National Disease Surveillance Centre
Annual Report 2003

Table of Contents

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Foreword

This is my first foreword to the NDSC annual report. It was a great honour for me to be appointed as Chairperson of the National Disease Surveillance Centre, in January 2004, having been a board member since the establishment of NDSC in 1998. During this time I have witnessed the organisation evolve from a small expert unit based in a corner of Sir Patrick Dun's Hospital to the dynamic, focused and dedicated centre at Gardiner Street today. From humble beginnings, NDSC now employs over 40 professionals to meet the public health challenges that face Ireland today.

At the outset, I would like to pay tribute to my predecessor, Professor Dermot Hourihane, who served NDSC so well from 1998 until his retirement in 2002.

The NDSC Annual Report reflects the diligence, professionalism, vision and sheer hard work of our Director, Dr Darina O'Flanagan and all the staff at NDSC.

During 2003, NDSC continued to make a valuable contribution to public health in Ireland, through the provision of expert advice, epidemiological investigation, scientific research, data collection and participation in health promotion and training.

The wide range of important work carried out at NDSC was enhanced by the recruitment of additional, highly qualified and committed staff across a number of disciplines, during the year.

The health services in Ireland are facing an exciting and challenging future. NDSC is well placed to confidently take part and contribute to the changes ahead and continue its invaluable work to improve the health of the Irish population.

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

Dr Elizabeth Keane
Chairperson
Board of the National Disease Surveillance Centre

Introduction

This the fifth Annual Report from the National Disease Surveillance Centre.

2003 was a difficult year for the surveillance and control of infectious diseases, not least due to the emergence of Severe Acute Respiratory Syndrome (SARS) – which has a severe fatality rate - in March 2003.

SARS, and its speed of transmission around the world, acted as an international warning to improve public health infrastructure and hospital infection control systems. Between March and July 2003, over 8000 probable SARS cases and 900 deaths were reported in approximately 30 countries. Healthcare workers accounted for 21% of documented cases. Ireland was particularly fortunate that none of the 50 cases investigated here were confirmed as caused by the SARS coronavirus.

'Traditional' public health measures –even before the aetiological agent was identified - effectively contained SARS and prevented its spread from reaching frightening proportions.

Endemic diseases continued to cause problems. Sexually transmitted infections continued to rise and notified numbers in 2002 were the highest for any year on record. During 2003 there was also a 10% increase in the number of newly diagnosed HIV cases. A decrease in the quality of data on HIV during 2003 is a cause for concern. No information on exposure category was provided in 10% of cases and serious consideration should now be given to make HIV a mandatory notifiable disease using anonymous identifiers, to safeguard patient confidentiality.

Campylobacter infections remain the single biggest bacterial cause of gastroenteric infection in Ireland. E.coli O157 remains a serious concern with 86 confirmed cases in 2003. One in eight children under 15 years of age with confirmed VTEC O157 develop haemolytic uraemic syndrome, a form of renal failure.

Members of households, which are not on main public water supplies, are over represented among VTEC cases and the potential for waterborne outbreaks of VTEC and cryptosporidiosis is a cause for concern.

Ongoing surveillance of disease outbreaks demonstrates the huge burden caused by the emergence of a variant strain of Norovirus which was responsible for over 154 outbreaks of gastroenteritis in 2002.

Over 5000 people were ill in the hospital sector alone due to this pathogen. As a result a subcommittee of the NDSC Scientific Advisory Committee was formed and guidelines on

the management of Norovirus in the hospital setting were published and launched by the Minister for Health and Children in December 2003.

The 2003 influenza season started early and resulted in higher incidence rate of influenza in young children. NDSC monitored the situation closely in collaboration with general practitioners, the National Virus Reference Laboratory, hospital clinicians and public health departments. Situation updates were reported to the Royal College of Physicians of Ireland Immunisation Advisory Committee. Developments in the spread of avian influenza in South-East Asia continue to be monitored closely. NDSC worked closely with the Department of Health and Children to further develop contingency plans on pandemic influenza and other major threats.

Data on anti-microbial consumption patterns in Ireland has been added to the report this year to inform the policies of the SARI committee (implementing the Strategy to control Antimicrobial Resistance in Ireland). The proportion of MRSA isolates in Ireland remains one of the highest in the countries reporting to the EARSS surveillance scheme.

On a positive note, annual immunisation rates for all vaccines improved in 2003. Uptake rates reached 92-94% in three health boards. The challenge now is to reduce the regional disparity and to continue the upward trend. Other advances include the successful piloting of Computerised Infectious Disease Reporting System during 2004 and the changes in the Infectious Disease Legislation at the end of 2003 which specified a number of important pathogens and which introduced reporting from microbiologists.

Finally, a thank you to all who have served voluntarily on NDSC's scientific advisory committees. They represent a successful multidisciplinary collaboration between professionals with an interest in reducing the burden of ill health from infectious diseases in this country. Thanks also to all staff at NDSC, whose professionalism is reflected throughout this report.

Dr Darina O'Flanagan
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National Disease Surveillance Centre

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Specialist in Public Health Medicine

Bacterial Meningitis, 2003

Key Points

- **In 2003, 311 cases of bacterial meningitis were notified in Ireland**
- **Two hundred and thirty seven of these notifications were due to meningococcal disease (including one imported case)**
- **Only five serogroup C meningococcal disease cases occurred in 2003, compared with 139 in 2000, highlighting the impact of the MenC vaccine**
- **There were 18 deaths due to bacterial meningitis in 2003, this included 12 deaths due to meningococcal disease**

Introduction

Neisseria meningitidis is the leading cause of bacterial meningitis in Ireland. This can be a potentially fatal condition. The peak age specific incidence rate for invasive meningococcal disease (IMD) is in infants under one year of age, with a second peak occurring in teenagers. Although not as common, this life threatening disease can also occur in adults.

The introduction of *Haemophilus influenzae* type b (Hib) vaccination in 1992 and serogroup C meningococcal (MenC) vaccination in 2000 has led to the near elimination of the these two forms of bacterial meningitis in Ireland. However, no suitable or effective vaccine is currently available for serogroup B IMD and this form remains a significant burden of disease in this country.

Materials and methods

An enhanced surveillance system for bacterial meningitis (including meningococcal septicaemia) commenced in Ireland in 1997. For each suspected case of bacterial meningitis notified, a Medical Officer in the Community Care Area completes part 1 of the enhanced form on the day of notification, which is faxed to the Department of Public Health and to NDSC. Within two weeks of the initial notification, part 2 of the enhanced form is completed which provides laboratory and epidemiological information as well as a final diagnosis. At NDSC, notifications are entered onto an MS Access database. The Irish Meningococcal and Meningitis Reference Laboratory (IMMRL) performs active surveillance on laboratory confirmed cases of IMD. The NDSC database is reconciled monthly with the IMMRL database and

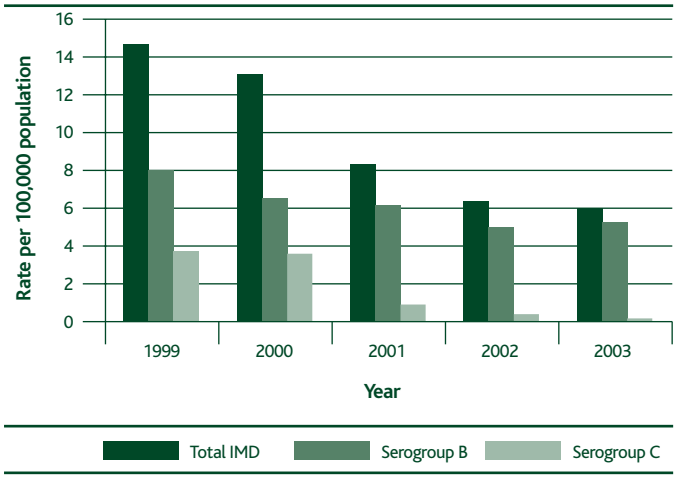

Figure 1. Crude incidence rates of invasive meningococcal disease in Ireland, 1999-2003

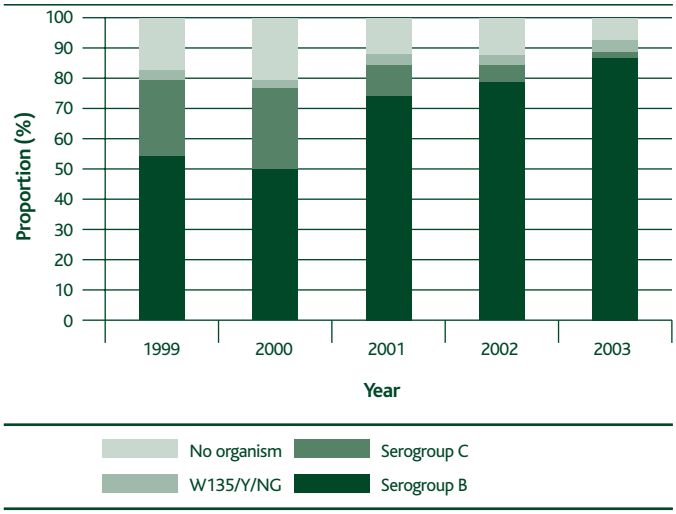

Figure 2. Proportion of invasive meningococcal disease notifications by serogroup, 1999-2003

quarterly with the Departments of Public Health databases. A final data validation step is performed with Departments of Public Health and IMMRL following year-end.

The incidence rates for the years 2000-2003 were calculated using population figures from the 2002 Census of Population, as the denominator. The 1996 census was used when calculating incidence rates for 1999. The direct method of age standardisation was used to control for the confounding effect of age and thereby enable comparisons of incidence rates be made between different health boards/geographical areas. The Irish population was used as the standard population.

The case definitions used for invasive meningococcal disease were as recommended by the National Meningitis Working Group in 1999.[1] The case definitions are also described in the NDSC Case Definitions for Notifiable Diseases" booklet.[2] A summary of these 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

Three hundred and eleven cases of bacterial meningitis were notified in Ireland in 2003. The majority of these notifications were due to invasive meningococcal disease (n=237; 76%), followed by pneumococcal meningitis (n=25), *Haemophilus influenzae* (n=7), *Escherichia coli* (n=4), group B streptococcus (n=2), listeria (n=2), TB (n=5), salmonella (n=1), *Enterobacter cloacae* (n=1) and bacterial agent unknown (n=27).

Invasive Meningococcal Disease

Imported case

During 2003 one imported case of invasive meningococcal disease (IMD) was notified in Ireland. An imported case is defined as a case where onset of illness is within two days of arrival in the country or where the infection is known to have been acquired abroad. This one imported case in 2003 was classified as possible and was notified by SEHB and will be excluded from subsequent analysis in this report.

Total IMD

Excluding the one imported case, 236 cases of IMD were notified in Ireland in 2003 (6.0 /100,000 total population). This was a very slight decrease from the previous year when 250 cases (excluding three imported cases) were notified. Therefore, the incidence of IMD in Ireland continued to decline in 2003 when compared with previous years (figure 1). Over 90% of IMD notifications were classified as definite

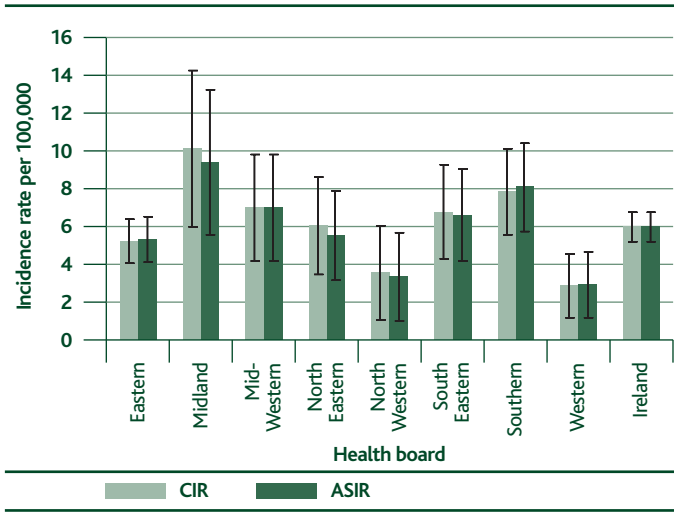

Figure 3. Age standardised and crude incidence rates with 95% confidence intervals by health board for invasive meningococcal disease in 2003.

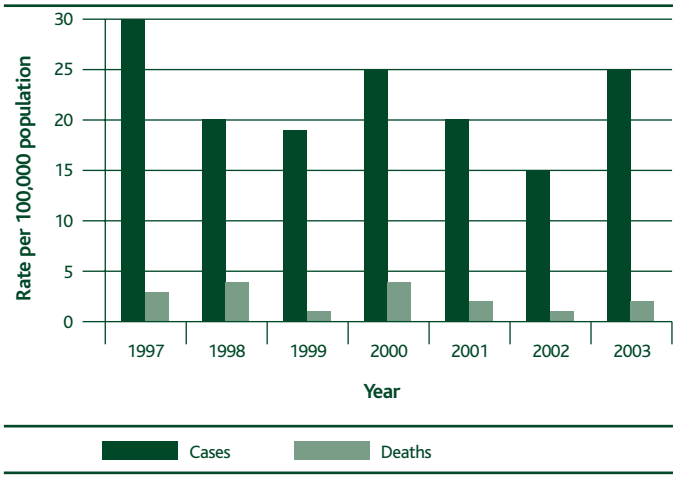

Figure 4. Pneumococcal meningitis – number of cases and deaths notified in Ireland, 1997-2003

(n=215), 3% as presumed (n=8) and 6% as possible (n=13, excluding the one imported case). Two hundred and twenty one of the 236 notifications were laboratory confirmed, 64% by PCR (n=142), 33% by culture (n=74), 2% by convalescent serology (n=4) and <1% by microscopy (n=1).

IMD by serogroup

Serogroup B is the most common meningococcal serogroup associated with IMD in Ireland, accounting for 87% of the notifications in 2003. Since the MenC vaccine was introduced in October 2000, the proportion of IMD due to serogroup B has increased from approximately 50% in 1999-2000, to over 70% in 2001-2002 to 87% in 2003 (figure 2). On the other hand the proportion of notifications due to serogroup C has declined over the same period. Serogroup C accounted for approximately 30% of IMD notifications in 2000, whereas it only accounted for 2% of these in 2003 (figure 2). The proportion of IMD notifications due to serogroups W135, Y or non-groupable has not fluctuated greatly over the last five years (range 2.5-3.8%). The proportion of notifications where no organism was detected (no laboratory evidence IMD but clinically the patient considered to have the infection) has declined from 20% in 2000 to below 10% in 2003.

The breakdown of IMD notifications by serogroup in 2003 was: 206 serogroup B, five serogroup C, three serogroup W135, two serogroup Y, four non-groupable and 16 (excluding one imported case) no organism detected. The annual incidence rates of serogroup B and C IMD between 1999-2003 are presented in figure 1. Incidence rate of serogroup B IMD increased very slightly in 2003 compared to 2002; 5.26 and 5.00 per 100,000 total population, respectively. The incidence rate of serogroup C disease continued to decline in 2003 with 0.13 per 100,000 cases occurring, compared to 0.36 per 100,000 in 2002. Comparing 2003 with 2000, the incidence of rate of serogroup C IMD has fallen by 96%. Only five serogroup C cases were notified during 2003. Four of these occurred in the age groups that were targeted for MenC vaccination. All four cases had not received the MenC vaccine.

IMD by age and sex

The male female ratio for IMD in 2003 was 1.2:1.0. As in previous years the age-specific incidence rates in 2003 for IMD where highest in the <1 year olds (124.8 100,000), followed by the 1-4 year olds (33.6/100,000). The frequencies of the different forms of bacterial meningitis including IMD notified by age group in 2003 are presented in table 1.

IMD by health board

The IMD crude incidence rates (CIR) and age standardised incidence rates (ASIR) by health board for 2003 are presented in figure 3. These rates fluctuated between health boards even following direct standardisation of the data to control for the confounding effect of age. The highest incidence rate was in the MHB (9.49/100,000, 95% CI 5.6-13.4/100,000), but this was not significantly different from the national rate since the 95% confidence interval overlapped with the national rate (6.02/100,000, 95% CI 5.3-6.8/100,000). The WHB (2.94/100,000, 95% CI 1.2-4.7/100,000) has the lowest incidence rate and this was significantly below the national rate (6.02/100,000, 95% CI 5.3-6.8/100,000). No statistical differences were observed between the national rate and those for the other health boards.

Table 1. Bacterial meningitis notifications by causative agent and age group in 2003

Disease	<1	1-4	5-9	10-14	15-19	20-24	≥25	Total	CIR
IMD*	69	75	19	14	26	8	26	237	6.0
S. pneumoniae	9	5	2	3	0	0	6	25	0.6
H. influenzae	4	2	0	1	0	0	0	7	0.2
L. monocytogenes	2	0	0	0	0	0	0	2	0.1
GBS**	1	0	0	0	0	0	1	2	0.1
TB	1	1	0	0	0	1	2	5	0.1
Other	11	3	0	3	2	3	11	33	0.8
Total	**97**	**86**	**21**	**21**	**28**	**12**	**46**	**311**	**7.9**
Population	54,499	223,131	264,090	285,708	313,188	328,334	2,448,253	3,917,203	
ASIR	**176.2**	**38.5**	**8.0**	**7.4**	**8.9**	**3.7**	**1.9**	**7.9**	

**The one imported case in the <1 yr old, included in the number of cases but not in the calculation of incidence rates.*
***GBS, group B streptococcus. CIR = Crude incidence rate per 100,000; ASIR = Age specific incidence rate per 100,000*

Table 2. Invasive meningococcal disease deaths and case fatality rates by age group, in 2003

Age group (years)	Total IMD			Serogroup B		
	Deaths	Cases	CFR (%)	Deaths	Cases	CFR (%)
<1	4	68*	5.9	4	56	7.1
1-4	2	75	2.7	2	68	2.9
5-9	0	19	0.0	0	16	0.0
10-14	2	14	14.3	2	13	15.4
15-19	1	26	3.9	1	23	4.4
20-24	0	8	0.0	0	6	0.0
?25	3	26	11.5	2	24	8.3
Total	**12**	**236**	**5.1**	**11**	**206**	**5.3**

CFR = case fatality rate. *Excluding the one imported case.

IMD clusters
A cluster is defined as the occurrence of two or more cases of meningococcal disease during a period of less than or equal to three months among persons in the same defined setting such as household, crèche, school/college or community. If cases are of different serogroups then these are not regarded as a cluster.

In 2003, two clusters were notified, with living in the same household being the setting for both clusters. Two siblings in each household were infected with serogroup B *N. meningitidis*. In both clusters the secondary case occurred within days of the primary/index cases.

Pneumococcal meningitis
Twenty five cases of pneumococcal meningitis due to *Streptococcus pneumoniae* were notified in 2003. This is an increase from 15 cases the previous year. Fifty six percent (14/25) of the cases occurred in children <5 years of age, while 24% (6/25) of cases occurred in adults (table 1). The annual number of pneumococcal meningitis notifications tends to vary between 15 and 30, based on data available since 1997 and the annual number of deaths notified has ranged between one and four (figure 4).

Haemophilus influenzae meningitis
Seven cases of *Haemophilus influenzae* meningitis cases were notified in 2003. All cases occurred in children <15 years of age and six of the seven cases were <5 years of age (table 1). Six of isolates were type b and the other non-capsular. One child had been fully vaccinated against Hib and thereby constitutes a true vaccine failure. Another child had received one of the three recommended doses of Hib vaccine and this is regarded as an apparent vaccine failure. The remaining four Hib cases had not been vaccinated.

Group B streptococcal meningitis
During 2003 two cases of group B streptococcal meningitis were notified, one case was in a neonate, the other in an adult.

Listeria monocytogenes meningitis
Two cases of listeria meningitis cases were notified in 2003. One case occurred in a neonate, the other in an infant (table 1).

Deaths due to Bacterial Meningitis
There were 18 deaths due to bacterial meningitis in 2003, which was an increase from 12 deaths notified in 2002. Of the 18 bacterial meningitis deaths notified in 2003, 12 were due to meningococcal disease (11 serogroup B and 1 serogroup C), two pneumococcal, one group B streptococci, one TB and two bacterial meningitis of unknown aetiology. Meningococcal disease had a case fatality rate (CFR) of 5.1% in 2003 (table 2). CFRs were highest in the 10-14 year olds at 14.3%, followed by the >25 year olds at 11.5% and the <1 year olds at 5.9% (table 2). The CFR for serogroup B disease closely reflected that seen for total IMD since 11 of the 12 deaths notified were due to this serogroup (table 2). There was one serogroup C death in 2003, this occurred in an adult.

Discussion
The downward trend in the incidence of IMD continued in Ireland in 2003 with 6.0 per 100,000 cases occurring. The

incidence of this disease has more than halved when compared with 1999 and 2000. This decline can mainly be attributed to the impact MenC vaccination has had in almost eliminating serogroup C IMD with a 96% reduction in the incidence of the disease seen in 2003 when compared with 2000.

The incidence of serogroup B IMD increased very slightly in 2003 compared with the previous year but overall there has been a gradual decline in the incidence of serogroup B IMD since 1999 although this decline is nowhere near the scale of the serogroup C reduction seen over the same period.

Despite the downward trend in the incidence if IMD over the last four years this disease is still the major cause of bacterial meningitis in Ireland. IMD accounted for 76% of the notifications in 2003 with serogroup B accounting for 87% of these IMD notifications. Twelve IMD deaths occurred in 2003. Half of these deaths occurred in children <5 years of age (n=6), a quarter in teenagers (n=3) and a quarter in adults (n=3). The highest case fatality rates were in the teenagers and adults.

As an infectious disease IMD especially serogroup B disease remains an important cause of morbidity and mortality in Ireland. The fact that a suitable serogroup B vaccine still remains elusive, as always parents and health care professionals are encouraged to be ever vigilant to the signs and symptoms of bacterial meningitis/meningococcal disease and also to be aware that adults too can succumb to this disease.[3]

Pneumococcal meningitis is the next most common form of bacterial meningitis and resulted in 8% of notifications in 2003. Meningitis was the only form of pneumococcal disease notifiable prior to January 1, 2004. Recent amendments to the Infectious Diseases Regulations stipulate that all cases of invasive *S. pneumoniae* are now notifiable and consequently our understanding of the epidemiology of this disease should improve.[4] Pneumococcal disease is vaccine preventable. At present in Ireland pneumococcal vaccination is recommended for use in persons who are at increased risk of the disease and its complications.[5] To help inform future vaccination policy in this country it is vital that the surveillance of pneumococcal disease is strengthened.

Acknowledgements

NDSC would like to thank all those who have participated in the surveillance of bacterial meningitis in Ireland. This includes public health doctors, surveillance scientists, microbiologists, medical scientists, hospital clinicians and administrative staff.

References

1. The Department of Health and Children's Working Group Report on Bacterial Meningitis and Related Conditions, July 1999. http://www.doh.ie/pdfdocs/meningfn99.pdf
2. Case Definitions for Notifiable Diseases. NDSC, 2004. Available at http://www.ndsc.ie/Publications/CaseDefinitions/
3. Bacterial Meningitis. NDSC disease fact sheets. Available at http://www.ndsc.ie/DiseaseTopicsA-Z/BacterialMeningitis/
4. Changes to the Notification of Infectious Diseases. Available at http://www.ndsc.ie/IDStatistics/ChangestoNotificationofInfectiousDiseases/
5. Immunisation Guidelines for Ireland, 2002. Recommendations by Immunisation Advisory Committee of the Royal College of Physicians of Ireland. Available at http://www.ndsc.ie/Publications/Immunisation /ImmunisationGuidelines/

Tuberculosis in Ireland, 2002

Key Points

- **There were 408 new cases of TB notified in 2002, giving a crude incidence rate of 10.4/100,000 population**
- ***Mycobacterium tuberculosis* was isolated in 234 cases and *Mycobacterium bovis* was isolated in 5 cases**
- **Of the 408 cases reported in 2002, 305 cases had a pulmonary component**
- **123 (30.1%) cases were born outside Ireland**
- **Five deaths were attributed to TB in 2002**
- **Outcome data were reported in 77.2% of TB cases**

Introduction

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

Materials and methods

For each individual case of tuberculosis notified in 2002, an enhanced notification form was completed by public health doctors, using the available clinical, microbiological, histological and epidemiological data. These forms were then collated in the regional Departments of Public Health. In each regional Public Health department, data were also entered onto an Epi Info 2000 database.[2] From this database, an anonymised dataset was submitted to NDSC on a quarterly basis.

All cases of tuberculosis notified to NDSC were collated at a national level on a single Epi Info 2000 database for detailed analysis. Reports summarising results were produced on a quarterly basis by NDSC. Information on all cases was updated in late 2003 / early 2004 by each health board to include outcome data.

Population figures, used as the denominator, were taken from

Figure 1: Age- and sex-specific TB incidence rates in Ireland, 2002

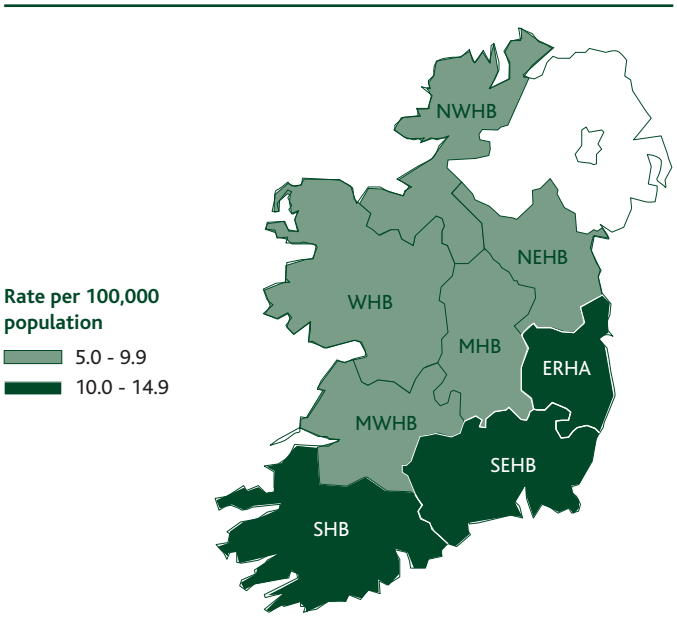

Figure 2: Age standardised incidence rates (per 100,000 population) in Ireland by health board, 2002

the 2002 census of population. In order to compare rates between groups of interest, 95% confidence intervals were used. Direct methods of standardisation were used to allow comparison of rates between geographical areas using the Irish population as the standard population.

As in previous years, the case definitions used were as recommended by the National Tuberculosis (TB) Working Group.[3]

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

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

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

Results

Four hundred and eight cases of TB were notified in 2002 in Ireland, giving a notification rate of 10.4/100,000 population. This represents a 7.1% increase on the corresponding figure in 2001 (381 cases: 9.7/100,000) (table 1).

The highest age standardised TB incidence rate was reported in the Southern Health Board, at 13.1 per 100,000 population (table 2). The North Western Health Board had the lowest rate at 5.1/100,000. In addition, the rate in the NWHB was significantly lower than the national age standardised incidence rate (10.4 per 100,000).

Sex and age distribution

Two hundred and fifty nine cases were male (63.5%) and 148 were female (36.3%), giving a male:female ratio of 1.8:1. The gender of one case was not recorded (0.2%). The average age of those diagnosed with TB was 44.6 years with a range from less than one year of age to 94 years. Almost a quarter (22.8%) of cases occurred in those aged 65 and over (n=93). The highest rates were observed in those aged over 65 years (at 21.3/100,000 population). The age- and sex-specific incidence rates per 100,000 population in Ireland, in 2001 are illustrated in figure 1.

Geographic origin

One hundred and twenty three (30.1%) of the patients diagnosed with TB in 2002 were born outside Ireland, compared to 63 patients in 2001. In 2002, 49 cases were born

Table 1. Notified TB cases in Ireland, 1991 – 2002, with 3-year moving averages, 1992 - 2001

Year	Number	Crude rate per 100,000pop.	3 year moving average
1991	640	18.2	
1992	604	17.1	612
1993	598	17	581
1994	524	14.5	526
1995	458	12.6	469
1996	434	12	436
1997	416	11.5	423
1998	424	11.7	433
1999	469	12.9	439
2000	395	10.1	410
2001	381	9.7	391
2002	408	10.4	

Table 2: Number of cases of TB in Ireland and age standardised incidence rates with 95% confidence intervals (CI) by health board, 2002

Health Board	TB cases	Age standardised incidence rate	95% CI
ERHA	162	11.5	9.7-13.3
MHB	19	8.8	4.8-12.8
MWHB	32	9.4	6.2-12.7
NEHB	24	7.1	4.3-9.9
NWHB	12	5.1	2.2-8.0
SEHB	49	11.7	8.4-14.9
SHB	77	13.1	10.2-16.1
WHB	33	8.6	5.6-11.5
Ireland	**408**	**10.4**	**9.4-11.4**

in Africa, 44 in Asia, 25 in Europe, three in South America and one in North America. The country of origin was unknown in one case. The crude rate of TB notifications in the indigenous population only in 2002 was 7.8/100,000 population while the national crude rate for all cases notified in 2002 was 10.4/100,000 population.

Diagnostic details

Of the 408 TB notifications, 249 (61%) were definite cases which were culture confirmed. Of the 249 culture-confirmed cases, 234 (97.9%) of the isolates were *M. tuberculosis* and five (2.1%) were *M. bovis*. The isolate was not specified in 10 culture positive cases.

Two hundred and sixty eight cases were pulmonary (65.7%), 95 cases were extrapulmonary (23.3%) and 37 cases were pulmonary and extrapulmonary TB (9.0%). In eight cases, the TB site was unspecified (2%). Of the 305 TB cases with a pulmonary disease component, 122 (40%) were sputum positive by microscopy. There were 6 cases of TB meningitis notified in 2002 giving an incidence rate of 1.5 cases per million. The diagnostic breakdown in each health board is shown in table 3.

Resistance

Resistance was documented in ten cases out of a total of 234 *M. tuberculosis* isolates (4.3% of *M. tuberculosis* isolates). Mono-resistance to isoniazid was recorded in eight cases and mono-resistance to streptomycin in one case. One further case was resistant to both isoniazid and streptomycin. Seven of the drug-resistant cases were born outside Ireland. In 2002, no multi-drug resistant TB cases (defined as resistance to at least isoniazid and rifampicin) were notified.

Outcome

Of the 408 cases notified in 2002, the outcome was recorded in 315 cases (77.2%). Two hundred and fifty nine of the 315 cases (82.2%) completed treatment. Sixteen patients (5.1%) were recorded as being lost to follow up. There were 30 deaths (9.5%) recorded, of which five were attributed to tuberculosis. Treatment was interrupted in five cases (1.6%) and five cases were continuing to receive treatment at time of reporting (1.6%).

Of the 117 smear positive cases of pulmonary TB notified in 2002, 91 completed treatment, seven died, four were lost to follow up and one was still on treatment at time of reporting. The outcome was unknown in 14 cases.

