National Disease Surveillance Centre
Annual Report 2001

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Foreword

This is my third foreword to our annual report which again is a clear reflection of the activity of our Director and all of the other staff. The range of work is wide, from tuberculosis to leptospirosis to cryptosporidiosis, with perhaps the most encouraging being the reduction in meningitis following the introduction of an effective vaccine for Meningococcus C.

A major advance for all of us was our move into new premises earlier this year, which allowed our staff to escape from a variety of premises, with the disadvantages that separating staff entails.

The Department of Health and Children has indicated its intention of establishing the NDSC Board on a statutory basis, and the Board has given many meetings to considering this. When so established the Board can employ its own staff and directly utilise its subvention from the Department of Health and Children.

The establishment of the Board will mean that a new board will be appointed by the Minister so that, among other things, this is likely to be my last foreword! It only remains for me to thank the present Board members, our Director, and all the staff at NDSC for their contribution towards making such a success of our first few years.

Professor Dermot Hourihane
Chairman
Board of the National Disease Surveillance Centre

Introduction

This is the third annual report from the National Disease Surveillance Centre (NDSC) in Ireland. This annual report builds on work covered in the previous reports and includes a new section on sexually transmitted infections in Ireland and also a section on the response to threats of deliberate release of biological agents in 2001. There has been a resurgence of sexually transmitted infection in Ireland beginning in the early 90's and culminating in a dramatic increase in syphilis predominately among men who have sex with men in Dublin. This outbreak has highlighted the need for improved surveillance of sexually transmitted infections in Ireland to inform policy and prevention strategies for sexual health.

In the aftermath of September 11 2001, many countries including Ireland developed contingency plans to address the threat of deliberate release of biological agents. The core lesson learnt in Ireland, as in all other countries, was that of the crucial importance of health protection. Whether outbreaks of infectious disease are natural or man-made, very similar processes, namely strong disease and risk factor surveillance systems, the capacity to undertake prompt epidemiological investigation, strong laboratory capacity and effective systems of public heath management are necessary to manage them.

It was with great sadness that staff of NDSC learned of the untimely death of Marie O'Shea – Senior Technologist in the microbiology laboratory at James Connolly Memorial Hospital. Marie worked on the CIDR Development Committee during 2001 and her contribution was greatly appreciated.

The staff at NDSC would like to express their appreciation to all the health professionals who worked on NDSC Scientific Advisory Committees during the past year.

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Dominic Whyte
Surveillance Scientist (Left in 2001)

Bacterial Meningitis, 2001

Key Points

In 2001,

- **396 cases of bacterial meningitis were notified in Ireland.**
- **330 cases (including 4 imported cases) of meningococcal disease were notified.**
- **Meningococcal disease notifications declined by 36% in 2001.**
- **Serogroup C meningococcal disease notifications declined by 76%.**
- **Meningococcal serogroup C conjugate vaccine has had a major impact in reducing serogroup C disease in Ireland.**
- **There were 15 deaths due to bacterial meningitis including 12 due to meningococcal disease.**

Introduction

The global burden of childhood bacterial meningitis is considerable. In Ireland the vast majority of cases of bacterial meningitis are due to invasive meningococcal disease (IMD). IMD is a serious life-threatening illness caused by *Neisseria meningitidis*. While the largest outbreaks and highest mortality and morbidity occur in the developing world the disease continues to strike, particularly the young in developed countries. IMD is hyperendemic in Ireland and the country has one of the highest incidence rates in Europe with serogroups B and C accounting for the vast majority of cases.

The development of the meningococcal serogroup C conjugate (MenC) vaccine has been a major breakthrough as this vaccine produces long-lasting protection and is effective in infants and toddlers. The UK was the first country to introduce the MenC vaccine, commencing in November 1999. One year later the MenC vaccine was introduced in Ireland (October 2000) as part of the primary childhood immunisation schedule. A catch-up programme was also launched at this time with the overall aim of offering the vaccine to everyone up to and including 22 years of age. This catch-up programme was introduced on a phased basis with Phase 1 targeting those most at risk (<5 year olds and 15-18 year olds). Phase 2 targeted the 5-6 year olds and finally Phase 3 targeted children aged 7-14 years and young adults aged 19-22 years. The catch-up programme was completed in Ireland by March 2002.

Materials and Methods
Enhanced surveillance of bacterial meningitis (including meningococcal septicaemia) commenced in Ireland in 1997. The Community Care Areas (CCAs) simultaneously notify the Departments of Public Health and the National Disease Surveillance Centre (NDSC) of each suspected case of bacterial meningitis. Follow-up information on each case notified is collected by the Department of Public Health/CCA and forwarded to NDSC. At NDSC data are inputted to an MS Access database. The National Meningococcal Reference Laboratory (MRL) at The Children's Hospital, Temple Street, Dublin, performs active surveillance on laboratory-confirmed cases of IMD. The NDSC database is reconciled monthly with the MRL database and quarterly with the Departments of Public Health databases. A final data validation is performed with the Departments of Public Health and MRL following year-end.

Data analysis was performed using MS Access, MS Excel and Epi Info. Population data were taken from the 1996 census. For surveillance purposes the diagnosis of IMD is classified as **Definite**, **Presumed** and **Possible** as outlined in the Department of Health and Children's Working Group report.[1]

A summary of the case definitions are as follows:

Definite: A case where *Neisseria meningitidis* is detected by culture or PCR in a normally sterile site (CSF, blood, synovial fluid etc.).

Presumed: A case where the convalescent serology test is positive or Gram-negative diplococci are detected in CSF or skin-scrapings or *N. meningitidis* is isolated from an eye, throat or nasal swab together with either the characteristic purpuric rash or clinical or laboratory features of bacterial meningitis (CSF pleocytosis).

Possible: A case with evidence of acute sepsis with or without meningitis, together with the characteristic purpuric rash or a case with clinical evidence of sepsis without a purpuric rash and in whom *N. meningitidis* is isolated from an eye, throat or nasal swab.

Results
Bacterial meningitis
Three hundred and ninety six cases of bacterial meningitis (including 4 imported cases) were notified in Ireland in 2001. Bacterial meningitis notifications declined by 32% in 2001 compared to 2000 (586 cases). In 2001, invasive meningococcal disease (IMD) accounted for 84% of the bacterial meningitis notifications – 330 cases (including 4 imported cases). *Streptococcus pneumoniae* accounted for 5% (n=20) of the bacterial meningitis cases notified, while *Haemophilus influenzae* type b accounted for 0.5% of the cases (n=2).

Invasive meningococcal disease
Imported cases of IMD
An imported case is defined as a case where the onset of illness occurs within two days of arrival in the country or where the infection is known to have been acquired abroad. In 2001, four imported cases of IMD were notified in Ireland. Three serogroup B cases were notified (2 notified by the ERHA and 1 by the WHB) and one serogroup C case (notified by the NWHB). Two of the imported cases were from Northern

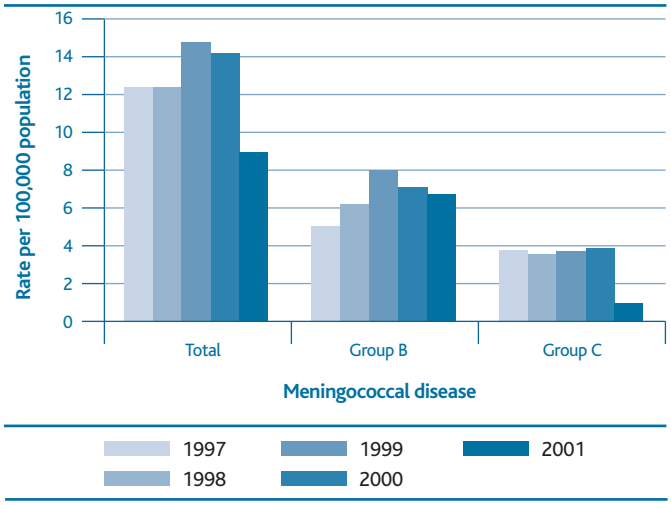

Figure 1. Incidence of invasive meningococcal disease in Ireland, 1997-2001

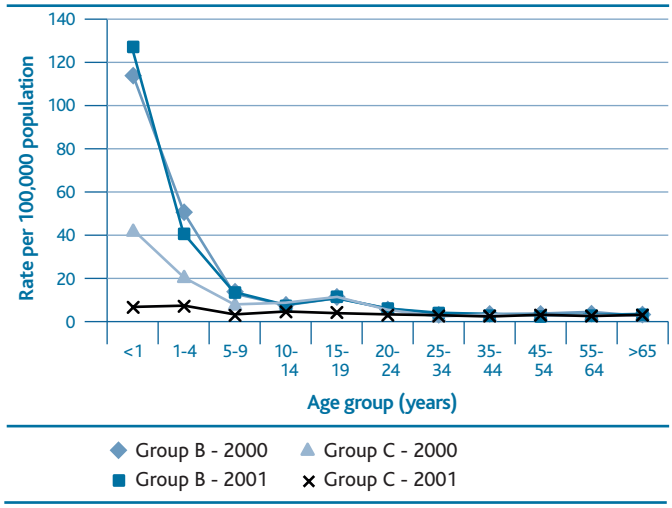

Figure 2. Age-specific incidence rates of serogroup B and C IMD in Ireland, in 2000 and 2001

Ireland and one each from England and Spain. These imported IMD cases will be excluded from subsequent analysis in this report.

Total IMD

In 2001, 326 cases (excluding 4 imported cases) of IMD were notified in Ireland, which is equivalent to a rate of 8.99/100,000 population. IMD notifications declined by 36% in 2001 compared with the previous year, 513 cases (14.15/100,000 excluding 2 imported cases) (figure 1). This is the lowest rate recorded since the enhanced surveillance system for bacterial meningitis (including meningococcal septicaemia) commenced in 1997 (figure 1). Two hundred and fifty nine (79.5%) were classified as definite, 30 (9.2%) as presumed and 37 (11.3%) as possible cases. Ninety percent (n=293) of cases were laboratory-confirmed and 280 of the 293 cases were confirmed by the MRL. The 13 cases not confirmed by MRL included six microscopy and seven throat/nasal/eye swabs. Of the 280 cases confirmed by MRL, 60% (167 cases) were by PCR, 33% (92 cases) by culture and 7% (21 cases) by serology.

IMD by serogroup

Of the 326 cases of IMD notified, the breakdown by serogroup was as follows: 242 serogroup B (excluding 3 imported cases), 34 serogroup C (excluding 1 imported case), three serogroup W135 (none Hajj related), one serogroup Y, seven non-groupable (NG) and 39 had no organism detected. Serogroup B IMD accounted for 84% of the serogrouped cases. The incidence of serogroup B IMD dropped by 5.5% in 2001 (6.67/100,0000, 242 cases) when compared with 2000 (7.06/100,000; 256 cases) and by 16.6% when compared with 1999 (8.00/100,000; 290 cases) (figure 1). However, the incidence rate for serogroup B IMD in 2001 was still higher than those reported for 1997 and 1998, 5.02 and 6.15 per 100,000, respectively (figure 1).

Serogroup C IMD accounted for just 12% of the serogrouped cases in 2001 compared to 34% of these cases in 2000. The incidence of serogroup C IMD declined by a dramatic 76% in 2001 (0.94/100,000; 34 cases, excluding 1 imported case) compared with the previous year (3.83/100,000; 139 cases) (figure 1).

IMD by age and sex

The male:female ratio was 1:1.04, with females accounting for 51% of the cases. One hundred and eighty three cases of IMD (56%) were in those <5 years of age, while 83% of the cases were <25 years of age. The highest age-specific incidence rates were in the less than 1 year olds (168/100,000) and 1-4 year olds (50/100,0000). The age-specific incidence rates for serogroup B and C IMD in 2000 and 2001, are presented in figure 2. The age-specific incidence rates for serogroup B IMD in 2001, were similar to those seen in 2000, with the highest rates in the <1 year olds (127/100,000) and 1-4 year olds (39/100,000). In 2001, the age-specific incidence rate for serogroup C IMD was highest in 1-4 year olds (5/100,000) followed by <1 year olds (4/100,0000). Compared with 2000, the age-specific incidence rates for serogroup C IMD in 2001 declined in all the age groups under 25 years of age (figure 2).

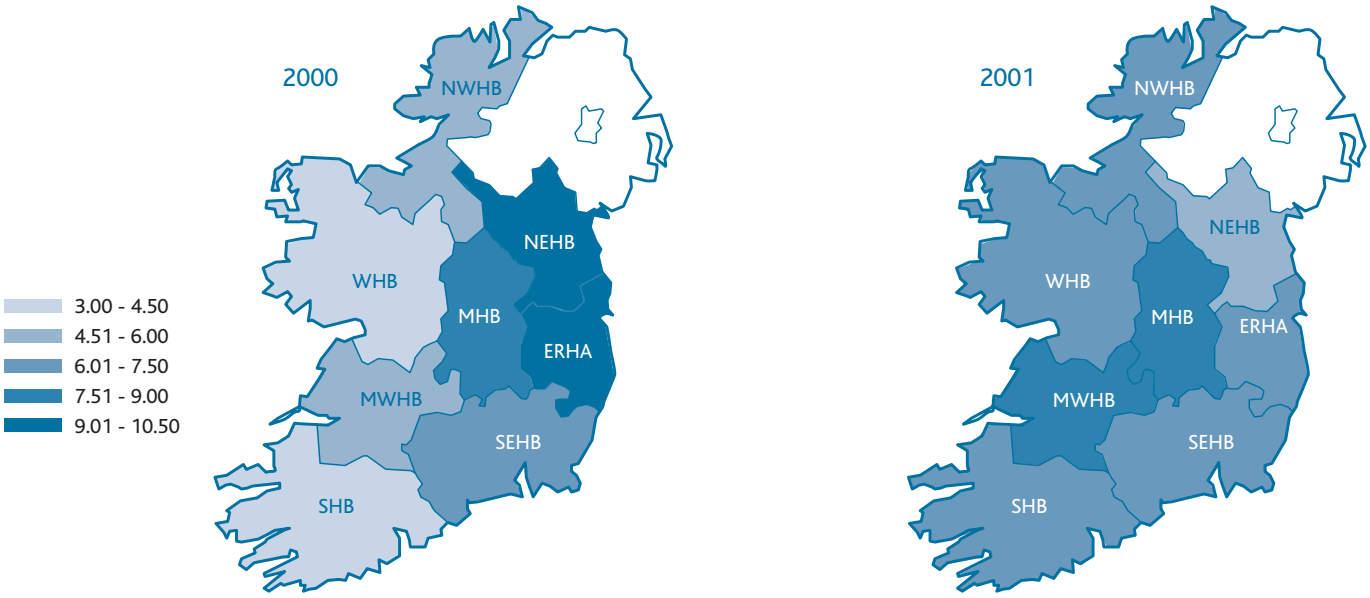

Figure 3. Age standardised incidence rates of serogroup B IMD by health board in 2000 and 2001

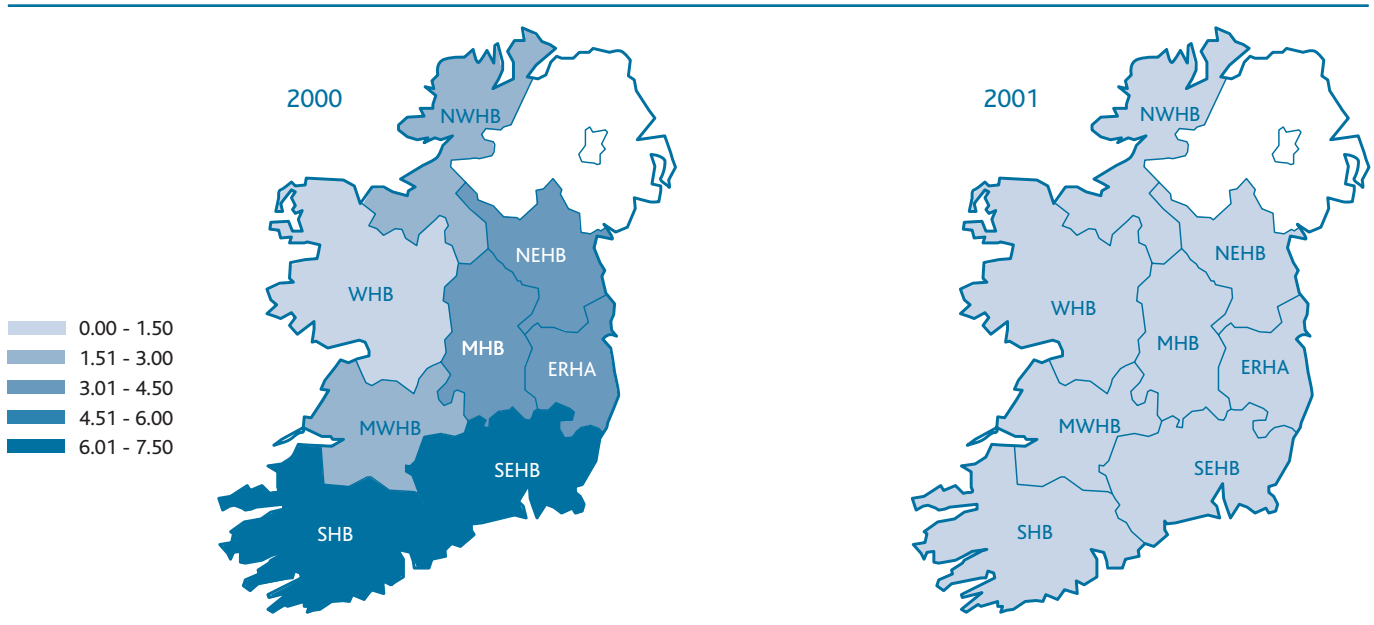

Figure 4. Age standardised incidence rates of serogroup C IMD by health board in 2000 and 2001

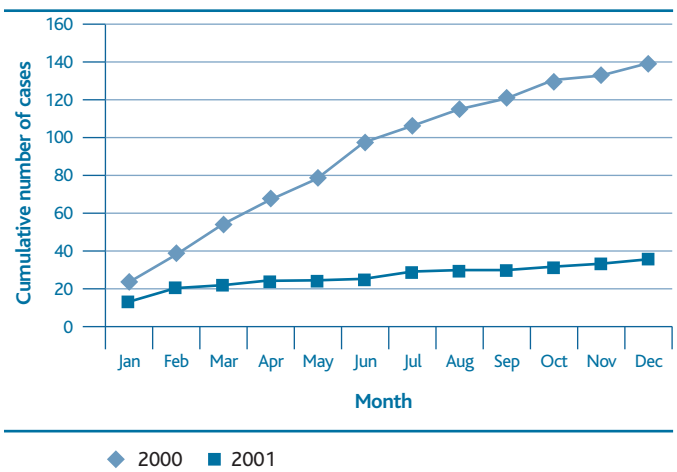

Figure 5. Cumulative number of cases of serogroup C IMD in 2000 and 2001 in Ireland

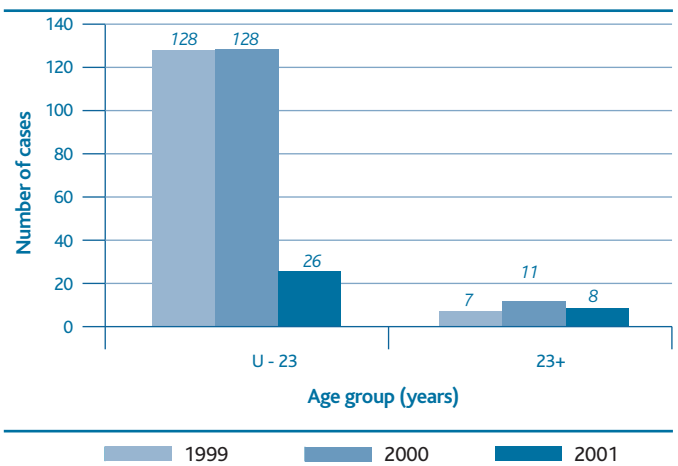

Figure 6. Serogroup C IMD 1999-2001 in Ireland in the age groups targeted (<23years) and not targeted (≥23 years) by MenC vaccine campaign

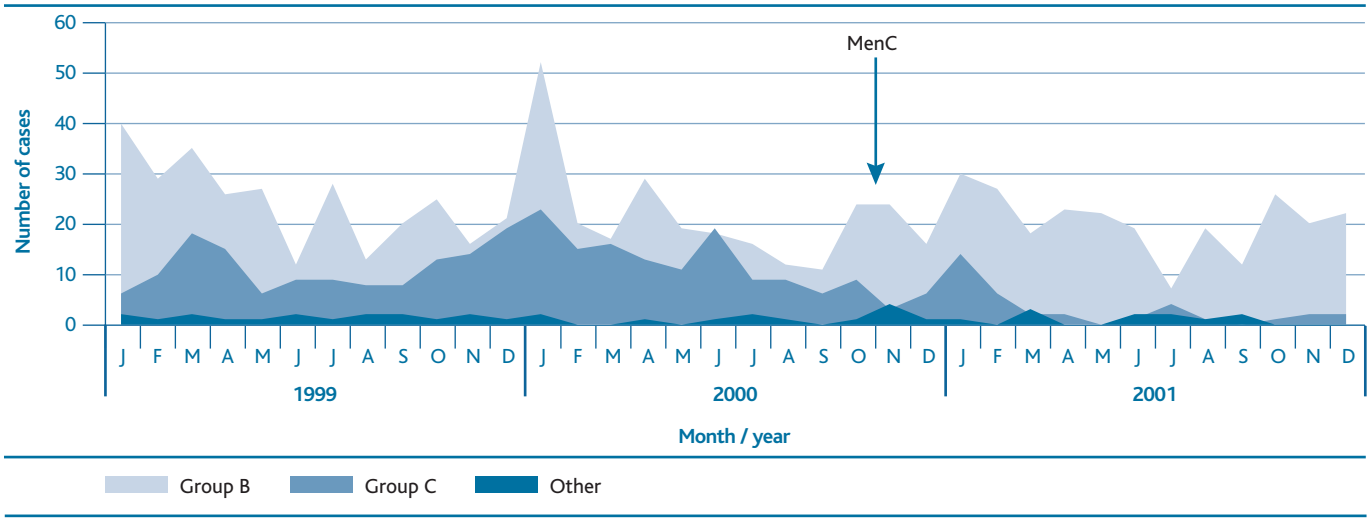

Figure 7. Monthly number of cases of serogroup B, C, IMD and others notified between 1999 and 2001 in Ireland (blue arrow indicates introduction MenC vaccine)

IMD by health board

In 2001, as in previous years the crude incidence rates (CIR) and age standardised incidence rates (ASIR) for IMD varied by health board (table 1). However, compared to the national rates none of these differences were statistically significant. The ASIR of serogroup B and C IMD by health board in 2000 and 2001 are presented in figures 3 and 4, respectively. For both serogroup B and C no statistical differences were noted between the national incidence rates and the health board rates. Although the national incidence rate for serogroup B declined slightly in 2001, the incidence rates increased in some health boards, namely, the MWHB, NWHB, SHB and WHB, whereas they declined in the ERHA and NEHB (figure 3). In 2000, the highest incidence rates for serogroup C were in the south of the country with the SEHB and SHB reporting ASIR of greater than 6/100,000. In 2001, the incidence rates declined in all health boards, with no health board reporting ASIR of greater than 1.3/100,000 (figure 4).

Impact of MenC vaccine on serogroup C IMD

Figure 5 presents the cumulative number of serogroup C cases notified in 2000 and 2001. There was a significant flattening of the curve in 2001, with serogroup C IMD declining by 76%. Of the 34 cases notified in 2001 (excluding 1 imported case), 68% (23 cases) were notified in the first four months of 2001. Serogroup C IMD declined by 79% in the age group targeted by the campaign (<23 years), dropping from 128 cases in both 1999 and 2000 to 26 cases (excluding 1 imported case) in 2001, whereas in those 23 years and over the numbers of serogroup C cases remained largely unchanged (figure 6). Seventy-six percent (26/34) of the serogroup C cases occurred in the target age group (<23 years) and two of these cases had received the MenC vaccine. However, only one of these can be classified as a vaccine failure. The other case had only received the vaccine one day prior to onset of illness so insufficient time had elapsed for the individual to illicit an immune response and therefore is not regarded as a vaccine failure.

The number of cases of non-serogroup B and non-serogroup C has remained largely unchanged over the last number of years and the introduction of MenC vaccine has not changed the epidemiology of these strains to date (figure 7).

Bacterial meningitis other than IMD

Sixty-six cases (1.8/100,000) of bacterial meningitis other than IMD were notified in 2001 (table 2). The breakdown by aetiological agent of these meningitis cases was as follows; 20 *Streptococcus pneumoniae*, three *Escherichia coli*, three serogroup B streptococci (GBS), two *Haemophilus influenzae* type b (Hib), two *Listeria monocytogenes*, two *Mycobacterium tuberculosis*, one *Sphingomonas paucimobilis* and 33 organism unknown (table 2). The incidence rate of bacterial meningitis other than IMD was highest in the <1 year olds (table 2). *Streptococcus pneumoniae* and bacterial meningitis (organism unknown) accounted for the majority of these cases. In relation to the Hib cases, only one of the two cases had been vaccinated and this was classified as a vaccine failure.

Table 1. Numbers, crude incidence rates (CIR) and age standardised incidence rates with 95% confidence intervals (CI) of IMD by health board in Ireland, in 2001

Health Board	Number	CIR [95% CI]	ASIR [95% CI]
ERHA	120	9.3 [7.6-10.9]	9.3 [7.6-11.0]
MHB	22	10.7 [6.23-15.2]	10.6 [6.15-15.0]
MWHB	28	8.8 [5.56-12.1]	8.9 [5.57-12.1]
NEHB	20	6.5 [3.67-9.39]	6.3 [3.52-9.01]
NWHB	16	7.6 [3.87-11.3]	7.7 [3.93-11.5]
SEHB	43	11.0 [7.7 – 14.3]	10.9 [7.67-14.2]
SHB	51	9.3 [6.77-11.9]	9.5 [6.87-12.1]
WHB	26	7.4 [4.54-10.2]	7.6 [4.7-10.6]
IRELAND	**326**	**9.0 [8.01-9.97]**	–

Table 2. Bacterial meningitis other than IMD in Ireland in 2001

Organism	Age group (years)								CIR
	<1	1-4	5-9	10-14	15-19	20-24	>25	Total	
E. coli	2	0	0	0	0	0	1	3	0.08
GBS	3	0	0	0	0	0	0	3	0.08
Hib	1	1	0	0	0	0	0	2	0.06
L. monocytogenes	2	0	0	0	0	0	0	2	0.06
*M. tuberculosis**	0	0	0	0	1	0	1	2	0.06
S. paucimobilis	0	0	0	0	0	1	0	1	0.03
S. pneumoniae	3	5	1	0	1	0	10	20	0.55
Other (organism unknown)	2	2	3	6	2	4	14	33	0.91
Total	**13**	**8**	**4**	**6**	**4**	**5**	**26**	**66**	**1.82**
ASI	26.61	3.97	1.41	1.84	1.18	1.70	1.21	1.82	–

CIR = Crude incidence rate per 100,000 ASI = age -specific incidence rate per 100,000

* Maybe an underestimate of incidence as TB 2001 figures are not yet finalised. Final TB meningitis figures will be published in TB 2001 Report.

Deaths due to bacterial meningitis

There were 15 deaths due to bacterial meningitis in 2001, compared to 30 in 2000. Twelve of the deaths in 2001 were due to IMD (8 serogroup B, 3 serogroup C and 1 serogroup W135), two due to pneumococcal meningitis and one due to other bacterial meningitis (organism unknown). The case fatality rate (CFR) for IMD in 2001 was 3.7%. However, since all the deaths were in definite cases the CFR for IMD was higher at 4.6%, if only definite cases are included in the analysis. The CFR for serogroup B IMD was 3.3% and was highest in the <1 year olds at 9.7% (table 3). All of the eight serogroup B deaths occurred in those <20 years of age. The CFR for serogroup C IMD was 8.8% and was highest in the 20-24 years age group at 50% (table 3). However, this latter figure should be interpreted with caution, as it is more a reflection of the low number of cases (n=2) in this age group rather than any particular increase in fatality. This is highlighted by the fact that there was one serogroup C death in this age group also in 2000, but there were eight cases so the CFR was much lower at 12.5%. There were three serogroup C deaths in 2001 compared to 11 in 2000 and five in 1999.

Discussion

The lowest incidence of IMD since the enhanced surveillance system commenced in Ireland in 1997 was in 2001, with rates falling from between 12 and 15 per 100,000 in the years previous to 2001 to 9 per 100,000 in 2001. This decline in IMD can be attributed to the introduction of the MenC vaccine in October 2000. As expected the MenC vaccine had an even more dramatic impact in reducing serogroup C IMD in 2001 with the incidence rate declining by an impressive 76% overall. Reductions in the incidence of serogroup C disease were seen in all age groups targeted by the MenC programme and in all health boards. Mortality due to serogroup C disease also declined in 2001 compared with previous years. Thus, highlighting the really positive impact the MenC vaccine has had in reducing morbidity and mortality due to serogroup C IMD and total IMD in Ireland. It is important that the achievements of 2001 are built on and that further reductions in serogroup C IMD are realised over the coming year with the ultimate goal of eliminating morbidity and mortality due to serogroup C disease in infants, children and young adults. To realise this goal, it is vital that high MenC vaccine uptake rates are achieved and maintained.

In 2000, the incidence of serogroup B IMD was highest in the east/north-east region of the country (ERHA and NEHB) and lowest all along the western seaboard running north south from the NWHB down to the SHB. However, there was a shift in 2001, with the incidence decreasing in the ERHA and NEHB but increasing in other health boards. However, these health board rates were not regarded as statistically different from the national rate. As a result of this shift the regions of highest incidence now stretch from the MHB to MWHB and five of the eight health boards have similar incidence rates (6-7.5/100,000), thereby giving a more homogenous appearance to the distribution of serogroup B incidence rates between health boards.

As in 2000, cases of serogroup W135 IMD (type 2a subtype P1.2, 1.5) in returning pilgrims and their contacts were

Table 3. Deaths due to serogroup B and C IMD by age group in Ireland, in 2001

Age group (years)	Serogroup B			Serogroup C		
	Deaths	Cases	CFR (%)	Deaths	Cases	CFR (%)
<1	6	62	9.7	0	2	0.0
1-4	1	78	1.3	0	10	0.0
5-9	0	32	0.0	0	1	0.0
10-14	0	19	0.0	1	6	16.7
15-19	1	27	3.7	0	5	0.0
20-24	0	10	0.0	1	2	50.0
≥25	0	14	0.0	1	8	12.5
Total	**8**	**242**	**3.3**	**3**	**34**	**8.8**

reported in 2001 by several countries, following the Hajj pilgrimage to Mecca in Saudi Arabia. In England and Wales there were 45 serogroup W135 2a; P1.2, 5 cases (28 with links to the Hajj) and 8 deaths in 2000 [2] and 51 cases (26 with Hajj links) and 10 deaths in 2001.[3] The three serogroup W135 cases notified in Ireland in 2001 were not Hajj related and no serogroup W135 2a; P1.2, 5 have been reported in Ireland to date. As a result of these outbreaks in 2000 and 2001, the Saudi-Arabian Government made vaccination against serogroups ACWY (quadrivalent vaccine) a visa requirement for all pilgrims wishing to attend the Hajj or Umrah in 2002.

In comparison to IMD, the incidence of pneumococcal meningitis remains low in Ireland (0.55/100,000), but unlike IMD the CFR tends to be higher, 10% in 2001, with the two pneumococcal deaths occurring in children two years of age. A 7-valent conjugate vaccine (Prevenar, PCV7) has recently been licensed for use in Ireland in at-risk children <2 years of age. It has enhanced immunogenicity compared with the 23-valent polysaccharide vaccine, even in infancy. The 7-valent conjugate vaccine is active against approximately 70% of *Streptococcus pneumoniae* strains causing invasive disease.

Development of the MenC vaccine and its national implementation in the UK and Ireland can be seen as a significant step in the prevention of meningococcal disease. Despite these advances serogroup B IMD still accounts for the majority of meningococcal infections in industrialised countries, but the development of safe, immunogenic and effective serogroup B vaccines has been an elusive goal to date. However, advances in new genome sequencing technology, public and scientific interest in the disease and pharmaceutical company investment in the development of serogroup B vaccines would indicate that prospects for the development of an effective serogroup B vaccine look extremely promising.[4]

Acknowledgements

The authors would like to thank all those involved in the surveillance, prevention and control of meningococcal disease in Ireland: the Departments of Public Health, medical officers in the Community Care Areas, the MenC immunisation teams, the Meningococcal Reference Laboratory and the microbiology laboratories.

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Tuberculosis in Ireland, 2000

Key Points

- **There were 395 new cases of TB in 2000 giving a crude incidence rate of 10.9/100,000 population.**
- **Forty five cases were born outside Ireland (11.4%).**
- **The mean age of those diagnosed with TB was 49.1 years. One-third of cases occurred in those aged 65 years and older.**
- **There were 222 isolates of *M. tuberculosis*, three of *M. africanum* and two of *M. bovis*.**
- **There were three multi-drug resistant cases, two *M. tuberculosis* cases and one *M. bovis* case.**
- **Six deaths were attributed to TB in 2000.**
- **Outcome data were reported in 60% of TB cases in 2000.**

Introduction

The year 2000 is the third year that national epidemiological data on TB has been collated by NDSC. From January 1st 2000 NDSC, in consultation with the eight health boards and the National Tuberculosis (TB) Advisory Group, implemented an enhanced national TB surveillance system. Three hundred and ninety five cases of TB were notified in 2000, giving a notification rate of 10.9/100,000 population. This represents a 16% decrease on the corresponding figure in 1999 (469 cases: 12.9/100,000). Two hundred and forty one cases were male (61%) and 154 were female (39%).

Definitions

As in previous years the case definitions used were those recommended by the National Tuberculosis (TB) Working Group.[1]

- A **definite case** of TB was defined as one in which infection due to *M. tuberculosis*, *M. bovis* or *M. africanum* was confirmed by culture.
- An **other than definite case** was defined as one, in the absence of confirmation by culture, in which there were signs and symptoms compatible with TB and the clinician took the decision to treat the patient with a full course of anti-tuberculous drugs.

Table 1. Notified cases of TB in Ireland 1991-2000 with moving averages 1992-1999

Year	Number	Crude rate per 100,000	3 year moving average
1991	640	18.2	
1992	604	17.1	621
1993	598	16.9	581
1994	524	14.5	526
1995	458	12.6	468
1996	434	12.0	438
1997	416	11.5	426
1998	424	11.7	430
1999	469	12.9	439
2000	395	10.9	

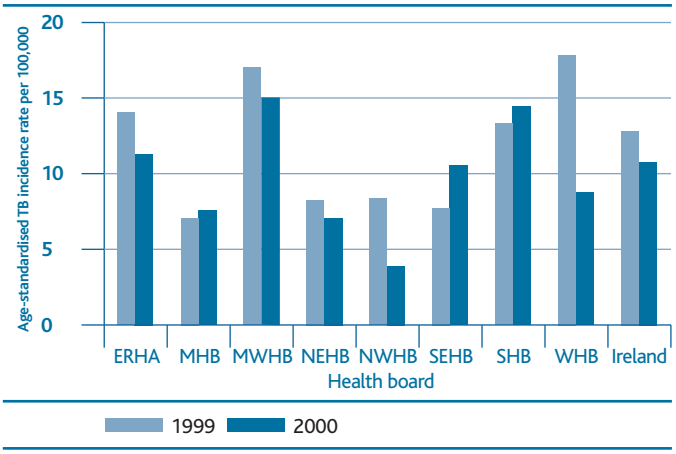

Figure 1. Age-standardised TB incidence rates per 100,000 population, 1999 and 2000

Results

The year 2000 saw a reversal in the upward trend in the number of cases which were seen in the previous two years (table 1). There were 395 new TB cases in Ireland in 2000 (10.9/100,000). This was the lowest annual number of cases ever reported in Ireland.

Geographical distribution of cases

In 2000, the highest age-standardised TB incidence rates were seen in the Mid-Western Health Board (14.9 per 100,000 population) and the Southern Health Board (14.5/100,000). The North Western Health Board (3.9 per 100,000) had the lowest TB incidence rate. This rate was significantly lower than the national age standardised TB incidence rate of 10.8 per 100,000 (figure 1).

The age-standardised TB incidence rates in each county in 2000, is shown in figure 2.

Age and sex distribution of cases

The mean age of those diagnosed with TB was 49.1 years with a range from one to 100 years. One-third of cases (n=130) occurred in those aged 65 years and older. The age- and sex-specific incidence rates per 100,000 population in Ireland in 2000 are illustrated in figure 3.

