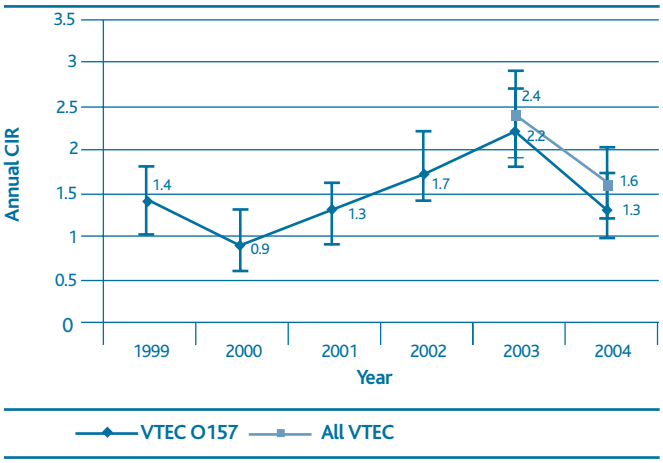

Figure 1. Crude incidence rate with 95% confidence intervals of VTEC infections in Ireland, 1999-2004

Methods

Since 1999 HPSC, in co-operation with Directors of Public Health in each health board region, have operated an epidemiological surveillance system for VTEC O157; the data reported under this system has formed the basis of the HPSC annual reports on *E. coli* O157 for the last 5 years. Details on how this system operates, and the case definition used, have been outlined in previous reports. [1]

In 2004, changes to the infectious disease legislation resulted in all VTEC becoming notifiable (S.I. 707 of 2003), and this annual report is the first that aims to describe disease caused in Ireland by VTEC of all serogroups. Enhanced information was supplied as in the previous years by health board personnel, and in addition, typing data was provided by the HSE-SWA Public Health Laboratory at Cherry Orchard Hospital which offers specialist diagnostic and typing services for VTEC.

Data from the enhanced surveillance system in 2003 was also compared with data from the HSE-SWA PHL database retrospectively. A composite list of cases from 2003 showed that 88 cases of VTEC O157 and 7 cases of VTEC O26 occurred. The data quoted in this report for 2003 has been updated to reflect the combined data.

Results

Sixty-one confirmed cases of VTEC were notified to HPSC during 2004, an incidence rate of 1.6 per 100,000. This compares with 95 cases reported in 2003 (2.4/100,000), a reduction of 36% (Figure 1 and Table 1). Among these 61 cases were 52 cases of VTEC O157 (1.3/100,000), four VTEC O26, two VTEC O111, and one each of VTEC O145, O146 and O Ungroupable.

Regional distribution

Regional variation was noted in the numbers of cases reported (Table 2), with the highest incidence rates this year in the North-Eastern and Western Health Boards, however the number of cases per region is small, and differences unlikely to be significant.

Age-sex distribution

The highest incidence was recorded in young children (Figure 2), which is consistent with previous years. This was particularly pronounced among male cases.

It was also notable that all non-O157 VTEC infections reported were in persons less than 15 years or over 65 years (Figure 3).

Clinical Features

Information on symptoms was available for 56 cases, of whom 47 (84%) were reported as symptomatic. Reported symptoms included: bloody diarrhoea in 25 cases (53%), and HUS in four cases (8.5%). All four cases of HUS occurred in children under 10 years of age. Significantly, two of these HUS cases were caused by non-O157 VTEC.

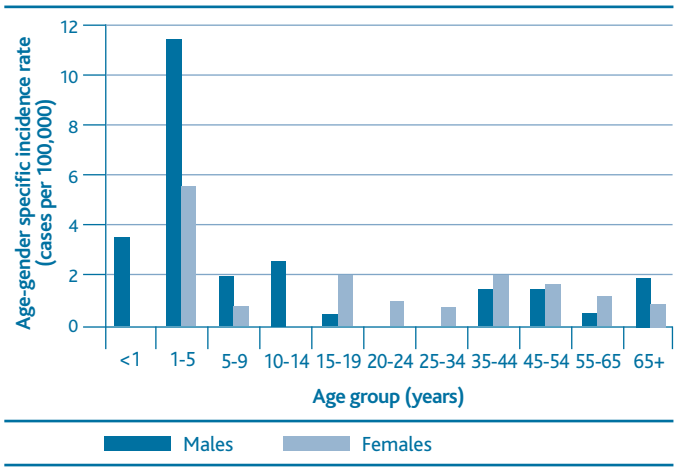

Figure 2. Age-specific incidence rate (per 100,000 population) of confirmed cases of VTEC, Ireland 2004

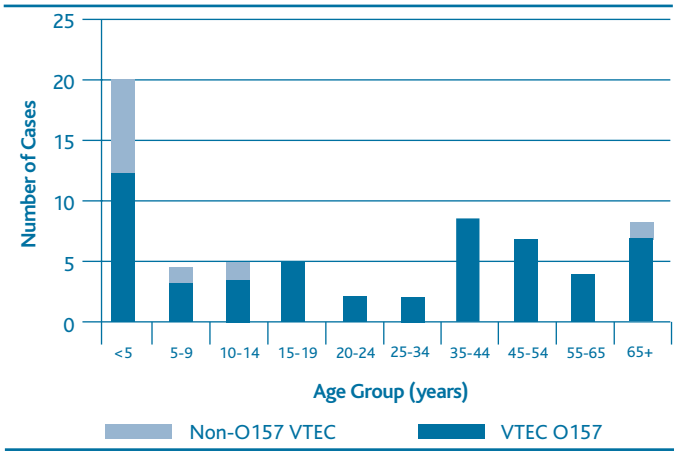

Figure 3.Confirmed cases of VTEC infection stratified by age group, Ireland 2004

Seasonality of VTEC cases

The largest number of cases in 2004 occurred in the third quarter (46%), very similar to the trend observed in previous years (Figure 4), although the peak in the number of cases was not as pronounced. Specifically, all non-O157 cases were reported in quarter 2 and 3.

Travel-association

Seven cases were travel-associated. The countries visited within 14 days of onset of illness were Spain (2), UK (2), Italy (1), Malaysia (1) and Turkey (1), reflecting to some extent the frequency of travel by Irish people to these destinations.

Phage Typing Results

Table 3 shows the phage types of the VTEC O157 strains isolated in 2004. As in previous years, PT32 was the commonest phage type reported, accounting for 58% of the VTEC O157 reported.

Verotoxin profiles of VTEC strains isolated in Ireland 2004

In 2004, 71% of VTEC O157 strains carried the genes for VT2 while a further 25% carried the genes for both VT1 and VT2 (Table 4). In contrast, 56% of non O157 VTEC isolates carried the genes for VT1 only, 11% for VT2 only and 22% VT1 and VT2. It is notable that strains for all HUS cases (both non-O157 and O157) carried the genes for VT2.

Outbreaks

In 2004, eight clusters/outbreaks of two or more cases were reported. Microbiological and /or epidemiological evidence was obtained linking human cases in a number of these outbreaks with water and/or livestock.

The NEHB reported a general cross-health board outbreak of VTEC O157 linked to a sports club. Four confirmed cases were reported, three of whom were admitted to hospital. Drinking water used at the venue, and supplied from an untreated private well, was found positive for the outbreak strain. Epidemiological evidence was also obtained linking infection with water consumption at the venue. In total, 900 people were potentially exposed. During the investigation further non-outbreak VTEC strains were identified in environmental samples, emphasizing the potential public health risk from environmental contamination.

Two additional family clusters in the NEHB were also reported as waterborne. Definitive microbiological evidence was obtained linking water from a private well to 2 confirmed cases in one of these outbreaks.[2] For the second, water from a private well was found positive for *E. coli* and coliforms but no VTEC were isolated.

A third family cluster (WHB) was reported as being transmitted either by water or by animal contact. In this instance, both water from a small group water scheme used by the family, and samples taken subsequently from sheep on the family farm, tested positive for VTEC O157 that were indistinguishable from those isolated from the human cases.

Table 3 Phage Types of VTEC O157 isolates referred to the HSE SWA Public Health Laboratory, Cherry Orchard Hospital in 2004

Phage type	Number (%)
PT32	30 (58%)
PT8	5 (10%)
PT14	5 (10%)
RDNC	3 (6%)
PT21/28	2 (4%)
PT1	1 (2%)
PT31	1 (2%)
PT34	1 (2%)
PT51	1 (2%)
N/K	3 (6%)
Total	52 (100%)

N/K= Not known

Table 4. Verotoxin typing results for the VTEC isolates referred to the HSE SWA Public Health Laboratory, Cherry Orchard Hospital in 2004

	VT1 only	VT2 only	VT1 and VT2	N/K	Total
O157	0	37	13	2	52
O26	2	0	1	0	3
O111	1	0	1	0	2
O145	0	1	0	0	1
O146	1	0	0	0	1
O Ungroupable	1	1	0	0	2

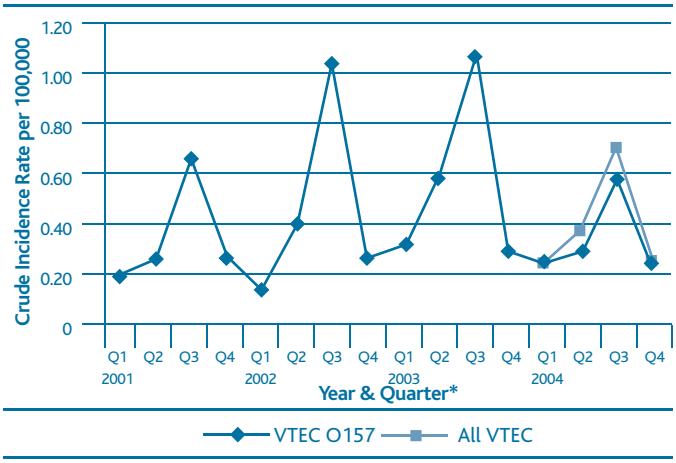

Figure 4. Confirmed VTEC cases by quarter of onset of symptoms, Ireland, 2001-2004
**For asymptomatic cases, the month of onset of associated cases was used. For sporadic cases where date of onset was unknown, date of notification was used*

While the precise route of transmission is unclear, the group water scheme had experienced problems over a protracted period of time, and was observed to be poorly maintained, with the schemes chlorinator non functional and the water source unprotected.

For the 4 remaining family/household clusters, two were suspected to be due to contact with livestock on family farms, one to person-to-person transmission and for the remaining cluster the mode of transmission was reported as unknown.

Discussion

Significant changes were made in 2004 in the reporting of cases of VTEC. Illness caused by enterohaemorrhagic *E. coli* (EHEC) became a notifiable disease on January 1st 2004. For the first time also in this report, typing data from the HSE-SWA PHL has been linked with the epidemiological data from the HPSC providing a composite picture of the epidemiology of VTEC in Ireland. As a result, data reported here is more comprehensive for both O157 and non-O157 infections.

Sixty-one VTEC cases were reported in 2004, a rate of 1.6 per 100000. When only VTEC O157 are considered, the rate was 1.3, considerably lower than was reported for Ireland for the last two years. This compares with provisional VTEC O157 incidence rates of 1.1/100,000 in Northern Ireland (CDSC NI personal communication), 4.1/100,000 in Scotland[3] and 1.3 in England and Wales (HPA Colindale, personal communication) in 2004.

Of particular interest are the nine (15%) VTEC infections reported in 2004 that were caused by non-O157 *E. coli* strains. All nine were reported in quarters 2 and 3, which is in keeping with the seasonal distribution noted both historically and this year for VTEC O157 in Ireland. Although the case numbers were small, non-O157 VTEC cases were reported from 6 of the 8 health board regions, indicating that they were widely distributed throughout the country. All non-O157 VTEC infections reported were in children less than 15 years or adults over 65 years. In fact, non-O157 serogroups comprised 30% of VTEC cases reported in children less than 5 years. In addition, 2 of the four VTEC-associated HUS cases reported in 2004 were caused by non-O157 VTEC. While these latter two observations presumably reflect a greater degree of screening for non-O157 VTEC in these higher risk groups, it is evident that non-O157 VTEC were an important cause of VTEC infections in Ireland in 2004. It is also notable that while in the past, VTEC O26 was the primary non-O157 VTEC reported in Ireland, the range of serogroups reported in 2004 was much greater.

A variety of sources and transmission routes have been demonstrated worldwide for VTEC, including food, water, environmental and direct animal contact as well as person-to-person transmission. In 2004 in Ireland, two outbreaks, one general and one family were linked epidemiologically and/or microbiologically with drinking water from private wells, demonstrating the potential of this type of water supply in the transmission of VTEC infection. A private well was also suspected as the route of transmission for a further family

cluster. The general outbreak illustrates the danger that even a small private water supply can pose if it provides water to a large number of people in a short period of time, exposing them to infection if the water is contaminated.

No other sources or transmission routes were definitively identified for any of the other VTEC outbreaks reported in 2004 although person-to-person transmission and/or animal contact were suspected in a number of family/household clusters. In several case control studies internationally, contact with farm animals and farming environments has been shown to be a strong risk factor for VTEC infection among sporadic cases.[4] As a result of zoonotic disease outbreaks relating to farm animal contact in public settings in the US, the US National Association of State Public Health Veterinarians published a 'Compendium of Measures To Prevent Disease Associated with Animals in Public Settings, 2005' which outlines recommendations for public health officials, veterinarians, animal venue operators, animal exhibitors, visitors to animal venues and exhibits, and others concerned with disease-control and with minimizing risks associated with animals in public settings.[5]

The HPSC established a sub-committee to develop guidance for health professionals regarding human cases of VTEC infection. A report by this sub-committee is due to be published shortly and will provide guidance for clinicians, and laboratory, infection control and public health professionals, for the diagnosis, treatment and care of those suffering from VTEC infection, and advice for the prevention of transmission of infection.

Acknowledgements

We wish to acknowledge the co-operation of microbiologists, medical scientists, SMOs, SPHMs, surveillance scientists, infection control nurses, PEHOs, and EHOs in providing the information on which this report is based.

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Invasive *Haemophilus influenzae* in Ireland, 2004

Key Points

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

Introduction

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

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

Materials and Methods

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

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

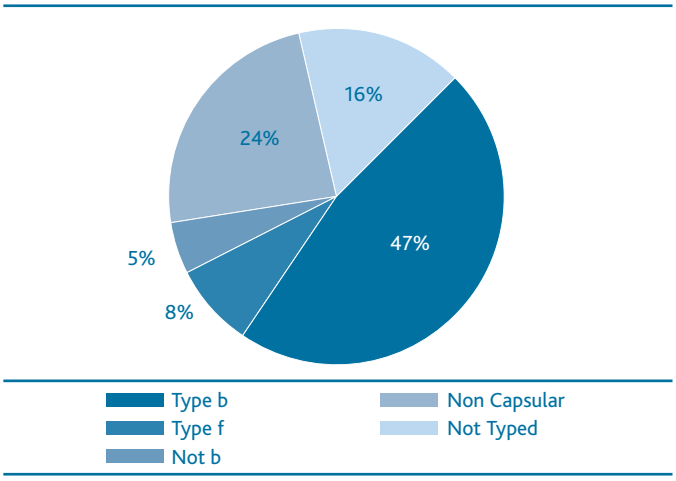

Figure 1. Invasive Haemophilus influenzae disease notifications in 2004 by serotype

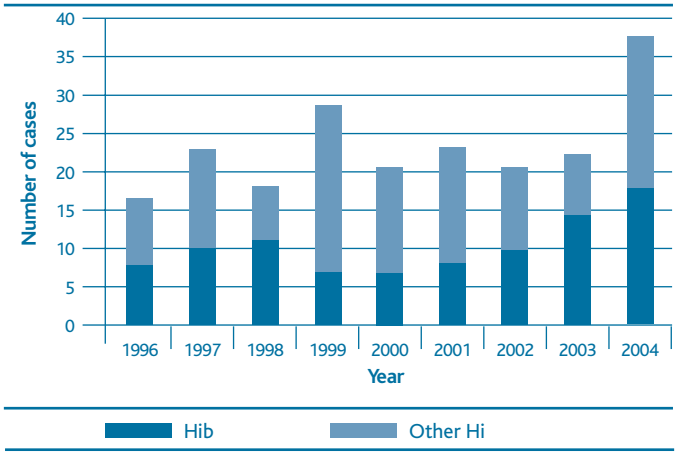

Figure 2. Invasive H. influenzae cases in Ireland, 1996-2004

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

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

ASIR, age specific incidence rate per 100,000

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

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

Results

Invasive Haemophilus influenzae disease

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

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

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

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

Haemophilus influenzae type b

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

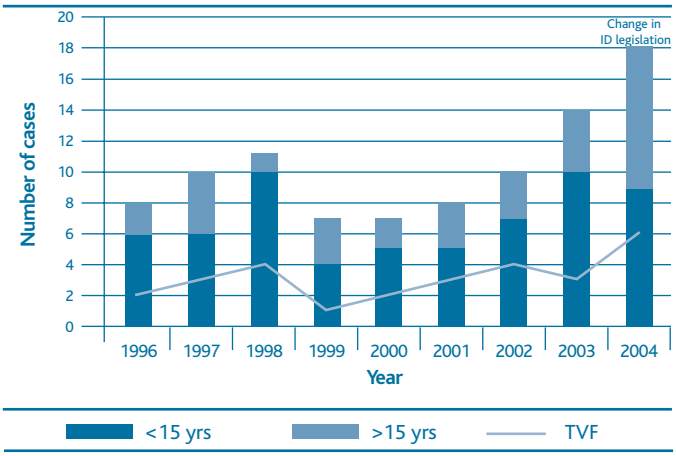

Figure 3. Number of Haemophilus influenzae type b (Hib) cases in under and over 15 year olds 1996-2004 and the number of true vaccine failures (TVF)

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

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

Hib vaccine failures

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

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

Discussion

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

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

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

Acknowledgements

HPSC wish to thank all involved in the surveillance of invasive *H. influenzae* in Ireland. – Specialists in Public Health Medicine, Medical Officers, Surveillance Scientists, Microbiologists and Medical Scientists.

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Epidemiology of Influenza in Ireland, 2004/2005 Season

Key Points

- **During the 2004/2005 season, influenza activity peaked in January 2005**
- **Influenza A (H3N2) was the predominant circulating subtype**
- **The most significant global event during the 2004/2005 season was the continuing spread of poultry outbreaks of avian influenza A (H5N1) in Asia**

Introduction

The 2004/2005-influenza season was the fifth year of influenza surveillance using computerised sentinel general practices in Ireland. The HPSC is working in collaboration with the NVRL and the ICGP on this surveillance project.

Influenza activity was mild in Ireland for most of the 2004/2005 season, with a short peak of activity in January 2005. Influenza A (H3N2) and A (H1N1) co-circulated for the first part of the season, followed by circulation of influenza B for the last 12 weeks of the season. Influenza activity mainly affected 15 to 64 year olds, unlike the 2003/2004 season, which mainly affected 0 to 4 year olds.

The most significant global event during the 2004/2005-influenza season was the continuing spread of poultry outbreaks of avian influenza A (H5N1) in South East Asia, associated with sporadic cases and clusters of human infection and a significant proportion of human deaths. [1, 2]

Materials and Methods

Clinical data

Thirty-six general practices were recruited to report electronically, on a weekly basis, the number of patients with influenza-like illness (ILI). ILI is defined as the sudden onset of symptoms with a temperature of 38°C or more, with two or more of the following: headache, sore throat, dry cough and myalgia. Cases were those attending for the first time with these symptoms. In total, the 36 sentinel general practices, comprising 68 general practitioners, represent 2.9% of the national population. Practices were located in all HSE health

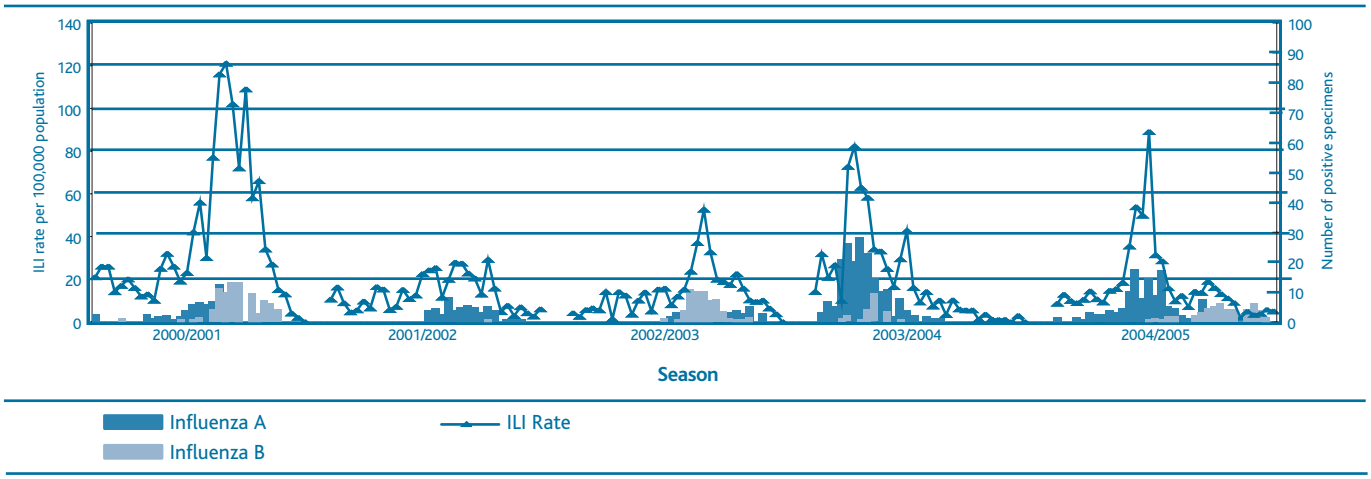

Figure 1. ILI rate per 100,000 population and the number of positive influenza specimens detected by the NVRL during the 2000/2001, 2001/2002, 2002/2003, 2003/2004 and 2004/2005 seasons

areas with the number of sentinel practices in each HSE health area largely based on the population of the HSE health area.

Virological data

Sentinel GPs were requested to send a combined nasal and throat swab on at least one patient per week where a clinical diagnosis of ILI was made. Swabs were sent to the NVRL for testing for influenza and respiratory syncytial virus (RSV) using immunofluorescence and PCR techniques and results were reported to HPSC. The NVRL also reported the results of respiratory specimens (mainly paediatric), referred mainly from hospitals, on a weekly basis.

Other indicators of influenza activity

The Departments of Public Health sent an influenza activity index (no report, no activity, sporadic-, localised-, regional- or widespread activity) every week, to HPSC. The activity index is analogous to that used by the WHO global influenza surveillance system and the European Influenza Surveillance Scheme (EISS). [3,4] The index is based on sentinel GP ILI consultation rates, laboratory-confirmed cases of influenza, sentinel hospital admissions data and/or sentinel school absenteeism levels. One sentinel hospital was located in each HSE health area, reporting total hospital admissions, accident and emergency admissions and respiratory admissions data on a weekly basis. Sentinel primary and secondary schools reported absenteeism data on a weekly basis, and were located in each health area in close proximity to the sentinel GPs.

The Departments of Public Health also notified HPSC on a weekly basis of all cases of influenza and all influenza/ILI outbreaks (following the amendments to the infectious disease regulations (SI No. 707 of 2003)). An enhanced dataset on all hospitalised influenza cases aged between 0 and 14 years of age was also reported to HPSC from the Departments of Public Health.

From January 2005, HPSC was also notified of all registered deaths on a weekly basis from the General Registrar's Office, including influenza and pneumonia deaths.

Weekly report and EISS

HPSC produced a weekly influenza report, which was posted on the HPSC website www.hpsc.ie each Thursday. Results of clinical and virological data were reported, along with a map of influenza activity and a summary of influenza activity worldwide. HPSC also reported the clinical and virological dataset to the EISS every Thursday.

Results

It should be noted that hospital admissions data and enhanced surveillance data for the 2004/2005 season are provisional.

Clinical data

Influenza activity in Ireland peaked later in the 2004/2005 season, compared to the 2003/2004 season. Activity was mild for most of the 2004/2005 influenza season, with a sharp peak during week one 2005, peaking at 89.0 per 100,000 population (figure 1). This was the highest peak rate since the 2000/2001 season when rates peaked at 121.0 per 100,000 during week eight. During the peak in ILI consultation rates,

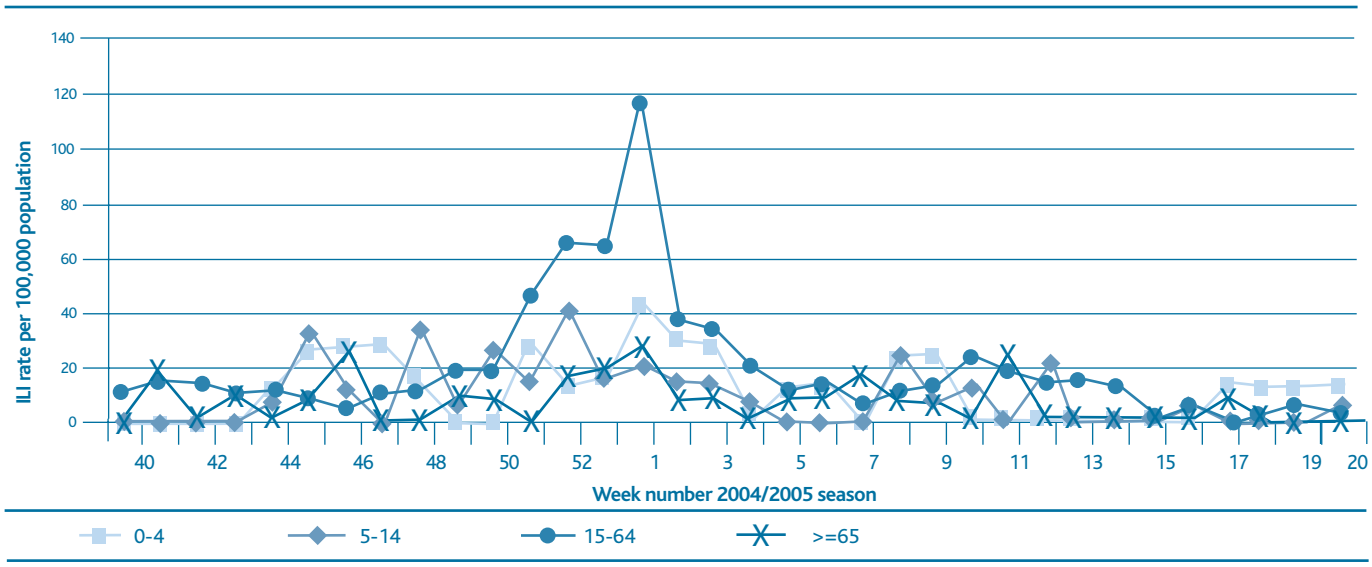

Figure 2. Age-specific GP consultation rate for ILI per 100,000 population by week for the 2004/2005-influenza season

the majority of cases reported were aged between 15 to 64 years (figure 2). A total of 585 ILI cases were reported by sentinel GPs during the 2004/2005 season compared to 625 during the 2003/2004 season.

Virological data

The NVRL tested 370 sentinel specimens for influenza virus during the 2004/2005 season. One hundred and forty-two (38.4%) sentinel specimens were positive for influenza: 103 influenza A (62 A H3N2, 36 A H1N1 and 5 A unsubtyped) and 39 influenza B (figure 1). The predominant influenza virus subtype identified was influenza A (H3N2), accounting for 43.7% of positive specimens. The majority of positive influenza sentinel cases were in the 15 to 64 year age group (83.8%). Of the 370 sentinel specimens tested, six (1.6%) were positive for RSV. Five of the six RSV positive sentinel specimens were aged between 0 and 9 years and one was aged over 65 years of age.

The NVRL also tested 1526 non-sentinel respiratory specimens, mainly from hospitals. Of the 1526 specimens tested, 52 (3.4%) were positive for influenza A, eight (0.5%) for influenza B and 349 (22.9%) were positive for RSV. The majority (86.1%) of non-sentinel respiratory specimens were aged between 0 and 4 years of age.