A summary profile of the epidemiology of TB in Ireland from 2000 to 2002 is shown in table 4.

Discussion

When compared with 2001 figures (9.7/100,000), there was a 7.1% increase in TB notifications in 2002 giving a national crude rate of 10.4/100,000 population. A similar increase was observed in 1999 when the number of cases rose by 10.6% from a crude rate of 11.7/100,000 in 1998 (n=424) to 12.9/100,000 (n=469) in 1999. The 3 year moving average removes some of the yearly fluctuation and continues to fall.

Differences in age standardised TB incidence rates persist between health board areas (figure 2). In 2002, the SHB had

Table 3: Diagnostic categories of TB cases notified in 2002, by health board

Health Board	Pulmonary	Extrapulmonary	P+E	Unknown	Total
ERHA	109	36	17	0	162
MHB	12	4	0	3	19
MWHB	15	12	4	1	32
NEHB	11	5	4	4	24
NWHB	10	1	1	0	12
SEHB	33	10	6	0	49
SHB	54	20	3	0	77
WHB	24	7	2	0	33
Total	**268**	**95**	**37**	**8**	**408**

Table 4. Summary of epidemiology of TB in Ireland, 2000 – 2002

	2000	2001	2002
Total number of cases	395	381	408
Notification rate per 100,000 population	10.1	9.7	10.4
Foreign born TB patients	44	63	123
% culture positive patients	58	58.8	61
M. tuberculosis	222	204	234
M. bovis	2	7	5
M. africanum	3	1	0
% smear positive pulmonary cases	47.2	44.4	38.4
Monoresistance to isoniazid	2	4	8
Monoresistance to streptomycin	1	3	1
Monoresistance to pyrizinamide	1	1	0
Multi-drug resistant cases	2	2	0
Deaths attributed to TB	6	5	5

the highest rates of TB (13.1/100,000) followed by SEHB (11.7/100,000) and ERHA (11.5/100,000). In 2001, the highest rates were seen in the ERHA and SHB while in 2000, TB rates were highest in the MWHB and the SHB. In 2002, rates were below the national average in the NWHB (5.1/100,000).

Those aged 65 and over had the highest age-specific rate in 2002 (21.3/100,000 population). This was comparable with the rate observed in this age group in 2001 (20.6/100,000 population). The male:female ratio of 1.8:1 reported in 2002 was also comparable with the rate reported in 2001 (1.7:1).

When compared with previous years, the percentage of cases born outside Ireland increased in 2002. One hundred and twenty three cases (30.1%) were born outside Ireland, compared to 63 cases (16.5%) in 2001, 45 cases (11.1%) in 2000 and 65 cases (13.9%) in 1999. However, this percentage remains comparable with other western European countries. In 2001, among the 21 countries in Western Europe who reported data to the EuroTB network, 32% of notifications were in foreign born patients.[4] For example, in the United Kingdom, France and Germany, all of whom have similar notification rates to Ireland (9.2-11.8/100,000), the percentage of foreign-born patients ranged from 35.7% to 51.1% in 2001.[4]

The number of cases with outcome data in 2002 was 77.2%. This is an increase of 17% on percentage of outcome data available in 2001 and 2000. This increase may partly be due to the fact that 2002 was the first year where data were collected using the Epi2000 system. This windows-based system is more user friendly than the previous Epi6 system. In the short term, NTBSS will continue to run on the current Epi2000 system. It is critical to TB control in Ireland that surveillance of TB be maintained at a high level, particularly in monitoring multi-drug resistant tuberculosis. Although there were no cases of MDR-TB notified in Ireland in 2002, 1.6% of new cases of TB in 2001 in Western Europe were multi-drug resistant.[4]

Acknowledgements

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References

1. www.eurotb.org
2. Epi Info 2000 software package
3. Department of Health (Ireland). Report of the Working Party on Tuberculosis 1996: Government Publications.
4. EuroTB (InVS/KNCV) and the national coordinators for tuberculosis surveillance in the WHO European Region. Surveillance of tuberculosis in Europe. Report on tuberculosis cases notified in 2001, December 2003.

HIV in Ireland, 2003

Key Points

- **During 2003, there were 399 newly diagnosed cases of HIV infection, a 10% increase in the number of cases diagnosed in 2002**
- **The cumulative total of HIV infections reported in Ireland to the end of December 2003 is 3,408**
- **Of the 399 cases, 221 were heterosexually acquired, 75 were among men who have sex with men (MSM) and 47 were among injecting drug users (IDUs)**
- **During 2003, almost 80% of the cases were between 20 and 40 years of age and the mean age was 30.8 years**
- **Of the 399 cases diagnosed in 2002, 202 (51%) were male and 196 (49%) were female. The mean age at HIV diagnosis was 33.4 years in males and 27.7 years in females, a difference of 5.7 years**
- **One hundred and thirty three of the newly diagnosed cases in 2003 were born in Ireland and 198 were born in sub-Saharan Africa**

Introduction

During 2003, an estimated 4.8 million people became newly infected with HIV worldwide.[1] This is the largest number in a single year since the epidemic began.[1] Today, an estimated 37.8 million people are living with HIV and the epidemic has killed over 20 million people since the first cases of AIDS were identified in 1981.[1] Sub-Saharan Africa is the most severely affected region of the world. An estimated three million people were newly infected in sub-Saharan Africa in 2003, representing over 60% of new infections globally.[1]

Increasing numbers of people newly diagnosed with HIV have been seen in Ireland since the late 1990s. National HIV case based reporting was introduced in Ireland in July 2001 on a recommendation of the National AIDS Strategy Committee (NASC).[2] The system aims to ensure the collection of timely data on the distribution and mode of transmission of HIV infection, accurately monitor trends in the epidemic, and enable linkage between reports of HIV infection and AIDS. A report on newly diagnosed HIV infections in Ireland in 2003 was recently published and is available on the NDSC website.[3] This is the second annual report published since the introduction of HIV case based reporting in Ireland.

Methods

All positive HIV samples are sent to the NVRL for confirmation. For every newly confirmed HIV diagnosis, the laboratory sends a HIV/AIDS surveillance report form to the clinician who requested the confirmatory HIV test. The

Table 1: Newly diagnosed HIV infections in Ireland by exposure category (2002 and 2003)

Exposure category	2002		2003	
	Number	%	Number	%
Heterosexual	232	63.7	221	55.4
MSM	46	12.6	75	18.8
IDU	50	13.7	47	11.8
Mother to Child transmission (MCT)	8	2.2	12	3.0
Other	5	1.4	5	1.3
Unknown	23	6.3	39	9.8
Total	**364**	**100.0**	**399**	**100.0**

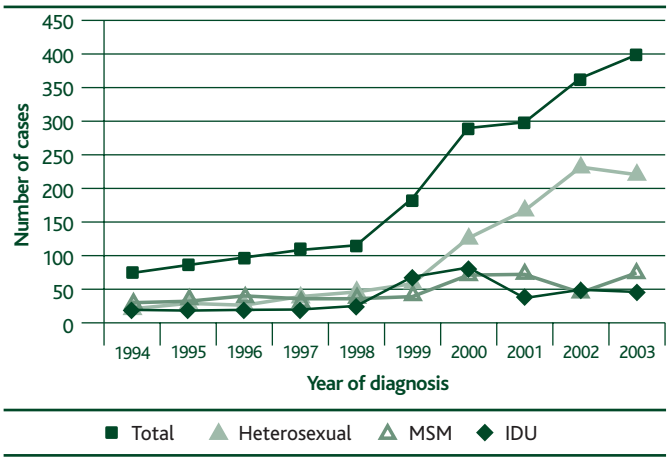

Figure 1: Newly diagnosed HIV infections in Ireland among heterosexuals, MSM and IDUs (1994 to 2003)

laboratory generates a soundex code, which is used as an identifier on the HIV/AIDS surveillance report form. Soundex coding adds an extra layer of confidentiality to HIV/AIDS surveillance report forms and allows patient names to be coded in a way that makes it impossible to decode it to an unequivocal form of the actual name. A copy of the form is also sent to the Director of Public Health (or nominee on his/her behalf) in the health board where the patient resides to alert them to the newly diagnosed case. The clinician is requested to complete the form and return it to the relevant Director of Public Health. The forms are then forwarded to the NDSC where national figures are collated. Analysis of HIV data is carried out by the NDSC every six months and a report is published on the NDSC website and sent to people on a large mailing list including clinicians, microbiologists, public health personnel, DoHC, non-governmental organizations (NGOs) and other interested parties. In addition, twice yearly, a summary of the data is forwarded to the European Centre for the Epidemiological Monitoring of AIDS (EuroHIV). Clinicians are also asked to report all cases of AIDS to NDSC using the HIV/AIDS surveillance report forms. A summary of the AIDS data is also reported to EuroHIV on a twice-yearly basis.

Results

There were 399 newly diagnosed HIV infections in Ireland in 2003. This compares to 364 cases diagnosed in 2002, and represents a 10% increase. The rate of newly diagnosed HIV infection in Ireland in 2003 was 101.9 per million population.

Exposure category

A breakdown by exposure category in 2003 can be seen in table 1. This is compared to the breakdown by exposure category in 2002. Figure 1 shows the trends in newly diagnosed cases among the three major risk groups (heterosexuals, MSM and IDUs) from 1994 to 2003.
Of the 399 newly diagnosed cases, 221 were heterosexually acquired. This compares to 232 in 2002 and 173 in 2001. There were 75 new diagnoses among MSM during 2003 compared with 46 in 2002 and 71 in 2001. There were 47 new diagnoses among IDUs during 2003 compared with 50 in 2002 and 38 in 2001. The exposure category was not reported for 39 of the newly diagnosed infections in 2003.

HIV infection was newly diagnosed in 14 children during 2003. Of the 14 children, 12 (including 5 infants) were known to be infected through mother-to-child transmission (MCT). A total of 150 babies were born to HIV infected mothers in 2003. Of these 5 (see above) were diagnosed with HIV infection and the status of the remaining 145 is indeterminate (i.e. they do not meet the criteria for HIV infection and were <18 months at time of test or they were born to a HIV infected mother but their antibody status is unknown).

Sex and age distribution

Of the 399 newly diagnosed cases, 202 (51%) were male and 196 (49%) were female. Information on gender was unavailable for one of the new cases. The majority of

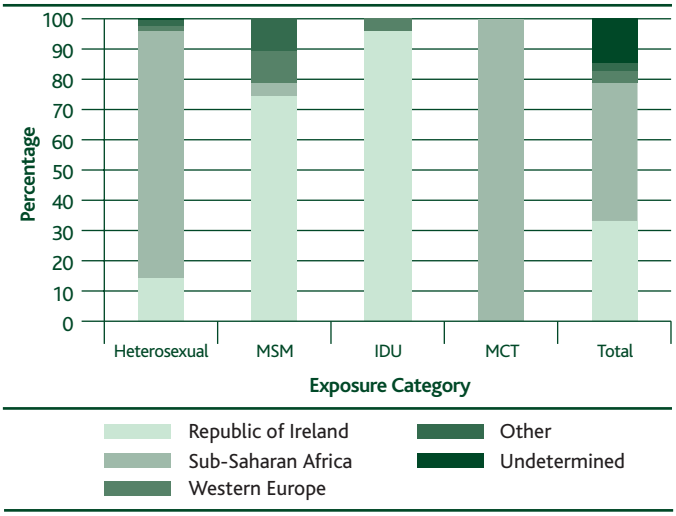

Figure 2: Newly diagnosed HIV infections in Ireland by exposure category and geographic origin (2003). (Geographic origin is based on country of birth for adults and country of birth of mother for children.)

Table 2: Newly diagnosed HIV infections in Ireland by exposure category and age group (2003)

Age group (years)	Exposure Category						
	Heterosexual	MSM	IDU	MCT	Other	Unknown	Total
0-9	-	-	-	10	-	-	10
10-19	13	1	2	2	2	1	21
20-29	92	15	23	-	2	16	148
30-39	95	36	18	-	1	15	165
40-49	16	16	4	-	-	6	42
50-59	5	5	-	-	-	-	10
60-69	-	1	-	-	-	1	2
70-79	-	1	-	-	-	-	1
Total	**221**	**75**	**47**	**12**	**5**	**39**	**399**

heterosexuals (66.5%) were female and the majority of IDUs (63.8%) were male. Of the 196 females with newly diagnosed HIV infection in 2003, 81 were pregnant at the time of HIV diagnosis. Information relating to pregnancy status is unavailable for 30 of the female cases.

A breakdown of cases by exposure category and age group is shown in table 2. Almost 80% were between 20 and 40 years of age and the mean age was 30.8 years. The mean age at HIV diagnosis was 27.7 years in females and 33.4 years in males, a difference of 5.7 years. The mean age at HIV diagnosis was 29.0 years in IDUs, 30.2 years in heterosexuals and 36.7 years in MSM.

Geographic origin

Analysis of 2003 cases by geographic origin is presented in figure 2. Classification by geographic origin is as used by EuroHIV. Geographic origin is based on the country of birth for adults and the country of birth of the mother for children. Of the 399 cases diagnosed in 2003, 133 were born in Ireland and 198 were born in sub-Saharan Africa. Information on geographic origin is unavailable for 41 of the newly diagnosed cases. Of the reported heterosexual cases, 82% were born in sub-Saharan Africa and 14% were born in Ireland. Seventy five percent of the newly diagnosed cases reported among MSM and 96% of the newly diagnosed cases reported among IDUs were born in Ireland.

Area of residence

Of the 399 cases newly diagnosed in 2003, 231 were resident in the ERHA area and 125 were resident outside the ERHA at the time of HIV diagnosis. Information on area of residence is unavailable for 43 of the 399 cases. By exposure category, 92% of IDUs, 62% of heterosexuals and 56% of MSM were resident in the ERHA area at HIV diagnosis.

Cumulative Total

The cumulative total of HIV cases reported in Ireland to December 2003 to 3,408. A breakdown of the cumulative cases can be seen in table 3.

AIDS cases and AIDS-related deaths

The total number of AIDS cases reported to the end of 2002 is 731 and the total number of AIDS-related deaths reported to the end of 2002 is 369. Information on AIDS and AIDS-related deaths reported during 2003 is currently being collated and will be published on the NDSC website.

Discussion

Between 1998 and 2003, there was a 243% increase in the number of HIV infections diagnosed annually in Ireland. This increase can largely be explained by a substantial rise in the number of heterosexually acquired cases, which increased from 47 new diagnoses in 1998 to 221 new diagnoses in 2003. Of the heterosexually acquired cases diagnosed in 2003, the majority were born in sub-Saharan Africa. A similar

Table 3: Cumulative total HIV infections diagnosed in Ireland by exposure category (to end of December 2003)

Exposure category	Cumulative Total to end of Dec 2003	
	Number	%
IDU	1131	33.2
Heterosexual	1164	34.2
MSM	764	22.4
Haemophiliac	106	3.1
Children	75	2.2
Prisoner	39	1.1
Blood Donor†	30	0.9
Transfusion Recipient	8	0.2
Occupational	6	0.2
Haemophiliac contact	4	0.1
Other	11	0.3
Unknown	70	2.0
Total	**3408**	**100.0**

situation is evident in many other western European countries where persons originating from sub-Saharan Africa bear a disproportionate share of the burden of the epidemic.[4] This is not surprising given that sub-Saharan Africa is the area of the world that is most severely affected by the global pandemic.[1]

The number of cases of HIV infection for which the exposure category is not reported has increased in recent years from 7 (2.3%) in 2001, to 23 (6.3%) in 2002 to 39 (9.8%) in 2003. This makes the analysis of data and interpretation of trends difficult. Neither HIV nor AIDS are currently statutorily notifiable in Ireland and the present HIV case based reporting system and AIDS reporting systems operate on a voluntary basis. The report, *A Review of Notifiable Diseases and the Process of Notification,* from the Notifiable Diseases Subcommittee of the Scientific Advisory Committee of the National Disease Surveillance Centre, in February 2001, recommended that HIV/AIDS should be a statutorily notifiable.[5] In order to bring this about, a change in legislation would be required. The issue of incomplete reporting and statutory notification of HIV/AIDS is currently under review by the National AIDS Strategy Committee.

The increase in HIV infections diagnosed among MSM in Ireland may be a reflection of increasing risky sexual behaviour in this group. Recent increases in rates of syphilis and gonorrhoea and rises in HIV-related risk behaviours among MSM have been reported in Western Europe.[6] Concern has also been raised in the United States over a resurgence of risky sexual behaviours and infections among MSM.[7] In 2000, a syphilis outbreak was identified in Ireland, which occurred mainly among MSM in Dublin.[8] Because syphilis infection facilitates acquisition and transmission of HIV, this recent outbreak of syphilis among MSM in Dublin raises concerns about potential increases in HIV transmission in this group.

It has been clearly shown that transmission of the HIV virus from mother to child can be dramatically reduced or prevented by antenatal screening and treatment of HIV positive women with antiretroviral drugs and by careful management of the delivery.[9] In April 1999, the Department of Health and Children officially launched the national linked antenatal HIV screening programme in Ireland. This programme recommends that HIV testing be offered to all women who attend for antenatal care. The NDSC collects data on the linked antenatal HIV testing programme from maternity units/hospitals on a quarterly basis and provisional data for 2002 are published on the NDSC website.[10] Data are available in respect of 53,929 women who were offered the antenatal HIV test in 2002. Of these 53,929 women, 51,144 availed of the test (an uptake rate of 94.8%). Of the 51,144 women tested, 156 were identified as HIV positive. Of these, 113 (72.4%) were new diagnoses, that is, they had not been previously aware of their HIV status. Once diagnosed, these women have the opportunity to avail of treatment, which will dramatically reduce or even prevent the transmission of HIV to their babies.

These provisional data highlight the effectiveness of the antenatal HIV testing programme in Ireland.

The majority of people diagnosed with HIV infection in 2003 were aged between 20 and 40 years. There was a notable difference in age distribution between the sexes and 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.[1] The availability of routine antenatal HIV screening in Ireland and differences in health seeking behaviour may result in women being diagnosed at an earlier stage than their male counterparts.

A disproportionately high number of newly diagnosed HIV infections were resident in the ERHA area at time of HIV diagnosis. In 2003, the rate in the ERHA was 164.8 per million population compared to 49.7 per million population in the rest of the country. In particular, the rate of newly diagnosed HIV in the ERHA among those whose probable route of HIV transmission was IDU was 30.7 per million population compared to 1.6 per million population in the rest of the country.

It is important to note that the data presented does not represent HIV incidence but reflects the number of new diagnoses in a given time period, which is dependent on uptake of HIV testing. In the UK, it is estimated that 31% of HIV infected people remain unaware of their HIV status.[4]

This report highlights the continued increase in the annual number of newly diagnosed HIV infections in Ireland and emphasises the ongoing need for appropriate prevention and treatment and care programmes for all risk groups in Ireland.

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References

1. UNAIDS. *2004 Report on the global AIDS epidemic: 4th global report*. Geneva: UNAIDS, 6 July 2004. Available at http://www.unaids.org/bangkok2004/report.html
2. AIDS strategy 2000. National AIDS strategy committee. Department of Health and Children.
3. NDSC. Newly diagnosed HIV infection in Ireland, Quarter 3&4 2003 & 2003 annual summary. Available at http://www.ndsc.ie/Publications/
4. Hamers F, Downs A. The changing face of the HIV epidemic in western Europe: what are the implications for public health policies? Lancet 2004; **364**: 83-94.
5. Notifiable diseases sub-committee of the scientific advisory committee. National Disease Surveillance Centre. Review of notifiable diseases and the process of notification. NDSC, 2001.
6. Nicoll A., Hamers F., Are trends in HIV, Gonorrhea and Syphilis worsening in Western Europe. *BMJ* 2002; **324**:1324-1327.
7. Centers for Disease Control and Prevention. Resurgent bacterial sexually transmitted disease among men who have sex with men. King County, Washington 1997-1999 *Morb Mortal Wkly Rep MMWR* 1999; **48**:773-777.
8. Domegan L., Cronin M. Enhanced Surveillance of Syphilis, 2000-2002. *Epi-Insight* 2004; **5** (1)
9. Connor EM *et al*. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. *N Engl J Med*. 1994; **331**(18):1173-1180.
10. NDSC. Available at http://www.ndsc.ie/DiseaseTopicsA-Z/AntenatalHIVTesting/

Sexually Transmitted Infections in Ireland

Key Points

Quarterly STI data (2002)

- Total number of notified STIs increased by 8% in 2002, compared to 2001
- Three most commonly notified STIs in 2002 were ano-genital warts, non-specific urethritis and *Chlamydia trachomatis*
- Largest increases during 2002, compared to 2001, were observed for infectious hepatitis B, molluscum contagiosum and non-specific urethritis
- Gonorrhoea notifications decreased by 39% during 2002, compared to 2001

Syphilis enhanced surveillance data (2000-2003)

- Following the syphilis outbreak that occurred between 2000 and 2002, there remains a high level of endemic syphilis in 2003

Introduction

During 2002, 14 sexually transmitted infections (STIs) were legally notifiable in Ireland: ano-genital warts, candidiasis, chancroid, *Chlamydia trachomatis*, genital herpes simplex, gonorrhoea, granuloma inguinale, infectious hepatitis B, lymphogranuloma venereum, molluscum contagiosum, non-specific urethritis, *Pediculosis pubis*, syphilis and trichomoniasis. This list of notifiable STIs was updated in January 2004 *(Infectious Diseases (Amendment) (No. 3) Regulations 2003, S.I. No. 707 of 2003)*, however this report details the 14 STIs that were notifiable during 2002.

Aggregate data on the number of notified STIs from Departments of Public Health is collated quarterly. Departments of Public Health are notified of STIs mostly from STI clinics and some GPs. The number of STIs notified by quarter, health board, age group and gender for 2002 are presented in this report. Rates per 100,000 population are based on the 2002 population census, unless otherwise stated. It should be noted that cases of infectious hepatitis B that are sexually transmitted may also be reported through the weekly infectious disease notification system. Please note that quarterly STI data is only available from Q1 1995 & annual STI data is only available from 1989. This report also briefly summarises provisional syphilis data reported through the enhanced syphilis surveillance system between January 2000 and December 2003.

During 2002, the total number of notified STIs increased by

Table 1: Notified sexually transmitted infections for 2002 and 2001

Sexually Transmitted Infection	2002	2001	Increase	% Increase
Ano-Genital Warts	3932	3993	-61	-1.53
Candidiasis	1351	1150	201	17.48
Chancroid	1	1	0	0.00
Chlamydia Trachomatis	1922	1649	273	16.56
Genital Herpes Simplex	358	331	27	8.16
Gonorrhoea	214	349	-135	-38.68
Granuloma Inguinale	0	0	0	0.00
Infectious Hepatitis B	57	39	18	46.15
Lymphogranuloma Venereum	1	0	1	-
Molluscum Contagiosum	150	111	39	35.14
Non-Specific Urethritis	2025	1634	391	23.93
Pediculosis Pubis	84	103	-19	-18.45
Syphilis	303	279	24	8.60
Trichomoniasis	73	64	9	14.06
Total	**10471**	**9703**	**768**	**7.92**

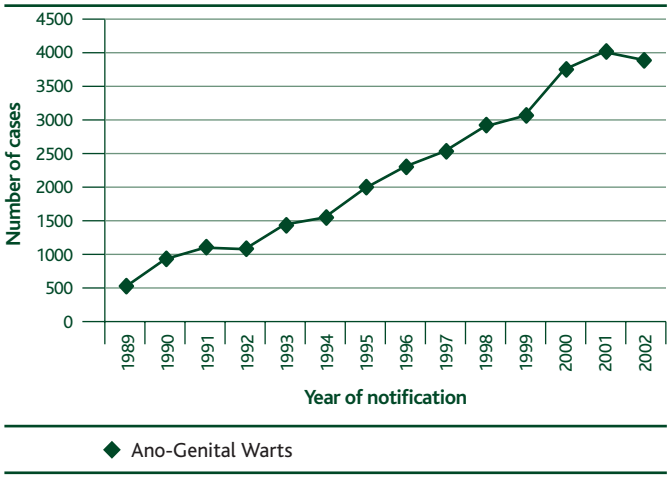

Figure 1a

Figure 1: Number of notifications of ano-genital warts, non-specific urethritis, C. trachomatis, genital herpes simplex, gonorrhoea, syphilis & infectious hepatitis B, by year between 1989 and 2002.

7.9%, when compared to 2001. A comprehensive report on STIs notified in Ireland in 2002 is available on the NDSC website.[1, 2] During 2003, a high level of endemic syphilis was identified through the syphilis enhanced surveillance system.

Materials and methods

Aggregate STI data is collated quarterly from STI clinics including age group, gender and diagnosis. Rates per 100,000 population for 1989 to 1993 are based on the 1991 population census; rates for 1994 to 1999 are based on the 1996 population census and rates for 2000 to 2002 are based on the 2002 population census.

The enhanced syphilis surveillance system was set up to capture data on all syphilis cases from January 2000 including age, gender, country of birth and health board of diagnosing clinic. Clinical details and at risk behaviour data were also collected.

Results

Notified STIs between 1989 and 2002

During 2002, 10471 STIs were notified compared to 9703 in 2001, a 7.9% increase (table 1). Notified STIs have been increasing steadily each year since 1994, increasing by 157.1% between 1994 and 2002 and by 370.0% between 1989 and 2002. The number of STIs notified in 2002 is the highest number reported in any year on record. Notified cases of candidiasis, *C. trachomatis*, genital herpes simplex, infectious hepatitis B, lymphogranuloma venereum, molluscum contagiosum, non-specific urethritis, syphilis and trichomoniasis all increased during 2002, compared to 2001. Ano-genital warts, gonorrhoea and *P. pubis* notifications all decreased in 2002, compared to 2001. Significantly, notified cases of infectious hepatitis B increased by 46.2% and gonorrhoea decreased by 38.7%. No cases of granuloma inguinale were notified in 2002 or 2001. Notifications of chancroid remained constant. The cumulative rate per 100,000 population for all notified STIs increased in 2002 to 267.3 per 100,000 population; compared to a rate of 247.7 per 100,000 in 2001. Annual trends for ano-genital warts, non-specific urethritis, *C. trachomatis*, genital herpes simplex, gonorrhoea, syphilis and infectious hepatitis B are presented in figure 1.

Notified STIs by quarter, 2002

The total number of notified STIs in 2002 peaked during Q2 (table 2). Syphilis peaked during Q1 and ano-genital warts, candidiasis, genital herpes simplex, gonorrhoea, lymphogranuloma venereum, molluscum contagiosum and trichomoniasis peaked during Q2 2002. Chancroid and non-specific urethritis peaked during Q3 2002. *C. trachomatis* and *P. pubis* reached their highest numbers for 2002 during Q4. Infectious hepatitis B peaked during quarters 3 and 4 in 2002.

Notified STIs by health board, 2002

During 2002, 42.4% (4434) of all STI notifications were from the ERHA, 16.4% (1721) from the MWHB, 15.4% (1617) from the SHB, 11.0% (1147) from the WHB, 8.7% (906) from the

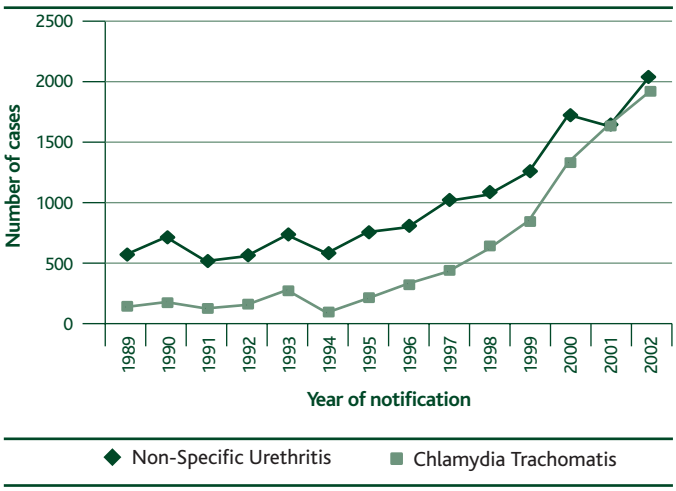

Figure 1b

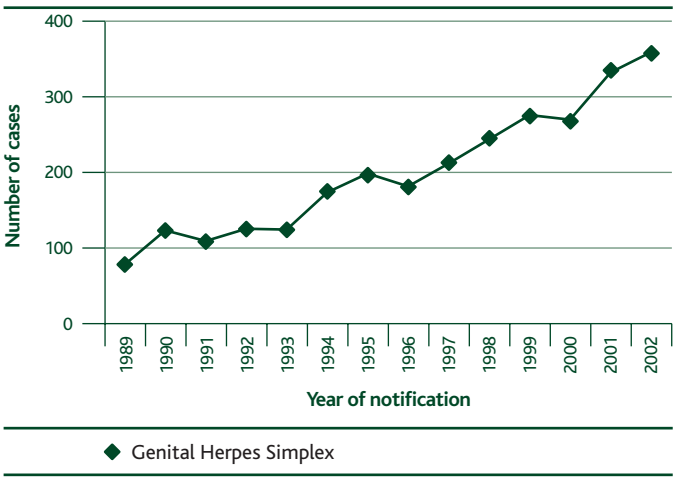

Figure 1c

SEHB, 6.1% (637) from the NWHB, 0.07% (7) from the MHB and 0.02% (2) from the NEHB (table 3). It is important to note that STI surveillance is mainly clinic based and there are currently no STI clinics in the MHB and NEHB. The majority of all notifiable STIs in 2002 were notified from the ERHA: chancroid (n=1; 100.0%), lymphogranuloma venereum (n=1; 100.0%), syphilis (n=243; 80.2%), trichomoniasis (n=49; 67.1%), genital herpes simplex (n=220; 61.5%), gonorrhoea (n=120; 56.1%), infectious hepatitis B (n=30; 52.6%), molluscum contagiosum (n=72; 48.0%), *C. trachomatis* (n=910; 47.4%), candidiasis (n=546; 40.4%), ano-genital warts (n=1588; 40.4%) and *P. pubis* (n=24, 28.6%). The majority of notifications of non-specific urethritis (n=691; 34.1%) in 2002 were from the MWHB. STI notifications have increased in all health boards in 2002, compared to 2001, with the exception of the ERHA, where notifications decreased by 9.9%.

Notified STIs by age group and gender, 2002

Where the age group was known (n=6013, 57.4%), 12.2% (736) of notified STIs were 0 to 19 years old, 61.3% (3683) were 20 to 29, 18.3% (1099) were 30 to 39 and 8.2% (495) were aged 40 years of age or older, in 2002. For all STIs, the 20-29 year age group represented the largest age group, with the exception of syphilis and lymphogranuloma venereum where the majority of cases were aged between 30 and 39 years of age (table 4).