Geographic origin

Forty five (11.4%) of the patients diagnosed with TB were born outside Ireland. Twenty two were born in Europe, 14 in Asia and nine in Africa.

Diagnostic details

Of the 395 TB notifications, 229 (58.0%) were definite cases which were culture confirmed. Two hundred and eighty cases were pulmonary (70.1%), 92 cases were extra-pulmonary (23.3%) and 21 cases were pulmonary and extrapulmonary TB (5.3%). The diagnostic breakdown in each health board is shown in table 2.

Of the 301 TB cases with a pulmonary disease component, 144 (47.8%) were sputum positive.

Of the 229 definite culture confirmed cases, 222 (97.8%) of isolates were *M. tuberculosis*, three (1.3%) were *M. africanum* and two (0.9%) were *M. bovis*. Two isolates were not available.

Resistance

Resistance was documented in six cases out of a total of 222 *M. tuberculosis* isolates (2.7%). Mono-resistance to isoniazid was recorded in two cases. Mono-resistance to pyrazinamide was recorded in one case. There were two multi-drug resistant (MDR-TB) cases (*M.tuberculosis* isolates)notified and treated in 2000. Multi-drug resistance is defined as resistance to at least isoniazid **and** rifampicin. One case of streptomycin resistance was reported.

One of the cases where *M. bovis* was isolated was multi-drug resistant while the other was resistant to isoniazid. All cases of TB caused by *M. bovis* are resistant to pyrazinamide.

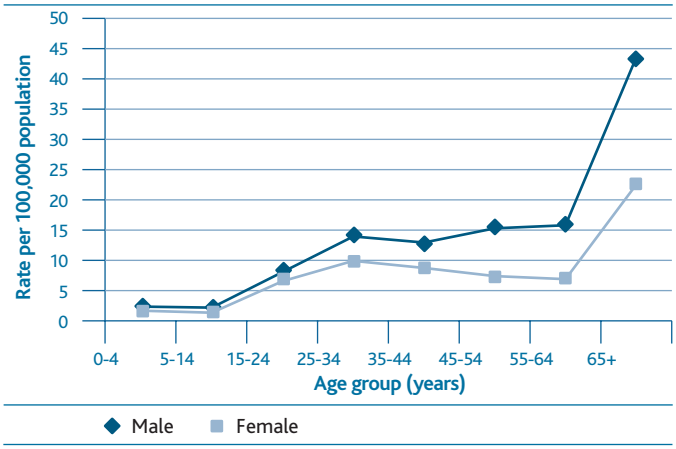

Figure 3. Age- and sex-specific TB incidence rates in Ireland, 2000

Outcome

Of the 395 cases notified in 2000 the outcome was recorded in 235 cases (59.5%). One hundred and eighty one cases (77.0%) completed treatment. Six patients (1.5%) were recorded as being lost to follow up. There were 37 deaths (9.4%) recorded amongst the 395 TB cases in 2000. Six deaths were attributed to TB. A summary profile of the epidemiology of TB in Ireland from 1998 to 2000 is shown in table 3.

Discussion

In Ireland the year 2000 saw a 16% decrease in the TB notification rate when compared to 1999. There was also a decrease in the percentage of cases who were born outside Ireland (11.4% vs 13.8% in 1999). This percentage remains low when compared to that in other European countries. Differences in age-standardised TB incidence rates persist between health board areas. In 2000, the SHB and MWHB had the highest rates of TB. In 1998 and 1999, TB rates were highest in the MWHB and the WHB. Rates remain below the national average in the NWHB. A clear north-south divide can be seen for age standardised incidence rates for 2000 (figure 4).

There were three cases of multi-drug resistant TB in 2000 compared to the 1999 figure of two. The surveillance of drug resistance should be greatly facilitated by the establishment of the National TB Reference Laboratory which was set up in 2001.

Although outcome data is still incomplete, a big improvement was seen in 2000 when compared to that recorded in previous years. Sixty percent of all cases had outcome information recorded in 2000 compared to less than 30% in 1999. This is important information that needs to be recorded as completely as possible.

TB remains a huge problem worldwide and kills two million people every year. Although TB rates in Ireland are at a low level, it is important to continue and enhance our screening and treatment programmes to ensure that our rates remain low.

Acknowledgements

NDSC would like to thank all those who provided data for this report: notifying pysicians, public health doctors, surveillance scientists, microbiologists, nurses, laboratory and administrative staff.

Reference

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Table 2. Diagnostic categories of TB by health board, 2000

Health Board	Pulmonary	Extrapulmonary	P+E	Unknown	Total
ERHA	107	28	8	0	143
MHB	7	8	1	0	16
MWHB	30	10	6	1	47
NEHB	18	3	0	0	21
NWHB	6	2	1	0	9
SEHB	30	9	2	0	41
SHB	52	25	3	0	80
WHB	30	7	0	1	38
Total	**280**	**92**	**21**	**2**	**395**

Table 3. Summary of epidemiology of TB in Ireland, 1998 - 2000

Parameter	1998	1999	2000
Total number of cases	**424**	**469**	**395**
Notification rate (per 100,000)	11.7	12.9	10.9
Foreign born TB patients	35	65	45
% culture positive patients	56.8	55.4	58.0
M. tuberculosis	234	242	222
M. bovis	6	11	2
M. africanum	-	-	3
% smear positive pulmonary cases	38.6	38.0	47.8
Monoresistance to isoniazid	2	4	2
Monoresistance to streptomycin	2	0	1
Monoresistance to pyrizinamide	0	0	1
Multi-drug resistant cases	0	2	3
Deaths attributed to TB	6	9	6

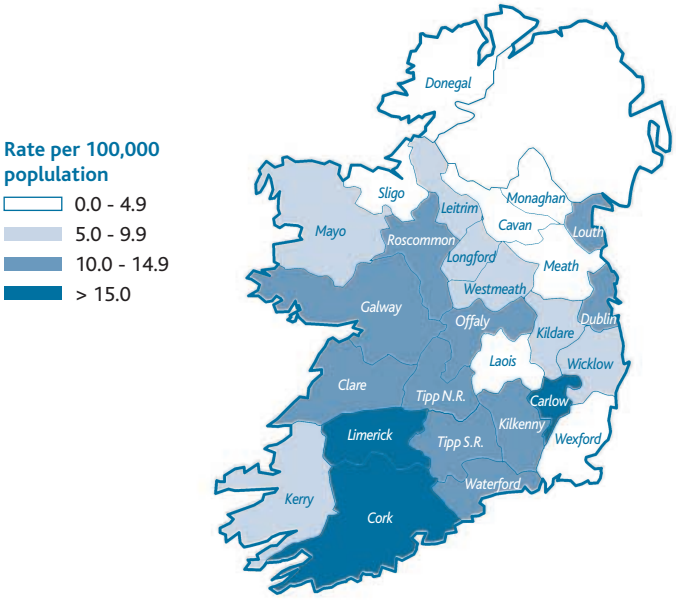

Figure 2. Age-standardised TB incidence rate per 100,000 population by county, 2000

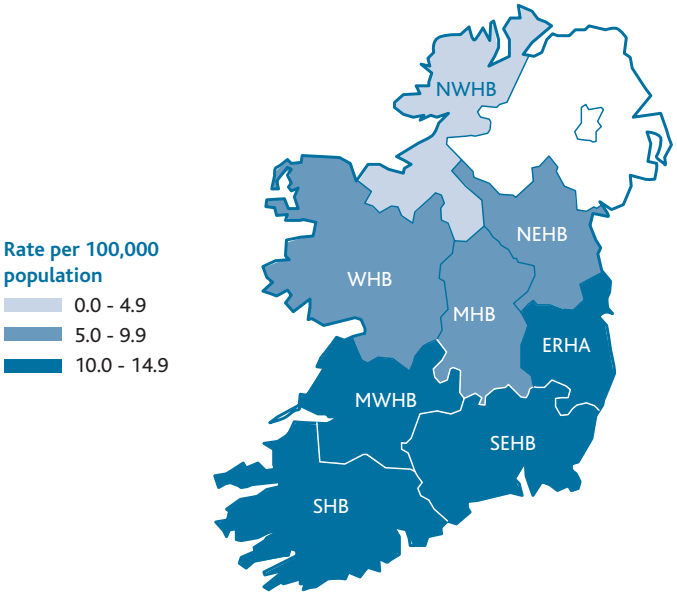

Figure 4. Age-standardised TB incidence rate per 100,000 population by health board, 2000

HIV and AIDS Surveillance in Ireland, 2001

Key Points

- **There were 299 newly diagnosed HIV infections in Ireland in 2001 compared to 290 in 2000.**
- **The majority of new diagnoses (60%) were in the heterosexual exposure category.**
- **There were 12 cases of AIDS reported in Ireland in 2001. This brings the cumulative total of reported AIDS cases to 719.**
- **While the annual incidence of AIDS has decreased in recent years, it is important to note that the annual incidence of HIV has increased dramatically.**

Background

Since the HIV epidemic began over twenty years ago, more than 60 million people have been infected with the virus.[1] HIV/AIDS is now the leading cause of death in sub-Saharan Africa and the fourth biggest killer worldwide.[1 2] By the end of 2001, an estimated 40 million people globally were living with HIV.[1] In many parts of the world, the majority of new infections occur in young adults, with young women especially vulnerable.[1]

For many years the epidemiological monitoring of HIV in Europe was based on AIDS case reporting, with back projection to give estimates of the incidence and modes of transmission of HIV infections. In recent years however, there has been a decline in incidence of AIDS in western Europe which is primarily due to the availability of new effective antiretroviral treatments, which delay the progression from HIV infection to AIDS.[3 4] This has reduced the effectiveness of AIDS reporting for monitoring the incidence and modes of transmission of HIV infection. It is necessary to obtain epidemiological information at the early stages of the disease so that the appropriate prevention strategies can be put in place. Quality national AIDS surveillance data are still essential to assess the progress of the disease and to recognise failures in the treatment of HIV infection.

As recommended in the Report of the National AIDS Strategy Committee, 2000,[5] HIV case based reporting was introduced in Ireland on 1st July 2001. The new system replaced the existing AIDS surveillance system.

Methods

On 1st July 2001, HIV case based reporting was introduced in Ireland. The design of the HIV case based reporting system

Table 1: Newly diagnosed HIV infections in Ireland by exposure category (2001)

	2001	
Exposure category	Number	%
Heterosexual	173	57.9
MSM	73	24.4
IDU	38	12.7
Children	6	2.0
Transfusion recipient	2	0.7
Undetermined	7	2.3
Total	**299**	**100.0**

Table 2: HIV infections in Ireland among the three most common exposure categories (1995 to 2001)

Year	Exposure category		
	Heterosexual	MSM	IDU
1995	30	33	19
1996	27	41	20
1997	40	37	21
1998	47	37	26
1999	59	40	69
2000	127	72	83
2001	173	73	38

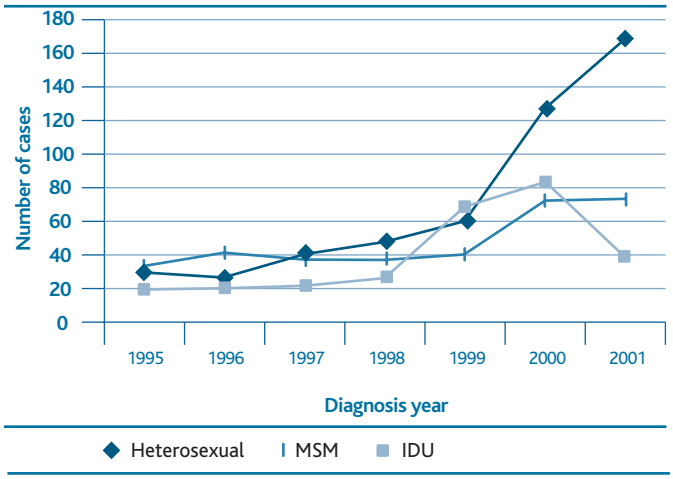

Figure 1: Newly diagnosed HIV infections in Ireland among heterosexuals, MSM and IDUs (1995 to 2001)

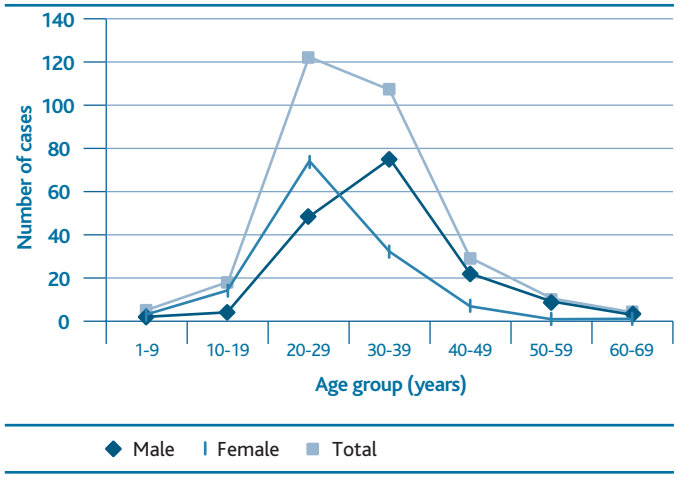

Figure 2: Age distribution of newly diagnosed HIV infections in males and females (2001)

involved all of the key players including the Department of Health and Children (DoHC), Departments of Public Health, the National Virus Reference Laboratory, Consultants in Infectious Disease/Genitourinary Medicine and the Irish College of General Practitioners. The new HIV/AIDS surveillance report form collects information on both HIV positive cases and cases of AIDS and replaces the AIDS Surveillance Report form. When a HIV infection is confirmed by the National Virus Reference Laboratory, a surveillance report form is sent to the clinician who requested the confirmatory test. The clinician completes the form and returns it to the Director of Public Health of the health board/health authority where the patient resides. The forms are then forwarded to NDSC where national figures are collated. AIDS cases are reported by clinicians using the new surveillance report form. Analysis of information is carried out by NDSC every six months and reports are provided to clinicians, microbiologists, public health personnel, DoHC, non-governmental organizations (NGOs) and other interested parties. The report is also posted on the NDSC website. Data are collected in a format consistent with that used by the European Surveillance System and a summary of the data is forwarded to the European Centre for the Epidemiological Monitoring of AIDS every six months.

Results

A: HIV Surveillance

A total of 299 cases of HIV infection were newly diagnosed in Ireland during 2001 compared to 290 cases in 2000. The cumulative total of HIV positive cases reported to the end of December 2001 is 2,645.

Exposure category

Table 1 lists the number of new HIV infections in Ireland in 2001 by exposure category. Table 2 and figure 1 show the trends in the number of newly diagnosed cases of HIV between 1995 and 2001 in the three most common exposure categories: heterosexuals, men who have sex with men (MSM) and injecting drug users (IDUs). Between 1996 and 2001, there was a 6-fold increase in the number of cases among heterosexuals. Among MSM, the increase in the number of new HIV diagnoses between 2000 and 2001 was small (from 72 to 73 cases), but the 80% increase observed between 1999 and 2000 (from 40 to 72 cases) was sustained. Among IDUs, there was a 4-fold increase from 1997 to 2000. There was a 54% decrease in the number of new diagnoses seen between 2000 and 2001.

Sex and age group

Of the 299 newly diagnosed HIV infections, 55% were male and 45% were female. Figure 2 shows the age distribution of the cases by sex. The majority of cases among females were aged between 20 and 29 years. The majority of cases in males were aged between 30 and 39 years. Table 3 shows the age distribution by exposure category.

Area of residence

A breakdown of HIV cases by area of residence is shown in table 4. In 2001, 62% (184) of cases were resident in the Eastern Regional Health Authority (ERHA) at HIV diagnosis. By exposure category, 58% of heterosexuals, 70% of MSM and 82% of IDUs were resident in the ERHA.

Geographic origin

From July 1st 2001, data on the geographic origin of patients were collected. Classification by geographic origin is that used by the European Centre for the Epidemiological Monitoring of AIDS (EuroHIV). An analysis of the newly diagnosed cases by

Table 3: Newly diagnosed HIV infections in Ireland by age group and exposure category (2001)

Age group	Exposure category						
Years	MSM	Hetero	IDU	Children	Transfusion	Undeterm.	Total
1-9	-	-	-	5	-	-	5
10-19	-	15	-	1	-	-	16
20-29	20	80	19	-	-	7	126
30-39	33	55	17	-	2	-	107
40-49	12	15	2	-	-	-	29
50-59	7	3	-	-	-	-	10
60-69	1	3	-	-	-	-	4
Unknown	-	2	-	-	-	-	2
Total	**73**	**173**	**38**	**6**	**2**	**7**	**299**

Table 4: Newly diagnosed HIV infections in Ireland by exposure category and area of residence at diagnosis (2001)

	Area			
Exposure category	ERHA	Non-ERHA	Unknown	Total
Heterosexual	100	67	6	173
MSM	51	21	1	73
IDU	31	7	-	38
Children	1	1	4	6
Transfusion recipient	1	1	-	2
Undetermined	-	-	7	7
Total	**184**	**97**	**18**	**299**

Table 5: Newly diagnosed HIV infections in Ireland by exposure category and geographic origin (Q3 and Q4 2001)

	Geographic origin					
Exposure category	Ireland	West Europe	North Africa	sub-Saharan Africa	Other/ Undeterm.	Total
Hetero	12	1	7	61	1	82
MSM	24	3	-	2	3	32
IDU	10	1	-	-	-	11
Children	-	-	-	5	-	5
Transfusion recipient	-	-	-	1	-	1
Undeterm.	-	-	-	-	7	7
Total	**46**	**5**	**7**	**69**	**11**	**138**

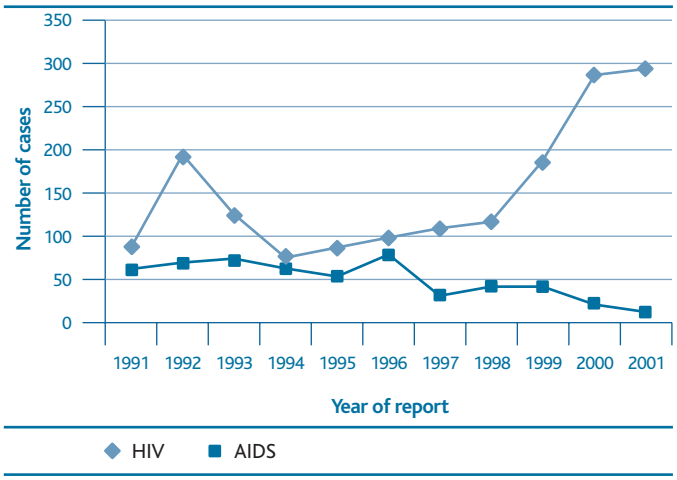

Figure 3: AIDS cases and HIV cases diagnosed in Ireland (1991 to 2001)

geographic origin is presented in table 5. In the third and fourth quarters of 2001, a total of 138 newly diagnosed HIV infections were reported through the case based reporting system. Of the 82 heterosexual cases, 61 of the cases (74%) were born in sub-Saharan Africa and 12 cases (15%) were born in Ireland. Among MSM, 75% of the cases were born in Ireland. Among IDUs, 91% of the cases were born in Ireland.

B: AIDS Surveillance, 2001

There were 12 cases of AIDS reported in Ireland in 2001. This is the lowest number of cases reported since 1986. However, it is important to remember that there is a significant delay in reporting AIDS cases and the number reported may not accurately reflect the number of new diagnoses. The cumulative total of AIDS cases reported in Ireland to December 2001 is 719. Figure 3 compares the number of AIDS cases reported in the last ten years with the number of HIV cases diagnosed. While there has been a decrease in the number of new AIDS cases reported in the last five years, the number of new HIV diagnoses has increased dramatically.

Table 6 gives a breakdown of AIDS cases by exposure category in 2001 and the cumulative total. In 2001, there were six cases of AIDS reported in MSM and six cases of AIDS among heterosexuals. Figure 4 shows the trends among the three most common exposure categories since the beginning of the AIDS epidemic in Ireland.

There were three reports of AIDS related deaths in 2001. This brings the total of AIDS related deaths reported in Ireland to date to 365.

Discussion

In recent years, the epidemiology of HIV and AIDS in Ireland has undergone considerable change. While there has been a decrease in the annual incidence of AIDS in Ireland in recent years, the annual incidence of HIV infection has increased dramatically. Clearly, monitoring trends in the AIDS epidemic does not reliably reflect trends in HIV infection. It is essential to have reliable information about the incidence and future directions of HIV infection and the types of behaviour that increase the risk of HIV transmission. In order to collect this information, HIV case based reporting was introduced in Ireland on July 1st, 2001. The aim of HIV case based reporting is to ensure the collection of accurate and complete epidemiological data on the distribution and mode of transmission of HIV infection and to allow linkage between reports of HIV infection and AIDS which will enable the progression of the disease from HIV infection to AIDS to be monitored.

The number of AIDS cases in all exposure categories has declined since the mid 1990's and this can be primarily attributed to increased use of highly active antiretroviral therapy (HAART), which has delayed disease progression.[3] Over the last five years, the number of newly diagnosed HIV infections among heterosexuals has increased six fold. There has also been an increase in the number of newly diagnosed cases among MSM, with the number of cases almost doubling since 1998. The increase in this group is worrying in the context of the current syphilis outbreak in Ireland,[6] and indications from some other European countries that the practice of safer sex in this group is declining.[7] Among IDUs, there was a reduction in the number of newly diagnosed HIV infections from 2000 to 2001. While this is to be welcomed

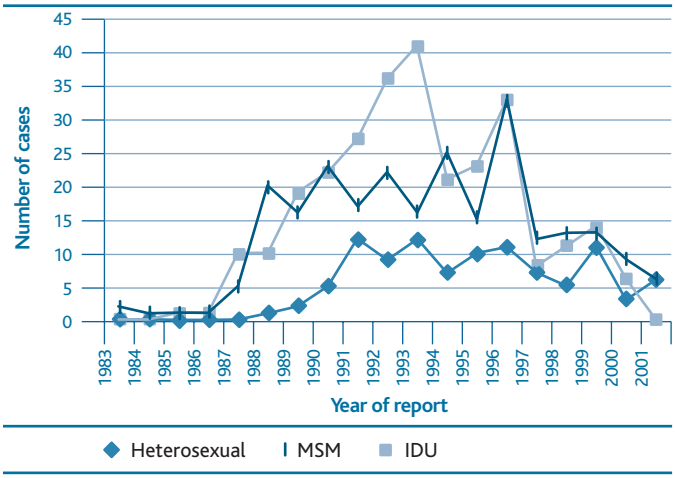

Figure 4: AIDS cases among the three most common exposure categories by year of report (1983 to 2001)

Table 6: AIDS cases reported in Ireland by exposure category (2001 and Total)

	2001		Cumulative to Dec. 2001	
Exposure category	**Number**	**%**	**Number**	**%**
IDU	-	-	283	39.4
MSM	6	50.0	250	34.8
Heterosexual/ risk unspecified	6	50.0	101	14.0
Haemophiliac	-	-	33	4.6
Children	-	-	25	3.5
IDU + MSM	-	-	10	1.4
Post transfusion	-	-	3	0.4
Other/undetermined	-	-	14	1.9
Total	**12**	**100.0**	**719**	**100.0**

and may reflect investment in harm reduction and treatment services over the past number of years, the decrease must be interpreted with caution as it remains to be seen whether it will be sustained in future years. It must also be emphasised that newly diagnosed infections do not represent HIV incidence, as diagnosis may be several years after infection is acquired.

Of the 88 children born to HIV infected mothers in 2001, three are known to be infected. This reflects the effectiveness of the antenatal HIV screening programme and treatment and follow up services for HIV infected pregnant women in Ireland in preventing transmission of the infection from mother to baby.

The majority of people diagnosed with HIV infection in 2001 were aged between 25-44 years. There was a difference in age distribution between the sexes. Females were younger at HIV diagnosis then males. This trend has been seen worldwide and it has been suggested that women may be at risk for infection at an earlier age due to infection by older sexual partners.[8]

There was a disproportionately high number of newly diagnosed HIV infections resident in the ERHA area. In 2001, the incidence of HIV infection (per million population) in the ERHA area was 141.9 compared to 41.6 in non-ERHA areas. In particular, 82% of newly diagnosed HIV cases among IDUs were resident in the ERHA area.

Data on the geographical origin of cases were collected for the first time in Quarter 3 and 4, 2001. This data revealed that 74% of heterosexual cases in this time period were from sub-Saharan Africa. This is not unexpected, given that sub-Saharan Africa is the region of the world most severely affected by the global HIV epidemic.[2] Although it is clear that people from sub-Saharan Africa who are infected with HIV do not form a homogeneous group, these data highlight the need for culturally appropriate prevention and treatment services for migrants and ethnic minorities in Ireland.

AIDS is the leading cause of death in Africa and the fourth leading cause of death worldwide.[1,2] Of the 719 cases of AIDS that have been reported in Ireland, fifty one percent are reported to have died. The mortality rate from AIDS in Ireland has dropped from 13.8 deaths per million population in 1995 to 0.8 deaths per million population in 2001. This decrease in AIDS related deaths reflects the improved survival among persons with AIDS due to improvements in medical care and the effect of antiretroviral therapies.[3] The use of antimicrobial prophylaxis to delay or prevent the development of a number of opportunistic infections may also extend survival.[9]

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Sexually Transmitted Infections in Ireland, 2000

Key Points

- **Notified STIs increased significantly in 2000 compared to previous years.**
- **The 3 most commonly notified STIs in 2000 were ano-genital warts, *Chlamydia trachomatis* and non-specific urethritis.**
- **The highest increases in 2000 were for chancroid, *Chlamydia trachomatis*, gonorrhoea, infectious hepatitis B, syphilis and trichomoniasis.**
- **The rising incidence of STIs in Ireland and across Europe is consistent with an increase in unsafe sex.**

Introduction

Fourteen sexually transmitted infections (STIs) are currently 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. The National Disease Surveillance Centre (NDSC) took over statutory responsibility for STIs from the Department of Health and Children (DoHC) on July 1st 2000. Previously, the Departments of Public Health provided STI data to the DoHC on a quarterly basis. STI data are now provided to NDSC by the Departments of Public Health on a quarterly basis.

The STI Subcommittee of the Scientific Advisory Committee was established during 2000. This subcommittee is reviewing the current system of notification of STIs. The subcommittee will make recommendations regarding the following: the diseases under surveillance and the data items required for effective surveillance; the process of notification and the systems/structures required to facilitate easy communication of information between notifiers and public health; ensuring patient confidentiality; and the use of surveillance information to inform policy and prevention strategies for sexual health. The committee are also investigating the need for screening for chlamydia in Ireland.

This report refers to the STIs notified by quarter, health board, age group and sex through the quarterly STI notification system for 2000. During 2000, the number of STIs notified has increased significantly compared to previous years.

Table 1: Number of notified sexually transmitted infections and rate of notified sexually transmitted infections per 100,000 population for 1999 and 2000

Sexually Transmitted Infection	Number of cases				Rate per 100,000 population		
	1999	2000	Increase/Decrease	% Increase/Decrease	1999	2000	Increase/Decrease
Ano-genital warts	3049	3735	686	22.5	84.1	103.0	18.9
Candidiasis	1105	1095	-10	-0.9	30.5	30.2	-0.3
Chancroid	1	16	15	1500.0	0.0	0.4	0.4
Chlamydia trachomatis	869	1343	474	54.5	24.0	37.0	13.0
Genital herpes simplex	275	269	-6	-2.2	7.6	7.4	-0.2
Gonorrhoea	175	290	115	65.7	4.8	8.0	3.2
Granuloma inguinale	1	0	-1	-100.0	0.0	0.0	0.0
Infectious hepatitis B*	2	15	13	650.0	0.1	0.4	0.3
Lymphogranuloma venereum	2	0	-2	-100.0	0.1	0.0	-0.1
Molluscum contagiosum	83	118	35	42.2	2.3	3.3	1.0
Non-specific urethritis	1265	1726	461	36.4	34.9	47.6	12.7
Pediculosis pubis	113	138	25	22.1	3.1	3.8	0.7
Syphilis	6	46	40	666.7	0.2	1.3	1.1
Trichomoniasis	47	78	31	66.0	1.3	2.2	0.9
Total	**6993**	**8869**	**1876**	**26.8**	**192.9**	**244.6**	**51.7**

**Cases of infectious hepatitis B that are sexually transmitted may also be reported through the weekly infectious disease report by NDSC.*

Materials and Methods

Aggregate STI data are collected quarterly from STI clinics including age group, sex and diagnosis. Rates per 100,000 population are based on the 1996 population census.

Results

Notified STIs between 1989 and 2000

During 2000, 8869 cases of STIs were notified in Ireland, compared to 6993 during 1999, representing a 26.8% increase in STI notifications (table 1). Notified STIs have increased by 85.5% between 1995 and 2000 and by 298% between 1989 and 2000. Of the total 59,300 STIs notified since 1989, 15% were notified in 2000 (figure 1). Notified cases of ano-genital warts, chancroid, *Chlamydia trachomatis*, gonorrhoea, infectious hepatitis B, molluscum contagiosum, non-specific urethritis, *Pediculosis pubis*, syphilis and trichomoniasis increased during 2000, compared to 1999. Candidiasis and genital herpes simplex notifications decreased during 2000, compared to 1999. No cases of granuloma inguinale or lymphogranuloma venereum were notified during 2000 (table 1 and 2).

Notified STIs by quarter during 2000

The total numbers and rates per 100,000 of notified STIs increased during each quarter in 2000, compared to 1999 (tables 3 and 4). In 2000, notified STIs peaked during Quarter (Q) 4, with decreases recorded during Q2 and Q3. Candidiasis peaked during Q1, molluscum contagiosum during Q2, and genital herpes simplex, gonorrhoea, syphilis and trichomoniasis during Q3 in 2000. *Pediculosis pubis* peaked during Q2 and Q4 in 2000. Ano-genital warts, chancroid, *Chlamydia trachomatis*, infectious hepatitis B, non-specific urethritis all peaked during Q4 in 2000. In 1999 the total number of notified STIs peaked during Q2.

Notified STIs by health board

Notified cases of STIs by health board are presented in table 5. It is important to note that STI surveillance is mainly clinic based. People may travel from their area of residence to STI clinics outside their area. At the time these notifications were made there were no STI clinics in the MHB and NEHB. During 2000, 55.3% of all notified STIs were from the ERHA, 0.02% from the MHB, 12.9% from the MWHB, 0.02% from the NEHB, 4.6% from the NWHB, 7.7% from the SEHB, 10.2% from the SHB and 9.3% from the WHB.

Notified STIs by age

Notified cases of STIs by age group (years) are presented in tables 6 and 7. Twenty-seven percent (2439) of all STIs notified in 2000 were in the 20 to 29 year age group. Seven percent (641) of cases were aged between 0 and 19 years, 6.5% (573) were 30 to 39 years old and 2.6% (231) were 40+ years of age. The data represented in table 6 should be interpreted with caution, as the age group data for 56.0% (4966) of all notified STIs in 2000 were unknown.

Notified STIs by sex

During 2000, 4549 (51.3%) of all notified STI cases were male and 4317 (48.7%) were female. The majority of notified cases of candidiasis, chancroid, *Chlamydia trachomatis*, genital herpes simplex and trichomoniasis in 2000 were female. The majority of cases of gonorrhoea, infectious hepatitis B,

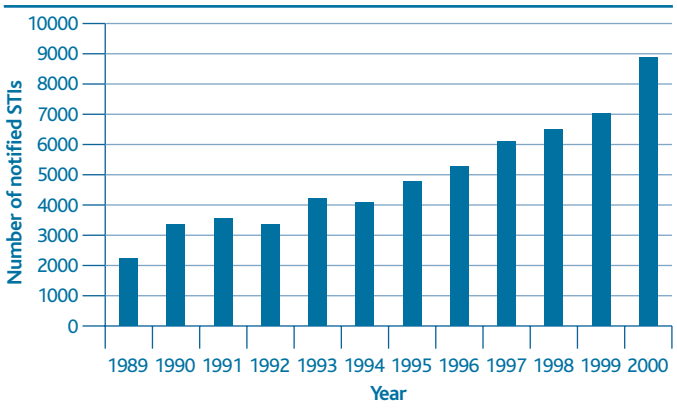

Figure 1: Total number of notified sexually transmitted infections from 1989 to 2000

**Cases of infectious hepatitis B that are sexually transmitted may also be reported through the weekly infectious disease report by NDSC.*

molluscum contagiosum, non-specific urethritis, *Pediculosis pubis* and syphilis in 2000 were male (tables 8 and 9, figure 2).

Discussion

Recently concern has been raised over a resurgence of STIs, particularly among men who have sex with men (MSM). The rising incidence of gonorrhoea and syphilis reported since 1995 across Europe is consistent with an increase in unsafe sex, perhaps reflecting an increase in risk behaviour associated with the availability of highly active antiretroviral therapy for HIV infection and a loss of impact of the HIV prevention campaigns of the 1980s and early 1990s.[1,2]

The three most commonly notified STIs in 2000 were ano-genital warts, *Chlamydia trachomatis* and non-specific urethritis. The most significant increases in 2000 were for chancroid, *Chlamydia trachomatis*, gonorrhoea, infectious hepatitis B, syphilis and trichomoniasis.[3] Syphilis, like other genital ulcer diseases increases the risk of transmitting and acquiring HIV. Additionally, STIs have been shown to increase genital HIV viral load and could affect the resistance patterns of genital HIV-1.[2]

Since early 2000, there has been a dramatic increase in syphilis amongst MSM in Dublin. This is against a low incidence of syphilis throughout the 1990s, which in 1999 reached its lowest levels in 10 years. 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. An enhanced surveillance system was introduced by NDSC to capture data on all syphilis cases from January 2000.[4] The enhanced surveillance data for syphilis was not presented in this report.

The majority of STIs notified during 2000 were from the ERHA. It is important to reiterate that people may travel from their area of residence to STI clinics outside their area. The data presented in this report, therefore did not necessarily reflect numbers of infections diagnosed among residents of a particular health board area.

The increases in STIs during 2000 are likely to be associated with an increase in unsafe sexual behaviour, particularly among young heterosexuals and MSM. Although the rise in genital chlamydia infections may also reflect increased testing for this infection. In addition, improved acceptability of STI clinic services and greater public and professional awareness of certain STIs may have also contributed to the increases.