Vaccination status and antigenic characterisation

Of the 142 positive influenza virus detections from sentinel specimens, 107 (75.3%) were unvaccinated, four (2.8%) were vaccinated and vaccination status was unknown in 31 (21.8%) cases. Of the four cases that were vaccinated, influenza A (H3N2) was detected in two cases, influenza A (H1N1) in one case and influenza B in one case.

Three influenza specimens were sequenced at the NVRL and phylogenetic analysis was undertaken at the WHO laboratory (Mill Hill) in London. One influenza A (H1N1) isolate was antigenically characterised as A/New Caledonia/20/99-like, which was included in the 2004/2005 vaccine. One influenza A (H3N2) isolate was found to be closest in antigenic character to the reference viruses A/Shantou/1219/04 and A/Oslo/807/04. A/Shantou/1219/04-like strains have been found to be closely related to the newer reference strain A/California/7/04 (H3N2). The A/California/7/04 (H3N2)-like isolates have reduced titres to the A/Fujian/411/02-like antisera (included in the 2004/2005 vaccine), but the H3N2 component of the 2004/2005 vaccine was expected to provide some protection against this new variant. One influenza B isolate was antigenically characterised as being closely related to B/Jiangsu/10/2003. B/Jiangsu/10/2003 was included in the 2004/2005 vaccine (as a B/Shanghai/361/2002-like virus).

Regional influenza activity

Influenza A and B were detected in all HSE-health areas during the 2004/2005 season. Influenza A was the predominant influenza type detected in all areas, except for HSE-MA, where influenza A and B co-circulated in equal numbers. Influenza activity peaked during week one 2005, with HSE-ER and HSE-SEA both reporting regional influenza activity (figure 3). Overall, influenza activity was most intense in HSE-ER and HSE-SEA during the 2004/2005 season.

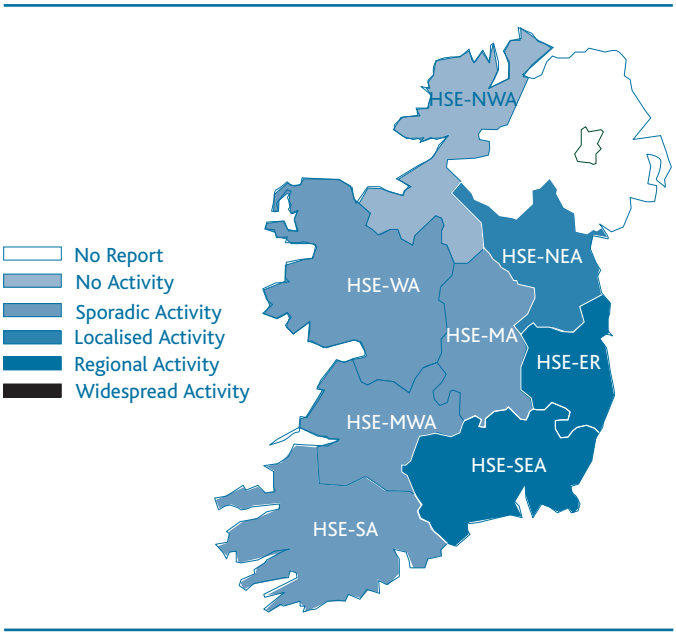

Figure 3. Map of influenza activity by HSE-health area during the 2004/2005 season peak of influenza activity, week 1 2005.

Outbreaks

Three influenza outbreaks were reported to HPSC during the 2004/2005 season. A school outbreak of ILI in a sentinel school occurred during week 48 in HSE-MWA. A total of 32 pupils were reported ill. There were no hospitalisations. Influenza A (unsubtyped) was isolated from two cases. An outbreak of influenza A (H3N2) in a long-stay care facility for the elderly was reported by HSE-ER during week three. Thirty-seven patients and 19 staff members were affected, corresponding to an attack rate of 33.4%. A school outbreak of ILI occurred during week 16 in HSE-MA. A total of 32 out of 35 pupils (91.4%) were reported ill. Seven throat swabs were taken and influenza B was isolated from five of these. All patients made a full recovery.

Sentinel hospitals & sentinel schools

Hospital respiratory admissions peaked or were at elevated levels in the two weeks preceding and/or during the peak of influenza activity (week 1 2005), in HSE-ER, -NEA, -SEA, –SA and -WA. The percentage of respiratory admissions over total admissions in six sentinel hospitals compared to ILI consultation rates are shown in figure 4. Total hospital admissions and/or total accident and emergency admissions were also at elevated levels either prior to or during the peak of clinical influenza activity in HSE-MWA, HSE-NEA, HSE-NWA, HSE-SEA, and HSE-WA.

As the peak in clinical influenza activity occurred over the Christmas holiday period, schools were closed and sentinel school absenteeism levels could not be used as an indicator of influenza activity in the weeks preceding the peak in influenza activity.

Enhanced influenza surveillance

A total of 13 cases aged between 0 and 14 years were reported through the enhanced influenza surveillance system during the 2004/2005 season. All 13 cases were notified from HSE-ER. All cases were hospitalised and were positive for influenza A. Five cases were aged less than one year, seven were aged between 1 and 2 years and one case was 13 years of age. One case was vaccinated, four were not vaccinated and the vaccination status was unknown for eight cases. The number of days in hospital ranged from one to 62 days. Two cases were in at risk categories for influenza, one of whom was not vaccinated and the vaccination status was unknown for the second case.

Mortality data

Two deaths attributed to influenza were reported to HPSC during the 2004/2005 season. Both deaths were registered during week one 2005, one in a child in the 5 to 14 age group with an underlying chronic medical condition who died in early December 2004 and the second in an adult aged over 64 years who died in early January 2005.

Influenza notifications data

Influenza notifications for 2004 are discussed in a separate chapter on infectious disease notifications within this annual report.

Influenza activity worldwide

In the United Kingdom, low levels of influenza activity were experienced throughout the 2004/2005 season, peaking late in the season (January to March). Virological activity also remained at low levels, with influenza A/Wellington/1/2004

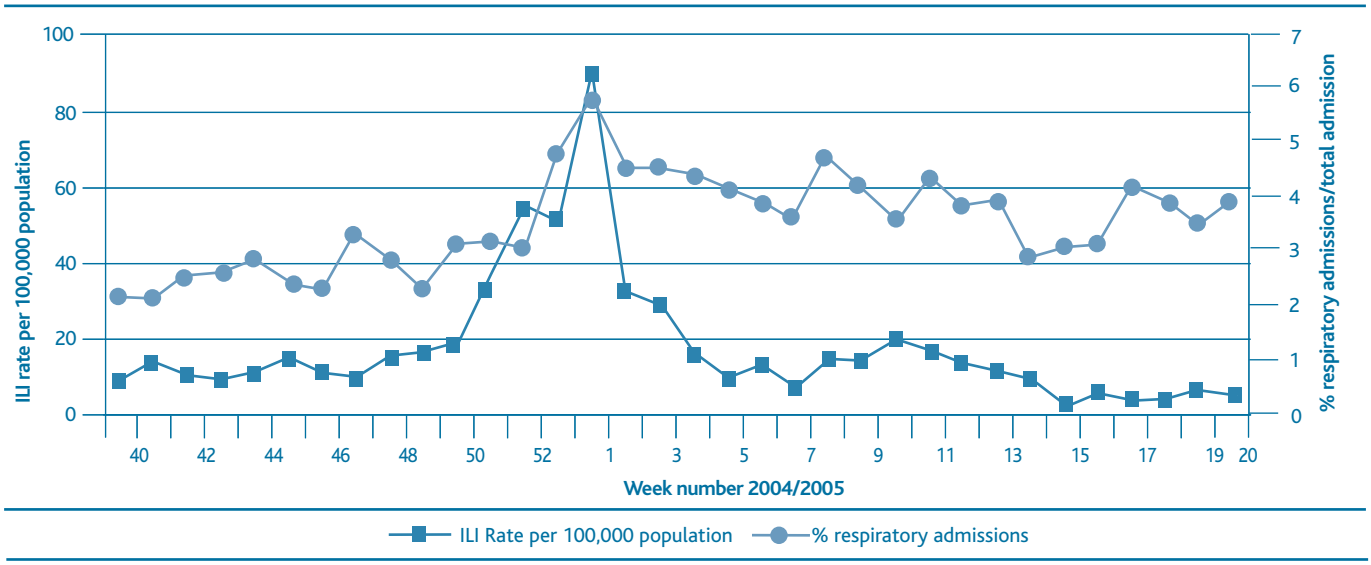

Figure 4. Respiratory admissions as a percentage of total hospital admissions in six sentinel hospitals and ILI rates per 100,000 population by week for the 2004/2005 influenza season.

(H3N2)-like viruses identified as the dominant circulating strain. [5]

Influenza activity in other European countries also started later than in the 2003/2004 season, with spatial analysis indicating both a west to east and south to north spread of influenza across Europe. Based on subtyping data of all influenza virus detections reported to EISS up to week 16 2005, 47% were A (unsubtyped), 32% were A(H3), 5% were A(H1) and 17% were B. A total of 4083 viruses (29% of all isolates) have been antigenically and/or genetically characterised: 1263 A/California/7/2004 (H3N2)-like viruses, 1226 A/Wellington/1/2004 (H3N2)-like viruses, 112 A/Fujian/411/2002 (H3N2)-like viruses, two A/Panama/2007/99 (H3N2)-like viruses, 765 A/New Caledonia/20/99 (H1N1)-like viruses, 401 B/Jiangsu/10/2003-like viruses and 314 B/Hong Kong/330/2001-like viruses. [3]

In Canada and the US, influenza activity also started later than the 2003/2004 season, with clinical activity peaking in February 2005. Influenza A (H3N2) was the predominant subtype identified, with the majority of strains identified as A/Fujian/411/2002 (H3N2)-like and A/California/7/2004 (H3N2)-like viruses. [6, 7]

The most significant global influenza event during the 2004/2005 season was the continuing poultry outbreaks of avian influenza A (H5N1) in Asia. Avian influenza (H5N1) outbreaks spread rapidly and widely across Asia and resulted in mass poultry culls, and were associated with cases/clusters of human infections and a number of human deaths. [1, 2]

The WHO announced its recommendations for the composition of the influenza vaccine for the northern hemisphere for 2005/2006 on February 10th 2005. The members of the WHO Collaborating Centres on Influenza recommended that influenza vaccines contain the following strains: A/New Caledonia/20/99(H1N1)-like virus, A/California/7/2004(H3N2)-like virus and B/Shanghai/361/2002-like virus. [8]

Discussion

Influenza activity peaked late in Ireland during the 2004/2005-influenza season with influenza A (H3N2) being the predominant circulating virus, occurring mostly in 15 to 64 year olds. Influenza activity also started later in most of Europe, Canada and the US, with lower levels of activity reported than the previous season. [3, 5, 6, 7]

Surveillance of hospital admissions data and school absenteeism data plays a significant role in the early detection of influenza epidemics. [9] This was demonstrated during the 2004/2005 season, with increased levels of admissions reported from sentinel hospitals detected prior to the peak in influenza activity. The value of collating school absenteeism data as an indicator of influenza activity was also highlighted with the detection of an ILI outbreak in a sentinel school.

The small number of influenza associated deaths reported to HPSC for the 2004/2005 season is not unexpected. Excess deaths due to influenza are often not registered as influenza deaths. The overall impact of influenza on mortality is estimated to be greater than registered influenza mortality.

Monitoring influenza and pneumonia deaths is one method of identifying these influenza-non-attributed deaths, and from this estimating the mortality burden caused by influenza each season. [10]

Avian outbreaks of influenza A (H5N1) have posed a significant threat to human health since 2003. In a number of outbreaks in Asia, the virus has jumped from infected chickens or ducks directly to humans. These direct human infections have produced severe and sometimes fatal outcomes. The risk of virus transmission to humans from infected poultry will continue as long as outbreaks are occurring in poultry. Of greatest concern is the risk that continuing transmission of the virus to humans will give avian and influenza viruses an opportunity to exchange genes (reassortment), thereby acquiring the ability to transmit easily from human-to-human and thus triggering a pandemic.[1, 2]

In July 2005, avian outbreaks of influenza A (H5N1) spread westwards to Russian bird populations, posing an ever-greater threat of pandemic in Europe. EU Member States are strengthening their preparedness for a potential human influenza pandemic.[11] As a result of the threat posed to human health, a number of additional measures have been put in place in Ireland to improve surveillance of ILI/influenza. Work is in progress to increase the number of sentinel GPs, thereby improving geographical and population representation. Sentinel GPs are also currently monitoring ILI on a year round basis. In addition, influenza and all ILI/influenza outbreaks became notifiable in Ireland on January 1st 2004. Good reporting of such events is critical to early detection of influenza activity. An enhanced influenza surveillance system was set up to detect all hospitalised influenza cases aged between 0 and 14 years of age, in response to the circulation of the Fujian strain of influenza, particularly amongst younger age groups, during the 2003/2004 season. Other activities that are in progress to improve the surveillance of influenza include, weekly surveillance of influenza and pneumonia registered deaths, monthly surveillance of influenza vaccine uptake data in those aged 65 years and older, an evaluation of sentinel hospital admissions and school absenteeism data, and the construction of baseline and epidemic threshold levels for influenza activity in Ireland. This information will in turn inform continuing progress on the Irish national influenza pandemic preparedness plan.

Further information on influenza is available on the HPSC website http://www.ndsc.ie/DiseaseTopicsA-Z/InfluenzaFlu/

Acknowledgements
Special thanks are due to the sentinel GPs, the ICGP, the NVRL, the Departments of Public Health and sentinel schools and hospitals that provide data throughout the influenza season.

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Corporate Services

Corporate Services provides HPSC with a quality support service that promotes, advises, communicates and assists work across the organisation.

Extensive work was undertaken during 2004 in preparation for the streamlining of the centre into the new Health Service Executive in January 2005. This involved ongoing consultation and communication with the Board, staff and staff representatives. A submission was also prepared for inclusion in the HSE National Service Plan 2005.

As an organisation, HPSC continues its commitment to working in a culture of openness, transparency and accountability, and to the continual improvement and attainment of the highest standards. Our commitment to excellence is demonstrated by our progress in introducing the quality management system ISO 9001:2000. Work on this project commenced in late 2004 and continues in 2005. In addition, an internal audit system was introduced in 2004, following the approval of an audit plan by the Board.

Human Resources
Progress continued in 2004 towards making the centre an employer of choice, including improved access to educational, training and development initiatives and the expansion of flexible working policies.

Specialist expertise was enhanced during 2004 with the appointment of a Consultant Microbiologist as part of a joint post with The Children's University Hospital, Temple Street.

Communications
During 2004, the communications office continued to provide ongoing support to all divisions across the organisation. This included providing key public health messages and information to the media and the public and ensuring the production of quality publications and reports for the public and allied health care professionals. Key publications in 2004 included:

- National Guidelines On The Management Of Outbreaks Of Norovirus Infection In Healthcare Settings
- Preventing Foodborne Disease: A Focus on the Infected Food Handler
- Report of the Waterborne Cryptosporidiosis Subcommittee

Surveillance of Infectious Disease Outbreaks in Ireland, 2003

Key points

- **109 infectious disease outbreaks, of which 102 were gastroenteric/infectious intestinal disease (IID) outbreaks were reported in 2003**
- **The IID outbreaks were responsible for at least 2113 cases of illness**
- **Noroviruses were the most common cause of IID outbreaks**
- **The majority of outbreaks occurred in healthcare settings**

Introduction

The aim of outbreak investigations is to identify the source of the outbreak, institute control measures and prevent additional cases. The data obtained during outbreak investigations can be used to determine possible ways of preventing future outbreaks.

The primary objective of the national outbreak surveillance system is to gain information on the epidemiology of all outbreaks of infectious disease in Ireland.
More specific objectives of the system include measuring the burden of illness caused by outbreaks, identifying high-risk groups in the population and estimating the workload involved in the management of outbreaks. The information gathered can be 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.

Outbreak definition

An outbreak of infection or foodborne illness may be defined as two or more linked cases of the same illness or the situation where the observed number of cases exceeds the expected number, or a single case of disease caused by a significant pathogen. Outbreaks may be confined to some of the members of one family or may be more widespread and involve cases either locally, nationally or internationally.

Methods

Since July 2001, public health professionals have been requested to report all investigated infectious disease

Table 1. All outbreaks of ID, number of IID outbreaks and total numbers ill in IID outbreaks reported by health board (2003).

Health Board	No. Outbreaks	Outbreak rate per 100,000 pop	No. of IID outbreaks	No. ill in IID outbreaks
ERHA	42	3.0	39	1103
MHB	3	1.3	2	70
MWHB	6	1.8	6	85
NEHB	6	1.7	6	151
NWHB	6	2.7	6	60
SEHB	19	4.5	16	204
SHB	26	4.5	26	412
WHB	1	0.3	1	28
Total	109	2.8	102	2113

Table 2. Pathogens associated with IID outbreaks notified in 2003.

Pathogen	Number of outbreaks	Number ill
Suspect viral	39	576
Norovirus	37	1168
S. enterica	8	44
E. coli O157	7	188
Campylobacter spp	2	25
Clostridium difficile	1	5
Rotavirus	1	12
Staph. aureus	1	4
Not Known	6	91
Total	102	2113

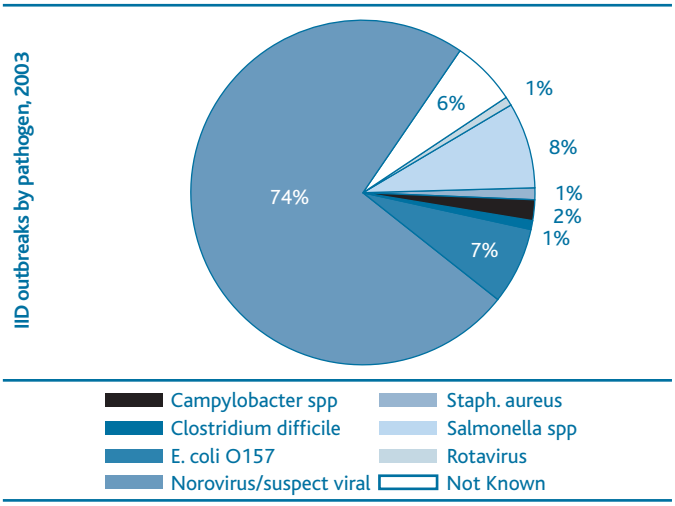

Figure 1. IID outbreaks by pathogen, 2003.

outbreaks to HPSC using a preliminary notification form (by fax or email). A follow-up investigation form and/or final report is then forwarded by the lead investigator at the end of the investigation. The data collected include information on the source of reporting of the outbreak, the extent of the outbreak, mode of transmission, location, pathogen involved, laboratory investigation, morbidity and mortality data, suspected vehicle and factors contributing to the outbreak. These data are stored and analysed in a Microsoft Access database in HPSC.

Results

During 2003, 109 outbreaks of infectious disease were reported to HPSC, of which 102 were gastrointestinal/ infectious intestinal disease (IID) outbreaks. The IID outbreaks were responsible for at least 2113 people becoming ill. The regional distribution of all outbreaks of infectious disease, and those specifically IID are detailed in Table 1. The majority of outbreaks were reported from the ERHA region (n=42), although the highest outbreak rates were in the South-Eastern and Southern health board regions. The lowest rate was reported from the WHB.

Causative Pathogen

Tables 2 and 3 outline the breakdown of IID and non-IID outbreaks by pathogen respectively. In 2003, as has been the trend since the year 2000, the IID outbreaks have been dominated by norovirus or suspect viral outbreaks, comprising 74% of all IID outbreaks in 2003 (Figure 1). The overall numbers of IID outbreaks decreased in comparison with 2002, but was still an increase on all other previous years (Figure 2). The only other confirmed viral cause of IID outbreaks in 2003 was rotavirus, causing an outbreak in a crèche in the Eastern region. After norovirus, the next most commonly reported outbreaks were *Salmonella enterica* and *E. coli* O157.

There were eight outbreaks of *S. enterica* reported in 2003, three general and five household outbreaks. The general outbreaks were all reported to be foodborne, and all occurred in restaurant/cafes. There was one general outbreak of *S.* Hadar (11 ill), one of *S.* Rissen (11 ill) and one outbreak of *S.* Typhimurium (6 ill). There were four household outbreaks of *S.* Enteritidis and one of *S.* Kentucky.

Two general outbreaks of VTEC *E. coli* O157 occurred during the summer months of 2003. Both occurred in hotel restaurants in the Eastern region. Five confirmed and twelve probable cases were reported in one outbreak, with seven cases hospitalised. An intensive investigation took place, but no food or water items were identified as the source of the outbreak. In the second general outbreak of VTEC, three confirmed cases were identified. One of the cases developed haemolytic uraemic syndrome (HUS) and two cases were hospitalised. No source was identified. Five family outbreaks of VTEC were reported to the outbreak surveillance system in 2003. In addition, the HPSC Enhanced Surveillance system for *E. coli* O157 identified a further eight family clusters[1], as a result of sporadic case investigation, but only those outbreaks notified through the national outbreak surveillance system are analysed in this report.

There were two outbreaks of *Campylobacter spp* reported in 2003, one occurred in a residential institution (19 ill) and the

Table 3. Non–IID outbreaks notified in 2003

Disease	Number of outbreaks	Number ill
Influenza A	3	302
Measles	1	95
Tuberculosis	2	32
MRSA	1	12
Total	7	441

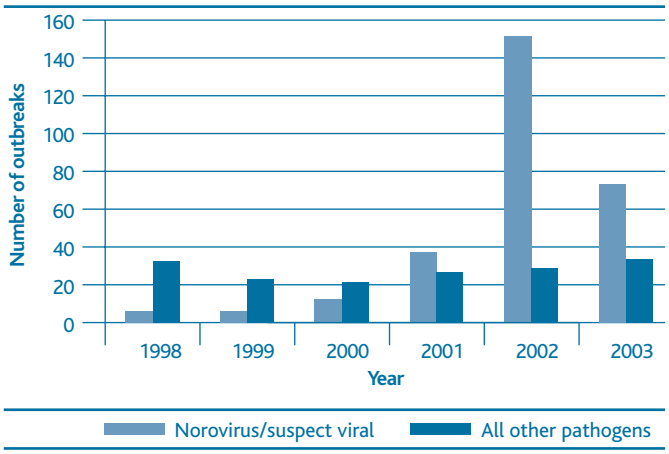

Figure 2. Number of outbreaks by year and by pathogen, 1998-2003 (Data prior to July 200 provided by FSAI)

other in a hospital (6 ill). The sources were not identified in either of these outbreaks.

There were seven non-IID outbreaks reported in 2003 (Table 3) namely, Influenza A (3), Measles (1), Tuberculosis (2) and MRSA (1).

Mode of Transmission

In the majority of outbreaks of IID reported in 2003, the principal mode of transmission was reported as person-to-person (Table 4). The majority of these outbreaks were due to norovirus/ suspect viral, similar to the trend in 2002. There were six outbreaks where the primary mode of transmission was described as foodborne. Four of these were due to *Salmonella enterica*, one was *S. aureus* and one was suspect norovirus. No waterborne outbreaks were reported in 2003.

Location

Similar to the trend reported in 2002, the commonest location in which outbreaks occurred in 2003 was health-care settings (Table 5). 64% of all reported outbreaks occurred in these settings. The greatest number of people ill was also associated with outbreaks in the health-care sector, with almost 1000 people known to be ill as a result of hospital outbreaks alone.

A significant number of suspect foodborne outbreaks also occurred in private homes and in eating establishments, emphasising the need for reinforcing good hygiene and food safety practices in these settings.

Seasonal distribution

When the IID outbreaks in 2003 are analysed by month of onset of illness of first case, it is seen that the majority of outbreaks occurred in the month of February (Figure 4). This is explained by the large number of outbreaks of norovirus that occurred at this time of the year. A smaller peak was noted in September when the majority of *S. enterica* and *E. coli* outbreaks occurred.

Discussion

Analysis of the outbreak data for 2003 shows a decrease in the overall number of outbreaks reported nationally compared to 2002. There were 102 outbreaks of IID reported nationally in 2003, compared to 188 in 2002. The overall number of outbreaks for 2003 however is still higher than that reported from 1998 to 2001.

The trend in recent years of a predominance of norovirus outbreaks seen since 2001, has continued in 2003 with the highest proportion of IID outbreaks being either confirmed as norovirus or suspect viral. This trend has also been noted across much of Europe.[1] Interestingly, the numbers ill in these outbreaks seems to be much lower than in 2002. There were over 7650 people ill due to norovirus outbreaks in 2002. In 2003, however, that figure had decreased to 1744. It is likely that with the institution of early control measures, these outbreaks were being contained at a much earlier stage and hence there was a marked reduction in person-to-person spread of the virus. It is also likely that short-term immunity had developed to the new norovirus sub-type that was first seen in Ireland in 2002 (GII-4).[2] The national norovirus outbreak guidelines developed by the Viral Gastroenteritis

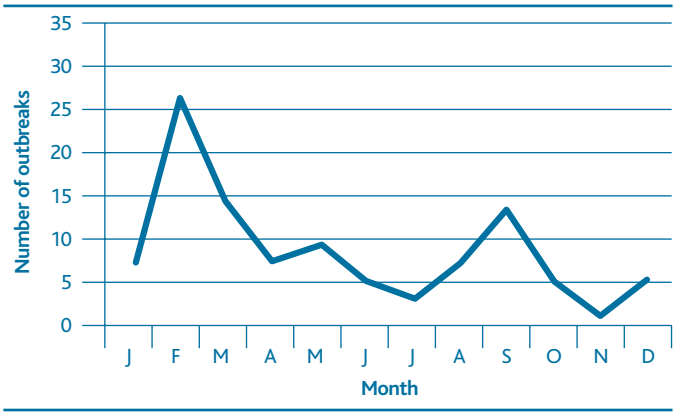

Figure 3. Seasonal distribution of IID outbreaks, 2003.

Table 4. IID Outbreaks by location and numbers ill, 2003.

Location	Number of Outbreaks	Number ill
Animal Contact	1	3
Foodborne	6	45
Person-to-person	62	1646
P-P/Airborne	11	197
P-P/Foodborne	1	16
Other	1	6
Unknown	20	200
Total	102	2113

Table 5. IID Outbreaks by location, 2003.

Location	Number of Outbreaks
Hospital	34
Residential Institution	31
Private House	12
Hotel	8
Restaurant/ Café	5
Crèche	4
Other	3
Tour Bus	2
Guest House/ B&B	1
School	1
Travel Related	1
Total	102

sub-committee of HPSC appear to be in wide use and serve to assist in the management of these outbreaks particularly in healthcare settings.

Similar to 2002, all of the *Salmonella enterica* outbreaks reported in 2003 were small in size. Two very significant general outbreaks of *E. coli* O157 occurred in 2003. Both were associated with hotel restaurants in the Eastern part of the country. In one outbreak, over 130 possible cases were identified during the intensive investigation, and the final outcome was five confirmed and twelve probable cases, with seven cases hospitalised. Despite the thorough investigation, no food or water items were identified as a source of the outbreak. Similarly despite an intensive investigation of the second VTEC O157 outbreak, no source was identified.

For the first time, data on non-IID outbreaks were reported to the national outbreak surveillance system in 2003. With the introduction of the new ID legislation, all outbreaks and unusual clusters of illness became statutorily notifiable on 1st January 2004, so it is hoped that more complete reporting of all outbreaks will occur in the coming years.

In addition, with the advent of the CIDR system in 2004, real time data on outbreaks should become available to all users nationally as they go-live on the system. This will enable key epidemiological, microbiological and environmental data relating to the outbreak to be shared and assist in the management and control of the outbreak.

Outbreak investigations remain one of the most important components of public health in terms of learning more about the epidemiology of infectious diseases and their transmission routes. The lessons learnt from outbreak investigations should always be documented, so that information on the causes and factors contributing to outbreaks can be used to inform future prevention strategies.

Acknowledgements

We wish to sincerely thank all the contributors to the national outbreak surveillance system, namely, Directors of Public Health, Specialists in Public Health Medicine, Senior/ and Area Medical Officers, Surveillance Scientists, Clinical Microbiologists, Medical laboratory scientists and Environmental Health Officers.