Forty-eight percent (5066) of all notified STIs were amongst males during 2002, whilst 50.6% (5298) were amongst females (table 4). Gender data was not reported for 107 (1.0%) notifications. The majority of cases of lymphogranuloma venereum (100.0%), syphilis (71.0%), trichomoniasis (61.6%), non-specific urethritis (58.9%), *P. pubis* (58.3%) and molluscum contagiosum (50.7%) were amongst males. The majority of notifications of chancroid (100.0%), infectious hepatitis B (68.4%), genital herpes simplex (57.8%), gonorrhoea (57.0%), candidiasis (55.9%), ano-genital warts (53.5%) and *C. trachomatis* (53.0%) were amongst females.

STI notifications: disease-specific trends, 2002

Ano-genital warts

In 1989, 505 (14.3/100,000) ano-genital warts cases were notified, increasing to 1066 (30.2/100,000) in 1992. Notifications have increased each year since 1992, reaching 3993 (101.9/100,000) in 2001. In 2002 (n=3932), notifications decreased slightly by 1.5%, compared to 2001. From Q1 2001 to Q4 2002, notified cases of ano-genital warts have remained stable, with a mean of 991 cases per quarter. In 2002, males accounted for 44.8% of cases and females for 53.5% of cases (gender was not reported for 1.7% cases). Where the age group was known (in 55.2% of cases), 0-19 year olds accounted for 13.9% of cases, 65.6% of cases were 20-29, 15.2% were 30-39 and 5.3% were aged 40 years or older. Ano-genital warts accounted for the majority (37.6%) of all STI notifications in 2002.

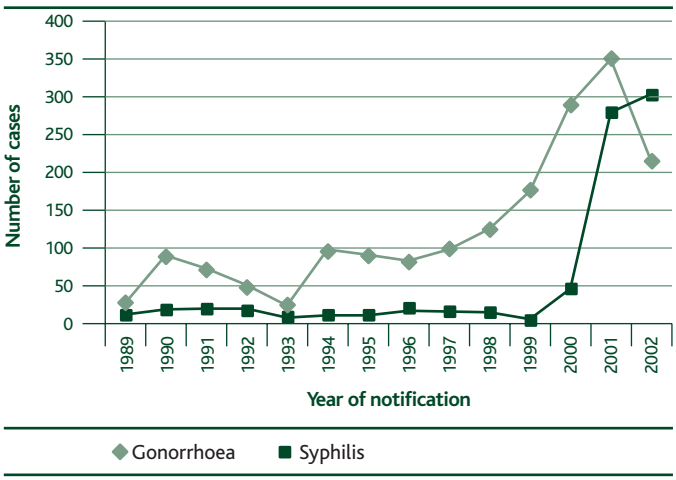

Figure 1d

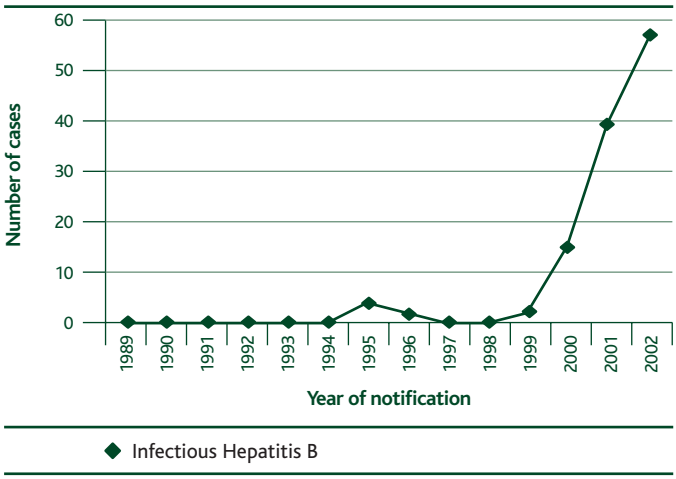

Figure 1e

Candidiasis

Between 1990 and 1997, the mean number of notified candidiasis cases was 1293 per year, peaking in 1997 at 1521 cases (42.0/100,000). Notified cases decreased each year between 1997 and 2000, reaching 1095 in 2000 (28.0/100,000). During 2001 & 2002, this decreasing trend was reversed, with 1150 (29.4/100,000) and 1351 (34.5/100,000) candidiasis cases notified, respectively. Candidiasis accounted for 12.9% of all STI notifications in 2002. In 2002, 34.5 candidiasis cases per 100,000 population were notified, a decrease from the rate of 29.4 per 100,000 in 2001. During 2002, the number of male cases increased by 246.5% and the number of female cases decreased by 29.5%, compared to 2001. In 2002, males accounted for 43.6% of cases and females for 55.9% (gender was not reported for 7 cases). Where the age group was known (in 60.8% of cases) in 2002, 0-19 year olds accounted for 11.7% of cases, 20-29 year olds for 55.5%, 30-39 year olds for 20.6% and 12.2% were aged 40 years or older.

Chancroid

One case of chancroid was notified during 2002, in Q3 2002. With the exception of the year 2000 (when 16 cases were notified), between 0 and 3 cases of chancroid were notified each year between 1989 and 2002.

Chlamydia trachomatis

From 1989 to 1995, the number of notified cases of *C. trachomatis* generally remained stable fluctuating around a mean of 205 per year. In 1995 there was a marked increase of 84.2% on the previous year (from 133 cases, 3.7/100,000 to 245 cases, 6.8/100,000). Since 1995 there has been an increasing number of cases reported each year reaching 1922 in 2002 (49.1/100,000). Notified cases have increased by 684.5% between 1995 and 2002 and by 16.6% between 2001 and 2002. During Q4 2002, 546 (13.9/100,000) cases of *C. trachomatis* were notified, the highest number notified in any one quarter on record. The number of male and female notifications increased by 15.0% and 16.7%, respectively, in 2002, compared to 2001. Fifty-three percent of cases were female and 45.8% were male (gender was not reported in 24 cases) in 2002. Where the age group was known (in only 49.2% of cases), 0-19 year olds accounted for 16.0% of cases, 20-29 year olds for 68.0%, 30-39 year olds for 12.8% and 3.2% were 40 years of age or older in 2002.

Genital herpes simplex

Genital herpes simplex notifications have been increasing gradually since 1989, with 78 (2.2/100,000) cases notified in 1989 and 358 (9.1/100,000) in 2002. During 2002, there was an increase of 8.2% in the number of notified cases, compared to 2001. During 2002, the number of male cases increased by 24.2% and the number of female cases increased by 0.5%, when compared to 2001. In 2002, where the age group was known (in 41.9% of cases), 0-19 year olds accounted for 12.0% of cases, 20-29 year olds for 58.7%, 30-39 year olds for 23.3% and 6.0% were 40 years of age or older.

Table 2: Notified sexually transmitted infections by quarter from Q1 1999 to Q4 2002

Sexually Transmitted Infection	1999				2000				2001				2002			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Ano-Genital Warts	762	905	671	711	953	952	832	998	1060	1025	974	934	1017	1027	939	949
Candidiasis	269	263	273	300	317	262	272	244	222	282	347	299	324	383	311	333
Chancroid	0	0	0	1	0	3	5	8	1	0	0	0	0	0	1	0
Chlamydia Trachomatis	169	295	152	253	309	346	310	378	375	379	441	454	433	460	483	546
Genital Herpes Simplex	94	53	38	90	75	50	74	70	97	73	72	89	84	103	90	81
Gonorrhoea	21	55	59	40	54	50	96	90	86	100	89	74	48	60	59	47
Granuloma Inguinale	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Infectious Hepatitis B	2	0	0	0	0	0	5	10	7	10	9	13	10	13	17	17
Lymphogranuloma Venereum	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0
Molluscum Contagiosum	23	29	10	21	33	37	21	27	35	38	19	19	34	49	40	27
Non-Specific Urethritis	243	389	304	329	425	385	404	512	400	421	407	406	470	497	530	528
Pediculosis Pubis	35	25	21	32	37	38	25	38	30	30	19	24	23	18	17	26
Syphilis	2	1	1	2	2	7	21	16	49	72	87	71	85	64	82	72
Trichomoniasis	10	15	9	13	18	15	27	18	15	11	16	22	13	31	14	15
Total	**1630**	**2030**	**1541**	**1792**	**2223**	**2145**	**2092**	**2409**	**2377**	**2441**	**2480**	**2405**	**2541**	**2706**	**2583**	**2641**

Gonorrhoea

Two hundred and fourteen gonorrhoea cases were notified in 2002. The total number of gonorrhoea notifications decreased by 38.7% in 2002, compared to 2001. During 2002, the number of male cases decreased by 66.0% and the number of female cases increased by 48.8%, when compared to 2001. Where the age group was known (in 52.8%), 0-19 year olds accounted for 11.5% of cases, 20-29 year olds for 60.2%, 30-39 year olds for 17.7% and those aged 40 years or older for 10.6% of cases in 2002. Prior to the recent quarterly decreases in gonorrhoea notifications (in Q4 2001 & in 2002), reported notifications of gonorrhoea increased consistently between 1996 and 2001, increasing from 83 (2.3/100,000) in 1996 to 349 (8.9/100,000) in 2001.

Granuloma Inguinale

No cases of granuloma inguinale were notified during 2002. The number of cases of granuloma inguinale has ranged from 0 to 6 cases per year, between 1989 and 2002.

Infectious Hepatitis B

Between 1989 and 1999, infectious hepatitis B cases reported through the STI quarterly notification system ranged from 0 to 4 cases per year. Between 1999 and 2000, there was a 650.0% increase in notifications, when 15 cases were notified in the last 2 quarters of 2000. During 2001, this increase continued with 39 cases reported, a 160.0% increase on 2000. Fifty-seven cases were notified in 2002, the highest yearly total on record, increasing by 46.2%, compared to 2001. The number of male cases decreased by 40.0% in 2002, compared to 2001. However, the number of female cases increased dramatically by 333.3%. Thirty-two percent (31.6%) of cases notified in 2002 were male and 68.4% were female. Where the age group was known (in 56.1%), 6.3% of cases were aged between 0 and 19 years, 20-29 year olds accounted for 53.1%, 28.1% were 30-39 year olds and 12.5% of cases were aged 40 years or older in 2002.

Lymphogranuloma venereum

Only one case of lymphogranuloma venereum was notified during 2002, in Q2 2002. The number of notified cases of lymphogranuloma venereum ranged from 0 to 5 cases per year, between 1989 and 2002.

Molluscum contagiosum

Notified cases of molluscum contagiosum have increased gradually between 1989 and 2002, increasing from 31 (0.9/100,000) in 1989 to 150 (3.8/100,000) in 2002. Following a slight decrease of 5.9% in 2001, notifications of molluscum contagiosum increased by 35.1% in 2002, compared to 2001. During 2002, 50.7% of cases were male and 49.3% were female. Male cases increased by 11.8% in 2002, compared to 2001 and female cases increased by 72.1%. Where the age group was known (in 48.0% of cases), 0-19 year olds accounted for 13.9% of cases, 65.3% were 20-29, 9.7% were 30-39 and 11.1% were aged 40 years or older in 2002.

Table 3: Notified sexually transmitted infections by health board for 2002

Sexually Transmitted Infection	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
Ano-Genital Warts	1588	0	490	0	272	418	703	461	3932
Candidiasis	546	0	195	1	84	74	182	269	1351
Chancroid	1	0	0	0	0	0	0	0	1
Chlamydia Trachomatis	910	1	237	0	49	170	333	222	1922
Genital Herpes Simplex	220	0	23	0	6	22	48	39	358
Gonorrhoea	120	0	34	0	5	20	16	19	214
Granuloma Inguinale	0	0	0	0	0	0	0	0	0
Infectious Hepatitis B	30	1	17	0	0	1	5	3	57
Lymphogranuloma Venereum	1	0	0	0	0	0	0	0	1
Molluscum Contagiosum	72	0	11	0	2	24	31	10	150
Non-Specific Urethritis	630	0	691	0	205	158	251	90	2025
Pediculosis Pubis	24	0	9	0	7	10	18	16	84
Syphilis	243	5	8	1	5	7	20	14	303
Trichomoniasis	49	0	6	0	2	2	10	4	73
Total	**4434**	**7**	**1721**	**2**	**637**	**906**	**1617**	**1147**	**10471**

Non-specific urethritis

Non-specific urethritis notifications fluctuated around a mean of 640 per year between 1989 and 1994. Between 1994 and 2000 notifications increased steadily each year, from 610 in 1994 to 1726 in 2000, an increase of 183.0%. This steady increase was followed by a slight dip in 2001 with notifications decreasing by 5.3%, compared to 2000. This decrease was reversed in 2002, with notifications increasing by 23.9%, compared to 2001. During 2002, the number of female cases increased by 125.8% and the number of male cases decreased by 5.7%, compared to 2001. Where the age group was known (in 66.5% of cases), 0-19 year olds accounted for 9.4% of cases, 60.7% were 20-29, 20.9% were 30-39 and 9.0% were aged 40 years or older in 2002. Non-specific urethritis accounted for 19.3% of all STI notifications in 2002.

Pediculosis pubis

P. pubis notifications fluctuated around a mean of 72 cases per year between 1989 and 1995. Following this, notifications increased gradually between 1996 and 2000, with 79 (2.2/100,000) cases notified in 1996 and 138 (3.5/100,000) cases in 2000. This increasing trend was reversed in 2001, when 103 (2.6/100,000) cases were notified, the lowest number notified since 1997. The decreasing trend was continued in 2002, with 84 cases notified, a decrease of 18.5% compared to 2001. During 2002, male cases decreased by 30.0%, however female cases increased by 12.9%, compared to 2001. Where the age group was known in 2002 (in 65.5% of cases), 0-19 year olds accounted for 18.2% of cases, 60.0% were 20-29, 16.4% were 30-39 and 5.5% were aged 40 years or older.

Syphilis

The data reported in this paragraph refers to syphilis cases notified through the quarterly STI notification system. Enhanced syphilis data is detailed elsewhere in this report. There was a dramatic increase in syphilis amongst men who have sex with men (MSM) in Dublin beginning in early 2000.[3, 4] This was against a low incidence of syphilis nationally throughout the 1990s, which in 1999 reached its lowest level in 10 years (6 cases, 0.2/100,000). Between Q2 and Q3 2000, syphilis notifications increased significantly by 200.0% (from 7, 0.2/100,000 to 21, 0.5/100,000). A total of 46 (1.2/100,000) syphilis cases were notified through the STI quarterly notification system in 2000, the highest number on record prior to this. In 2001, 279 (7.1/100,000) syphilis cases were notified, an increase of 506.5% compared to 2000, peaking in Q3 2001. Three hundred and three syphilis cases (7.7/100,000) were notified through the STI quarterly notification system in 2002. Although, syphilis notifications increased by 8.6% in 2002, compared to 2001, the steadily increasing trend observed between Q4 2000 and Q3 2001, did not continue in 2002, with an undulating pattern being observed during 2002 (figure 1). During 2002, male cases decreased by 6.5% and female cases increased by 85.1%, compared to 2001. Where the age group was known (in 92.4% of cases), 2.1% of cases were aged between 0 and 19

Table 4: Notified sexually transmitted infections by age group (years) & gender for 2002

Sexually Transmitted Infection	0-19	20-29	30-39	40+	Age unknown	Male	Female	Gender unknown	Total
Ano-Genital Warts	302	1424	330	114	1762	1761	2103	68	3932
Candidiasis	96	456	169	100	530	589	755	7	1351
Chancroid	0	0	0	0	1	0	1	0	1
Chlamydia Trachomatis	151	643	121	30	977	880	1018	24	1922
Genital Herpes Simplex	18	88	35	9	208	149	207	2	358
Gonorrhoea	13	68	20	12	101	90	122	2	214
Granuloma Inguinale	0	0	0	0	0	0	0	0	0
Infectious Hepatitis B	2	17	9	4	25	18	39	0	57
Lymphogranuloma Venereum	0	0	1	0	0	1	0	0	1
Molluscum Contagiosum	10	47	7	8	78	76	74	0	150
Non-Specific Urethritis	127	818	281	121	678	1193	831	1	2025
Pediculosis Pubis	10	33	9	3	29	49	35	0	84
Syphilis	6	74	114	86	23	215	87	1	303
Trichomoniasis	1	15	3	8	46	45	26	2	73
Total	**736**	**3683**	**1099**	**495**	**4458**	**5066**	**5298**	**107**	**10471**

years, 26.4% were 20-29, 40.7% were 30-39 and 30.7% were aged 40 years or older in 2002. The age group of syphilis cases is markedly different to most other STIs notified, with the majority of cases aged between 30 and 39 years of age.

Trichomoniasis

The mean number of trichomoniasis notifications reported per year between 1989 and 2002 was 68, peaking in 1991 at 163 (4.6/100,000). During 2002, 73 (1.9/100,000) cases were notified, an increase of 14.1% compared to 2001 when 64 (1.6/100,000) cases were notified. In 2002, male trichomoniasis notifications increased dramatically by 221.4%, however female cases decreased by 46.9%, compared to 2001. Where the age group was known (in 37.0% of cases), 3.7% of cases were aged between 0 and 19 years, 55.6% were 20-29, 11.1% were 30-39 and 29.6% were 40 years of age or older in 2002.

Enhanced surveillance of syphilis (January 2000 to December 2003, provisional data)

A total of 874 syphilis cases have been reported to NDSC through the syphilis enhanced surveillance system between January 2000 and December 2003, peaking in 2001. Of the total 874 cases reported, 88.7% (775) have been reported from the ERHA. Sixty-eight percent of the 874 cases were early (infectious)[*] syphilis and 32% were late[†] syphilis cases. Seventy-two percent of cases were male and 27.8% were female. The mean age for male and female cases was 36.0 and 29.7 years, respectively. Fifty-nine percent of all syphilis cases were amongst MSM: 416 were homosexual and 53 were bisexual. Forty-one percent of cases were heterosexual: 137 male and 194 female. One hundred and forty-four (16.5%) syphilis cases were HIV positive, 93 of these cases were early (infectious) syphilis cases and 44 were late syphilis cases. Four percent of cases were newly diagnosed HIV cases. Twenty-two percent of early (infectious) syphilis cases had one or more concurrent STI (excluding HIV). Over, 2% of infectious syphilis cases had two or more concurrent STIs. One hundred female cases were identified through antenatal screening, 67.0% were late syphilis cases, 23.0% were early syphilis cases and 10.0% were of unknown syphilis stage. Seventy-nine cases identified through antenatal screening were non-nationals, seven were Irish nationals and 14 were of unknown nationality. Five of these cases were HIV positive. Six congenital syphilis cases have been reported to NDSC since January 2000.

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

[†]*Late syphilis cases refer to late latent and tertiary syphilis cases*

Discussion

The increase in STIs in Ireland during 2002 is likely to be associated with an increase in unsafe sexual behaviour. Anecdotal evidence also suggests that improved acceptability of STI clinic services, greater public and professional awareness of STIs and improvements in diagnostic tests have contributed to the increases in identification and reporting of STIs.

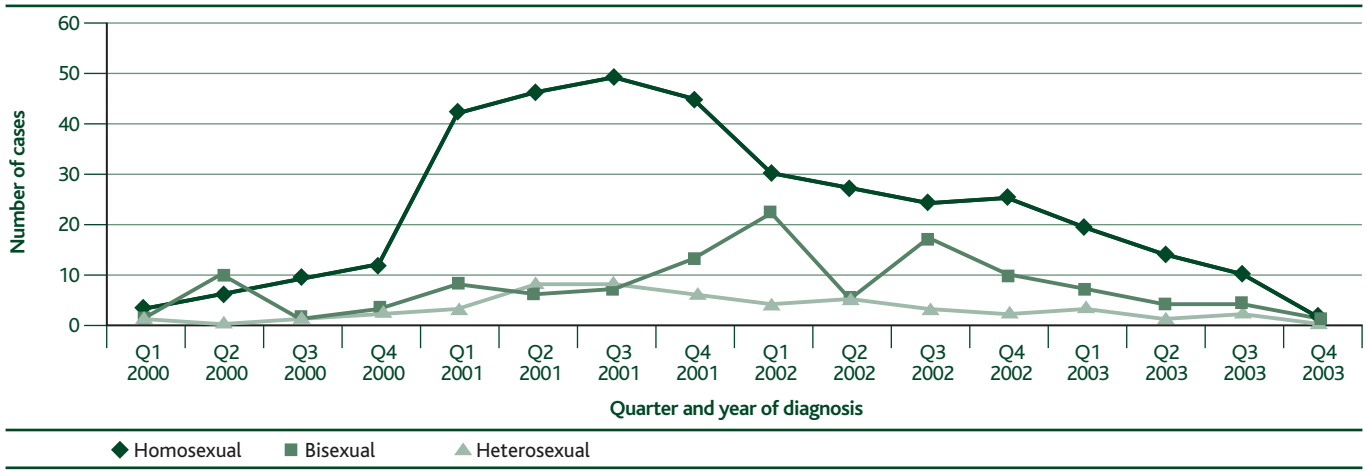

Figure 2: Early (infectious) syphilis cases by sexual orientation and quarter and year of diagnosis, as reported through the syphilis enhanced surveillance system. Please note that 2003 data is provisional and incomplete.

Recently concern has been raised over a resurgence of STIs, particularly amongst MSM. There was a dramatic increase in syphilis amongst MSM in Dublin during 2000. This was against a low incidence of syphilis throughout the 1990s. Syphilis, like other genital ulcer diseases, increases the risk of transmitting and acquiring HIV. In response to this increase in syphilis the Director of Public Health in the ERHA established an outbreak control team in October 2000. The outbreak amongst MSM in Dublin peaked in Q3 2001 and there now remains a high level of endemicity.[3, 4] The increase observed in female syphilis cases during 2002 was partly due to cases identified through antenatal screening, as reported through the syphilis enhanced surveillance system. The peak in gonorrhoea notifications observed in 2001, coincided with the outbreak of syphilis amongst MSM. Gonococcal infections tend to be concentrated in core risk groups, such as MSM. During 2002, the decrease in gonorrhoea notifications observed, particularly amongst men, coincided with the decrease in reported syphilis cases amongst MSM. Gonorrhoea and syphilis co-infections were reported through the syphilis enhanced surveillance system, during the syphilis outbreak. The decreases in gonorrhoea and syphilis notifications in male cases in 2002 may have resulted from the interventions put in place to control the syphilis outbreak.

The true rates of chlamydial infections are likely to be higher than those presented in this report, due to the pool of undiagnosed asymptomatic infection. Increased testing for chlamydial infection and the availability of sensitive and specific tests using nucleic acid amplification may also have influenced the increase in *C. trachomatis* notifications.

The dramatic increase in infectious hepatitis B notifications since 1999 may reflect the introduction of screening programmes. Asylum seekers currently undergo voluntary health screening, which includes testing for hepatitis B infection. The high proportion of female cases notified may also be a result of antenatal screening of pregnant women in some maternity hospitals.[5] Information currently reported on hepatitis B is inadequate. More detailed information (including risk factor details) gathered through enhanced surveillance is necessary to monitor and inform prevention and control strategies and to plan services.

STI surveillance is mainly clinic-based, although some notifications also come from primary care. The health board data presented in this report represent the proportion of STIs notified by each health board and do not necessarily reflect cases among *residents* of a particular health board area. People may travel from their area of residence to STI clinics outside their area, for example, there are no STI clinics in the MHB or NEHB and this is reflected in the very small numbers of STIs reported from these health boards. The decrease in reported cases from the ERHA may not represent an actual decline in incidence or diagnosis of STIs in the ERHA but may reflect incomplete reporting as people may be opting to attend local services e.g. General Practitioners and cases may not be reported. Modern STI control and policy-making

requires behaviourally and geographically targeted interventions. STI surveillance systems should collect data from *all* sites where STIs are identified including general practice and should include a range of behavioural, geographical, clinical and microbiological information. A subcommittee of the Scientific Advisory Committee of NDSC is currently undertaking a review of STI surveillance in Ireland and will make recommendations in this regard. [1, 2]

Acknowledgements

NDSC would like to thank all those who provided data for this report, particularly the STI clinics, GPs, Departments of Public Health and the Syphilis Outbreak Control Team.

References

1. Domegan L., Jackson S., Cronin M. Report on sexually transmitted infections, Quarter 4 2002 & 2002 annual report. Available on the NDSC website http://www.ndsc.ie/Publications/STIQuarterlyReports/
2. Domegan L., Jackson S., Cronin M. Sexually transmitted infections in Ireland, 2002. *Epi-insight*. June 2004; **5** (6). http://www.ndsc.ie/Publications/EPI-Insight/
3. Domegan L., Cronin M. Enhanced surveillance of syphilis, 2000-2002. *Epi-insight*. January 2004; **5** (1). http://www.ndsc.ie/Publications/EPI-Insight/
4. Domegan L., Cronin M., Thornton L., Creamer E., O'Lorcain P., Hopkins S. Enhanced surveillance of syphilis in Ireland. *Epi-insight*. July 2002; **3** (7). http://www.ndsc.ie/Publications/EPI-Insight/
5. NDSC. National Disease Surveillance Centre Annual Report, 2002. Viral Hepatitis, 2002. http://www.ndsc.ie/Publications/AnnualReports/

Information and Communications Technology and Website

NDSC's information and communication technology activities continued to grow in 2003. IT staff are responsible for the management, purchase and support of the following systems and functions:

- information security
- network systems and infrastructure
- NDSC website
- e-mail system
- telephone system and fax machines
- mobile phones
- mobile computing equipment
- building access control system
- security system

Additional IT systems deployed in 2003 include:

- Blackberry wireless email devices
- Visiontime flexitime software
- monitoring and logging system for internet traffic
- connection to the Government Virtual Private Network (VPN)
- infrastructure for the CIDR system

Information Governance

During 2003 the NDSC Board agreed funding for the organisation to work towards attaining certification to the Information Security standard IS17799/BS7799. The decision was taken due to the continuing growth of NDSC, increasing volumes of data and information held by NDSC, and requirements of the Computerised Infectious Disease Reporting (CIDR) system.

The standard is very broad based and requires an organisation to address all aspects of security including physical access to its facilities, document handling and storage, secure communication in all formats and security of IT systems.

To comply with the standard NDSC must show that it has appropriate policies, procedures and equipment in place to protect its information resources. One of NDSC's core activities is the exchange of medical information with partner organisations. It is therefore vital that NDSC ensures the data it holds on behalf of others is stored, processed and transmitted securely.

The National Disease Surveillance Centre became the first public body in Ireland to be awarded an IS 17799 certificate for information security in April 2004.

Website

The NDSC website (www.ndsc.ie) continues to be one of the most important communications tools available to NDSC. A wide range of information is published on the web site, including electronic versions of all reports produced by the NDSC, weekly and annual infectious disease statistics, disease specific fact sheets, press releases and other general information.

The level of use of the site increased significantly during the year. In the last quarter of 2002 the average number of logons to the site per day was 575 compared with 789 users per day in the last quarter 2003.

Measles, 2003

Key Points

- **There was increased measles activity in 2003**
- **The crude incidence rate of measles per 100,000 population in 2003 was 14.6 compared to 6.2 in 2002**
- **Ireland has a high measles incidence rate compared to many other developed countries**
- **Ireland needs to develop and implement a measles elimination plan to meet the WHO target of 2010 as the year for achieving measles elimination in the WHO European Region**

Introduction

Measles is an acute viral infectious disease. The onset of illness is characterised by high fever, cough, coryza (runny nose) and conjunctivitis. Approximately two to four days after onset of illness a rash appears and usually lasts four to seven days. Complications of measles can occur and include pneumonia, otitis media and encephalitis. Measles results in death in approximately one to two cases per 1000 population. In Ireland three measles deaths were reported during 2000. Two of these deaths were as a result of pneumonia complicating measles and one was due to post-measles encephalitis.

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

Measles is a notifiable disease in Ireland and since 2000 is notified weekly to NDSC. During 2003 measles notifications more than doubled compared to annual figures for 2001 and 2002.

Materials and methods

Measles data, obtained through the weekly infectious disease

Table 1. Numbers of measles notifications and crude incidence rates (CIR) per 100,000 population by health board in 2002 and 2003

Health board	2002		2003	
	Number	CIR	Number	CIR
ERHA	105	7.5	363	25.9
MHB	18	8.0	123	54.6
MWHB	10	2.9	24	7.1
NEHB	41	11.9	15	4.3
NWHB	1	0.5	1	0.5
SEHB	14	3.3	6	1.4
SHB	18	3.1	5	0.9
WHB	36	9.5	35	9.2
Total	**243**	**6.2**	**572**	**14.6**

Table 2. Number of measles notifications and rate per 100,000 population by age group in 2002 and 2003

Age group (years)	2002		2003	
	Number	Rate	Number	Rate
<1	67	123.0	109	200.0
1-2	85	76.1	207	185.3
3-4	27	24.2	61	54.7
5-9	30	11.4	107	40.5
10-14	21	7.4	60	21.0
15-19	5	1.6	6	1.9
20-24	4	1.2	13	4.0
25+	3	0.1	0	0.0
Unknown	1	-	9	-
Total	**243**	**6.2**	**572**	**14.6**

notification system, for 2003 are presented in this report. A dataset, including identification number, date of birth, age, sex, date of onset, date of notification/week of notification, Community Care Area and county, is routinely collected through the weekly notification system for each case. In addition, for a number of measles cases in 2003, enhanced details such as information on vaccination status, laboratory results and hospitalisation status were reported.

Analysis of measles data was carried out using Microsoft Access and Excel. Incidence rates were calculated based on population data taken from the 2002 census.

Results

Incidence

A total of 572 measles cases were notified during 2003 in Ireland, giving a crude incidence rate of 14.6 per 100,000 population. This rate is more than double the crude incidence rate of 6.2 per 100,000 population in 2002. The breakdown of measles cases by health board and the crude incidence rates by health board during 2002 and 2003 are presented in table 1. In 2003, the highest numbers of cases were notified in the ERHA (n=363, 63%) and the MHB (n=123, 22%) followed by the WHB (n=35, 6%). Compared to 2002 there was a 6.8 fold increase in measles notifications in the MHB and a 3.5 fold increase in notifications in the ERHA. The highest crude incidence rate in 2003 was in the MHB (54.6/100,000) followed by the ERHA (25.9/100,000) and the WHB (9.2/100,000).

Sex and age distribution

A breakdown of measles cases by age group and the age specific incidence rates of measles cases per 100,000 population in 2002 and 2003 are presented in table 2. Measles cases were reported in both children and adults in 2003. The highest number of cases (n=207, 36%) in 2003 was in the age group 1-2 years while the highest incidence rates were in the age groups <1 year (200.0/100,000) and 1-2 years (185.3/100,000). Compared to 2002, the largest increase was seen in the age group five to nine years. Of the 572 measles notifications, 283 were male, 282 were female while sex was not reported for seven cases.