Table 2: Number of notified sexually transmitted infections from 1989 to 2000

Sexually Transmitted Infection	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Ano-genital warts	505	917	1089	1066	1432	1532	1972	2286	2514	2886	3049	3735
Candidiasis	688	1056	1257	1157	1400	1360	1271	1321	1521	1277	1105	1095
Chancroid	2	0	0	2	0	2	3	1	1	0	1	16
Chlamydia trachomatis	174	215	164	192	315	133	245	364	462	646	869	1343
Genital herpes simplex	78	123	109	125	124	173	198	181	211	243	275	269
Gonorrhoea	27	90	73	51	24	98	91	83	98	125	175	290
Granuloma inguinale	0	0	0	0	6	0	0	1	1	0	1	0
Infectious hepatitis B*	0	0	0	0	0	0	4	2	0	0	2	15
Lymphogranuloma venereum	0	0	0	0	0	0	0	0	5	1	2	0
Molluscum contagiosum	31	39	43	44	34	56	59	34	74	84	83	118
Non-specific urethritis	600	738	549	585	756	610	781	823	1034	1083	1265	1726
Pediculosis pubis	60	70	72	70	77	69	86	79	81	105	113	138
Syphilis	12	19	20	20	8	11	11	17	16	15	6	46
Trichomoniasis	51	86	163	41	57	29	60	71	94	38	47	78
Total	**2228**	**3353**	**3539**	**3353**	**4233**	**4073**	**4781**	**5263**	**6112**	**6503**	**6993**	**8869**

Table 3: Number of notified STIs by quarter for 1999 and 2000

Sexually Transmitted Infection	Q1 1999	Q2 1999	Q3 1999	Q4 1999	Q1 2000	Q2 2000	Q3 2000	Q4 2000
Ano-genital warts	762	905	671	711	953	952	832	998
Candidiasis	269	263	273	300	317	262	272	244
Chancroid	0	0	0	1	0	3	5	8
Chlamydia trachomatis	169	295	152	253	309	346	310	378
Genital herpes simplex	94	53	38	90	75	50	74	70
Gonorrhoea	21	55	59	40	54	50	96	90
Granuloma inguinale	0	0	1	0	0	0	0	0
Infectious hepatitis B*	2	0	0	0	0	0	5	10
Lymphogranuloma venereum	0	0	2	0	0	0	0	0
Molluscum contagiosum	23	29	10	21	33	37	21	27
Non-specific urethritis	243	389	304	329	425	385	404	512
Pediculosis pubis	35	25	21	32	37	38	25	38
Syphilis	2	1	1	2	2	7	21	16
Trichomoniasis	10	15	9	13	18	15	27	18
Total	**1630**	**2030**	**1541**	**1792**	**2223**	**2145**	**2092**	**2409**

Table 4: Rate of notified STIs per 100,000 population by quarter for 1999 and 2000

Sexually Transmitted Infection	Q1 1999	Q2 1999	Q3 1999	Q4 1999	Q1 2000	Q2 2000	Q3 2000	Q4 2000
Ano-genital warts	21.0	25.0	18.5	19.6	26.3	26.3	22.9	27.5
Candidiasis	7.4	7.3	7.5	8.3	8.7	7.2	7.5	6.7
Chancroid	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
Chlamydia trachomatis	4.7	8.1	4.2	7.0	8.5	9.5	8.5	10.4
Genital herpes simplex	2.6	1.5	1.0	2.5	2.1	1.4	2.0	1.9
Gonorrhoea	0.6	1.5	1.6	1.1	1.5	1.4	2.6	2.5
Granuloma inguinale	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Infectious hepatitis B*	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.3
Lymphogranuloma venereum	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Molluscum contagiosum	0.6	0.8	0.3	0.6	0.9	1.0	0.6	0.7
Non-specific urethritis	6.7	10.7	8.4	9.1	11.7	10.6	11.1	14.1
Pediculosis pubis	1.0	0.7	0.6	0.9	1.0	1.0	0.7	1.0
Syphilis	0.1	0.0	0.0	0.1	0.1	0.2	0.6	0.4
Trichomoniasis	0.3	0.4	0.2	0.4	0.5	0.4	0.7	0.5
Total	**45.0**	**56.0**	**42.5**	**49.4**	**61.3**	**59.2**	**57.7**	**66.4**

**Cases of infectious hepatitis B that are sexually transmitted may also be reported through the weekly infectious disease report by NDSC.*

Table 5: Number of notified sexually transmitted infections by health board, 2000

Sexually Transmitted Infection	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
Ano-genital warts	1941	0	431	0	203	300	489	371	3735
Candidiasis	544	0	122	0	55	60	79	235	1095
Chancroid	13	0	0	0	3	0	0	0	16
Chlamydia trachomatis	830	0	122	0	37	146	95	113	1343
Genital herpes simplex	176	0	19	1	6	17	31	19	269
Gonorrhoea	186	2	27	0	4	17	35	19	290
Granuloma inguinale	0	0	0	0	0	0	0	0	0
Infectious hepatitis B*	10	0	3	0	1	0	1	0	15
Lymphogranuloma venereum	0	0	0	0	0	0	0	0	0
Molluscum contagiosum	69	0	9	0	3	14	14	9	118
Non-specific urethritis	970	0	402	0	82	107	130	35	1726
Pediculosis pubis	71	0	9	1	6	15	19	17	138
Syphilis	35	0	1	0	0	3	5	2	46
Trichomoniasis	58	0	1	0	7	3	7	2	78
Total	**4903**	**2**	**1146**	**2**	**407**	**682**	**905**	**822**	**8869**

Table 6: Number of notified sexually transmitted infections by age group (years), 2000

Sexually Transmitted Infection	0-19	20-29	30-39	40+	Unknown	Total
Ano-genital warts	283	1190	223	64	1975	3735
Candidiasis	95	261	108	69	562	1095
Chancroid	0	3	0	0	13	16
Chlamydia trachomatis	116	327	51	9	840	1343
Genital herpes simplex	12	59	14	7	177	269
Gonorrhoea	14	63	12	15	186	290
Granuloma inguinale	0	0	0	0	0	0
Infectious hepatitis B*	2	2	0	1	10	15
Lymphogranuloma venereum	0	0	0	0	0	0
Molluscum contagiosum	9	31	8	1	69	118
Non-specific urethritis	88	451	145	55	987	1726
Pediculosis pubis	16	40	7	2	54	138
Syphilis	1	5	3	2	35	46
Trichomoniasis	5	7	2	6	58	78
Total	**641**	**2439**	**573**	**231**	**4966**	**8869**

Table 7: Rate of notified sexually transmitted infections per 100,000 population by age group (years), 2000

Sexually Transmitted Infection	0-19	20-29	30-39	40+	Unknown	Total
Ano-genital warts	23.6	215.4	40.4	4.7	54.5	103.0
Candidiasis	7.9	47.2	20.9	5.1	15.5	30.2
Chancroid	0.0	0.5	0.0	0.0	0.4	0.4
Chlamydia trachomatis	9.7	59.2	9.9	0.7	23.2	37
Genital herpes simplex	1.0	10.7	2.7	0.5	4.9	7.4
Gonorrhoea	1.2	11.4	2.3	1.1	5.1	8.0
Granuloma inguinale	0.0	0.0	0.0	0.0	0.0	0.0
Infectious hepatitis B*	0.2	0.4	0.0	0.1	0.3	0.4
Lymphogranuloma venereum	0.0	0.0	0.0	0.0	0.0	0.0
Molluscum contagiosum	0.8	5.6	1.5	0.1	1.9	3.3
Non-specific urethritis	7.3	81.6	28.1	4.0	27.2	47.6
Pediculosis pubis	1.3	7.2	1.4	0.1	1.5	3.8
Syphilis	0.1	0.9	0.6	0.1	1.0	1.3
Trichomoniasis	0.4	1.3	0.4	0.4	1.6	2.2
Total	**53.5**	**441.5**	**110.9**	**17.0**	**137.0**	**244.6**

**Cases of infectious hepatitis B that are sexually transmitted may also be reported through the weekly infectious disease report by NDSC.*

Table 8: Number of notified sexually transmitted infections by sex, 2000

Sexually Transmitted Infection	Male	Female	Unknown	Total
Ano-genital warts	1868	1867	0	3735
Candidiasis	158	937	0	1095
Chancroid	6	10	0	16
Chlamydia trachomatis	662	679	2	1343
Genital herpes simplex	89	180	0	269
Gonorrhoea	228	62	0	290
Granuloma inguinale	0	0	0	0
Infectious hepatitis B*	13	2	0	15
Lymphogranuloma venereum	0	0	0	0
Molluscum contagiosum	65	52	1	118
Non-specific urethritis	1324	402	0	1726
Pediculosis pubis	93	45	0	138
Syphilis	29	17	0	46
Trichomoniasis	14	64	0	78
Total	**4549**	**4317**	**3**	**8869**

**Cases of infectious hepatitis B that are sexually transmitted may also be reported through the weekly infectious disease report by NDSC.*

Table 9: Rate of notified sexually transmitted infections per 100,000 population by sex, 2000

Sexually Transmitted Infection	Male	Female	Unknown	Total
Ano-genital warts	103.8	102.3	0.0	103
Candidiasis	8.8	51.3	0.0	30.2
Chancroid	0.3	0.5	0.0	0.4
Chlamydia trachomatis	36.8	37.2	0.1	37
Genital herpes simplex	4.9	9.9	0.0	7.4
Gonorrhoea	12.7	3.4	0.0	8.0
Granuloma inguinale	0.0	0.0	0.0	0.0
Infectious hepatitis B*	0.7	0.1	0.0	0.4
Lymphogranuloma venereum	0.0	0.0	0.0	0.0
Molluscum contagiosum	3.6	2.8	0.0	3.3
Non-specific urethritis	73.5	22	0.0	47.6
Pediculosis pubis	5.2	2.5	0.0	3.8
Syphilis	1.6	0.9	0.0	1.3
Trichomoniasis	0.8	3.5	0.0	2.2
Total	**252.7**	**236.4**	**0.1**	**244.6**

**Cases of infectious hepatitis B that are sexually transmitted may also be reported through the weekly infectious disease report by NDSC.*

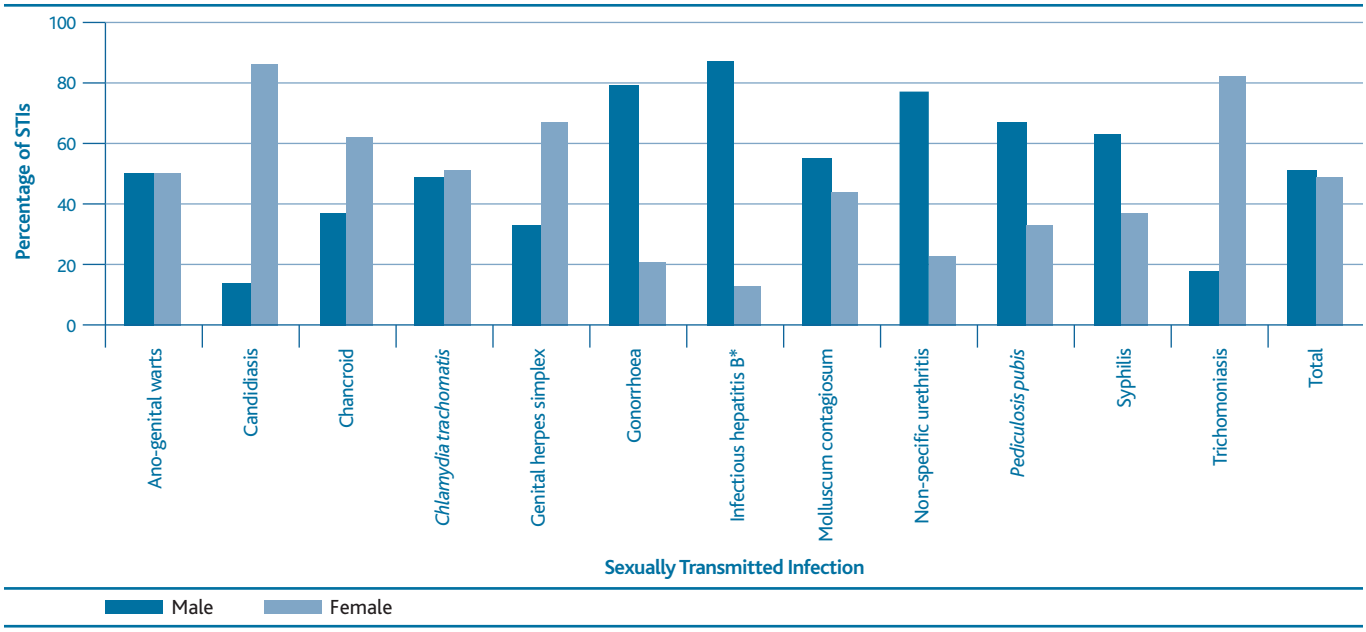

Figure 2: Percentage of each notified STI by sex in 2000

Acknowledgements

NDSC would like to thank all those who provided data for this report, particularly the STI Clinics and the Departments of Public Health.

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Hepatitis B, 2001

Key Points

- **In 2001, there were 342 cases of Hepatitis B virus (HBV) infection notified to NDSC. This is an 83% increase in the number of notifications compared with 2000.**
- **Since 1996, there has been an increase in the number of notifications of HBV per year and in particular, there was a sharp increase between 1997 and 1998 and 2000 and 2001.**
- **Comprehensive information on the epidemiology of HBV and on the specific risk groups affected by HBV is not available. In addition, it is evident that there is considerable under-notification of HBV in Ireland.**

Introduction

Hepatitis B virus (HBV) is one of the major diseases of mankind and is a serious global public health problem. It is estimated that of the 2 billion people who have been infected with HBV, more than 350 million have chronic infections.[1] Chronic HBV infection is associated with the development of chronic liver disease, including cirrhosis, or primary hepatocellular carcinoma in later life.

A study carried out between 1998 and 1999 estimated that the prevalence of HBV in the Republic of Ireland was 0.51%.[2] Ireland is therefore characterised as a low prevalence country for HBV infection. HBV is a notifiable disease in Ireland and is notified weekly to the National Disease Surveillance Centre (NDSC).

Methods

Since July 2000, cases of HBV are reported weekly to NDSC via the weekly infectious disease notification system.

Results

In 2001, there were 342 cases of HBV notified to NDSC. This is an 83% increase in the number of notifications compared with 2000. There was a ten-fold increase in the number of notifications between 1997 and 2001 (figure 1).

Table 1 outlines the number of cases and the crude rate of HBV infection reported in each health board. Three health boards, namely the Eastern Regional Health Authority (ERHA), Southern Health Board (SHB) and South Eastern Health Board (SEHB), notified the majority (82%) of cases. In 2001, the highest rate (per 100,000 population) of HBV infection

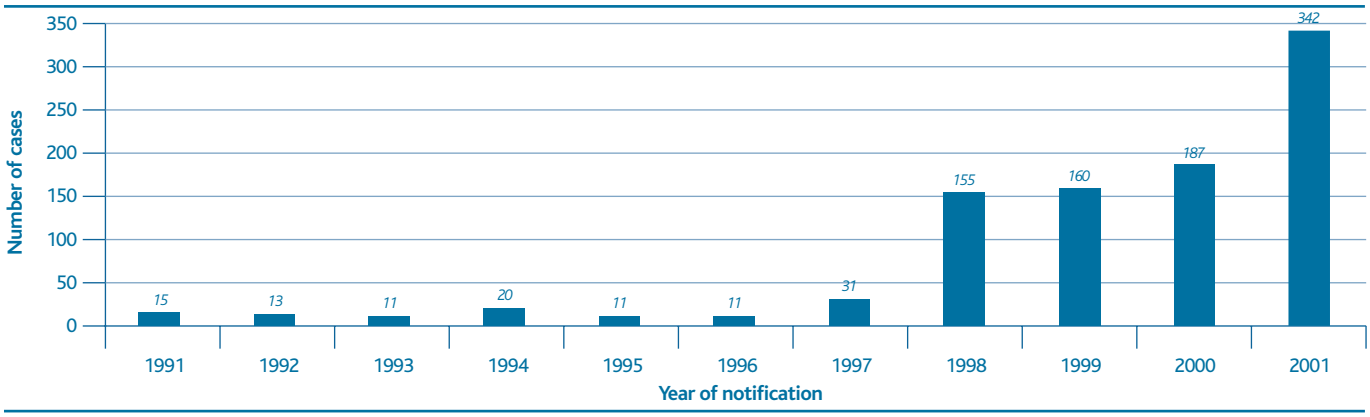

Figure 1: Cases of HBV notified in a ten-year period from 1991 to 2001

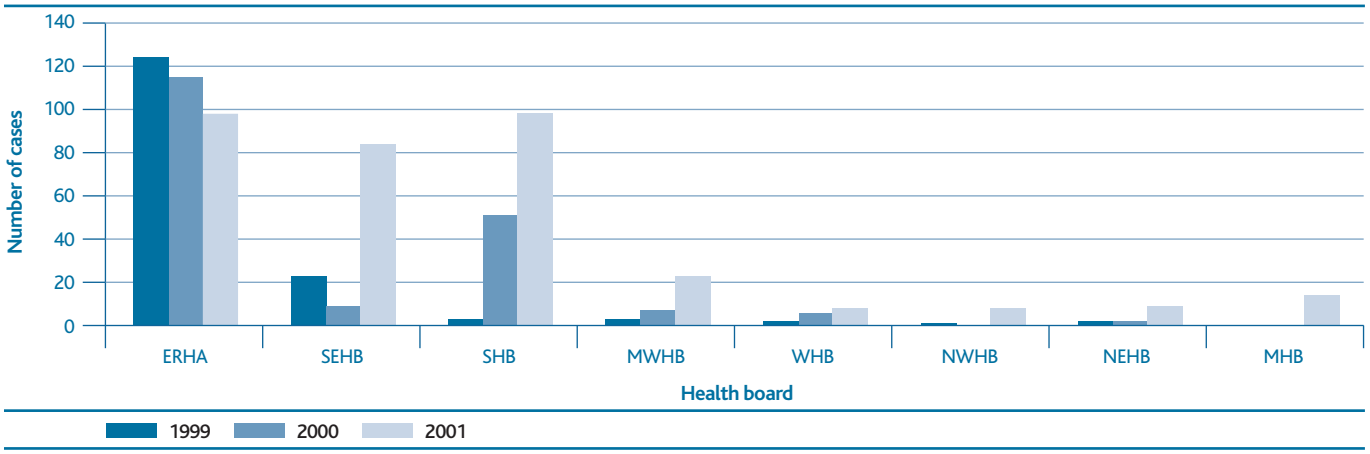

Figure 2: Cases of HBV notified by health board (1999-2001)

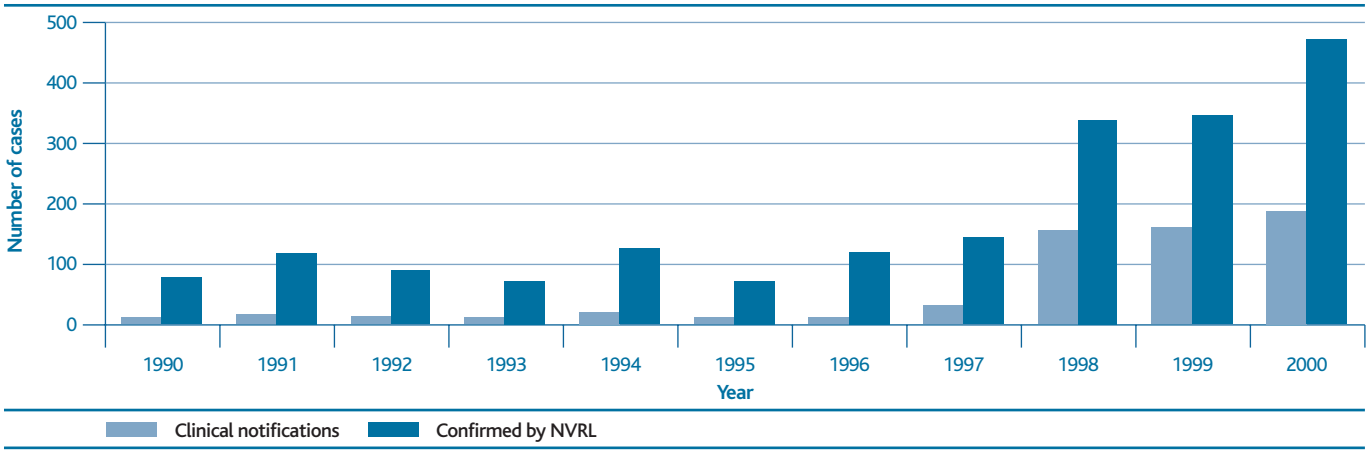

Figure 3: Number of HBV cases (a) notified to NDSC and (b) identified by the National Virus Reference Laboratory (surface antigen positive) (1990-2000)

Table 1: Number and crude rate (per 100,000 population) of HBV infection notified to NDSC by health board (2001)

Health Board	Number of cases	Crude rate (per 100,000)
ERHA	98	7.6
SHB	98	17.9
SEHB	84	21.5
MWHB	23	7.3
MHB	14	6.8
NEHB	9	2.9
WHB	8	2.3
NWHB	8	3.8
Total	**342**	**9.5**

Table 2: Cases of HBV notified by sex (2001)

Sex	Number of cases	Percentage
Male	185	54.1
Female	137	40.1
Not known	20	5.8
Total	**342**	**100.0**

occurred in the SEHB (21.5) and the SHB (17.9). Figure 2 presents the number of HBV notifications in each health board from 1999 to 2001. With the exception of the ERHA, there has been an increase in the number of notifications of HBV in all health boards.

Table 2 gives a breakdown of cases by sex. Of the 342 cases notified, 54% are male and 40% are female. Table 3 gives the breakdown by age group. The majority of cases (47%) were in the 25-34 year old age group.

Figure 3 compares the number of cases of HBV clinically notified to NDSC with the number of cases of HBV identified by the National Virus Reference Laboratory (NVRL) from 1990 to 2000.

Discussion

There were 342 cases of HBV reported to NDSC in 2001. Since 1996, there has been an increase in the number of notifications per year and in particular, there was a sharp increase between 1997 and 1998, and 2000 and 2001. The increase in certain health boards may reflect the introduction of new screening programs for HBV in certain areas.

It is evident that there is a need for enhanced surveillance of HBV in Ireland. Currently, comprehensive information on the epidemiology of HBV and on the specific risk groups affected by HBV is not available. In addition, some of the reported cases may be chronic carriers rather than newly infected persons and currently this information is not collected. In addition, the data presented here indicates that there is considerable under-notification of HBV in Ireland.

Table 3: Cases of HBV notified by age group (2001)

Age group (years)	Number of cases	Percentage
<1	2	0.6
1-4	1	0.3
5-9	6	1.7
10-14	8	2.3
15-19	19	5.5
20-24	41	12.0
25-34	162	47.2
35-44	65	19.2
45-54	15	4.4
55-64	4	1.2
>65	1	0.3
Unknown	18	5.2
Total	**342**	**100.0**

Acknowledgements

NDSC would like to thank staff in the Community Care Areas and Departments of Public Health for the provision of the data. NDSC would also like to thank the National Virus Reference Laboratory for the data provided on the laboratory-confirmed cases of hepatitis B.

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Salmonella in Ireland, 2001

Key Points

- **The incidence of salmonellosis in Ireland appears to be decreasing, as evident from the weekly clinical notification data.**
- **The crude incidence rate per 100,000 population of salmonellosis in Ireland in 2001 was 11.8, compared to 17.7 in 2000.**
- **There were 543 clinical isolates of *Salmonella enterica* referred to the National Salmonella Reference Laboratory (NSRL) in 2001 for serotyping, phage typing and antimicrobial sensitivity tests.**
- **In 2001, *S.* Enteritidis took over from *S.* Typhimurium as the predominant serotype detected, followed by *S.* Virchow and *S.* Dublin.**

Introduction

Salmonella enterica is an important human pathogen with over 2,500 distinct serotypes recognised. Most serotypes are zoonotic pathogens associated with foodborne illness in Ireland and worldwide. *Salmonella* Typhi and Paratyphi are exclusively human pathogens with no animal reservoir. A wide range of domestic and wild animals may act as sources of infection with zoonotic *S.enterica*. Secondary spread from human cases of salmonellosis may occur although chronic carriage of serotypes other than *S.* Typhi and *S.* Paratyphi is rare in humans. In recent years, two serotypes, namely, *S. enterica* serotype Enteritidis and *S. enterica* serotype Typhimurium have accounted for the majority of cases of human salmonellosis throughout Europe.

Salmonellosis usually presents 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 are associated with a severe systemic life-threatening infection (Enteric fever), but this is very rare in Ireland and mainly travel-associated.

Prevention, surveillance and control of *Salmonella* infections is of major public health importance. Measures have been implemented from farm to fork in an attempt to control spread of this zoonotic agent.

Table 1. Age group and sex of patients from whom clinical isolates of S. enterica (n=543) referred to NSRL, 2001

Age group (years)	No. of isolates (%)	Male	Female	Unknown
0-4	104 (19)	46	49	9
5-14	76 (14)	40	36	0
15-24	92 (17)	38	53	1
25-34	72 (13)	29	37	6
35-44	48 (9)	18	29	1
45-54	39 (7)	20	19	0
55-64	27 (5)	9	17	1
65+	41 (8)	23	17	1
Not known	44 (8)	21	18	5
Total	**543**	**244**	**275**	**24**

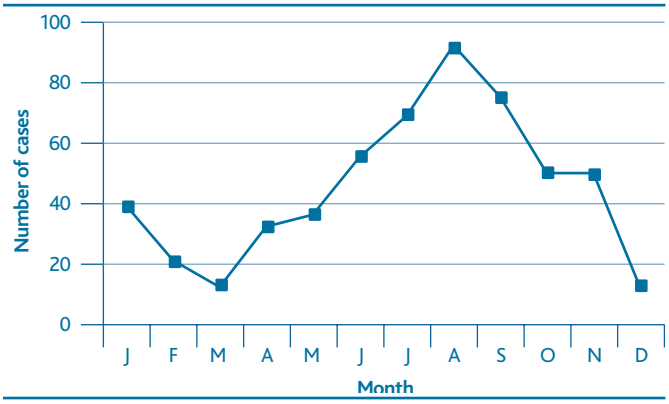

Figure 1. Isolates of Salmonella enterica referred to NSRL by month, 2001 (Note: month refers to the date the isolate was received in the reference laboratory).

Materials and 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 throughout Ireland for serotyping, phage typing and antimicrobial susceptibility testing. Molecular typing is performed selectively in particular to clarify possible relationships between isolates that are suspected to be associated with an outbreak.

This report reviews data available from the NSRL and weekly clinical notifications for the year 2001. These data enable us to provide an overview of the epidemiology and burden of disease caused by *Salmonella* infections in Ireland today.

Results

NSRL data

Demographic information

There were 543 clinical isolates of *S. enterica* referred to NSRL in 2001. The male:female ratio was 1:1. The age groups and sex of those affected are shown in table 1.

Seasonality

There was a marked seasonality in the number of human cases reported in 2001 with a sharp peak seen in late August (figure 1).

Serotyping, phage typing and antibiotic susceptibility results

The breakdown of *Salmonella* serotypes by health board is shown in table 2. The total figures and crude incidence rates (CIR) are also presented. It should be noted however, that health board location refers to the location of the clinical laboratory that the isolate was sent to, and may not correspond with the geographic location of the cases.

In 2001 *S.* Enteritidis replaced *S.* Typhimurium as the predominant serotype associated with human salmonellosis in Ireland (table 3). The next most commonly isolated serotypes were *S.* Virchow (n=16) and *S.* Dublin (n=12). There were nine isolates of *S.* Typhi detected in 2001, all associated with travel abroad.

Antimicrobial resistance

The antimicrobial susceptibilities of the most commonly isolated serotypes in 2001 are presented in table 4. High levels of resistance were found among *S.* Typhimurium isolates, particularly *S.* Typhimurium DT1O4. Many of these isolates were resistant to at least five antimicrobial agents, *viz.* ampicillin, chloramphenicol, streptomycin, sulphonamide and tetracycline (ACSSuT).

Results

Clinical notification data

Salmonellosis is a notifiable disease. Medical practitioners are legally obliged to report all suspected cases. Information on trends in salmonellosis notifications shows that the crude incidence rate rose in the 1990s to peak in 1998, and has been steadily decreasing since then (figure 2). The total number of notifications in 2001 was 428 compared to 640 in 2000, and 960 in 1999.

Table 2. Serotypes of Salmonella enterica by health board, 2001

Serotype	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
Abony	1	0	0	0	0	0	0	0	1
Agona	0	0	0	1	0	0	1	0	2
Albany	0	0	0	0	0	0	1	0	1
Anatum	1	0	0	0	0	0	0	0	1
Argentina	0	0	0	1	0	0	0	0	1
Bareilly	1	0	0	0	0	0	0	0	1
Braenderup	1	0	0	0	0	0	0	1	2
Brandenburg	2	0	2	0	0	0	0	0	4
Bredeney	3	0	1	0	0	4	2	1	11
Cerro	0	1	0	0	0	0	0	0	1
Coeln	0	0	0	0	0	1	0	0	1
Corvallis	0	0	0	0	0	0	0	1	1
Derby	1	0	0	0	0	0	1	1	3
Dublin	6	2	0	0	0	2	2	0	12
Enteritidis	94	13	15	6	15	25	62	18	248
Garba	1	0	0	0	0	0	0	0	1
Haardt	0	0	0	0	0	0	0	1	1
Hadar	0	0	0	1	0	0	1	2	4
Haifa	1	0	0	0	0	0	0	0	1
Hato	0	0	0	0	0	0	0	1	1
Heidelberg	1	2	0	0	0	2	1	1	7
Hofit	0	0	0	0	0	0	0	1	1
Infantis	1	0	0	0	0	1	0	0	2
Java	1	0	0	0	0	0	1	0	2
Johannesburg	0	0	0	0	0	2	0	0	2
Kentucky	2	0	0	1	0	0	0	1	4
Limete	1	0	0	0	0	0	0	0	1
Mbandaka	1	0	0	0	0	0	0	0	1
Mikawasima	0	1	0	0	0	0	0	0	1
Molade	0	0	0	0	0	0	0	1	1
Newington	2	0	0	0	0	0	0	0	2
Newport	3	0	0	1	0	0	0	0	4
Othmarschen	2	0	0	0	0	0	0	0	2
Paratyphi B	0	0	1	0	0	0	0	0	1
Putten	1	1	0	0	0	0	0	0	2
Rissen	1	0	0	0	0	0	0	0	1
Rostock	0	0	0	1	0	0	0	0	1
Saintpaul	3	0	0	0	0	0	0	0	3
Schwarzengrund	0	0	0	0	0	0	0	1	1
Senftenberg	1	0	0	0	0	0	0	0	1
Stanley	3	0	0	0	0	0	0	1	4
Stanleyville	1	0	0	0	1	0	0	0	2
Typhi	7	0	0	0	0	0	0	2	9
Typhimurium	58	19	21	14	9	12	25	7	165
Uganda	1	1	0	0	0	0	0	1	3
Unnamed	1	0	0	1	0	0	0	1	3
Veneziana	0	0	0	0	0	0	1	0	1
Virchow	8	3	1	1	0	2	0	1	16
Wein	0	0	0	0	0	0	0	1	1
Zanzibar	0	0	1	0	0	0	0	0	1
Total	**211**	**43**	**42**	**28**	**25**	**51**	**98**	**45**	**543**
CIR*	**16.3**	**20.9**	**13.2**	**9.1**	**11.9**	**13.0**	**17.9**	**12.8**	**15.0**

**CIR = Crude incidence rate / 100,000 population*

Discussion

Salmonella remains an important enteric pathogen and is responsible for a significant burden of human illness as evident from the data presented in this report.

The detailed typing laboratory data being generated by the NSRL are enabling us to monitor salmonella trends more accurately and is providing us with detailed information regarding the epidemiology of this pathogen in Ireland.

Analysis of the serotyping results reveals that in 2001, *S.* Enteritidis was the predominant serotype, followed by *S.* Typhimurium. This was a change from the results of the previous three years and now mirrors the trend seen in the UK and most of the rest of Europe with *S.* Enteritidis being the commonest serotype.

Detailed serotyping, phage and molecular typing, in conjunction with antibiogram profiling of all *Salmonella*

Table 3. Serotypes of S. enterica referred to NSRL by year.

	No. of isolates (%)			
Serotype	**1998**	**1999**	**2000**	**2001**
S. Enteritidis	60 (8)	155 (33)	239 (36)	248 (46)
S. Typhimurium	578 (80)	200 (42)	286 (43)	165 (30)
S. Bredeney	15 (2)	55 (12)	24 (4)	11 (2)
S. Kentucky	14 (2)	12 (3)	15 (3)	4 (1)
All other serotypes	54 (7)	52 (11)	101 (15)	115 (21)
Total	**721**	**474**	**665**	**543**

Table 4. Antimicrobial susceptibilities of human Salmonella enterica serotypes isolated in Ireland in 2001.

		% Resistance						
Serotype	**N**	**Amp**	**Chl**	**Strep**	**Sulph**	**Tet**	**Trim**	**Nal**
S. Enteritidis	248	7	0.4	5	7	12	2	24
S. Typhimurium	165	65	59	63	65	65	28	2
S. Virchow	16	6	0	0	6	6	12	69
S. Dublin	12	0	0	8	0	0	0	0
S. Bredeney	11	0	0	18	18	18	0	0
S. Heidelburg	7	29	0	0	0	0	0	14
S. Stanley	4	0	0	75	75	75	25	50
S. Kentucky	4	0	0	0	0	0	0	0

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

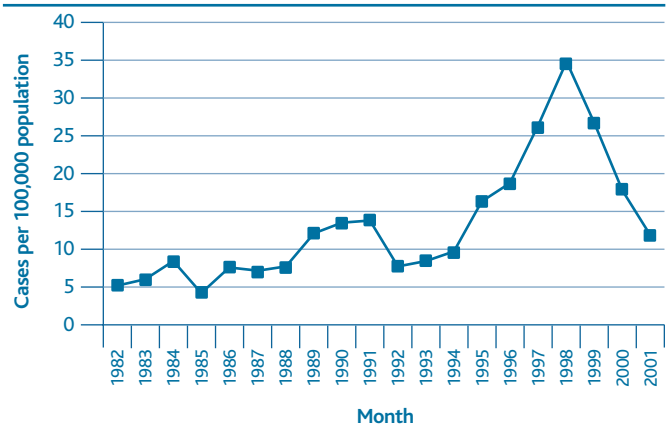

Figure 2. Crude rate of salmonellosis in Ireland per 100,000 population 1982-2001.

isolates has also proved invaluable for tracing of isolates through the food chain and enables outbreaks to be detected in a timely fashion. In 2001, a number of clusters of unusual *Salmonella* strains were detected by the reference lab in this way e.g. a small cluster of *S.* Typhimurium phage type U310 isolates.

Analysis of the 2001 NSRL dataset has again emphasised the scale of the problem of antimicrobial resistance amongst *Salmonella* isolates, particularly *S.* Typhimurium DT104. This is now recognised as a global problem and to this end the NDSC Strategy for the Control of Antimicrobial Resistance in Ireland (SARI) is endeavouring to deal with this problem.

The incidence (per 100,000 population) of recognised salmonellosis outbreaks and of sporadic laboratory-confirmed salmonellosis cases associated with *S.* Enteritidis, *S.* Typhimurium or *S.* Kentucky is lower in Ireland than in England, Northern Ireland or Scotland. It is difficult to determine if this reflects a true difference in incidence or a difference in ascertainment.

The incidence rates of laboratory-confirmed human salmonellosis have declined significantly in the past number of years. This has coincided with an overall decrease in the incidence of salmonellosis at EU level. The Department of Agriculture, Food and Rural Development Salmonella monitoring programme, the Bord Bia Egg Quality Assurance scheme and education campaigns targeting consumers and catering establishments may all have contributed to this downward trend.

Control of zoonotic agents, including *Salmonella enterica*, is a priority at EU level particularly with the advent of the new European Food Safety Authority. The first Irish Zoonosis Report will be published shortly, and for the first time report trends on zoonoses in Ireland, merging animal, food and clinical data.

Acknowledgements

We wish to sincerely thank Prof. Martin Cormican and all of his staff in the National Salmonella Reference Laboratory, University College Hospital Galway for providing the data for this report and also the clinical and food microbiology laboratories that send *Salmonella* isolates to NSRL for analysis. In addition, we would like to acknowledge the Departments of Public Health and Community Care Areas for providing the clinical notification data, and Dr. M Fitzgerald and staff of the Public Health Unit of FSAI for providing outbreak data from the first six months of 2001.

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Campylobacteriosis in Ireland, 2000

Key Points

- ***Campylobacter* continues to be the most common bacterial cause of gastroenteritis in Ireland.**
- **In 2000, there were 1613 laboratory-confirmed cases of campylobacteriosis in Ireland (compared to 2085 cases in 1999).**
- **The highest burden of illness was seen in the 0-4 year age group.**
- **Campylobacteriosis was found predominantly in males in several age groups.**
- **A peak in cases was recorded in early summer during 2000.**

Introduction

Infections due to *Campylobacter spp* are the most commonly isolated bacterial cause of human gastrointestinal illness, and reports of campylobacteriosis in Ireland, the UK, and other countries with temperate climates have been increasing since the organism was first recognised as a human pathogen in 1972. *Campylobacter jejuni* is the predominant species associated with human illness, with the remainder mostly being *C. coli*.

Campylobacteriosis presents as a diarrhoeal illness. The diarrhoea is often bloody and is frequently associated with acute abdominal pain. Symptoms may subside after a number of days or may persist for weeks. Rarely, some long-term sequelae may develop such as arthritis and approximately one in every 1000 cases leads to a severe neurological disorder called Guillain-Barré Syndrome (GBS).

In 2000, NDSC conducted the first national survey of the incidence of human campylobacteriosis in Ireland. Valuable information was derived from that study regarding the epidemiology of laboratory-confirmed campylobacteriosis which supplemented further investigations in this field by the Food Safety Authority of Ireland. This review presents the data from the second year of this laboratory survey.

Table 1. Number of cases and crude incidence rate (CIR) by health board in Ireland for 1999 and 2000

	1999		2000	
Health Board	No. of cases	CIR (incl. 95% C.I.)	No of cases	CIR (incl. 95% C.I.)
ERHA	591	45.6 [41.9-49.3]	472	36.4 [33.1-39.7]
Midland	83	40.4 [31.7-49.1]	63	30.7 [23.1-38.2]
Mid-Western	103	32.5 [26.2-38.8]	73	23.0 [17.7-28.3]
North Eastern	74	24.2 [18.7-29.7]	51	16.7 [12.1-21.2]
North Western	118	56.0 [45.9-66.1]	100	47.4 [38.1-56.7]
South Eastern	219	55.9 [48.5-63.3]	226	57.7 [50.2-65.3]
Southern	507	92.7 [84.7-101.0]	337	61.6 [55.1-68.2]
Western	390	110.7 [99.7-122.0]	291	82.6 [73.1-92.1]
Ireland	**2085**	**57.5**	**1613**	**44.5**

Table 2. The number of cases by health board and sex, in 2000.