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Surveillance of Infectious Disease Outbreaks in Ireland, 2004

Key points

- **187 infectious disease outbreaks, of which 169 were gastroenteric/infectious intestinal disease (IID) outbreaks were notified in 2004, which was an increase on 2003**
- **The IID outbreaks were responsible for at least 4008 cases of illness**
- **Viral gastroenteritis caused by norovirus (NV) continues to the most common cause of IID outbreaks (81% of IID outbreaks confirmed/suspected NV)**
- **The majority of IID outbreaks (69%) were reported to have occurred in healthcare settings.**

Introduction

Outbreak investigations aim to identify the source of the outbreak, institute control measures and prevent additional cases. The information gathered during outbreak investigations can be used to determine possible ways of preventing future outbreaks.

The principal objective of the national outbreak surveillance system is to gain information on the epidemiology of all outbreaks of infectious disease in Ireland.

More specific objectives include measuring the burden of illness caused by outbreaks, identifying high-risk groups in the population and estimating the workload involved in the management of outbreaks. The information gathered can be 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.

Outbreak definition

An outbreak of infection or foodborne illness may be defined as two or more linked cases of the same illness or the situation where the observed number of cases exceeds the expected number, or a single case of disease caused by a significant pathogen. Outbreaks may be confined to some of the members of one family or may be more widespread and involve cases either locally, nationally or internationally.

Methods

Since 1st January 2004, outbreaks or "unusual clusters of

Table 1. All outbreaks of ID, number of IID outbreaks and total numbers ill in IID outbreaks reported by health board (2004).

Health Board	No. Outbreaks	Outbreak rate per 100,000 pop	No. ill in all outbreaks	No. of IID outbreaks
ERHA	67	4.8	1949	61
MHB	9	4.0	218	9
MWHB	8	2.4	290	8
NEHB	21	6.1	315	19
NWHB	12	5.4	336	8
SEHB	23	5.4	390	21
SHB	40	6.9	569	36
WHB	7	1.8	85	7
Total	**187**	**4.8**	**4152**	**169**

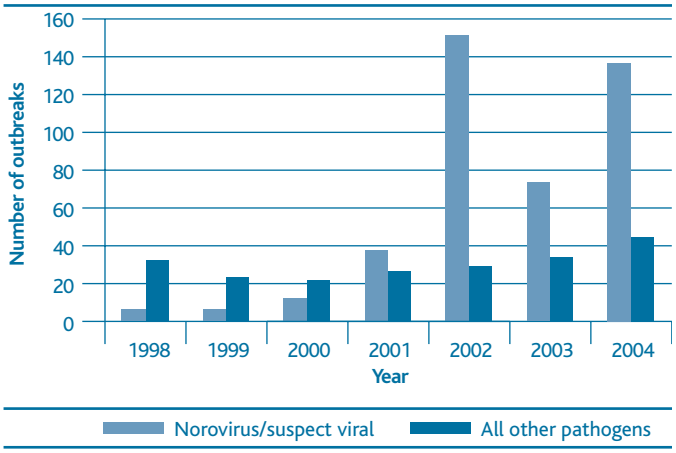

Figure 1. Number of outbreaks by year and by pathogen, 1998-2004 (Data prior to July 2001 provided by FSAI)

Table 2. Pathogens associated with IID outbreaks notified in 2004.

Disease	Number of outbreaks	Number ill
Noroviral Infection	78	2838
Suspect norovirus	59	1038
Enterohaemorrhagic *Escherichia coli*	10	17
Salmonellosis	8	30
Cryptosporidiosis	5	25
Shigellosis	2	15
Campylobacter infection	1	2
Giardiasis	1	2
Rotavirus	1	5
C. difficile	1	11
Unknown	3	25
Total	**169**	**4008**

changing patterns of illness" became notifiable under the Amendment to the Infectious Diseases Regulations.[1] (see outbreak definition in box). Since that date, medical practitioners and clinical directors of diagnostic laboratories are required to notify to the medical officer of health any unusual clusters or changing patterns of illness, and individual cases thereof, that may be of public health concern.

In addition since 1st January 2004, all outbreak data are being entered into the CIDR system database (either directly by the HSE-region, if that region has gone live onto CIDR) or indirectly by staff in HPSC.

Results

During 2004, 187 outbreaks of infectious disease were reported to HPSC, of which 169 were gastrointestinal/ infectious intestinal disease (IID) outbreaks. The IID outbreaks were responsible for at least 4008 people becoming ill, and there were 115 reported hospitalisations. The regional distribution of all outbreaks of infectious disease, and those specifically IID are detailed in Table 1. The highest number of outbreaks was reported from the ERHA region (n=67), although the highest outbreak rates were in the SHB and NEHB (both 6.9/100,000). The lowest rate was reported from the Western health board region (1.8/100,000).

Causative Pathogen

The breakdown of IID and non-IID outbreaks by pathogen are outlined in Tables 2 and 3 respectively. In 2004, as has been the trend since the year 2000, the IID outbreaks have been dominated by norovirus/ suspect viral outbreaks, comprising 81% of all IID outbreaks in 2004 (Figure 1). The overall numbers of IID outbreaks reported, increased compared with 2003.

After norovirus, the next most commonly reported outbreaks were EHEC and *Salmonella enterica*.

There were ten outbreaks of EHEC reported in 2004, one general and nine family outbreaks. The general outbreak involved a significant investigation and occurred at a sports event in June 2004. Four cases were confirmed as *E. coli* (VTEC) O157 (VT1 and VT 2 positive) infection. Three cases were hospitalised. Cases ranged in age from twelve to forty-nine years. Epidemiological, environmental and microbiological investigations implicated the consumption of water from the sports club as the cause of the outbreak. Consumption of this water was prohibited as soon as it was confirmed as a possible source of infection and this action effectively ended the outbreak.

Interestingly, a microbiological and/or epidemiological link with waterborne transmission was also found for a number of the family outbreaks/clusters of VTEC in 2004. In addition, contact with animals was also suspected for a number of the waterborne outbreaks.

There were eight outbreaks of *S. enterica* reported, one general, six family outbreaks, and one small outbreak was deemed to be travel-associated. The general outbreak was caused by *S.* Typhimurium and occurred in a restaurant in the WHB region. Ten persons became ill, and the food implicated in the outbreak epidemiologically, was tiramisu dessert. The restaurant was closed during the investigation and subsequently no additional cases were identified.

There were five outbreaks of cryptosporidiosis reported in

Table 3. Non–IID outbreaks notified in 2004

Disease	Number of outbreaks	Number ill
Hepatitis A (acute)	3	8
Measles	2	7
Mumps	2	16
Hepatitis B (acute and chronic)	1	3
Leptospirosis	1	5
Vancomycin Resistant Enterococci	1	n/a
Meningococcal disease	1	3
Tuberculosis	1	3
Chickenpox	1	3
MRSA	1	4
Respiratory suspected viral	1	65
Suspected Rubella/Parvovirus	1	11
Suspected Scabies	1	5
Not identified	1	11
Total	**18**	**144**

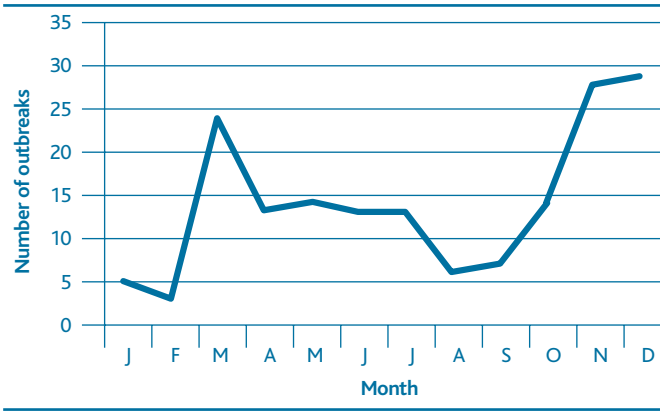

Figure 2. Seasonal distribution of IID outbreaks, 2004.

2004, four general and one family outbreak. All the general outbreaks were reported as waterborne. Two outbreaks of shigellosis were notified, one general and one family outbreak. The general outbreak occurred in a crèche and eleven children were reported ill.

Eighteen outbreaks of non-IID/gastroenteric diseases were notified in 2004, which is the highest numbers reported since we initiated surveillance of all infectious disease outbreaks. Table 3 outlines the pathogens implicated and numbers ill. Further details on the non-IID outbreaks are available in the individual disease chapters. It is hoped that surveillance data on these outbreaks will improve in the coming years.

Mode of Transmission

Similar to previous years, the principal mode of transmission was reported to be person-to-person spread in the majority of outbreaks of IID reported in 2004 (Table 4). Most of these outbreaks were due to norovirus/ suspect viral.
There were twelve outbreaks where the primary mode of transmission was described as foodborne, and six outbreaks were deemed to be waterborne in 2004, compared to 2003 when there no reports of waterborne outbreaks. There was also an increase in the number of outbreaks reported to be due to contact with livestock compared with 2003.

Location

Similar to the trend which first emerged in 2002, the commonest location in which outbreaks occurred in 2004 was healthcare settings (Table 5). 69% of all reported outbreaks occurred in these settings. The greatest number of people ill was also associated with outbreaks in the health-care sector.

Seasonal distribution

When the IID outbreaks in 2004 are analysed by month of onset of illness of first case, it is seen that the majority of outbreaks occurred in the winter months of November and December. This is not surprising as the majority of outbreaks of norovirus occur during the winter season.

Discussion

In 2004, all outbreaks of infectious diseases became notifiable for the first time, under the new Infectious Diseases Legislation.[1] There was an increase in the overall number of outbreaks reported nationally in 2004, with 169 outbreaks of IID notified, compared to 102 in 2003. In addition, the highest number of non-IID outbreaks since the surveillance system commenced was notified in 2004 (n=18).

The 2004 outbreak data continues the trend in recent years of a predominance of outbreaks of viral gastroenteritis, principally caused by norovirus (81% of IID outbreaks confirmed/suspected NV). Detailed molecular detection and typing of norovirus isolates was introduced by the National Virus Reference Laboratory (NVRL) in 2003, which has enabled us to study in much greater detail the molecular epidemiology of strains causing outbreaks in Ireland.

A one-year North-South study funded by FSPB, coordinated jointly between HPSC and NVRL in the ROI, commenced in 2004. The aim of this study was to merge epidemiological and virological data on norovirus outbreaks on the island of Ireland by genotyping and obtaining sequence date from one sample of every outbreak detected North and South for a one-year period. The study is due to be completed in October

Table 4. Principal mode of transmission reported in outbreaks of IID (2004).

Primary Mode of Transmission	Number of IID Outbreaks
Person to person	136
Foodborne	12
Waterborne	6
Animal contact	3
Not Specified	12
Total	**169**

Table 5. IID Outbreaks by location, 2004.

Location	Number of Outbreaks
Hospital	68
Residential institution	49
Private house	17
Hotel	12
Not Specified	7
Other	6
School	4
Restaurant / Cafe	3
Crèche	1
Public house	1
Travel related	1
Total	**169**

2005 and will be published shortly thereafter. Some interesting trends have emerged from preliminary analysis of the data such as the emergence of the GII-4 (2004 variant) so-called "Jam" strain in the winter season of 2004.[2] This strain was originally detected from an outbreak of NV at an international scout Jamboree held in the Netherlands in the summer of 2004[3], and then went on to cause a global increase in this variant. In 2004, Ireland also joined the European network 'Divine-net', which is an extension of the previous network entitled "Foodborne Viruses in Europe".[4] This network aims to merge epidemiological and virological data on outbreaks of viral gastroenteritis, including norovirus, across Europe.

Water was seen to be an important mode of transmission from analysis of the 2004 data, with a general cross-health board outbreak of VTEC O157, as well as a number of smaller family outbreaks confirmed/suspected to be waterborne. In addition, four small general outbreaks of cryptosporidiosis were considered to be waterborne. With the potential for a substantial number of people to be exposed in such outbreaks, the message must be reinforced that untreated water supplies, particularly from private wells, may pose a significant risk to public health.

Outbreak data has been entered into the CIDR system since the beginning of 2004, therefore real time data on outbreaks is available to all CIDR users nationally as they go-live on the system. It is hoped that as national roll-out on CIDR is achieved, enhanced surveillance data on all outbreaks of infectious disease will be even more timely and complete as users enter their own outbreak data.

This will enable epidemiological, microbiological and environmental data relating to the outbreak to be shared locally and nationally, and should greatly assist in the management and control of outbreaks, as well as allowing analysis of the national data to inform future public health policies.

Acknowledgements

We wish to sincerely thank all the contributors to the national outbreak surveillance system, namely, Directors of Public Health, Specialists in Public Health Medicine, Senior/ and Area Medical Officers, Surveillance Scientists, Clinical Microbiologists, Medical laboratory scientists and Environmental Health Officers.

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Antimicrobial Resistance in Ireland, 2004

Key Points

In 2004,

- **1323 invasive isolates of *Staphylococcus aureus* were reported. The proportion of isolates that was meticillin-resistant *S. aureus* (MRSA) was 41.8%, which remains one of the highest in countries reporting to EARSS**
- **400 invasive isolates of *Streptococcus pneumoniae* were reported. The proportion that was penicillin-non-susceptible *S. pneumoniae* (PNSP) was 10.3%, which is moderately high compared to most other European countries. Of the 41 PNSP isolates identified, seven were found to be high-level resistant [minimum inhibitory concentration (MIC), >2 mg/L] and 28 were determined to have intermediate levels of resistance (MIC, 0.12-1.0 mg/L). No MICs were available for six isolates. The proportion of *S. pneumoniae* that was erythromycin-resistant was 14.2%**
- **1256 invasive isolates of *Escherichia coli* were reported. The proportions of isolates that were resistant to third-generation cephalosporins (3GCs), fluoroquinolones and aminoglycosides were 2.4%, 12.5% and 5.7%, respectively. Multi-drug resistance (MDR) was reported in 5.6% of all Irish isolates. Resistance to fluoroquinolones and gentamicin is increasing but the rise in 3GC resistance observed in many European countries has not yet been seen in Ireland**
- **242 invasive isolates of *Enterococcus faecalis* were reported. The proportion of isolates that were vancomycin-resistant was 1.3%. Although this figure is low, it is still slightly higher than observed in most other European countries (<1%)**
- **187 invasive isolates of *Enterococcus faecium* were reported. The proportion of isolates that were vancomycin-resistant was 23.2%, which is one of the highest in Europe**

Introduction

The European Antimicrobial Resistance Surveillance System (EARSS) was established in 1998 and is funded by DG SANCO of the European Commission. It is an international network of national surveillance systems, encompassing approximately 800 laboratories serving 1300 hospitals in 28 countries, which aims to collect comparable and reliable antimicrobial resistance data on invasive infections of *Staphylococcus aureus, Streptococcus pneumoniae, Escherichia coli,* and *Enterococcus faecium/faecalis* for public health action.[1]

EARSS in Ireland started in 1999 with the surveillance of *S. aureus* and *S. pneumoniae* and expanded in 2002 to include three further pathogens, *E. coli* and the enterococci, *E. faecalis* and *E. faecium*. Thirteen additional laboratories joined the program in 2004 bringing the total number of participating laboratories to 41. Based on acute public hospital activity data obtained from Department of Health and Children (DoHC), the estimated population coverage of EARSS in 2004 was approximately 98%, which represents an increase from 90% coverage in 2003. In 2003, EARSS coverage in other European countries ranged from 16% in the UK and 19% in Spain to 100% in smaller countries such as Estonia, Norway and

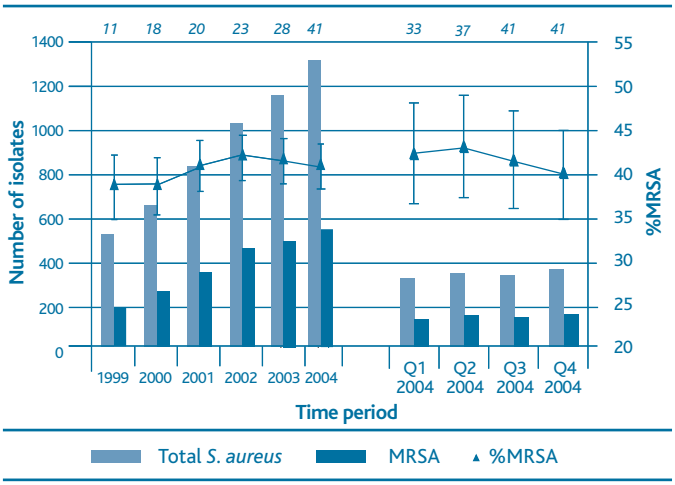

Figure 1. Trends for S. aureus by time period: by year for 1999-2004 and by quarter for 2004 (Q1-Q4) – total numbers of S. aureus/MRSA and percentage MRSA with 95% confidence intervals. Changes in the numbers of laboratories participating in the surveillance system by year-end are indicated above the chart

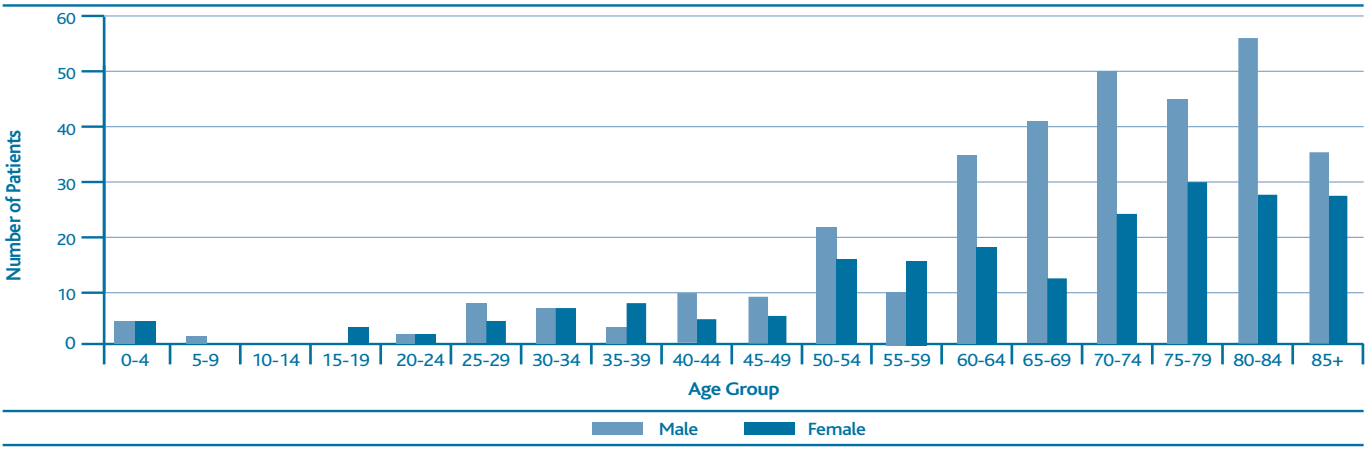

Figure 2. Age and sex distribution of MRSA cases reported to EARSS in 2004.

Slovenia (coverage in Belgium, France, Germany, Greece and Italy was not available).[1]

Protocol

Data are collected on the first invasive isolate per patient per quarter of *S. aureus* and the enterococci (from blood only) and *S. pneumoniae* and *E. coli* [from blood and cerebrospinal fluid (CSF)]. Laboratories report routinely generated qualitative disc diffusion data on:

- oxacillin/meticillin (Note: revised spelling in accordance with new International Pharmacopoeia guidelines) /cefoxitin for *S. aureus*
- oxacillin/penicillin and erythromycin for *S. pneumoniae*
- ampicillin, cefotaxime/ceftriaxone and/or ceftazidime (3GCs), ciprofloxacin or ofloxacin (fluoroquinolones) and gentamicin or tobramycin (aminoglycosides) for *E. coli*. Laboratories are also asked to specifically test for the presence of extended-spectrum beta-lactamases (ESBLs)
- ampicillin, high-level gentamicin (HLG) and vancomycin for enterococci

All MRSA isolates are submitted to the National MRSA Reference laboratory (NMRSARL) at St James's Hospital, where MICs are determined for oxacillin and vancomycin. Laboratories are requested to submit data on MICs or Etests® performed in-house for penicillin and cefotaxime or ceftriaxone on all PNSP isolates.

Epi Info 6 software (CDC, Atlanta, USA and WHO, Geneva, Switzerland) was used to determine the 95% confidence intervals (CIs) for medians and to perform Chi-squared tests, χ^2, and Chi-squared tests for trend, χ^2_{trend}.

Rates of MRSA bacteraemia per 1,000 bed days were calculated using the total number of patient bed days used from the Acute Public Hospital Activity Data provided by the DOHC for those hospitals that participated in EARSS over the relevant time period. Data from all private hospitals, even if participating in EARSS, were not included in these calculations as activity data were not available for these hospitals.

$$\text{MRSA rate} = \left\{ \frac{\text{No. of MRSA bacteraemias reported to EARSS}}{\text{Total No. of bed days used over the surveillance period}} \right\} \times 1000$$

Crude rates of invasive pneumococcal disease (IPD) per 100,000 population were calculated based on the estimated population coverage of hospitals participating in EARSS over the relevant time period and the total population of 3,917,203 in the Republic of Ireland as determined in the 2002 census.

Results

Staphylococcus aureus

In 2004, 1323 reports of *S. aureus* isolates from bacteraemia

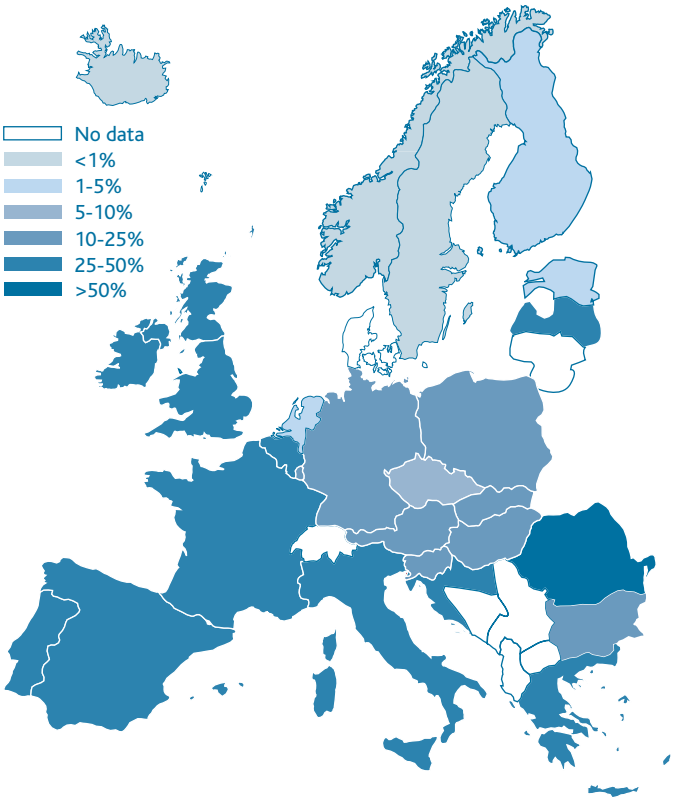

Figure 3. Map illustrating the distribution of MRSA in EARSS countries in 2004.

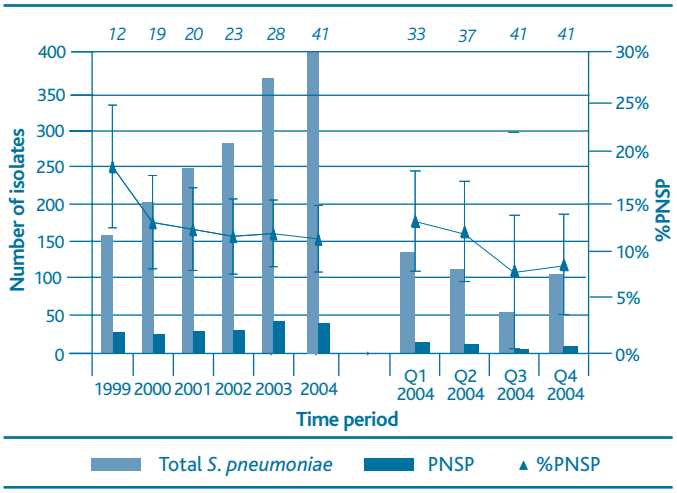

Figure 4. Trends for S. pneumoniae by time period: by year for 1999-2004 and by quarter for 2004 (Q1-Q4) – total numbers of S. pneumoniae/PNSP and percentage PNSP with 95% confidence intervals. Changes in the numbers of laboratories participating in the surveillance system by year-end are indicated above the chart

were received from 38 laboratories, of which 553 (41.8%) were resistant to meticillin (see table 1). By comparison, the proportion of *S. aureus* isolates that were meticillin-resistant in 2003 was 42.1%. In 2004, there was a peak in Q2 when the proportion of MRSA was 43.4% compared with the other three quarters of the year when the proportion ranged from 39.9-42.2% (see figure1). A similar pattern was seen in 2003.

The median age of patients with *S. aureus* bacteraemia was 64 years (95% CI, 62-66 years). The difference in median ages of patients with meticillin-sensitive *S. aureus* (MSSA) [57 years (95% CI, 55-59 years)] and MRSA bacteraemia [72 years (95% CI, 70-73 years)] was considered to be significant as the CIs did not overlap. The probability of acquiring MRSA bacteraemia as opposed to MSSA bacteraemia in patients aged 65 years or more was approximately twice greater than in patients under 65 years (RR, 1.9; 95% confidence interval, 1.7 to 2.1; χ^2=93.2, P<0.0001). There were significantly more isolates from males than from females for both MSSA (61% versus 39%; z-test=6.0, P<0.0001) and MRSA (62% versus 38%; z-test=5.7, P<0.0001). The age and sex distribution of MRSA cases reported in 2004 is shown in figure 2.

The national MRSA rate, based on the EARSS case definition (first isolate of *S. aureus* per patient per quarter: an MRSA isolate is not reported if it is isolated subsequent to an MSSA isolate within the same quarter), was 0.14 per 1000 bed days in 2003 and 0.15 in 2004. By comparison, the rate in England for the period April 2003 to March 2004 was 0.17 per 1000 bed days while the rate in Scotland was 0.15 per 1000 bed days between July 2002 and June 2003.[2,3] The rates in England and Scotland are broadly similar to that found in Ireland but are calculated using a different case definition (an episode of MRSA bacteraemia is counted every 14 days). In Scotland, the system of data collection has recently been changed by combining data from two separate surveillance systems (from Scottish Centre for Infection and Environmental Health's MRSA Reporting System and EARSS) to ensure more complete and accurate reporting on MRSA bacteraemia and this will result in slightly higher reported rates.[4]

Ireland has one of the highest proportions of MRSA in Europe (see figure 3). Between 1999 and 2002, the proportion of MRSA increased from 39% to 43%, however, this trend was borderline approaching significance (χ^2_{trend}=3.14; P=0.08). Since 2002, the proportion has stabilised and even decreased slightly. Other countries reporting high proportions of MRSA in 2004 include the UK, France, Spain, Portugal, Italy and Greece, although the proportions in Ireland and the UK seem to have levelled off in recent years. The lowest proportions are still observed in the Netherlands and the Nordic countries. Between 2000 and 2003, EARSS reported that the Netherlands, Belgium, Germany and Portugal have seen significant increases in the proportion of MRSA. Increases were also observed in the Nordic countries but at a lower level. This trend is worrying according to EARSS as "a low threshold for losing control may exist but is not well defined".[1] A recent report by the Scandinavian Society for Antimicrobial Chemotherapy also indicates that the level of MRSA, from both colonized and infected individuals, is increasing throughout the Nordic countries.[5]

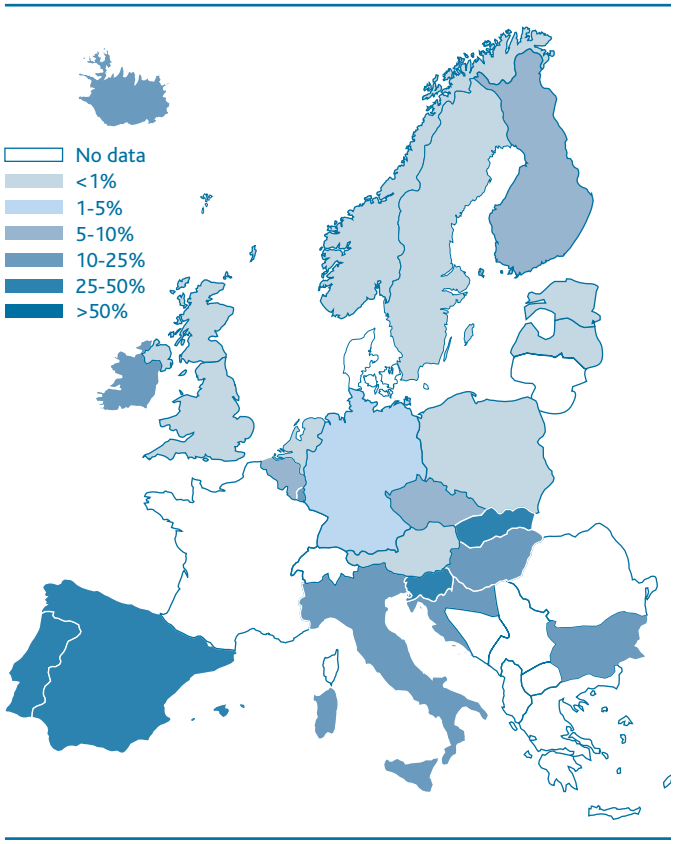

Figure 5. Map illustrating the distribution of PNSP in EARSS countries in 2004.