Seasonality

Measles cases by week of notification are shown in figure 1. An increase in measles notifications commenced in late November 2002 (Week 48 2002) peaking in the last week of January 2003 (Week 5 2003) with 45 cases reported nationally. It was late July (Week 31 2003) before weekly measles notifications had dropped to five cases or fewer for two consecutive weeks. From late November to late July (Weeks 48 2002-31 2003) 563 measles cases were notified. The majority of these cases were notified in the ERHA (n=355, 63%) and MHB (n=127, 23%) followed by the WHB (n=34, 6%).

Laboratory data

Laboratory results were provided to NDSC for 114 (114/572, 20%) measles notifications. Of these 114 cases, 111 were reported as laboratory positive while three were negative for measles. In addition, 69 (69/572, 12%) measles notifications

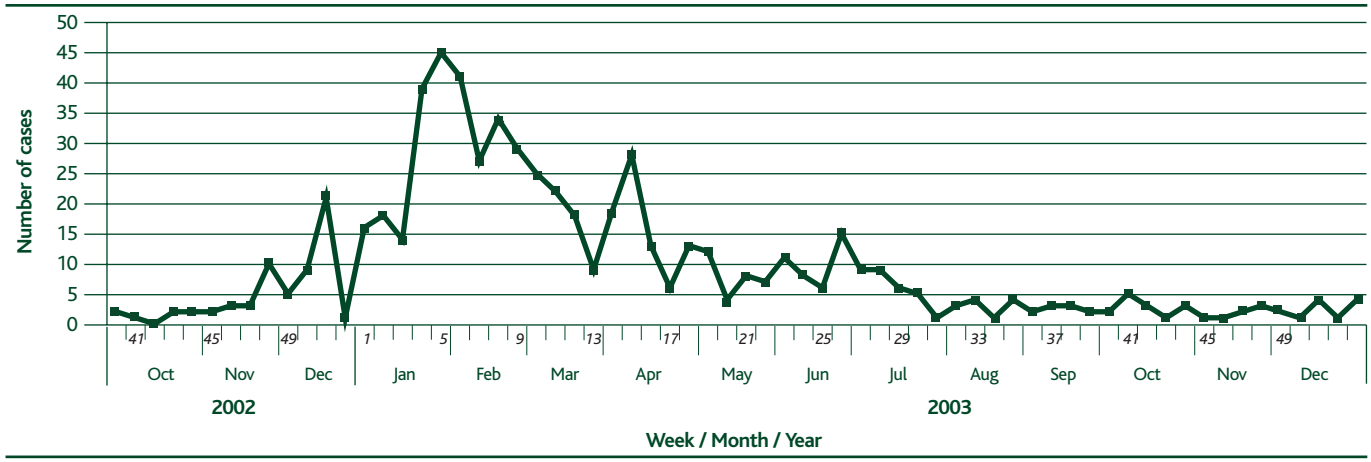

Figure 1. Number of measles cases notified by week, month and year

had specimens sent for laboratory testing but the results were not reported to NDSC.

As measles vaccine induces a positive measles IgM response a positive IgM test cannot be used to confirm the diagnosis of measles in individuals who received measles vaccine six to 45 days before rash onset. Of the 111 laboratory positive measles cases reported 29 had received at least one dose of vaccine (table 3). The date of vaccination in relation to onset of disease was not provided for 21 of these cases. Of the remaining eight cases, six were vaccinated (MMR_1) six years or greater prior to onset while two were vaccinated just preceding onset (indicating that these two cases were already incubating measles at the time of vaccination).

Saliva specimens for laboratory testing should be taken between one and five weeks following the appearance of the rash. Of the three laboratory negative measles cases, two had saliva specimens sent for laboratory testing. One of these negative saliva specimens was taken on the day of rash onset and, therefore, may be a false negative result. For the second negative saliva specimen the specimen was taken at an appropriate time (nearly one month after onset of rash).

Vaccination data

Of the 300 cases where vaccination status was known, 61% (182/300) were unvaccinated; 82% (149/182) of those unvaccinated were aged greater than or equal to one year and therefore, were potentially eligible for vaccination with MMR_1 (assuming there were no contraindications to vaccination).

Fifteen percent (45/300) of cases were vaccinated with MMR_1 only. Fifty-eight percent (26/45) of these cases were aged greater than five years and therefore were not age appropriately vaccinated. Sixteen of the cases vaccinated with MMR_1 were known to have received the vaccine less than 18 days prior to onset suggesting the possibility they were already incubating measles at the time of vaccination. For six cases the date of vaccination in relation to disease onset was not reported. An additional 66 cases were known to have received at least one dose of MMR, however, cases may have received two doses.

Seven cases received MMR_2, however, it is important to note that none of these cases were reported as laboratory confirmed (table 3). Of the seven cases who received MMR_2, five received MMR_2 less than or equal to 14 days prior to onset of illness while the vaccination date was not reported for one case. Therefore, none of these seven cases are known to be or can be classified as vaccine failures based on the data provided.

Hospitalisation data and complications of measles

Information on hospitalisation status was available for 120 notifications (120/572, 21%). Twelve cases were hospitalised representing 10% (12/120) of all cases with known hospitalisation status (table 4). The hospitalised cases were aged between 10 months and 22 years (mean age, 8 years; median age, 4 years). Seven of the hospitalised cases were unvaccinated, six of these were aged greater than 12 months and, therefore, were potentially eligible for vaccination. Three had received MMR_1 only (2 of these received MMR_1 less than 18 days prior to onset of illness), one of these was aged greater than five years and therefore was not age

Table 3. Laboratory result and vaccination status of measles notifications in Ireland during 2003

Vaccination status	Laboratory Result			Total
	Positive	Negative	Not tested/unknown	
MMR[1]*	29†	0	82	111 ‡
MMR[2]§	0	1	6	7 §
Nil	54	0	128	182
Not Reported	28	2 ||	242	272
Total	**111**	**3**	**458**	**572**

**66 cases known to have at least one dose of MMR, cases may have received two doses*
†21 cases date of vaccination in relation to disease onset not provided, 2 cases vaccinated just preceding onset
‡68 cases date of vaccination in relation to disease onset not provided, 19 cases were known to be vaccinated <18 days prior to onset
§5 cases known to be vaccinated <=14 days prior to onset, 1 case vaccination date not provided
||1 possible false negative as saliva specimen taken on day of rash onset

Table 4. Number of measles cases notified in Ireland by age group and hospitalisation status during 2003

Age group (years)	Hospitalisation status			Total
	Hospitalised	Not hospitalised	Not reported	
<1	1	14	94	109
1-2	5	27	175	207
3-4	0	13	48	61
5-9	3	30	74	107
10-14	0	22	38	60
15-19	0	1	5	6
20-24	3	1	9	13
25+	0	0	0	0
Unknown	0	0	9	9
Total	**12**	**108**	**452**	**572**

appropriately vaccinated. Vaccination status was not provided for two cases. Laboratory results were reported to NDSC for seven of the hospitalised cases, all seven cases were laboratory confirmed.

Information on measles complications was reported for 10% (57/572) of cases. Six cases were reported to have a lower respiratory tract infection while ear infection was reported as a complication for two cases. No deaths were reported among the 572 measles notifications.

Discussion

In Ireland, despite the dramatic reduction in measles cases following the introduction of a measles vaccine in 1985 and MMR in 1988, measles continues to be a problem with recurrent outbreaks. Measles outbreaks occurred in 1993 and 2000 with 4328 and 1603 cases notified, respectively. Measles activity increased again in 2003 with a total of 572 measles cases notified, representing an increase of 135% compared to 2002. Since the national collation of cohort based immunisation uptake data commenced in Ireland in Quarter 1 1999, MMR_1 uptake at 24 months has never reached the WHO target of 95%.[1] While the uptake of MMR remains below the target of 95% required to prevent the spread of measles outbreaks will continue to occur.

Ireland has a high incidence of measles compared to a number of other European countries. In 2002, the incidence of measles in Ireland ranked us seventh highest among 42 regions reporting to WHO Europe.[2] The incidence of measles in Ireland increased in 2003 compared to 2002. In Quarter 1 2003 the incidence of measles in Ireland was the highest compared to 40 regions reporting to WHO Europe.[3]

Many countries, including Australia, USA and some European countries, have implemented measles control strategies with the aim of eliminating measles. The plan to eliminate measles in Australia began in 1998 with the Measles Control Campaign. In Australia, 31 confirmed measles cases were reported during 2002 giving an incidence rate of 0.2 cases per 100,000 population, the lowest annual rate for Australia since national surveillance began in 1991.[4] In the USA measles cases have declined since 1993, following elimination efforts, with a record low of 44 confirmed measles cases in 2002.[5] Finland has succeeded in eliminating measles while other European countries have reported incidence rates of less than 0.1/100,000 indicating they are nearing elimination.[6,7]

The WHO has targeted 2010 for measles elimination in the WHO European Region. In order to interrupt indigenous measles transmission by 2010 and achieve measles elimination Ireland needs to establish a national plan for elimination with particular emphasis on improving MMR uptake rates. Strengthening of measles surveillance in Ireland is also important, as surveillance is a critical component in the control and elimination of measles. Measles surveillance is required to detect cases and to understand the reasons for the occurrence of the disease so that appropriate and timely control measures can be implemented. Surveillance also detects trends and risk factors thereby guiding and monitoring the effectiveness of control and elimination efforts. One of the limitations of measles surveillance data provided to NDSC in 2003 was despite receiving enhanced data on a number of cases this data was often incomplete. For example, for a

number of cases, where vaccination status was provided, the date of vaccination in relation to disease onset was not reported making interpretation of the vaccination data difficult. Incomplete surveillance data poses problems during analysis and interpretation. As measles surveillance and data quality are improved so to will the ability to control and prevent measles cases thereby aiding elimination.

Acknowledgements

NDSC wish to sincerely thank everyone who contributed to measles surveillance in Ireland. Special thanks to those who provided enhanced measles data.

References

1. NDSC. Immunisation uptake statistics for Ireland, Quarter 4, 2003. A report by the National Disease Surveillance Centre. Available at http://www.ndsc.ie/Publications/ Immunisation/Immunisation UptakeStatistics/
2. WHO. Measles surveillance in the European region, 2002. *EURO Measles Quarterly* 2003; 2. Available at http://www.euro.who.int/ document/cpe/emqfeb03.pdf
3. WHO. *EURO Measles Quarterly* 2003; 3. Available at http://www.euro.who.int/document/CPE/emqmay03.pdf
4. CDA. Yohannes K, Roche P, Blumer C et al. Australia's notifiable disease status, 2002. Annual report of the National Notifiable Diseases Surveillance System. *Commun Dis Intell* 2004; **28**(1): 6-68. Available at http://www.cda.gov. au/pubs/cdi/2004/cdi2801/htm/cdi2801btoc.htm
5. CDC. Groseclose SL, Brathwaite WS, Hall PA et al. Summary of notifiable diseases - United States, 2002. *MMWR* 2004; **51**(53): 1-84. Available at http://www.cdc.gov/mmwr/ preview/mmwrhtml/mm5153a1.htm
6. Peltola H, Davidkin I, Valle M et al. No measles in Finland. *Lancet* 1997; **350:** 1364-1365.
7. Muscat M, Glismann S, Bang H. Measles in Europe in 2001-2002. *Eurosurveillance Monthly* 2003; **8**(6): 123-129. Available at http://www.eurosurveillance.org/

European Sero-Epidemiology Network 2 (ESEN 2)

The aim of the European Sero-Epidemiology Network 2 (ESEN2) is to co-ordinate and harmonise the serological surveillance of immunity to communicable disease across Europe. The ESEN2 network focuses on eight vaccine preventable diseases in particular: measles, mumps, rubella, pertussis, diphtheria, varicella zoster, hepatitis A and hepatitis B. The network expanded in 2003 to include 6 new applicant states, bringing to 22 the total number of countries participating in the network (figure 1).

In order to accurately compare results from serological surveillance across participating countries, each country tested a set of agreed standards supplied by reference laboratories throughout Europe. A first round of testing for these standards was completed in 2003 by the National Virus Reference Laboratory (NVRL). These standards will be retested upon completion of the project. In collaboration with the NDSC and the NVRL, laboratories from six health boards / authorities completed the collection of samples for the ESEN2 study in 2003. Testing of these samples began in 2003. Key information on the history and development of vaccination programmes throughout Europe, collected in 2002 by ESEN2 participants, will be central in analysing the results generated from this study. This will provide valuable information on the level of immunity in the Irish population to these serious preventable diseases as well as aiding in decision and policy making in Ireland.

Testing for the measles, mumps, rubella, varicella zoster, hepatitis A and hepatitis B work-packages is being carried out at the National Virus Reference Laboratory, Dublin while testing for the diphtheria and pertussis work-packages is being carried out at the Communicable Disease Surveillance Centre, Colindale, London. The ESEN2 project is due to be completed in 2004.

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

Viral Hepatitis, 2003

Key Points

- **Viral hepatitis - type A continued to occur at very low levels, with 25 cases notified in 2003**
- **There were 547 cases of viral hepatitis - type B notified in 2003, this was an increase of 19% compared to the previous year. Little information is currently available on risk groups and sources of infection**
- **Most of the notifications made under the category of viral hepatitis-type unspecified were due to hepatitis C. Hepatitis C was not a notifiable disease in its own right in 2003. It has been made notifiable in an amendment to the Infectious Diseases Regulations implemented on January 1 2004 and it is hoped that this will improve the surveillance data available on hepatitis C in Ireland in the future**
- **Work is progressing on a national database for people infected though blood and blood products. It is hoped that this will provide useful information on hepatitis C infection in this group of people**

Viral hepatitis - type A

Introduction

Hepatitis A virus causes an acute, self-limiting disease. It is transmitted via the faecal-oral route, and is most common in areas of the world with poor sanitation. The clinical severity of hepatitis A infection increases with age. Childhood infection is usually quite mild, the majority of children under 5 years showing no symptoms, but people infected as adults can suffer severe and prolonged illness. Hospitalisation and mortality rates also increase with age.[1] Hepatitis A is preventable by vaccine. Currently in Ireland vaccination is recommended for people in certain high risk groups such as close contacts of known cases, travellers to high endemicity countries, patients with chronic liver disease and those at occupational risk.[2]

Materials and methods

Hepatitis A is a notifiable disease under the Infectious Diseases Regulations 1981. Aggregate data on notifications are available from 1982 and disaggregate data (including age and sex) since mid-2000.

Results

There were 25 cases of hepatitis A notified in 2003 (figure 1), giving an incidence rate of 0.6 cases/100,000 population. The incidence rates varied between health boards, from no cases in the NWHB to 1.8 cases/100,000 in the MHB (figure 2).

The majority of cases of hepatitis A notified in 2003 were male (n=16). This was in contrast to 2002 when most cases

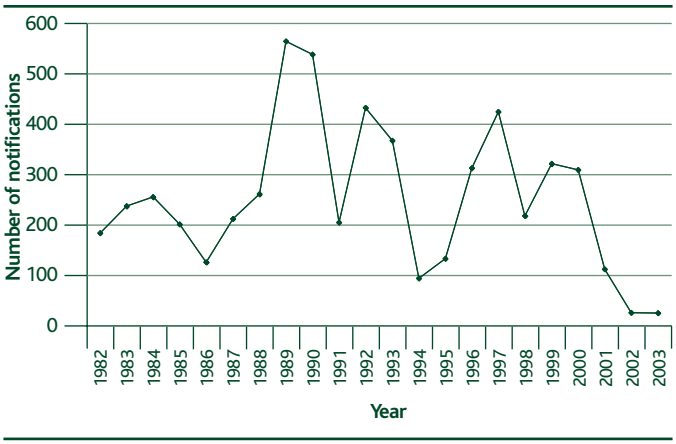

Figure 1. Number of cases of hepatitis A notified 1982-2003

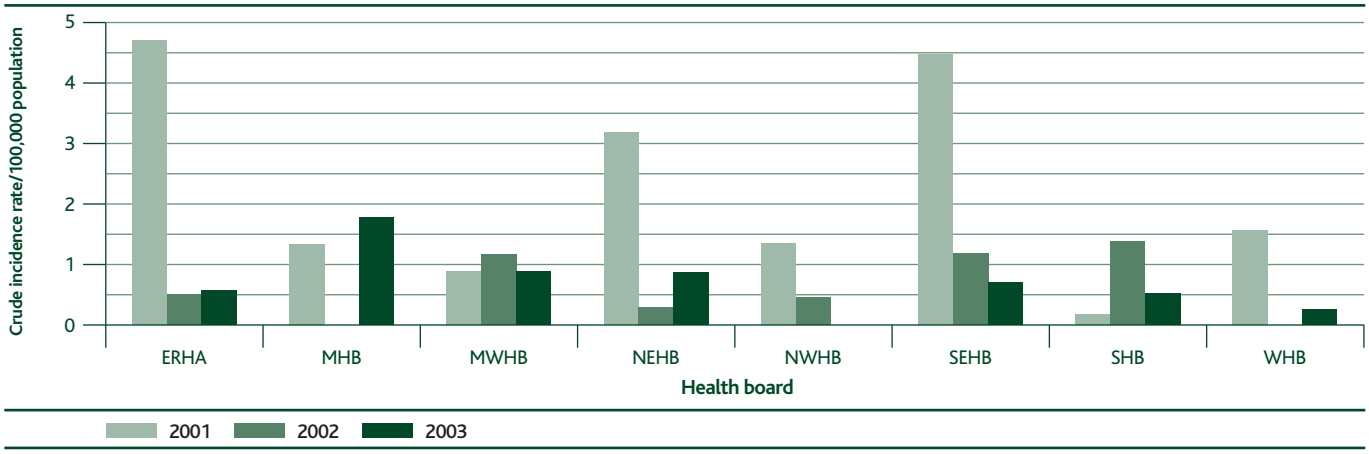

Figure 2. Rate of notified hepatitis A per 100,000 population by health board, 2001-2003

were female. The mean age of cases was 26 years (ranging from <1 year to 91 years).

Discussion

Hepatitis A continued to occur at a low rate in 2003, with less than one case notified per 100,000 population. However, the incidence of hepatitis can vary greatly from year to year (figure 1). Hepatitis A has the potential to cause large scale community outbreaks in susceptible populations. While foodborne outbreaks continue to occur[3, 4] outbreaks of hepatitis A are also being described in risk groups such as men who have sex with men (MSMs)[5, 6] and injecting drug users (IDUs).[7] The burden of illness associated with hepatitis A can be high, especially those infected as adults.

Risk factor information is not collected at a national level in Ireland. More detailed information, including risk factor details, is required to monitor and inform prevention and control strategies and to plan services.

Viral hepatitis – type B

Introduction

Hepatitis B virus is spread via infected body fluids including blood. Only a small proportion of acute hepatitis B cases (10% children and 30-50% of adults) develop clinical symptoms. Chronic infection can occur and is associated with an increased risk of developing chronic liver disease and liver cancer. The proportion of cases who develop chronic infection decreases with age at infection, from 90% of babies infected at birth to around 10% of people infected as adults.[1] In Ireland hepatitis B infection is known to be prevalent in certain populations such as IDUs,[8] prisoners,[9] and immigrants from high endemicity countries.[10, 11] A vaccine is available for the prevention of hepatitis B infection. Currently immunisation is recommended for individuals who are at increased risk of infection because of their occupation, lifestyle or other factors.[2]

Materials and methods

The Infectious Diseases Regulations 1981 specify hepatitis B as a notifiable disease. Up to the end of 2003 no case definitions existed for any of the notifiable diseases, and there was therefore no requirement in the notification process to distinguish between cases of acute and chronic hepatitis B. An amendment to the regulations implemented on 1st January 2004 (S.I. 707 of 2003) introduced case definitions and differentiated between notifications of acute hepatitis B and chronic hepatitis B for the first time. In addition, laboratory directors are now required to report cases of notifiable diseases they identify.

The National Virus Reference Laboratory (NVRL) provided data on the number of new hepatitis B surface antigen (HBsAg) positive samples identified by them between 1990 and 2003.

Results

The increase in hepatitis B notifications seen in recent years continued in 2003, with a total of 547 cases being notified (figure 3). In 2003 for the first time there were fewer new HBsAg positive samples identified by the NVRL than clinical notifications made. The national notification rate was

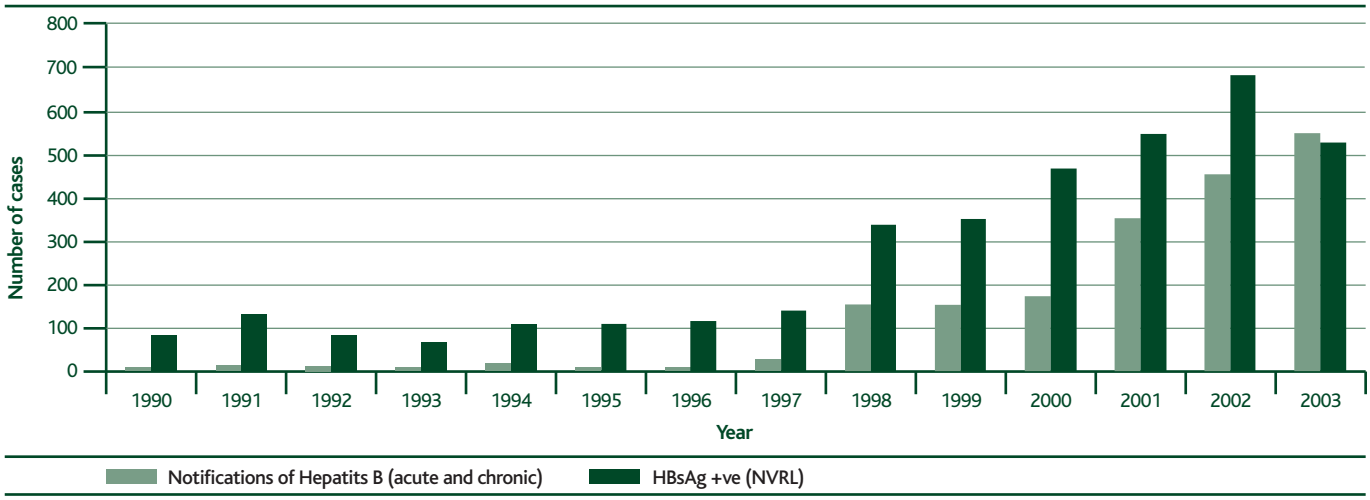

Figure 3. Number of cases of hepatitis B notified to health boards, and HBsAg positive samples identified by the NVRL, 1990-2003.

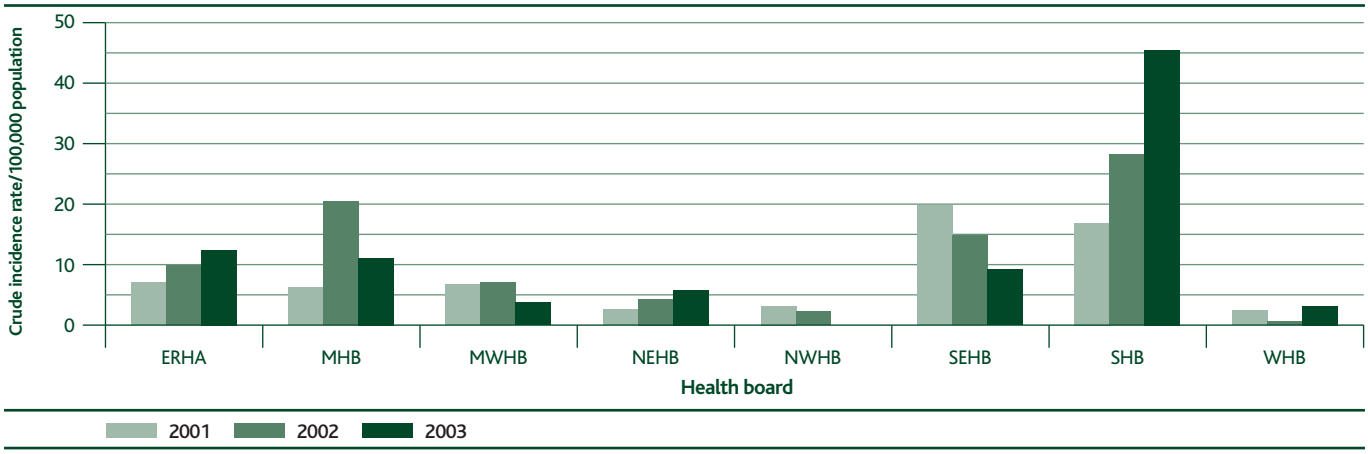

Figure 4. Rate of notified hepatitis B per 100,000 population by health board, 2001-2003

14/100,000 population, with the highest rates being reported by the SHB (figure 4).

There were slightly more female than male cases notified (259 male, 275 female). The mean age of cases was 29 years (ranging from <1 year to 58 years). Just over half (52%) of all notified cases were between the ages of 25 and 34 years. The largest increases compared to 2002 occurred in the 15-19 year and 25-34 year age groups (table 1).

In addition to these notifications, it is likely that some hepatitis B cases in 2003 will have been notified as sexually transmitted infections (STIs). STIs are notified separately to the weekly notifications, in aggregate form on a quarterly basis. Unfortunately the STI reporting system is not as timely as the weekly notification system and the hepatitis B STI data for 2003 are not currently available. While the cases of hepatitis B notified through this system may be duplicates of cases reported through the weekly notification system, it is more likely that they are new cases as they would have been identified through a different route (i.e. identified in STI clinics). The number of cases of hepatitis B notified through this system has increased in recent years. [12]

Discussion

Although Ireland is considered a low endemicity country, hepatitis B notifications have increased substantially in recent years. This increase may reflect the introduction of screening programmes or it may reflect improved notification. Many of the notified cases are likely to be chronically infected asylum seekers. Asylum seekers currently undergo voluntary health screening, which includes testing for hepatitis B infection. The high proportion of female cases notified might also be a result of antenatal screening of pregnant women which now takes place routinely in many maternity hospitals, although it has not been implemented as a national programme.

Information on hepatitis B in Ireland is poor. Prior to the introduction of the amendment to the Infectious Diseases Regulations on 1 January 2004, the only data routinely available were those from clinical notifications. Surveillance data should improve now with the requirement on laboratories to notify and with the introduction of case definitions. However, this will not provide risk factor information. This information is essential in order to identify risk groups and sources of infection. It is impossible to plan or evaluate prevention and control activities without having this information. This can only be achieved by the introduction of an enhanced surveillance system for all cases of acute and chronic hepatitis B throughout the country. There is also a need for ongoing seroprevalence surveys to track the epidemiology of hepatitis B in Ireland.

In 1992 the WHO recommended that hepatitis B vaccine should be integrated into national immunisation programmes of all countries by 1997. In Ireland the current guideline recommends hepatitis B vaccination for high groups only.[2] Until better information is available on the epidemiology of hepatitis B in Ireland it is not possible to accurately assess whether universal childhood hepatitis B vaccination should be introduced.

Table 1. Notified cases of hepatitis B, number and notification rate/100,000 population by age group, 2002 and 2003

	2002		2003	
Age group (years)	Number	Rate/100,000	Number	Rate/100,000
0-4	6	2.2	8	2.9
5-9	4	1.5	4	1.5
10-14	5	1.8	12	4.2
15-19	23	7.3	43	13.7
20-24	65	19.8	69	21.0
25-34	241	39.0	282	45.7
35-44	88	15.6	84	14.9
45-54	14	2.9	26	5.4
55-64	2	0.6	8	2.3
65+	0	0	0	0
Total*	**458**	**11.7**	**547**	**14.0**

** Total includes cases of unknown age*

Table 2. Notified cases of viral hepatitis type unspecified, number and notification rate/100,000 population by age group, 2002 and 2003

	2002		2003	
Age group (years)	Number	Rate/100,000	Number	Rate/100,000
0-4	4	1.4	0	0.0
5-9	1	0.4	0	0.0
10-14	0	0.0	0	0.0
15-19	2	0.6	2	0.6
20-24	15	4.6	19	5.8
25-34	36	5.8	36	5.8
35-44	17	3.0	18	3.2
45-54	8	1.7	6	1.2
55-64	3	0.9	2	0.6
65+	3	0.7	0	0.0
Total*	**89**	**2.3**	**85**	**2.2**

** Total includes cases of unknown age*

Viral hepatitis-type unspecified

Introduction

Up to the end of 2003 the third category of viral hepatitis notifiable under Infectious Diseases Regulations 1981 was "viral hepatitis, type unspecified". Most cases notified under this category in recent years are likely to have been hepatitis C. Hepatitis C is spread via infected body fluids. Initial infection is mainly asymptomatic (around 90% of cases). However, between 50% and 80% of cases go on to develop chronic infection.[1] It is likely that approximately half of chronically infected people eventually develop cirrhosis or liver cancer. There is no vaccine currently available for the prevention of hepatitis C.

Materials and methods

Hepatitis C was made a notifiable disease by the Infectious Diseases Regulations amendment introduced on the 1 January 2004 (S.I. 707 of 2003). Previously hepatitis C could have been notified under the category "viral hepatitis, type unspecified", but was not a notifiable disease in its own right. Since the NDSC started collecting disaggregate data in mid-2000, many of the notifications of viral hepatitis type unspecified have included information on the cause of the hepatitis, most of these being hepatitis C.

Results

There were 85 cases of unspecified viral hepatitis notified in 2003. This was slightly fewer than the number notified in 2002 (n=89). Ninety one percent of the viral hepatitis, type unspecified notifications in 2003 were identified as hepatitis C. There was one case of hepatitis E notified in 2003.

The notification rate of viral hepatitis type unspecified in 2003 was 2.2 cases/100,000 population. Although the SEHB continued to have the highest rate of viral hepatitis type unspecified, its rate had decreased compared to previous years (figure 5).

Age and sex were reported for most cases (96% and 93% respectively). There were more male than female cases notified (49 male, 30 female). The mean age of cases was 32 years (ranging from 17 years to 62 years). The age specific rates of notified cases can be seen in table 2.

Discussion

Up to now there has been little routine information available on hepatitis C in Ireland. With the introduction of the amendment to the Infectious Diseases Regulations on 1 January 2004 the specification of hepatitis C as a notifiable disease and the introduction of laboratory reporting should greatly improve the quality of routine information on hepatitis C. Enhanced surveillance is also needed to enable identification of risk factors, and this information could be used to monitor and inform prevention and control strategies and to plan services.