Health Board	Males	Females	Total
ERHA	270	202	472
Midland	39	24	63
Mid-Western	45	28	73
North Eastern	26	25	51
North Western	57	43	100
South Eastern	121	105	226
Southern	172	164	337
Western	172	116	291
Ireland	**902**	**707**	**1613**

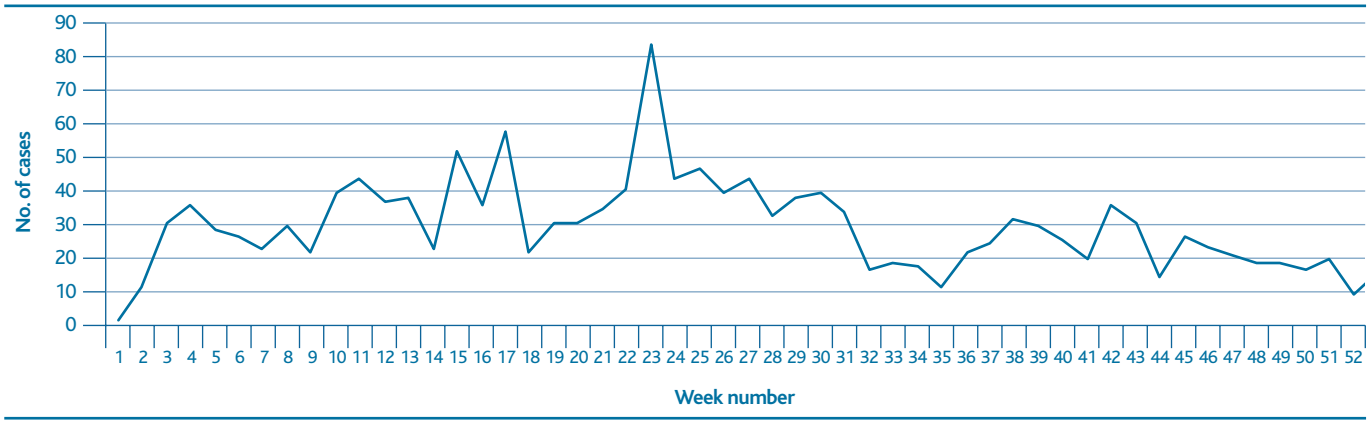

Figure 1. Total cases of campylobacteriosis by week (2000) in Ireland.

Methods

NDSC requested laboratories and/or public health doctors to provide disaggregated information on all laboratory-confirmed cases of campylobacteriosis diagnosed in 2000. The following minimum dataset was requested: identifier, date of birth/age, sex, address and date of onset/isolation/ reporting. In regions where laboratory surveillance systems were in place, this information was requested from their databases. Duplicates were removed where detected. Data were assigned a health board and a county where address was supplied. Analyses were carried out using MS Excel and Access.

Direct methods of standardisation were applied using the Irish population as the standard population. Population data were taken from the 1996 census. Species differentiation of isolates was not requested.

Results

Information on *Campylobacter* was obtained from all health boards. Information on age was missing in 11% of cases and information on sex was incomplete in 0.2% of cases. Data on age were not available on many cases in two health board areas (Midland, 40%; and Western, 21%). Those without age were not presented in age standardised charts.

Incidence

In total, 1613 cases of laboratory-confirmed campylobacteriosis were reported in 2000, in Ireland. This gives a crude incidence rate (CIR) of 44.5 per 100,000 population. This compared with a CIR of 57.5 per 100,000 in 1999 (table 1).

Sex

Males accounted for 56% of cases and females 44%, where gender data were given (table 2). This showed an overall male: female ratio of 1.29:1. A very similar result was found in 1999, with a ratio of male: female of 1.28:1.

Seasonality

Campylobacter has a well characterised seasonal distribution, with a peak in early summer seen each year and this is evident when the trend over time is examined. Table 3 shows the cases as they occurred in each health board by month. Figure 1 shows the occurrence of cases by week for Ireland in 2000. In 1999, a peak was seen in week 25 however, a sharp peak in week 23 is noted for 2000.

Age standardised rates were then calculated to allow comparisons between areas to be made without the confounding effects of age (figure 2). In 2000, the highest incidence was recorded in the Western region of the country, with the lowest incidence seen in the North Eastern region. A similar pattern was observed in 1999. Table 4 depicts the crude incidence rates (CIR) and age standardised incidence rates (ASIR) per 100,000 population by health board in 2000.

The age-standardised data are mapped and presented in figure 3 below. Table 5 below shows the age distribution of cases by health board and demonstrates that there is a large burden of illness in children under 5 years of age, and mirrors the results found in 1999. When we examine age-specific incidence rates for each age group, the burden of illness in this age group is even more evident (figure 4). Looking more closely at those cases, the age distribution for children under 5 years is illustrated in figure 5.

Table 3. Cases by month (2000) for each health board in Ireland

	E	M	MW	NE	NW	SE	S	W	Total
Jan	43	1	5	2	7	21	26	12	117
Feb	18	2	4	9	7	18	37	15	110
Mar	51	5	9	6	12	28	47	33	191
Apr	61	3	4	7	9	13	30	19	146
May	55	6	16	4	6	30	45	40	202
Jun	49	9	5	4	18	22	44	15	166
Jul	47	0	4	4	13	28	34	15	145
Aug	25	2	7	2	7	7	23	18	91
Sept	40	5	7	4	6	22	9	21	114
Oct	42	1	3	5	3	7	8	24	93
Nov	18	3	6	1	7	20	20	18	93
Dec	23	1	3	3	5	10	14	0	59
N/K		25						61	
Total	**472**	**63**	**73**	**51**	**100**	**226**	**337**	**291**	**1613**

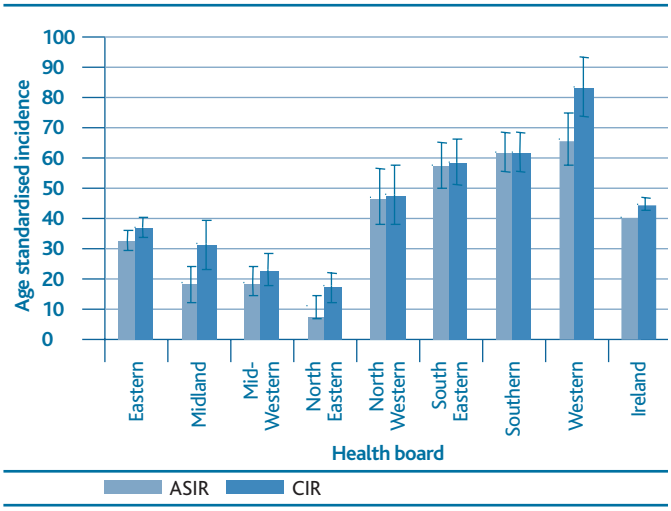

Figure 2. Age standardised incidence rates (AISR), compared to crude incidence rates (CIR) for Campylobacter enteritis in each health board, 2000. 95% confidence intervals included.

Gender distribution

The variance in gender distribution that was first noted in 1999 was again evident from analysis of the data in 2000. In every age-group except 25-35 years and 65+, there was a predominance of male cases. This is shown in figure 6 when the data are adjusted for age and sex.

Discussion

These data reveal a crude incidence rate of 44.5 cases per 100,000 persons in Ireland in 2000. Overall a decrease in the crude incidence rate was seen in Ireland in 2000 when compared with 1999 (57.5/100,000). This decrease was most notable in three health board regions/authority, *viz.* the Eastern, Western, and Southern. Despite the decrease however, campylobacteriosis remains the single biggest cause of bacterial gastroenteric infection in Ireland. It should be noted that these are laboratory-confirmed cases and the real burden of illness is even higher.

Higher rates were seen for the same period in Northern Ireland (59.75/100,000), England and Wales (101.7/100,000) and Scotland (126.7/100,000). These data also represented a decrease from 1999 figures for England and Wales. However, the rates in Northern Ireland and Scotland increased.

Most cases of *Campylobacter* infection are sporadic and suggested risk factors for infection have included ingestion of undercooked poultry meats and handling raw poultry, contact with pets, especially puppies, consumption of unpasteurised milk or dairy products and drinking water from contaminated/ untreated supplies. Recent evidence suggesting that *Campylobacter* has a low infectious dose, implies that cross-contamination of ready-to-eat foods by raw meats may be an important source of infection.

C. jejuni and *C. coli* can be isolated from the intestines of healthy farm animals, poultry, pets and wild birds. These organisms rarely cause disease in these animals and the carriage rate is believed to be quite high, particularly in poultry. On-farm control measures such as bio-security have not been as effective in controlling *Campylobacter* infections, compared to the success rate with *Salmonella*. Clear messages must be given that thorough cooking of meat and good personal hygiene will help to prevent illness in the home.

In this study, details of speciation and further sub-typing information were not available for many of the health board regions. In order to fully understand the epidemiology and virulence of this organism it is necessary to be able to accurately identify the isolates that are causing illness in humans compared to animals. Improved detection methods and developments in the area of molecular typing of isolates are also required. A national laboratory study on methodologies employed for detection of *Campylobacter* was carried out in 2001 as part of a larger European survey on *Campylobacter* surveillance and diagnostics. The findings of that study clearly demonstrated that there is a need for a European-wide *Campylobacter* surveillance network, possibly in combination with the EU-funded working group 'Campy-net'.

Table 4. Crude incidence rates (CIR) and age standardised incidence rates (ASIR) per 100,000 population by health board in 2000

Health Board	CIR [95% CI]	ASIR [95% CI]
ERHA	36.4 [33.1-39.7]	32.4 [29.3-35.3]
Midland	30.7 [23.1-38.2]	18.0 [12.2-23.9]
Mid-Western	23.0 [17.7-28.3]	18.4 [13.7-23.2]
North Eastern	16.7 [12.1-21.2]	10.3 [6.7-13.8]
North Western	47.4 [38.1-56.7]	46.5 [37.2-55.7]
South Eastern	57.7 [50.2-65.3]	56.9 [49.4-64.3]
Southern	61.6 [55.1-68.2]	61.6 [55.0-68.2]
Western	82.6 [73.1-92.1]	65.7 [57.1-74.3]
Ireland	**44.5**	

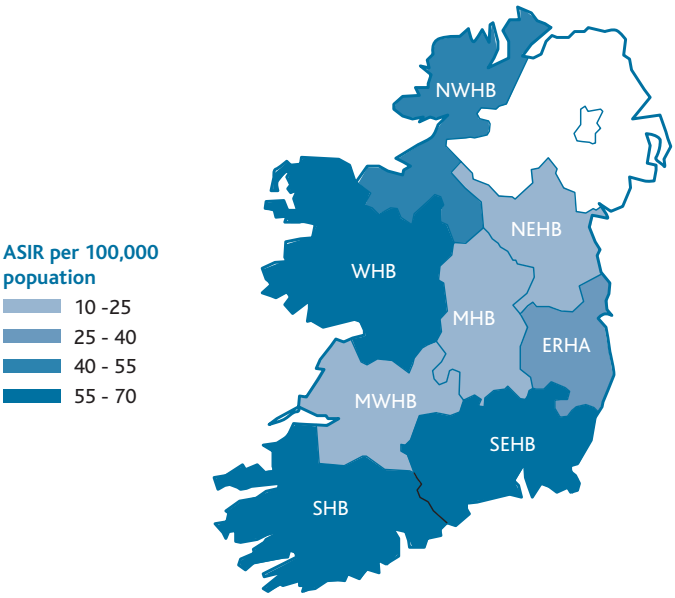

Figure 3. Age-standardised rates of campylobacteriosis in Ireland by health board, 2000

Table 5. Age-distribution by health board in 2000

Age group (years)	E	M	MW	NE	NW	SE	S	W	Total
0-4	92	8	17	12	35	87	140	95	486
5-9	24	1	7	4	12	16	21	20	105
10-14	17	1	2	2	3	20	11	12	68
15-19	16	4	2	0	5	7	11	5	50
20-24	27	0	4	1	6	18	21	19	96
25-34	91	11	8	2	8	25	45	18	208
35-44	79	3	6	4	9	17	27	16	161
45-54	30	2	3	3	4	6	22	15	85
55-64	23	1	3	2	5	10	17	8	69
65+	28	6	6	2	11	16	18	18	105
NK*	45	26	15	19	2	4	4	65	180
Total	**472**	**63**	**73**	**51**	**100**	**226**	**337**	**291**	**1613**

** NK = not known*

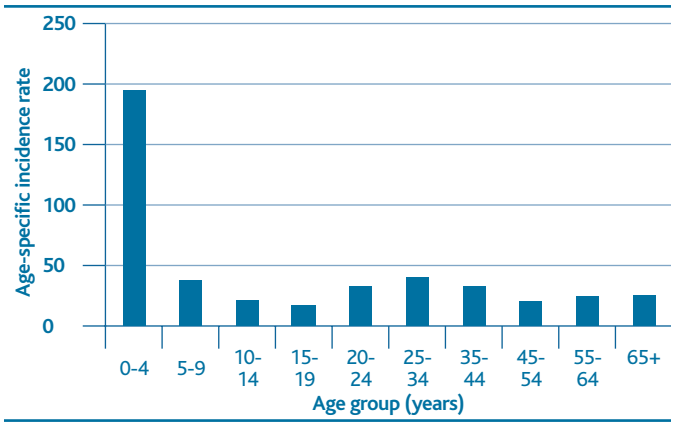

Figure 4. Age-specific incidence rates for campylobacteriosis in Ireland, 2000

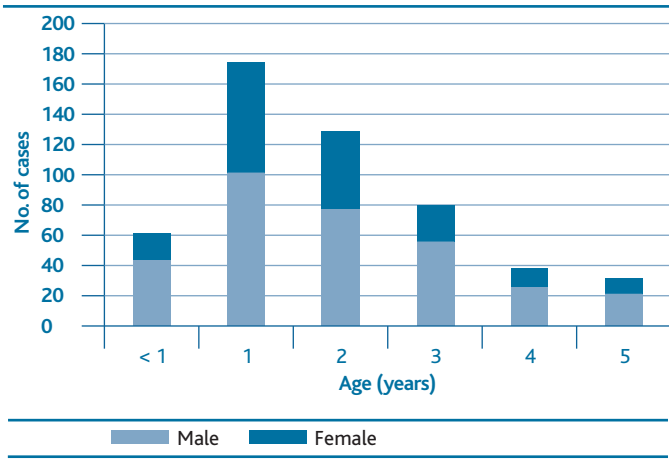

Figure 5: Cases of campylobacteriosis in children under 5 years in Ireland (2000)

Much work is needed to help to reduce the burden of illness caused by this zoonotic agent. The Food Safety Authority of Ireland identified prevention and control of foodborne illness due to *Campylobacter* as a key priority and to this end, a multi-disciplinary group was established by FSAI to identify control measures to combat *Campylobacter* infections from farm to fork. The report from this working group is due to be published shortly.

Additional investigations are needed in Ireland to examine the epidemiology of this organism and attempt to provide answers to the questions that the data presented in this report pose, such as, the high incidence in very young children, the bias towards male cases and the geographical distribution of cases. A recent publication from Australia[3] describes a matched case-control study conducted to identify risk factors for *Campylobacter* infection in infants and young children. Ownership of pet puppies and pet chickens and consumption of mayonnaise were identified as being independently associated with illness.

Campylobacter is a major cause of human gastrointestinal illness. Work towards its control must be a priority if the burden of human infectious intestinal disease is to be reduced.

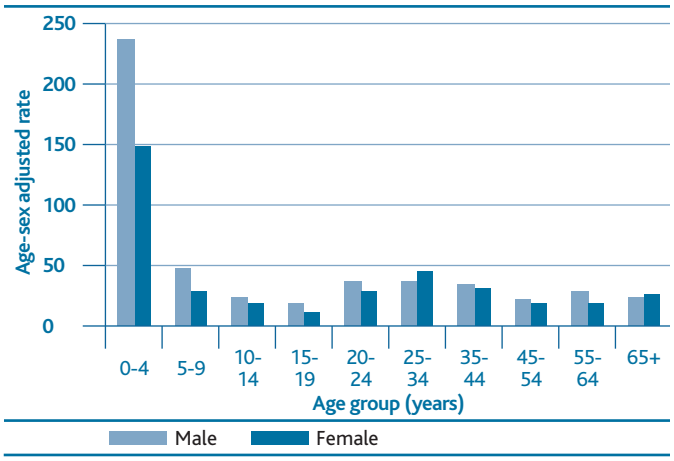

Figure 6: Age-sex adjusted incidence according to age-group in 2000

Acknowledgements

NDSC sincerely thanks and acknowledges all those who provided information for the second year of this report on the epidemiology of campylobacteriosis in Ireland. As was the case last year, many medical microbiologists, public health doctors and medical laboratory scientists made special efforts to obtain their data for this period to allow NDSC complete an accurate and relatively complete database of laboratory-confirmed cases of campylobacteriosis.

We are particularly grateful for the availability of quality information from INFOSCAN (Southern, South Eastern and Mid-Western Health Boards) and LSS (Eastern Health Board) which made data collection very efficient.

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The Epidemiology of Verocytotoxigenic *E. coli* O157:H7 in Ireland, 2001

Key Points

- ***E. coli* O157 is an emerging pathogen and a serious global public health concern.**
- **There were 52 confirmed cases of VTEC O157 in Ireland in 2001, compared with 42 cases in 2000.**
- **Haemolytic uraemic syndrome developed in 8% of cases in 2001.**
- **The increasing role of animal contact and environmental modes of transmission is being recognised.**

Introduction

Strains of *E. coli* that produce potent cytotoxins active on Vero cells were first reported in Canada in 1977. These organisms are described as Vero cytotoxin producing *E. coli* (VTEC) but have also been called Shiga-like toxin producing *E. coli* and Shiga toxin producing *E. coli*, and the term enterohaemorrhagic *E. coli* was introduced for strains that cause bloody diarrhoea.

E. coli O157 and other VTEC infections cause a wide range of illnesses, from mild diarrhoea to haemorrhagic colitis with severe abdominal pain and bloody diarrhoea. The illness is usually self-limiting and resolves after about eight days. However, in one-third to one-half of diagnosed cases the patient is hospitalised and 2-7% develop haemolytic uraemic syndrome (HUS), a form of renal failure whose fatality rate has been reported to be 3 to 17%. HUS is a more likely complication in young children. In adults, VTEC infection may be followed by thrombotic thrombocytopaenic purpura (TTP).[1]

At present in Ireland there is no statutory requirement to notify *E. coli* O157:H7. We also do not yet have a national reference laboratory facility for confirmation of toxin production and definitive typing of VTEC. However, in 2001, the ERHA Public Health Laboratory in Cherry Orchard Hospital commenced provision of a verotoxin testing service for VTEC isolates.

Table 1. Number of cases of VTEC O157 and crude incidence rate (incl. 95% CI) in Ireland, 1996-2001

Year	Numbers of confirmed cases	Crude incidence rate (incl. 95% CI) per 100,000 population
1996	8	0.2 [0.1-0.4]
1997	31	0.8 [0.5-1.2]
1998	76	2.1 [1.6-2.6]
1999	51	1.4 [1.0-1.8]
2000	37 (42)	1.0 [0.7-1.4]
2001	50 (52)	1.4 [1.0-1.8]

In 2000, 42 cases notified, but 5 occurred in non-Irish residents
In 2001, 52 cases notified, but 2 occurred in non-Irish residents

Table 2. Crude incidence rate (CIR) and age standardised incidence rate (ASIR) with 95% confidence intervals by health board, Ireland, 2000-2001

	2001		2000	
Health board	CIR [95% CI] per 100,000	ASIR [95% CI] per 100,000	CIR [95% CI] per 100,000	ASIR [95% CI] per 100,000
ERHA	0.9 [0.4-1.5]	0.9 [0.4-1.5]	0.5 [0.1-0.9]	0.5 [0.1-1.0]
MHB	2.4 [0.3-4.6]	2.4 [0.3-4.6]	3.4 [0.9-5.9]	3.3 [0.9-5.7]
MWHB	0.9 [0.1-2.0]	0.9 [0.1-2.0]	0.9 [0.1-2.0]	0.9 [0.1-2.0]
NEHB	1.3 [0.0-2.6]	1.3 [0.0-2.5]	0	0
NWHB	0.5 [0.5-1.4]	0.6 [0.5-1.6]	0.5 [0.5-1.4]	0.4 [0.4-1.2]
SEHB	2.6 [1.0-4.1]	2.5 [1.0-4.1]	1.5 [0.3-2.8]	1.5 [0.3-2.8]
SHB	1.3 [0.3-2.3]	1.2 [0.3-2.3]	0.5 [0.0-1.2]	0.5 [0.1-1.2]
WHB	2.0 [0.5-3.5]	2.0 [0.5-3.5]	2.8 [1.1-4.6]	2.9 [1.1-4.7]
Total	**1.4 [1.0-1.8]**		**1.0 [0.7-1.4]**	

Methods

In 1999, NDSC in co-operation with Directors of Public Health in each health board region established an epidemiological surveillance system for VTEC O157:H7. Since 1999, Specialists in Public Health Medicine and Area Medical Officers have participated in a system whereby a standard dataset of information is collected on each case identified and reported to NDSC. This information includes socio-demographic data, clinical data, possible risk factors and information on links between cases. An initial notification to NDSC is made on the date of notification of the case to the health board, and follow-up information is returned when available. Several participants in the system also notify other non-O157:H7 verocytotoxin-producing *E. coli*.

The case definitions that have been used in this system are shown as follows:

Suspected:

- A case of post-diarrhoeal HUS or TTP.

Probable:

- A case with isolation of *E. coli* O157 from a clinical specimen (asymptomatic or symptomatic), pending confirmation of H7 or Shiga toxin or

- A clinically compatible case that is epidemiologically linked to a confirmed or probable case.

Confirmed:

- A case that has isolation of *E. coli* O157:H7 from a specimen or isolation of Shiga toxin-producing *E. coli* O157:NM (non motile) from a clinical specimen.

Probable cases that were subsequently confirmed as not H7 or Shiga toxin producing were removed from the database. A travel-associated case is defined as one where there has been international travel within two weeks prior to onset of illness.

Results

In 2001, 52 cases of VTEC O157 were notified to NDSC. Two of these cases occurred in non-Irish residents and therefore were not included in the estimation of population-based rates. These cases are however, included in the descriptive epidemiology.

The incidence of VTEC O157 in Ireland from 1996-2001 is shown in table 1. There has been some regional variation in the numbers of cases reported (table 2). The 2001 age-standardised data are mapped and presented in figure 1 below.

Gender data were available for 47 cases, of which 28 were female (60%) and 19 (40%) were male. The majority of cases occurred in young children in the 1-4 year age group, followed by the 25-44 age-group (table 3). However, when the age-specific incidence rate in cases in Irish residents is examined,

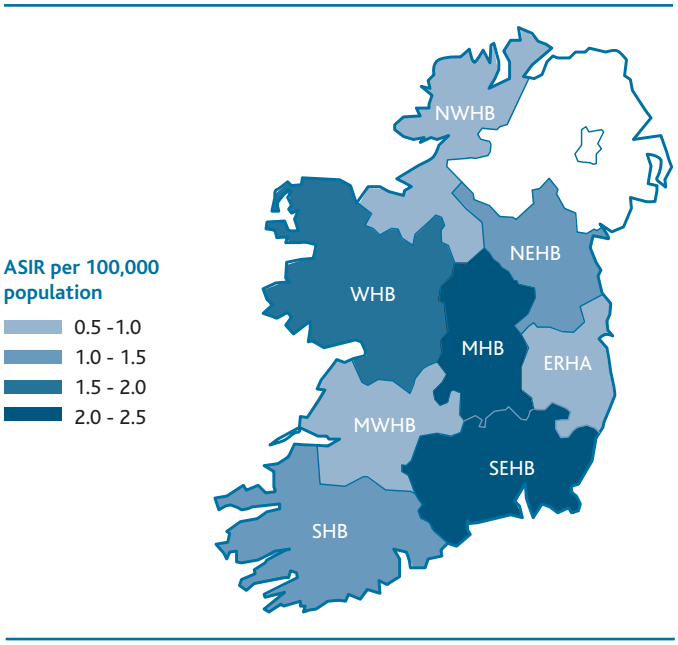

Figure 1: Age Standardised incidence (ASIR) rates of VTEC O157 by health board in Ireland, 2001.

Table 3. Cases of VTEC O157 by age group, 2001

Age group (years)	Number of cases	Percent
<1	5	9.5
1-4	11	21.0
5-9	7	13.0
10-14	4	8.0
15-24	6	12.0
25-44	10	19.0
45-64	6	11.5
65+	2	4.0
Unknown	1	2.0
Total	**52**	**100**

the high incidence in the 0-4 year olds is more notably reflected (figure 2).

Seasonality of VTEC O157

The majority of cases were seen to occur in the late summer/ early autumn, with a peak seen in September (figure 3).

Travel-association

Six cases were travel-associated (table 4). The countries visited within 14 days of onset of illness were Canary Islands (2), Turkey (2), Finland and Canada.

Clinical features

In total, 40 out of 52 confirmed cases (77%) were symptomatic, with 12 cases (23%) being asymptomatic. Reported symptoms included bloody diarrhoea in 24 (60%) of cases, and HUS in 3 cases (8%).

The three cases of HUS occurred in children under 12 years of age. Two were female and one was male. Only one of the cases reported bloody diarrhoea. All of the cases recovered but one required dialysis in hospital for a significant period of time. This case occurred in a two-year old female child and was part of an outbreak. The child was attending a crèche and several other children in the crèche became ill. The source of transmission for the index case was suspected to be consumption of water from a private well.

Microbiological investigation

In 2001, a number of food and water samples epidemiologically linked to cases were examined for the presence of VTEC organisms but no positives isolates were found.

Phage typing of isolates revealed that as in previous years, the predominant type detected was PT 32 (table 5). The population of phage types was found to be more homogeneous than that seen in previous years.

Epidemiological investigation

As was the situation in 1999 and 2000, active investigation of many of the cases in 2001 led to the identification of further, previously undiagnosed VTEC cases. As a result of following up apparently sporadic cases, eleven family outbreaks and one generalised outbreak that occurred in a crèche were detected.

The index case in the crèche outbreak was admitted to hospital with HUS. As the child attended a crèche all attendees of this crèche and household contacts were screened. This investigation revealed 15 people (10 of the attending children, the proprietor of the crèche, 2 mothers and 2 uncles) who were identified as having had gastrointestinal symptoms over a 4-week period. However,

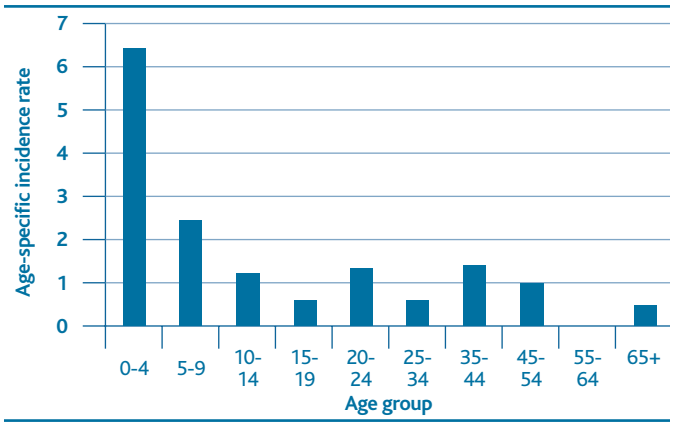

Figure 2. Age-specific incidence rate of VTEC O157 in Irish residents, Ireland 2001

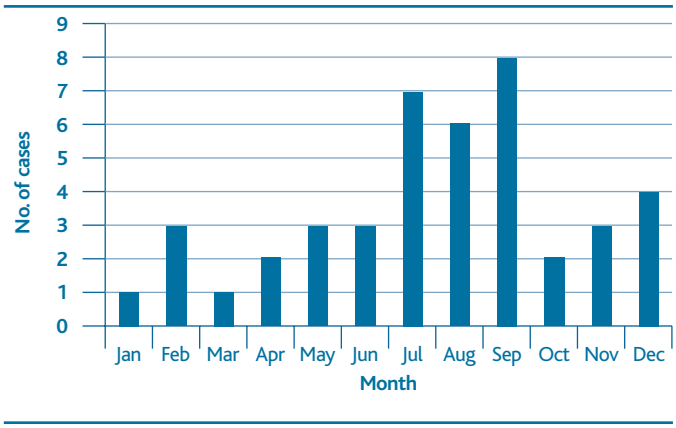

Figure 3. Cases of E. coli O157:H7 by month of onset of symptoms (or of diagnosis, if asymptomatic), Ireland, 2001

the majority of these cases had become ill over a 3-day period and were directly linked to the crèche. The crèche was closed while the investigation ensued. No suspect foods or other risk factors were identified.

Descriptive epidemiological information is collected on cases in order to attempt to identify potential risk factors for exposure to VTEC. A number of suspect foods were reported by cases but as the majority of these were from sporadic cases it was impossible to link them epidemiologically. No cases reported consumption of unpasteurised milk or cheese. Of 39 cases where information was collected on water source, the water supply was public in 27 (69%) cases, private well water in 11 (28%) cases, and from a group scheme in one case (3%). Contact with farm animals was reported in 10 (25%) cases (n=40).

Information on whether the case attended a crèche, or was an in-patient in a nursing home, hospital or other institutionalised setting, was also collected. The index case attended a crèche in 7 cases. In 7 cases the index case attended a primary school. Three cases were identified as food handlers. One case was an in-patient in hospital when VTEC was detected. No cases attended a nursing home facility.

Non-O157 VTEC

There were four cases of confirmed VTEC O26 reported in 2001, three cases from the NWHB and one from the SHB. All the cases were children and one attended a crèche. None of the cases developed HUS.

Discussion

Since the establishment of the NDSC Enhanced Surveillance System for VTEC O157 in 1999, we have been building up a picture of the epidemiology of this group of organisms in Ireland and compare trends with other countries. The incidence rate in the Republic of Ireland in 2001 was 1.4 per 100,000 population compared to 1.45/100,000 in England and Wales, and 4.6/100,000 in Scotland.

Undoubtedly, VTEC infections cause substantial morbidity and mortality. The severe complications that can be associated with infection, namely HUS in children and TTP in adults are particularly associated with significant mortality. In 2001 in Ireland, 60% of cases reported symptoms of bloody diarrhoea and 8% of cases developed HUS.

Studies undertaken worldwide over the past number of years have revealed the full complexity and ecology of VTEC O157 infection. One notable feature has been the range of modes of transmission of this organism. Several modes of transmission from the animal reservoir have been demonstrated (food-, water-, environmental- and animal-

Table 4. Phage type, association with international travel and countries visited within 14 days of onset of illness, for cases of E. coli O157:H7, Ireland, 2001

Phage type	Not travel associated	Travel associated	Countries	Total
14	2	0		2
32	30	3	Turkey, Canary Islands, Finland	33
8	6	2	Turkey, Canada	8
71	0	1	Canary Islands	1
N/A	8	0		8
Total	**46**	**6**		**52**

Table 5. Phage types of cases of E. coli O157:H7 by health board, Ireland, 2001

Health board	14	32	8	71	N/A	Total
ERHA	0	8	2	1	1	12
MHB	0	6	0	0	0	6
MWHB	0	3	0	0	0	3
NEHB	0	2	1	0	1	4
NWHB	0	0	0	0	1	1
SEHB	2	6	2	0	0	10
SHB	0	6	1	0	2	9
WHB	0	2	2	0	3	7
Total	**2**	**33**	**8**	**1**	**8**	**52**

person spread). In addition, person-to-person transmission has been demonstrated in households, crèches, hospitals and nursing homes. In particular, the emergence of direct or indirect transmission from animal and/or the environment has been demonstrated. In Ireland in 2001, 28% of cases reported drinking water from a private well and 25% of cases reported contact with farm animals in the period prior to onset of illness.

The notification of VTEC O26 cases again in 2001 highlights the importance of extending the enhanced surveillance system to non-O157 VTEC. A Working Group has been set up by a sub-committee of the NDSC Scientific Advisory Committee to review the clinical management and surveillance of VTEC infections in Ireland. It is hoped that one of the recommendations of this review will be to extend the current enhanced system to include all verotoxin-producing serogroups and also to commence surveillance of cases of HUS.

Acknowledgements

The writer would like to acknowledge the co-operation of microbiologists, medical laboratory scientists, SAMOs, AMOs, SPHMs, surveillance scientists, infection control nurses, PEHOs, and EHOs, for participating in the enhanced surveillance system.

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Influenza Activity and Surveillance, 2001/2002

Key Points

- **Influenza activity in Ireland was mild during the 2001/2002 influenza season, peaking in February 2002.**
- **Influenza A (H3N2) was the predominant circulating strain.**
- **A new strain of influenza virus, influenza A (H1N2) was identified by the NVRL this season from sentinel specimens.**

Introduction

Influenza is one of the oldest and commonest diseases known to man. Cases of influenza occur every winter, but the impact on morbidity, mortality and health services varies depending on the circulating strain of virus and the level of pre-existing immunity in the community.[1 2]

There are three types of influenza virus A, B and C. Influenza C rarely causes human illness. The clinical course of influenza B changes little from year to year and is usually milder than influenza A. Influenza A varies considerably and is responsible for epidemics and pandemics.[3] Influenza A viruses are divided into two subtypes on the basis of two surface glycoproteins, haemagglutinin (H) and neuraminidase (N). Minor changes in the surface glycoproteins are known as antigenic drift. Antigenic drift occurs between each influenza season. These minor changes necessitate annual reformulation of the influenza vaccine, which is based on the current circulating strains. Major changes in the surface glycoproteins occur infrequently and are known as antigenic shift, these result in the emergence of a novel virus that may be capable of causing an influenza pandemic. The Spanish Flu Pandemic of 1918 is acknowledged as the most devastating, resulting in an estimated 20-40 million deaths worldwide.[3 4]

In February 2002, the World Health Organisation (WHO) announced the isolation of a new strain of influenza A virus. Since 1977, two influenza A virus subtypes, A (H1N1) and A (H3N2) have circulated widely among humans. The new strain, influenza A (H1N2) appears to have resulted from the reassortment of genes in the current circulating H1N1 and H3N2 subtypes. Influenza A (H1N2) has been isolated from

Table 1: Number of sentinel GPs by health board, percentage of total practice population and percentage of population in each health board, 2001/2002 season

Health Board/ Authority	Number of GPs (n=32)	% of total practice population (n=87,619)	% of population (n=3,606,287)
ERHA	12	31.9	35.7
MHB	1	3.4	5.7
MWHB	2	4.8	8.7
NEHB	1	5.7	8.4
NWHB	2	5.1	5.8
SEHB	6	32.9	10.8
SHB	6	11.0	15.1
WHB	2	5.3	9.7

humans in Ireland, England, Scotland, France, Israel, Egypt, the US and Canada during the 2001/2002 influenza season. This strain was previously detected in China during the 1988/1989 influenza season. Further spread of these reassortment viruses in humans did not occur at the time. As the new strain is a combination of the two components (H1N1 and H3N2) present in the 2001/2002 influenza vaccine, vaccinees should have a good level of immunity. Those not vaccinated should also have some immunity as the H1N1 and H3N2 strains have been in circulation for the last two decades. To date, no unusual clinical illnesses are associated with the new strain.[5,6] The identification of this strain by the National Virus Reference Laboratory (NVRL) is highly significant; it highlights how effective the sentinel surveillance scheme is in identifying new influenza strains in a timely manner. This will be crucial in the event of an influenza epidemic or pandemic.

The composition of the vaccine for the 2002/2003 Northern Hemisphere influenza season is: A/New Caledonia/20/99 (H1N1)- like virus, A/Panama (H3N2)-like virus (the widely used vaccine strain A/Panama/2007/99 is an A/Moscow/10 /99-like virus) and B/Hong Kong/330/2001 (a B Victoria-like virus). The H1N1 and H3N2 components are considered to provide good protection against the new influenza A (H1N2) strain.[7]

Influenza surveillance is essential during a pandemic or interpandemic period to allow planning of control measures such as vaccinations. A national surveillance system must be able to:

- Detect increased influenza activity in the community.
- Report on influenza activity accurately and in a timely fashion.
- Confirm which influenza strains are circulating.[3,8]

This is the second year of influenza surveillance using computerised sentinel general practices in Ireland. The National Disease Surveillance Centre (NDSC) is working in collaboration with the NVRL and the Irish College of General Practitioners (ICGP).