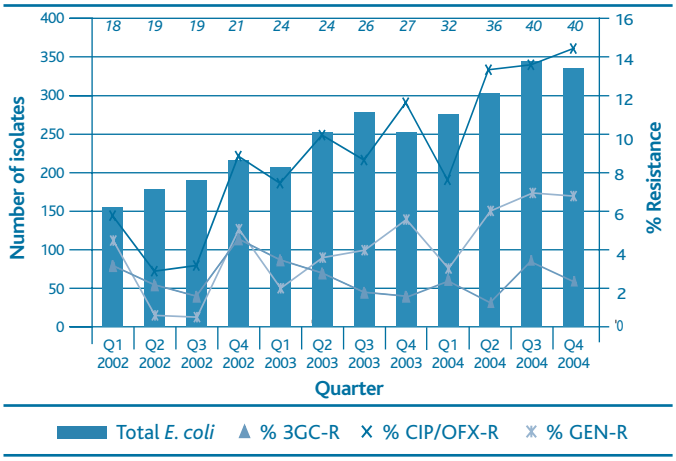

Figure 6. Trends for E. coli by quarter for 2004 – total numbers of E. coli and percentage resistance to 3GCs, ciprofloxacin/ofloxacin (CIP/OFX) and gentamicin (GEN). Number of participating laboratories is indicated for each quarter

Streptococcus pneumoniae

In 2004, 400 reports of *S. pneumoniae* isolates from bacteraemia/meningitis were received from 28 laboratories (see table 1). The majority of isolates (n=395) were from blood but five were from CSF. Forty-one isolates (10.3%) were PNSP. By comparison, the proportion of *S. pneumoniae* isolates that were penicillin-non-susceptible in 2003 was 11.8%.

As in previous years, a seasonal variation was seen in the numbers of *S. pneumoniae* isolates reported with a trough in Q3, reflecting the quieter summer period (see figure 4).
Of the 41 PNSP isolates reported, MIC data for penicillin and cefotaxime were available for 35 and 29 isolates, respectively. Seven isolates were found to be high-level penicillin resistant (MIC,>=2 mg/L) and the remaining 28 isolates of the 35 tested were determined to have intermediate levels of resistance (MIC, 0.12–1.0 mg/L). No MICs were available for six PNSP isolates. One isolate from blood was intermediately resistant to cefotaxime according to Clinical Laboratory Standards Institute (CLSI, formerly NCCLS) non-meningitis breakpoints (MIC, 2 mg/L) in addition to being high-level resistant to penicillin (MIC, 2 mg/L). Another isolate from CSF was also intermediately resistant to cefotaxime (see below). The remaining 27 isolates of the 29 tested were susceptible to cefotaxime (MIC,<=1 mg/L).

One additional isolate was reported to be oxacillin-resistant on screening by disc diffusion but was subsequently found to be penicillin-susceptible on MIC testing (MIC, 0.064 mg/L). This highlights the importance of MIC testing on all isolates that appear to be non-susceptible on the initial screening test.

Data on susceptibility to erythromycin were available for 388 isolates. Fifty-five (14.2%) were reported to be resistant. By comparison, 11.6% of isolates in 2003 were erythromycin-resistant.

Twelve isolates were resistant to erythromycin in addition to being non-susceptible to penicillin, of which 10 were intermediate and one was high-level resistant (HLR). No MICs were available for the remaining isolate.

The median age of patients with invasive *S. pneumoniae* infection was 58 years (95% CI, 53-61 years). The difference in the median ages of patients with PNSP [66 years (95% CI, 51-66 years)] and penicillin-susceptible *S. pneumoniae* (PSP) [57 years (95% CI, 44-75 years)] was not considered to be significant as the CIs overlapped. There were approximately equal numbers of *S. pneumoniae* isolates from males and females (51.5% and 48.5%, respectively; z-test=0.61, P=0.55).

Of the five CSF isolates reported in 2004, one (from a six-month old child) was intermediately resistant to both penicillin (MIC, 0.75 mg/L) and cefotaxime (MIC, 0.75 mg/L, interpreted using CLSI meningitis breakpoints). The other four isolates (one from a six-month old child and three from adults aged 32, 64 and 77 years, respectively) were susceptible to penicillin.

The crude incidence of IPD in Ireland was estimated to be 10.4 per 100,000 population, which is the same as reported in 2003. The corresponding figures for 1999, 2000, 2001 and 2002 were 8.2, 7.8, 8.1 and 8.8 per 100,000 population, respectively. By comparison, the rates of invasive

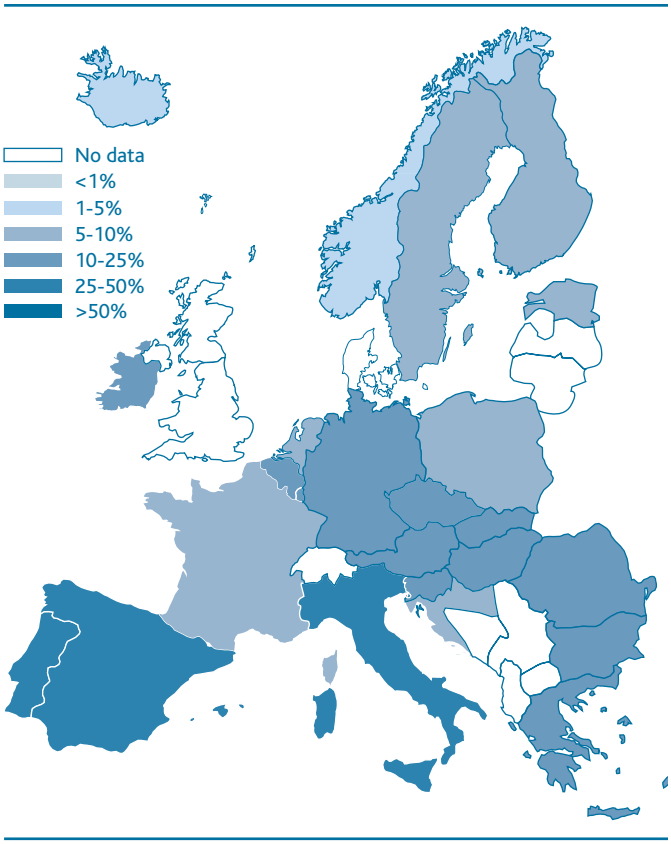

Figure 7. Map illustrating the distribution of resistance to fluoroquinolones among E. coli in EARSS countries in 2004

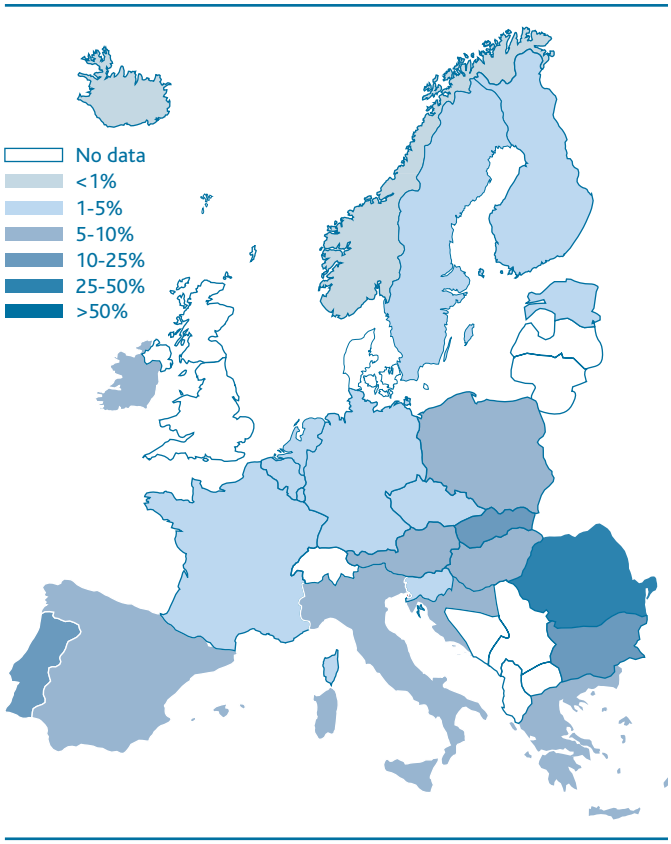

Figure 8. Map illustrating the distribution of resistance to aminoglycosides among E. coli in EARSS countries in 2004

pneumococcal disease reported in England and Wales in 1999 and 2000 were 8.6 and 8.9 per 100,000 population, respectively.[6,7] In Scotland, the overall incidence of IPD between 1999 and 2001 was found to be 11 per 100,000.[8] In 2004, the crude incidence rates of IPD in Ireland in children less than 5 years and adults aged 65 years and older were 24.1 and 37.6 per 100,000 population, respectively. These figures compare with projected rates of 21.0 and 37.9 per 100,000 population, respectively, in the US in 2004, with an overall projected national rate 12.6 per 100,000 population.[9]

The proportion of PNSP in Ireland has decreased significantly over the six years of surveillance of this pathogen (see figure 4): from 19% in 1999 to just over 10% in 2004 (χ^2_{trend}=5.81; P=0.02). The proportions of both PNSP and erythromycin-resistant *S. pneumoniae* in Ireland are at moderate levels compared to other countries reporting to EARSS (see figure 5). The highest proportions of both are observed in Spain and Slovakia.

Escherichia coli

In 2004, 1256 reports of *E. coli* isolates from bacteraemia/meningitis were received from 37 laboratories (see table 1). The majority of isolates (n=1252) were from blood but four were from CSF.

The proportions of isolates reported to be resistant to ampicillin, 3GCs, fluoroquinolones and gentamicin were 65.0%, 2.4%, 12.5% and 5.7%, respectively, compared with 61.9%, 2.4%, 9.5% and 3.9%, respectively, reported in 2003.

The total numbers of *E. coli* isolates and proportion of resistance reported by quarter for 3GCs, fluoroquinolones and gentamicin are shown in figure 6.
Sixty-six isolates were identified as MDR [defined as resistance to three or more of the mandatory antibiotics (ampicillin, 3GCs, fluoroquinolones and gentamicin)]:

- ten isolates were resistant to ampicillin, 3GCs, fluoroquinolones and gentamicin. Five of these were ESBL-positive
- forty-four were resistant to ampicillin, fluoroquinolones and gentamicin
- twelve were resistant to ampicillin, 3GCs and fluoroquinolones. Six of these were ESBL-positive

MDR isolates accounted for 5.6% of all *E. coli* isolates tested against all four mandatory antibiotic groups in 2004 compared with 3.6% (34 isolates) in 2003 and 2.4% (17 isolates) in 2002. The increase in MDR *E. coli* was found to be significant (χ^2_{trend}= 12.53; P<0.001).

In total, 861 (69%) of the 1256 isolates were examined for the presence of ESBLs (compared with 58% in 2003). ESBLs were detected in 11 (1.3%) of these (compared with 1.9% in 2003).

The median age of patients with invasive *E. coli* infection was 71 years (95% CI, 70-72 years). The difference in the median ages of patients with MDR [67 years (95% CI, 63-72 years)] and non-MDR strains [71 years (95% CI, 70-73 years)] was not considered to be significant as their CIs overlapped.

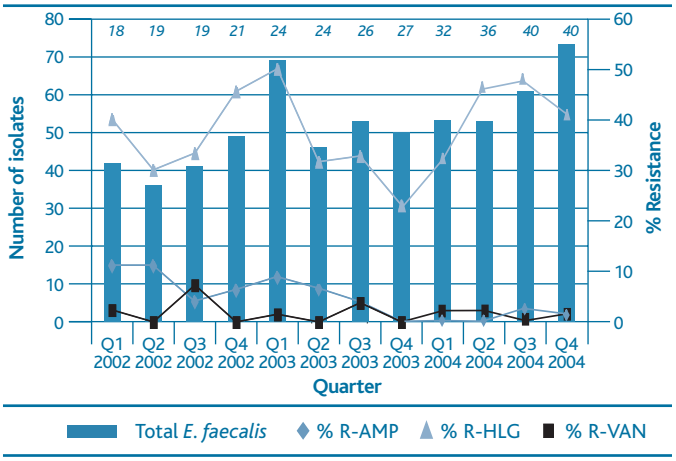

Figure 9. Trends for E. faecalis by quarter for 2004 – total numbers of E. faecalis and percentage resistance to ampicillin (AMP), high-level gentamicin (HLG) and vancomycin (VAN). Number of participating laboratories is indicated for each quarter

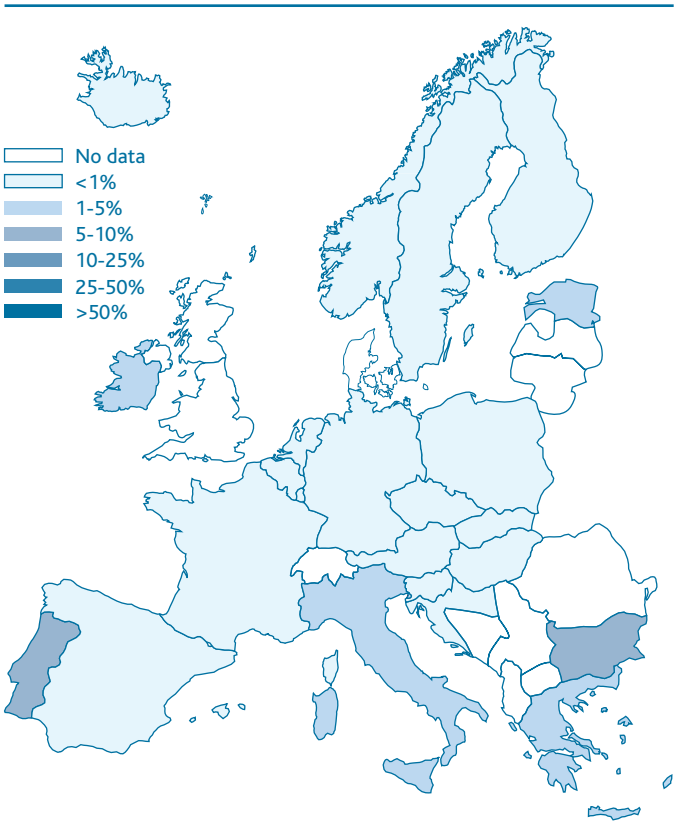

Figure 10. Map illustrating the distribution of resistance to glycopeptides among E. faecalis in EARSS countries in 2004.

Overall, there were more isolates from females than from males (58% versus 42%; z-test=-5.9, P<0.0001). However, there were more MDR isolates from males than from females but this was not statistically significant (56% versus 44%; z-test=0.99, P=0.32).

The four CSF isolates, from patients aged 1, 46, 60 and 86 years, respectively, were resistant to ampicillin but susceptible to 3GCs, fluoroquinolones and gentamicin.

Between 2001 and 2003, an increasing trend in resistance to 3GCs and fluoroquinolones in *E. coli* was observed in seven and 15 European countries, respectively.[1] Ireland has seen an increase in the proportions of resistance to fluoroquinolones (x^2_{trend}=26.06; P<0.0001) and gentamicin (x^2_{trend}=10.11; P=0.001) over the 3 years of surveillance of this pathogen (see figures 7 and 8). The increase in gentamicin resistance is unlike the trend reported elsewhere in Europe. The apparent increase and spread of 3GC resistance in other countries coincides with numerous reports of a particular class of ESBL (CTX-M) in *E. coli*. This increase in 3GC resistance has not yet been seen in Ireland. The lowest proportions of resistance were observed in the Scandinavian countries while the highest proportions were seen in Southern and Eastern Europe.

Enterococcus faecalis

In 2004, 242 reports of *E. faecalis* isolates from bacteraemia were received from 26 laboratories (see table 1).

The total numbers of *E. faecalis* isolates and proportion of resistance reported by quarter for ampicillin, HLG and vancomycin are shown in figure 9.

Two isolates (0.8%) were reported to be ampicillin-resistant (compared to 5% in 2003). Ampicillin resistance in *E. faecalis* is unusual and further investigation of these isolates is warranted to confirm their identity as it is generally acknowledged that speciation of enterococci can be problematic.

Ninety-two isolates (42%) of the 218 tested were reported to be HLG resistant, of which 44 were confirmed by MIC determination. By comparison, 34% of isolates were reported to be HLG resistant in 2003.

Three isolates (1.3%) were reported to be vancomycin resistant (not confirmed by MIC). Two of these were also resistant to teicoplanin (teicoplanin was not reported on the third isolate). By comparison, 1.4% of isolates were vancomycin-resistant in 2003.

No isolates were resistant to all three indicator antibiotics (ampicillin, HLG and vancomycin).

The median age of patients with *E. faecalis* bacteraemia was 66 years (95% CI, 62-69 years). There were more isolates from males than from females (61% versus 38%, respectively; z-test=3.66, P<0.001).

Although the proportion of vancomycin-resistant *E. faecalis* (VREfa) in Ireland is low, it is still higher than that reported in most other countries reporting to EARSS (see figure 10). From 2002 to 2003, the proportion of VREfa decreased from 2.4% to 1.4% but was not significant (Yates' corrected x^2=0.11, P=0.79). Resistance to HLG among *E. faecalis* is

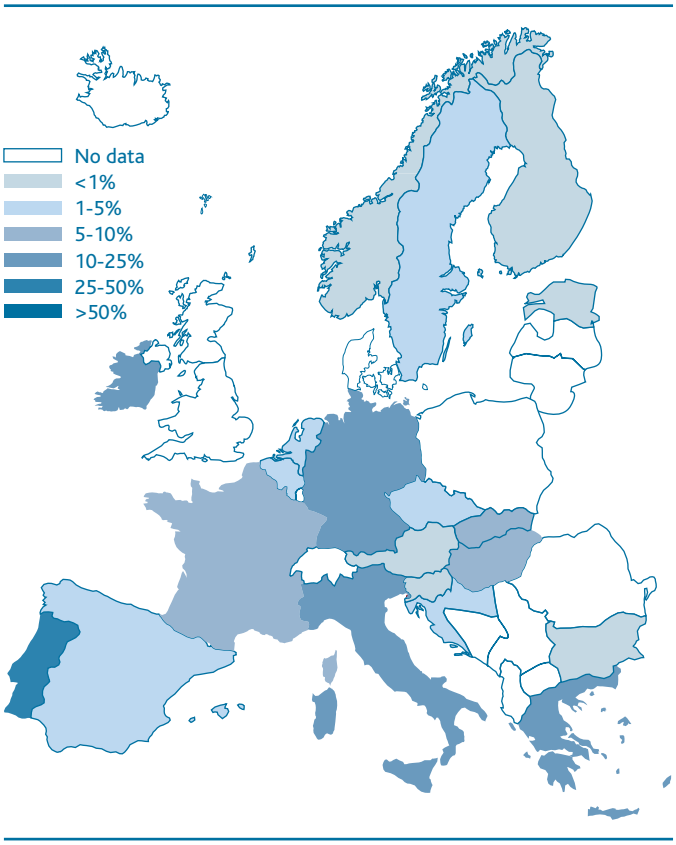

Figure 12. Map illustrating the distribution of resistance to glycopeptides among E. faecieum in EARSS countries in 2004

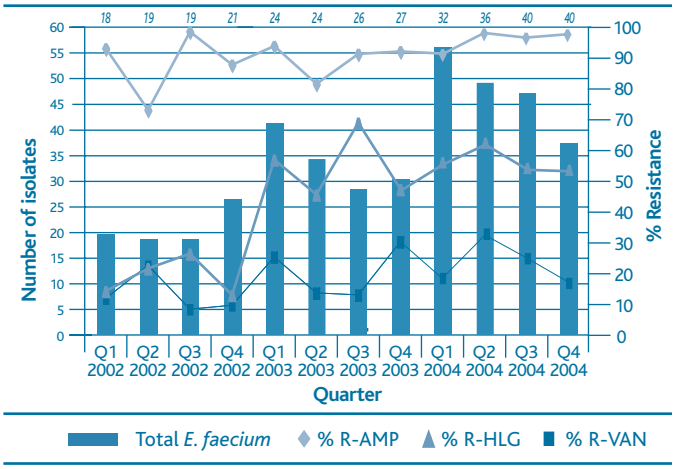

Figure 13. Trends for E. faecium by quarter for 2004– total numbers of E. faecium and percentage resistance to ampicillin (AMP), high-level gentamicin (HLG) and vancomycin (VAN). Number of participating laboratories is indicated for each quarter

common throughout Europe. There was no obvious trend in HLG resistance in Ireland between 2002 and 2004.

Enterococcus faecium

In 2004, 187 reports of *E. faecium* isolates from bacteraemia were received from 21 laboratories (see table 1).

The total numbers of *E. faecium* isolates and proportion of resistance reported by quarter for ampicillin, high-level gentamicin and vancomycin are shown in figure 11.

The proportions of isolates reported to be resistant to ampicillin, HLG and vancomycin were 96%, 58% and 23%, respectively, compared with 91%, 55% and 19%, respectively, in 2003. Globally, most *E. faecium* are ampicillin-resistant.

Thirty-three of the 43 isolates reported as resistant to vancomycin were additionally tested for susceptibility to teicoplanin: 24 were resistant, four were intermediately-resistant and five were susceptible. One isolate was reported as intermediately-resistant to teicoplanin (with no result for vancomycin).

Thirty-three isolates were resistant to ampicillin, HLG (13 confirmed by MICs) and vancomycin (17 confirmed by MICs). Such MDR isolates accounted for 18% of all *E. faecium* reported in 2004 compared with 17% in 2003.

The median age of patients with *E. faecium* bacteraemia was 63 years (95% CI, 59-66 years). The differences in the median ages of patients with vancomycin-resistant [59 years (95% CI, 51-65 years)] versus vancomycin-susceptible *E. faecium* [64 years (95% CI, 60-67 years)] and MDR [59 years (95% CI, 47-70 years)] and non-MDR strains [64 years (95% CI, 60-67 years)] were not considered to be significant as their CIs overlapped. There were more isolates from males than from females (57% versus 42%, respectively; z-test =2.08, P=0.04).

Ireland had one of the highest proportions of vancomycin-resistant *E. faecium* (VREfm) in Europe in 2004 (see figure 12). The majority of countries reported proportions of <5% for vancomycin resistance. Of countries reporting to EARSS, only Portugal had a higher proportion of VREfm. The proportion of VREfm increased from 11% in 2002 to 23% in 2004 (χ^2_{trend}=5.01; P=0.03). This increase is of borderline significance and is supported by the overlapping confidence intervals. Ireland also had one of the highest proportions of resistance to HLG. Between 2002 and 2003, there was a significant increase in the proportion of HLG resistance from 17% to 55% (χ^2=13.6; P<0.001). Between 2003 and 2004, there was a slight increase from 55% to 58% but this was not significant (χ^2=0.25; P=0.61).

Additional Information

The quarterly EARSS Newsletters and other useful reports and documents produced by HPSC can be accessed on the HPSC website at: http://www.hpsc.ie/A-Z/Microbiology AntimicrobialResistance/EuropeanAntimicrobialResistanceSurveillanceSystemEARSS/MainBody,1137,en.html
Antimicrobial resistance data, including the most up-to-date maps (in full colour) showing the distributions of resistance, for all five pathogens surveyed in the 28 countries participating in this surveillance system can be obtained from

Table 1. Summary of EARSS data by pathogen over the period 1999-2004 (with total numbers of isolates reported and proportion (%) resistance to the key antibiotics).

	1999	2000	2001	2002	2003	2004
Max. no. of labs	12	19	20	23	28	41
by year end						
S. aureus						
No. of isolates	510	639	815	1042	1140	1323
Meticillin	38.8%	39.0%	41.3%	42.7%	42.1%	41.8%
S. pneumoniae						
No. of isolates	157	201	245	278	364	400
Penicillin	19.1%	12.9%	12.2%	11.5%	11.8%	10.3%
Erythromycin*	13.4%	12.0%	12.6%	12.7%	11.6%	14.2%
E. coli						
No. of isolates				741	991	1256
3GC*				3.0%	2.4%	2.4%
Ciprofloxacin*				5.4%	9.5%	12.5%
Gentamicin*				2.7%	3.9%	5.7%
E. faecalis						
No. of isolates				168	218	242
Vancomycin*				2.4%	1.4%	1.3%
HLG*				39.2%	34.1%	42.2%
E. faecium						
No. of isolates				85	135	187
Vancomycin*				11.1%	19.4%	23.2%
HLG*				16.7%	54.7%	57.8%

** Not all isolates tested; 3GC, 3rd Generation Cephalosporin (e.g. cefotaxime, ceftriaxone, ceftazidime); HLG, High-Level Gentamicin*

the interactive database available on the EARSS website at: http://www.earss.rivm.nl/PAGINA/interwebsite/home_earss.html

The impact of the first five years of EARSS in Ireland, which was instrumental in the development of a national antimicrobial resistance surveillance programme, is discussed in a recent report.[10]

Enhanced Surveillance of EARSS Pathogens

As well as resistance data, as collected under the EARSS protocol, collection of additional information, both clinical and demographic, was identified as vital in understanding the factors affecting the acquisition of bloodstream infections in Ireland. This in turn could offer input into future infection control measures both nationally and in those hospitals that participate in the surveillance scheme. Comprehensive enhanced data were collected on EARSS pathogens causing bloodstream infections in Ireland for the first time in 2004.

Hospitals voluntarily contributing to the enhanced survey were asked to supply a completed questionnaire for each isolate from blood culture on a quarterly basis. The fields included were patient age/sex, admission and specimen dates, inter-hospital transfers, clinical significance, risk factors, primary source and secondary foci. Clinical and scientific staff at the microbiology departments of contributing institutions completed the forms after obtaining the data from a variety of hospital systems.

Seven laboratories contributed to the enhanced surveillance on 985 records that were matched to the resistance data on the EARSS dataset. The resistance profiles of these isolates were found to be representative of equivalent blood culture isolate data for all the EARSS participating hospitals for 2004. The breakdown of the number of records for each organism was as follows: *S. aureus* 426 (MRSA 193, 45%), *S. pneumoniae* 90 (PNSP 13, 14%), *E. coli* 311, *E. faecalis* 81 (VRE 1, 1%) and *E. faecium* 77 (VRE 21, 27%).

Contributing hospitals specified if the infection was hospital or community acquired. *S.aureus* bacteraemia was hospital-acquired in 64% of known cases (MRSA 81% and MSSA 61%). Similarly, *S. pneumoniae* was noted as hospital-acquired in 10%, *E. coli* in 47% and enterococci in 82%. During the feedback of data some contributing hospitals indicated that a number of episodes were incubating at the time of admission as a result of inter-hospital transfer and in cases where the infections may have been acquired through care received in long-term care facilities and other healthcare settings. The data collection protocol will be modified to include healthcare-associated category for subsequent years.