National hepatitis C database

The Consultative Council on Hepatitis C commissioned a review of health services available for people infected with hepatitis C through the administration in this state of blood

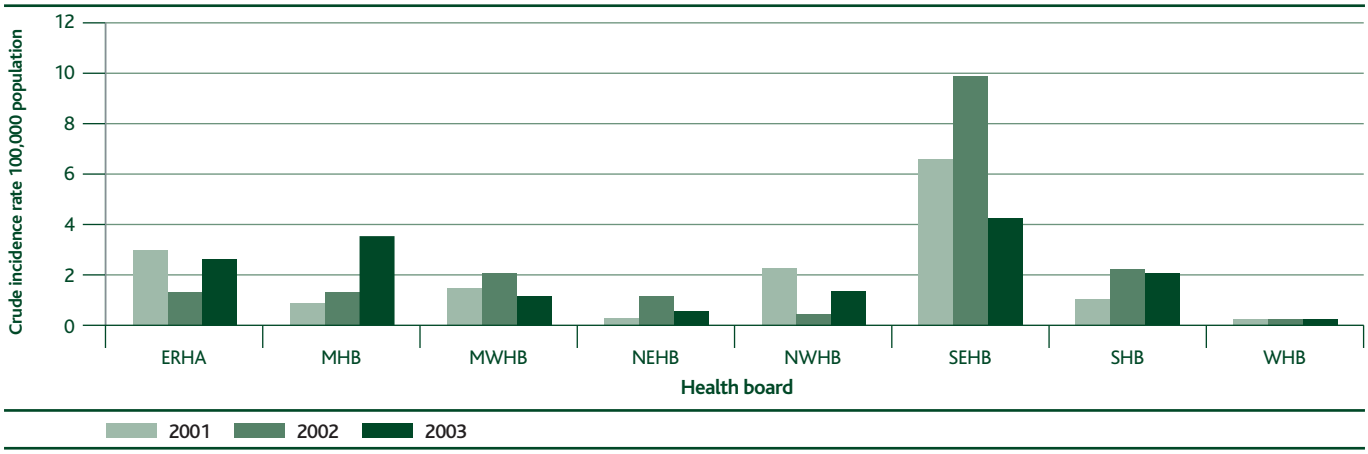

Figure 5. Rate of notifications of viral hepatitis type unspecified per 100,000 population by health board, 2001-2003

and blood products. One of the recommendations of the review was that a national database of people infected with hepatitis C through the administration of blood or blood products within the state be established for research purposes at an independent coordinating agency and run in association with relevant groupings.[13] There was consensus that a unique opportunity exists for internationally significant research which can inform both treatment and understanding of the nature of the hepatitis C process, and there was agreement that hepatitis C research in Ireland would be greatly advanced by the availability of a national database of those affected by the virus.

The NDSC was asked to set up this database, and the preparatory work was started in 2002 and continued in 2003.

The objectives of the database are:

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

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

The source of the information for the database will be the medical records of patients who have attended any of the eight designated hepatology units (Beaumont Hospital, the Mater Misericordiae University Hospital, St Vincent's University Hospital, St James's Hospital and Our Lady's Hospital for Sick Children in Dublin, St Luke's General Hospital in Kilkenny, Cork University Hospital and University Hospital, Galway). Patients will only be included on the database if they give their consent. The database will not contain names or addresses; initials and dates of birth will be collected to allow for identification of duplicates. Ethical approval for the database has been received from the ethics committees of the eight hospitals.

Acknowledgments

NDSC would like to thank staff in the Departments of Public Health and the NVRL for the provision of data. Special thanks are also due to the staff in the hepatology units for all their work for the hepatitis C database.

References

1. Hepatitis, Viral. In Chin J, ed. *Control of Communicable Diseases Manual*, pp 238-57. American Public Health Association, 2000.
2. Immunisation Advisory Committee Royal College of Physicians of Ireland. Immunisation Guidelines for Ireland. 2002.
3. Hepatitis A outbreak associated with green onions at a restaurant-Monaca, Pennsylvania, 2003. *MMWR Morb.Mortal.Wkly.Rep*. 2003; **52**:1155-7.
4. Boccia D. Community outbreak of hepatitis A in southern Italy - Campania, January-May 2004. *Eurosurveillance Weekly* 2004;8.
5. de Jager C, Heijne J. Increase in hepatitis A in MSM in the Netherlands. *Eurosurveillance Weekly* 2004;8.
6. Molbak K. Increase in hepatitis A in MSM in Denmark. *Eurosurveillance Weekly* 2004;8.
7. Roy K, Howie H, Sweeney C, Parry J, Molyneaux P, Goldberg D et al. Hepatitis A virus and injecting drug misuse in Aberdeen, Scotland: a case-control study. *J Viral Hepat*. 2004;**11**:277-82.
8. Fitzgerald M, Barry J, O'Sullivan P, Thornton L. Blood-borne infections in Dublin's opiate users. *Ir.J.Med.Sci*. 2001;**170**:32-4.
9. Allwright S, Bradley F, Long J, Barry J, Thornton L, Parry JV. Prevalence of antibodies to hepatitis B, hepatitis C, and HIV and risk factors in Irish prisoners: results of a national cross sectional survey. **BMJ** 2000; **321**:78-82.
10. Healy CM, Cafferkey MT, Butler KM, Cahill I, McMorrow J, Philbin M et al. Antenatal hepatitis B screening - is there a need for a national policy? *Ir.Med.J*. 2001; **94**:111-2, 114.
11. Smith A, O'Flanagan D, Igoe D, Cronin J, Forde D, McArdle E et al. Outcome of medical screening of Kosovan refugees in Ireland: 1999. Commun.*Dis.Public Health* 2000; **3**:291-4.
12. Domegan L, Jackson S, Cronin M. Report on sexually transmitted infections, quarter 4 2002 and 2002 annual summary. 2004. National Disease Surveillance Centre.
13. Consultative Council on Hepatitis C. Review of the health services available for persons who contracted hepatitis C through the administration within the state of blood or blood products. 2000.

Severe Acute Respiratory Syndrome (SARS)

Key Points

- **Severe Acute Respiratory Syndrome (SARS) is considered to be the "first severe and readily transmissible new disease to emerge in the twenty first century"**
- **SARS placed unprecedented demands on public health systems challenging their capacity for surveillance, outbreak containment, infection control and information management at global, national and regional level**
- **SARS is less infectious but more virulent than most acute respiratory infections e.g. influenza**
- **The overall global case fatality from SARS was approximately 9.6% but was higher in older age groups (50% if aged over 65 years)**
- **In Ireland, one probable case of SARS (who was infected overseas) was notified**
- **Globally, 21% of documented SARS cases occurred in health care workers**

Introduction

Severe Acute Respiratory Syndrome (SARS) is considered to be the "first severe and readily transmissible new disease to emerge in the twenty first century".[1] Between March and July 2003, over 8,000 probable cases of SARS and 900 deaths from SARS were reported in approximately 30 countries. The main countries affected by the SARS outbreak were China, Southeast Asia and Canada.[2] The outbreak was successfully contained within five months and on July 5th 2003, the World Health Organisation (WHO) announced that the last human chain of transmission of SARS had been broken.

The overall case fatality from SARS is approximately 9.6%, ranging from less than 1% in those aged 24 years or under, to 15% in persons aged 45 to 64 years and in persons aged over 65 it can exceed 50%.[3] SARS is a droplet spread viral infection caused by a novel coronavirus known as SARS-CoV. It is likely that SARS originated in the Guangdong Province in China in November 2002 and preliminary animal studies have isolated the SARS-CoV virus in wild animals native to this Province and to other parts of China.[4] Globally, 21% of documented SARS cases occurred in health care workers.[5]

Currently, there is no vaccine against SARS. In addition, SARS remains a challenge for clinical diagnosis and management because of its non-specific clinical features, which resemble those of other respiratory infections and the lack of both specific antiviral therapy and a rapid diagnostic test that can reliably detect SARS-CoV in the first few days of illness.

During the outbreak period, the WHO case definitions relied heavily on epidemiological criteria such as locations of SARS

Table 1: Countries visited by Probable and Suspect Cases of SARS

Country visited	Probable case	Suspect case	Total for destination
Hong Kong	1	2	3
Hong Kong and China	0	2	2
Hong Kong and Thailand	0	1	1
Toronto	0	2	2
Singapore	0	5	5
Singapore and Thailand	0	1	1
China (Guangdong)	0	2	2
Unknown	0	1	1
Total no of cases	**1**	**16**	**17**

outbreaks to increase the specificity of syndromic clinical criteria for atypical pneumonia or respiratory distress syndrome (RDS). However, epidemiological links to cases of SARS and areas reporting recent local transmission are no longer of use in helping to define incident cases. This presents a challenge for the surveillance of SARS

While much has been learned about SARS including its causation (SARS-CoV), we still have limited knowledge about the epidemiology and ecology of SARS coronavirus infection and its potential to re-emerge has not been ruled out. In view of this, in the post outbreak period, it is imperative that all countries remain alert for the recurrence of SARS and increase their capacity to detect and respond to SARS should resurgence occur.[6] Further information on SARS including guidelines is available at http://www.ndsc.ie/DiseaseTopicsA-Z/SevereAcuteRespiratorySyndrome.

Materials and methods

During the SARS outbreak in 2003, a dataset was agreed for reporting of all suspect and probable SARS cases. The agreed dataset for each case included demographic details (including occupation), clinical details, laboratory investigations and results and travel history. See (http://www.ndsc.ie/DiseaseTopicsAZ/SevereAcuteRespiratorySyndrome/HealthcareProfessionals/d891.PDF) for reporting forms. This information was entered and stored on a Microsoft Access Database.

Results

One probable case of SARS was notified in March 2003. The patient, who became ill after a visit to Hong Kong, subsequently made a full recovery. Although meeting the WHO case definition for a probable SARS case, this case was not confirmed microbiologically with negative convalescent serology at 28 days. Fifty possible cases of SARS were investigated of whom 17 met the WHO case definition for a probable or suspect case of SARS. See http://www.ndsc.ie/DiseaseTopicsAZ/SevereAcuteRespiratorySyndrome/HealthcareProfessionals/d891.PDF for case definitions. Of the 50 cases investigated, there was one probable case and 16 suspect cases. Of these cases, 60% occurred in males and the age range of cases was between 1 to 77 years, with a median age of 45 years and mean age of 43 years. All cases had travelled abroad. Table 1 outlines the countries visited by cases.

Of the 16 suspect cases, eight had alternative diagnoses, which included:
- Influenza A (2)
- Influenza B (1)
- Respiratory Syncytial Virus (1)
- Acute Bacterial Pneumonia (2)
- Exacerbation of Chronic Obstructive Pulmonary Disease (1)
- Atypical Pneumonia (1)-No organism isolated.

Discussion

The most significant global threat to public health in 2003 was the outbreak of SARS. It not only had consequences for public health but also had an immense economic and social impact on the affected areas. SARS also demonstrated the impact of globalisation and the pivotal role travel plays in the rapid dissemination of infectious diseases. Human migration has been a key means of infectious disease transmission

throughout recorded history. However the volume, speed and reach of travel today have accelerated the spread of infectious disease. [7]

SARS posed a considerable challenge to global and national public health due to the following factors: it was a new disease of unknown aetiology with rapid transmission rates, no specific treatment or vaccine and a high case fatality ratio.[7]

Implementing effective "traditional" public health measures before the aetiological agent was known effectively contained SARS. This included rapid detection and isolation of cases, institution of stringent infection control measures including personal protective equipment (PPE), vigorous contact tracing, effective risk communication and applied research which involved international and technical collaboration. Health Canada's review of the SARS outbreak emphasises this by stating that *"SARS has been contained, at least temporarily, not by the genomic revolution, not by advanced pharmaceuticals, but by old fashioned public health measures like handwashing, infection control procedures, isolation of cases and tracing and quarantine of contacts"*. [2]

Resurgence of SARS remains a distinct possibility and does not allow for complacency.[6] It is likely that SARS will re-emerge, however it will most likely recur outside Ireland. Potential sources of re-emergence of SARS include: the animal reservoir in Southern China which may reseed the human population, as illustrated by four isolated cases in Guangdong in January 2004 for which no source was isolated.[8] Another potential source of re-emergence may be laboratory exposure as demonstrated by episodes in Singapore, Taiwan and China.[9 10 11] In addition, human-to-human transmission may initiate re-emergence as seen in the 2003 outbreak. In order to ensure timely recognition of initial cases and rigorous follow-up of contacts, well-established, robust global and national surveillance systems are crucial.

Strengthening of the following areas needs to be prioritised to ensure an effective response to any future SARS outbreak or similar public health threat:

1. Enhanced surveillance mechanisms to ensure early detection of public health threats e.g. SARS, Influenza Pandemic
2. Improved integration of clinical, laboratory and epidemiological data which will be facilitated by Computerised Infectious Disease Reporting (CIDR)
3. An effective alert and response system in all countries which includes integrating and strengthening existing early warning systems
4. National capacity (including a 24/7 response) in outbreak investigation and prevention and disease control
5. Co-ordination of outbreak control at national and regional level and between public health and healthcare providers
6. National and international co-ordination
7. Improved public communication strategies
8. Effective communication procedures and pathways including command and control structures across the health services and with other relevant sectors
9. Investment in infection control in acute and primary care settings in terms of facilities, practice, manpower and training
10. Research and training in the management of new and emerging diseases

The lessons learned from SARS are critical in determining the improvements needed in the public health infrastructure at global, national, regional and local level. Without these

improvements, an effective response to any future threat to public health will not be optimal. Planning and preparedness are key to increasing the public health capacity and capability to respond to SARS or any future threats and to mitigate the impact on individuals and communities.[12] Contingency plans for responding to public health emergencies must be flexible and have a multisectoral, multidisciplinary and multilevel approach.

Finally, SARS has demonstrated the speed with which a dangerous new disease can emerge and spread throughout the world. The seriousness of the outbreak and the challenges, which arose in containing SARS, are regarded as signposts for the need to strengthen public health infrastructure and systems globally.

Acknowledgements
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References

1. World Health Organisation. "Severe Acute Respiratory Syndrome (SARS): Status of the Outbreak and Lessons for the Immediate Future". SARS technical briefing, WHA 56, 20th May 2003. http://www.who.int/csr/media/sars_wha.pdf
2. Health Canada, 2003. Learning from SARS. Renewal of Public Health in Canada.
3. World Health Organisation. Severe Acute Respiratory Syndrome-multi-country outbreak. Update 49- SARS case fatality ratio, incubation period. 7th May 2003. http://www.who.int/csr/don/2003_05_07a/en/
4. World Health Organisation Geneva, 2003. Consensus Document on the Epidemiology of Severe Acute Respiratory Syndrome. http://www.who.int/csr/sars/en/WHOconsensus.pdf
5. World Health Organisation. Summary of probable SARS cases with onset of illness from 1 November 2002 to 31st July 2003. 21 April 2004. http://www.who.int/csr/sars/country/table2004_04_21/en/
6. World Health Organisation. Alert, verification and public health management of SARS in the post-outbreak period. 14 August 2003. http://www.who.int/csr/sars/postoutbreak/en/
7. Mary E Wilson. "Travel and Emergence of Infectious Disease" EID Vol 1 (2), April-June 1999.
8. World Health Organisation. New case of laboratory-confirmed SARS in Guangdong, China - update 5. 31 January 2004. http://www.who.int/csr/don/2004_01_31/en/
9. World Health Organisation. China's latest SARS outbreak has been contained, but biosafety concerns remain – Update 7. 18 May 2004. http://www.who.int/ csr/don/2004_05_18a/en/
10. World Health Organisation. Severe Acute Respiratory Syndrome (SARS) in Taiwan, China. 17 December 2003. http://www.who.int/csr/don/2003_12_17/en/
11. World Health Organisation. Severe acute respiratory syndrome (SARS) in Singapore - update 2. 24 September 2003.http://www.who.int/csr/don/2003_09_24/en/
12. World Health Organisation. WHO Scientific Research Advisory Committee on Severe Acute Respiratory Syndrome (SARS). Report of the first meeting. 20-21 October 2003. http://www.who.int/csr/resources/publications/en/SRAC-CDSCSRGAR2004_16.pdf

Salmonella in Ireland, 2003

Key Points

- **The incidence of human salmonellosis increased in 2003 with a crude incidence rate (per 100,000 pop.) of 11.5 in 2003, compared to 9.4 in 2002 (clinical notification data)**
- **The highest rate was seen in children under 5 years of age**
- **In 2003, there were 486 clinical isolates of Salmonella enterica referred to the National Salmonella Reference Laboratory (NSRL) for serotyping, phage typing and antimicrobial sensitivity tests**
- **15% of cases were reported to be associated with travel outside of Ireland in 2003**

Introduction

Salmonella is a bacterial zoonotic pathogen that is a relatively common cause of foodborne illness in Ireland and worldwide. At present there are over 2,500 known serotypes of *Salmonella*. 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.

Salmonellosis 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 can cause enteric fever, a severe systemic life threatening condition, but this is very rare in Ireland and mainly travel-associated.

A wide range of domestic and wild animals, as well as humans can act as the reservoir for this pathogen, although chronic carriage is rare in humans.

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.

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 all clinical and

Table 1. Analysis of clinical isolates of S. enterica (n=416) referred to NSRL, (2003) by age-group and gender.

Age group (years)	No. of isolates (%)	Male	Female	Unknown
0-4	81 (17)	43	29	9
5-9	32 (7)	20	10	2
10-14	24 (5)	12	12	-
15-19	29 (6)	11	18	-
20-24	52 (10)	19	30	3
25-34	80 (16)	36	42	2
35-44	58 (12)	32	25	1
45-54	49 (10)	22	27	-
55-64	22 (5)	15	7	-
65+	41 (8)	17	24	-
Unknown	18 (4)	8	9	1
Total	**486**	**235**	**233**	**18**

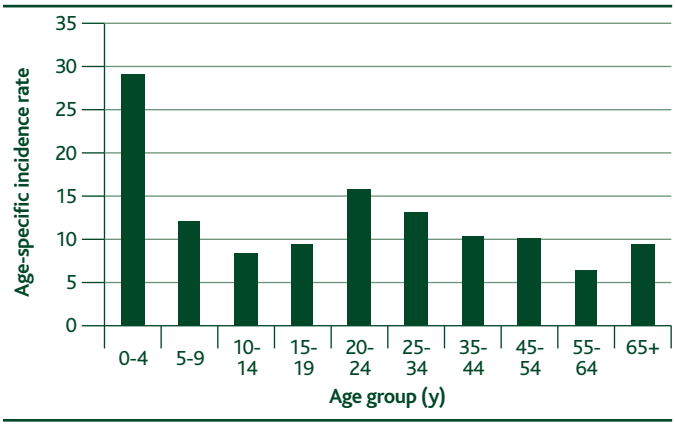

Figure 1. Age-specific incidence rate of human salmonellosis in Ireland, 2003.

food laboratories for serotyping, phage typing and antimicrobial sensitivity testing.

This report reviews data available from the National Salmonella Reference Laboratory (NSRL) and weekly clinical notifications for the year 2003. These data enable us to provide an overview of the epidemiology and burden of disease caused by *Salmonella* infections in Ireland today.

Results

Demographic information

There were 486 clinical isolates of *S. enterica* referred to NSRL in 2003. The male: female ratio was 1:1. The age groups and sex of those affected are shown in Table 1. The highest number of cases in seen in children under five years of age. However, when age-specific incidence rates are calculated (figure 1), the burden of illness in this age group is even more evident.

Seasonality

There was a marked seasonal pattern seen in the number of clinical salmonellosis cases reported through the weekly notification system in 2003, with a sharp peak seen in week number 36 (figure 2).

Serotyping, phage typing and antibiotic susceptibility results from NSRL

Serotyping

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

The predominant serotype causing human illness was *S.* Enteritidis (42% of isolates) followed by *S.* Typhimurium (28%). Table 3 demonstrates the shift between these two serotypes in the past number of years. The next most commonly isolated serotypes in 2003 were *S.* Hadar (n=21), *S.* Virchow (n=10) and *S.* Kentucky (n=10). There were nine cases of *S.* Typhi detected in 2003, which is an increase on 2002 when there were five cases reported.

Phage typing

The predominant phage types of *S.* Typhimurium and *S.* Enteritidis are summarised in Tables 4 and 5.
The incidence of *S.* Typhimurium DT104b has increased in recent years and it represented 50% of all Typhimurium isolates tested in 2003. PT4 has been the predominant phage type in Enteritidis isolates since 1998 (comprised 28% of all Enteritidis isolates in 2003), however the incidence of PT1 appears to be on the increase (26% of all Enteritidis isolates in 2003).

Travel-association

72 isolates (14.8%) reported to NSRL in 2003 were found to be associated with travel outside of Ireland. The majority of these cases were associated with travel to Spain (n=26). The next most common countries reported were Portugal (n=6) and Thailand (n=6), followed by Pakistan (n=5), India (n=3) and the UK (n=3).

Table 2. Serotypes of Salmonella enterica by health board, 2003.

Serotype	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
Agbeni	1	0	0	0	0	0	0	0	1
Agona	4	0	0	0	0	0	0	1	5
Anatum	4	0	0	0	0	0	0	1	5
Blockley	1	0	0	0	0	1	0	0	2
Bovismorbificans	0	0	0	1	0	0	0	0	1
Braenderup	2	1	0	0	0	0	0	0	3
Brandenburg	1	0	0	0	0	0	1	0	2
Bredeney	2	0	1	0	0	0	0	0	3
Cerro	0	0	0	0	0	1	0	0	1
Corvallis	1	0	0	0	0	0	1	1	3
Cotham	1	0	0	0	0	0	0	0	1
Derby	0	0	0	0	0	0	0	1	1
Dublin	0	0	2	1	0	0	0	2	5
Enteritidis	65	17	9	15	9	37	34	19	205
Hadar	2	0	3	13	1	1	1	0	21
Havana	0	0	1	0	0	0	0	0	1
Heidelberg	1	0	0	0	0	0	0	0	1
Indiana	0	0	0	0	0	1	0	0	1
Infantis	2	0	0	0	0	0	0	2	4
Java	0	0	0	0	0	0	1	0	1
Javiana	1	0	0	0	0	0	0	0	1
Kentucky	3	0	1	1	0	5	0	0	10
Kottbus	1	1	0	0	0	1	0	2	5
Litchfield	1	0	0	0	0	0	0	0	1
Manhattan	0	0	1	0	0	0	0	0	1
Mbandaka	1	0	0	0	1	0	0	1	3
Muenchen	1	0	0	0	0	0	1	0	2
Newport	2	1	0	0	0	0	0	2	5
Ohio	0	0	0	0	1	0	0	0	1
Ohlstedt	0	0	0	0	0	0	1	0	1
Panama	0	0	0	0	0	0	0	1	1
Paratyphi A	1	0	0	3	0	0	1	1	6
Paratyphi B	0	0	0	0	0	0	1	0	1
Poona	1	0	0	0	0	0	0	0	1
Reading	2	0	0	0	0	0	0	0	2
Rissen	0	0	0	0	0	0	1	0	1
Saintpaul	1	1	0	0	0	0	1	1	4
Sandiego	1	0	0	0	0	0	1	0	2
Senftenberg	1	0	0	0	0	0	0	0	1
Stanley	3	0	0	1	0	0	0	0	4
Tennessee	0	0	0	0	0	1	0	0	1
Typhi	3	0	2	0	2	0	2	0	9
Typhimurium	54	10	4	5	20	15	13	14	135
Virchow	3	1	1	1	2	1	0	1	10
Wangata	1	0	0	0	0	0	0	0	1
Welikade	1	0	0	0	0	0	0	0	1
Weltevreden	1	0	0	0	0	0	0	0	1
Unknown	4	1	0	1	1	0	0	1	8
Total	**174**	**33**	**25**	**42**	**37**	**64**	**60**	**51**	**486**
CIR	**12.4**	**14.6**	**7.4**	**12.2**	**16.7**	**15.1**	**10.3**	**13.4**	**12.4**

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

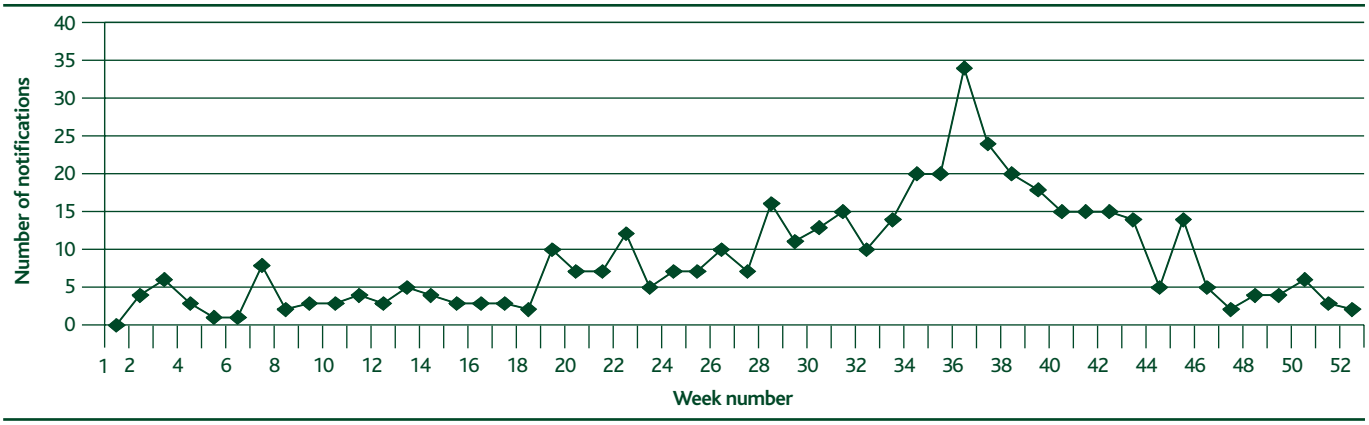

Figure 2. Number of salmonellosis notifications by week, 2003 (NDSC).

Table 3. Serotypes of S. enterica referred to NSRL (1998-2003) (%).

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

Table 4. Phage types of S. Typhimurium in human isolates (2003)

Phage type	No. of isolates (%)
DT104b	67 (50)
DT104	22 (16)
DT12	8 (6)
U302	8 (6)
U310	6 (4)
DT193	4 (3)
U311	3 (2)
Others	12 (9)
No type	5 (4)
Total	**135**

Table 5. Phage types of S. Enteritidis in human isolates (2003)

Phage type	No. of isolates (%)
PT4	58 (28)
PT1	53 (26)
PT21	21 (10)
PT6	13 (6)
PT6a	11 (5)
PT8	10 (5)
PT14b	7 (3)
PT5c	6 (3)
PT13a	5 (2)
Others	18
No type	3
Total	**205**

Six of the nine isolates of *S.* Typhi received by NSRL in 2003 were reported to be travel-associated. Three of these were associated with travel to Pakistan; two with travel to India and one was unknown.

Antimicrobial resistance

The antimicrobial susceptibility patterns of the most commonly isolated serotypes in 2003 are presented in Table 6. The same trend that was noted in previous years with high levels of resistance found amongst *S.* Typhimurium isolates, particularly *S.* Typhimurium DT104 was again found in the 2003 data. Many of these isolates were found to have the penta resistance phenotype (ACSSuT) that was also reported in previous years.

Clinical notification data

Salmonellosis is a notifiable disease. Medical practitioners have a statutory obligation 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, decreased until 2002 but an increase was again seen in 2003 (figure 3). The total number of notifications in 2003 was 449.

Discussion

The significant burden of human illness caused by *Salmonella enterica* is evident from the data presented in this review of the epidemiology of salmonellosis in Ireland in 2003. Of particular note is that the incidence of disease of human salmonellosis in Ireland was seen to increase in 2003 (CIR 11.5 per 100,000 population) for the first time since 1998. The highest incidence was reported in the North-Western health board region. Higher rates were seen for the same period in Northern Ireland[1] (12.4), England and Wales[2] (28.3) and Scotland[3] (24.8).

Similar trends regarding the epidemiology of this pathogen were noted in 2003 as in previous years. All age-groups were seen to be affected but the highest incidence was again noted in children under five years of age. It is likely that more specimens are submitted for testing from this age-group, so this should be borne in mind when interpreting these data. Males and females were equally affected.

Salmonella has a well characterised seasonal distribution and a sharp rise in cases was noted in week 36 in 2003. A Europe-wide study has been undertaken by the WHO European Centre for Environment and Health (ECEH) to examine the effects of global climate change on a number of gastroenteric pathogens including *Salmonella spp*. The first results from this study examining the effect of temperature on the incidence of salmonellosis were published in 2004.[4]

The detailed typing methods being employed by the National Salmonella Reference Laboratory are dramatically improving our ability to monitor epidemiological trends, identify clusters and outbreaks, and assist in trace back through the food chain.

Analyses of the serotyping results revealed that in 2003, *S.* Enteritidis still remained the predominant serotype, followed by *S.* Typhimurium. These two serotypes represent 70% of the total salmonellas affecting humans. A diverse number of other serotypes comprise the remaining 30% of

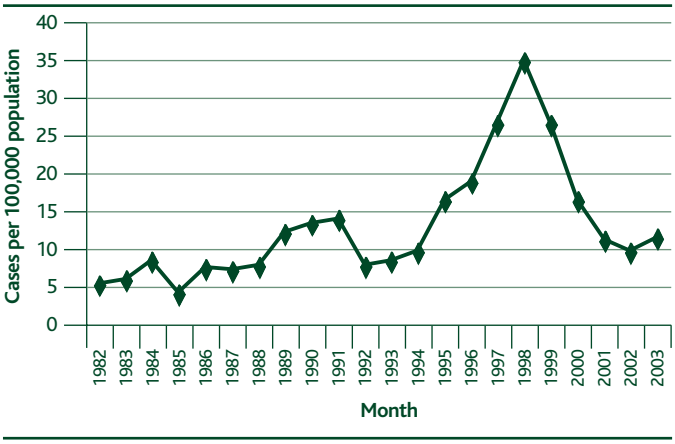

Figure 3. Crude rate of Salmonellosis in Ireland per 100,000 population 1982-2003.

Table 6. Antimicrobial susceptibilities of human Salmonella enterica serotypes isolated in Ireland in 2003.

	% Resistance						
Serotype (Number)	Amp	Chl	Strep	Sulph	Tet	Trim	Nal
S. Enteritidis (205)	8	0	3	4	4	1	33
S. Typhimurium (135)	77	58	66	79	76	21	3
S. Hadar (21)	81	0	95	0	81	0	100
S. Virchow (10)	30	0	0	30	2	20	90
S. Kentucky (10)	50	10	50	60	5	20	70
S. Typhi (9)	11	11	11	11	11	11	44
S. Dublin (5)	0	0	0	0	0	0	0
S. Stanley (4)	25	25	50	50	50	0	25
S. Bredeney (3)	33	0	0	33	0	0	0

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

human isolates, with forty-five serotypes other than Enteritidis or Typhimurium detected by NSRL in 2003. Phage typing provides an additional level of sub-typing detail. The trends in Enteritidis and Typhimurium isolates are particularly interesting (tables 4 and 5). DT104b has taken over from DT104 as the predominant Typhimurium phage type in humans. A decrease has been seen in *S*. Enteritidis PT4 across Europe in recent years[5]. In Ireland, as a percentage of all *S*. Enteritidis isolates, PT4 decreased from 85% in 1998 to 28% in 2003. However, a corresponding increase has been seen of PT1, which comprised 26% of Enteritidis isolates in 2003.

When the AMR (antimicrobial resistance) patterns of the various *Salmonella* serotypes were examined, the trend that has been reported over the past number of years of high levels of resistance among S. Typhimurium DT104 isolates, was again seen in 2003. This continues to be cause for concern.