Materials and Methods

Clinical data

Thirty-two 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. Patients were those attending for the first time with these symptoms.

In total, the 32 sentinel general practices cover an estimated total practice population size of 87,619, representing 2.4% of the population. The 32 practices include 20 practices from the 2000/2001 influenza season and 12 new recruits. Practices are located in all health boards with their location based on the population of each health board (table 1).

The influenza surveillance period runs from week 40 in October to week 20 in May, with the week running Monday to Sunday. Sentinel GPs send a report to the ICGP electronically every Tuesday. All data received are anonymous. Information recorded includes the general practitioner ID number and patient data (date of birth, gender, date seen, diagnosis, weekending, week number and health board). If there are no cases of ILI, zero reporting is required.

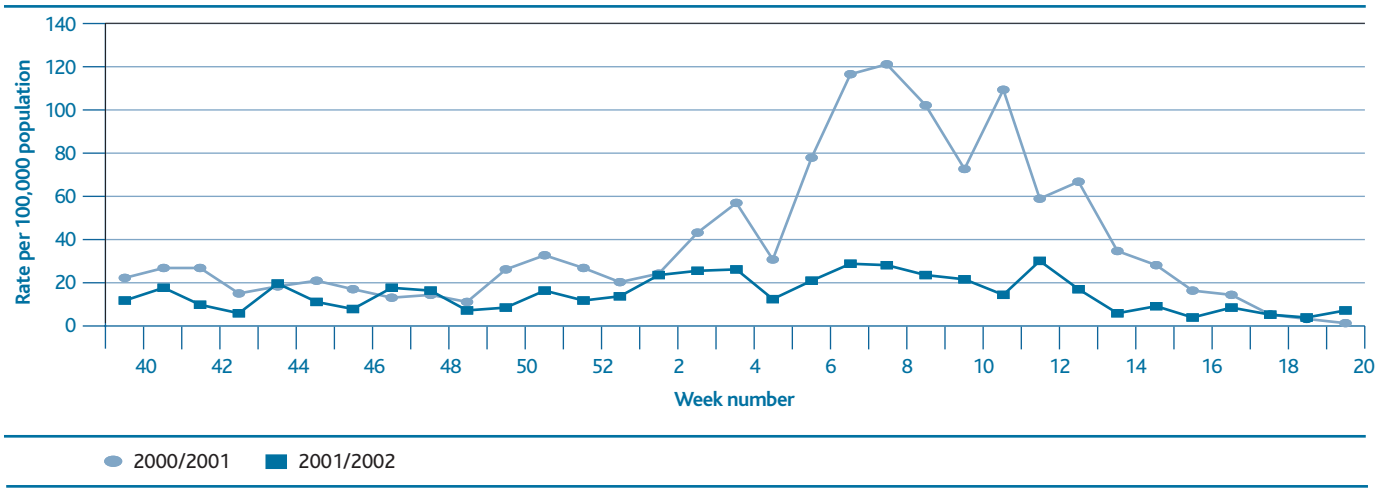

Figure 1: GP consultation rate for influenza-like illness per 100,000 population by report week, during the 2000/2001 and 2001/2002 influenza seasons.

Virological data
Sentinel GPs are asked to send a combined nasopharyngeal and throat swab on one patient per week where a clinical diagnosis of ILI was made. All materials necessary for swabbing, including instructions, easily identifiable laboratory forms and stamped addressed envelopes complying with An Post regulations, were supplied by the NVRL at the commencement of the surveillance season. Swabs were sent to the NVRL for testing using Shell Vial and PCR techniques. The NVRL supplied results on a weekly basis on the number of swabs received from each of the practices. The date of swab receipt, sex, date of birth, and positive or negative results by PCR and/or Shell Vial by type and subtype are all reported.

Regional influenza activity
The Departments of Public Health send an influenza activity index (no report, no activity, sporadic-, localised-, regional- or widespread activity) every week, to NDSC. The activity index is analogous to that used by the WHO Global Influenza Surveillance System and the European Influenza Surveillance Scheme. 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. Sentinel hospital data are based on: total admissions per week, total A & E admissions per week and total respiratory admissions per week (the definition of respiratory illness in this instance includes upper respiratory tract infection, lower respiratory tract infection, pneumonia, asthma, chronic bronchitis, and exacerbations of chronic obstructive airways disease). One sentinel hospital was located in each health board. Sentinel primary and secondary schools in each health board are located in close vicinity to the sentinel GPs. Each sentinel school reports absenteeism data on a weekly basis. The activity index by health board is included in a map of Ireland in the weekly influenza report.

Weekly influenza surveillance report
NDSC is responsible for producing a weekly influenza report, which is sent to all those involved in influenza surveillance and also posted on the NDSC website. Results of clinical and virological data are reported, along with a map of influenza activity, and a summary of influenza activity worldwide.

Results
Clinical data
GP consultations for influenza-like illness (ILI) were reported on a weekly basis per 100,000 population from week 40, 2001 to week 20, 2002 (figure 1). Influenza activity was very mild during the 2001/2002 influenza season compared to the previous season. The peak GP consultation rate occurred during week 12, with a rate of 29 per 100,000 population. This is compared to a peak rate of 121 per 100,000 during the 2000/2001 influenza season. It was only during weeks 44, 47, and 48, 2001 and weeks 18, 19 and 20, 2002 that the rates were marginally higher than the previous season. The peak age-specific consultation rate during the 2001/2002 season was in the 35-39 year age group (figure 2), with the overall rate slightly higher in males. A total of 279 ILI cases were reported by sentinel GPs during the 2001/2002-influenza season.

Virological data
The NVRL received 242 swabs from sentinel GPs during the 2001/2002 influenza season. Sixty-five (26.9%) of these were

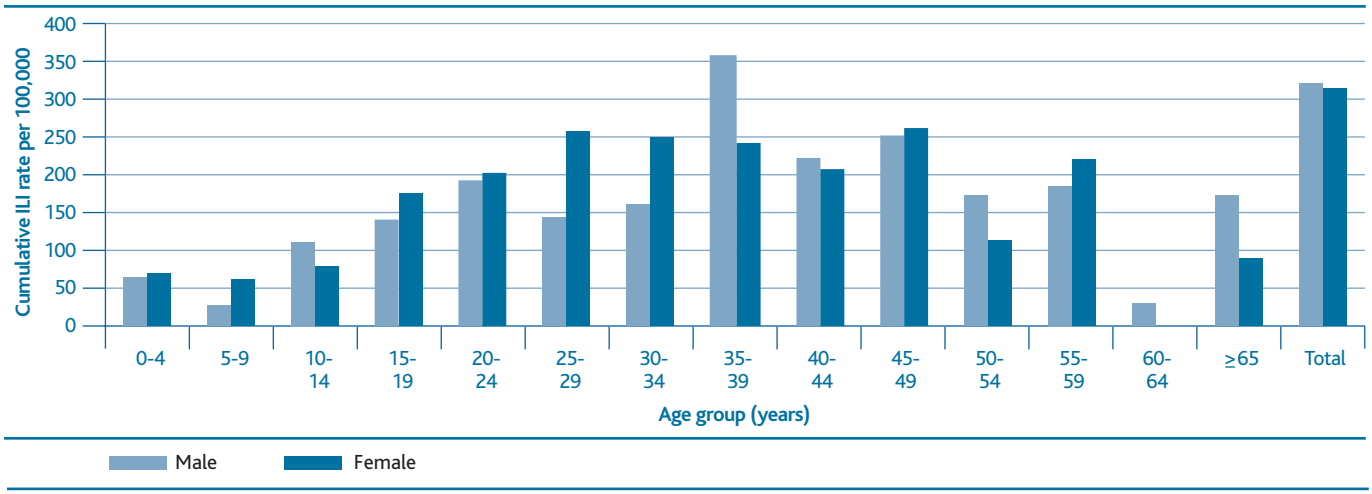

Figure 2: Cumulative age- and sex-specific ILI rate per 100,000 population between week 40, 2001 and week 20, 2002. The denominator used in the age- and sex-specific consultation rate is from the 1996 census data; this assumes that the age and sex distribution of the sentinel general practices is similar to the national age and sex distribution.

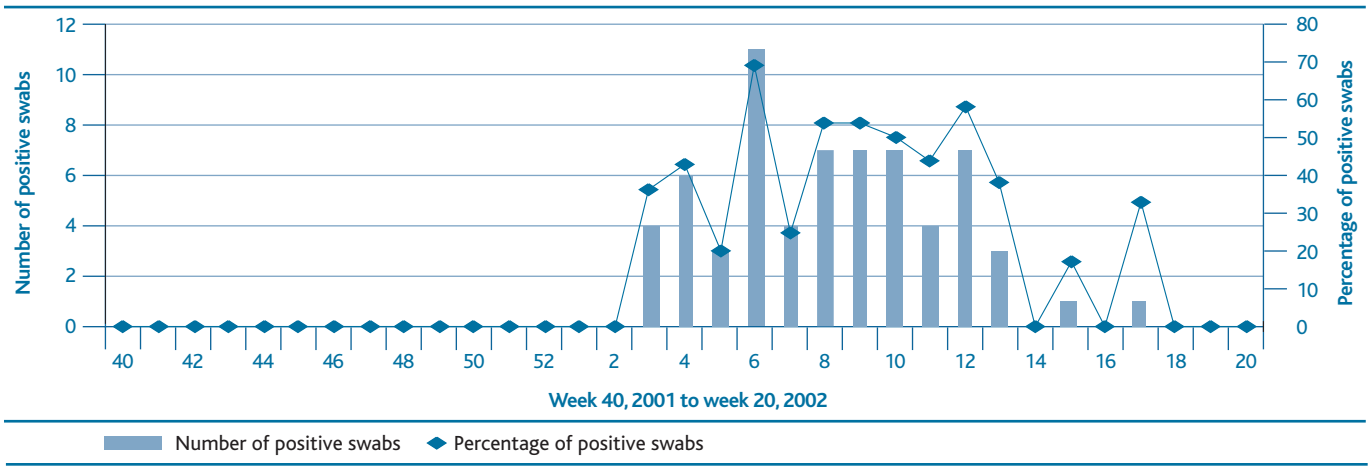

Figure 3: Number and percentage of influenza virus detections during the 2001/2002-influenza season.

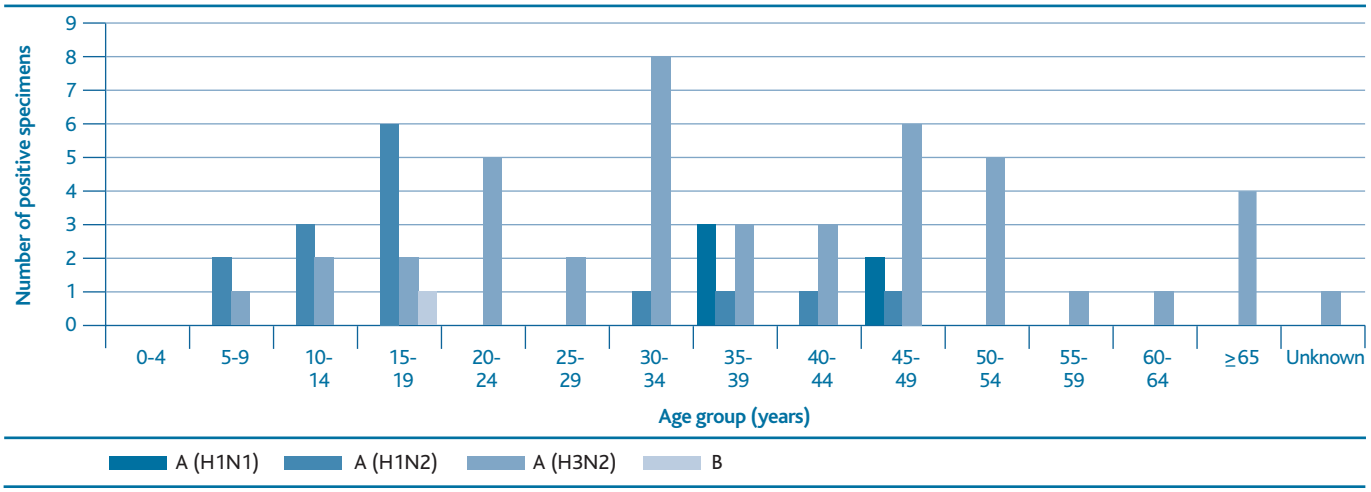

Figure 4: Number of specimens positive for influenza virus by type, subtype and age (years) between week 40, 2001 and week 20, 2002.

Table 2: Sentinel influenza results by type, subtype and report week for 2001/2002

Week number	Total swabs	Positive swabs	Percentage positive	A (H1N1)	A (H1N2)	A (H3N2)	B
40	4	0	0%	0	0	0	0
41	4	0	0%	0	0	0	0
42	4	0	0%	0	0	0	0
43	2	0	0%	0	0	0	0
44	2	0	0%	0	0	0	0
45	6	0	0%	0	0	0	0
46	3	0	0%	0	0	0	0
47	10	0	0%	0	0	0	0
48	8	0	0%	0	0	0	0
49	6	0	0%	0	0	0	0
50	8	0	0%	0	0	0	0
51	9	0	0%	0	0	0	0
52	1	0	0%	0	0	0	0
1	7	0	0%	0	0	0	0
2	10	0	0%	0	0	0	0
3	11	4	36%	1	0	3	0
4	14	6	43%	0	0	6	0
5	15	3	20%	0	2	1	0
6	16	11	69%	1	2	8	0
7	16	4	25%	0	0	4	0
8	13	7	54%	0	4	3	0
9	13	7	54%	0	0	7	0
10	14	7	50%	0	3	4	0
11	9	4	44%	1	1	2	0
12	12	7	58%	1	1	4	1
13	8	3	38%	0	1	2	0
14	2	0	0%	0	0	0	0
15	6	1	17%	1	0	0	0
16	2	0	0%	0	0	0	0
17	3	1	33%	0	1	0	0
18	1	0	0%	0	0	0	0
19	1	0	0%	0	0	0	0
20	2	0	0%	0	0	0	0
Total	**242**	**65**	**27%**	**5**	**15**	**44**	**1**

positive for influenza virus (figure 3 and table 2). Influenza virus was only detected between weeks 3 and 17, 2002. The highest number of positive swabs was during week 6, with 69% of swabs positive [50% of these were influenza A (H3N2)]. During the period of peak clinical activity, week 12, 58% of swabs were positive. Only one (1.5%) influenza B virus was detected this season. Influenza A accounted for 64 (98.5%) of the positive swabs: 5 (7.7%) influenza A (H1N1) and 15 (23.1%) influenza A (H1N2). Influenza A (H3N2) predominated this season with 44 (67.7%) swabs positive, peaking in the 30 to 34 year age group (figure 4).

Influenza A (H1N2)

Fifteen influenza A (H1N2) viruses were detected in Ireland during weeks 5, 6, 8, 10, 11, 12, 13 and 17, 2002. Influenza A (H1N2) accounted for 23.1% of all positive specimens and 23.4% of all influenza A positive specimens. Influenza A (H1N2) is the new strain of influenza virus announced by the WHO in February 2002. Eleven of the 15 cases detected were aged between 9 and 19 (figure 4). Nine of these cases were not vaccinated, the vaccination status of 6 cases was unknown. No unusual symptoms were associated with this new strain.

Antigenic characterisation

The NVRL referred influenza virus isolates to the World Health Organisation Laboratory in London for antigenic characterisation. The influenza B virus was antigenically closely related to B/Sichuan/379/99. Three of seven influenza A (H1) viruses were antigenically similar to A/New Caledonia/20/99 (H1N1) and A/Egypt/96/02 (H1N2), whereas the other 4 were more closely related to A/Egypt/96/02 (H1N2). All isolates were covered by the 2001/2002 influenza vaccine.

Vaccination status

Of the 65 positive influenza virus cases, 40 (61.5%) were not vaccinated, 2 (3.1%) were vaccinated and 23 (35.4%) were of unknown vaccination status (table 3).

Non-sentinel specimens

The NVRL tested 719 respiratory specimens from non-sentinel sources (GPs and hospitals) during the 2001/2002 influenza season. Seven specimens were positive for influenza A [four A (H3N2), one A (H1N1) and two A (unsubtyped)], 2 for adenovirus, and 2 for parainfluenza virus type 3. Of the 719 respiratory specimens, 214 (29.8%) were positive for respiratory syncytial virus (RSV), peaking in week 1, 2002 (figure 5).

Regional influenza activity

Localised, regional or widespread activity was not reported during the 2001/2002-influenza season. Prior to week 4, 2002, 2 to 4 health boards reported sporadic influenza activity weekly, with the remainder reporting no influenza activity. Between weeks 4 and 14, 2002, 4 to 6 health boards reported sporadic activity weekly. After week 14, the majority of health boards reported no influenza activity. Figure 6 is a map

Table 3: Influenza vaccination status of influenza virus positive cases during the 2001/2002-influenza season (n=65) between week 40, 2001 and week 20, 2002

Influenza type/ subtype	Unknown vaccination status	Vaccinated	Not vaccinated	Positive cases
A (H1N1)	2	0	3	5
A (H1N2)	6	0	9	15
A (H3N2)	14	2	28	44
B	1	0	0	1
Total	**23**	**2**	**40**	**65**

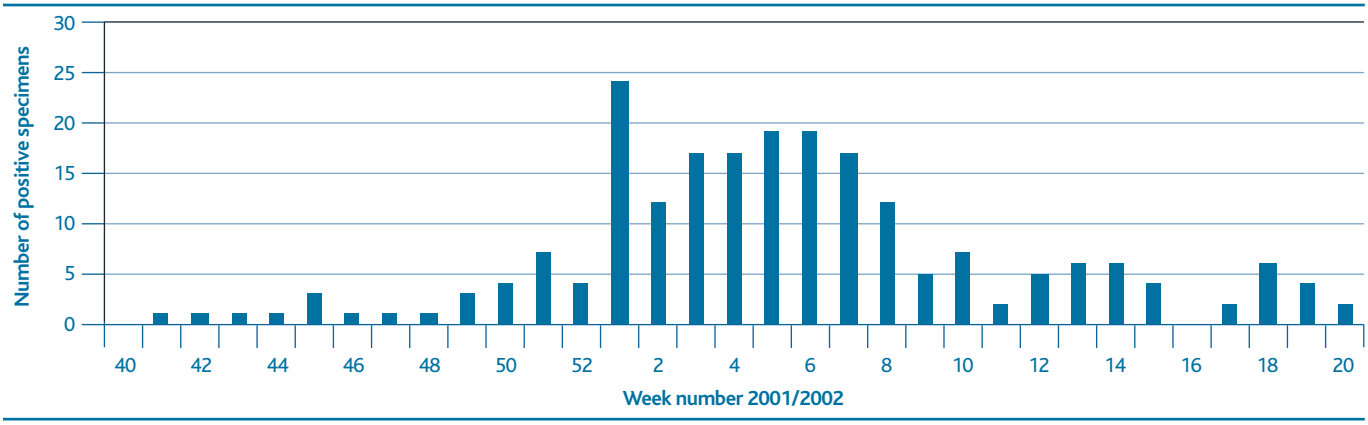

Figure 5: Non-sentinel RSV positive specimens between week 40 2001 and week 20 2002

of influenza activity by health board during week 12, the period of peak clinical activity.

The influenza activity index was compiled using sentinel GP ILI consultation rates, laboratory-confirmed cases of influenza, sentinel hospital admissions data and/or sentinel school absenteeism levels. In some health boards increases in the number of ILI cases were reflected by increases in hospital respiratory admissions and also occasionally by increases in school absenteeism, in particular primary school absenteeism.

Influenza activity worldwide

In Northern Ireland, morbidity levels for influenza and ILI were low during the 2001/2002 influenza season compared to the 2000/2001 influenza season. Influenza A (H3N2) predominated this season in Northern Ireland. In England, Scotland and Wales, consultation rates peaked during February 2002. Influenza outbreaks reported in schools in England that were investigated virologically were due to influenza A (H1N2).[6] Influenza activity across Europe during the 2001/2002 influenza season was mild to moderate. Influenza A and B were co-circulating this season, with influenza A (H3N2) predominating in most European countries.[5]

In the US, the 2001/2002 influenza season was also mild to moderate, with influenza A (H3N2) predominating.[9] Influenza B/Victoria/2/87-like viruses have been detected this season. The B/Victoria lineage has not been identified outside of Asia since 1991. However, since March 2001, B/Victoria-like viruses have been detected in Canada, Hawaii, India, China, Hong Kong, Japan, Thailand, the Philippines, Oman, France, Germany, Italy, the Netherlands, and Norway. The 2001/2002 vaccine was expected to provide lower levels of protection against viruses of this lineage. An influenza B virus belonging to the B/Victoria lineage will be included in the 2002/2003 influenza vaccine.

In Canada, influenza A (H3N2) was the predominant circulating strain during the 2001/2002 season. The B/Hong Kong/22/01-like viruses detected this season in Canada were antigenically different from the 2001/2002 vaccine, which was expected to provide limited cross protection against these viruses.[10] In Hong Kong, influenza B and A (H3N2) predominated during 2001/2002. Avian influenza A (H5N1) has been confirmed in a number of farms and markets since February 2002 in Hong Kong, resulting in the culling of thousands of chickens and has led to the first chicken vaccination programme. No human cases of H5N1 virus were detected during this outbreak.

Discussion

Influenza activity has been mild in Ireland this season. Overall, influenza morbidity levels are lower this season than the 2000/2001 influenza season (which was not as intense as the 1999/2000 season). Influenza A (H3N2) has been the predominant strain circulating this season. Of significance for influenza surveillance in Ireland, the NVRL identified the new strain of influenza virus, A (H1N2) in sentinel specimens; these

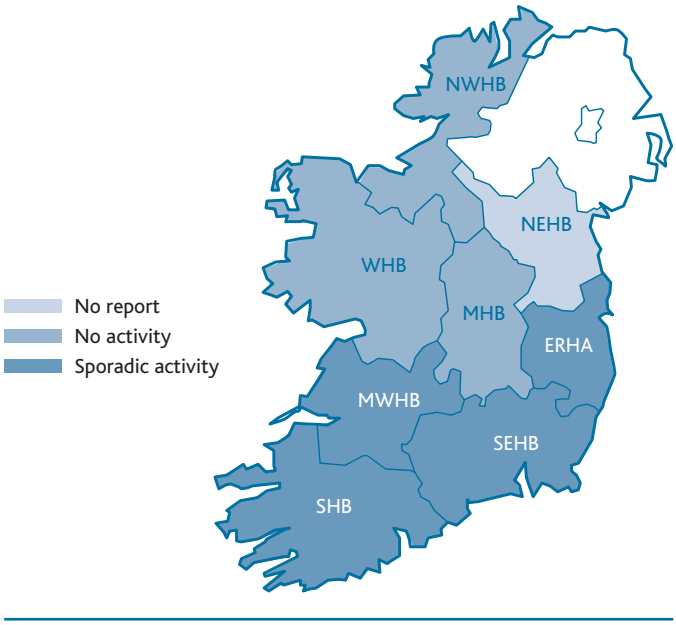

Figure 6: Map of influenza activity by health board during week 12 2002

were not associated with any unusual clinical symptoms. It is of interest to note that the majority of A (H1N2) cases identified in Ireland were aged between 9 and 19 years, particularly as influenza activity associated with A (H1N2) in the UK mainly affected children and was also responsible for a number of school outbreaks. Influenza A (H3N2) was detected in all age groups, which was also reflected in the UK. [2]

Influenza activity can be measured not only by GP consultation rates, and laboratory-confirmed cases of influenza but also through school and work absenteeism, hospital admission rates, sales of "over the counter" medications and deaths.[4] Influenza epidemics can cause considerable social and commercial disruption to healthcare services. Among school children absenteeism due to influenza is a useful indirect measure of morbidity. During epidemics in the UK and the USA in 1976 and 1977, total school absenteeism and absenteeism specifically due to ILI corresponded closely with influenza epidemic curves. Influenza epidemics also place secondary care services under considerable pressure. Studies have revealed increases in both the number of emergency room admissions and the proportion of those attending with respiratory symptoms during influenza epidemics.[4] However, due to the low incidence of ILI this season a direct relationship between increases in hospital admissions and school absenteeism and the incidence of ILI was difficult to ascertain. This was however, a useful exercise and will be a good indicator in the future of influenza morbidity levels, in particular during influenza epidemics.

Further expansion and improvements in the present system are now being planned for the forthcoming season, including an increase in the number of sentinel GPs and the number of swabs. Influenza surveillance is essential in order to minimise the impact of this fatal infection especially in high-risk patients: the elderly, very young and people with underlying health problems. Monitoring of ILI activity in the community over a number of seasons may help to predict the potential impact of influenza on the health services.

Acknowledgements

Special thanks are due to the sentinel GPs, the Departments of Public Health, sentinel hospitals and schools who provide data throughout the influenza season. Many thanks also to Fiona Cloak and Niamh Murphy, NDSC.

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Legionnaires' Disease, 2001

Key Points

- **In 2001, there were 3 cases of Legionnaires' disease notified to NDSC. All 3 were male and 2 were travel-associated.**

- **When compared with other European countries, Ireland is conspicuous by its low rate. This would suggest that a major degree of under-diagnosis and under-reporting of Legionnaires' disease currently exists in Ireland.**

Introduction

Legionnaires' disease is a notifiable disease in Ireland as defined by the Infectious Disease Regulations 1981.[1] Forty three *Legionella* species and 65 serotypes have been described.[2 3] The most common cause of Legionnaires' disease is *Legionella pneumophila*, a gram negative aerobic non-spore forming bacillus.[4] *Legionella* lives as an intracellular parasite of amoebae in aquatic environments[5 6] and can be found naturally in environmental water sources such as rivers, lakes and reservoirs, usually in low numbers. Inadequately maintained man-made water systems provide a favourable environment in which the *Legionella* bacteria can proliferate.

Legionnaires' disease is a multi-system illness which can have wide-ranging clinical symptoms, though the principle manifestation of the disease is pneumonia.

Potential sources of Legionnaires' disease are shown below:

- **Hot and cold water systems.**
- **Cooling towers and evaporative condensers.**
- **Respiratory and other therapy equipment.**
- **Spa pools/natural pools/thermal springs.**
- **Fountains/sprinklers.**
- **Humidifiers for food display cabinets.**
- **Water cooling machine tools.**
- **Vehicle washes/carpet cleaners/medication nebulizers.**
- **Potting-compost or soil, especially in warmer climates.**

Materials and Methods

Definitions

Participants in the European Working Group for Legionella Infections (EWGLI), which includes Ireland, use the following case definitions:

Confirmed case of Legionnaires' disease

An acute lower respiratory tract infection with focal signs of pneumonia on clinical examination and/or radiological evidence of pneumonia and one or more of the following:

- *Culture* - isolation of any *Legionella* organism from respiratory secretion, lung tissue or blood.

- *Seroconversion* – a fourfold or greater rise in specific serum antibody titre to *L. pneumophila* serogroup 1 by the indirect immunofluorescent antibody test or by microagglutination.

- *Antigen detection* – the detection of specific *Legionella* antigen in urine using validated reagents.

Presumptive case of Legionnaires' disease

An acute lower respiratory tract infection with focal signs of pneumonia on clinical examination and/or radiological evidence of pneumonia and one or more of the following:

- *Serology* – a fourfold or greater rise in specific serum antibody titre to *L. pneumophila*, other serogroups or other *Legionella* species by the indirect immuno-fluorescent antibody test or by microagglutination.

- *Serology* – a single high titre* using reagents to *L. pneumophila* serogroup 1 or other *Legionella* species and serogroups.

- *Antigen detection* – the detection of specific *Legionella* antigen in respiratory secretion or direct fluorescent antibody (DFA) staining of the organism in respiratory secretion or lung tissue using evaluated monoclonal reagents.

- PCR-detection of *Legionella* species DNA by Polymerase Chain Reaction.

**A single high serological titre: as differing serological testing methods are used in different countries, and as an internationally accepted validation exercise has not been carried out, no specific serological test or titre level can be specified. It is suggested however, that the single high titre result considered to indicate recent Legionella infection, in the presence of compatible symptoms, be set at a sufficiently high level to be specific for Legionella infection (i.e. to produce a low level of false positives).*

Travel-associated cases

A case 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, ships, campsites etc. in the 10 days before the onset of illness. The onset of symptoms for Legionnaires' disease must be within ten days of the last date of travel. Travel-associated cases may involve travel within Ireland or travel abroad. A case must meet the clinical, microbiological

Table 1. Number of Legionnaires' disease cases notified in Ireland, 1991-2001

Year	Legionnaires' disease cases notified	Rate per million population
1991	0	-
1992	2	0.6
1993	0	-
1994	1	0.3
1995	1	0.3
1996	2	0.6
1997	6	1.7
1998	2	0.6
1999	2	0.6
2000	9	2.5
2001	3	0.9

1991 population: 3,525,719; 1996 population: 3,626,087

Table 2. Rate of Legionnaires' disease in European countries in 2001[7]

Country	Number of cases	Rate per million population
Spain*	1026	25.48
Denmark	115	21.7
France	800	13.29
The Netherlands	182	11.38
Belgium	109	10.9
Malta	4	10.46
Norway	43	9.56
Italy	302	5.25
Austria	39	4.88
Scotland	19	3.7
England & Wales	175	3.31
Finland	15	2.94
Switzerland	115	1.6
Sweden	78	0.9
Ireland	**3**	**0.83**
Northern Ireland	0	0

**The largest ever community outbreak occurred in Murcia in Spain in 2001*

and travel history criteria for it to be notified to the European Working Group on Legionella Infection surveillance scheme (EWGLINET).

Notification

An enhanced surveillance form is completed by public health doctors on each case that is notified to the Departments of Public Health. This form is then faxed to NDSC where details are entered onto an MS Access database. If the case fulfils the definition of a travel-associated case, NDSC forwards on details of the case to EWGLI.

Results

Cases

In 2001, there were 3 cases of Legionnaires' disease notified. All 3 were male and were Irish nationals. Admission dates to hospital were in July, September and December.

Microbiology

All 3 cases were *Legionella pneumophila* serogroup 1. One case was positive on urinary antigen detection alone. One case was positive on serology (4 fold rise in titre). The third case was positive on urinary antigen, serology and culture of bronchial washings.

EWGLI

Two cases were travel-associated cases and were notified to EWGLI. One travelled to Italy and the other to both Spain and Italy.

Outcome

There were no deaths among these cases.

Discussion

It would appear that Legionnaires' disease is rare in Ireland but when compared with other European countries Ireland is conspicuous by its low rate. This would suggest that a major degree of under-diagnosis and under-reporting of Legionnaires' disease currently exists in Ireland. Table 1 shows the number of cases of Legionnaires' disease notified in Ireland over the last 10 years and table 2 shows the number of cases notified in some European countries in 2001.[7] The average incidence rate of Legionnaires' disease in European countries in 2001 was 7.6 per million population.[7]

On 1 July 2002, new European guidelines under which the European surveillance scheme for travel-associated Legionnaires' disease will operate were introduced, as was a new identity for the scheme – EWGLINET.[8]

Participation in EWGLINET ensures standardised methods of diagnosis, recording and reporting of disease and permits direct comparisons from other participating countries. Outbreaks or clusters of cases of Legionnaires' disease in travellers can be quickly identified through this European network allowing rapid alerts to be communicated to all participating countries, WHO and other relevant bodies.

Useful Documents

Health and Safety Commission. Legionnaires' disease: the control of legionella bacteria in water systems: approved code of practice and guidance. ISBN 0 7176 1772 6, ref. L8. HSE Books, Suffolk, 2000. This document can also be ordered online at **http://www.hsebooks.co.uk**

The Management of Legionnaires' disease in Ireland. ISBN 0-9540177-2-2. National Disease Surveillance Centre, 2002. Available at **http://www.ndsc.ie**

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Antimicrobial Resistance in Ireland, 2001

Key Points

- **In 2001, there were 821 reports of invasive *S. aureus* infection. The methicillin-resistant *S. aureus* (MRSA) rate was 42.5% (n=340).**
- **Gentamicin-resistance in MRSA has decreased in the last three years, reflecting the changing profile of circulating strains. Less multi-drug resistant strains of MRSA are becoming more prevalent.**
- **In 2001, there were 246 reports of invasive *S. pneumoniae* infection. The penicillin-non-susceptible *S. pneumoniae* (PNSP) rate was 12.2% (n=30).**
- **Of 23 PNSP isolates examined, 20 were intermediately-resistant to penicillin and three were high-level resistant.**
- **Overall, the resistance rates in Ireland observed in 2001 are similar to the previous year and remain high compared to other European countries.**
- **The Strategy for the Control of Antimicrobial Resistance in Ireland (SARI) was launched in June 2001. Initial funding was directed towards staffing for surveillance and control of antimicrobial resistance. Expert working groups and regional SARI committees were established.**

Background

The European Antimicrobial Resistance Surveillance System (EARSS) has been in operation in Ireland since January 1999. The number of laboratories reporting antimicrobial resistance data on invasive pathogens of *Staphylococcus aureus* and *Streptococcus pneumoniae* has increased from 12 in 1999 to 21 in 2001. The percentage population coverage is estimated to be 85-90%.

Data are collected on the first invasive isolate per patient per quarter of *S. aureus* (blood only) and *S. pneumoniae* (blood and CSF). Laboratories collect routinely generated qualitative disc diffusion data: oxacillin/methicillin for *S. aureus* and oxacillin/penicillin for *S. pneumoniae*, plus any additional antibiotics tested locally. All methicillin-resistant *S. aureus* (MRSA) isolates are submitted to the National MRSA Reference Laboratory (NMRSARL) at St James's Hospital and all isolates of *S. pneumoniae* to the Pneumococcal Referral Laboratory at RCSI/Beaumont where minimum inhibitory concentrations (MICs) are determined for a number of key antibiotics. Additional tests, such as extended antibiograms, are also carried out.

Individual laboratories report their data to the national EARSS co-ordinating centre at NDSC in one of three ways:

- Isolate report forms;
- A WHONET database file;
- A structured text file from their laboratory information system, which can be translated to WHONET format via the allied BacLink software.

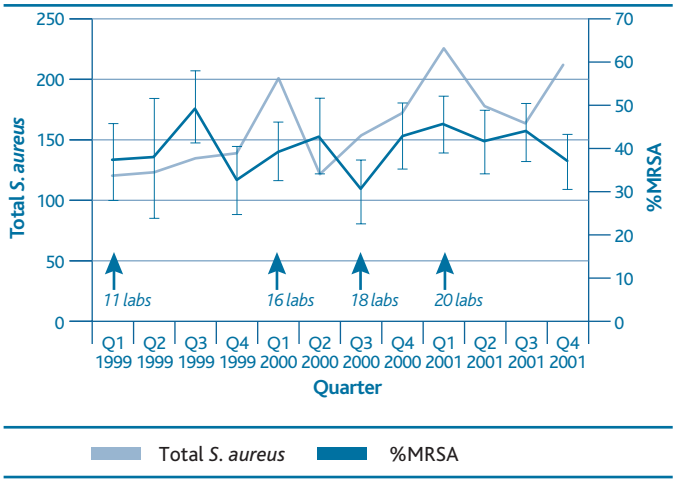

Figure 1. Trends in reported S. aureus bacteraemia/%MRSA by quarter 1999-2001 with 95% confidence intervals.

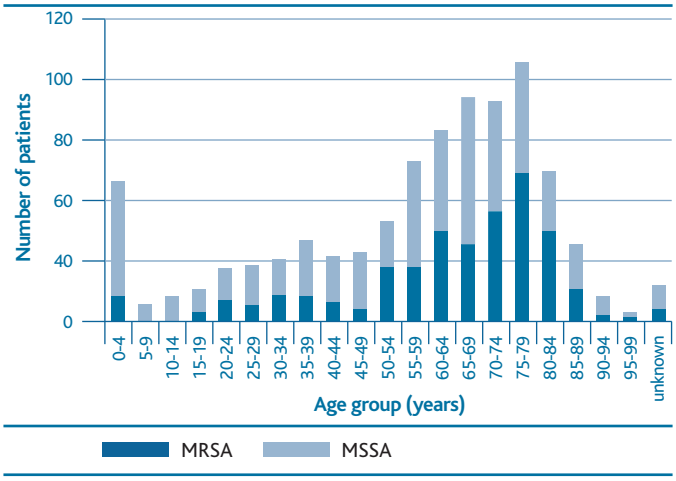

Figure 2. Breakdown of S. aureus isolates (n=821) by age for 2001.