The age distribution analysis showed that the burden of infection for all of the pathogens is on the very young and especially the old. The probability of isolating MRSA as opposed to MSSA in blood cultures from patients of age 65 or over (59%) is nearly twice that in younger patients (33%, P<0.001, RR=1.79). This probably reflects a combination of greater exposure to healthcare, increased likelihood of serious underlying medical conditions and waning immunity among older persons.

Among primary sources of *S. aureus* bacteraemia, central venous catheter (CVC) usage was by far the most commonly noted (47% of known sources), followed by respiratory tract (11%) and skin/soft tissue (18%) infections. The proportion of isolates that were MRSA among these three main sources of *S. aureus* bacteraemia was widely different: CVC 48% (which is close to the overall level of 45% MRSA in the study), respiratory tract 61% (which is higher although without reaching statistical significance at P=0.08) and skin/soft tissue infections 29% (which is significantly lower than the overall level with P=0.005). These differences probably reflects the fact that MRSA infection is most likely to occur in patients who have a prolonged hospital stay or have significant underlying medical conditions. Respiratory tract was usually the primary source for *S. pneumoniae* bacteraemia (97% of known sources). Urinary tract with or without catheter (61%) and intra-abdominal/gastro-intestinal tract (27%) were commonly the sources for *E. coli* bacteraemia, and intra-abdominal/gastro-intestinal tract (36%) was a common source of enterococcal bloodstream infections along with CVC usage (also 36%).

One or more known risk factors were noted for each infection. Major factors affecting *S. aureus* bloodstream infections, with varied proportions of MRSA, were: haemodialysis (52%, P=0.09), recent surgery (49%, P=0.4) and treatment in intensive care unit (58%, P=0.02). Malignancies and immunosuppression were collectively by far the most common risk factors associated with the acquisition of EARSS pathogens. For *E. coli* and enterococci, stay in intensive care unit and recent surgery were frequently recorded.

Secondary foci were largely non-identifiable however bone/joints and the cardiovascular system (endocarditis) for *S. aureus* were noted in nine of the cases.

In conclusion, the study of factors affecting acquisition of infections caused by EARSS pathogens has shown that surveillance could explain some aspects of the dynamics of the rates of bacteraemia, which are a reflection of hospitals regularly treating patients with certain case-mix profiles. In the upcoming year data on outcomes (death or discharge) will also be collected and analysis of these along with length of stay should shed more light on the impact of EARSS pathogens.

The Future

From 1st July 2005, EARSS is expanding to include two additional pathogens, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*. All Irish laboratories wishing to participate are invited to contribute data from 1st October 2005 (corresponding with the start of Quarter 4).

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Infectious Disease Notifications, 2004

Key Points

- **An amendment to the Infectious Diseases Regulations that came into effect on the 1st January 2004**
  - **introduced a revised and extended list of notifiable diseases**
  - **legally obliges clinicians and diagnostic laboratories to notify infectious diseases**
  - **introduced case definitions for the first time in Ireland**
- **Infectious disease notifications in 2004 increased by 62% compared to 2003**
- **Hepatitis C and noroviral infection notifications mainly accounted for this increase**
- **A mumps outbreak commenced towards the end of 2004, this also contributed to the increase in total notifications**

Introduction

The Health Act, 1947 entitles the Minister for Health and Children to specify by regulation diseases that are infectious, covered by legislation and that require notification to a medical officer of health. The infectious diseases notifiable in Ireland are regulated in the 1981 Infectious Diseases Regulations, which were revised in 1985, 1988, 1996 and 2003. An amendment (S.I. No. 707 of 2003) to these regulations that came into effect on 1st January 2004 brought in important changes in the infectious diseases legislation in Ireland.[1] In summary, these amended regulations: (1) specified a revised and expanded list of notifiable diseases (2) introduced a requirement, for the first time, for clinical directors of diagnostic laboratories to notify infectious diseases (3) introduced the use of case definitions for infectious diseases for the first time in Ireland and (4) specified that unusual clusters or changing patterns of illness that may be of public health concern must be reported.

Under the legislation, as soon as a medical practitioner becomes aware of or suspects that a person is suffering from or is a carrier of an infectious disease specified in the regulations, or as soon as a clinical director of a diagnostic laboratory identifies an infectious disease specified in the regulations, he/she is required to provide a written or electronic notification to a Medical Officer of Health. For a subset of diseases that have serious public health implications, medical practitioners/laboratory directors are required to give immediate preliminary notification (e.g. by phone) to the medical officer.[1]

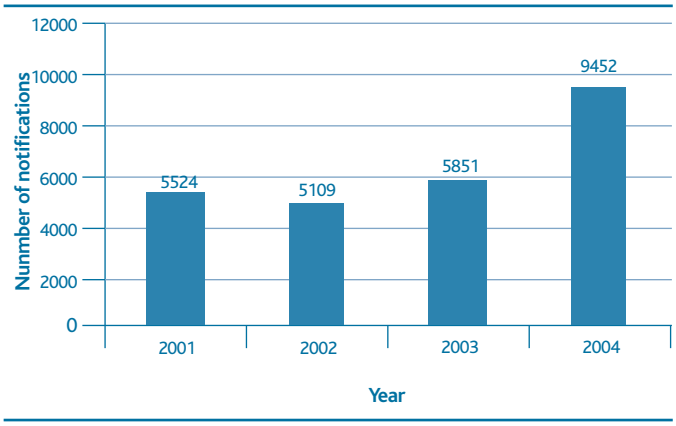

Figure 1. Number of infectious disease notifications received, 2001 – 2004 (Please note the EARSS, STI and TB data are not included in these figures).

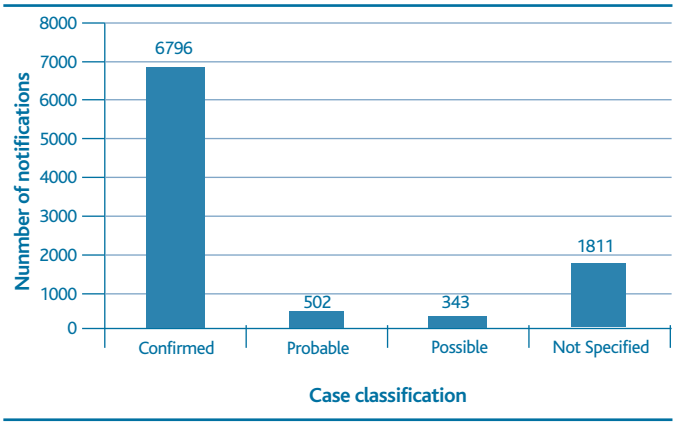

Figure 2. Infectious disease notifications received, in 2004 by case classification (Please note the EARSS, STI and TB data are not included in these figures).

The health boards forward these notification data to HPSC on a weekly basis, where a weekly infectious disease report on national data is produced. National surveillance allows infectious disease trends to be monitored, provides information about the need for, and impact of, infectious disease prevention and control programmes, guides infectious disease policy development and allows Ireland to meet international reporting requirements such as providing infectious disease data to EU disease specific networks and the World Health Organisation (WHO).

This review summarises the 2004 weekly infectious disease notification data.

Materials and Methods

Medical officers in the health boards provide case based data to the Director of HPSC by the Wednesday of each week, on infectious diseases notified to them during the previous week, using an agreed dataset.[2] Case classifications are assigned to notifications as per the Case Definitions for Notifiable Diseases.[3]

Infectious disease notifications received during 2004 were inputted on a Microsoft Access database. In February 2005 HPSC commenced using the Computerised Infectious Disease Reporting (CIDR) system. Historical notifiable infectious disease data since 1988 were migrated from the Microsoft Access system to CIDR. Extensive data cleaning and validation of 2004 infectious diseases data was undertaken with the Departments of Public Health. Any revisions and updates to 2004 data were made on the CIDR system. The figures presented in this report are based on data from the CIDR system as of the 30th September 2005.
Data analysis was performed using Business Objects and Microsoft Excel. Incidence rates were calculated using population data taken from the 2002 census.

Notifiable infectious diseases in 2004, excluding three of the European Antimicrobial Resistance Surveillance System (EARSS) diseases (enterococcal bacteraemia, *Escherichia coli* infection (invasive) and *Staphylococcus aureus* bacteraemia), sexually transmitted infections (STIs) and tuberculosis (TB) are presented in this chapter. Reports on the EARSS, STI and TB data are included as separate chapters within this document. A report on infectious disease outbreaks is also included elsewhere in this document.

Results

Notifiable infectious diseases

There were 9452 infectious disease notifications reported during 2004, representing a 62% increase in notifications compared to 2003. In the years prior to the changes in the infectious diseases legislation the number of notifications had not fluctuated greatly; from 2001 to 2003 the number of notifications ranged between 5000 and 6000 annually (figure 1). Hepatitis C and noroviral infection notifications mainly accounted for the increase in total notifications in 2004.

Case classification was assigned for 81% of the notifications in 2004. Seventy-two percent were classified as confirmed, five

Table 1. Number of notifiable infectious diseases by health board in 2004

Inectious disease	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total 2004
Acute anterior poliomyelitis	0	0	0	0	0	0	0	0	0
Acute infectious gastroenteritis	618	161	93	116	59	320	450	100	1917
Anthrax	0	0	0	0	0	0	0	0	0
Bacillus cereus food-borne infection/intoxication	0	0	0	0	0	0	0	0	0
Bacterial meningitis (not otherwise specified)	16	3	4	2	3	4	1	4	37
Botulism	0	0	0	0	0	0	0	0	0
Brucellosis	0	1	57	1	0	0	1	0	60†
Campylobacter infection	591	134	107	113	92	194	240	240	1711
Cholera	0	0	0	0	0	0	0	0	0
Clostridium perfringens (type A) food-borne disease	2	0	0	0	0	1	2	0	5
Creutzfeldt Jakob disease	**	**	**	**	**	**	**	**	4
Creutzfeldt Jakob disease (new variant)	0	0	0	0	0	0	0	0	0
Cryptosporidiosis	23	62	45	30	41	80	74	77	432
Diphtheria	0	0	0	0	0	0	0	0	0
Echinococcosis	0	0	0	0	0	0	0	0	0
Enterohaemorrhagic *Escherichia coli*	12	2	6	11	9	6	11	10	67
Giardiasis	25	3	4	2	1	3	9	6	53
Haemophilus influenzae disease (invasive)	16	3	3	1	1	5	7	2	38
Hepatitis A (acute)	30	2	2	3	0	1	5	4	47
Hepatitis B (acute and chronic)	507	19	60	38	5	56	57	55	797
Hepatitis C	954	21	33	22	5	30	45	44	1154
Influenza	14	2	42	2	6	6	6	2	80
Legionellosis	**	**	**	**	**	**	**	**	4
Leptospirosis	6	1	1	2	1	2	1	1	15
Listeriosis	5	1	2	0	0	1	0	2	11
Malaria	12	3	1	2	0	5	2	2	27
Measles	223	10	10	17	22	9	26	13	330
Meningococcal disease	62	10	16	20	17	28	34	12	199
Mumps	96	111	12	13	112	9	16	55	424
Noroviral infection	568	29	235	36	72	45	79	64	1128
Paratyphoid	**	**	**	**	**	**	**	**	4
Pertussis	37	0	22	1	4	5	14	10	93
Plague	0	0	0	0	0	0	0	0	0
Q fever	1	1	4	0	0	0	0	1	7
Rabies	0	0	0	0	0	0	0	0	0
Rubella	24	4	1	4	4	5	3	4	49
Salmonellosis	162	48	21	30	18	43	56	37	415
Severe Acute Respiratory Syndrome (SARS)	0	0	0	0	0	0	0	0	0
Shigellosis	23	0	2	2	2	18	8	2	57
Smallpox	0	0	0	0	0	0	0	0	0
Staphylococcal food poisoning	**	**	**	**	**	**	**	**	3
Streptococcus group A infection (invasive)	25	0	1	1	0	7	1	0	35
Streptococcus pneumoniae infection (invasive)	72	3	14	25	3	42	9	6	174
Tetanus	**	**	**	**	**	**	**	**	1
Toxoplasmosis	20	3	2	0	3	2	0	3	33
Trichinosis	0	0	0	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0	0	0	0
Typhoid	3	0	0	0	1	0	2	1	7
Typhus	0	0	0	0	0	0	0	0	0
Viral encephalitis	2	1	0	0	2	0	0	0	5
Viral haemorrhagic fevers	0	0	0	0	0	0	0	0	0
Viral meningitis	9	3	3	1	3	1	2	1	23
Yellow fever	0	0	0	0	0	0	0	0	0
Yersiniosis	3	0	0	0	0	0	2	1	6

NN - Not specified as a notifiable disease prior to 2004

† See section on brucellosis

**Prior to 2004 meningococcal disease was not specified as a notifiable disease. In 2003 there were 74 non-meningococcal and 237 meningococcal notifications under t category bacterial meningitis (including meningococcal septicaemia)*

***Data not reported to health board level when total figures for Ireland less than five cases*

‡ Of the 11 Typhoid and Paratyphoid notifications in 2003, four were paratyphoid and seven were typhoid notifications Please note the EARSS, STI and TB data are n report. Data on these diseases can be found in separate chapters in this document

Table 2. Number of notifiable infectious diseases by age group (years) in 2004

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	1756	27	11	9	10	21	22	12	8	16	25	1917
Bacterial meningitis (not otherwise specified)	17	1	1	4	0	5	2	4	1	1	1	37
Brucellosis	0	1	0	1	3	2	16	19	9	9	0	60
Campylobacter infection	492	110	60	72	142	286	164	126	102	144	13	1711
Clostridium perfringens (type A) food-borne disease	2	0	1	0	0	0	0	0	0	2	0	5
Creutzfeldt Jakob disease	0	0	0	0	0	0	0	1	1	2	0	4
Cryptosporidiosis	259	69	21	11	10	20	17	6	1	14	4	432
Enterohaemorrhagic *Escherichia coli*	22	6	4	4	2	2	8	6	3	7	3	67
Giardiasis	10	5	2	1	5	9	8	6	5	1	1	53
Haemophilus influenzae disease (invasive)	10	3	0	0	0	5	3	4	3	10	0	38
Hepatitis A (acute)	9	1	4	1	4	9	11	3	1	1	3	47
Hepatitis B (acute and chronic)	6	3	4	52	144	377	134	39	16	12	10	797
Hepatitis C	6	1	3	15	168	519	273	108	33	14	14	1154
Influenza	21	7	5	4	1	5	6	7	9	15	0	80
Legionellosis	0	0	0	0	0	0	0	1	1	2	0	4
Leptospirosis	0	0	0	2	2	4	1	5	1	0	0	15
Listeriosis	0	0	0	0	0	2	2	1	2	3	1	11
Malaria	4	4	1	0	0	6	5	4	2	1	0	27
Measles	252	49	12	3	5	4	1	2	0	0	2	330
Meningococcal disease	129	16	9	21	11	5	2	2	2	2	0	199
Mumps	22	8	23	116	130	45	16	7	4	2	51	424
Noroviral infection	95	7	5	7	5	39	35	45	90	765	35	1128
Paratyphoid	0	0	0	1	1	2	0	0	0	0	0	4
Pertussis	65	10	10	2	0	1	1	1	1	0	2	93
Q fever	2	0	0	0	1	0	3	0	0	1	0	7
Rubella	38	4	3	0	0	2	0	0	0	0	2	49
Salmonellosis	82	31	17	24	40	67	45	42	34	32	1	415
Shigellosis	10	6	1	0	5	9	8	8	7	3	0	57
Staphylococcal food poisoning	2	0	1	0	0	0	0	0	0	0	0	3
Streptococcus group A infection (invasive)	4	3	0	1	1	7	3	0	3	13	0	35
Streptococcus pneumoniae infection (invasive)	40	5	4	0	1	5	23	13	24	57	2	174
Tetanus	0	0	0	0	0	0	0	1	0	0	0	1
Toxoplasmosis	0	1	0	5	3	11	8	3	0	1	1	33
Typhoid	1	2	0	1	0	2	1	0	0	0	0	7
Viral encephalitis	1	1	2	0	0	0	0	0	0	0	1	5
Viral meningitis	8	3	4	1	1	2	1	2	0	0	1	23
Yersiniosis	3	0	1	0	0	1	0	0	0	1	0	6
Total	3368	384	209	358	695	1474	819	478	363	1131	173	9452

Please note the EARSS, STI and TB data are not included in this report. Data on these diseases can be found in separate chapters in this document

percent as probable, four percent as possible, while 19% had no case classification assigned (figure 2).

The breakdown of infectious diseases notified in 2004 by health board, age group, sex and case classification are presented in tables 1 - 4. Please note that notifiable diseases with no cases in 2004 are not presented in tables 2 - 4.

No cases of acute anterior poliomyelitis, anthrax, *Bacillus cereus* food-borne infection/intoxication, botulism, cholera, nvCJD, diphtheria, echinococcosis, plague, rabies, SARS, smallpox, trichinosis, tularemia, typhus, viral haemorrhagic fevers or yellow fever were notified during 2004.

Acute infectious gastroenteritis

During 2004, 1917 cases (48.9/100,000) of acute infectious gastroenteritis were notified. The majority were due to rotavirus (1611, 84%) while the remainder were unspecified gastroenteritis cases (306, 16%). Ninety-two percent of the notifications were in the age group 0-4 years.

Acute infectious gastroenteritis was first specified as a notifiable infectious disease in 2004; only cases of rotavirus and gastroenteritis unspecified are notifiable under this disease category while cases of giardia, cryptosporidiosis and norovirus are specified as separate notifiable diseases. Prior to 2004 cases of gastroenteritis were only notifiable under the disease category gastroenteritis (when contracted by children under two years of age). In 2003, 1835 cases of gastroenteritis were notified, these notifications included cases of rotavirus and gastroenteritis unspecified as well as cases of adenovirus, cryptosporidiosis, giardia and norovirus in those less than two years of age. In total during 2004 there were 1694 notifications of acute infectious gastroenteritis, cryptosporidiosis, giardiasis and norovirus in this age group.

Bacterial meningitis (not otherwise specified)

During 2004, 37 bacterial meningitis (not otherwise specified) cases were notified. Enhanced surveillance of bacterial

meningitis (including meningococcal septicaemia) commenced in Ireland in 1997. Data obtained through this enhanced surveillance system, during 2004, are presented in the meningococcal disease chapter within this document.

Brucellosis

During 2004, 60 cases of brucellosis were notified. Case classification was provided for 59 of the 60 brucellosis notifications; two were classified as confirmed cases while 57 were classified as probable cases. The number of notifications in 2004 appears to be a significant increase on the previous ten years, but it is important to bear in mind that cases are now being notified by laboratories that would previously have gone unreported and the notifications classified as probable may be a reflection of past infection rather than acute infection as laboratory reports were based on an isolated high titre result. Fifty-two of the cases in 2004 were male (87%) while eight were female (13%). The cases ranged in aged from 7 years to 77 years with over half in the age group 35-54 years.

Campylobacter infection

During 2004, there were 1711 notifications (43.7/100,000) of campylobacter infection. Prior to 2004 cases of campylobacter were only notifiable under the disease category food poisoning (bacterial other than salmonella). Of the 1623 food poisoning notifications in 2003 *Campylobacter* species was reported as the causative organism for 1440 (89%). A comprehensive report on campylobacteriosis is presented as a separate chapter elsewhere within this document.

Clostridium perfringens (type A) food-borne disease

Five cases of *Clostridium perfringens* (type A) food-borne disease were notified during 2004. The cases ranged in age from <1 year to 80 years. Four of the five cases were female. *Clostridium perfringens* (type A) food-borne disease was first specified as a notifiable infectious disease in 2004. Prior to 2004 cases of *Clostridium perfringens* (type A) were only notifiable under the disease category food poisoning (bacterial other than salmonella). In 2003 no cases of *Clostridium perfringens* (type A) were reported under this category.

Creutzfeldt Jakob disease

In 2004, four cases of classical Creutzfeldt Jakob disease (CJD) were notified while in 2003 two cases were notified. All four cases in 2004 occurred in females and were aged greater than 45 years.

Cryptosporidiosis

Cyrptosporidiosis was first specified as a notifiable infectious disease in 2004. There were 432 notifications of cryptosporidiosis in 2004 with 60% of these notifications occurring in children less than five years of age. Prior to 2004 cryptosporidiosis was only notifiable under the disease category gastroenteritis (when contracted by children under two years of age). In 2003, under this category 106 cases of cryptosporidiosis were reported. This is similar to 2004 when 133 cryptosporidiosis notifications were aged less than two years. A comprehensive report on cryptosporidiosis is presented as a separate chapter within this document.

Table 3. Number of notifiable infectious diseases by sex in 2004

Infectious disease	Male	Female	Unknown	Total
Acute infectious gastroenteritis	1012	882	23	1917
Bacterial meningitis (not otherwise specified)	17	20	0	37
Brucellosis	52	8	0	60
Campylobacter infection	926	778	7	1711
Clostridium perfringens (type A) food-borne disease	1	4	0	5
Creutzfeldt Jakob disease	0	4	0	4
Cryptosporidiosis	224	207	1	432
Enterohaemorrhagic *Escherichia coli*	37	29	1	67
Giardiasis	25	27	1	53
Haemophilus influenzae disease (invasive)	20	18	0	38
Hepatitis A (acute)	20	26	1	47
Hepatitis B (acute and chronic)	403	362	32	797
Hepatitis C	706	426	22	1154
Influenza	37	42	1	80
Legionellosis	3	1	0	4
Leptospirosis	14	1	0	15
Listeriosis	5	6	0	11
Malaria	14	12	1	27
Measles	159	167	4	330
Meningococcal disease	102	97	0	199
Mumps	230	192	2	424
Noroviral infection	481	647	0	1128
Paratyphoid	3	1	0	4
Pertussis	42	51	0	93
Q fever	3	4	0	7
Rubella	27	22	0	49
Salmonellosis	194	218	3	415
Shigellosis	32	25	0	57
Staphylococcal food poisoning	0	3	0	3
Streptococcus group A infection (invasive)	19	16	0	35
Streptococcus pneumoniae infection (invasive)	90	84	0	174
Tetanus	1	0	0	1
Toxoplasmosis	12	21	0	33
Typhoid	4	3	0	7
Viral encephalitis	3	2	0	5
Viral meningitis	19	4	0	23
Yersiniosis	2	4	0	6
Total	4939	4414	99	9452

Please note the EARSS, STI and TB data are not included in this report. Data on these diseases can be found in separate chapters in this document

Enterohaemorrhagic Escherichia coli

Enterohaemorrhagic *Escherichia coli* (EHEC) was specified as a notifiable infectious disease in Ireland for the first time in 2004. Sixty-seven cases of EHEC were notified during 2004. A comprehensive report on EHEC is presented as a separate chapter elsewhere in this document.

Giardiasis

Fifty-three cases of giardiasis were notified in 2004 in Ireland, giving a notification rate of 1.4 per 100,000 total population. Age was reported for 52 cases, these ranged in age from 1 year to 77 years (mean age, 28 years; median age, 30 years). Twenty-seven of the cases were female, 25 were male while gender was unreported for one case.

Giardiasis was first specified as a notifiable infectious disease in Ireland in 2004. Prior to 2004, giardiasis was only notifiable under the disease category gastroenteritis (when contracted by children under two years of age). In 2003, two cases of giardiasis were reported under this category. This compares to five giardiasis notifications in 2004 in children less than two years.

Haemophilus influenzae disease (invasive)

During 2004 there were 38 notifications of *Haemophilus influenzae* disease (invasive). *Haemophilus influenzae* disease (invasive) was specified as an infectious disease for the first time in 2004. An enhanced surveillance system exists for *Haemophilus influenzae* disease and data obtained through this surveillance system are presented as a separate chapter elsewhere within this document.

Hepatitis A (acute)

Forty-seven cases (1.2/100,000) of hepatitis A (acute) were notified in 2004 compared to 25 cases (0.6/100,000) in 2003. A comprehensive report on viral hepatitis is presented as a separate chapter within this document.

Hepatitis B (acute and chronic)

Hepatitis B notifications continued to increase in 2004 with 797 notifications (20.3/100,000) compared to 547 and 458 notifications in 2003 and 2002, respectively. A comprehensive report on viral hepatitis is presented as a separate chapter within this document.

Table 4. Number of notifiable infectious diseases by case classification in 2004

Inectious disease	Confirmed	Probable	Possible	Not Specified	Total
Acute infectious gastroenteritis	1357	297	0	263	1917
Bacterial meningitis (not otherwise specified)	8	6	23	0	37
Brucellosis	2	57	0	1	60
Campylobacter infection	1286	0	0	425	1711
Clostridium perfringens (type A) food-borne disease	4	0	0	1	5
Creutzfeldt Jakob disease	4	0	0	0	4
Cryptosporidiosis	280	1	0	151	432
Enterohaemorrhagic *Escherichia coli*	66	0	0	1	67
Giardiasis	39	0	0	14	53
Haemophilus influenzae disease (invasive)	38	0	0	0	38
Hepatitis A (acute)	36	0	5	6	47
Hepatitis B (acute and chronic)	570	13	0	214	797
Hepatitis C	1006	0	0	148	1154
Influenza	74	0	1	5	80
Legionellosis	3	1	0	0	4
Leptospirosis	10	0	0	5	15
Listeriosis	9	0	0	2	11
Malaria	12	0	0	15	27
Measles	156	0	150	24	330
Meningococcal disease*	171	3	25	0	199
Mumps	85	13	82	244	424
Noroviral infection	1000	27	0	101	1128
Paratyphoid	2	2	0	0	4
Pertussis	42	1	21	29	93
Q fever	1	4	0	2	7
Rubella	4	1	32	12	49
Salmonellosis	242	74	0	99	415
Shigellosis	55	0	0	2	57
Staphylococcal food poisoning	0	0	0	3	3
Streptococcus group A infection (invasive)	32	0	0	3	35
Streptococcus pneumoniae infection (invasive)	160	0	4	10	174
Tetanus	0	0	0	1	1
Toxoplasmosis	26	0	0	7	33
Typhoid	6	0	0	1	7
Viral encephalitis	2	0	0	3	5
Viral meningitis	4	2	0	17	23
Yersiniosis	4	0	0	2	6
Total	**6796**	**502**	**343**	**1811**	**9452**

**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.*
Please note the EARSS, STI and TB data are not included in this report. Data on these diseases can be found in separate chapters in this document

Hepatitis C

There were 1154 (29.5/100,000) notifications of hepatitis C in 2004. Hepatitis C was specified as a notifiable infectious disease in Ireland for the first time in 2004. Prior to 2004 hepatitis C was only notifiable under the disease category viral hepatitis unspecified. In 2003, of the 85 viral hepatitis unspecified notifications 77 were reported as hepatitis C, one as hepatitis E while the organism was not reported for seven cases. A comprehensive report on viral hepatitis is presented as a separate chapter elsewhere within this document.

Influenza

Influenza was first specified as a notifiable infectious disease in 2004. Eighty cases of influenza were notified in 2004, giving a notification rate of 2.0 per 100,000 population. Of the 80 influenza notifications, 40 were reported as influenza A virus, 30 as influenza B virus while organism details were not reported for the remaining 10 cases. A report on influenza activity during the 2004/2005 season is included elsewhere in this document.