In 2003, the use of the Enter-net network and hub again proved to be extremely beneficial for sharing knowledge and expertise in the area of surveillance and control of gastrointestinal disease, and as a particularly efficient alert system to aid in the investigation of clusters and epidemics of *Salmonella* and VTEC *E. coli*.

Finally, analyses of the 2003 data reveal that it is becoming evident that an increasing number of cases of illness of salmonellosis are linked to travel outside of Ireland, with 15% of cases in 2003 being reported as travel-associated. It is quite likely that many of the 'unusual' serotypes that we are seeing each year are acquired abroad. Of particular note in 2003 was the increase in the number of typhoid cases seen (n=9) compared to five isolates in 2002. This highlights the need for reinforcing awareness amongst travellers to endemic countries.

It is evident from the data presented in this review that Salmonella continues to be an extremely significant public health problem, and especially in light of the increase in cases seen in 2003, control measures must be enforced throughout the food chain to help to reduce this burden of disease.

References

1. Communicable Disease Surveillance Centre - Northern Ireland. http://www.cdscni.org.uk/
2. Health Protection Agency – CDSC. http://www.hpa.org.uk/infections/topics_az/topics.asp?category=a
3. SCIEH. http://www.show.scot.nhs.uk/scieh/
4. Kovats R. S., Edwards S. J., Hajat S., Armstrong B.G., Ebi K.L., Menne B., and The Collaborating Group. The effect of temperature on food poisoning: a time-series analysis of salmonellosis in ten European countries. *Epidemiol Infect* (2004) **132**: 443-453.
5. Enter-net website. http://www.hpa.org.uk/hpa/inter/enter-net_menu.htm

Acknowledgements

We wish to sincerely thank Prof. Martin Cormican and the staff of the National Salmonella Reference Laboratory, UCHG 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 thank the Departments of Public Health and Community Care areas for providing the clinical notification data.

Campylobacteriosis in Ireland, 2002

Key Points

- **Campylobacter is the most common bacterial cause of gastroenteritis in Ireland**
- **In 2002, there were 1336 cases of confirmed campylobacteriosis reported, which was an increase on the previous year (1286 cases in 2001)**
- **The crude incidence rate in 2002 was 34.0 per 100,000 persons**
- **The highest burden of illness is in children under 5 years of age**
- **There are slightly more males affected than females**

Introduction

Infections due to *Campylobacter spp* are the most commonly isolated bacterial cause of human gastrointestinal illness in Ireland, the UK and many countries globally with temperate climates. *Campylobacter jejuni* is the predominant species associated with human illness, with the remainder mostly being *C. coli and C. lari*.

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).

This review presents data from the fourth year of the NDSC national survey of the incidence of human campylobacteriosis in Ireland.

Methods

NDSC requested public health doctors and laboratories to provide disaggregated information on all laboratory-confirmed cases of campylobacteriosis diagnosed in 2002.

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 Access and

Table 1: Number of cases and CIR of human campylobacteriosis in Ireland by health board and year, 2002. (Excluding non-resident cases).

Health Board	No of cases	CIR - (incl. 95% C.I.)
ERHA	467	33.3 [30.3 - 36.3]
Midland	90	39.9 [31.7 - 48.2]
Mid-Western	71	20.9 [16.0 - 25.8]
North Eastern	50	14.5 [10.5 - 18.5]
North Western	87	39.3 [31.0 - 47.5]
South Eastern	208	49.1 [42.4 - 55.8]
Southern	173	29.8 [25.4 - 34.3]
Western	185	48.6 [41.6 - 55.7]
Ireland	**1331**	**34.0**

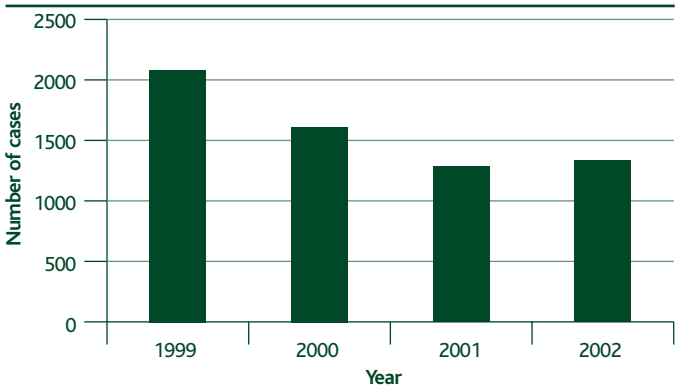

Figure 1. Number of laboratory confirmed cases of Campylobacteriosis in Ireland, 1999-2002

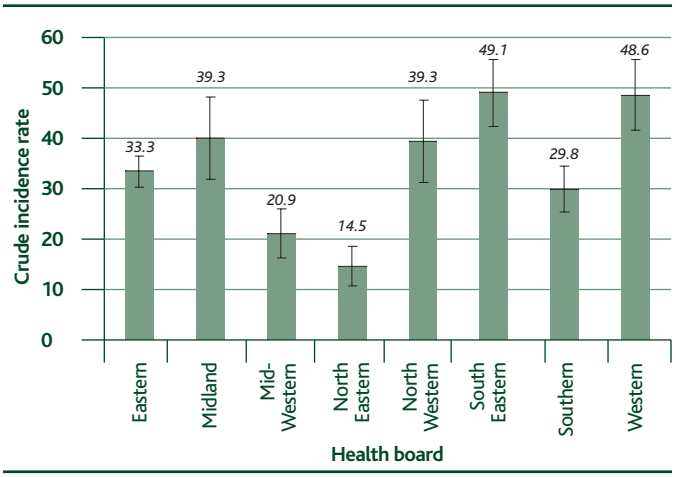

Figure 2. Crude incidence rates per 100,000 population for human campylobacteriosis by health board in Ireland in 2002

SPSS. Direct methods of standardisation were applied using the Irish population as the standard population. Population data were taken from the 2002 census. Species differentiation of isolates was not requested.

Results

Information on *Campylobacter* was obtained from all Health Boards. Information on age was missing in 2.3% of cases and information on sex was incomplete in 3.7% of cases. Those data without age were not presented in age standardised charts.

Incidence

In total, 1336 cases of laboratory-confirmed campylobacteriosis were reported in 2002 in Ireland (including five cases in non-residents). This gives a crude incidence rate (CIR) of 34.0 per 100,000 population (table 1). This compared with a CIR of 32.8 per 100,000 in 2001 (based on 2002 census data). The number of cases by year is shown in figure 1. Crude rates by health board for 2002 are presented graphically in figure 2.

Sex

Males accounted for 51.0% of cases and females 45.3% (with 3.7% of cases missing data on gender) as shown in table 2. A similar ratio was reported in previous years. The gender distribution by health board is shown in table 2.

Seasonality

The distribution of cases by week is shown in figure 3. A peak was seen in week number 22 in 2002. Campylobacter is known to have a well characterised seasonal distribution with a peak seen in early summer each year. The seasonal pattern broken down by health board is shown in Table 3.

Age

Age standardised rates were calculated to allow comparisons to be made between health board regions without the confounding effects of age (Figure 4). In 2002, the highest incidence was recorded in the WHB (48.9) followed by the SEHB (48.6), with the lowest incidence rate seen in the NEHB (14.0).

Table 4 depicts crude incidence rates (CIR) and age standardised incidence rates (ASIR) (per 100,000 population) by health board in 2002.

The age-standardised data are mapped and presented in figure 5.

Table 5 shows the breakdown of cases in each age group by health board in Ireland.

Figure 6 graphs the breakdown of cases by age-group. This demonstrates that there is a large burden of illness in children under 5 years of age, and mirrors the results consistently found since 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 7).

Gender distribution

The variance in gender distribution that has been noted since 1999 was again evident from analysis of the data in 2002. In every age-group except 15-19 years there was a

Table 2. Number of cases by health board and sex, 2002

Health Board	Total	Males	Females	Unknown
ERHA	467	243	219	5
MHB	90	44	39	7
MWHB	71	41	30	0
NEHB	50	29	20	1
NWHB	87	43	42	2
SEHB	208	101	103	4
SHB	173	83	80	10
WHB	185	94	72	19
Non Irish Residents	5	4	0	1
Ireland	**1336**	**682**	**605**	**49**

Table 3. Cases by month (2002) for each health board in Ireland

	E	M	MW	NE	NW	SE	S	W	N.r.*	Total
Jan	13	7	3	3	6	11	13	13	0	69
Feb	19	3	2	4	3	9	13	12	0	65
Mar	28	4	6	2	7	7	9	10	0	73
Apr	42	7	5	1	6	24	11	13	0	109
May	54	7	7	8	8	22	26	18	0	150
Jun	58	16	10	6	9	34	11	32	4	180
Jul	42	10	1	4	7	23	16	17	1	121
Aug	48	7	5	4	12	14	19	14	0	123
Sep	37	5	8	4	7	14	8	11	0	94
Oct	46	10	7	6	9	21	15	7	0	121
Nov	47	5	11	5	7	13	16	23	0	127
Dec	33	8	6	3	6	16	16	14	0	102
NK	0	1	0	0	0	0	0	1	0	2
Total	**467**	**90**	**71**	**50**	**87**	**208**	**173**	**185**	**5**	**1336**

**Non resident*

predominance of male cases. This is shown in Figure 8 when the data are adjusted for age and sex.

Outbreak data

There was one outbreak of *Campylobacter jejuni* reported to NDSC in 2002. It occurred in a restaurant and was responsible for seven persons being ill. The mode of transmission was suspected to be foodborne although no implicated food item was identified during the course of the investigation.

Discussion

This paper presents data from the fourth year of the national survey of incidence of human campylobacteriosis in Ireland and has provided valuable information regarding the epidemiology of this pathogen. It is evident that campylobacteriosis remains the single biggest cause of bacterial gastroenteric infection in Ireland (greater than three times the number of salmonellosis cases reported in 2002). It should also be noted that these are laboratory confirmed cases and the true burden of illness is probably much higher.

The crude incidence rate (CIR) was seen to increase in 2002 (34.0 cases/100,000 persons) compared to 2001 (32.8/100,000). The increase was most notable in the South-Eastern and Midland health board regions. The Western health board however has consistently the highest incidence rate over the past number of years when the data are standardised for age (ASIR =48.9/100,000). Higher rates were seen in 2002 for Northern Ireland[1] (48.2/100,000), England and Wales[2] (90.7/100,000) and Scotland[3] (101.3/100,000).

Many of the epidemiological trends noted since this annual survey began in 1999, have been found again on examination of the 2002 data. The incidence rate of this pathogen is consistently higher in young children and there is a bias towards male cases in almost all age-groups. It was recognised that research was needed in Ireland to provide answers to some of these epidemiological questions, and hence to address this, a matched case-control study was initiated in the ERHA region in 2003. The objective is to identify and assess risk factors for sporadic cases of campylobacter in Ireland. The study is being carried out by the Department of Public Health in the ERHA and the NDSC, and is expected to be completed by the end of 2004, after which the results will be disseminated.

Another notable feature of this organism is the seasonal pattern of infection seen each year. In 2002 a sharp peak in cases was seen in week 22 (Figure 3). An international study, of which Ireland was involved, has been undertaken by the WHO European Centre for Environment and Health (ECEH) to examine the effects of global climate change on a number of gastroenteric pathogens including *Campylobacter spp*.[4] The role of climate variability on laboratory-confirmed cases of campylobacter infections from Europe, Canada, Australia and New Zealand was examined. The findings of this important study are due to be published shortly.

There are still many questions that remain unanswered regarding this pathogen. The lack of typing data on all isolates often hinders public health investigations, particularly in trace back through the food chain to find the source of infection. Detailed antimicrobial resistance profiling of

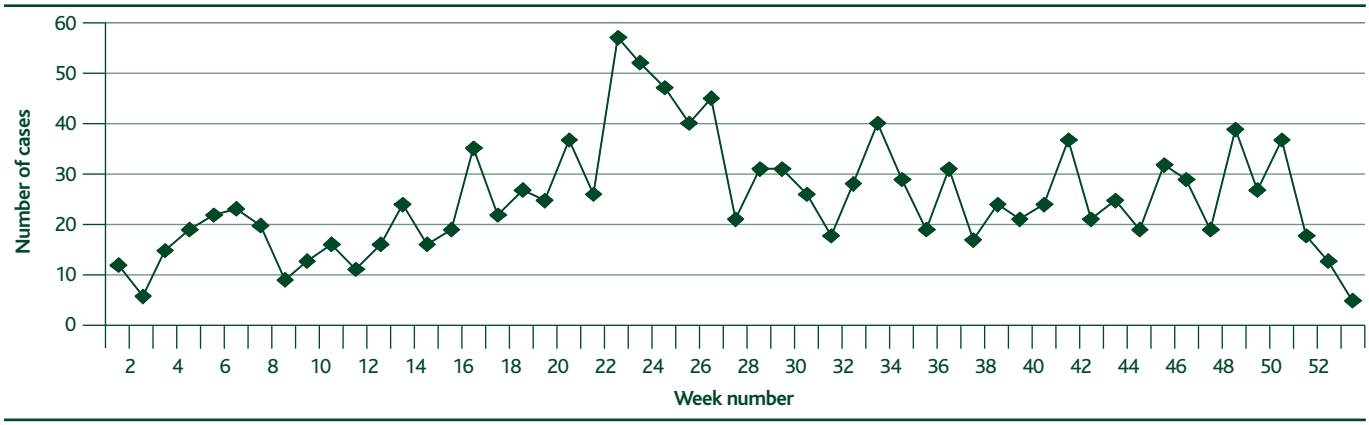

Figure 3: Total cases of campylobacteriosis by week of notification (2002)

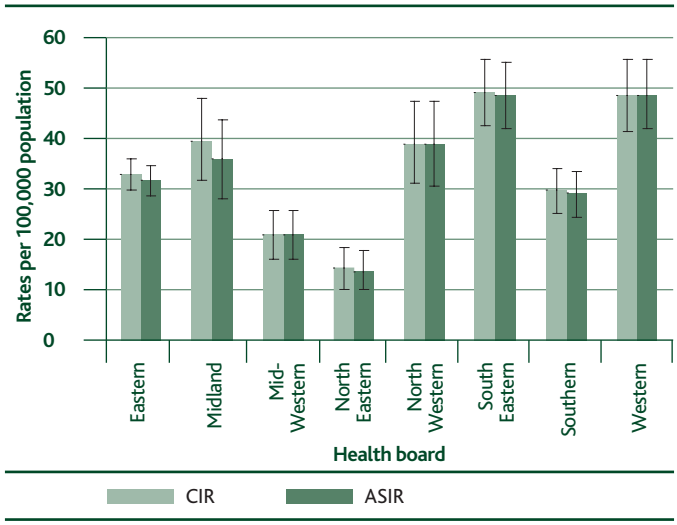

Figure 4: Age standardised incidence rates (ASIR) compared to crude incidence rates (CIR) in each health board, 2002.

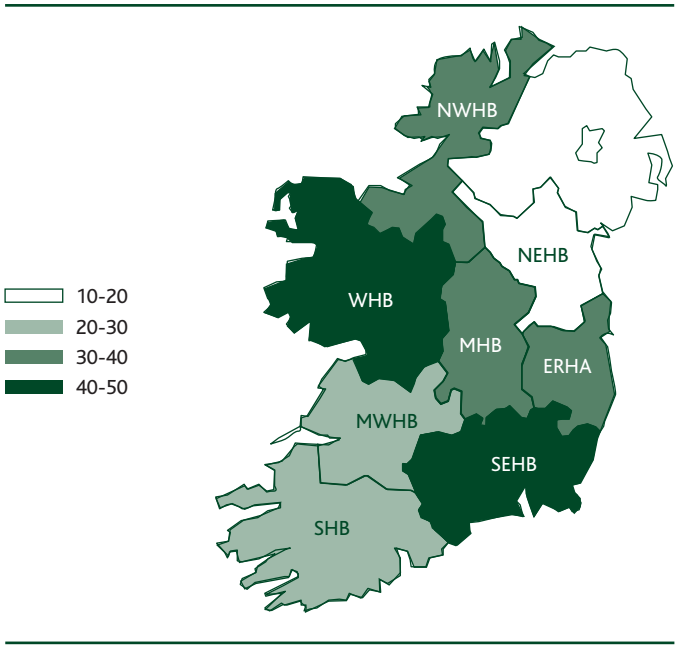

Figure 5. Age-standardised rates of campylobacteriosis in Ireland by health board, 2002.

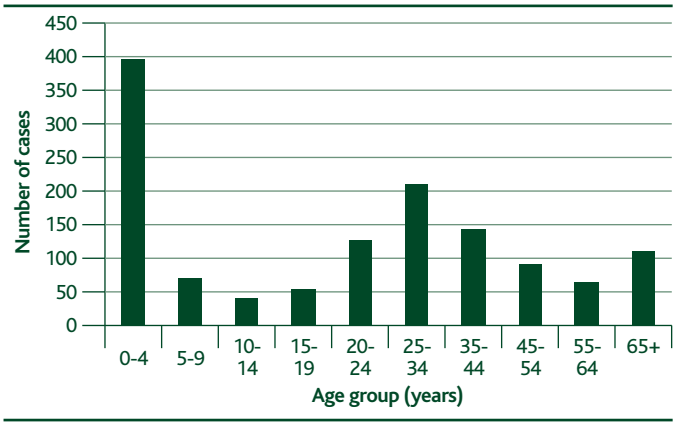

Figure 6. Cases of campylobacteriosis by age group for Ireland in 2002

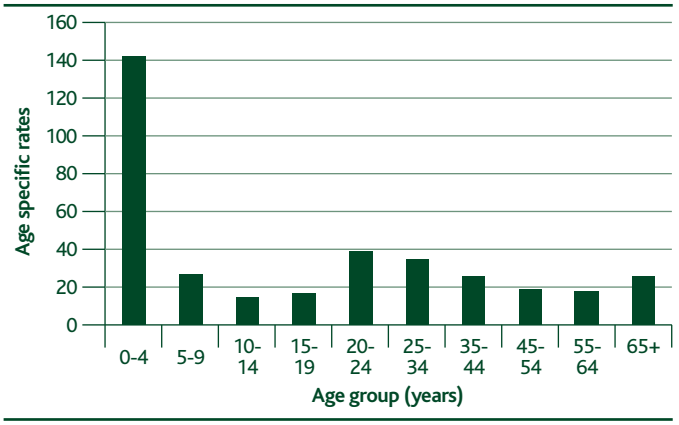

Figure 7. Age specific incidence rates for campylobacteriosis in Ireland, 2002

Table 4. Crude incidence rates (CIR) and age standardised incidence rates (ASIR) (per 100,000 population) by health board in 2002

Health Board	CIR [95% CI]	ASIR [95% CI]
ERHA	33.3 [30.3 - 36.3]	31.9 [29.0 - 34.8]
Midland	39.9 [31.7 - 48.2]	36.0 [28.3 - 43.7]
Mid-Western	20.9 [16.0 - 25.8]	21.1 [16.2 - 26.0]
North Eastern	14.5 [10.5 - 18.5]	14.0 [10.0 - 17.9]
North Western	39.3 [31.0 - 47.5]	39.0 [30.8 - 47.2]
South Eastern	49.1 [42.4 - 55.8]	48.6 [42.0 - 55.3]
Southern	29.8 [25.4 - 34.3]	29.1 [24.7 - 33.6]
Western	48.6 [41.6 - 55.7]	48.9 [41.8 - 56.1]
IRELAND	**34.0 [32.2 - 35.8]**	

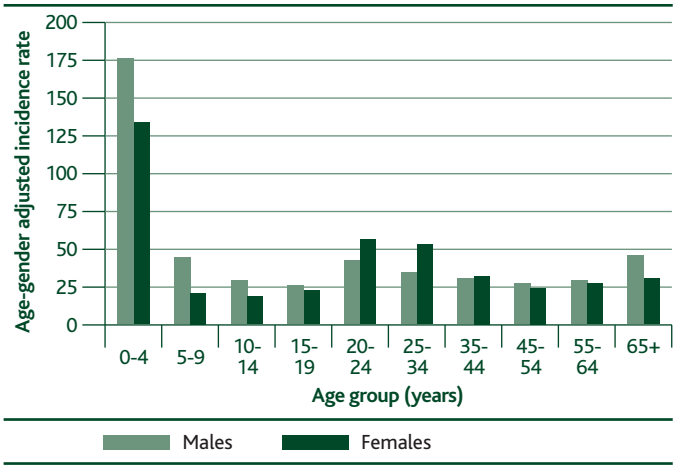

Figure 8: Age-gender adjusted incidence according to age-group in 2002.

Table 5. Age distribution of cases by health board, 2002.

Health board	0-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65+
ERHA	105	14	9	22	58	100	63	33	18	34
MHB	39	6	0	4	1	12	6	5	4	7
MWHB	22	2	0	6	7	13	7	3	6	5
NEHB	11	1	1	3	8	12	5	2	1	4
NWHB	23	9	5	2	2	12	7	9	10	8
SEHB	68	10	8	10	14	29	22	16	9	20
SHB	63	10	6	4	16	15	18	8	7	20
WHB	64	19	12	3	18	17	15	14	7	12
Non- Residents	0	0	0	0	2	0	0	1	2	0
Total	**395**	**71**	**41**	**54**	**126**	**210**	**143**	**91**	**64**	**110**

isolates is also essential to monitor trends that have been highlighted in recent years such as the emergence of quinolone-resistant *Campylobacter spp* isolates.[5] This review again highlights the significance of this gastroenteric pathogen and the considerable public health burden it constitutes. Emphasis must be placed on control measures throughout the food chain in order to attempt to reduce the incidence of human disease caused by this organism.

Acknowledgements

NDSC sincerely acknowledges all those who provided information for the fourth year of this report on the epidemiology of campylobacteriosis in Ireland, in particular, public health doctors, surveillance scientists, medical microbiologists, medical laboratory scientists and environmental health officers.

References

1. Communicable Disease Surveillance Centre - Northern Ireland. http://www.cdscni.org.uk/
2. Health Protection Agency – CDSC. http://www.hpa.org.uk/infections/topics_az/topics.asp?category=a
3. SCIEH. http://www.show.scot.nhs.uk/scieh/
4. Climate Change and Adaptation Strategies for Human health in Europe (cCASHh) website http://www.euro.who.int/eprise/main/who/progs /cash/home
5. Engberg J., Neimann J., Nielsen E.M., Aerestrup F.M., Fussing V. Quinolone-resistant Campylobacter infections: risk factors and clinical consequences. *Emer Infect Dis* (2004) **10**:1056-1063.

Campylobacteriosis in Ireland, 2003

Key Points

- ***Campylobacter spp* is the commonest cause of gastroenteritis of bacterial aetiology in Ireland**
- **In 2003, there were 1568 cases of confirmed campylobacteriosis reported, which was an increase on the previous two years (1336 cases in 2002 and 1286 in 2001)**
- **The crude incidence rate in 2003 was 39.9 cases per 100,000 persons**
- **The highest burden of illness was in children under 5 years of age**

Introduction

Campylobacteriosis is the commonest bacterial cause of human gastrointestinal illness in Ireland. *C. jejuni* is the predominant species associated with human illness, with the remainder mostly being *C. coli and C. lari*.

It is primarily a diarrhoeal illness. The diarrhoea is often bloody and frequently associated with acute abdominal pain. Symptoms may subside after a number of days or may persist for weeks. Rarely, long-term sequelae may develop such as reactive, arthritis, Reiter's syndrome, or HUS and approximately one in every 1000 cases leads to a severe neurological disorder called Guillain-Barré Syndrome (GBS). This review presents data from the fifth year of the NDSC national survey of the incidence of human campylobacteriosis in Ireland.

Methods

NDSC requested public health doctors and laboratories to provide disaggregated information on all laboratory-confirmed cases of campylobacteriosis diagnosed in 2003.
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 Access and SPSS. Direct methods of standardisation

Table 1: Number of cases and CIR of human campylobacteriosis in Ireland by health board and year, 2003.

Health Board	No of cases	CIR - (incl. 95% C.I.)
ERHA	544	38.8 [35.6 - 42.1]
Midland	136	60.3 [50.2 - 70.5]
Mid-Western	103	30.3 [24.5 - 36.2]
North Eastern	95	27.5 [22.0 - 33.1]
North Western	52	23.5 [17.1 - 29.8]
South Eastern	213	50.3 [43.5 - 57.0]
Southern	208	35.8 [31.0 - 40.7]
Western	211	55.5 [48.0 - 63.0]
IRELAND	**1562**	**39.9 [37.9 - 41.9]**

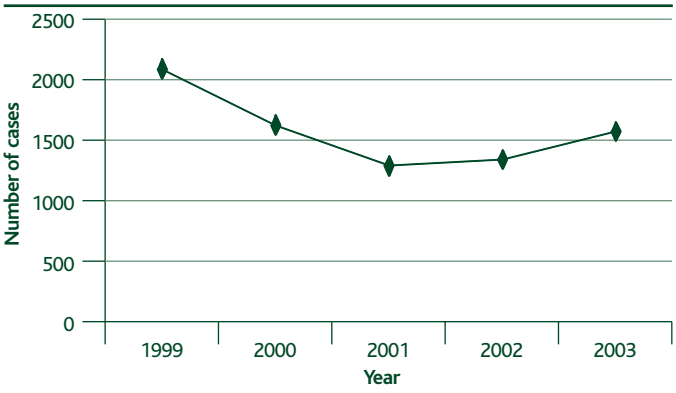

Figure 1. Number of laboratory confirmed cases of Campylobacteriosis in Ireland, 1999-2003

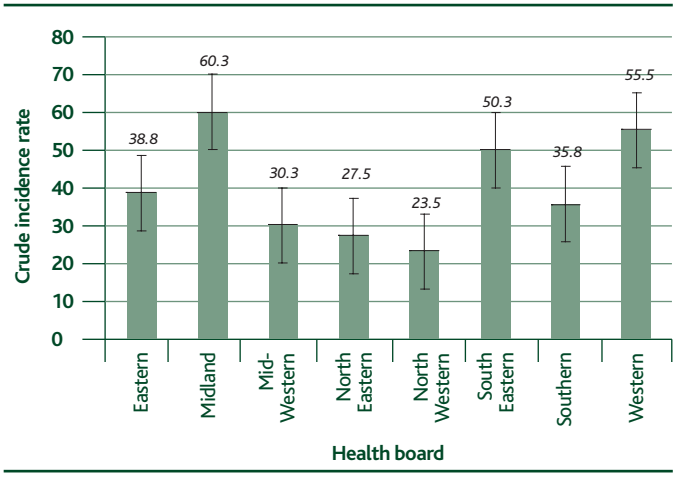

Figure 2. Crude incidence rates per 100,000 population for human campylobacteriosis by health board in Ireland in 2003

were applied using the Irish population as the standard population. Population data were taken from the 2002 census. Species differentiation of isolates was not requested.

Results

Information on *Campylobacter* was obtained from all Health Boards. Information on age was missing in 1% of cases and information on gender was incomplete in 5% of cases. Those data without age were not presented in age standardised charts, and without gender were not presented in age-gender standardised charts.

Incidence

In total, 1568 cases of laboratory-confirmed campylobacteriosis were reported in 2003 in Ireland (including six cases in non-residents). This gives a crude incidence rate (CIR) of 39.9 cases per 100,000 population (table 1). This compared with a CIR of 34.0 cases per 100,000 in 2002. The number of cases by year is shown in Figure 1. Crude rates by health board for 2003 are presented graphically in figure 2.

Sex

Males accounted for 49.4% of cases and females 45.6% (with 5% of cases missing data on gender) as shown in table 2. This trend of a greater incidence of male cases has been consistently found since this survey began in 1999. The gender distribution by health board is shown in table 2.

Seasonality

The distribution of cases by month is shown in Figure 3. A rise in cases occurred in May 2003, reaching a peak in July in 2003. Campylobacter is known to have a well characterised seasonal distribution with a peak seen in early summer each year. The seasonal pattern broken down by health board is shown in table 3.

Age

Age standardised rates were calculated to allow comparisons to be made between health board regions without the confounding effects of age (figure 4). In 2003, the highest incidence was recorded in the Midland health board region followed by the Western health board with the lowest incidence rate seen in the NWHB.

Table 4 depicts crude incidence rates (CIR) and age standardised incidence rates (ASIR) (per 100,000 population) by health board in 2003.

The age-standardised data are mapped and presented in Figure 5.

Table 5 shows the breakdown of cases in each age group by health board in Ireland.

Figure 6 graphs the breakdown of cases by age-group. This demonstrates that there is a large burden of illness in children under 5 years of age, and mirrors the results consistently

Table 2. Number of cases by health board and sex, 2003

Health Board	Total	Males	Females	Unknown
ERHA	544	278	261	5
MHB	136	65	64	7
MWHB	103	59	44	0
NEHB	95	27	31	37
NWHB	52	32	20	0
SEHB	213	102	111	0
SHB	208	109	80	19
WHB	211	100	101	10
Non Irish Residents	6	2	4	0
Ireland	**1568**	**774**	**716**	**78**

Table 3. Cases by month (2003) for each health board in Ireland

	E	M	MW	NE	NW	SE	S	W	N.r.*	Total
Jan	39	2	8	8	4	19	13	23	0	116
Feb	31	16	6	9	8	12	16	15	0	113
Mar	38	10	6	5	2	14	10	15	0	100
Apr	33	5	9	5	0	16	11	9	0	88
May	61	26	12	7	0	30	23	20	0	179
Jun	37	13	11	5	8	27	24	29	1	155
Jul	75	16	12	14	9	27	26	24	3	206
Aug	48	14	9	12	4	14	22	21	2	146
Sep	69	8	6	12	4	14	27	21	0	161
Oct	34	7	9	6	7	16	11	9	0	99
Nov	39	10	8	3	2	11	10	14	0	97
Dec	40	9	6	5	4	13	15	9	0	101
NK	0	0	1	4	0	0	0	2	0	7
Total	**544**	**136**	**103**	**95**	**52**	**213**	**208**	**211**	**6**	**1568**

**Non resident*

found since 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 7).

Gender distribution

The variance in gender distribution that has been noted since 1999 was again evident from analysis of the data in 2003. In almost every age-group, there was a predominance of male cases. This is shown in Figure 8 when the data are adjusted for age and sex.

Outbreak data

There were two outbreaks of campylobacteriosis reported to NDSC in 2003. One occurred in a residential institution with 19 people reported ill. The other occurred in a hospital with six cases of illness. The mode of transmission was not determined in these outbreaks, and no food vehicles were identified during the investigations.

Discussion

The results presented here are from the fifth year of the national survey of the incidence of human campylobacteriosis in Ireland. It is evident from these data that campylobacteriosis remains the greatest cause of bacterial gastroenteric infection in Ireland (3.5 times the number of salmonellosis cases reported in 2003).