Table 1. Annual rates of MRSA bacteraemia, 1999-2001, with 95% confidence intervals (CI)

Year	n	%MRSA	Upper 95% CI	Lower 95% CI
1999	514	39.3	38.6	45.3
2000	645	38.8	35.0	42.5
2001	821	42.5	34.9	43.3

At NDSC, the data are stored in a WHONET database and duplicate (subsequent) isolates are removed before analysis is carried out.

Protocol

Case definitions:

Antimicrobial susceptibility testing (AST) data on the first isolate only from blood of every patient with a *S. aureus* infection (confirmed by a coagulase test) and on the first isolate only from blood or CSF of every patient with a *S. pneumoniae* infection (confirmed by an optochin test).

Resistance definitions, as determined by MIC testing using Etests:

S. aureus

(tested and interpreted according to NCCLS guidelines)

Oxacillin susceptible	MIC ≤ 2mg/L	MSSA[1]
Oxacillin resistant	MIC ≥ 4mg/L	MRSA[2]

S. pneumoniae

(tested and interpreted according to BSAC guidelines)

Penicillin susceptible	MIC ≤ 0.06mg/L	PSSP[3]
Penicillin intermediate	MIC 0.1 to 1.0mg/L	PNSP[4]
Penicillin resistant	MIC ≥ 2mg/L	PNSP[4]

1. Methicillin-susceptible S. aureus, 2. Methicillin-resistant S. aureus, 3. Penicillin-susceptible S. pneumoniae, 4. Penicillin-non-susceptible S. pneumoniae

Results

S. aureus

In 2001, 821 reports of *S. aureus* isolates from bacteraemia were received (Q1, 223; Q2, 177; Q3, 204; Q4, 217). The total proportion of *S. aureus* resistant to methicillin/oxacillin was 42.5% (n=340).

The quarterly trend in resistance to methicillin/oxacillin is illustrated in figure 1. Over the first two years, the rate by quarter fluctuated between 30 and 50% while annually the overall rate remained at 38-39%. In 2001, the quarterly rate has stabilised at approximately 40% while the overall annual rate has increased to 42.5% (table 1).

There was no significant seasonal variation in the MRSA quarterly rate however, there was a peak in Q1 and a trough in Q3 for the total number of *S. aureus* isolates submitted. The peak in Q1 coincides with the busy winter period in hospitals, while Q3 coincides with the less busy summer season.

For total *S. aureus*, MRSA and MSSA isolates, there is a greater preponderance of infection in males to females (males are twice more at risk than females).

The risk of invasive *S.aureus* and MRSA infections increases with age >4 years, peaking in the older age groups >50 years (figure 2). Children aged 0-4 years also represent a significant risk group.

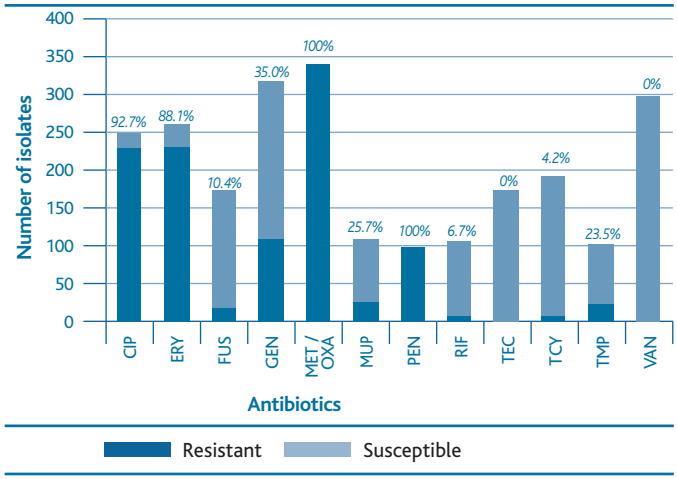

Figure 3. Susceptibility data, based on participant returns, for invasive isolates of MRSA reported in 2001. Percentage resistance is indicated above the bar.

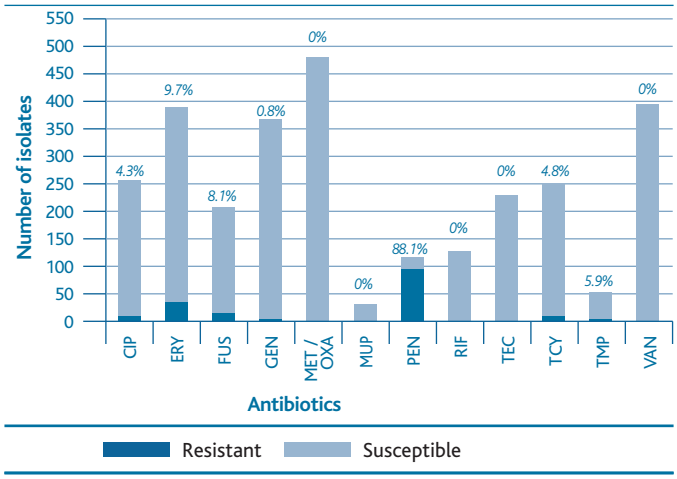

Figure 4. Susceptibility data, based on participant returns, for invasive isolates of MSSA reported in 2001. Percentage resistance is indicated above the bar.

Antibiotic codes: CIP – ciprofloxacin, ERY – erythromycin, FUS – fusidic acid, GEN – gentamicin, OXA – oxacillin, MET – methicillin, MUP – mupirocin, PEN – penicillin, RIF – rifampicin, TEC – teicoplanin, TCY – tetracycline, TMP – trimethoprim, VAN – vancomycin.

Patients in ICU are most at risk of invasive MRSA infection. In 2001, over 20% of all patients with invasive MRSA infections were from ICUs compared with 11.6% of patients with invasive MSSA infections.

Figures 3 and 4 show the susceptibility data, based on participant returns in 2001, to selected anti-staphylococcal antibiotics for invasive isolates of MRSA and MSSA respectively.

The antibiogram results of all MRSA isolates (n=316) referred to the NMRSARL at St James's Hospital during 2001 are shown in figure 5.

The changing profile of circulating strains is reflected in changes in the antibiotic susceptibility patterns and this has been confirmed by epidemiological typing at the NMRSARL. Gentamicin resistance among MRSA isolates has decreased over the three years that the surveillance system has been in operation. In 1999, the gentamicin resistance rate was 58.4%. This decreased to 44.2% in 2000 and 33.9% in 2001, reflecting a growing trend in which epidemic strains of MRSA are becoming increasingly less multi-drug resistant to anti-staphylococcal antibiotics.

Most MRSA isolates referred to the NMRSARL in 2001 had MICs to oxacillin of > 256mg/L. Two isolates demonstrated MICs of 8mg/L and four isolates had MICs of 16mg/L, which are close to the NCCLS breakpoint for resistance to oxacillin (4mg/L). All isolates had vancomycin MICs of ≤ 4mg/L.

The overall annual MRSA rate observed in Ireland is high and is comparable with rates observed in the UK, France and most southern European countries (figure 6). The Scandinavian countries and The Netherlands report lower MRSA rates.

S. pneumoniae

In 2001, 246 reports of *S. pneumoniae* isolates from bacteraemia/meningitis were received (Q1, 90; Q2, 79; Q3, 27; Q4, 50). The majority (n=241) of isolates were from blood but five were from CSF. The total proportion of *S. pneumoniae* non-susceptible to penicillin/oxacillin was 12.2% (n=30).

The quarterly trend in resistance to penicillin/oxacillin is illustrated in figure 7. In the first year, the rate by quarter was initially high at 27% in Q1, but dropped off to 10% by Q4, remaining at this level over the next two years with two exceptions, Q4 2000 with an increase to 19% and Q3 2001, with a drop to 7%. Annually, the overall rate dropped from an initial high in 1999 to 12-13% for 2000-2001 (table 2).

A seasonal variation is seen in the numbers of *S. pneumoniae* isolates reported with a peak in Q1 and a trough in Q3. As observed with *S. aureus*, the peak in Q1 coincides with the busy winter period in hospitals, which is also seen for other respiratory pathogens, while Q3 concides with the less busy summer period. There was no significant seasonal variation in the PNSP quarterly rate.

For total *S. pneumoniae*, PNSP and penicillin-susceptible *S. pneumoniae* (PSSP) isolates, there is a greater preponderance of infections in males to females (males are 1.3 times more at risk than females).

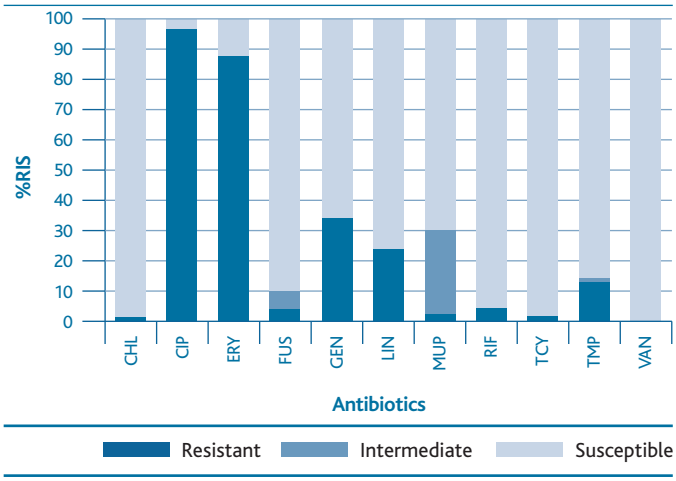

Figure 5. Antibiogram results of MRSA isolates (n=316) referred to NMRSARL at St James's Hospital during 2001.

Antibiotic codes: CHL – chloramphenicol, CIP – ciprofloxacin, ERY – erythromycin, FUS – fusidic acid, GEN – gentamicin, LIN – lincomycin, MUP – mupirocin, RIF – rifampicin, TCY – tetracycline, TMP – trimethoprim, VAN – vancomycin.

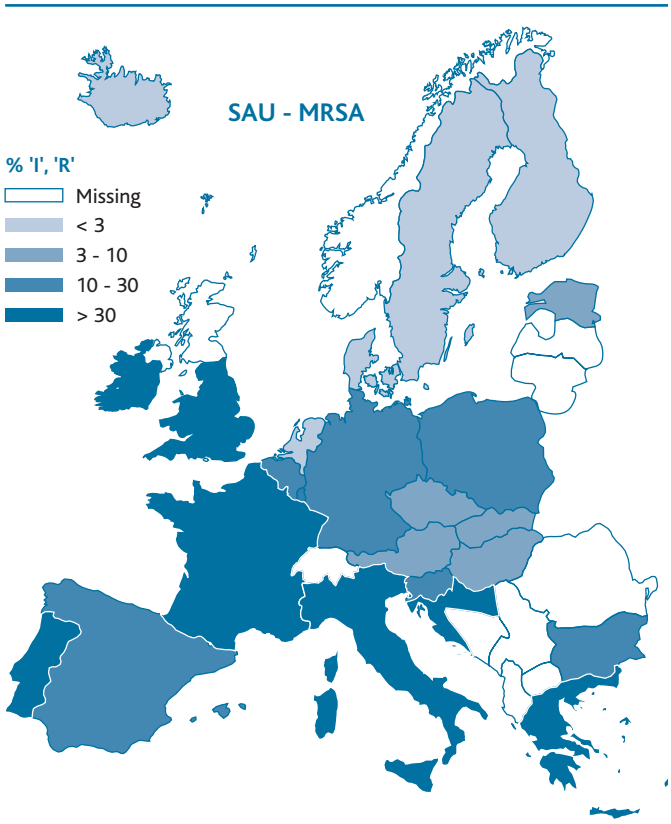

Figure 6. Map illustrating the distribution of MRSA in EARSS countries in 2001.

The highest rates of invasive *S. pneumoniae* and PNSP infections are observed in children aged <4 years and adults >60 years (figure 8). The peak observed for the 35-39 year age group is most probably not a true peak in that this group represents one of the most numerous in the population. To investigate the significance of this, age standardised rates were calculated using the 1996 census as the denominator. This peak was found to be markedly reduced, however, it should be noted that as EARSS coverage for S. pneumoniae in 2001 was approximately 90% of the population, there could be a bias in the data reported in this manner due to certain age groups being either under- or over-represented. Thus, caution would have to be exercised when interpreting such data.

Figures 9 and 10 show the susceptibility data, based on participant returns in 2001, to selected anti-pneumococcal antibiotics for invasive isolates of PNSP and PSSP respectively.

Penicillin MIC determination was performed on 183 isolates referred to the Pneumococcal Referral Laboratory at RCSI/ Beaumont (figure 11). Overall, 23 isolates were found to be non-susceptible to penicillin (MIC ≥ 0.1mg/L). Of these, 20 were intermediately-resistant to penicillin (MIC 0.1-1.0mg/L) and three were high-level resistant (MIC ≥ 2mg/L). All isolates were susceptible to cefotaxime (MIC ≤ 2mg/L) and, apart from one resistant isolate (MIC = 4mg/L), moderately-resistant to ciprofloxacin (MIC ≤ 2mg/L).

In addition, in-house penicillin MIC results were available on five PNSP isolates not referred to RCSI/Beaumont, four of which were intermediately-resistant while one was high-level resistant. No MICs were available for two isolates reported to be penicillin-non-susceptible.

Four penicillin intermediately-resistant isolates were also found to be resistant to one or more other anti-pneumococcal antibiotics. One isolate was intermediately-resistant to cefotaxime (but no MICs available), another was resistant to erythromycin and tetracycline while two were resistant to erythromycin only.

Of the five CSF isolates, three were intermediately-resistant to penicillin but susceptible to other antibiotics tested while two were fully susceptible to all antibiotics tested.

Figure 11 shows the distribution of penicillin MICs (determined by Etest) in pneumococcal isolates submitted to the Pneumococcal Referral Laboratory at RCSI/Beaumont in 2001.

The overall annual PNSP rate observed in Ireland is moderately high (figure 12). The UK, Scandinavia, and some central European countries are generally associated with lower PNSP rates. Higher PNSP rates are observed in Belgium, southern Europe and some countries of the former Eastern Bloc.

The Future

From 1st January 2002, EARSS in Ireland has expanded to include collection of data on three additional pathogens, *Escherichia coli*, *Enterococcus faecalis* and *Enterococcus faecium*. Antimicrobial resistance data for all five pathogens surveyed in the 24 countries participating in this surveillance

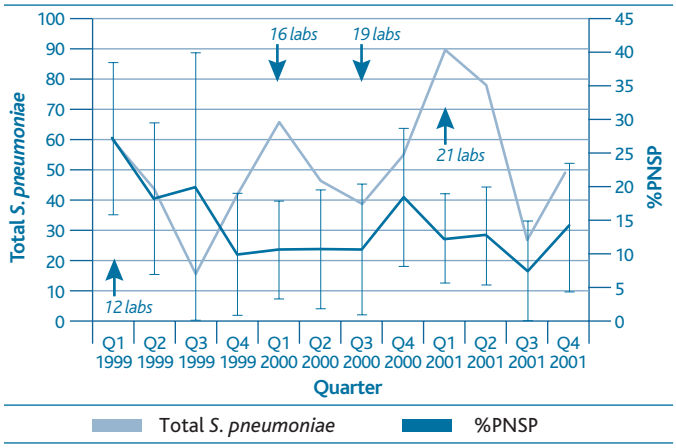

Figure 7. Trends in reported S. pneumoniae bacteraemia/% penicillin-non-susceptible S. pneumoniae (PNSP) by quarter 1999-2001 with 95% confidence intervals.

Table 2. Annual rates of penicillin-non-susceptible S. pneumoniae (PNSP) bacteraemia/meningitis, 1999-2001, with 95% confidence intervals (CI).

Year	n	%PNSP	Upper 95% CI	Lower 95% CI
1999	159	19.5	25.7	13.3
2000	205	12.7	17.2	8.1
2001	246	12.2	16.3	8.1

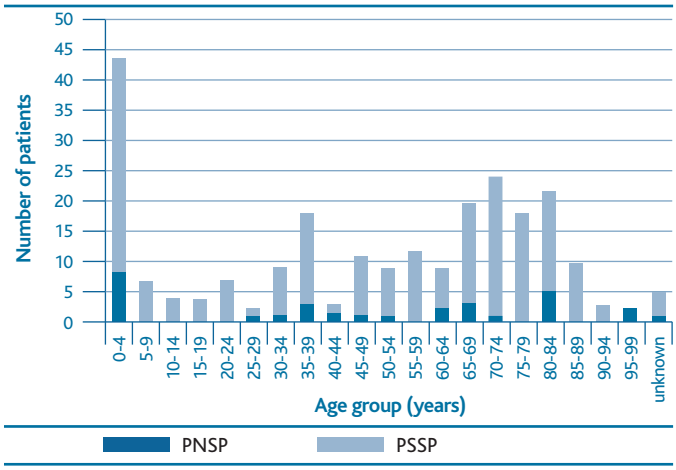

Figure 8. Breakdown of S. pneumoniae isolates (n=246) by age for 2001.

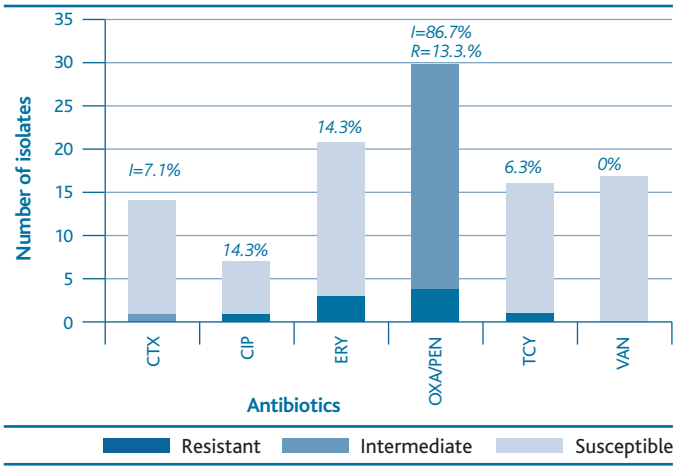

Figure 9. Susceptibility data to selected antibiotics, based on participant returns, for invasive isolates of PNSP reported in 2001. Percentage resistance is indicated above the bar.

Antibiotic codes: CTX – cefotaxime, CIP – ciprofloxacin, ERY – erythromycin, OXA – oxacillin, PEN – penicillin, TCY – tetracycline, VAN – vancomycin.

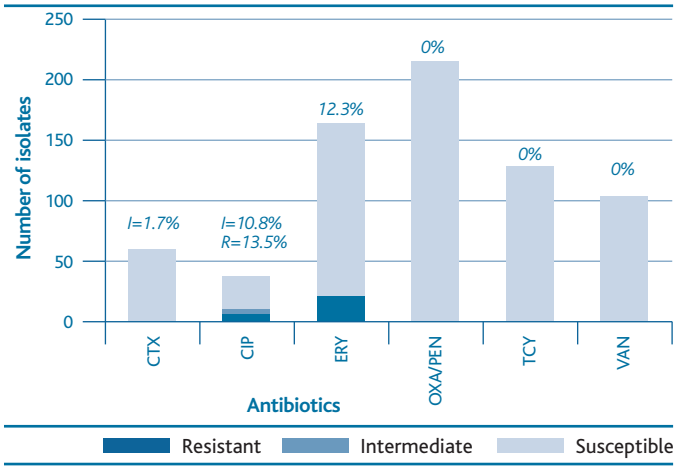

Figure 10. Susceptibility data to selected antibiotics, based on participant returns, for invasive isolates of PSSP reported in 2001. Percentage resistance is indicated above the bar.

See legend for figure 9 for antibiotic codes.

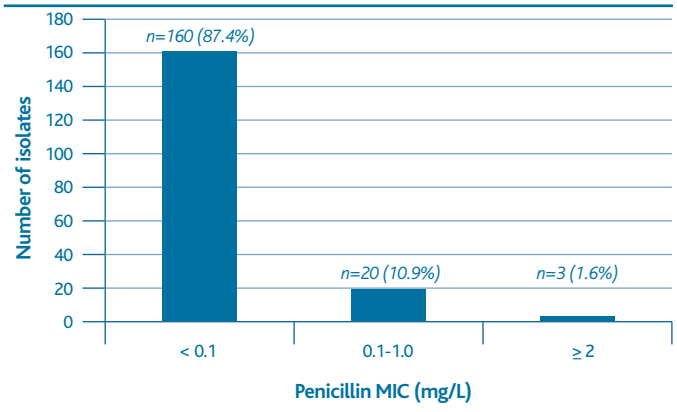

Figure 11. Distribution of penicillin MICs (determined by Etest) in pneumococcal isolates submitted to the Pneumococcal Referral Laboratory at RCSI/Beaumont in 2001.

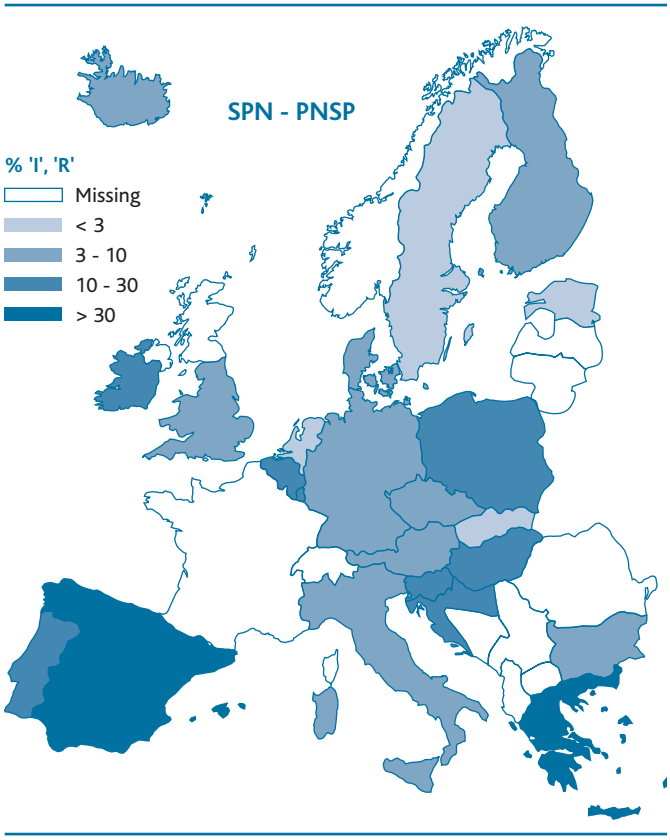

Figure 12. Map illustrating the distribution of PNSP in EARSS countries in 2001.

system can be obtained from the interactive database available on the EARSS website: **http://www.earss.rivm.nl/PAGINA/interwebsite/home_earss.html**

Following the success of the WHONET workshop held in Dublin in November 2001, more laboratories are now routinely reporting their quarterly data to NDSC electronically. Local copies of the WHONET5 software are currently used in eight laboratories for data collection. Three laboratories download a structured text file from their laboratory information system at the end of each quarter, which are then translated into WHONET format using the allied BacLink software. The remaining ten laboratories report their data using paper Isolate Record Forms.

Prior to the introduction of EARSS in 1999, there was no national surveillance of resistance in Ireland, although some local and regional surveillance was undertaken. The EARSS project has proved to be a very valuable source of reliable resistance data on invasive *S. aureus* and *S. pneumoniae* infections over the past three years and, as such, has played an important role in informing the national "Strategy for the Control of Antimicrobial Resistance in Ireland" (SARI).

Strategy for Control of Antimicrobial Resistance in Ireland

The Minister for Health and Children launched the Strategy for the Control of Antimicrobial Resistance in Ireland (SARI) in June 2001. SARI was developed by a multidisciplinary NDSC committee, at the request of the Department of Health and Children (DoHC), and contains a series of recommendations for the control of antimicrobial resistance (AMR) in Ireland. These include:

- Development of a national framework for AMR surveillance and control, including local, regional and national tiers.
- Enhanced AMR surveillance in both hospital and community settings.
- Enhanced monitoring of supply and use of antimicrobials.
- Development of guidelines for appropriate use of antimicrobials.
- Education for both health professionals, patients and the general public with regard to rational antibiotic use and infection control.
- Development of infection control resources and principles in hospital and community settings.
- Future areas for research in AMR.

Following the launch of SARI, each health board was asked to set up a regional SARI committee in order to determine local requirements for controlling AMR and decide on funding priorities. Considerable funding was made available to SARI by the DoHC, €6.9 million by the end of 2001, and was distributed among the individual health boards. Staffing for AMR control was recognised as an initial priority, particularly surveillance scientists, infection control nurses, clinical pharmacists and microbiologists, and a number of appointments have already been made.

A series of expert working groups were also set up to produce specific national guidelines and recommendations in the following areas:

- AMR surveillance.
- Surveillance and antibiotic consumption.
- Community antibiotic stewardship.
- Hospital antibiotic stewardship.
- Infection control.

As SARI inplementation progresses, and the current shortfall in relevant staffing improves, national guidelines will be produced that can be adapted for local and regional implementation. At the same time a regional network for the surveillance of AMR, antibiotic consumption and hospital-acquired infection will also be established.

Copies of the SARI report are available on the NDSC website: **www.ndsc.ie**.

Acknowledgements

Thanks to everyone involved in the laboratories for their continued support and enthusiasm for EARSS; the EARSS Steering Group for their time and effort; Stef Bronzwaer, Paul Schrijnemakers and the EARSS Management Team in The Netherlands, Dominic Whyte and John Stelling for their support, feedback and assistance.

Infectious Disease Notifications, 2001

Key Points

- **In 2001, case-based information on infectious disease notifications for an entire year was available for the first time at national level in Ireland.**
- **Incidence of bacterial meningitis declined in 2001.**
- **Acute viral meningitis and viral hepatitis type B notifications continued to rise in 2001.**
- **Food poisoning, gastroenteritis, salmonellosis and viral hepatitis A notifications declined further in 2001.**

Introduction

The statutory surveillance of infectious disease in Ireland is regulated in the 1981 Infectious Disease Regulations, which were revised in 1985, 1988 and 1996. The infectious diseases currently notifiable in Ireland are outlined on the NDSC website.[1] Since July 2000, responsibility for the collation and analysis of the weekly infectious disease notifications at national level was transferred from the Department of Health and Children to NDSC (S.I. No. 151, 2000).

As soon as a medical practitioner becomes aware of or suspects that a person on whom he/she is in professional attendance is suffering from or is the carrier of an infectious disease, he/she is required to transmit a written notification to the relevant medical officer in his/her health board. For a subset of diseases namely, bacterial meningitis (including meningococcal septicaemia), cholera, ornithosis, plague, smallpox, typhus, viral haemorrhagic diseases and yellow fever or where a serious outbreak of an infectious disease is suspected, a medical practitioner is also required to give immediate preliminary notification by phone or fax to the medical officer. Once weekly the medical officers forward notification data to NDSC.

Materials & Methods

Medical officers furnish to the Director of NDSC by the Wednesday of each week, cases of infectious diseases notified to them in the week ending on the previous Saturday. Case-based information on each notification (ID number, Community Care Area, county, date of onset, date of notification, date of birth, age, sex, disease and organism) is provided to NDSC either on paper or disk. Zero notifications are also reported. At NDSC data are either imported or inputted manually to an MS Access database. Data are analysed weekly and feedback provided in the form of a weekly report. Following the end of the notification year detailed cleaning and validation of the 2001 data are undertaken and NDSC database is reconciled with the health board databases/ records. Data are analysed using MS Access and MS Excel. The notifiable sexually transmissible infections (STIs) are not presented in this chapter, but will be discussed in a separate chapter within this document.

Results

Notifiable infectious diseases

Annual figures on the notifiable infectious diseases (excluding STIs) in Ireland from 1982-2001 are presented in table 1. The numbers of infectious diseases notified by health board in 2001 are presented in table 2, while the breakdown by age and sex are presented in tables 3 and 4, respectively. Changes in notifications in 2001 are shown in figure 1 as a percentage change of the 2001 notifications compared with a five-year mean (1996-2000). Of the infectious diseases currently notifiable in Ireland no cases of acute anterior poliomyelitis, anthrax, variant Creutzfeldt-Jakob disease (vCJD), diphtheria, plague, rabies, smallpox, typhus, viral haemorrhagic disease and yellow fever were notified in 2001.

Table 1. Annual number of infectious diseases notified in Ireland, 1982-2001

Infectious disease	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Acute Anterior Poliomyelitis	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acute Encephalitis	4	7	10	4	7	1	0	0	0	0	1	2	1	0	7	3	0	1	1	5
Acute Viral Meningitis	54	191	163	120	161	81	101	52	300	86	104	39	90	74	77	32	32	27	98	161
Anthrax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bacillary Dysentery (Shigellosis)	143	212	273	146	347	68	422	143	277	736	283	219	203	97	59	41	120	116	30	28
Bacterial Meningitis (including meningococcal septicaemia)*	124	141	192	100	147	111	128	115	131	155	225	203	241	382	410	508	491	587	586	396
Brucellosis	159	126	126	115	53	38	22	20	15	27	26	28	14	6	10	7	15	19	15	14
Cholera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Creutzfeldt Jakob Disease**	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	3	6	1	2	6
vCreutzfeldt Jakob Disease**	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	0	0	1	0	0
Diphtheria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Food Poisoning (bacterial other than salmonella)	68	83	164	98	195	88	43	64	157	83	46	97	62	100	276	448	1235	1673	1554	1219
Gastroenteritis (when contracted by children under 2 years)	2404	2987	3242	3317	3815	3900	3241	3410	3758	4132	3410	3832	3043	3234	2997	2968	3483	2917	2796	2057
Infectious Mononucleosis	55	196	233	214	145	186	286	211	208	188	208	206	183	156	216	212	217	198	151	150
Infectious Parotitis (Mumps)	NA	NA	NA	NA	NA	NA	271	709	48	53	43	44	33	27	422	285	57	38	52	40
Influenzal Pneumonia	6	76	93	37	153	53	73	42	94	139	48	55	6	31	54	29	4	15	20	2
Legionnaires' Disease	2	2	1	0	0	0	4	2	1	0	2	0	1	1	2	6	2	2	9	3
Leptospirosis	4	14	8	5	4	6	3	5	5	4	9	5	2	1	6	8	12	6	7	9
Malaria	33	17	12	32	41	28	30	23	12	11	15	9	12	9	14	8	17	17	19	11
Measles	1897	6180	5725	9903	451	201	936	1248	556	135	179	4328	1233	235	228	185	204	147	1603	241
Ornithosis	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	3
Plague	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rabies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubella	166	2395	2060	668	799	444	1156	440	258	206	155	179	206	100	602	113	83	62	97	57
Salmonellosis (other than typhoid or paratyphoid)	175	205	287	142	265	249	271	427	473	484	270	295	338	571	678	958	1261	962	640	428
Smallpox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tetanus	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	1	1	3
Tuberculosis***	975	924	837	804	602	581	575	638	613	640	604	598	524	458	434	416	424	469	395	409
Typhoid & Paratyphoid	2	4	3	1	1	0	2	0	0	4	3	1	1	4	4	0	3	0	1	4
Typhus	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Viral Haemorrhagic Disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Viral Hepatitis Type A	184	237	255	201	126	212	261	564	538	205	430	369	94	133	313	422	218	323	309	112
Viral Hepatitis Type B	26	54	33	57	55	63	32	20	11	15	13	11	20	11	11	31	155	160	187	342
Viral Hepatitis Unspecified	1066	1192	1022	731	544	381	253	371	398	152	240	190	60	66	67	122	147	125	65	90
Whooping Cough	1073	1728	3061	3689	1482	1717	1170	2217	803	843	860	869	353	436	261	459	252	179	152	142
Yellow Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0

*Note: 1982-1999, data collated by DoHC. *Since 1997, figures taken from Enhanced Surveillance System for Bacterial Meningitis.*

*** CJD and vCJD not notifiable (NN) in Ireland, prior to 1997. *** Taken from the Enhanced TB Surveillance System, figure for 2001 provisional.*

Table 2. Number of notifiable infectious diseases by health board in 2001

Infectious disease	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
Acute Encephalitis	1	0	0	2	0	0	1	1	5
Acute Viral Meningitis	93	13	9	11	5	12	13	5	161
Bacillary Dysentery (Shigellosis)	14	0	1	2	6	1	3	1	28
Bacterial Meningitis (incl. meningococcal septicaemia)	139	26	31	28	20	49	69	34	396
Brucellosis	0	0	7	2	2	3	0	0	14
Cholera	**	**	**	**	**	**	**	**	1
Creutzfeldt Jakob Disease	3	0	0	1	0	0	1	1	6
Food Poisoning (bacterial other than salmonella)	437	40	22	62	87	176	214	181	1219
Gastroenteritis (children < 2 years of age)	819	49	30	94	74	255	402	334	2057
Infectious Mononucleosis	48	0	53	10	0	9	24	6	150
Infectious Parotitis (Mumps)	22	1	2	2	4	5	2	2	40
Influenzal Pneumonia	**	**	**	**	**	**	**	**	2
Legionnaires' Disease	**	**	**	**	**	**	**	**	3
Leptospirosis	8	0	0	0	0	0	1	0	9
Malaria	10	0	0	1	0	0	0	0	11
Measles	184	13	4	10	1	4	17	8	241
Ornithosis	**	**	**	**	**	**	**	**	3
Rubella	45	2	1	0	2	1	1	5	57
Salmonellosis (other than typhoid or paratyphoid)	159	33	10	37	24	46	85	34	428
Tetanus	**	**	**	**	**	**	**	**	3
Tuberculosis***	186	9	34	38	12	20	76	34	409
Typhoid & Paratyphoid	**	**	**	**	**	**	**	**	4
Viral Hepatitis Type A	66	3	3	11	3	19	1	6	112
Viral Hepatitis Type B	98	14	23	9	8	84	98	8	342
Viral Hepatitis Unspecified	42	2	5	1	5	28	6	1	90
Whooping Cough	75	1	1	7	0	25	23	10	142

*** Data not reported to health board level when total figures for ROI less than 5 cases. *** Taken from the Enhanced TB Surveillance System, figure for 2001 provisional.*

Table 3. Number of notifiable infectious diseases by age group (years) in 2001

Infectious disease	0-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65+	Unknown	Total
Acute Encephalitis	4	0	1	0	0	0	0	0	0	0	0	5
Acute Viral Meningitis	44	33	34	13	7	14	9	3	0	1	3	161
Bacillary Dysentery (Shigellosis)	6	0	0	1	3	6	6	2	1	3	0	28
Bacterial Meningitis (incl. meningococcal septicaemia)	206	45	34	38	21	24	5	10	4	9	0	396
Brucellosis	0	0	0	0	1	5	3	2	2	0	1	14
Cholera	0	0	0	0	0	0	0	0	0	0	1	1
Creutzfeldt Jakob Disease	0	0	0	0	0	0	1	0	1	4	0	6
Food Poisoning (bacterial other than salmonella)	371	71	34	47	102	200	122	82	49	98	43	1219
Gastroenteritis (children < 2 years of age)	2042	0	0	0	0	0	0	0	0	0	15	2057
Infectious Mononucleosis	7	3	22	61	21	20	7	4	1	0	4	150
Infectious Parotitis (Mumps)	14	6	8	3	3	4	1	0	0	0	1	40
Influenzal Pneumonia	1	0	0	0	0	1	0	0	0	0	0	2
Legionnaires' Disease	0	0	0	0	0	0	1	1	1	0	0	3
Leptospirosis	0	0	0	1	4	0	4	0	0	0	0	9
Malaria	0	0	0	0	2	3	0	2	4	0	0	11
Measles	205	21	9	2	1	0	0	0	0	0	3	241
Ornithosis	0	0	0	1	0	1	0	1	0	0	0	3
Rubella	48	4	1	0	2	0	0	0	0	0	2	57
Salmonellosis (other than typhoid or paratyphoid)	89	37	21	24	48	64	47	28	28	34	8	428
Tetanus	0	0	0	0	0	1	0	0	1	1	0	3
Tuberculosis***	1	7	6	29	32	75	46	44	48	99	22	409
Typhoid & Paratyphoid	3	0	0	0	0	0	0	0	0	1	0	4
Viral Hepatitis Type A	9	26	19	5	10	20	10	6	3	4	0	112
Viral Hepatitis Type B	3	6	8	19	41	162	65	15	4	1	18	342
Viral Hepatitis Unspecified	2	0	3	4	12	40	11	11	2	3	2	90
Whooping Cough	102	28	8	0	2	0	1	0	0	0	1	142

*** Taken from the Enhanced TB Surveillance System, figure for 2001 provisional.*

Table 4. Number of notifiable infectious diseases by sex in 2001

Infectious disease	Male	Female	Not known	Total
Acute Encephalitis	3	2	0	5
Acute Viral Meningitis	93	65	3	161
Bacillary Dysentery (Shigellosis)	9	18	1	28
Bacterial Meningitis (incl. meningococcal septicaemia)	187	208	1	396
Brucellosis	13	1	0	14
Cholera	0	1	0	1
Creutzfeldt Jakob Disease	5	1	0	6
Food Poisoning (bacterial other than salmonella)	630	562	27	1219
Gastroenteritis (children < 2 years of age)	1102	916	39	2057
Infectious Mononucleosis	68	82	0	150
Infectious Parotitis (Mumps)	19	18	3	40
Influenzal Pneumonia	1	1	0	2
Legionnaires' Disease	3	0	0	3
Leptospirosis	7	2	0	9
Malaria	6	5	0	11
Measles	128	105	8	241
Ornithosis	0	3	0	3
Rubella	25	31	1	57
Salmonellosis (other than typhoid or paratyphoid)	208	212	8	428
Tetanus	2	1	0	3
Tuberculosis***	261	148	0	409
Typhoid & Paratyphoid	2	2	0	4
Viral Hepatitis Type A	55	50	7	112
Viral Hepatitis Type B	185	137	20	342
Viral Hepatitis Unspecified	59	28	3	90
Whooping Cough	66	73	3	142

**** Taken from the Enhanced TB Surveillance System, figure for 2001 provisional.*

Acute anterior poliomyelitis

No case of wild polio was notified in 2001. The last case of wild polio to occur in Ireland was in 1984.