Legionellosis

Four cases of legionellosis were notified in 2004. All four cases were aged greater than 44 years. Three of the cases were male and one was female. Three of the cases were classified as confirmed while one was classified as probable. There was one death. Of the four cases one was community-acquired in Ireland, one was hospital-acquired while two were travel-associated (Ireland and USA). A case of Legionnaires' disease is defined as travel-associated if the patient spent one or more nights away from their home in accommodation used for commercial or leisure purposes e.g. hotels, holiday apartments etc. in the 10 days before the onset of illness. Travel-associated cases may involve travel within Ireland or travel abroad. Both travel-associated cases in 2004 were notified to the European Working Group for Legionella Infections (EWGLI) surveillance scheme. The aim of this surveillance scheme (EWGLI) is to detect cases of travel-associated Legionnaires' disease and thereby rapidly identify outbreaks and implement control measures. [4]

Leptospirosis

Fifteen cases of leptospirosis were notified in 2004, an increase of 66% on 2003 (n=9). This increase may be a reflection of laboratories becoming notifiers for the first time in 2004. All except one of the cases were male (93%) and all were aged between 18 and 57 years (mean age, 36 years; median age, 33 years). Information on the possible source of infection was received for 11 cases; five were believed to be leisure-acquired, five occupationally and one could have acquired the illness either through work or leisure. The ERHA reported six cases while each of the other health boards reported between one and two cases each. A cross health-board outbreak (reported by the ERHA) among canoeists accounted for five of the cases with exposure through leisure activities.[5] All five were admitted to hospital. Gardening was the exposure for the remaining leisure-acquired case. Among the occupational exposures reported, four cases had contact with livestock through the course of their work and two with construction sites. The species implicated was reported as *Leptospira interrogans icterohaemorrhagiae* for one case; species was not reported for the remaining 14 cases.

Listeriosis

Eleven cases of listeriosis were notified in 2004. Three were pregnancy associated, one resulting in an intrauterine death. The remaining eight cases were non-pregnancy-associated adult cases. In this group, 63% (5/8) were male and the age range was 41-86 years (mean age, 63 years). Five were reported either as elderly (>65 years) or as suffering from an underlying illness that predisposed them to listeriosis. No information on risk factors was available for the remaining three cases but two were aged over 55 years.

Listeriosis was first specified as a notifiable infectious disease in 2004; prior to 2004 listeriosis was only notifiable under the disease category food poisoning (bacterial other than salmonella). In 2003 four listeriosis cases were notified under this category.

Malaria

During 2004, twenty-seven cases of malaria were notified, a 29% increase on the number reported in 2003 (n=21). It is generally recognised that malaria has been under notified and this increase may be a reflection of laboratories becoming notifiers for the first time in 2004. Fourteen of the reported cases were male, twelve were female and the sex of the remaining case was not reported. Cases ranged in age from two to 73 years, with a median age of 30 years.

Malaria is not indigenous in Ireland and cases are usually associated with recent exposure in an endemic country or are relapses of earlier illness. However, one case in 2004 was reported as a congenital case. Countries where exposure to malaria occurred included Nigeria (n=9), and Tanzania, Uganda, Brazil, Chile/Africa and Ethiopia (n=1 each): country of exposure was not reported for the remaining 13 cases. The reasons for travel to a malarious region were: holiday (n=1), business/professional travel (n=1), new entrant to Ireland (n=5), visiting family in country of origin (n=2), other (n=3, which includes aid/development workers) and unknown (n=15).

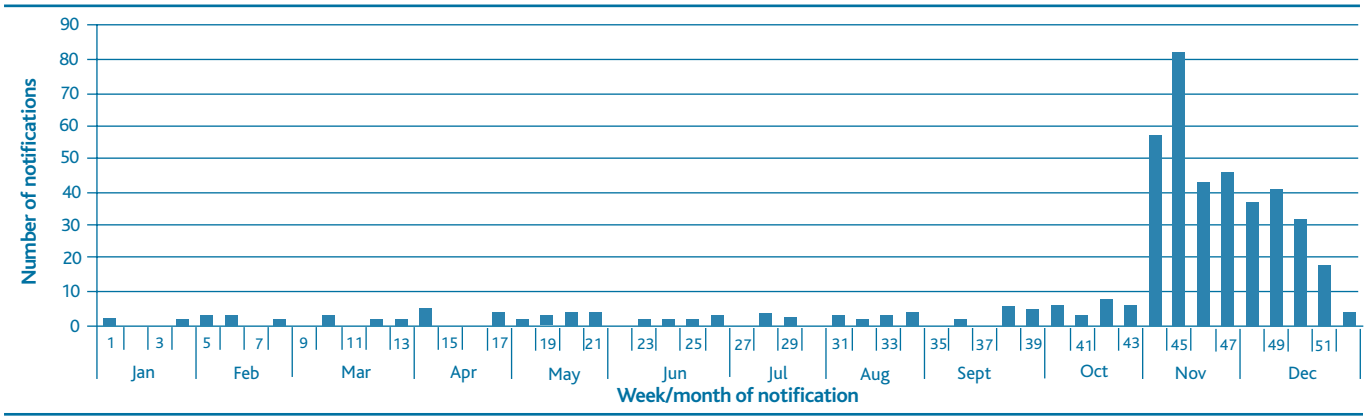

Figure 3. Mumps notifications received by week of notification in 2004

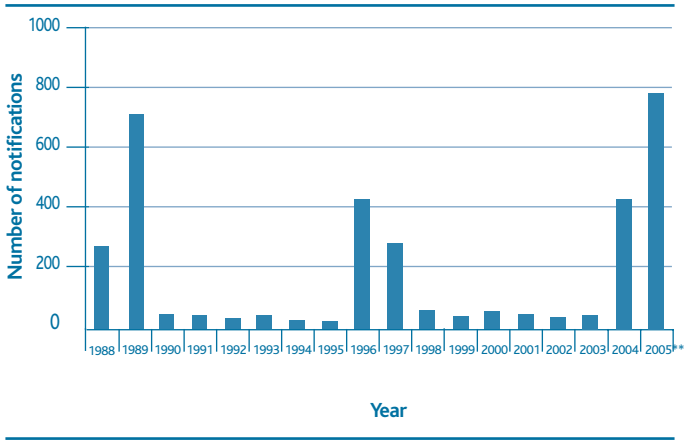

Figure 4. Mumps notifications received, 1988-2005
***Please note the figure for 2005 is only up to 30/09/2005.*

In 14 cases (70%), *Plasmodium falciparum* was the causative organism, *P. vivax* in four cases (20%), *P. ovale* in one case (5%), a mixed infection in one case (5%): the malarial parasite was not reported for the remaining seven cases. Information on malaria prophylaxis was available for eleven of the cases, of these nine (82%) did not take any malaria prophylaxis while the remaining two cases (18%) discontinued prophylaxis before one month after their return to Ireland.

Measles

During 2004, 330 measles cases (8.4/100,000) were notified, a decrease compared to 2003 when 572 (14.6/100,000) cases were notified. Case classification was provided for 93% (n=306) of measles notifications in 2004, of these 51% (n=156) were classified as confirmed and 49% (n=150) were classified as possible. Enhanced details including laboratory and hospitalisation data were obtained on some of the measles notifications in 2004, these data are discussed further in a separate measles report in this document.

Meningococcal disease

One hundred and ninety-nine cases of meningococcal disease were notified in Ireland in 2004, giving a notification rate of 5.1 per 100,000 population. A comprehensive report on meningococcal disease is presented as a separate chapter in this document.

Mumps

During 2004, 424 cases of mumps were notified, giving a notification rate of 10.8 per 100,000 population. This represents a 10-fold increase compared to 2003 when 40 cases were notified. This increase in mumps was associated with a national mumps outbreak that began in early November 2004 and predominantly affected university/college-going students (figure 3). Three hundred and fifty one (83%) of the mumps notifications in 2004 were in November and December (Weeks 44-52) with 49% in the age group 17-21 years. The mumps outbreak continued into 2005 with 784 cases (provisional figure) notified between January and September 2005.

Mumps became a notifiable disease in 1988. Mumps outbreaks occurred in 1988-89, 1996-97 and recently in 2004-2005 (figure 4; data up to 30/09/2005).

Noroviral infection

There were 1128 noroviral infection notifications during 2004, giving a notification rate of 28.8 per 100,000 population. The majority (n=765, 68%) of notifications were in those aged greater than 64 years followed by those in the age group 0-4 years (n=95, 8%). The highest age specific incidence rates were also in those aged greater than 64 years (175.5/100,000) followed by those in the age group 0-4 years (34.2/100,000). Six hundred and forty seven cases (57%) were female and 481 were male (43%).

Noroviral infection was first specified as a notifiable infectious disease in 2004; prior to 2004 norovirus was only notifiable under the disease category gastroenteritis (when contracted by children under two years of age). There were 14 noroviral

notifications in 2003 under the disease category gastroenteritis, whereas 75 cases were notified in children less than two years of age in 2004. However, 1053 noroviral notifications (93%) in 2004 were in those greater than or equal to two years, such cases were not previously notifiable.

Paratyphoid

Four cases of paratyphoid were notified during 2004. All four cases were in the age group 15-34 years. Three of the four cases were male. The countries of infection were Germany (n=1), India (n=1), Nepal (n=1), and not reported (n=1). Prior to 2004 paratyphoid was notifiable under the disease category typhoid and paratyphoid. During 2003 four cases of paratyphoid were notified under typhoid and paratyphoid, this is identical to 2004.

Pertussis

Notifications of pertussis had fallen to the lowest number on record (n=40) during 2003. Pertussis notifications increased again in 2004 with 93 cases reported (2.4/100,000). The majority (91%) of cases in 2004 were aged less than 15 years with 70% of cases in the age group 0-4 years. Fifty-one cases were female while 42 were male.

Q Fever

Seven cases of Q fever were notified during 2004. Four cases occurred in females and three in males. The cases ranged in age from two years to 67 years (mean age, 31 years; median age, 36 years). This is the first year Q fever was specified as a notifiable infectious disease in Ireland.

Rubella

During 2004, 49 cases (1.3/100,000) of rubella were notified, compared to 59 in 2003 and 33 in 2002. Case classification was provided for 37 (76%) of the rubella notifications, of these four were classified as confirmed, one as probable and 32 as possible. Forty-five of the cases (92%) notified in 2004 were less than 15 years, with 38 (78%) of the cases aged less than five years. Twenty-two cases were female and 27 cases were male. One of the rubella notifications in 2004 was a case of confirmed congenital rubella syndrome in a newborn baby.

Salmonellosis (other than typhoid or paratyphoid)

There were 415 *Salmonella* notifications in 2004 (10.6/100,000) a slight decrease compared to 449 in 2003. In 2004, the highest number of cases (n=82) and the highest age specific incidence rate (29.5/100,000) were in those aged less than five years. In 2004, *Salmonella* Enteritidis accounted for 32% (n=134) of the notifications, *S*. Typhimurium accounted for 18% (n=73) while serotype details were not provided for 31% (n=127). A separate and comprehensive report on *Salmonella* is presented elsewhere within this document.

Shigellosis

Fifty-seven cases (1.5/100,000) of shigellosis were notified in 2004 compared to 36 cases in 2003. The majority of cases (70%) in 2004 occurred in those aged 20 years or older. Of the 57 cases notified, 38 were due to *Shigella sonnei*, 15 due to *Shigella flexneri* and four due to *Shigella boydii*. For

comparison, of the 36 cases notified in 2003, 13 were due to *S. sonnei*, 12 due to *S. flexneri*, one due to *S. boydii*, one due to *Shigella dysenteriae* while species was not reported for nine cases. This indicates a slight increase in the number of *S. sonnei* reported in 2004 compared to 2003.

Staphylococcal food poisoning

Three cases of staphylococcal food poisoning were notified during 2004. All three cases occurred in females aged 10 years and younger. Staphylococcal food poisoning was first specified as a notifiable infectious disease in 2004; prior to 2004 food poisoning due to staphylococcus was only notifiable under the disease category food poisoning (bacterial other than salmonella). In 2003, two notifications of food poisoning were reported as *Staphylococcus* species; both were aged greater than 30 years.

Streptococcus group A infection (invasive)

Thirty-five cases of Streptococcus group A infection (invasive) were notified during 2004. The majority (77%) of cases were aged greater than 20 years with 37% aged greater than 64 years. Nineteen cases were male while 16 cases were female. Streptococcus group A infection (invasive) was not notifiable prior to 2004.

Streptococcus pneumoniae infection (invasive)

During 2004, 174 cases of *Streptococcus pneumoniae* infection (invasive) were notified. The majority of cases (71%) were aged greater than 20 years with one third of cases aged greater than 64 years. Ninety cases were male while 84 cases were female. *S. pneumoniae* infection (invasive) was specified as a notifiable infectious disease for the first time in 2004. Prior to 2004, cases of *S. pneumoniae* were only notifiable under the disease category bacterial meningitis (including meningococcal septicaemia). In 2003, 25 cases of *S. pneumoniae* were notified under bacterial meningitis (including meningococcal septicaemia) while in 2004, 22 cases of *S. pneumoniae* were notified. *S. pneumoniae* infection (invasive) is discussed further in a separate chapter in this document.

Tetanus

One tetanus case was notified during 2004 in a patient aged 45-54 years. The case survived the infection. The case had occupational exposure to soil and animals and had no record of ever receiving tetanus vaccination. Tetanus is a vaccine preventable disease; tetanus vaccine was introduced into Ireland in the 1930s and is currently part of the childhood immunisation schedule. Primary immunisation consists of three doses of a tetanus toxoid-containing vaccine, routinely administered at 2, 4 and 6 months of age. A booster dose is given at school entry with a further dose between the ages of 11-14 years.[6] Further boosters may be required at the time of injury. In Ireland, those considered most at risk of developing tetanus are in the older age groups, many of whom never had active immunisation. Tetanus is relatively uncommon in Ireland; however, nine cases were notified in the last 16 years with seven of these notified since 1998.

Toxoplasmosis
During 2004, 33 cases of toxoplasmosis were notified. The majority of cases (64%) were female. The cases were aged between 9 and 75 years (mean age, 32 years; median age, 30 years). Toxoplasmosis was not specified as a notifiable infectious disease in Ireland prior to 2004.

Typhoid
Seven cases of typhoid were notified during 2004. The cases ranged in age from 4 to 40 years (mean age, 19 years; median age, 18 years). Four of the cases were male and three were female. The countries of infection were India (n=2), Pakistan (n=1), Philippines (n=1), Nigeria (n=1) and not reported (n=2). Prior to 2004 typhoid was notifiable under the disease category typhoid and paratyphoid. During 2003 seven cases of typhoid were notified under typhoid and paratyphoid, this is identical to 2004.

Viral encephalitis
Five cases of acute encephalitis were notified in 2004, similar to six cases in 2003. Case classification was provided for two notifications in 2004; both cases were classified as confirmed. Details of the causative organisms were not reported for any of the five cases. Age was reported for four cases, all four were aged less than 14 years.

Viral meningitis
In 2004, 23 (0.59/100,000) cases of viral meningitis were notified compared to 39 cases in 2003. Over sixty percent of cases in 2004 occurred in those aged less than 15 years with over 30% in the age group 0-4 years. The majority of viral meningitis notifications in 2004 were male (n=19). Of the 23 notifications, four were classified as confirmed, two as probable while case classification was not specified for the remainder. The causative organisms were not reported for any of the acute viral meningitis notifications in 2004. The low number of cases reported in 2004 is considered an underestimate of the true incidence of disease.

Yersiniosis
Six cases of yersiniosis were notified during 2004. The cases ranged in age from 9 months to 85 years with three of the cases aged less than two years. Prior to 2004 yersiniosis was only notifiable under the disease category food poisoning (bacterial other than salmonella). For comparison, during 2003, three cases of yersiniosis were notified under food poisoning.

Discussion
There were important changes in the infectious diseases legislation when the Infectious Diseases Regulations (Amendment) (No.3) 2003, S.I. No. 707 of 2003, came into operation on the 1st January 2004. The changes to the legislation were based on recommendations from a subgroup of the Scientific Advisory Committee following a review of the notification system in Ireland.[7] This review was carried out at the request of the Department of Health and Children. These amended regulations specified a new and expanded list of notifiable diseases. The changes to the list of notifiable diseases are consistent with a European Commission Decision

on the communicable diseases to be progressively covered by the Community network (Decision no. 2000/96/EC, under Decision no. 2119/98/EC of the European Parliament and of the Council). The amended regulations require all diagnostic laboratories to report cases of notifiable infectious diseases identified in their laboratories. This change in the notification system must be taken into account when interpreting trends in disease in 2004 compared to previous years.

In total there were 9452 notifications in 2004, a 62% increase compared to 2003 (these figures exclude the EARSS, STI and TB data which are presented elsewhere in this document). This rise in notifications during 2004 is attributed predominantly to an increase in hepatitis C and noroviral infection notifications. In 2004, there were 1154 and 1128 notifications of hepatitis C and noroviral infections, respectively. In comparison, during 2003, there were 77 hepatitis C notifications in the disease category viral hepatitis unspecified and 14 noroviral notifications in the disease category gastroenteritis (when contracted by children under two years of age). The increase in hepatitis C and noroviral infection notifications is in part attributed to both being specified as notifiable diseases in their own right and to laboratories being legally required to notify infectious diseases, for the first time in 2004. The fact that notifications were no longer restricted to children under two years of age would also account for the increase in noroviral notifications. During 2004, 1053 noroviral notifications were in those greater than or equal to two years; such cases would not have been previously notifiable.

The increase in mumps notifications in 2004 also contributed to the increase in total notifications in 2004 compared to 2003. Mumps notifications increased ten-fold in 2004 compared to annual figures for 2001-2003 (range 32 to 40 notifications). This increase in mumps was due to an outbreak that started towards the end of 2004 and affected predominantly those aged 17-21 years. The mumps outbreak continued during 2005.

Notifications due to *Streptococcus pneumoniae* infection (invasive) also contributed to the increase in notifications in 2004. This disease was first specified as notifiable in its own right in 2004. There were 174 notifications of *S. pneumoniae* in 2004 compared to 2003 when 25 cases were notified under the disease category bacterial meningitis (including meningococcal septicaemia). *S. pneumoniae* appears, however, to be under-reported, as indicated by comparisons with the EARSS data. Four hundred *S. pneumoniae* bacteraemia cases were reported through the EARSS system in 2004 as opposed to 174 notifications through the weekly infectious disease notification system. Cases of invasive *S. pneumoniae* that are reported through the EARSS system should also be reported through the weekly infectious disease notification system.

There were also increases in notifications of brucellosis, hepatitis A, leptospirosis, malaria, pertussis and shigellosis in 2004. Perhaps some of these increases may be attributed to laboratories becoming notifiers for the first time in 2004. It is also important to recognise that of the 60 brucellosis cases

57 were classified as probable. Brucellosis cases classified as probable may be cases of past infection rather than acute infection as laboratory results for these notifications were based on an isolated high titre.

There were no apparent increases in diseases such as meningococcal disease and salmonellosis in 2004 despite laboratories becoming notifiers for the first time. Perhaps this is a reflection that laboratories already had informal arrangements in place to report infections such as these to public health prior to the changes in legislation.

There were significant and welcome changes in infectious disease surveillance in Ireland during 2004 with the amended legislation (S.I. No. 707 of 2003) coming into effect at the beginning of the year. These changes are in line with EU requirements on surveillance. The inclusion of laboratories as notifiers means a more complete picture of the burden of infectious diseases is now available for Ireland. The successful piloting of the electronic surveillance system (i.e. CIDR) in 2004 followed by the commencement of national rollout of the system to laboratories and public health in 2005 is also helping improve infectious disease surveillance in Ireland. For CIDR users data is now available in a more timely manner. In addition, the use of a single data repository is helping improve data quality and the efficiency with which data is managed.

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The authors would like to sincerely thank everyone who contributed to the surveillance of notifiable infectious diseases in Ireland including notifying physicians, laboratory staff, medical, scientific and administrative staff in the Community Care Areas and in the Departments of Public Health. Special thanks to everyone involved in cleaning and validating the data.

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Immunisation Uptake in Ireland, 2004

Key Points

- **Immunisation uptake rates at both 12 and 24 months improved in 2004**
- **Uptake of D_3, T_3, P_3, Hib_3, $Polio_3$ and $MenC_3$ at 12 months was 83%**
- **Uptake of D_3, T_3, P_3, Hib_3 and $Polio_3$ at 24 months was 89%**
- **Uptake of $MenC_3$ at 24 months was 88%**
- **Uptake of MMR_1 at 24 months was 81%**

Introduction

Widespread access to lifesaving vaccines is considered one of the great public health achievements of all time. Immunisation is a simple, safe and effective way of protecting children against certain diseases. Immunisation programmes against childhood vaccine-preventable diseases is one of the most cost-effective health strategies, leading to improved health, reduced mortality and morbidity and resulting in huge savings to society and to the health care system.

Through immunisation it is possible to eradicate or eliminate certain childhood infectious diseases. Nine diseases can currently be prevented by routine childhood immunisation in Ireland – diphtheria, tetanus, pertussis, poliomyelitis, *Haemophilus influenzae* type b (Hib) disease, meningococcal group C disease, measles, mumps and rubella. All these diseases are capable of causing serious complications and sometimes death. Immunisation against tuberculosis is also provided in the form of BCG vaccination.

The current Irish childhood immunisation schedule recommends that newborns should receive one dose of BCG and that infants receive three doses of DTaP/IPV/Hib and MenC at two, four and six months of age. Between 12 and 15 months these children should receive the first does of MMR. Immunisation uptake/coverage statistics for 2004 are presented in this report.

Materials and Methods

Each health board maintains a childhood immunisation register. In 2004, health boards provided immunisation

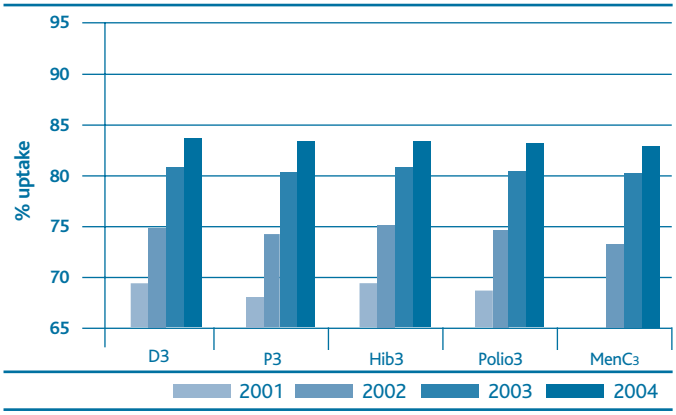

Figure 1. Annual immunisation uptake rates at 12 months in Ireland, 2001-2004
Note scale ranges from 65-95%
T_3 uptake identical to D_3 uptake, therefore T_3 uptake not presented in this chart

Table 1. Immunisation uptake rates in children 12 months of age in 2004

% Uptake at 12 months

Cohort born between 01/01/2003 – 31/12/2003

Health Board	No. in cohort	D_3	P_3	T_3	Hib_3	$Polio_3$	$MenC_3$	BCG
ERHA	22,399	79	79	79	79	79	78	na*
MHB	3,820	90	90	90	90	90	90	84
MWHB	5,086	86	86	86	86	86	86	89
NEHB	6,054	86	86	86	86	86	86	na*
NWHB	3,225	89	89	89	89	89	88	91
SEHB	6,760	86	86	86	86	86	86	96
SHB†	8,508	83	83	83	83	83	83	86‡
WHB	5,501	81	81	81	81	81	79	na*
Ireland	**61,353§**	**83**	**83**	**83**	**83**	**83**	**83**	**91**

** Data not available at this time*
† As the denominator/number in cohort varied according to vaccine, most commonly used number is presented here. The number in cohort eligible for BCG vaccine was 1332
‡ SHB: part coverage of neonatal BCG, Kerry only
§ Number in cohort eligible for BCG vaccine was 19,925

uptake data on a quarterly basis. These data related to children who reached their first or second birthday in that quarter and had completed the primary immunisation schedule i.e. immunisation uptake at 12 and 24 months, respectively. Data on the number of children eligible for immunisation in each cohort, the number immunised and the percentage immunised were provided. Data were collected on children who had received three doses of diphtheria (D_3), pertussis (P_3), tetanus (T_3), poliomyelitis ($Polio_3$), *H. influenzae* type b (Hib_3), meningococcal group C ($MenC_3$), one dose of vaccine against measles, mumps and rubella (MMR_1; uptake at 24 months only) and one dose BCG vaccine (uptake at 12 months only).

Using MS Excel, these data were collated and analysed by HPSC. Quarterly reports were produced and are available on the HPSC website.[1] Annual immunisation uptake rates presented in this report were calculated by collating the quarterly data provided by the health boards. These statistics relate to children who were 12 and 24 months of age in 2004, i.e. birth cohorts born between 01/01/2003 & 31/12/2003 and 01/01/2002 & 31/12/2002 and who completed the immunisation schedule outlined above.

Results

Immunisation uptake rates at 12 months

In 2004, national immunisation uptake rates at 12 months were 83% for D_3, P_3, T_3, Hib_3, $Polio_3$ and $MenC_3$. This was an improvement of 2.5% when compared to 2003 and of 8% when compared to 2002 (Figure 1). Immunisation uptake rates in Ireland have been steadily rising each year since 2001, when uptake of vaccines was between 68-70%. In 2004, uptake of the above vaccines ranged from 78-79% in the ERHA to 90% in the MHB. Five of the eight health boards had uptake rates at 12 months of greater than 85% (Table 1). BCG uptake rates were available for the first time in 2004 for an entire year. Five of the eight health boards were in a position to provide figures (representing a third of the national birth cohort), and uptake was 90.5%. BCG uptake ranged from 84% in MHB to 96% in SEHB (Table 1).

Quarterly immunisation uptake rates steadily rose throughout 2004 from 81.6% in Q1-2004 to 84.5% by Q4-2004 (Figure 2). The highest uptake rate at 12 months since the collation of these data commenced in Q3-2000 was actually reported in Q4-2004 (84%). This is in contrast to the low that was seen in Q2-2001 when uptake rates were 65-67% (Figure 2).