The crude incidence rate (CIR) of campylobacteriosis was seen to increase in Ireland in 2003 (39.9 cases/100,000 persons) compared to 2002 (34.0/100,000). This was the highest rate reported in Ireland since 2000. The increase was most notable in the Midland and Western health board regions.

Higher rates were seen in 2003 for Northern Ireland[1] (43.8/100,000), England and Wales[2] (85.4/100,000) and Scotland[3] (87.9/100,000) but these rates represented a decrease from the incidence reported in 2002 for all these countries (*provisional data*).

Some consistent data trends are evolving as the Campylobacter data are analysed year on year. The incidence rate of this pathogen is consistently higher in young children and there is a bias towards male cases in almost all age-groups. A case-control study being conducted in the ERHA region is due to be completed in the coming months. It is hoped to identify and assess risk factors for sporadic cases of human campylobacteriosis in Ireland.

Much work needs to be done to provide answers to many of the epidemiological questions posed by the data presented in this report. Detailed typing data of human isolates is needed to be able to examine relationships between Campylobacter isolates from food, food animals and humans, and to assist in traceback in outbreak investigations. Information on risk factors is needed to inform public health interventions. In recent years, water has been increasingly featured as a potential source of Campylobacter infection internationally, and reports have described associations with swimming in

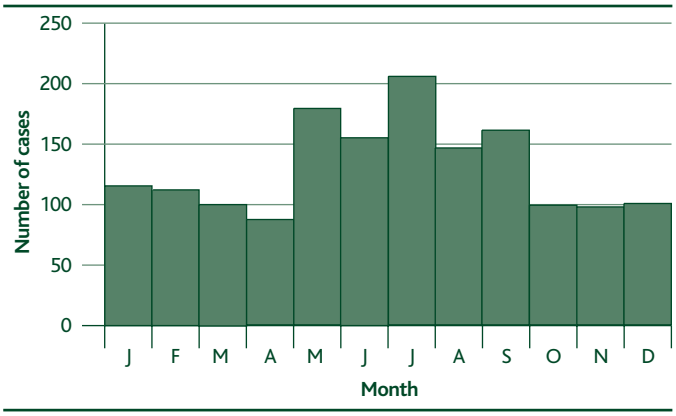

Figure 3: Total cases of campylobacteriosis by month of notification (2003)

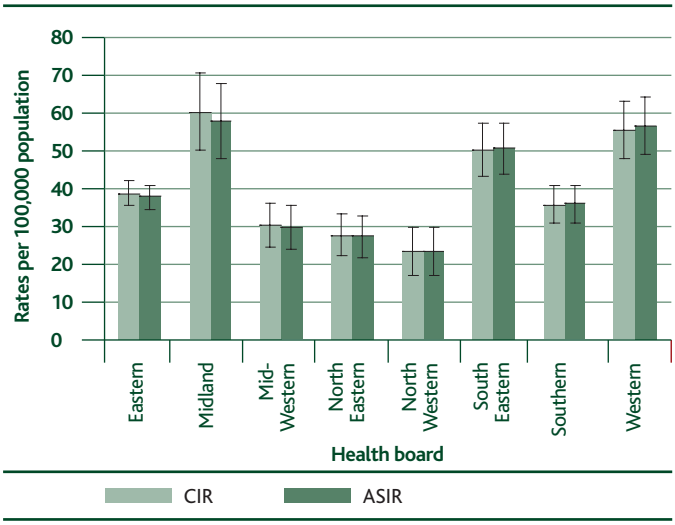

Figure 4: Age standardised incidence rates (ASIR) compared to crude incidence rates (CIR) in each health board, 2003.

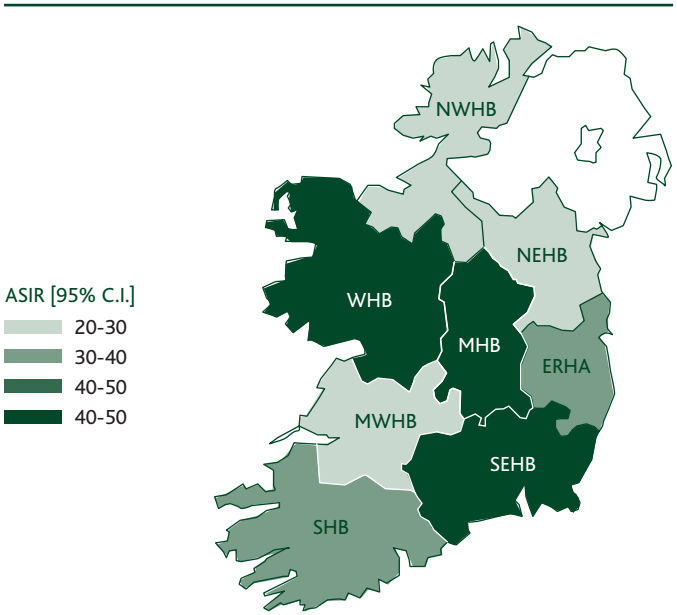

Figure 5. Age-standardised rates of campylobacteriosis in Ireland by health board, 2003.

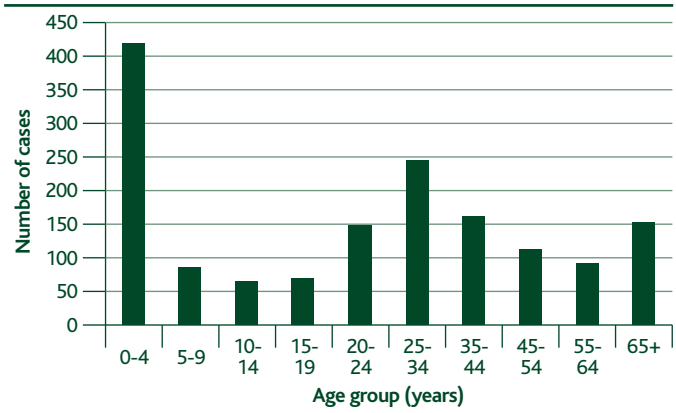

Figure 6. Cases of campylobacteriosis by age group for Ireland in 2003

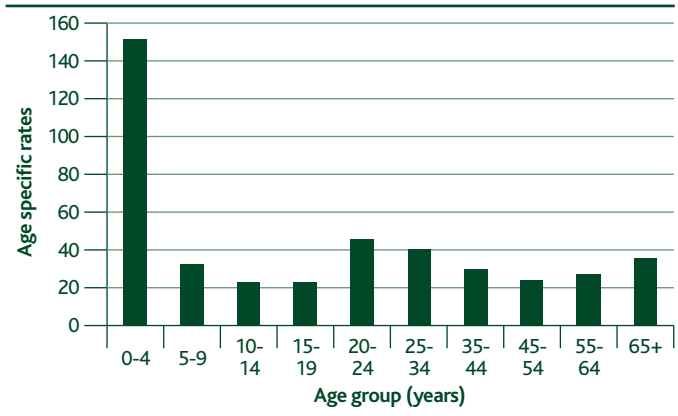

Figure 7. Age specific incidence rates for campylobacteriosis in Ireland, 2003

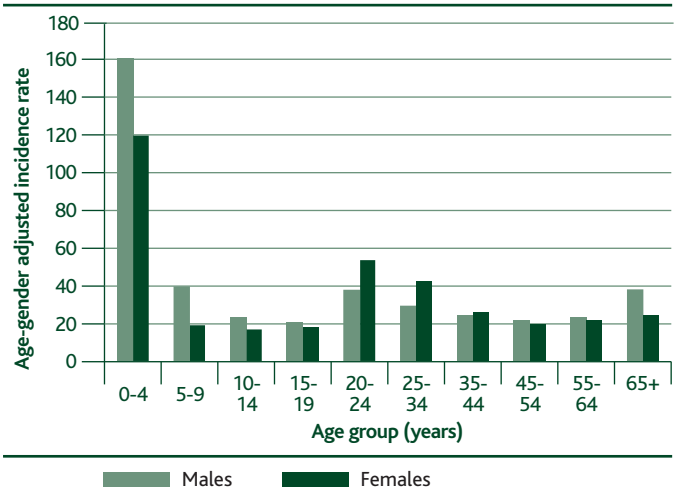

Figure 8: Age-gender adjusted incidence according to age-group in 2003.

Table 4. Crude incidence rates (CIR) and age standardised incidence rates (ASIR) (per 100,000 population) by health board in 2003

Health Board	CIR [95% CI]	ASIR [95% CI]
ERHA	38.8 [35.6 - 42.1]	37.8 [34.5 - 41.0]
Midland	60.3 [50.2 - 70.5]	57.7 [47.9 - 67.5]
Mid-Western	30.3 [24.5 - 36.2]	29.9 [24.1 - 35.7]
North Eastern	27.5 [22.0 - 33.1]	27.2 [21.7 - 32.7]
North Western	23.5 [17.1 - 29.8]	23.5 [17.1 - 29.9]
South Eastern	50.3 [43.5 - 57.0]	50.6 [43.8 - 57.4]
Southern	35.8 [31.0 - 40.7]	36.1 [31.2 - 41.0]
Western	55.5 [48.0 - 63.0]	56.5 [48.8 - 64.2]
IRELAND	**39.9 [37.9 - 41.9]**	

Table 5. Age distribution of cases by health board, 2003.

Age group (years)	E	M	MW	NE	NW	SE	S	W	Total
0-4	81	58	30	24	16	56	75	81	421
05-9	23	13	4	7	3	11	13	11	85
10-14	18	5	5	4	1	9	12	10	64
15-19	27	6	4	5	2	10	7	8	69
20-24	58	7	7	12	5	23	18	18	148
25-34	115	18	14	13	3	32	26	22	245
35-44	80	6	14	10	7	17	18	10	163
45-54	43	9	4	5	5	12	13	19	112
55-64	34	6	6	8	3	18	8	10	93
65+	56	6	13	7	7	25	16	21	152

waters contaminated with sewage effluent, drinking of untreated water and consumption of seafood.[4,5] A study in Northern Ireland, revealed significant levels of contamination of untreated surface waters with *Campylobacter spp*.[6] It is hoped that the results of the first Irish case-control study will identify risk factors for sporadic cases of campylobacteriosis in this country.

It is clear that there is a very significant burden of illness caused by this zoonotic agent, with the highest incidence in four years reported in 2003. Efforts by all public health professionals throughout the food chain must continue to aid in our understanding of the complex epidemiology of this globally important pathogen.

Acknowledgements

NDSC sincerely acknowledges all those who provided information for the fifth year of this report on the epidemiology of campylobacteriosis in Ireland, in particular, public health doctors, surveillance scientists, medical microbiologists, medical laboratory scientists and environmental health officers.

References

1. Communicable Disease Surveillance Centre - Northern Ireland. http://www.cdscni.org.uk/surveillance/Gastro/Campylobacter_sp.htm
2. Health Protection Agency – CDSC. http://www.hpa.org.uk/infections/topics_az/topics.asp?category=a
3. SCIEH. http://www.show.scot.nhs.uk/scieh/
4. Engberg J, Neimann J, Nielsen EM, Aerestrup FM, Fussing V. Quinolone-resistant Campylobacter infections: risk factors and clinical consequences. *Emerg Infect Dis*. (2004) **10**:1056-63.
5. Kapperud G, Espeland G, Wahl E, Walde A, Herikstad H, Gustavsen S, Tveit I, Natas O, Bevanger L, Digranes A. Factors associated with increased and decreased risk of Campylobacter infection: a prospective case-control study in Norway. *Am J Epidemiol*. (2003) **158**:234-42.
6. Moore JE, Caldwell PS, Millar BC, Murphy PG. Occurrence of Campylobacter spp. in water in Northern Ireland: implications for public health. *Ulster Med J*. (2001) **70**:102-7.

The Epidemiology of Verocytotoxigenic *E. coli* O157 in Ireland, 2003

Key Points

- ***E. coli* O157 is an emerging pathogen and a serious global health concern**
- **In 2003, there were 86 confirmed cases of VTEC O157 infection in Ireland, the highest number reported since records began**
- **The highest burden of illness was recorded in children under 5 years of age**
- **Four cases of haemolytic uraemic syndrome were reported among *E.coli* 0157 confirmed cases**
- **Forty-eight per cent of cases had a date of onset between July and September**

Verotoxigenic *E. coli* (VTEC) are so-called because of their ability to produce one or both of two verotoxins (VT1 and VT2). They cause a wide range of illnesses, from mild diarrhoea to haemorrhagic colitis with severe abdominal pain and bloody diarrhoea. Illness is usually self-limiting and resolves after about eight days. Historically 9% of symptomatic Irish cases have developed haemolytic uraemic syndrome (HUS), a form of renal failure (1). In children under 15 years of age in Ireland, one in eight with confirmed VTEC O157 develop HUS (one in seven of symptomatic cases).

The primary reservoir is cattle, although VTEC have been isolated from a variety of healthy animal carriers including sheep, horses, goats and wild birds. While this organism was first recognized as a foodborne pathogen (the 'burger bug'), it is now known that it can also be transmitted through water, the environment and by direct contact with animal carriers. Person-to-person spread is important in households, crèches and institutions.

E. coli O157 is the most commonly reported VTEC in Ireland (1), the UK and the US, although other serogroups are capable of causing the same spectrum of illness, including O26, O111, O103 and O145. In particular, cases of VTEC O26 have been reported in Ireland every year since 1999.

The Public Health Laboratory at Cherry Orchard Hospital, Dublin provides an *E. coli* O157 and non-O157 diagnostic service for clinical and food samples, including *E. coli*

Table 1. Number of cases of confirmed VTEC O157 and crude incidence rate (95% CI) in Ireland, 1999-2003

Year	Numbers of confirmed cases (incl. non-residents)	Crude incidence rate* (95% CI) per 100,000 population
1999	51	1.4 (1.0-1.8)
2000	37(42)	0.9 (0.6-1.3)
2001	50 (52)	1.3 (0.9-1.6)
2002	68 (70)	1.7 (1.3-2.2)
2003	82 (86)	2.1 (1.6-2.6)

**Data from 1996 census was used to calculate the rate in 1999 while the 2002 census were used to calculate rates from 2000-2003.*

Table 2. Number, crude incidence rate (CIR) and age-standardised incidence rate (ASIR) with 95% confidence intervals of confirmed cases of VTEC O157 by health board of residence, Ireland, 2003

Health board	Numbers of cases VTEC (incl. non-residents)	CIR (95% CI) per 100,000	ASIR(95% CI) per 100,000
ERHA	12	0.9 (0.4-1.3)	0.9 (0.4-1.3)
MHB	8	3.5 (1.1-6.0)	3.4 (1.0-5.7)
MWHB	6 (8)	1.8 (0.4-3.2)	1.8 (0.4-3.2)
NEHB	1	0.3 (0.3-0.8)	0.3 (0.2-0.8)
NWHB	7	3.2 (0.8-5.5)	-*
SEHB	20 (21)	4.7 (2.7-6.8)	4.7 (2.7-6.8)
SHB	20	3.4 (1.9-5.0)	3.5 (1.9-5.0)
WHB	8 (9)	2.1 (0.6-3.6)	-*
Total	**82 (86)**	**2.1 (1.6-2.6)**	

All rates in this table exclude non-resident cases
**age was not reported for all cases in these health boards*

serotyping and verotoxin detection. Phage typing for VTEC O157 is carried out at the HPA CPHL Colindale, London.

Methods

This is the fifth year that NDSC, in co-operation with Directors of Public Health in each health board region, have operated the epidemiological surveillance system for VTEC O157.

Since 1999, specialists in public health medicine, (senior) area medical officers, microbiologists, clinical scientists, surveillance scientists, infection control nurses and (principal) environmental health officers participate in a system whereby a standard dataset of information is collected at health board level 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. NDSC welcomes reports of cases infected with non-O157 VTEC. The case definitions that have been used in this system are 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 are subsequently confirmed as not H7 or Shiga toxin producing are 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

Eighty-six confirmed cases of VTEC O157 were reported to NDSC that had a date of onset of symptoms during 2003, an incidence rate of 2.1 per 100,000. The numbers of confirmed cases and the crude incidence rates of VTEC O157 in Ireland from 1999-2003 are shown in table 1.

Regional distribution

As in previous years, regional variation was noted in the numbers of cases reported (Table 2 and Figure 1), with the highest incidence rates this year in the SEHB, MHB, SHB and NWHB.

Age-sex distribution

The highest incidence was recorded in young children (Figure 2), a trend also recorded noted over the last few years. This was particularly pronounced among male cases. There was also a slightly higher incidence among adult females than adult males.

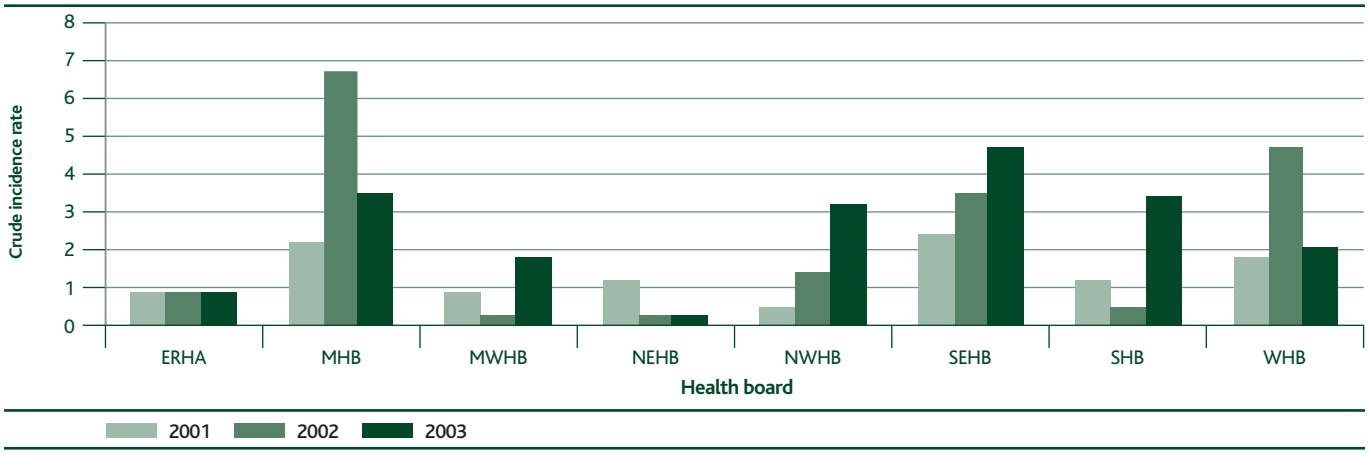

Figure 1: Crude incidence rate (CIR) of confirmed resident cases of VTEC O157 by health board of residence, Ireland, 2001-2003

Clinical Features

In total, 68 out of the 86 confirmed cases (79%) were reported as symptomatic. Reported symptoms included: bloody diarrhoea in 31 cases (46%), and HUS in 4 cases (6%). Of the 4 cases of HUS, 3 occurred in children under 15 years of age and there was one adult case.

Seasonality of VTEC O157 cases

The largest number of cases in 2003 occurred in the third quarter, with a peak in August (figure 3), very similar to the trend observed in 2002.

Travel-association

Eight cases were travel-associated. The countries visited within 14 days of onset of illness were Canary Islands (4), Italy (2), Austria/Germany (1) and Turkey (1).

Epidemiological Investigation

Two general outbreaks of VTEC O157 occurred during the summer of 2003 (3). Both were centred in hotel restaurants in the ERHA. Five confirmed and twelve probable cases were reported in one outbreak; seven cases were hospitalised. Investigations found no relationship between any specific food or drink and the development of illness. In the second outbreak, 3 confirmed cases including one who developed HUS were reported; there were two hospital admissions. Similarly, the source of this outbreak was not established.

As a result of following up apparently sporadic cases in 2003, an additional 13 family/household outbreaks were detected by health board personnel among 36 confirmed cases but no links were confirmed with any food or water sources.

For six households served by private water supplies (comprising 10 confirmed cases), there was documented evidence of either coliforms or *E. coli* in the water supply. However, *E. coli* O157 was not detected in any instance.

Risk exposures

Descriptive epidemiological information was collected on all reported cases in an attempt to identify potential risk factors for exposure to VTEC. Three (3.5%) cases reported consumption of unpasteurised milk or cheese. Contact with farm animals was reported in 17 (20%) cases. Of 56 cases where information was collected on water source, the water supply was public in 36 (64%) cases, private well water in 17 (31%) cases, from a group scheme in 2 (3.6%) cases and recorded as other (not public and not well) in 1 (1.8%) cases.

Non-O157 VTEC

Non-O157 VTEC, in particular VTEC O26, remain a concern in Ireland. While the enhanced surveillance system did not routinely collect information on these subtypes in 2003 four confirmed cases of VTEC O26 (1 in SEHB, 2 in NWHB and 1 in MWHB) were reported to the surveillance system. Most

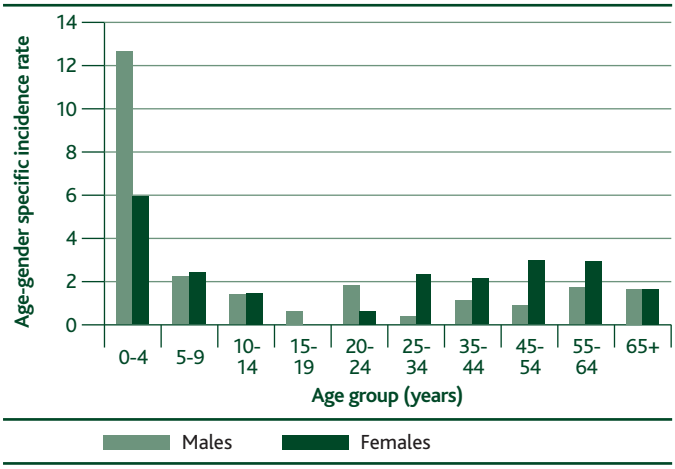

Figure 2. Age-gender specific incidence rate (per 100,000 population) of confirmed cases of VTEC O157, Ireland 2003

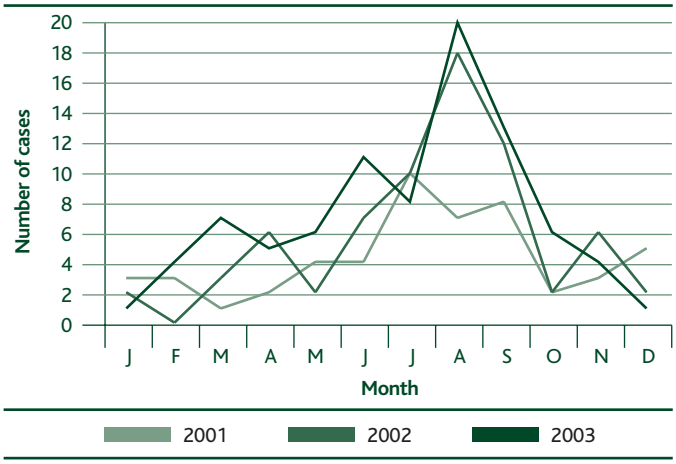

Figure 3. Confirmed cases of VTEC O157 by month of onset of symptoms, Ireland, 2001-2003

importantly, one child developed HUS in 2003 as a consequence of infection with *E. coli* O26.

Discussion

The enhanced surveillance system for VTEC O157 has been operating for 5 years and provides valuable information on the epidemiology of VTEC O157 in Ireland. Eighty-six confirmed cases of VTEC O157 infection (2.1 per 100,000 population) were reported in Ireland in 2003, the highest annual number on record. This compares with provisional incidence rates of 3.1/100,000 in Northern Ireland (4), 2.9/100,000 in Scotland (Mary Locking SCIEH personal comm.) and 1.3 in England and Wales (Sue Le Baigue, CDSC Colindale, personal communication) in 2003.

A further 4 cases of VTEC O26 were reported to the enhanced surveillance system, increasing the overall VTEC rate to 2.2 per 100,000. The potential for illness by non-O157 VTEC should not be overlooked; cases of VTEC O26 have been reported in Ireland every year since 1999.

A large proportion of cases in 2003 were reported in late summer with almost 48% per cent of cases having a date of onset between July and September. While a higher incidence during this time is a feature of VTEC infection, the particularly high rate in the summer of 2003 was in part influenced by the occurrence of 2 general outbreaks centred in the ERHA involving 8 cases, and in part by the reporting of 8 confirmed VTEC O157 cases with a date of onset in August from the SHB alone. The SHB cases included one family outbreak of 3 cases, and while geographical and temporal clustering was noted among 4 of the remaining 5 cases, no epidemiological links were identified and 4 different phage types were represented, making a general outbreak unlikely.

No sources or transmission routes were definitively identified for any of the VTEC cases reported in 2003 although person-to-person transmission is likely to have played some role in family/household outbreaks. In several case control studies internationally, contact with farm animals and farming environments has been shown to be a strong risk factor for VTEC infection among sporadic cases (5); 20% of cases here in 2003 reported contact with farm animals although it has not been demonstrated that this was the route by which infection occurred in these instances. In Ireland, there is increasing concern about the potential of water as a possible transmission route. Those who consume water from supplies other than public water supplies are over represented among VTEC cases. The 2002 census recently reported that 72% of persons in Ireland were served by public water supplies (6); only 64% of VTEC O157 cases in 2003 had public water supplies. Moreover, for a number of households served by private supplies, there was documented evidence of either coliforms or *E. coli* in their water supply, although *E. coli* O157 was not detected in any instance.

The importance of co-operation in surveillance at national and international level was demonstrated during epidemiological investigations of some of the VTEC cases reported here. A number of foreign tourists were involved in the 2 general outbreaks in Ireland in the summer of 2003, some of whom had travelled on to other regions of the country prior to diagnosis; some had even travelled home prior to diagnosis, necessitating international collaboration.

Significant changes have been made in 2004 in the reporting of cases of VTEC. Illness caused by enterohaemorrhagic *E. coli* (EHEC) became a notifiable disease on January 1st 2004. Previously, VTEC were notified under the category of 'Food Poisoning (bacterial other than Salmonella)'. Under EHEC, all verotoxin positive *E. coli*, and *E. coli* of serogroups O157, O26, O111, O103, O145 regardless of whether verotoxin producers, are reported.

Acknowledgements

We wish to acknowledge the co-operation of microbiologists, medical scientists, SAMOs, AMOs, SPHMs, surveillance scientists, infection control nurses, PEHOs, and EHOs in participating in the enhanced surveillance system.

References

1. Garvey, P. Foley. B and P. McKeown. 2003. Epidemiology of Verotoxigenic *E. coli* O157 in Ireland, 2002. *Epi-Insight* **4**(6):2-3
2. Smith H et al. 2000. Laboratory Surveillance and Typing Of VTEC O157 in England and Wales. VTEC 2000. Kyoto. Abstract 264.
3. Anon. 2003. Two Outbreaks of Illness due to *E. coli* O157:H7 in Dublin. *Epi-Insight* **4**(7):1
4. CDSC NI. http://www.cdscni.org.uk/surveillance/Gastro/Escherichia_coli_O_157.htm
5. Locking ME, O'Brien SJ, Reilly WJ, Wright EM, Campbell DM, Coia JE, Browning LM, Ramsay CN. 2001. Risk factors for sporadic cases of *Escherichia coli* O157 infection: the importance of contact with animal excreta. *Epidemiol Infect*. Oct; **127**(2):215-20.
6. CSO. Census 2002. Volume 13 - housing. Government of Ireland 2004. Available at www.cso.ie/census/vol13-index,htm

Invasive *Haemophilus influenzae* in Ireland, 2003

Key Points

- **22 cases of invasive *Haemophilus influenzae* were reported in 2003**
- **14 of the cases were due to *H. influenzae* type b (Hib) disease**
- **64% of Hib cases occurred in children <5 years of age**
- **There were two true Hib vaccine failures in 2003**

Introduction

Routine *Haemophilus influenzae* type b (Hib) immunisation has resulted in a marked decrease in the incidence of invasive *H. influenzae* disease. Since the introduction of the vaccine in 1992 the incidence of Hib disease has declined from approximately 2.8 per 100,000 in the late 1980s to <0.4 per 100,000 more recently. Despite these preventive measures, diseases due to Hib have not been completely eliminated and the organism still causes serious invasive blood-borne infections such as meningitis, septicaemia, epiglottitis, cellulitis and septic arthritis.

Materials and methods

A case is defined as invasive *H. influenzae* disease in a person with an isolate from a normally sterile site.

Two sources of data allowed NDSC to monitor the incidence of invasive *H. influenzae* in Ireland in 2003.

1. Reports from laboratories which NDSC received via Departments of Public Health
2. Updates from the HPA Haemophilus Reference Unit, Oxford, UK

Details of all cases were inputted to an MS Access database at NDSC. Analysis was preformed using MS Access and MS Excel.

Incidence rates were calculated using population data taken from 2002 Census of Population, as the denominator.