Acute encephalitis

During 2001, five cases of acute encephalitis were notified compared to one case in 2001. Four of the five cases were less than five years of age.

Acute viral meningitis

During 2001, 161 cases of acute viral meningitis were notified in Ireland compared to 98 cases in 2000. Twenty seven percent of these cases occurred in children less than five years of age, with an age-specific incidence rate of 17.6/100,000, closely followed by 5-9 year olds (11.7/100,000) and 10-14 year olds (10.4/100,000). The incidence rate ranged from 7.2 per 100,000 in ERHA down to 1.4 per 100,000 in WHB, with a national rate of 4.4 per 100,000. Viral meningitis notifications increased by 203% in 2001 when compared with the mean number notified over the five-year period, 1996-2000 (figure 1). The increase in viral meningitis notifications seen from June 2000 continued into 2001, with a large increase being observed during the summer months, peaking in August 2001 with 39 notifications for that month (figure 2). The number of acute viral meningitis notifications has not dropped below 5 per month since May 2000. The increase in notifications seen over the past 18 months has coincided with an increase in reports from the Virus Reference Laboratory (VRL) of laboratory-confirmed non-polio enterovirus (NPEV) isolates. These increased from 32 in 1999, to 90 in 2000 and to 170 in 2001. Forty nine percent (n=44) of the NPEV isolates in 2000 were echovirus type 13 whereas in 2001 the predominant NPEV strains confirmed by the VRL were echovirus 30 (41%) and echovirus 6 (22%). No echovirus 13 isolates were seen in 2001.[2] A similar pattern has been reported in England and Wales.[3]

Bacillary dysentery

In 2001, 28 cases of bacillary dysentery (shigellosis) were notified compared to 30 in 2000. The majority of the cases in 2001 (75%) occurred in those 20 years of age or older. Of the 28 cases notified 15 were due to *Shigella sonnei*, three due to *Shigella flexneri* and 10 due to *Shigella spp*. (species not reported).

Bacterial meningitis (including meningococcal septicaemia)

In 2001, 396 notifications due to bacterial meningitis (including meningococcal septicaemia) were received. Notifications due to bacterial meningitis declined by 23% in 2001 when compared to the five-year mean (figure 1). This decline can largely be attributed to the introduction of the meningococcal group C conjugate (MenC) vaccine in October 2000. A detailed report on the epidemiology of bacterial meningitis (including meningococcal septicaemia) in 2001 and the impact the MenC vaccine has had is presented as a separate chapter within this document.

Brucellosis

Fourteen cases of brucellosis were notified in 2001, while 15 were notified in 2000. Age was available on 13 of the 14 cases and all were 20 years or older. Ninety-three percent (13/14) of the cases were male, reflecting the fact it is occupational

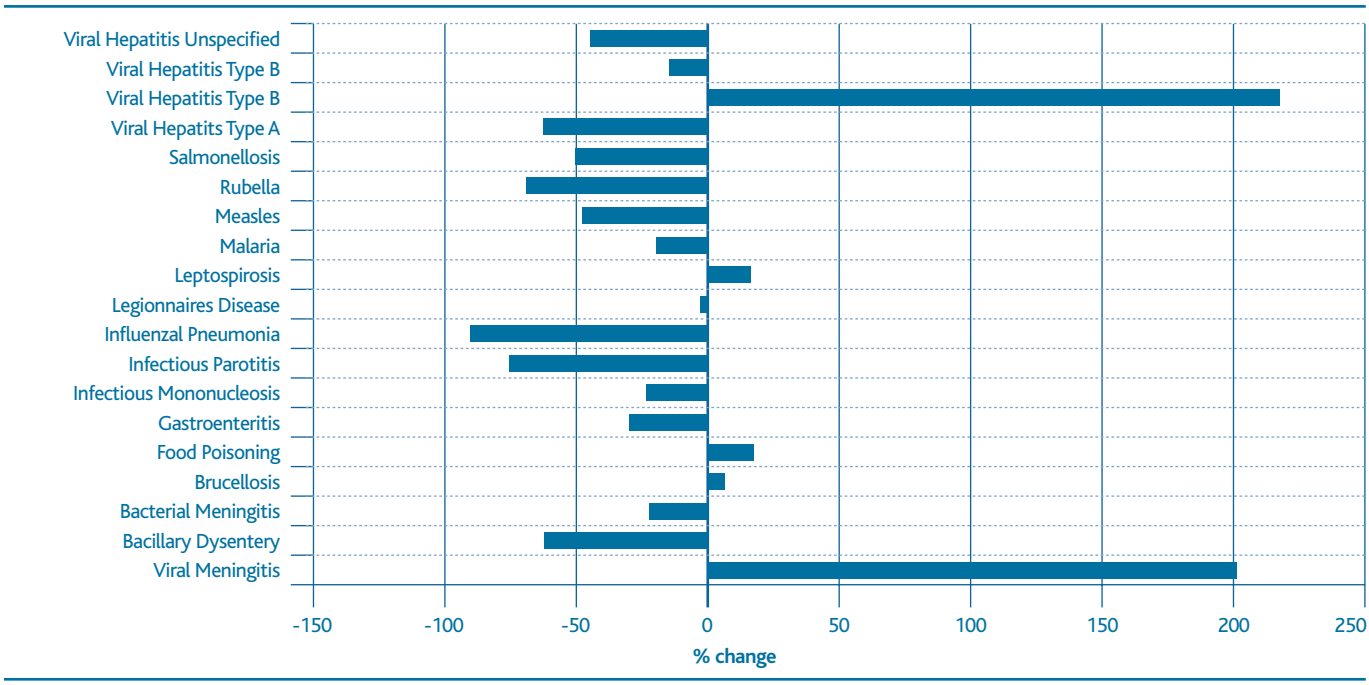

Figure 1. Comparison of selected disease totals in 2001 with historical data (5 year mean, 1996-2000) expressed as percentage change

disease of those working with infected animals or their tissues, especially farm workers, veterinarians and abattoir workers, occupations traditionally associated with males.

Cholera

One case of cholera was notified in 2001. The country of infection was India and the causative organism was identified as *Vibrio cholerae* serogroup O1 biotype El Tor serotype Ogawa.

Creutzfeldt Jakob disease (CJD)

Six cases of classical CJD were notified in 2001, while there were no cases of variant CJD. Five of the classical CJD cases occurred in males and four of the six cases were >65 years of of age.

Variant Creutzfeldt Jakob disease (vCJD)

No case of vCJD was notified in 2001. Since vCJD became a notifiable disease in December 1996, only once case has occurred to date in Ireland and that was in 1999.

Diphtheria

No case of diphtheria was notified in 2001. The last case of diphtheria reported in Ireland was in 1967.

Food poisoning (bacterial other than salmonella)

In 2001, 1219 cases of bacterial food poisoning other than salmonella were notified as opposed to 1554 in 2000. *Campylobacter spp* accounted for 80% (n=971) of these food poisoning notifications, followed by *Escherichia coli* (n=118) which included verocytotoxigenic *E. coli* (VTEC) such as O157, O26 and O111, *Yersinia spp.* (n=22), *Clostridium* spp. (n=5), *Listeria monocytogenes* (n=4), *Staphylococcus* spp. (n=1). Organism details were not provided for 8% of the notifications (n=98). Detailed reports on campylobacter (2000) and VTEC (2001) are presented as separate chapters within this document.

Gastroenteritis
(when contracted by children < 2 years of age)

In 2001, 2057 cases of gastroenteritis in children less than two years of age were notified, decreasing from 2796 cases in 2000. Rotavirus accounted for 52% of these notifications (n=1077), while 12.6% were due to adenovirus (n=260), 4.9% to *Cryptosporidium* (n=102), 0.5% to echovirus (n=11) and 0.2% to *Giardia lamblia* (n=4). No organism details were provided for 30% of the notifications (n=605).

Infectious mononucleosis

In 2001, 150 cases of infectious mononucleosis were notified, which was almost identical to the number notified in 2000, n=151. Forty one percent of these cases occurred in the 15-19 year old age group.

Infectious parotitis (mumps)

In 2001, 40 cases of infectious parotitis (mumps) were notified compared to 52 in 2000. Thirty five percent of the cases (14/40) were in the 0-4 years age group with an age-specific incidence rate of 5.6 per 100,000, followed by the 10-14 year olds (2.5/100,000) and 5-9 year olds (2.1/100,000). Infectious parotitis notifications fell by 77% in 2001 when compared with the 5-year mean (figure 1). However, this five-year mean

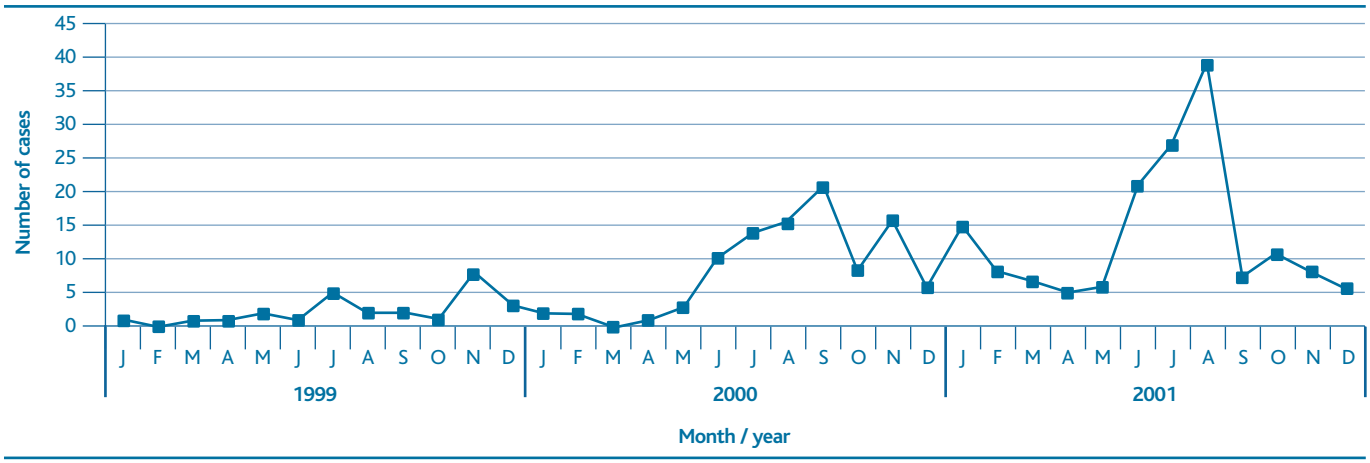

Figure 2. Monthly number of acute viral meningitis cases notified in Ireland, 1999-2001.

would have included 1996 and 1997 figures when infectious parotitis notifications increased dramatically due to an outbreak (with the ERHA and SHB being most affected) and therefore, makes the decline in 2001 look more dramatic than would be the case if these outbreaks had not occurred. When the 1996 and 1997 figures are excluded and a three-year mean (1998-2000) is calculated, infectious parotitis notifications declined by only 18% in 2001 when compared with this mean.

Influenzal pneumonia

There were two cases of influenzal pneumonia notified in 2001. One case occurred in a 33 year old the other in a 3 year old.

Legionnaires' disease

Three cases of Legionnaires disease were notified in 2001 compared to 9 cases in 2000. A more detailed report on Legionnaires' disease is presented as a separate chapter within this document.

Leptospirosis

Nine cases of leptospirosis were notified in 2001 compared to seven cases in 2000. All nine cases were aged between 18 and 44 years (mean age, 27 years; median age, 24 years) and seven of the cases (78%) of the cases were male. Eight of the nine cases (89%) were notified by ERHA. Five of these ERHA notifications were linked to an outbreak that was associated with canoeing on a particular stretch of the river Liffey in October 2001.[4] The sixth case in this outbreak referred to in the Epi-Insight article (March 2002, reference 4) was from Northern Ireland and therefore not included in the final ERHA leptospirosis figures.

Malaria

In 2001, 11 cases of malaria were notified. This includes the 10 confirmed cases reported in Epi-Insight in May 2002[5] and one additional case. Six cases were male and five were female. The age of cases ranged from 22 and 64 years of age (mean age, 42.2 years; median age, 45 years). Seven of the cases were Irish, three were Nigerian and one was from Cameroon. The countries where the malarial infection was acquired were Nigeria (n=5), South Africa (n=2), Cameroon (n=1), Ghana (n=1), Rwanda/Uganda (n=1) and Zambia/Zimbabwe (n=1) . The reasons for travel to malarious area were as follows: holiday, three cases; business/professional travel, two cases; visitor to Ireland from malarious region, one case; new entrant to Ireland from malarious region, three cases; Irish citizen living in malarious region, one case; and visiting family in country of origin, one case. Six of the cases were diagnosed by both blood film and clinical presentation, while five were diagnosed by blood film. The infectious agent was *Plasmodium falciparium* in eight cases (*P. ovale* was also demonstrated in one of these cases), *P. malariae* in one case, *P. vivax* in one case, while the sporazoan parasite was not reported in one case. Seven of the eleven cases were reported to have taken prophylaxis and only one person continued to take prophylaxis for one month following return from malarious areas. Nine cases recovered and the outcome was unknown for the remaining two cases.

Measles
In 2001, 241 cases of measles were notified (6.6/100,000), 128 were male, 105 female and gender was not reported for eight cases. The majority (76%) were notified by ERHA (184 cases, 14.2/100,000), a region where MMR uptake at 24 months was 66% in 2001 and below 60% in some areas within the region. The age-specific incidence rate was highest in the 0-4 year olds (81.9/100,000), followed by the 5-9 year olds (7.4/100,000). Eighty-five of the cases (36%) occurred in infants less than 1 year of age. Although, the number of measles notifications in 2001 was significantly lower than the number reported due to the outbreak in 2000 (n=1603), it still exceeded the annual numbers reported between 1995 and 1999, inclusive. When compared with the five-year mean, measles notifications in 2001 declined by 50%. However, this result is skewed, as the 1603 cases in 2000 would have been included in the calculation. If the five-year mean was calculated using data from 1995-1999 (when no major outbreaks occurred) then measles notifications in 2001 actually increased by 21% compared to this particular five-year mean.

Since the introduction of measles vaccination in Ireland measles notifications have declined dramatically, whereas prior to vaccination the number of notifications never dropped below 1000 cases per year (figure 3). The measles vaccine was introduced in 1985, followed by the introduction of the combined MMR vaccine in October 1988. In July 1992, a second dose of MMR for boys and girls was introduced replacing the previous selective rubella vaccination schedule for prepubertal girls. A measles and rubella (MR) campaign for primary school-age children (4-12 years) was conducted in 1995 and in 1999 it was recommended that the second dose of MMR be lowered to 4-5 years. However, despite these initiatives measles outbreaks still occur in Ireland, with 4328 cases notified in 1993 and 1603 cases in 2000 (figure 3). Such a trend is typical of a country that has only achieved intermediate MMR uptake levels (between 70-80% nationally and lower in some regions). The uptake levels are high enough to lengthen the inter-epidemic period from 1-3 years in the absence of vaccination to approximately 6 years with vaccination, but too low to interrupt transmission of the infection. For successful measles control, immunisation of at least 95% of susceptible targets is required with a two-dose MMR schedule.

Measles had been targeted for elimination by WHO by 2007, this has since been extended to 2010. Many countries have implemented innovative immunization and surveillance strategies in an effort to eliminate indigenous transmission of measles virus. The efforts of these initiatives have begun to reap dividends. Finland[6] has eliminated the disease, while Sweden,[7] UK,[8] USA[9] and Australia[10] have reported record low numbers of cases. NDSC has been involved in developing guidelines for the control of measles outbreaks in Ireland and recommendations have been made to implement an enhanced surveillance system. These are preliminary steps but a national measles elimination plan has to be developed, resourced and implemented as a matter of urgency if indigenous transmission of measles is to be effectively eliminated in Ireland by the end of the decade.

Ornithosis
Three cases of ornithosis (psittacosis) were notified in Ireland in 2001. The three cases were in females with an age range of 15-47 years (median age, 29 years).

Rubella
In 2001, 57 cases of rubella were notified with the highest age-specific incidence rates occurring in the 0-4 year olds (19.2/100,000).

Salmonellosis (other than typhoid or paratyphoid)
The number of salmonellosis notifications (other than typhoid or paratyphoid) continued to decline in 2001, with 428 cases being notified. In 2001, salmonellosis notifications declined by 52% when compared with the five-year mean (figure 1). Serovar details were not provided for 307 of the cases. However, for those cases where these details were provided the breakdown by serovar was as follows: *Salmonella* Enteritidis (n=69), *S.* Typhimurium (n=36), *S.* Agona, *S.* Bredney, *S.* Dublin, *S.* Heidelberg, *S.* Stanley (n=2, each), *S.* Brandenburg, *S.* Derby, *S.* Java, *S.* Kentucky, *S.* Newport and *S.* Virchow (n=1, each). A detailed report on salmonella is presented as a separate chapter within this document.

Tetanus
Three cases of tetanus were notified in 2001, 2 cases were male and one was female. The age of cases ranged from 31-69 years.

Tuberculosis
At present only a provisional figure on TB notifications is available for 2001, 409 cases were notified through the enhanced national TB surveillance system (NTBSS). A final figure on TB notifications for 2001 will be available once follow up information on all cases has been received and a process of data validation has been completed, which will be in the latter half of 2002. A detailed report on the finalised data for 2000 is presented as a separate chapter within this document.

Typhoid & Paratyphoid
Four cases of typhoid & paratyphoid were notified in 2001. Two cases were male and two female. The age range was 1-65 years, median age 2.5 years. The infection was acquired in India (n=1), Africa (n=1), Pakistan (n=1) and the fourth case was secondary contact of the case who acquired it in Pakistan.

Viral hepatitis type A
One hundred and twelve cases of viral hepatitis type A were notified in 2001, compared to 309 in 2000. This was the first year that hepatitis A notifications did not exceed hepatitis B notifications. The highest age-specific incidence rates for hepatitis A were in the 5-9 year olds (9.2/100,000), followed by 10-14 year olds (5.8/100,000). The overall incidence rate was 3.1 per 100,000.

Viral hepatitis type B
In 2001, 342 cases of viral hepatitis type B were notified in Ireland. The number of hepatitis notifications has increased by over 200% in 2001 when compared with the five-year mean (figure 1). A detailed report on hepatitis B is presented as a separate chapter within this document.

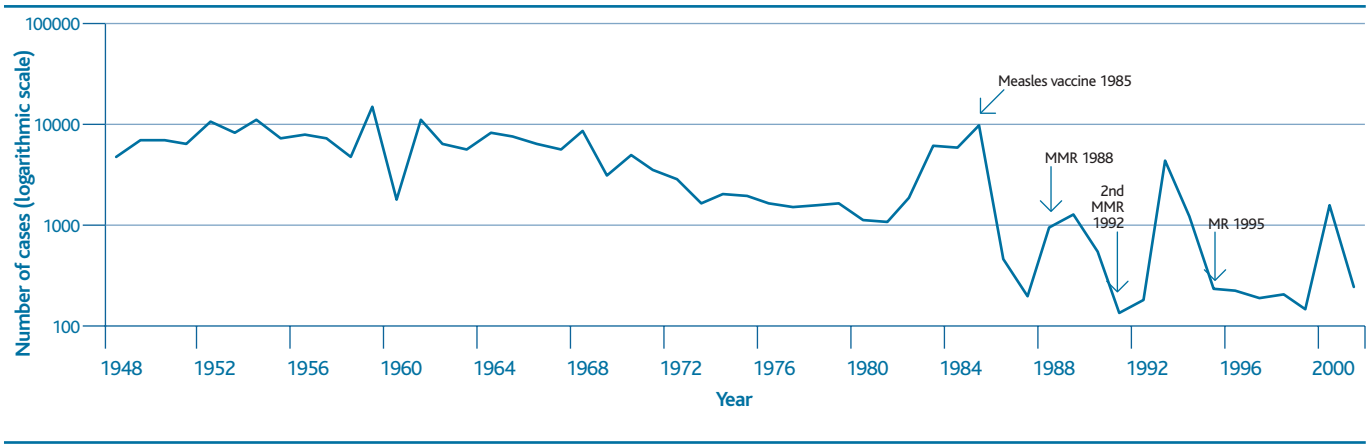

Figure 3. Annual number (log10) of measles notifications in Ireland 1948-2001.

Viral hepatitis unspecified

In 2001, 90 cases of viral hepatitis type unspecified were notified (2.5/100,000). The highest age-specific incidence rates were in 25-34 years (7.7/100,000) and the 20-24 years (4.1/100,000) age-groups. Fifty-nine cases were male, 28 were female and gender was not reported for three cases. Hepatitis C was notified as the aetiological agent in 77% of the viral hepatitis unspecified notifications (69 of 90 cases).

Whooping cough

The number of whooping cough (pertussis) notifications continued to decline in 2001, with 142 cases being notified (3.9/100,000). The majority of the cases (71%) occurred in 0-4 year olds (40.7/100,000; n=102), followed by 5-9 year olds (9.9/100,000; n=28) (figure 3). Thirty-eight percent of the notifications (n=55) were in children less than six-months of age. Infants are at greatest risk of death or severe complications from whooping cough therefore, it is vital that immunisation uptake levels for pertussis are improved in Ireland, not only to protect a greater proportion of the population but to develop an adequate level of herd immunity to ensure that those too young to be vaccinated are also protected. At present in Ireland, pertussis uptake at 24 months is 81% and is below 70% at 12 months.

Over recent years a resurgence of whooping cough has been reported by some countries especially in older children and adults despite sustained high coverage of the pertussis vaccine in these countries.[11] Although this increase has not been seen in Ireland to date, it raises the question has there not been a real increase in incidence of the disease or is it a reflection of under-notification and possible underdiagnosis of the disease? Underdiagnosis occurs because whooping cough has mild and atypical forms and many clinicians may not consider whooping cough as a cause of cough especially in older children and adults. Over the coming years it is important that we closely monitor the age-profile of whooping cough notifications in Ireland to ascertain if a shift towards an increasing burden of disease in adolescent and young adults begins to emerge and the possible implications this will have on our immunisation programme and the need for booster doses in these age groups.

Discussion

In 2001, case-based information on all infectious disease notifications for an entire year was available for the first time at national level in Ireland. This enabled more detailed analysis of the data, not only by health board, but also by age and sex and for some diseases by organism also. With the exception of the notifiable diseases where enhanced surveillance systems have been implemented successfully at national level, it is an accepted fact that a limitation of the notification data is that it represents only a proportion of the total cases occurring in the community. However, the present notification system is useful in that it does detect trends in the occurrence of notifiable diseases and can provide an estimate of the magnitude of morbidity related to these diseases. For example, based on the notification data for 2001 it was evident that the incidence of acute viral meningitis and viral hepatitis type B continued to rise, while a decline in meningococcal disease due to the introduction of the MenC vaccine was reflected in the decline in bacterial meningitis (including meningococcal septicaemia) notifications.

Excluding the notifiable diseases where enhanced surveillance systems have been implemented, there are limitations with the notification data in its current format. Although there is no specific requirement for laboratories to report notifiable diseases, a voluntary system has been initiated in some but not all health board regions, with the result that it makes the interpretation of notification data between regions difficult as some report both clinical and laboratory notifications whereas others just have clinical notifications. Details on outcome, notification source and vaccination status for the vaccine-preventable diseases are not routinely notified at national level and furthermore agreed case definitions are not used. A review of the notifiable diseases system has recently been completed in Ireland. Should the recommendations from this review be translated into legislation it will have a major impact in improving the surveillance of infectious diseases in Ireland.

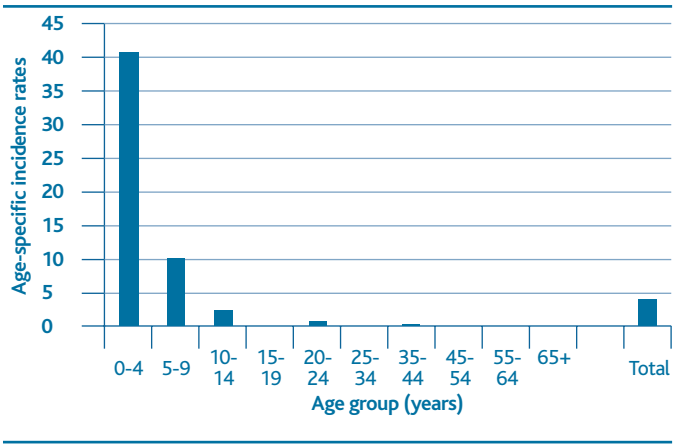

Figure 4. Age-specific incidence rates of whooping cough notifications in 2001

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Immunisation Uptake in Ireland, 2001

Key Points

- **Immunisation uptake rates declined in 2001 compared with 2000.**
- **MMR_1 uptake at 24 months fell by 6% to 73%.**
- **D_3, P_3, $Polio_3$, T_3 and Hib_3 uptake ranged between 81-84%.**

Introduction

Childhood immunisation is a safe and effective means of protecting children and the population in general from a range of serious infectious diseases. However, to effectively control vaccine-preventable diseases, it is essential that 95% of children complete the primary childhood immunisation schedule by two years of age. The current primary childhood immunisation schedule recommends that children are vaccinated against diphtheria (D), tetanus (T), pertussis (P, acellular pertussis vaccine), polio, *Haemophilus influenzae* type b (Hib) and group C meningococcal disease (MenC, since October 2000) at 2, 4 and 6 months and against measles, mumps and rubella (MMR) at 12 to 15 months. It also recommends that children receive the BCG vaccine at birth or by one month of age. A booster dose of DTaP/Polio should be given at 4-5 years of age and the second dose of MMR should also be given at this stage. Since July 2001, live oral polio vaccine is no longer recommended as part of the primary immunisation schedule in Ireland. This change reflects the reduced incidence of wild polio worldwide due to successful immunisation campaigns. The small risk of vaccine-associated paralytic polio with oral polio vaccine is now considered to outweigh the benefit of offering oral versus inactivated polio vaccine.

Materials and Methods

Each health board is responsible for maintaining an immunisation register. In 2001, the health boards provided NDSC with quarterly immunisation uptake data on children who reached their first or second birthday (uptake at 12 and 24 months, respectively) during the quarter in question, and

Table 1. Immunisation uptake rates in children 12 months of age in 2001

% Uptake at 12 months
Cohort born 01/01/2000 - 31/12/2000

Health Board	No. in cohort	D_3	P_3	T_3	Hib_3	$Polio_3$
ERHA	21,534	61	60	61	61	60
MHB	3,445	67	65	67	68	67
MWHB	4,959	70	68	70	69	69
NEHB	4,113	77	**	77	78	77
NWHB	2,907	79	**	79	79	78
SEHB	6,122	83	82	83	83	83
SHB	7,920	73	71	73	73	72
WHB	4,826	75	73	75	73	74
Ireland	**55,826**	**70**	**68**	**70**	**69**	**69**

*** P_3 uptake could not be accurately calculated as DTaP/DT uptake was reported as a combined value*

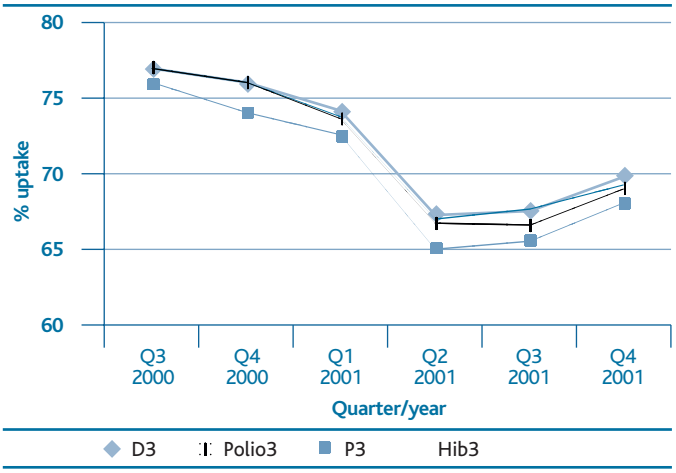

Figure 1. Quarterly immunisation uptake rates at 12 months in Ireland (Note scales range from 60-80% on this figure)

who had completed the primary immunisation schedule (i.e. D_3, P_3, T_3, $Polio_3$, Hib_3 and MMR_1, the latter at 24 months only; subscript signifies number of doses).

Data on the number eligible for immunisation in each cohort, the number who completed the primary immunisation schedule and the percentage immunised were provided. NDSC collated and analysed these data in MS Excel. The annual uptake rates presented in this report were calculated from the quarterly reports submitted by the health boards.

National data on MenC uptake on those targeted by Phase 1 of the campaign i.e. <5 year olds and 15-18 year olds were also collated. For the <5 year olds health boards provided data by birth cohort, while for the 15-18 year olds the data provided were based on school and college registers and/or on birth cohort.

Results

Immunisation uptake rates at 12 months in 2001

Overall, immunisation uptake at 12 months in 2001 (i.e. for the cohort born between 01/01/2000 and 31/12/2000) was 70% for D_3 and T_3, 69% for Hib_3 and $Polio_3$, and 68% for P_3. Uptake rates at 12 months in 2001 by health board are presented in table 1. Uptake rates ranged from 60-61% in the ERHA to 82-83% in the SEHB.

There was a dramatic decline in immunisation uptake at 12 months between Quarter 1 and Quarter 2, 2001. These rates recovered slightly in Quarter 3 and 4, 2001, but the rates achieved in Quarter 3 and 4, 2000 were not reached at any stage in 2001 (figure 1).

Immunisation uptake at 24 months in 2001

Immunisation uptake rates at 24 months in 2001 (i.e. for the cohort born between 01/01/1999 and 31/12/1999) were 84% for D_3, T_3, Hib_3 and $Polio_3$, 81% for P_3 and 73% for MMR_1. Uptake rates at 24 months in 2001 by health board are presented in table 2. Rates for D_3, T_3, P_3, Hib_3 and $Polio_3$ ranged from 78-80% in the ERHA to 92% in the NEHB, while MMR_1 uptake rates ranged from 66% in the ERHA to 87% in the SEHB.

In 2001, immunisation uptake rates at 24 months declined for all antigens when compared with previous years (figure 2). D_3, T_3 and $Polio_3$ uptake declined by 2% to 84%. P_3 and Hib_3 uptake declined by 1% to 81% and 84%, respectively. The most dramatic decrease was seen with MMR_1 uptake dropping by 6% to 73% (figure 2).

The decline in MMR_1 uptake commenced in Quarter 1, 2001 and this downward trend continued throughout 2001 (figure 3). A decline in uptake of the other antigens was also observed throughout 2001, but these reductions were not as dramatic as that seen for MMR_1 (figure 3).

MenC uptake rates in <5 year olds

MenC uptake rates in those aged 1-4 years in 2000 (i.e. when MenC vaccine was introduced) are presented in table 3 (i.e. birth cohort born between 1996 and 1999). These statistics are based on what was recorded on health board systems as of February 2002. Overall, MenC uptake was 72% in this age group, ranging from 64% in the ERHA to 84% in the NWHB. National uptake was slightly higher in the one-year olds (74%) than in the three to four year olds (71%). MenC uptake

Table 2. Immunisation uptake rates in children 24 months of age in 2001

% Uptake at 24 months

Cohort born 01/01/1999 - 31/12/1999

Health Board	No. in cohort	D_3	P_3	T_3	Hib_3	$Polio_3$	MMR_1
ERHA	21,276	80	78	80	80	80	66
MHB	3,447	82	78	82	81	82	72
MWHB	5,086	83	81	83	82	83	74
NEHB	5,175	92	**	92	92	92	79
NWHB	3,084	89	**	89	88	89	78
SEHB	6,204	89	86	89	89	89	87
SHB	7,893	85	82	85	84	85	76
WHB	4,793	87	85	87	87	87	76
Ireland	**56,958**	**84**	**81**	**84**	**84**	**84**	**73**

** *P_3 uptake could not be accurately calculated as DTaP/DT uptake was reported as a combined value*

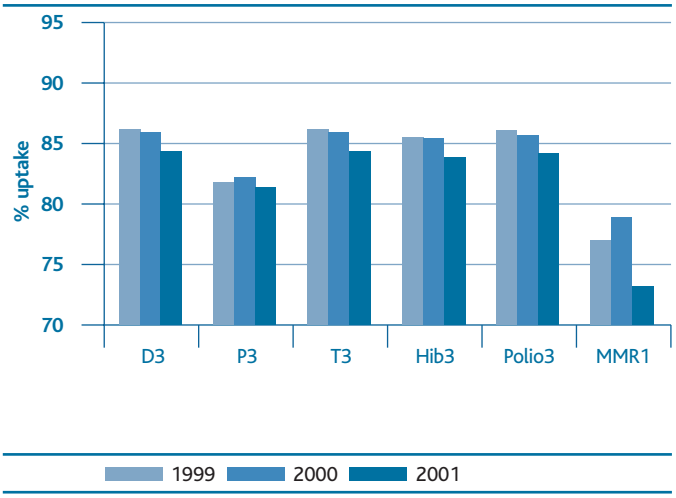

Figure 2. Annual immunisation uptake rates at 24 months (Note scales range from 70-95% on this figure)

data on those <1 year of age are not presented as some difficulties were experienced in extracting accurate information from the immunisation systems on those within this cohort who had actually completed the immunisation schedule. This was due to the fact that, depending on the age the child presented for vaccination, the number of doses required to complete the schedule varied between one and three.

MenC uptake rates in 15-18 year olds

These figures are based on data recorded on health board systems as of February 2002. MenC uptake for those 15-18 years of age in 2000 was 82% in schools and tended to be much lower in third level institutions at 57%. Overall, MenC uptake in 15-18 year olds by birth cohort was 77%, but decreased with increasing age ranging from 85% in 15 year-olds down to 55% in 18 year-olds. The MenC uptake rates based on school and college registers refers to those immunised by the health board teams and will not take into account those immunised by GPs. The uptake by birth cohort includes those immunised by both the health board teams and the GPs, where immunisation returns have been made to the health boards. However, anecdotal reports would suggest that the uptake by birth cohort in the 15-18 year-olds currently underestimates the true MenC uptake in this age group as not all returns have been made by GPs and there have been delays experienced by some health boards in imputing data on the immunisation systems.

Discussion

In 2001, as in previous years immunisation uptake rates at 24 months did not reach the target 95% uptake rate. Uptake rates of D_3, P_3, $Polio_3$, T_3 and Hib_3 were at least 11% below the target rate. In the case of MMR_1 the results were even more worrying with uptake 22% below the national target. It is a widely held view that the current registers in operation in Ireland underestimate immunisation uptake. This has been attributed to data quality issues such as duplicate records on the systems, delays with data entry and not receiving returns from GPs in a timely fashion. However, since these quality issues are not recent manifestations, the downward trend in immunisation uptake has to be interpreted as a real effect.