Immunisation uptake rates at 24 months

In 2004, an improvement in immunisation uptake rates at 24 months was also seen. National uptake for D_3, P_3, T_3, Hib_3 and $Polio_3$ was 89%, 88% for $MenC_3$ and 81% for MMR_1 (Figure 3). Compared with 2003, uptake of D_3, T_3, Hib_3 and $Polio_3$ improved by 3%, P_3 by 3.6%, $MenC_3$ by 4% and MMR_1 by almost 3%. MMR_1 uptake in 2004 was the highest recorded since the collation of these statistics commenced in 1999 (Figure 3). Uptake of D_3, P_3, T_3, Hib_3, $Polio_3$ and $MenC_3$ ranged from 84-86% in the ERHA to 93-95% in the NWHB (Table 2). Five of the eight health boards reached ≥90% uptake for D_3, T_3, Hib_3, $Polio_3$, while four health boards also did so for $MenC_3$ (Table 2). Only one health board, namely the NWHB, reached the target 95% uptake rate, this was

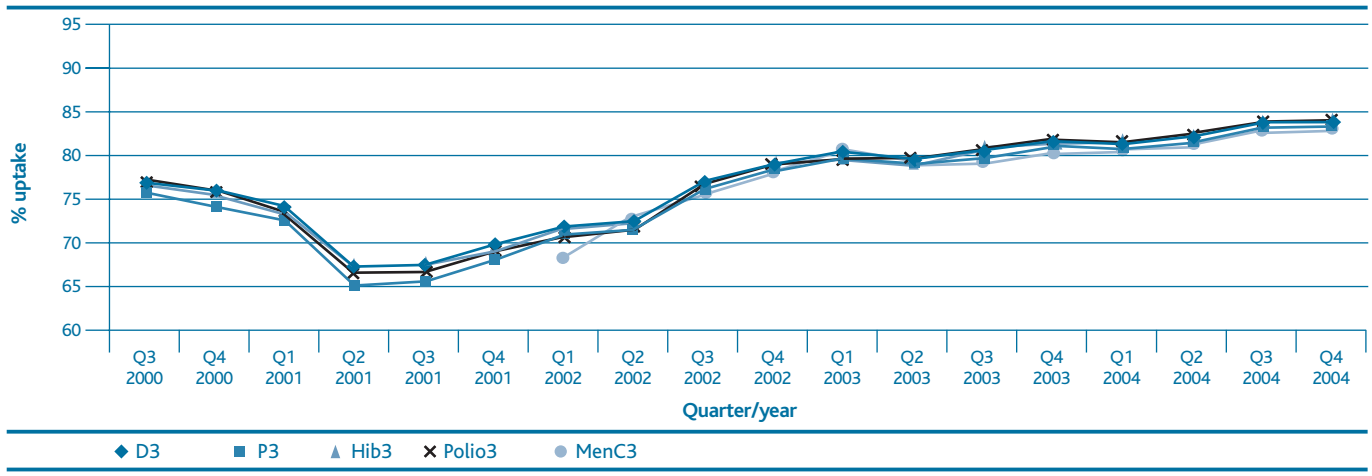

Figure 2. Quarterly immunisation uptake rates at 12 months in Ireland
Note scale ranges from 60-95%
T_3 uptake identical to D_3 uptake, therefore T_3 uptake not presented in this chart

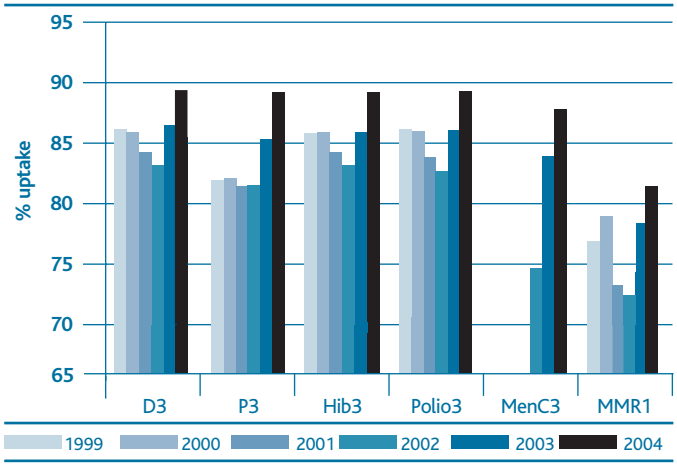

Figure 3. Annual immunisation uptake rates at 24 months in Ireland, 1999-2004
Note scale ranges from 65-95%
T_3 uptake identical to D_3 uptake, therefore T_3 uptake not presented in this chart

Table 2. Immunisation uptake rates in children 24 months of age in 2004

% Uptake at 24 months

Cohort born between 01/01/2002 – 31/12/2002

Health Board	No. in cohort	D_3	P_3	T_3	Hib_3	$Polio_3$	$MenC_3$	MMR_1
ERHA	22,522	86	86	86	86	86	84	76
MHB*	3,828	94	93	94	94	94	94	91
MWHB	5,038	89	88	89	89	89	88	84
NEHB	5,823	93	93	93	93	93	92	83
NWHB	3,127	95	95	95	94	95	93	87
SEHB	6,657	92	91	92	91	91	90	87
SHB*	8,597	89	89	89	89	89	88	83
WHB	5,476	90	89	90	90	90	87	78
Ireland	**61,068**	**89**	**89**	**89**	**89**	**89**	**88**	**81**

** As the denominator/number in cohort varied according to vaccine, most commonly used number is presented here*

achieved for D_3, T_3, P_3 and $Polio_3$. MMR_1 uptake ranged from 76% in the ERHA to 91% in the MHB. The MHB was the only health board to reach a MMR_1 uptake rate of greater than 90% in 2004. No health board reached the target rate of 95% (Table 2).

Throughout 2004 there was a steady rise in the national immunisation uptake rates, rising from 88% in Q1-2004 to 93% in Q4-2004 for D_3 and T_3 (Figure 4). Q4-2004 was the first quarter since the collation of these data commenced in Q1-1999, that national uptake rates broke the 90% level, achieved for D_3, P_3, T_3, Hib_3, $Polio_3$. This is in marked contrast to two to three years previously, quarterly uptake rates had dropped to 83% and remained consistently at this low from Q3-2001 until Q3-2002, inclusive (Figure 4).

Discussion

An improvement in immunisation uptake rates at both 12 and 24 months was seen in 2003.[2] This improvement continued in 2004, with even higher rates recorded. The 2004 uptake figures at both 12 months and 24 months are the highest reported since collation of these data commenced in 2001 and 1999, respectively. For all the vaccines with the exception of MMR_1, immunisation uptake rates at 24 months was 90% or greater in four of the eight health boards. These improvements are very encouraging and are a reflection of the work done by health care professionals and allied staff in the regions in promoting immunisation, making updates to the immunisation registers and undertaking data cleaning on these systems. It is vital that these improvements can be built on, so that the required 95% target rate can become a reality. MMR_1 uptake levels still need improving, as uptake remains 14% below the target rate, with the result that measles and mumps outbreaks continue to occur.

Complete national immunisation uptake figures on neonatal BCG, MMR_2 and the booster doses i.e. D_4, P_4, T_4 and $Polio_4$ would be useful so that immunisation uptake in Ireland for all the childhood vaccines can be effectively monitored. Unfortunately, many of the regional systems do not support the provision of these additional data in the format required for meaningful analysis. Initiatives currently being undertaken by the Programme of Action for Children which include defining the requirements of a proposed national IT system to register and track immunisations, producing immunisation health promotion materials and providing support for regional immunisation initiatives, will undoubtedly have a very positive impact in maximising immunisation uptake in Ireland and ultimately in the elimination and eradication of some childhood infectious diseases.

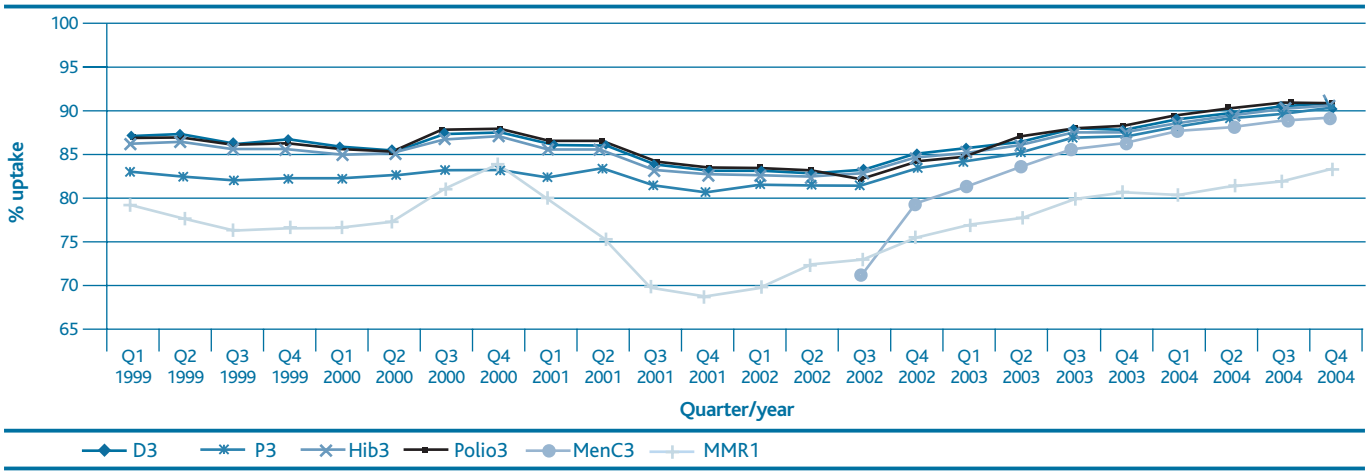

Figure 4. Quarterly immunisation uptake rates at 24 months in Ireland
Note scale ranges from 65-100%
T_3 uptake identical to D_3 uptake, therefore T_3 uptake not presented in this chart

Acknowledgements

HPSC would like to thank the health boards for providing these data. Particular thanks to the Specialists in Public Health, Surveillance Scientists, Immunisation Co-ordinators and System Analysts for their help.

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Computerised Infectious Disease Reporting System (CIDR)

What is CIDR?

- **Computerised Infectious Disease Reporting (CIDR) is a new information system developed to manage the surveillance and control of infectious diseases in Ireland**
- **CIDR is a web-based system. All information in CIDR is held in a single shared national information repository**
- **CIDR is a shared national information system for the CIDR partners - the HSE Areas, the Health Protection Surveillance Centre (formerly NDSC), the Food Safety Authority of Ireland (FSAI), the Food Safety Promotion Board (FSPB) and the Department of Health and Children (DoHC)**

CIDR Implementation -progress

- **CIDR pilot implementation started in May 2004 in NDSC, all laboratory and public health sites in the NEHB, and in national reference laboratories. During the period of pilot implementation CIDR system was found to be robust, secure and flexible.**
- **CIDR was recommended for national implementation in November 2004**
- **National roll-out commenced in January 2005 and by October 2005 CIDR was being used in four of the HSE areas (Midlands, South, South-East and North East) in addition to the reference laboratories. The remaining HSE areas (West, Mid-west, North-west, and Eastern region) are expected to implement CIDR in 2006. (Figure 1)**

Introduction

Computerised Infectious Disease Reporting (CIDR) is a system that has been developed by the HPSC in collaboration with its partners; the DoHC, the Health Boards, the FSAI and the FSPB. CIDR utilises modern internet-based technologies. When fully implemented throughout the country CIDR will provide an integrated and standardised electronic surveillance system to collect, collate, analyse and disseminate good quality laboratory-based and clinical notification data on communicable disease in a timely manner in Ireland. CIDR will:

- Provide timely and comprehensive information to facilitate public health action in individual cases of infectious disease
- Provide standard reports on the incidence and burden of infectious diseases and antimicrobial resistance nationally, regionally, and locally
- Allow users to build reports defined by their needs
- Evaluate the effectiveness of prevention and control programmes nationally, regionally and locally

CIDR System

CIDR was designed in 2002, and development and testing of the system took place between 2003-2004.

The CIDR system uses the latest .NET development environment with SQL Server 2000 as the backend database and makes extensive use of XML technology, in line with the inter-operability requirements of e-government initiatives.

Ensuring that information within CIDR is stored and accessed

appropriately is key to CIDR. A number of data security protection systems are in place; access to the system is provided via the Government Virtual Private Network (G-VPN); the core system is firewall-protected; information is encrypted before being transferred from local PCs to the core system; and access to the system is limited to authorised users (username, password and user authentication required by unique key fobs).

Public health departments and clinical microbiology laboratories enter and retrieve infectious disease information from CIDR via standard browser software on their personal computers. No additional software is required.

The information collected and stored by CIDR is available for analysis utilising a report writing / business intelligence application called 'Business Objects'. This software enables information to be retrieved from complex relational databases in a user-friendly fashion yet leaves the underlying data safe.

CIDR pilot in 2004
During CIDR pilot in the NEHB, the NDSC and in national reference laboratories in May 2004, CIDR was evaluated by the Pilot Implementation Evaluation Committee for performance, functionality, and security. CIDR was found to be robust, secure and flexible.

The CIDR Project Board recommended national CIDR implementation at their November 2004 meeting. The board recommended CIDR roll-out in a phased manner, to each of the HSE areas, starting with Departments of Public Health and followed by the local laboratories as closely as possible.

CIDR national implementation (roll-out)
CIDR national roll-out commenced in January 2005, is continuing throughout 2005 and is expected to be completed in 2006 (Figure 1). Rolling CIDR out nationally has required an on-going and close collaboration between the different HSE areas (Departments of Public Health, and regional laboratories, IT staff) and the national CIDR team.

As part of CIDR national rollout activities, CIDR team has met with each HSE area regional implementation committee (representing public health departments, regional laboratories and IT management) in the country. These meetings have provided a forum to update CIDR partners on CIDR implementation progress, identify local needs for CIDR implementation, and overall, to assess preparedness for CIDR implementation. Following these meetings each HSE area identifies local CIDR users, ensures that local IT systems are in place and functioning, with Government VPN access, reviews local business processes and data security measures, and provides local data protection training. CIDR 'go live' date is then agreed and CIDR application training is scheduled to precede 'go live' (with a short time interval between training and implementation).

By August 2005, meetings had been held between national CIDR team with all HSE areas and all areas were preparing for CIDR implementation. Delays in CIDR implementation were experienced in a number of HSE areas due to changes in Public Health structures e.g. organisation and staffing changes.

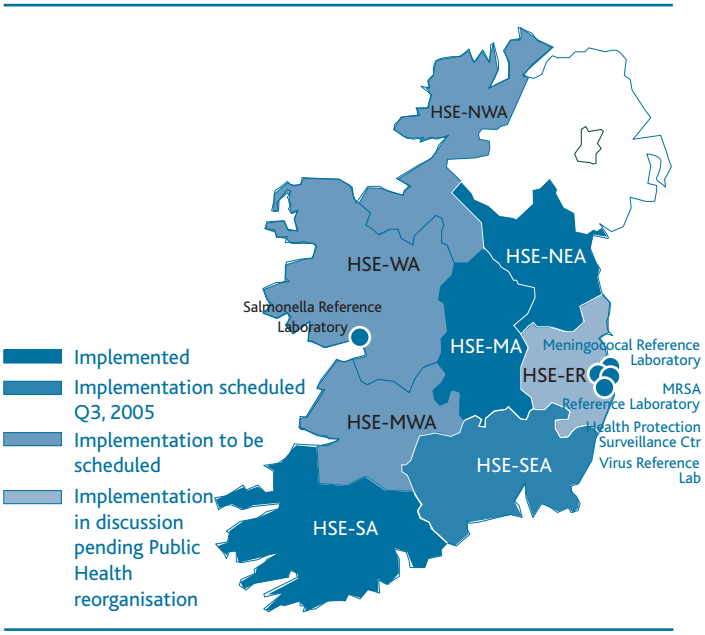

Figure 1. CIDR National implementation progress by HSE area (September 2005)

Many of these difficulties were resolved in the latter half of 2005. Those areas that were able to resolve these issues early in 2004 were the first to implement CIDR.

CIDR implementation in laboratories

CIDR implementation in the laboratories requires close liaison with relevant laboratory personnel to review and document current processes in relation to infectious disease notification, and to document the expected practice when each laboratory participates in CIDR. The laboratory then decides whether entry of data to CIDR will be manual or via upload from a Laboratory Information Management System (LIMS). If entry will be via LIMS, then a LIMS data extract questionnaire is completed, as well as a data availability analysis, a data capture analysis, and a data mapping exercise. Based on the data analysis documentation, CIDR is configured uniquely for each laboratory. Rules for extracting data, the format of the data to be imported, and in some cases the type and content of data may vary. CIDR is designed to facilitate all of this. It is important to note that the CIDR System is the only software required to upload data from LIMS systems. The CIDR design is open and flexible enough to accept data from systems other than LIMS e.g. Access databases. CIDR currently uploads delimited text files from other systems. The system imposes very few restrictions on data entry and/or upload and the number of mandatory data items is minimised.

By mid 2005, in addition to the laboratories in the North-east and the reference laboratories, CIDR had been introduced into all reporting laboratories in the Midlands. Preparations were taking place for CIDR implementation in the Southeast, the South, and the Midwest. By the latter half of 2005 senior scientific laboratory staff in the other regions had met with the CIDR team and were beginning to work together in laboratory information system user groups to pool knowledge and to identify how transition CIDR could be achieved in the most efficient manner.

CIDR Business Rules

For the shared national database to function effectively and efficiently as a surveillance tool for public health action, all partners/participants in CIDR need to agree and adhere to principles of participation, or business rules. A National Business Rules Committee was established in 2001 to provide a forum for feedback from regional business rules committees in each health board. Business rules have been agreed by all CIDR partners. These rules provide a framework which provides a template of the general principles for participation in CIDR by all partners.

The business rules template stipulates that information in CIDR will be:

- Held securely and confidentially
- Obtained fairly and efficiently
- Recorded accurately and reliably
- Used effectively and ethically
- Shared appropriately and lawfully

CIDR communications

Information and updates about CIDR are provided through a variety of channels. CIDR newsletter, initiated in 2004, is regularly (approximately bi-monthly) distributed electronically to all CIDR users and other individuals involved in the

infectious disease notification process (not yet on CIDR). The newsletter is also posted on the HPSC website for open access to all interested individuals. The HPSC/CIDR website also includes sections on Frequently Asked Questions (FAQs) as well as CIDR presentations to national or international audiences.

CIDR Disaster Recovery / Business Continuity

The core CIDR system is physically located within the premises of HPSC. Data is backed up daily and stored securely off-site. As part of a business continuity plan, in the event of unanticipated loss of equipment or access to that equipment, a disaster recovery / business continuity solution was developed, in conjunction with Fujitsu. This Business Continuity solution replicates data via the Government VPN to a Disaster Recovery CIDR environment hosted in the Fujitsu data centre in Swords, Co. Dublin. The Disaster Recovery system has been tried and tested and has demonstrated that this solution can support business continuity in the event of the main system being down.

Measles, 2004

Key Points

- **There were 330 measles notifications in 2004**
- **The crude incidence rate of measles per 100,000 population in 2004 was 8.4 compared to 14.6 in 2003 and 6.2 in 2002**
- **47% of the measles notifications in 2004 were classified as confirmed, 45% were classified as possible while 7% had no case classification assigned**

Introduction

Measles is an acute viral infectious disease characterised by high fever, cough, conjunctivitis, coryza (runny nose) and rash. Complications of measles include otitis media, pneumonia, croup, diarrhoea and encephalitis. Measles results in death in approximately one to two cases per 1000 population. In Ireland, three measles deaths were reported during 2000. Two of these deaths were as a result of pneumonia complicating measles and one was due to post-measles encephalitis.

Measles is highly contagious but can be prevented by vaccination. Measles vaccine in Ireland is currently available as part of the combined measles-mumps-rubella (MMR) vaccine. More than 99% of individuals who receive two MMR doses (provided the first dose is given after their first birthday) develop immunity to measles. Two doses of MMR are required to ensure protection, as two to five percent of children fail to respond to one dose of MMR. In Ireland, vaccination with the first dose of MMR (MMR_1) is recommended at twelve to fifteen months and the second dose (MMR_2) at four to five years.

Measles is a notifiable disease in Ireland and since 2000 is notified weekly to HPSC. In 2004 there were 330 measles notifications, a decrease compared to 2003 when 572 measles cases were notified.

Materials and Methods

Measles 2004 notification data, obtained through the weekly infectious disease notification system, are presented in this report. A dataset, including identification number, date of birth, age, sex, date of onset, date of notification/week of

Table 1. Numbers of measels notifications and crude incidence rates (CIR) per 100,000 population by health board in 2003 and 2004

Health board	2003		2004	
	Number	CIR	Number	CIR
ERHA	363	25.9	223	15.9
MHB	123	54.6	10	4.4
MWHB	24	7.1	10	2.9
NEHB	15	4.3	17	4.9
NWHB	1	0.5	22	9.9
SEHB	6	1.4	9	2.1
SHB	5	0.9	26	4.5
WHB	35	9.2	13	3.4
Total	**572**	**14.6**	**330**	**8.4**

Table 2. Number of measles notifications and rate per 100,000 population by age group in 2003 and 2004

Age group (years)	2003		2004	
	Number	Rate	Number	Rate
<1	109	200.0	96	176.2
1-2	207	185.3	118	105.6
3-4	61	54.7	38	34.1
5-9	107	40.5	49	18.6
10-14	60	21.0	12	4.2
15-19	6	1.9	3	1.0
20-24	13	4.0	5	1.5
25+	0	0.0	7	0.3
Unknown	9	-	2	-
Total	**572**	**14.6**	**330**	**8.4**

notification, Community Care Area, county, health board, case classification, diagnostic specimen type and vaccination status, is collected through the weekly notification system for each case. In addition, for a number of measles cases in 2004, enhanced details, such as information on hospitalisation status, were reported.

The following case definition is used for measles in Ireland:

Clinical description
Clinical picture compatible with measles i.e. a generalised erythematous rash lasting greater than three days and a temperature greater than 38°C and one or more of the following cough, coryza (rhinitis), Koplik's spots or conjunctivitis.

Laboratory criteria for diagnosis
One of the following:
- Detection of measles IgM antibody in absence of recent vaccination
- Four-fold or higher rise in measles IgG antibody level in absence of recent vaccination
- Detection of measles virus (not vaccine strains) in a clinical specimen.

Case classification

Possible:	Clinically compatible cases
Confirmed:	A case that is laboratory confirmed or a clinically compatible case which is epidemiologically linked to a confirmed case. A laboratory-confirmed case does not need to meet the clinical case definition.

A measles case is epidemiologically linked if there was exposure to a laboratory confirmed case during the infectious period (four days before to four days after rash onset) and this exposure occurred within the expected incubation period of the case under investigation – 7 to 18 days (mean 14 days) before rash onset.

Measles data presented in this report were taken from the Computerised Infectious Disease Reporting (CIDR) system on the 7th October 2005. Analysis of measles data was carried out using Business Objects and Microsoft Excel. Incidence rates were calculated based on population data taken from the 2002 census.

Results

Incidence

A total of 330 measles cases were notified during 2004, giving a crude incidence rate of 8.4 per 100,000 population. This rate is lower than the crude incidence rate of 14.6 per 100,000 in 2003 but higher than the incidence rate of 6.2 per 100,000 in 2002. The breakdown of measles cases by health board and the crude incidence rates by health board during 2003 and 2004 are presented in table 1. In 2004, the highest number of notifications was in the ERHA (n=223, 68%) followed by the SHB (n=26, 8%). The highest crude incidence rate in 2004 was in the ERHA (15.9/100,000) followed by the NWHB (9.9/100,000).

Case classification

Case classification was provided for 93% (n=306) of measles notifications in 2004. Of the 330 notifications, 156 (47%) were classified as confirmed, 150 (45%) as possible while case

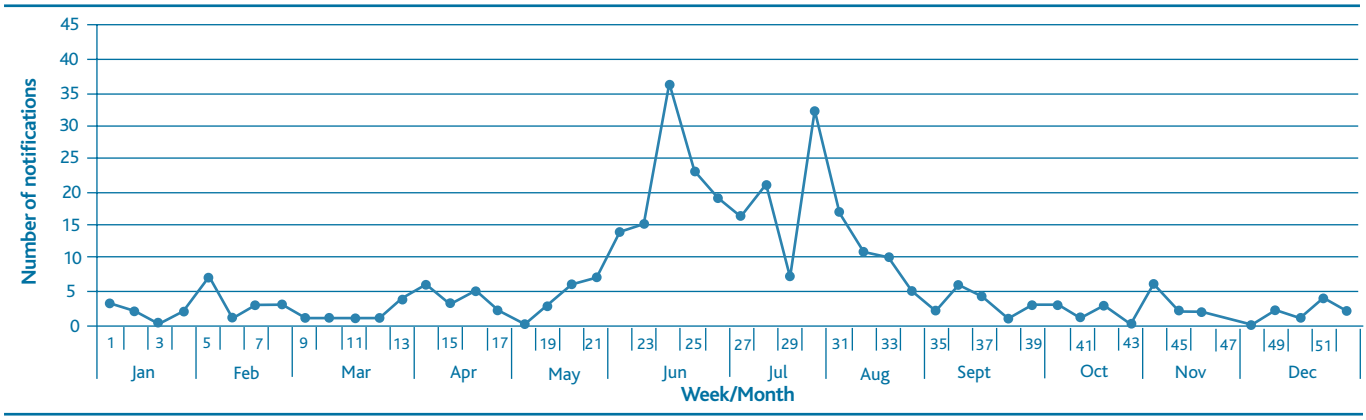

Figure 1. Number of measles cases notified by week and month, 2004.

classification was not provided for 24 notifications (7%). Of the 156 notifications classified as confirmed, 145 were laboratory confirmed while the remaining 11 were epidemiologically linked to a laboratory confirmed case.

Age and sex distribution

A breakdown of measles notifications by age group and the age specific incidence rates per 100,000 population in 2003 and 2004 are presented in table 2. Measles cases were reported in both children and adults in 2004. The highest number of notifications (n=118, 36%) in 2004 was in the age group 1-2 years followed by those aged <1 year (n=96, 29%) and those aged 5-9 years (n=49, 15%). The highest incidence rates in 2004 were in the age groups <1 year (176.2/100,000) and 1-2 years (105.6/100,000). Of the 330 measles notifications, 167 were female, 159 were male, while sex was not reported for four notifications.

Seasonality, increased activity and outbreaks

Measles notifications by week of notification are shown in figure 1. An increase in measles notifications commenced in early June 2004 (Week 22 2004) with the number of measles notifications remaining high throughout June, July and August. It was the beginning of September (Week 35 2004) before weekly measles notifications dropped to five cases or fewer for two consecutive weeks. During June, July and August (Weeks 22 -34) 226 measles cases were notified, this is 68% of the notifications for the entire year. The majority of these notifications during the period June-August were notified in the ERHA (n=162, 72%) followed by the SHB (n=18, 8%) and the NWHB (n=16, 7%). During the period June to August, twelve epidemiologically linked measles notifications were reported by the NWHB, seven by the SHB, while three linked notifications were reported by the NEHB.

Laboratory data

Laboratory confirmation of acute measles infection is recommended for all sporadic cases and to confirm the existence of outbreaks. Diagnosis can be confirmed by testing oral fluid specimens or serum specimens.

Oral fluid specimens are collected using a foam swab, which provides a non-invasive method for the confirmation of measles. Oral fluid specimens should be obtained between one and five weeks following the appearance of the rash. Specimens obtained less than one week after rash onset may lead to a false negative result. Measles can also be confirmed serologically by detecting measles specific antibodies. In 2004, laboratory results were provided to HPSC for 156 (156/330, 47%) measles notifications.

One hundred and forty-five notifications were laboratory positive for measles (table 3). Forty-six percent (67/145) of the laboratory confirmed cases were diagnosed based on tests of oral fluid specimens, 29% (42/145) were diagnosed using serum specimens, and 23% (34/145) were diagnosed on both oral fluid and serum specimens. Eleven notifications were not lab confirmed but the cases were considered to fit the clinical criteria for measles.

As measles vaccine induces a positive measles IgM response a positive IgM test cannot be used to confirm the diagnosis of

Table 3. Measles laboratory test results (n=156)

Specimen type	Laboratory result		Total
	Positive	Negative	
Oral fluid	67	10*	77
Serum	42	0	42
Oral fluid and serum	34†	1‡	35
Type not reported	2	0	2
Total	**145**	**11**	**156§**

** Specimen date in relation to onset date not reported for 2 cases, and for 3 cases the specimen was taken <7 days after rash onset*
†One case that was negative based on an oral fluid specimen (taken < 7 days after onset) but serum positive is reported here as laboratory positive
‡Specimens taken on day of rash onset
§Laboratory results were only provided for 156 of the 330 notifications

Table 4. Laboratory results and vaccination status of measles notifications in Ireland during 2004

Vaccination status	Laboratory result			Total
	Positive	Negative	Not Tested/Unknown	
MMR_1*	14 †	4	15	33 ‡
MMR_2§	0	0	6	6 §
Nil	74	5	62	141
Not Reported	57	2	91	150
Total	**145^**	**11 ||**	**174**	**330**

**24 of the 33 cases known to have at least one dose of MMR may have received two doses*
†For 13 cases date of vaccination in relation to disease onset not provided, 1 case vaccinated 6 months prior to onset
‡For 27 cases date of vaccination in relation to disease onset not provided, 2 cases were known to be vaccinated <18 days prior to onset
§MMR2 vaccination dates reported for 4 cases, 2 of these were vaccinated < 20 days prior to onset
^One case that was negative based on an oral fluid specimen (taken < 7 days after onset) but serum positive is reported here as laboratory positive
||4 possible false negative as specimens taken < 7 days following onset

measles in individuals who received measles vaccine six to 45 days before rash onset. Of the 145 laboratory positive measles notifications 14 had received at least one dose of vaccine (table 4). The date of vaccination in relation to onset of disease was not provided for 13 of these. The remaining case was vaccinated (MMR_1) six months prior to onset of illness.

Vaccination data

Vaccination status was reported for 180 (55%) of the 330 notifications. One hundred and forty-one (141/180, 78%) notifications were unvaccinated. Fifty percent (71/141) of those unvaccinated were aged greater than 15 months and therefore, were potentially eligible for vaccination with MMR_1 (assuming there were no contraindications to vaccination).

Nine cases (9/180, 5%) were vaccinated with MMR_1 only. Two of these cases were aged greater than five years; therefore, they were not age appropriately vaccinated. Of the nine cases vaccinated with MMR_1; two received the vaccine less than 18 days prior to onset suggesting the possibility they may have been incubating measles at the time of vaccination; four were vaccinated greater than two months prior to onset; the date of vaccination in relation to disease onset was not reported for three cases. An additional 24 notifications received at least one dose of MMR; however, cases may have received two doses. The MMR_1 vaccination dates were not reported for these notifications.