The decline in MMR uptake throughout 2001 can more than likely be attributed to the adverse publicity surrounding the vaccine and the alleged association between the MMR vaccine and autism, despite the fact that the body of scientific evidence refutes such a causal association. A number of initiatives have recently been undertaken in Ireland to assist parents and health professionals to review the evidence around MMR and to help provide the basis for informed decision-making. An *MMR discussion pack – an information guide for health professionals and parents* - was produced by NDSC and the Department of Public Health of the SHB and was published by The Health Boards Executive in early 2002.[1] The National Immunisation Advisory Committee of the Royal College of Physicians of Ireland produced a booklet on *Measles, Mumps & Rubella – Frequently Asked Questions* and was published in March 2002.[2] NDSC has devoted a section of its website to vaccination, providing information and

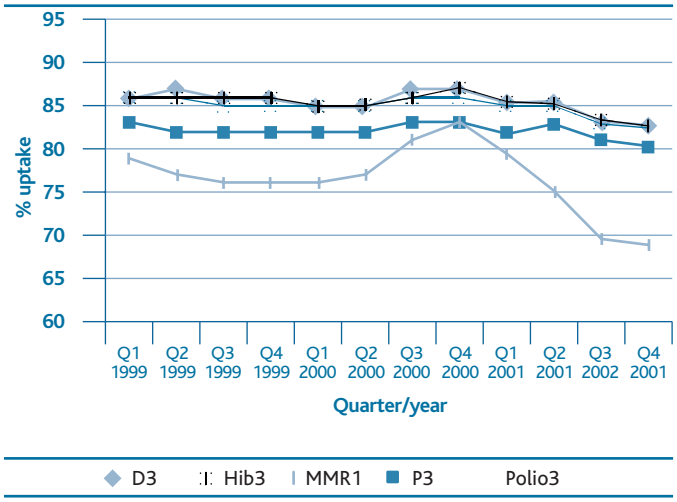

Figure 3. Quarterly immunisation uptake rates at 24 months in Ireland (note scales range from 60-95% on this figure)

Table 3. MenC uptake rates (%) in children 1-4 years of age in 2000

	Age (year cohort born)				
Health Board	1 yr [1999]	2 yrs [1998]	3 yrs [1997]	4 yrs [1996]	Total*
ERHA	67	62	61	67	64
MHB	70	68	66	65	67
MWHB	81	80	80	75	79
NEHB	80	79	79	73	78
NWHB	86	83	83	86	84
SEHB	81	82	81	74	79
SHB	79	77	76	74	76
WHB	76	76	75	75	76
Ireland	**74**	**72**	**71**	**71**	**72**

** Cohort born in the years 1996-1999, i.e. aged 1-4 years when MenC campaign commenced*

factsheets on measles, mumps, rubella, the MMR vaccine and on vaccination in general.[3]

Immunisation uptake rates in Ireland compare poorly with other countries. Vaccination coverage for children in the UK who reached their first birthday in Quarter 4, 2001 was 91% for D_3, P_3 and Hib_3 and 90% for MenC, while coverage for children who reached their second birthday in the same quarter was 94% for D_3 and Hib_3, 93% for P_3, 91% for MenC and 84% for MMR_1.[4] Although adverse media publicity is a contributory factor for Ireland's recently declining MMR uptake figures, it does not explain the consistently low uptake figures in general. Since the national collation of cohort-based immunisation uptake data commenced in Quarter 1, 1999 D_3, P_3, Hib_3 and $Polio_3$ uptake at 24 months has never exceeded 87% and MMR_1 uptake has not exceeded 83%. Such low immunisation uptake rates are a cause for concern as a substantial proportion of the population are left at risk of contracting serious infectious diseases that could otherwise be prevented by vaccination. A national review of immunisation/vaccination programmes was initiated by the Chief Executive Officers of the health boards in February 2001, to review all immunisation/vaccination programmes' policy, practice and procedures with the view to maximising uptake. The report of the National Steering Committee was published in January 2002 and made recommendations on communications, materials management, I.T. systems and policy, planning and organisation.[5] Should these recommendations be implemented it will be a major step towards strengthening the childhood immunisation programme in Ireland.

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Acknowledgements

The authors would like to thank the health boards for providing the data and special thanks to the specialists in public health medicine, the immunisation co-ordinators and the system analysts for their assistance.

Bioterrorism and Agents of Deliberate Release

Key Points

- **Infectious diseases have been used for centuries to frighten and harm.**
- **Following September 11th and the anthrax releases in the US, many countries including Ireland have put in place systems to address such threats.**
- **The anthrax alerts in Ireland were costly, putting a great strain on response services and the general public alike.**
- **Whether deliberate or natural, outbreaks of infectious disease are addressed in the same way; relying on effective surveillance systems, rapid field epidemiological response, strong laboratory capacity and powerful systems of public health management, and this capacity must be available 24 hours a day, 7 days a week.**
- **Limiting the effects of deliberate release of biological agents will involve strong leadership, forward planning, repeated training and practice, central coordination and clear definitions of roles and responsibilities.**
- **It is necessary to plan to have a certain amount of flexibilty in the system to allow for an effective response.**

Infectious diseases have been used deliberately to infect people and animals for centuries in order to produce illness and fear – military strategists have long known the effectiveness of the deliberate use of disease to incapacitate one's enemy. Technological advances during the 20th century meant that it became possible to incorporate many existing and novel diseases into weapon systems. During the late 1990s, the US experienced frequent hoax incidents involving the mailing of powder claimed to be anthrax. These were generally used to intimidate organisations or agencies.

The likelihood of such agents being used was considered to be remote until the attacks in the US on September 11th, 2001 and the mailing of finely milled anthrax spores to agencies and individuals in the US during October 2001. Systems for dealing with such incidents and with people who have been exposed to or infected with bioterrorist agents, have been put in place by governments across the world in order to address the unlikely widespread use of such tactics by terrorist organisations.

A country such as Ireland is thought unlikely to be a target for a primary bioterrorist attack. What is more likely is that those who have been unknowingly exposed to bioterrorist agents abroad could enter this country before they have had time to develop signs of illness and would require diagnosis and treatment in Ireland. If, in addition, this infectious disease were communicable – capable of being transmitted from one person to another – methods to control its spread would be necessary.

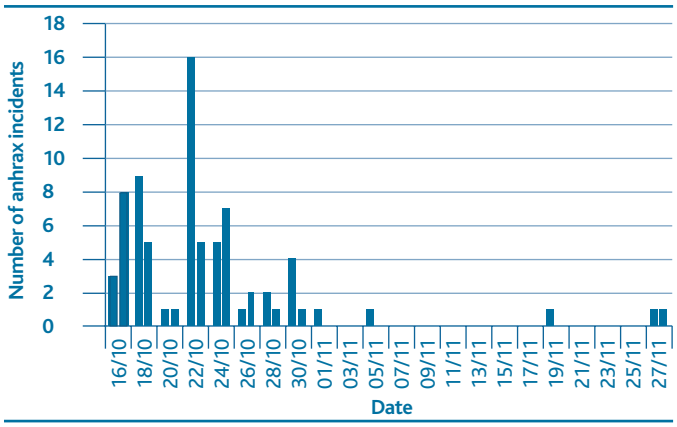


Figure 1. Distribution of anthrax incidents involving the intervention of health personnel, Ireland: October-November 2001

Table 1. Distribution of anthrax incidents involving the intervention of health personnel, Ireland by health board region.

Health board region	No. incidents	%
Eastern Region	52	67.5
Midland Health Board	5	6.5
Mid-Western Health Board	5	6.5
North Eastern Health Board	3	3.9
North Western Health Board	2	2.6
South Eastern Health Board	2	2.6
Southern Health Board	4	5.2
Western Health Board	4	5.2
Total	**77**	**100**

The systems to detect, diagnose and control natural or deliberately spread infectious disease are the same - effective surveillance systems, a strong laboratory network and a responsive public health system to address threats and to ensure the controls necessary to protect people's health. Early detection is essential for ensuring a prompt response to biological attacks.

In the aftermath of September 11th, many countries developed contingency plans to address the threat of the deliberate release of biological agents. In Ireland, the Government established a high-level committee to plan the national response to the threat posed by the deliberate release of biological agents. An Expert Committee – responsible for the contingency planning for biological threats, was established following the deliberate release of anthrax spores in the United States which led to 22 cases of anthrax, 11 of which were inhalational and leading to the deaths of 5 people.

This deliberate release of anthrax came to the attention of the authorities in the US on October 4th, 2001 with the infecting and subsequent death from inhalational anthrax of a 63-year-old British journalist in Boca Raton, Florida. Many countries around the world, including Ireland, had, in the weeks following the anthrax attacks in the US, to deal with numerous 'anthrax' alerts; many innocent mistakes made by worried members of the public and a few, deliberate hoaxes.

In Ireland, the first alerts were made on 16/10/02. There were over 120 alerts to the security and civil forces during the following six weeks, 77 of which involved the intervention of the Regional Departments of Public Health. Initially, there was health professional involvement in all incidents, but as expertise was rapidly developed it became possible to prioritise incidents and involve health professionals in only those that posed a credible risk. As a result, there was progressively less health professional involvement as time passed. The National Disease Surveillance Centre was alerted to all those in which public health and clinicians were involved. The final episode involving health personnel was on 28/11/02 (figure 1).

These incidents put primary responder services (health and ambulance, fire, Garda and military) under great pressure and resulted in significant consumption of resources.

The majority of incidents took place in the Eastern Region, but all health board areas reported incidents (table 1). A range of premises were involved (figure 2). Most involved the offices of private Irish companies, but 10 postal sorting offices were involved. The offices of three political parties, a government department and two embassies were involved. All alerts turned out to be innocent or hoaxes. Anthrax was not isolated from any of the 62 environmental samples sent for analysis.

In total, 438 people were exposed to the contents of suspect packages during the anthrax incidents (table 2). Of these, 307 (70.1%) underwent decontamination by showering and 312 (71.2%) were commenced on prophylactic antibiotics (Ciprofloxacin).

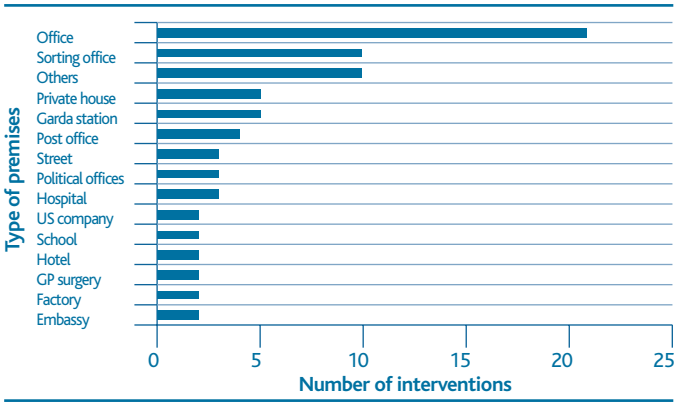


Figure 2. Types of premises involving the intervention of health personnel, Ireland, October-November 2001.

Table 2. Number of people exposed to the contents of suspect packages, the number decontaminated and the number given chemotherapy, Ireland, October-November 2001

	Number	%
Number exposed	438	100.0
Number decontaminated	307	70.1
Number given chemotherapy	312	71.2

These incidents, although they involved neither the release of dangerous substances nor the causing of a single case of illness illustrated the importance of a national and regional response capacity and provided many lessons. The core lesson learnt in Ireland and in every other country affected by these incidents was that of the crucial importance of health protection.

1. Whether outbreaks of infectious diseases are natural or man-made, very similar processes, namely strong disease and risk factor surveillance systems, the capacity to undertake prompt epidemiological investigation, strong laboratory capacity and effective systems of public health management, are necessary to manage them.

2. This capacity must be available 24 hours a day, 7 days a week.

3. The necessity of planning for such eventualities, ensuring that resources are available and that first responders have been adequately trained is fundamental to the successful management of such episodes.

4. The importance of central coordination of national episodes was clearly underlined by these incidents.

5. The vast potential for disruption of normal life was plainly demonstrated.

6. Local leadership and coordination emerged as being vital components of any response.

7. Given the degree of stress on services, it became obvious (in Ireland as in the US, UK and other EU countries) that it was necessary to have some degree of flexibility and surge capacity in the system to permit it to respond effectively to challenges such as these.

8. The importance of ensuring clearly defined roles and responsibilities, written down and understood by all was highlighted; everybody must know what has to be done, how it should be carried out, who is responsible for seeing that it gets done and by when it must be done.

The experience of other countries has taught us that clear planning, explicit roles and responsibilities and repeated rehearsal will be necessary to overcome the danger of threatened or actual deliberate release of biological agents.

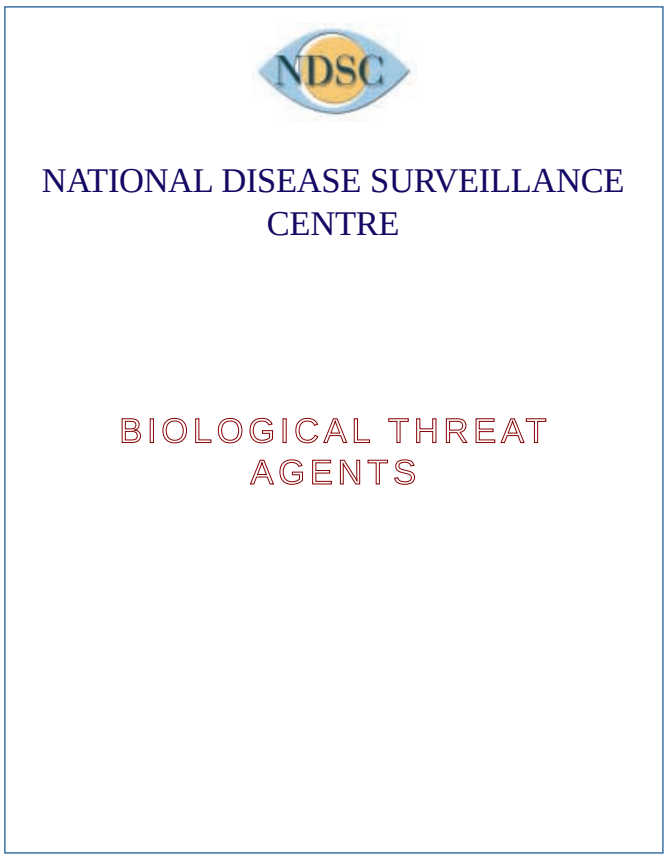
Although attention was focussed on anthrax, contingency planning was undertaken to deal with other possible threat agents. The Centers for Disease Control and Prevention in the US has identified 6 agents as being priority threats because they:

- Are easily disseminated or transmitted person-to-person.
- Have high mortality; potential for major public health impact.
- Produce public panic and social disruption.
- Require special action for public health preparedness.

These agents are Category A biological agents, those producing the diseases as shown in table 3.

Table 3. Category A biological agents

Agent	Disease
Variola major	Smallpox
Bacillus anthracis	Anthrax
Yersinia pestis	Plague
Clostridium botulinum	Botulism
Francisella tularensis	Tularaemia
Filoviruses and Arenaviruses	Viral Haemorrhagic Fevers



National Disease Surveillance Centre. Biological Threat Agents document

Guidance produced by the Expert Committee – responsible for the contingency planning for biological threats addressed the threats posed by the above agents. The National Disease Surveillance Centre produced a document giving an overview of the clinical management and public health implications of selected bioterrorist agents thought most likely to be used in terrorist attacks.

The early clinical features of many of these diseases can appear quite innocent or commonplace. Features that should alert healthcare providers to the possibility of a bioterrorism related outbreak include:

- A rapidly increasing disease incidence in a normally healthy population.
- An unusual increase in the number of people seeking care, particularly with fever, respiratory or gastrointestinal complaints.
- An endemic disease rapidly emerging at an uncharacteristic time or in an unusual pattern (e.g. an increase in what appears to be chickenpox-like illness among adult patients, but which might be smallpox).
- Clusters of patients arriving from a single locale.
- Large numbers of potentially fatal cases (e.g. a large number of cases of acute flaccid paralysis with prominent bulbar palsies, suggestive of a release of botulinum toxin).
- Any one patient presenting with a disease that is relatively uncommon and has bioterrorism potential.

Ireland is an unlikely target for such release but we must be vigilant to the possibility.

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Computerised Infectious Disease Reporting System

Key Points

- **CIDR is a national multi-agency partnership project to introduce an integrated electronic system for surveillance of both clinical and laboratory information on communicable diseases in Ireland.**
- **CIDR will provide high quality timely information for surveillance and control of communicable diseases, and for surveillance of antimicrobial resistance.**
- **CIDR will be a robust, enterprise-strength solution that will be adaptable with changing surveillance needs.**

Introduction

Surveillance and control of communicable diseases is of major importance in protecting the public's health. At present this important function is undertaken in the absence of a national electronic means of sharing information on communicable diseases. The databases of communicable diseases that exist are stand alone and difficult to maintain.

All those involved in the surveillance and control of communicable diseases want a quality information system for communicable diseases. By that is meant a timely, accurate information system that combines both clinical epidemiological information and laboratory information in the one system. It also means an efficient system, where there are no islands of information, and no multiple non-integratable databases.

CIDR is a Computerised Infectious Disease Reporting (CIDR) system being developed by the National Disease Surveillance Centre in collaboration with its partners, the Department of Health and Children, the Health Boards, the Food Safety Authority of Ireland and the Food Safety Promotion Board, and with the help of external IT consultants who advise on each step of the process. CIDR aims to 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.

This will allow for:
- Timely monitoring of trends in infectious disease.
- Earlier detection of outbreaks.
- Meaningful comparison of trends across regions as a result of having a nationally agreed standard data set.
- Appropriate public health action to be taken at local, regional and national levels.
- Monitoring of the effectiveness of preventive and control measures.
- Ireland to meet its obligations to provide data to EU networks for communicable diseases.

As CIDR is a joint initiative of a wide range of stakeholders, a distinct CIDR logo has been developed. We hope that the final design underscores the cooperative nature of the CIDR initiative.

Benefits of CIDR
CIDR will bring many benefits.

For patients and the public, CIDR will ensure that high quality information on communicable diseases is available to the public, patients and policy makers.

From the laboratory perspective, CIDR will allow for transmission of information electronically to public health and other CIDR partners securely, following authorisation by the laboratory, thus reducing paperwork for laboratories. It will allow the review of epidemiological information by the laboratory, enabling comparisons within region, and with national information. There will be potential for CIDR to act as a quality feedback tool, and it may help with laboratory audit and accreditation.

For GPs and clinicians, CIDR will bring timely information on communicable diseases into the surgery and clinic, and will be a user-friendly way of entering and receiving relevant information.

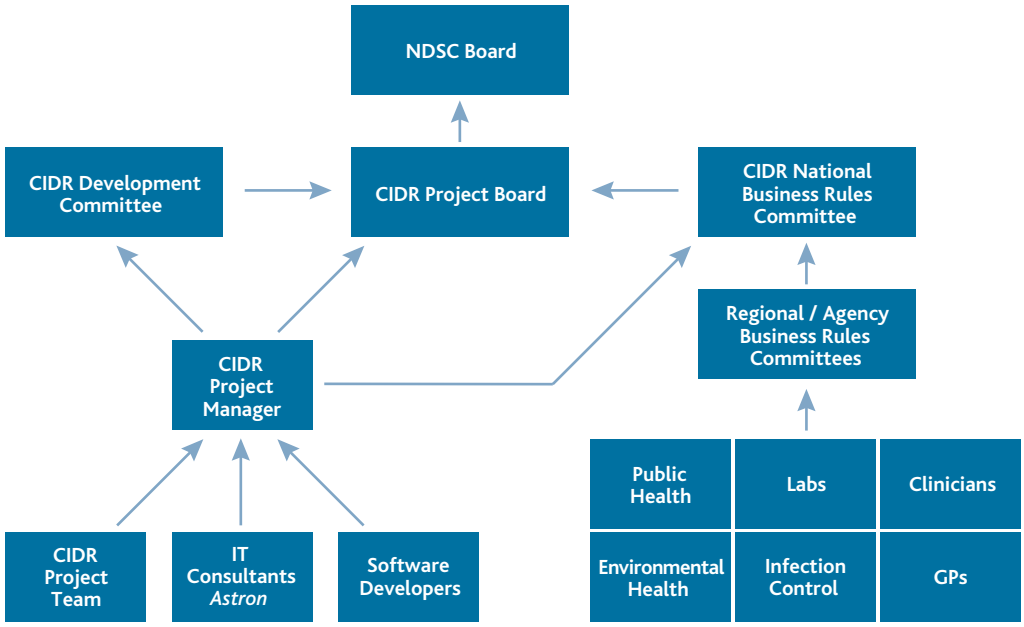
For public health professionals, CIDR will provide timely information for public health action. It will provide automated secure linkage of laboratory and clinical information. In other words, clinical and laboratory information on the same event will be merged. There will only be one surveillance system to maintain, not many as at present. It will be possible to evaluate the effectiveness of prevention and control programmes locally and regionally, and it will enable comparison of local information with neighbouring and national information. It will provide information to plan prevention and control programmes.

For NDSC, the Department of Health and Children and national agencies, CIDR will provide accurate, timely information on the incidence and burden of communicable diseases nationally. This information will be used to describe the epidemiology of communicable disease and to provide information to influence national policies related to communicable disease and vaccine-preventable disease.

Project Organisation
Work on planning the development and implementation of national electronic surveillance was initiated in September 1999 with the establishment of a CIDR development committee. This committee was instrumental in identifying and clarifying NDSC and partners' needs with regard to communicable disease surveillance. An external review was commissioned to aid in this process, and by December 2000, NDSC Board agreed that a new system should be developed.

It was recognised that a dedicated full-time project team was needed to manage this large national multi-agency project, and in addition, the project team needed expert advice on: selection of suitable software developers, contract negotiation, project planning, project control, implementing the system, assistance with development of business rules, working with the selected developer to agree the system, and user acceptance testing.

The CIDR project manager and team were assigned from NDSC staff in June 2001, and following an open tender EU procurement procedure, Astron Consulting was awarded the contract in October 2001. The senior surveillance scientist position on the CIDR Project Team was filled in June of this year (2002).



CIDR Development Committee
This committee was established in 1999 as a working group to advise on the development of electronic surveillance in Ireland; to assist and advise NDSC and other CIDR partners on the development and introduction of a national system for electronic surveillance; to act as an advocate and promote CIDR within his/her own organisation; and to be the quality assurance group for CIDR. Representation from medical laboratory scientists and microbiologists on the group has increased, in recognition of the importance of laboratory information for CIDR.

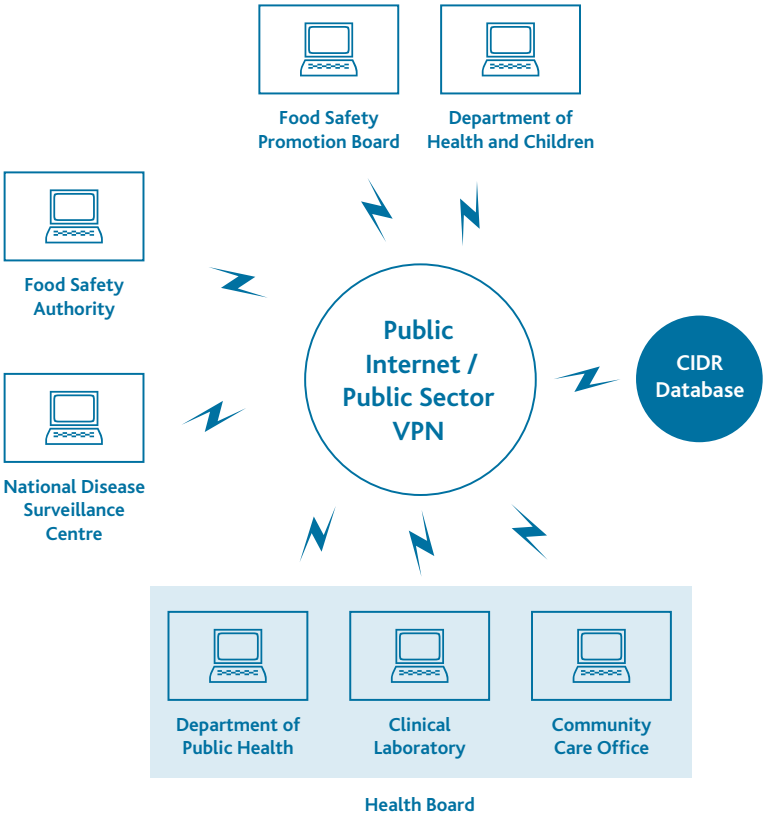
National Supervisory/Business Rules Committee
A CIDR National Supervisory Committee (subsequently renamed the National Business Rules Committee) was established during 2001 to help to determine the appropriate access to information within CIDR together with the levels of service and resource required to participate in CIDR. Each health board / authority / agency is represented by the chairperson of the relevant regional / agency business committee, nominated by their Health Board / Authority / Agency Chief Executive Officer.

Regional and National Agency Business Rules Committees
In 2001, regional and agency business rules committees were established representing the relevant CIDR stakeholders within that region or agency, with the role of preparing and agreeing business rules for participation in CIDR. This process is ongoing.

CIDR Project Board
A CIDR Project Board was established in 2001 to provide overall direction and management for the CIDR project and to approve all major plans for the project within the budget allocated to CIDR capital development by NDSC Board. The Project Board's responsibilities include the authorisation of deviations from the agreed plans within budget, and to seek to ensure that the required resources are available for and committed to the project. The CIDR Project Board include nominees of the Health Board Chief Executive Officers, the Department of Health and Children, and the Food Safety Promotion Board, and includes expertise in the areas of public health, information and communications technology, and finance.

CIDR System Development and Build
In October 2001, a EU tender for detailed design of CIDR core system, including specification of the hardware configuration and software infrastructure required to operate CIDR was initiated. By July 2002, Fujitsu Consulting completed the design, including the uploading of data from Laboratory Information Management Systems (LIMS) and CIDR. A second restricted EU tender is in progress to develop, implement and support the system. It is hoped to have completed development by mid 2003.

Liaison with Other National Agencies/Initiatives
In addition to extensive consultations with CIDR stakeholders, the CIDR Project Team has continued to make considerable efforts to inform and be informed by other national and international initiatives.



These include:

- Meeting the Data Protection Commissioner, including representation from the Department of Health and Children, to confirm that there is no data protection impediment to the concept behind CIDR.

- Meeting the National Health Information Strategy project group to inform them about CIDR, and to ensure that CIDR is in line with the recommendations of the National Health Information Strategy.

- Consulting with the e-government initiative, REACH to confirm that CIDR was potentially compatible with this project.

- Ongoing involvement with the General Practice Information Technology (GPIT) group to help to identify appropriate coding and pathology messaging standards.

- Ongoing consultation with related initiatives around the country and abroad, including: the multi-board procurement of laboratory information systems being led by the Western Health Board, the Irish Cervical Screening Programme, the Laboratory Infection Control and Public Health system (LIPS) initiative in the Midland Health Board, the national Healthlink project and the Tallaght Hospital initiative that allow patient information to be safely transferred electronically via the Internet to General Practice.

- Discussing with SNOMED, a not-for-profit branch of the College of American Pathologists, regarding the possible use of SNOMED coding in CIDR. SNOMED is a clinical terminology i.e. a comprehensive structured list of terms for use in clinical practice by healthcare professionals. The use of SNOMED to facilitate electronic laboratory reporting has been advocated by the US Centers for Disease Control and Prevention (CDC). The UK Department of Health and the US Department of Health and Human Services have recently agreed to adopt and develop SNOMED Clinical Terms (CT) as a standard clinical terminology to support data capture, retrieval and analysis.

- Ongoing communication with the Georgia (US) Division of Public Health who are developing a statewide infectious disease surveillance system (SENDSS – State Electronic Notifiable Disease Surveillance System) similar in principle to CIDR. SENDSS has provided the CIDR Project team with technical documentation about their system.

The continuing support and hard work of all the partner organisations involved in developing and delivering this major public health initiative is much appreciated by the CIDR project team.

Information and Communications Technology

The National Disease Surveillance Centre continued to grow through 2001 both in terms of the number of staff and the range of activities carried out. The expansion in staff numbers through the year needed to be accommodated across three separate locations and this required significant investment in information and communications infrastructure to ensure that all staff had access to the resources they required whilst at the same time ensuring network security was safeguarded.

Hardware and Software Developments

New Network Servers

To accommodate the increasing requirements of NDSC for network data storage and to support network-based printing new Windows 2000 Advanced Servers were installed. This increased the resilience of the NDSC network to accommodate hardware and software failure by the provision of RAID, uninterruptible power supplies, together with redundant power supply units and network interface cards.

New Email Server

The expansion in the number of users and in the volume of emails necessitated the installation of a more robust email solution. A Microsoft Exchange 2000 email server was installed and existing email accounts were migrated from the existing cMail server and Outlook Express clients. The Exchange 2000 server also facilitated the sharing of contact information and diaries, some of which was migrated from the Palm Desktop software previously used. The Palm handheld Personal Organisers used extensively by NDSC staff were integrated into this solution, allowing a single solution for recording contact details and diary scheduling. The installation of the new email system was accompanied by support staff and user training.

New Terminal Services Server

A new Terminal Services server was installed to support NDSC staff whose access to the main NDSC network was constrained by limited bandwidth i.e. staff accessing the main NDSC network from home or from the CIDR Project office in Lower Baggot Street. This server allowed users to access and edit files and run applications on the main NDSC network without the need to transfer high volumes of data.

Other Hardware

Other hardware purchases included laser printers, including a colour laser printer.

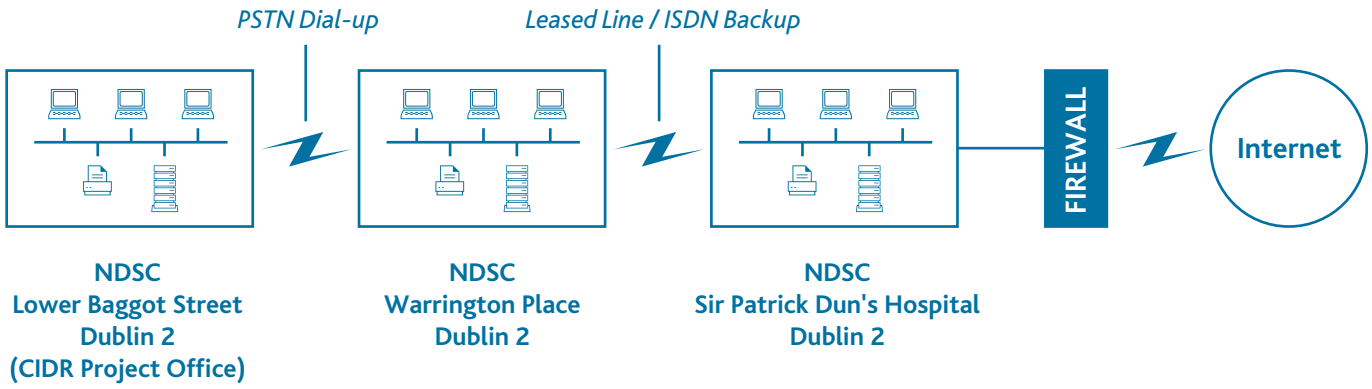
Communications Links

The NDSC local area networks in Sir Patrick Dun's Hospital and in Warrington Place were connected into a wide area network with a leased line. This leased line supported both voice and data communications and was backed up by a failover ISDN connection.

It was not possible to install a conventional wired local area network in the CIDR Project offices in Baggot Street so an alternative wireless solution was implemented. Despite somewhat lower bandwidth than a wired Category 5 network and some authentication problems attributable to limitations in the Windows 2000 server operating software, this solution worked well.

Network Security

The increase in size of the NDSC both in terms of staff and locations during 2001 resulted in a more complex IT infrastructure and potentially increased the risk of unauthorised access to the NDSC network. To minimise the risk to confidentiality and security of information NDSC



implemented several changes and upgrades to IT security during the year.

A new virus scanning system was installed which automatically downloaded updates from the Internet. It also scanned incoming and outgoing emails. This system substantially reduced problems associated with computer viruses.

Partly because of NDSC's accommodation arrangements and partly because of increased staff numbers, the requirement for remote access to the NDSC network rose substantially in 2001. A security gateway was installed to ensure proper validation of remote users by checking the credentials of requests for dial up conections before allowing logon to the NDSC network.

A number of external consultants were invited to review the security of NDSC's IT network and to recommend appropriate changes. A consultancy called Vnet Technologies was chosen to assist in implementing security upgrades commencing at the end of 2001 and reaching completion in 2002. In December 2001, an Intrusion Detection System was configured and installed to monitor attempts to hack into the NDSC network from the Internet.

Application Development
The WANDA (Weekly Analysis of Notifiable Data) Microsoft Access-based database designed for NDSC to support the collection of data and the production of reports on the statutory notifiable infectious diseases continued to be developed despite problems with the original supplier. This was supported by hiring contract staff who developed the application further and documented the structure and use of the application.Some additional work on specifying a similar MS Access-based database to support the collection of data and preparation of reports relating to the notifiable sexually transmitted infections (STIs) was also carried out.

Selection of Statistical Software
To support the analysis of data collected by NDSC, a number of statistical software applications were evaluated. As a result the SPSS statistical software application was selected, primarily on the basis of its extensive functionality coupled with relative ease of use.

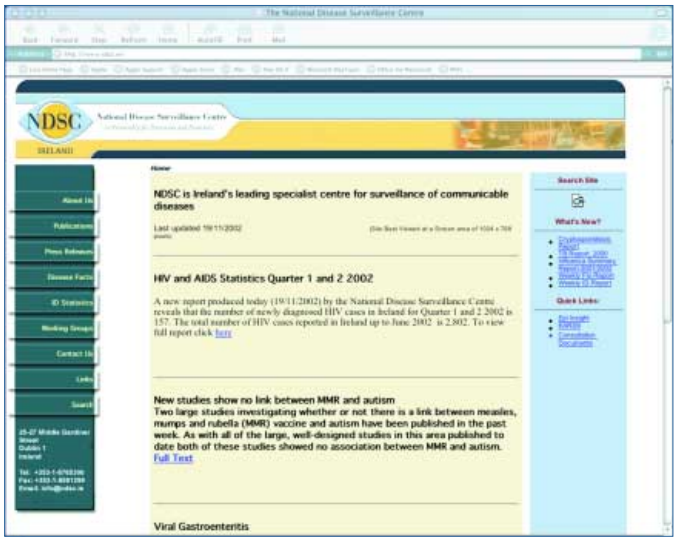
NDSC Website
The NDSC website developed significantly in both size and content throughout 2001. The content of the NDSC website was migrated into the new Terminal4 web content management application purchased from Creative Online and the hosting of this site was transferred from our existing Internet Service Provider.

To ensure that the website addressed the needs of NDSC and its intended viewership an NDSC Web Committee was established.

IT Support
As the IT systems in NDSC continued to grow in size and complexity throughout the year, increased support for these systems was required. Our existing helpdesk and support arrangements with Cara continued in conjunction with in-house NDSC IT staff. The increasing workload associated with the CIDR (Computerised Infectious Disease Reporting system) project necessitated the recruitment during the year of an IT Specialist as interim IT Manager for NDSC.

Website
www.ndsc.ie

The National Disease Surveillance Centre's website has been running since Spring 2000 and was revamped in 2001 resulting in a new site in December 2001. It carries electronic versions of all reports and press releases issued from NDSC as well as details of current committees, weekly and annual infectious disease statistics, disease facts and other general information. The site's homepage is dedicated to public health issues currently in the news and is updated regularly. Data available from Q4, 2001 shows there were over 17,000 separate logons to the site and connections from domains registered in 58 different countries.



An in-house website group, with representatives from all areas of responsibility within NDSC, was formed in August 2001 to manage the introduction of the new website and to provide a forum for continuing development and improvement of the site.

In December 2001, after transfer of all data from the old site to the new, consultation with all NDSC staff, reorganisation and new material added, NDSC's new website went live. The new site is managed and maintained by the NDSC using Sitemanager software provided by Terminal4. This has not only visually enhanced the site but also added a search engine, improved navigation around the site and simplified site management and maintenance by providing a user friendly interface.

Glossary of Terms

ERHA – Eastern Regional Health Authority
(Dublin, Kildare, Wicklow)

MHB – Midland Health Board
(Laois, Offaly, Longford, Westmeath)

MWHB – Mid-Western Health Board
(Clare, Limerick, Tipperary NR)

NEHB – North Eastern Health Board
(Cavan, Monaghan, Louth, Meath)

NWHB – North Western Health Board
(Donegal, Sligo, Leitrim)

SEHB – South Eastern Health Board
(Carlow, Kilkenny, Tipperary SR, Waterford, Wexford)

SHB – Southern Health Board
(Cork, Kerry)

WHB – Western Health Board
(Galway, Mayo, Roscommon)

ACE – Assistant Chief Executive

CSSD – Central Sterile Suppliers Department

EHSS – Eastern Health Shared Services

FPHM – Faculty of Public Health Medicine

FSAI – Food Safety Authority of Ireland

FSPB – Food Safety Promotions Board

IBTS – Irish Blood Transfusion Service

IMU – Information Management Unit

NDSC – National Disease Surveillance Centre

OLHSC – Our Lady's Hospital for Sick Children

TCD – Trinity College Dublin

UCD – University College Dublin

Notes

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