Six cases received MMR_2; however, it is important to note that none of these cases were reported as laboratory confirmed (table 4). The MMR_2 vaccination date was reported for four cases, two of these were vaccinated less than 20 days prior to onset of illness. Therefore, none of these six cases are known to be, or can be, classified as vaccine failures based on the data provided.

Hospitalisation data & complications of measles

Information on hospitalisation status was available for 178 notifications (178/330, 54%). Forty-one cases were hospitalised representing 23% (41/178) of all cases with known hospitalisation status (table 5). The length of hospital stay was only reported for six notifications, with the length of stay ranging from one to five days. The hospitalised cases were aged between 6 months and 53 years (mean age, 5 years; median age, 2 years). Twenty-nine of the hospitalised cases (29/41, 71%) were unvaccinated. Twenty-one (72%) of these unvaccinated cases were aged greater than 15 months and so were potentially eligible for vaccination. Six hospitalised cases had received at least one dose of MMR (dates of vaccination were not provided for any of the six cases), one of these was aged greater than five years and so was not age-appropriately vaccinated. Vaccination status was not provided for the remaining six hospitalised cases. Laboratory results were reported to HPSC for 37 of the hospitalised cases, all 37 were laboratory confirmed.

Information on measles associated complications was reported for 31 (31/330, 9%) notifications. Seizures were reported as a complication for two cases. Hypertension was reported as a complication for one older case (<50 years of age) but it is unlikely to have been related. The 28 remaining cases were reported to have no complications.

Table 5. Number of measles notifications in Ireland by age group and hospitalisation status during 2004

Age group (years)	Hospitalisation status			Total
	Hospitalised	Not hospitalised	Not reported	
<1	6	41	49	96
1-2	16	47	55	118
3-4	7	17	14	38
5-9	8	21	20	49
10-14	0	7	5	12
15-19	0	1	2	3
20-24	2	0	3	5
25+	2	2	3	7
Unknown	0	1	1	2
Total	**41**	**137**	**152**	**330**

Discussion

In Ireland, despite the dramatic reduction in measles cases following the introduction of a measles vaccine in 1985 and MMR in 1988, measles continues to be a problem with recurrent outbreaks. Measles outbreaks occurred in 1993 and 2000 with 4328 and 1603 cases notified, respectively. Following the measles outbreak in 2000 measles notifications had declined during 2001 and 2002 but measles activity increased again in 2003 with 572 notifications. In 2004, while there were fewer notifications compared to 2003, increased measles activity was observed between June and August. The majority of notifications during this time were in the ERHA (n=162). However, epidemiologically linked notifications were also reported by the NEHB (n=3), NWHB (n=12) and SHB (n=7) during this time. Since the national collation of cohort based immunisation uptake data commenced in Ireland in Quarter 1 1999, MMR_1 uptake at 24 months has never reached the WHO target of 95%.[1] While the uptake of MMR remains below the target of 95% required to prevent the spread of measles outbreaks will continue to occur.

Ireland continues to have a high incidence of measles compared to a number of other European countries. In 2004, the measles incidence was 8.4 per 100,000 in Ireland, compared with a measles incidence of less than one per 100,000 (as derived from the number of laboratory confirmed cases) in England and Wales.[2] The incidence of measles in Ireland, in 2004, ranked us second highest compared to 16 other regions reporting complete data to WHO Europe.[3]

The WHO has targeted 2010 for the elimination of measles and congenital rubella in the WHO European Region. In order to achieve measles elimination in Ireland a measles elimination committee was established during 2004 with the aim of producing a five-year elimination plan. The elimination plan will place particular emphasis on improving MMR uptake rates in Ireland. Strengthening of measles surveillance in Ireland will also be a critical component in the control and elimination of measles. Measles surveillance is required to detect cases and to understand the reasons for the occurrence of the disease so that appropriate and timely control measures can be implemented. Surveillance also detects trends and risk factors thereby guiding and monitoring the effectiveness of control and elimination efforts.

One of the limitations of measles surveillance data provided to HPSC in 2004 was the incompleteness of data. Laboratory confirmation of measles is an important aspect of surveillance but less than half of notifications had laboratory testing performed. Vaccination status was provided for just over half the notifications. In addition, for a number of cases, where vaccination status was provided, the date of vaccination in relation to disease onset was not reported making interpretation of the vaccination data difficult. Nearly a quarter of cases in 2004, where hospitalisation status was reported, were hospitalised. However, the duration of stay was not reported for the majority of these cases. Information on hospitalisation status was not provided for 46% of notifications, thus limiting interpretation of this data in relation to all measles notifications. However, it highlights the severity of measles infection and clearly indicates that measles causes substantial morbidity for the individual, with substantial implications for families and health services.

Incomplete surveillance data poses problems during analysis and interpretation. As measles surveillance and data quality are improved so to will the ability to control and prevent measles cases thereby aiding elimination.

Acknowledgements

HPSC wish to sincerely thank everyone who contributed to measles surveillance in Ireland. Special thanks to those who provided enhanced measles data.

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Antibiotic Consumption in the Community, 2004

Key Points

- **In 2004 comprehensive outpatient (primary care) and hospital care antibiotic usage data became available for the first time**
- **Outpatient antibiotic consumption rose to 20.9 DDD per 1000 inhabitants per day, which is mid-range in Europe, although strong seasonal fluctuations and regional pockets of high usage remain. Reliance on broad-spectrum penicillin was consistent with other countries where antimicrobial resistance in important pathogenic bacteria is high**
- **Hospital antibiotic consumption was estimated at 77 DDD per 100 bed days, which is equivalent to mid-range of usage in Europe. While differences in usage pattern are consistent with hospital function, the overall reliance on third-generation cephalosporins and fluoroquinolones was high**

Introduction and Methods

Surveillance of antimicrobial utilisation has been identified as a key component of the Strategy for the Control of Antimicrobial Resistance in Ireland (SARI) and Ireland now fully participates in the European Surveillance of Antimicrobial Consumption (ESAC). This report covers antibiotic consumption in both outpatient (sometimes referred to as ambulatory, community or primary care) and hospital care areas collected under ESAC guidelines for 2004 in Ireland.[1]

ESAC uses the WHO Anatomical Therapeutic Chemical (ATC) index to classify drugs through five hierarchical levels. For example, all anti-infective systemic drugs are grouped under J, antibacterial agents (antibiotics) are denoted as J01, penicillins are classed as J01C, broad-spectrum penicillins as J01CA and Amoxicillin as J01CA04. 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 expressed as DDD per 1000 inhabitants per day (DID) for outpatient consumption and DDD per 100 bed days used for hospital consumption.

HPSC has purchased Irish pharmaceutical sales data from a commercial organisation specialising in pharmaceutical market research, IMS Health. This dataset contains regional, monthly wholesaler to retail pharmacy sales data for 2004 from over 95% of the wholesalers and manufacturers in Ireland. Hospital prescribed antibiotics data were supplied directly by clinical pharmacists from a representative sample of 14 Irish hospitals for each quarter of 2004.

An automated data-extraction protocol was devised at HPSC

Table 1. The top ten combined outpatient and hospital care antibiotics used in Ireland for 2004: Rank (percent) within each healthcare area.

Antibiotic	Outpatient	Hospital
J01CR02 Amoxicillin and enzyme inhibitor	1 (23%)	1 (23%)
J01FA09 Clarithromycin	3 (10%)	2 (12%)
J01CA04 Amoxicillin	2 (16%)	6 (4%)
J01CF05 Flucloxacillin	7 (5%)	3 (10%)
J01MA02 Ciprofloxacin	12 (2%)	4 (7%)
J01AA02 Doxycycline	4 (7%)	18 (14%)
J01AA08 Minocycline	5 (7%)	28 (5%)
J01CE02 Phenoxymethylpenicillin	8 (4%)	13 (2%)
J01DC02 Cefuroxime	13 (2%)	5 (4%)
J01FA01 Erythromycin	10 (3%)	12 (2%)

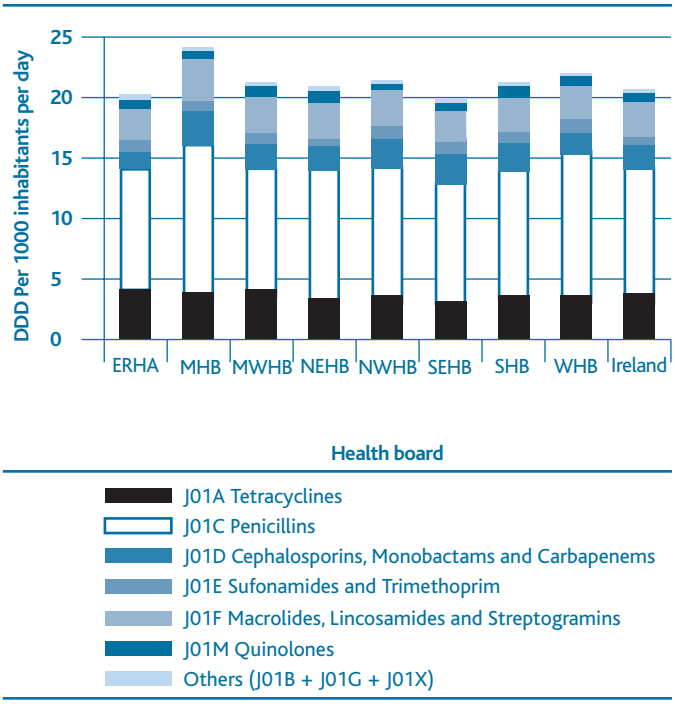

Figure 1. Outpatient antibiotic consumption by therapeutic class in each health board in Ireland, 2004.

to obtain the ATC/DDD outputs for antibiotics. The WHO ATC/DDD version 2005 was used throughout and retrospective data were re-analysed accordingly.

Results

The overall outpatient antibiotic consumption for Ireland in 2004 was 20.9 DID, a slight rise from the previous year's rate of 20.6 DID. Figure 1 shows the breakdown by antibiotic class for each health board and for Ireland as a whole. Penicillins accounted for the largest class used (48% of total at 10.1 DID), followed by tetracyclines (19%, 3.9 DID), macrolides (14%, 3.0 DID), cephalosporins (9%, 2 DID), quinolones (4%, 0.8 DID) and sulphonamides (4%, 0.8 DID). "Others" comprising aminoglycosides (J01G) and miscellaneous (J01X) accounted for 2% at 0.3 DID.

The overall hospital antibiotic consumption for Ireland in 2004 is estimated at 76 DDD per 100 bed days. Figure 2 shows the breakdown by antibiotic class for each hospital in the sample and the mean estimates for Ireland as a whole. Again penicillins accounted for the largest class used (48% of total at 37 DDD per 100 bed days), followed by macrolides (16%, 21), quinolones (10%, 8), cephalosporins (9%, 7), sulphonamides (5%, 4) and tetracylcines (2%, 2). "Others" comprising amphicols (J01B), aminoglycosides (J01G) and miscellaneous (J01X) accounted for 9% at 7 DDD per 100 bed days.

While there was a wide variation in terms of total antibiotic consumption in the different hospitals (range 51 to 110 DDD per 100 bed days), there was little variation in outpatient antibiotic usage among the different health boards (19.9 to 24.0 DID). However, as shown in figure 3, there was considerable variability in outpatient antibiotic usage at county level (16.0 to 29.7 DID).

Penicillins and cephalosporins

Figure 4 shows breakdown of penicillin usage by subclass. Penicillin in combination with beta-lactamase inhibitor (such as amoxicillin/clavulanate) accounted for the largest proportion of penicillins in both outpatient (48%) and hospital (57%) care. The proportion of broad-spectrum penicillins (such as ampicillin and amoxicillin) was next highest in outpatient care (35%), but not in hospital care (9%). The second highest proportion of penicillin subclass used in hospitals was beta-lactamase resistant penicillins (such as flucloxacillin) at 22%, which was third in outpatient care (9%). The narrow-spectrum penicillins, such as benzylpenicillins formed the smallest proportion of total penicillin usage in both outpatient (8%) and hospital (11%) care.

Figure 5 shows the breakdown of cephalosporin usage by generation. Second-generation cephalosporins (such as cefuroxime) accounted for the largest proportion of cephalosporins in both outpatient (75%) and hospital (56%) care. The proportion of first-generation cephalosporins (such as cefalexin) was next highest in outpatients (17%) but remained low in hospitals (6%), while the proportion of third-generation cephalosporin (such as cefotaxime) usage was next highest in hospital care (38%) and lowest in outpatients (8%).

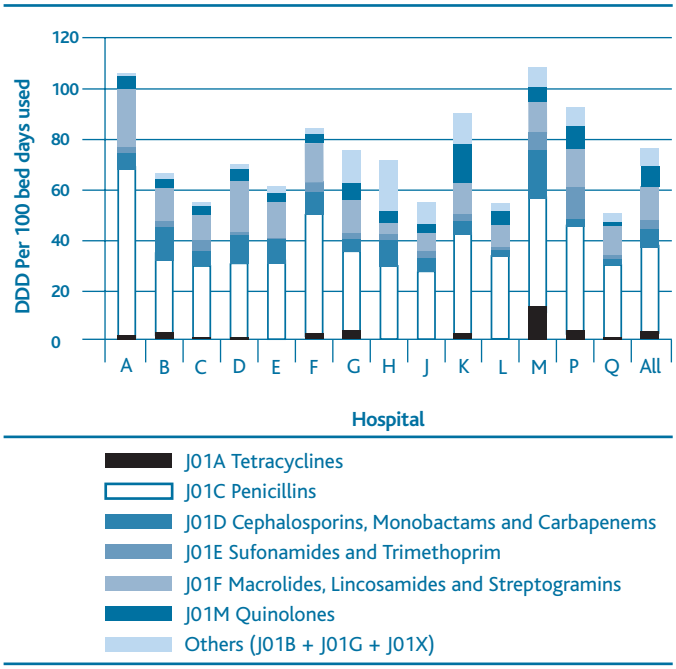

Figure 2. Hospital antibiotic consumption by therapeutic class in each institution in the survey for 2004

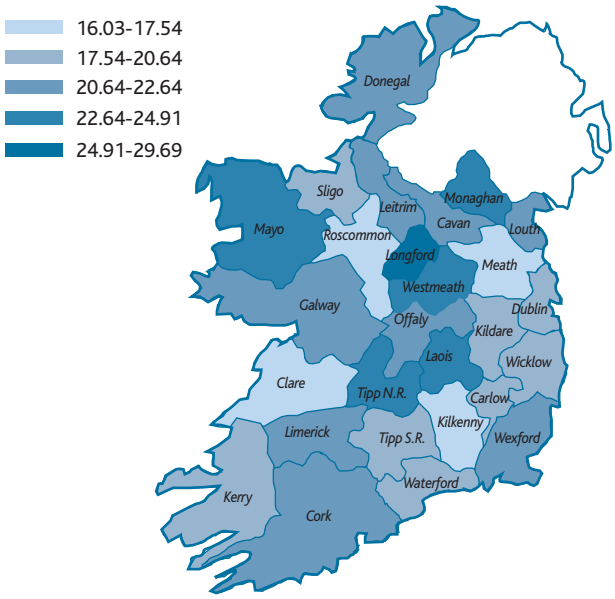

Figure 3. Total outpatient antibiotic consumption in Defined Daily Doses per 1000 Inhabitants per Day by county in Ireland, 2004

Commonly used antibiotics

Table 1 shows the top ten, combined outpatient and hospital care, antibiotics used in Ireland for 2004. At 23%, amoxicillin and enzyme inhibitor was the most commonly used antibiotic in both healthcare areas. The fluoroquinolone, ciprofloxacin was more commonly prescribed in the hospital setting, while the tetracyclines, doxycycline and minocycline, were more frequently employed among outpatients. The ten antibiotics accounted for 78% of outpatient antibiotics but only 67% of the antibiotics used in hospitals.

Time series analysis

Figure 6 shows consumption of antibiotics in outpatient care, in DID, for Ireland by quarter since 1993. Antibiotic usage has been rising steadily and rose to 24.2 DID for the last quarter of 2003 and 24.3 DID for the last quarter of 2004. These rates are the highest recorded for any quarter in the entire study period (12 years). Overall antibiotic use was highest during the winter months. The mean difference between troughs (quarters 2 and 3) and peaks (quarters 1 and 4) in antibiotic use was 23% (range 12% - 34%) and 19% for 2004.

The fluctuation in outpatient antibiotic utilisation during the course of a year is further demonstrated in figure 7. The mean monthly rate for the last five years (2000 – 04), dropped steadily from 21.6 DID in January to 15.2 DID in July and stayed low for August. The level rose sharply to a plateau in September, October and November to about 21 DID, then peaked to 23.2 DID in December.

There was no demonstrable seasonal fluctuation among hospital antibiotic consumption data.

Discussion

In 2004, comprehensive antibiotic usage data from both outpatient and hospital healthcare areas for Ireland became available. Some limitations of the data collection process still remain. Firstly, the IMS dataset is based on pharmacy wholesale figures rather than individual prescriptions and may be subject to bias arising from stockpiling and wastage of drugs. Secondly, among the hospital antibiotic usage data, a few outpatient prescriptions could be included; therefore this section of the analysis may not reflect true inpatient usage statistics. Lastly, there may be a small number of patients who fall between outpatient and hospital care areas for which antibiotic usage data are not available. Nevertheless the data do show reliability over time and similar data sources have been successfully used to calculate antibiotic consumption in other countries. Furthermore, the figures are in line with previous analyses from the of drugs prescribed under the reimbursement schemes of the General Medical Services Payments board.[2]

In a recent publication on aggregate outpatient antibiotic use in 32 European countries (2002 data) consumption rate ranged from 10.0 DID (the Netherlands) to 32.3 DID (France).[3] Figures in this report therefore show outpatient usage in Ireland (20.9 DID for 2004 and consistently around 17-20 DID over the last 5 years) to be mid-range in Europe. However, the strong seasonal fluctuation coupled with the reliance on broad-spectrum penicillins in outpatient antibiotics usage in

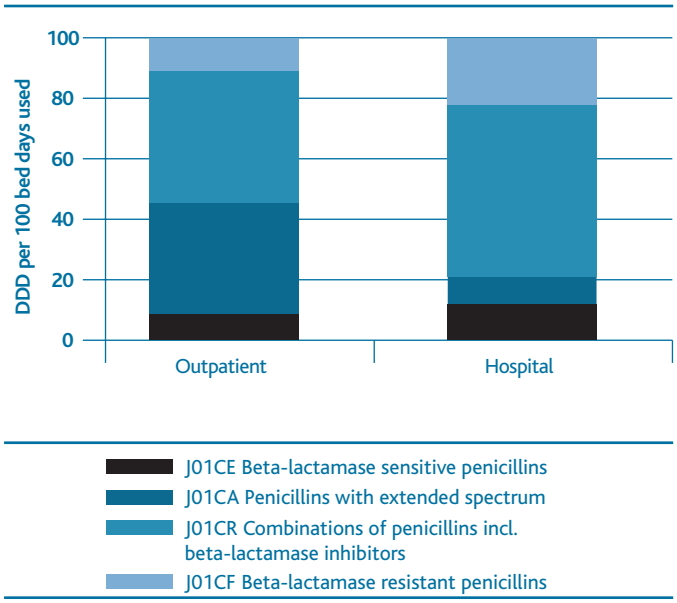

Figure 4. Relative proportions of penicillins used in outpatient and hospital care in Ireland, 2004

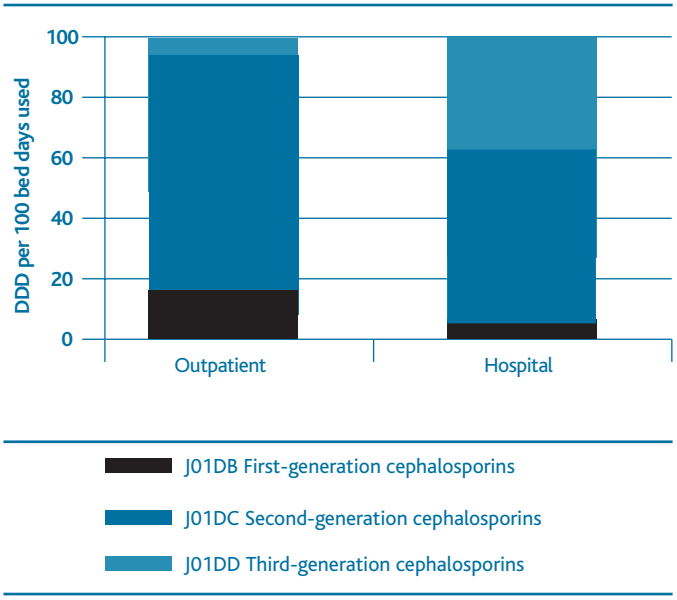

Figure 5. Relative proportions of cephalosporins used in outpatient and hospital care in Ireland, 2004

Ireland is consistent with those countries having a higher level of resistance among key indicator pathogens, as in Belgium, Greece and the UK, and much lower than the Nordic countries, which generally have low levels of resistance. Furthermore, the overall primary care usage is rising year-on-year and was highest for the last quarter of 2004 in any year in Ireland. The usage in regional pockets appears to be considerably different from the national rate and this regional variability, though not displaying any obvious geographical pattern, may reflect differences in socio-economic factors and regional prescribing practices. Seasonal fluctuation has been seen every year in outpatient antibiotic consumption and is probably related to over-prescribing of antibiotics for respiratory tract infections in winter months.

The pattern of antibiotic usage in hospitals is different from primary care usage but again the consumption in Ireland appears to be mid-range in Europe according to ESAC data (unpublished). Aggregate data from 15 countries in 2002 produced a median of 2.1 with a range of 1.3 to 3.9 DDD / 1000 inhabitants / day. [This unit of measure was employed as the recommended bed-days denominator is not obtainable in some countries. The figure is based on the catchment population of each hospital studied and can be only roughly estimated for the Irish data]. The equivalent rate for hospital antibiotic consumption in Ireland is 2.1 DDD / 1000 inhabitants / day, which is the same as the EU median, although variation in therapeutic choice was observed. The reliance on fluoroquinolones and third-generation cephalosporins, as preferred here, has been shown to exert constant pressure for the selection of resistant strains of

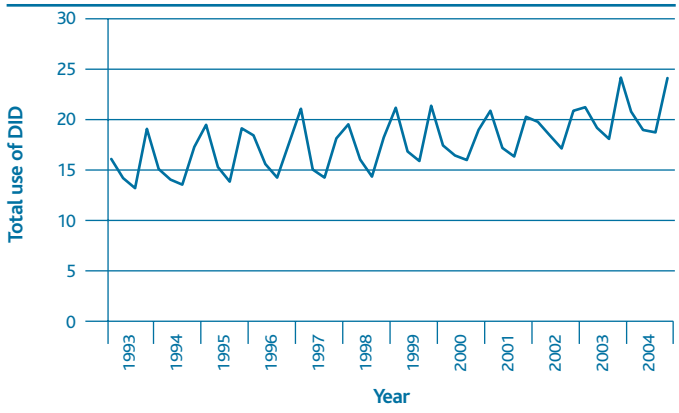

Figure 6. Seasonal variation in outpatient antibiotic consumption in Ireland, 1993-2004

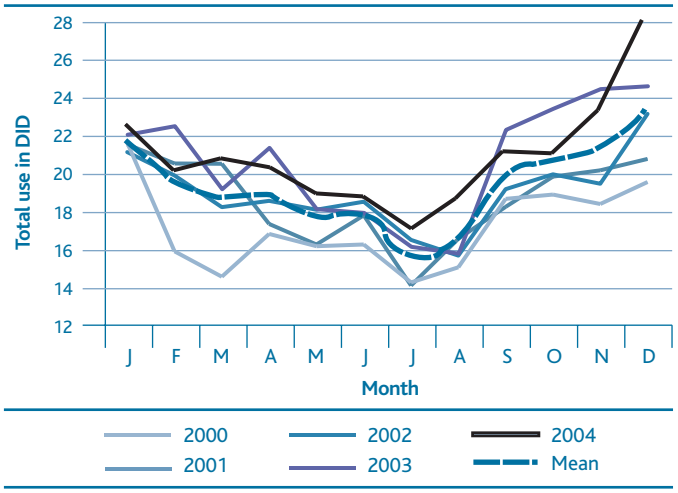

Figure 7. Variation in outpatient antibiotic consumption by month in Ireland, 2000-2004.

bacterial pathogens. The variation of antibiotic use between hospitals in Ireland is in line with the diversity of the type of hospitals taking part in the survey which included data from small single-specialist to large teaching hospitals as well as public, voluntary and private facilities from different geographical settings. The inclusion of a larger number of hospitals in the future will lead to improved analyses based on hospital type and location.

Acknowledgements

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Glossary of Terms

ACE – Assistant Chief Executive
AMO – Area Medical Officer
ASIR – Age Stanardised Incidence Rate
CIR – Crude Incidence Rate
CFR – Case Fatality Rate
CSF – Cerebo Spinal Fluid
CSSD – Central Sterile Suppliers Department
EARSS – European Antimicrobial Resistance Surveillance System
ECEH – European Centre for Environment and Health
EHSS – Eastern Health Shared Services
ERHA – Eastern Regional Health Authority - HSE Eastern Region since 2005. (Dublin, Kildare, Wicklow)
EISS – European Influenza Sureveillance Scheme
ESAC – European Surveillance of Antimicrobial Consumption
ESBL – Extended Spectrum Beta-lactamase
ESEN – European Sero-Epidemiology Network
FBHM – Faculty of Public Health Medicine
FSAI – Food Safety Authority of Ireland
FSPB – Food Safety Promotion Board
GBS – Guillain Barré Syndrome
HAART – Highly Active antiretroviral Therapy
HSE – Health Services Executive
HPA – Health Protection Agency
HUS – Haemolytic Uraemic Syndrome
IBTS – Irish Blood Transfusion Service
ICGP – Irish College of General Practioners
IDU – Injecting Drug User
IMMRL – Irish Meningococcal and Meningitis Reference Laboratory
IMU – Information Management Unit
MDR – Multi-Drug Resistant
MHB – Midlands Health Board - HSE Midlands Area since 2005. (Laois, Offaly, Longford, Westmeath)
MMR – Measles Mumps Rubella
MSM – Men who have Sex with Men
MWHB – Mid Western Health Board - HSE Mid Western Area since 2005. (Clare, Limerick, Tipperary NR)
NASC – National AIDS Strategy Committee
NDSC – National Disease Surveillance Centre
NEHB – North Eastern Health Board - HSE North Eastern Area since 2005. (Cavan, Monaghan, Louth, Meath)
NGO – Non-Governmental Organisation
NSRL – National Salmonella Reference Laboratory
NTBSS – National Tuberculosis Surveillance System
NVRL – National Virus Reference Laboratory
NWHB – North Western Health Board - HSE North Western Area since 2005. (Donegal, Sligo, Leitrim)
OLHSC – Our Lady's Hospital for Sick Children
PCR – Polymerase Chain Reaction
PFGE – Pulse Field Gel Electrophoresis
RCPI – Royal College of Physicians Ireland
RCSI – Royal College of Surgeons in Ireland
RSV – Respiratory Syncytial Virus
SAC – Scientific Advisory Activity
SARI – Strategy for the control of Antimicrobial Resistance in Ireland
SARS – Severe Acute Respiratory Syndrome
SEHB – South Eastern Health Board - HSE South Eastern Area since 2005. (Carlow, Kilkenny, Tipperary SR, Waterford, Wexford)
SHB – Southern Health Board - HSE Southern Area since 2005. (Cork, Kerry)
STI – Sexually Transmitted Infection
TCD – Trinity College Dublin
TTP – Thrombotic Thrombocytopenic Purpura
UCD – University College Dublin
UCH – University College Hospital
WHB – Western Health Board - HSE Western Area since 2005. (Galway, Mayo, Roscommon)
WHO – World Health Organisation