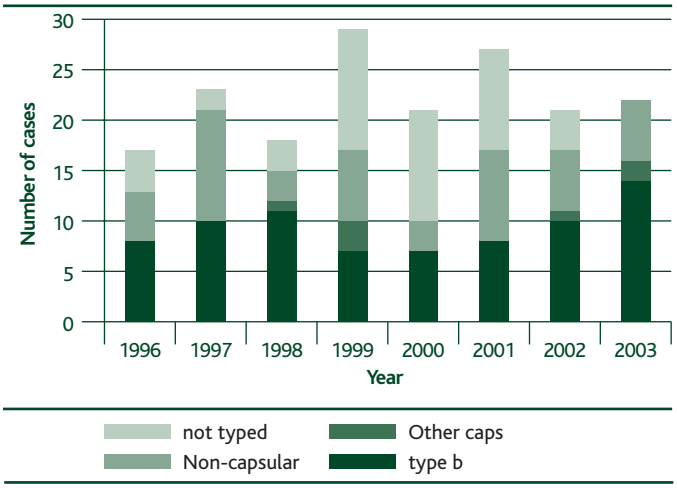

Figure 1. Invasive Haemophilus influenzae cases reported in Ireland by serotype

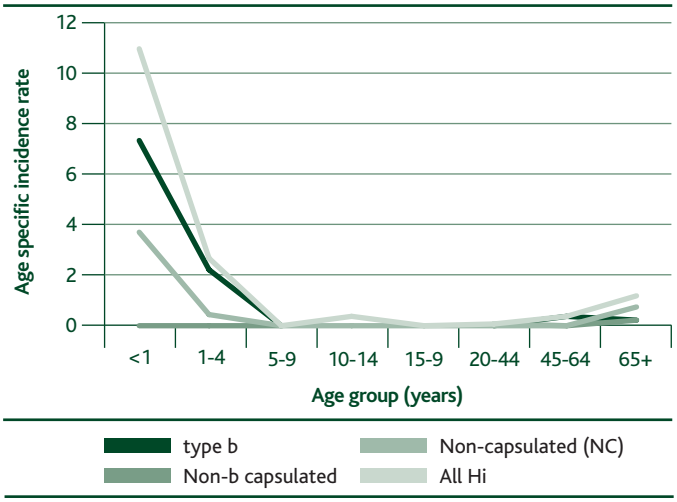

Figure 3. Age specific incidence rates of invasive Haemophilus influenzae cases reported in 2003 by serotype

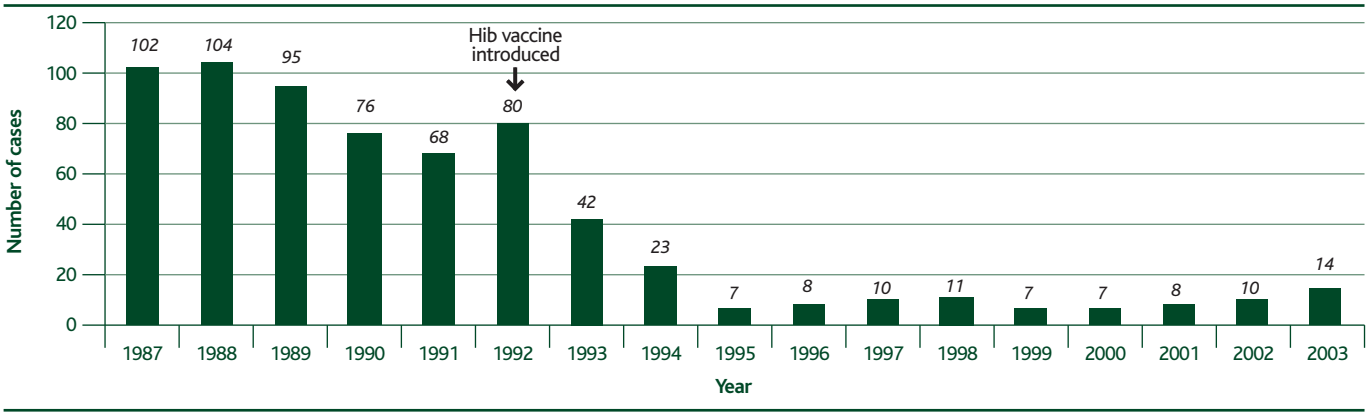

Figure 2. Invasive Haemophilus influenzae type b cases reported in Ireland, 1987-2003

Results

Overall incidence of Haemophilus influenzae

Twenty two cases of invasive *H. influenzae* were reported in 2003 (0.6/100,000), which was similar to the previous year when 21 cases were reported (figure 1). The clinical manifestations of the 22 cases reported were: meningitis (n=2), septicaemia (n=4), meningitis and septicaemia (n=5), pneumonia (n=3), osteomyelitis/septic arthritis (n=1), cellulitis (n=1), epiglottitis (n=1) and unknown (n=5). The highest number of *H. influenzae* type b (Hib) cases since 1994 was reported in 2003 (figure 2). The age distribution of cases by serogroup is presented in table 1 and the age specific incidence rates by serogroup are presented in figure 3. Sixty four percent of cases were due to serotype b (14/22), 9% (2/22) were non-b capsulated strains (1 serotype e and 1 serotype f) and the remainder (6/22) were non-capsulated. Over half the cases (12/22) occurred in children <5 years of age. Of the Hib cases reported, 64% (9/14) occurred in this age group.

The highest incidence rates of invasive *H. influenzae* were in the <5 year olds followed by the elderly (table 1 and figure 3). The predominant cause of disease in the <5 year olds was due to serotype b strains whereas in the elderly non-capsulated strains were more common.

Incidence of Haemophilus influenzae type b (Hib) in childhood

Thirteen cases of invasive *H. influenzae* occurred in children <15 years of age (table 1). Seventy seven percent of these cases (10/13) were due to serotype b strains with non-capsulated strains accounting for the remaining three cases. The incidence of Hib was highest in the <1 year olds (7.3/100,000), followed by 1-4 year olds (2.2/100,000) and dropped thereafter in the older age groups ranging from 0.0 to 0.4 per 100,000 (figure 3). During 2003, the clinical presentations of Hib disease in childhood were septicaemia (n=7), pneumonia (n=2) and cellulitis (n=1).

Hib vaccine failures

Five of the 10 Hib cases in the <15 year olds had not been vaccinated against Hib, while five had been vaccinated. Three of the vaccinated children had received three doses of Hib vaccine as per the childhood immunisation schedule at two, four and six months and therefore were fully vaccinated. These three cases constitute true vaccine failures and Hib disease occurred between two to three and a half years after receiving the third/final dose of vaccine. However it should be noted that one of these true vaccine failures occurred in an immunocompromised child. The number of true Hib vaccine failures tends to fluctuate between two and four per year, no change in this trend was observed in 2003.

The other two vaccinated Hib cases in 2003 had been incompletely vaccinated, each receiving only one of the three recommended doses. Therefore, these are classified as apparent vaccine failures.

In 2003, true vaccine failures occurred in only 30% of the Hib cases in children <15 year of age. Since 1996, the proportion Hib disease in fully vaccinated children has ranged between 20-60% per annum.

Table 1. Invasive Haemophilus influenzae cases reported in 2003, by serotype and age group

Serotype	<1	1-4	5-9	10-14	15-19	20-44	45-64	>65	Total
type b	4	5	0	1	0	0	3	1	14
Non-b capsulated	0	0	0	0	0	1	0	1	2
Non-capsulated (NC)	2	1	0	0	0	0	0	3	6
All *H. influenzae*	6	6	0	1	0	1	3	5	22
ASIR of all *H. influenzae*	11.0	2.7	0.0	0.4	0.0	0.1	0.4	1.2	0.6

ASIR, age specific rate per 100,000

Discussion

A recent resurgence of Hib infections observed in the UK over the last four years has predominantly been in vaccinated children. Experts believe that a reduction in antibody levels throughout the first five years of life in vaccinated children in recent years has fuelled the rise in reported Hib cases in the absence of an obvious increase in transmission.[1]

This trend has not been identified in Ireland. Although the number of Hib cases reported in Ireland in 2003 increased somewhat compared to previous years, the number of Hib vaccine failures remained unchanged. In 2003, only 30% of the Hib cases that occurred in those <15 years of age had been fully vaccinated. Therefore, a concomitant rise in true vaccine failures did not occur with the observed increase in Hib disease in 2003. Furthermore, the proportion of Hib disease in fully vaccinated children has never risen above 60% when data from 1996-2003 are reviewed. Based on these data for Ireland, there is no evidence to indicate that waning immunity to the Hib vaccine is the reason for the increase in Hib disease seen in 2003. The fact that at least 50% of the children diagnosed with Hib disease in 2003 were unvaccinated is more a cause for concern. Poor uptake of the Hib vaccine (86% in 2003) in Ireland is potentially one of the main contributory factors to the increase in childhood Hib disease recently observed.

Incidence rates of non-b capsulated *H. influenzae* remain low and no evidence of serotype replacement have been observed despite over 10 years of Hib vaccination. Non capsulated strains now account for approximately a third of invasive *H. influenzae* cases in Ireland and therefore highlights the importance of referring strains to a reference centre for accurate identification of all strains.

In conclusion, although the incidence of invasive Hib disease dropped impressively in the years after the introduction of appropriate vaccination, the disease did not disappear completely. Continued surveillance is essential to monitor trends in the incidence of invasive *H. influenzae* disease and Hib vaccine failures. This information is vital in measuring the impact of preventive measures being used and in examining strategies to eliminate Hib disease in Ireland.

Acknowledgements

NDSC would like to thank the Departments of Public Health, microbiologists and laboratories for providing these data and without whose support in the surveillance of invasive *H. influenzae* disease this report would not be possible.

References

1. McVernon J, Howard A, Slack M, Ramsay M. Long-term impact of vaccination on *Haemophilus influenzae* type b (Hib) carriage in the United Kingdom. Epidemiol Infect 2004; **132:** 765-767.

Corporate Services

The role of the corporate services division is to provide NDSC with the necessary resources, skills, policies and procedures, competencies, systems and internal support structures to achieve its objectives.

The divisional objectives are:

- To ensure NDSC has a qualified and competent workforce necessary to meet its objectives and that NDSC is an employer of choice
- To develop and implement systems, policies and procedures that ensure the most effective and efficient use of NDSC's financial resources to enable it to achieve its objectives
- To facilitate the enhanced performance of NDSC by the provision of office accommodation and other support services
- To provide skilled administration support to the Board, committees and functional teams at NDSC
- To ensure NDSC meets all its obligations and requirements in relation to legal, planning and compliance issues
- To provide an effective information service for NDSC

Human Resources
By the end of 2003 NDSC employed 41 staff members, including highly qualified and experienced medical, scientific, IT and administration staff. NDSC encourages staff to avail of training courses considered to be of value to them in their work and in their personal development. In addition to attendance at relevant courses, seminars and conferences during 2003, many staff of NDSC availed of the opportunity to attend computer skills courses during the year. In continuing with NDSC's policy of supporting a work-life balance, improved flexible working arrangements were introduced at the Centre in 2003.

Communications
Following the appointment of a Communications Officer at NDSC in January 2003, a new communications division was established at the Centre to facilitate the delivery of key public health messages and information to the media and the public, to develop an integrated communications programme at NDSC, and to ensure the production of quality publications, documents and information for the public and allied health care professionals.

Library and Information Services
In order to develop the library and information services provided at NDSC, a librarian was appointed to the Centre in January 2003. This led to the development of an extensive library collection including the provision of a range of electronic resources, which was facilitated by the introduction of the Liberty library management system.

Health Services Reform Programme
As part of the health services reform programme a comprehensive communication and consultation process was held at NDSC in August 2003 to allow staff to express their hopes and concerns for the reforms. This resulted in the production of a report on NDSC staff views, which was submitted to the Office for Health Management and the Department of Health and Children.

Influenza activity during the 2003/2004 season

Key Points

- **Influenza activity began early in Ireland during the 2003/2004 season, peaking in mid-November 2003**
- **The influenza A/Fujian/411/2002(H3N2)-like strain was the predominant circulating strain worldwide, mainly affecting younger age groups**
- **Avian influenza outbreaks were detected in East and South East Asia, Canada and the US**

Introduction

Influenza is one of the commonest and oldest diseases known to man. The impact on public health varies depending on the circulating strain of virus and the level of pre-existing immunity in the community each season.[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 three 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, necessitating the 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. During the 20th century, three influenza pandemics occurred, separated by intervals of 11 to 44 years: Spanish flu 1918-1919, Asian flu 1957-1958, and Hong Kong flu 1968-1969. The Spanish influenza pandemic of 1918 is acknowledged as the most devastating, resulting in an estimated 20-40 million deaths worldwide.[3, 4]

The 2003/2004-influenza season was the fourth year of

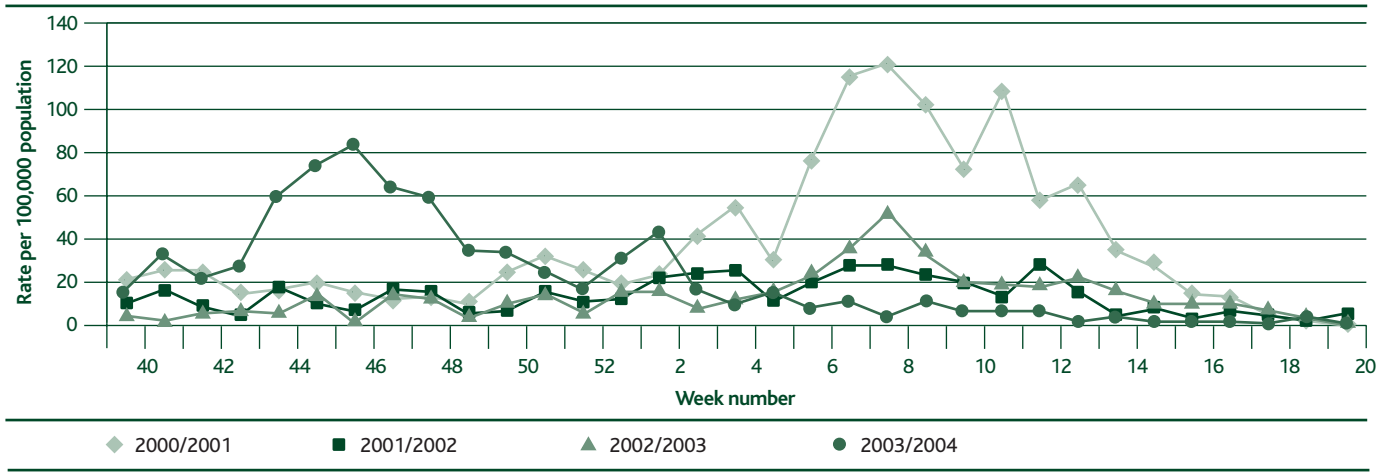

Figure 1. GP consultation rate for ILI per 100,000 population by week, during the 2000/2001, 2001/2002, 2002/2003 & 2003/2004-influenza seasons

influenza surveillance utilising computerised sentinel general practices in Ireland. The NDSC is working in collaboration with the NVRL and the ICGP on this surveillance project. Increased influenza activity was observed in Ireland at the start of the 2003/2004-influenza season, compared to previous seasons. Influenza activity was mainly observed in younger age groups during the 2003/2004 season. The predominant circulating strain this season was influenza A/Fujian/411/2002(H3N2)-like.

Materials and methods

Clinical data

Thirty-five 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 35 sentinel general practices, comprising 66 general practitioners, represent 2.8% of the national population. Practices were located in all health boards with the number of sentinel practices in each health board based on the population of each health board.

Virological data

Sentinel GPs were requested to send a combined nasal and throat swab on at least one patient per week where a clinical diagnosis of ILI was made. Swabs were sent to the NVRL for testing using Shell Vial and PCR techniques and results were reported to NDSC. The NVRL also reported on a weekly basis the results of respiratory specimens referred mainly from hospitals.

Regional influenza activity

The Departments of Public Health sent an influenza activity index (no report, no activity, sporadic-, localised-, regional- or widespread activity) every week, to NDSC. The activity index is analogous to that used by the WHO global influenza surveillance system and the European Influenza Surveillance Scheme.[5, 6] The index is based on sentinel GP ILI consultation rates, laboratory-confirmed cases of influenza, sentinel hospital admissions data and/or sentinel school absenteeism levels. One sentinel hospital was located in each health board. Sentinel primary and secondary schools in each health board were located in close proximity to the sentinel GPs.

Weekly influenza surveillance report

NDSC produced a weekly influenza report, which was posted on the NDSC website each Thursday. Results of clinical and virological data were reported, along with a map of influenza activity and a summary of influenza activity worldwide.

Enhanced influenza surveillance

In response to the increase in ILI activity in younger age groups during the 2003/2004 season, an enhanced influenza surveillance system was implemented to capture data on all hospitalised influenza cases aged 0-14 years.

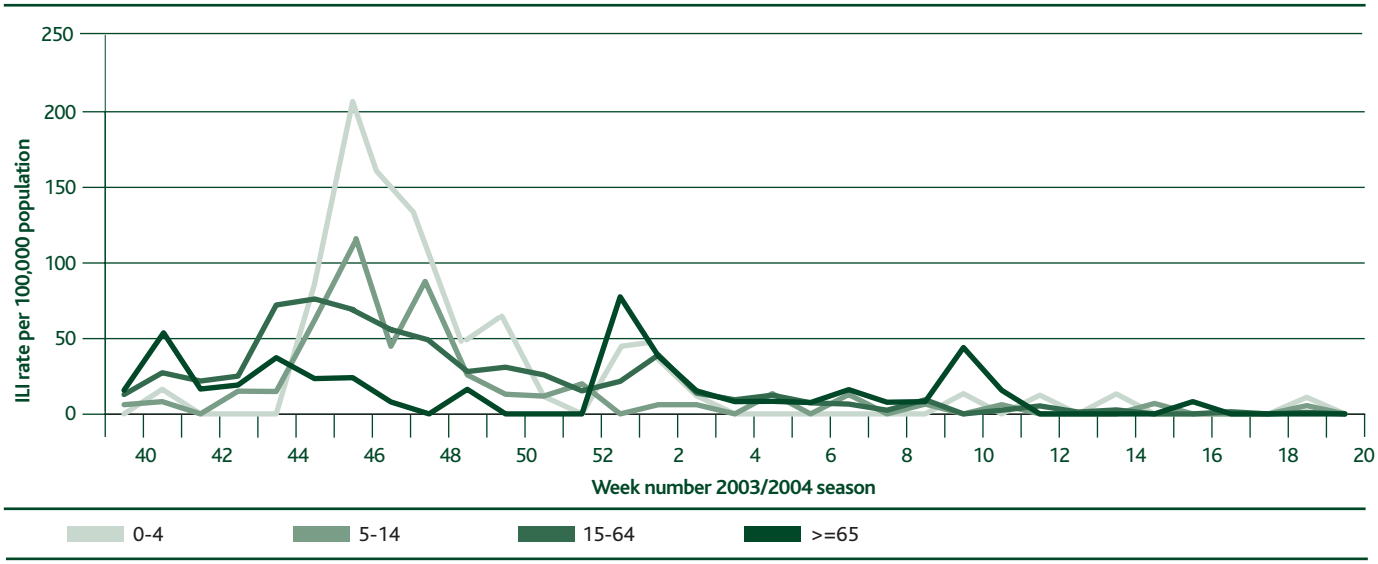

Figure 2. Age specific GP consultation rate for ILI per 100,000 population by week for the 2003/2004-influenza season

Results

Early school outbreaks

The 2003/2004-influenza season started early, with two school outbreaks of ILI during September 2003, in the ERHA. The first outbreak occurred during the first week of September and involved 160 students and four teachers in a school in Co. Kildare. The second school outbreak was in South County Dublin and occurred during the end of the second week of September 2003 and involved 81 pupils and one staff member. Influenza A (H3N2) was identified in both outbreaks and was later antigenically characterised as the A/Fujian/411/2002(H3N2)-like strain.[7,8] Two further school ILI outbreaks were reported during the 2003/2004 season, one in the SEHB during week 42 and the other in the MHB during week 45.

Clinical data

The early influenza activity associated with the two school outbreaks in the ERHA was also reflected in the GP sentinel surveillance scheme. Influenza activity increased earlier than usually observed by sentinel GPs, with GP consultation rates for ILI peaking during week 46 at 82.3 per 100,000 population (figure 1). This is the highest peak rate since the 2000/2001 season when rates peaked at 121.0 per 100,000 during week 8. During the peak in ILI consultation rates, the majority of cases reported were aged between 0-4 and 5-14 years of age (figure 2). A total of 625 ILI cases were reported by sentinel GPs during the 2003/2004 season, compared to 348 during the 2002/2003 season, 277 during the 2001/2002 season and 671 during the 2000/2001 season.

Virological data

The NVRL tested 350 sentinel specimens for influenza virus during the 2003/2004-influenza season. One hundred and forty-nine (42.6%) sentinel specimens were positive for influenza virus: 142 influenza A (140 A H3N2 and 2 A unsubtyped) and seven influenza B. The predominant influenza virus subtype identified through the sentinel GP scheme this season was influenza A (H3N2), accounting for 94.0% of positive specimens. The number of positive influenza specimens peaked during weeks 44 to 47 2003 (figure 3). Positive specimens in all age groups with the exception of those aged 65 years or older increased during the period of peak clinical activity. The majority of positive sentinel cases this season were in the 15-64 year age group, in contrast to non-sentinel cases, which were mainly 0-4 years of age.

The NVRL tested a total of 1857 non-sentinel respiratory specimens mostly from hospitals during the 2003/2004 influenza season. One hundred and twelve specimens (6.0%) were positive for influenza virus: 98 influenza A and 14 influenza B. The number of influenza positive specimens peaked between weeks 47 and 49. The majority of influenza positive non-sentinel cases were 0-4 years of age (69/112; 61.6%). Six (5.4%) cases were 5-14 years of age, 32 (28.6%) cases were 15-64 years of age and one case was 65 years of age or older. Eight non-sentinel specimens (0.4%) were positive for Adenovirus, 396 (21.3%) for respiratory syncytial virus (RSV), six (0.3%) for parainfluenza virus type-1, five (0.3%) for parainfluenza virus type-2 and 38 (2.0%) for

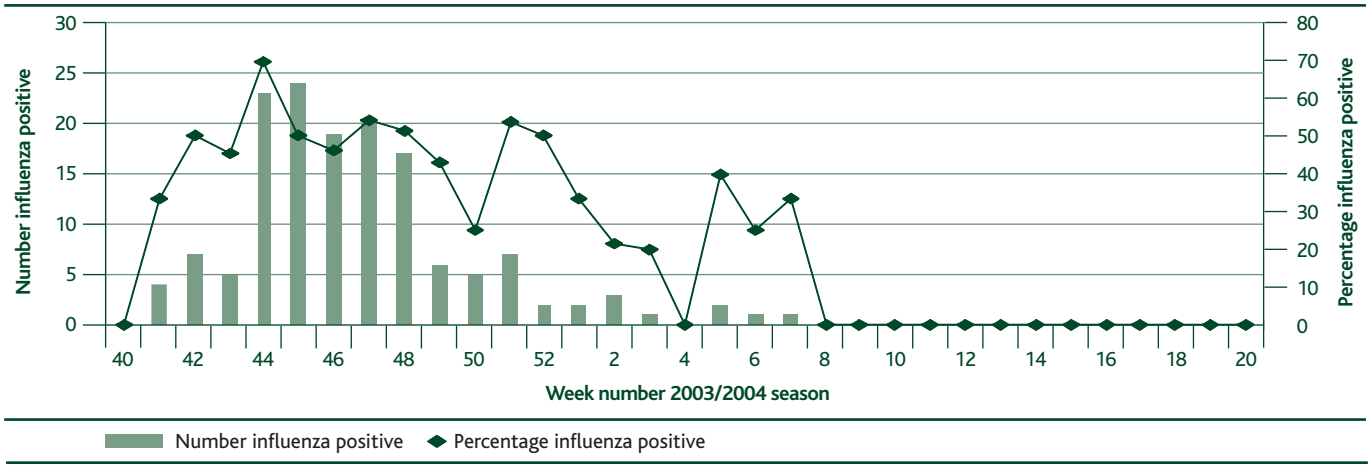

Figure 3. Number and percentage of sentinel specimens positive for influenza virus during the 2003/2004-influenza season

parainfluenza virus type-3. *Please note that non-sentinel specimens include all respiratory specimens referred to the NVRL; these specimens are mainly from hospitals and some GPs and may include more than one specimen from each case.*

The total number of influenza positive specimens from all sources (sentinel and non-sentinel) this season was 261: 240 influenza A and 21 influenza B. Seventy-five influenza positive cases this season were in the 0-4 year age group and 31 were in the 5-14 year age group. One hundred and forty-five influenza positive specimens were in cases aged between 15 and 64 years of age, six cases were 65 years or older and four cases were of unknown age group.

RSV data

During the 2002/2003 and 2003/2004 seasons, the number of RSV positive detections from hospital respiratory specimens referred to the NVRL reached the highest levels on record.[9] Three hundred and ninety-six RSV positive specimens were detected during the 2003/2004 season, peaking in January 2004 (figure 4). Prior to the 2002/2003 season, the largest seasonal outbreak of RSV occurred during the 1998/1999 season, with 250 RSV positive specimens detected by the NVRL.

Vaccination status and antigenic characterisation

Of the 149 positive influenza virus detections from sentinel specimens, 105 (70.5%) were not vaccinated, eight (5.4%) were vaccinated and vaccination status was unknown in 36 (24.2%) cases. Of the eight cases that were vaccinated, influenza A (H3N2) was detected in seven cases and influenza A (unsubtyped) was detected in one case.

The NVRL referred representative specimens from the initial ERHA school outbreaks and from sentinel specimens to the WHO laboratory (Mill Hill) in London for antigenic characterisation. Eight influenza A (H3N2) samples were sequenced at the NVRL and phylogenetic analysis was carried out at Mill Hill laboratory. All eight samples were characterised as A/Fujian/411/2002 (H3N2)-like strains. An influenza B virus isolate was antigenically characterised as being closely related to the B/Hong Kong/330/2001-like strain.

Regional influenza activity

Regional influenza activity peaked between weeks 42 and 50 2003, with localised and sporadic influenza activity reported in the ERHA and NEHB and sporadic activity reported in the remaining health boards. In some health boards, increases in sentinel hospital total admissions, A & E admissions and respiratory admissions and increases in sentinel primary and secondary school absenteeism were reported during the period of peak clinical activity. Influenza positive specimens by health board are detailed in table 1. The number of positive specimens by health board is influenced by the number of sentinel GPs in each health board and also the number of respiratory specimens that regional and local laboratories refer to the NVRL.

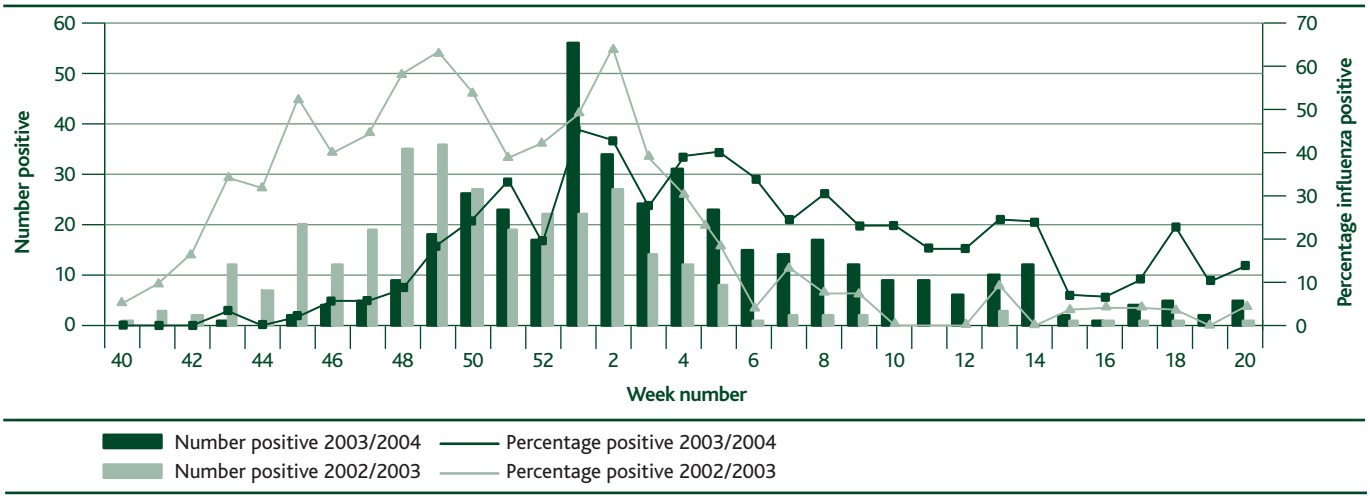

Figure 4. Number and percentage of non-sentinel RSV positive specimens detected during the 2003/2004 and 2002/2003 influenza seasons

Mortality data

Two influenza A associated deaths were reported to NDSC during the 2003/2004 season. Both deaths occurred in 0-4 year olds in the SEHB, one during week 47 and the other during week 48 2003.

Enhanced influenza surveillance

Seven influenza cases were reported to NDSC during December 2003 and January 2004, through the enhanced influenza surveillance system. The cases ranged in age from six weeks to 13 years, with four cases aged 0-4 years and three cases aged 5-14 years. Influenza A was detected in three of the seven cases, influenza B in one case and three cases were of unknown influenza type. The cases were all hospitalised for a period ranging from 2-11 days. Complications associated with these cases included: primary influenzal viral pneumonia, secondary bacterial pneumonia and bronchitis. Two of the cases were at risk of influenza related complications and therefore had been vaccinated. The remaining five cases were unvaccinated.

Six cases of influenza pneumonia were notified to NDSC in 2003 through the weekly infectious disease notification system, all six cases were notified during November and December 2003. Four of the six cases were 0-4 years of age, one was in the 5-14 year age group and one case was in the 15-24 year age group. Please note that these cases may have also been reported through the sentinel surveillance system or the enhanced influenza surveillance system.

Influenza activity worldwide

During the 2003/2004 season, influenza activity began early in Europe, with an initial surge of activity in Western Europe beginning in Ireland, the UK, Spain and Portugal and followed by Norway, France and Belgium, with incidence rates highest amongst 0-4 year olds. A second wave of activity was concentrated in Central and Eastern European countries. The vast majority of characterised influenza strains in Europe during the 2003/2004 season were influenza A/Fujian/411/2002(H3N2)-like. A small percentage of influenza B viruses were characterised, the majority of which were B/Shanghai/361/002-like. [5]

In the US, an early increase in influenza activity was reported with activity levels above baseline level from week 45 2003. The influenza A/Fujian/411/2002(H3N2)-like strain was the predominant strain detected.[10] Early influenza activity was also reported in Canada, with the A/Fujian/411/2002(H3N2)-like strain predominating mainly amongst younger age groups.[11]

Influenza activity in Africa and Oceania also began earlier than usual and was more severe than the preceding three years. Influenza A (H3N2) viruses predominated in most countries worldwide and were responsible for the majority of outbreaks. Influenza A (H1) circulated at low levels in most parts of the

Table 1. Total number of sentinel & non-sentinel influenza A and B positive specimens by health board for the 2003/2004 season*

Health board	Sentinel			Non-Sentinel			Sentinel & Non-Sentinel		
	Flu A	Flu B	Total	Flu A	Flu B	Total	Flu A	Flu B	Total
ERHA	63	2	65	55	7	62	118	9	127
MHB	3	0	3	6	2	8	9	2	11
MWHB	19	1	20	3	0	3	22	1	23
NEHB	20	2	22	15	1	16	35	3	38
NWHB	5	0	5	11	0	11	16	0	16
SEHB	15	1	16	5	2	7	20	3	23
SHB	10	0	10	1	0	1	11	0	11
WHB	7	1	8	2	2	4	9	3	12
Total	**142**	**7**	**149**	**98**	**14**	**112**	**240**	**21**	**261**

** Please note that non-sentinel specimens include all specimens referred to the NVRL; these specimens are mainly from hospitals and some GPs and may include more than one specimen from each case.*

world, with outbreaks occurring in Iceland and the Ukraine. Influenza B also circulated at low levels in most parts of the world. [12]

The most significant influenza event globally during the 2003/2004 season was the widespread epidemic in East and Southeast Asia of highly pathogenic avian influenza (HPAI), caused by influenza A (H5N1) in animal populations, particularly domestic fowl and a variety of other birds. These outbreaks posed a considerable potential human public health risk and resulted in 23 human deaths in Vietnam and Thailand and mass poultry culls in Asia. Low pathogenic avian influenza detections (caused by influenza A H7N2 & A H2N2) were reported in the eastern US, and HPAI (caused by influenza A H5N2) was reported in Texas during the 2003/2004 season (each of these viruses was different from the HPAI strain in Asia). Avian influenza poultry outbreaks were also reported in Canada, associated with influenza A (H7N3). Two human cases of avian influenza A (H7) were reported in poultry workers in Canada, both cases recovered.[13]

Discussion

Influenza activity peaked early in Ireland during the 2003/2004-influenza season; with higher levels of activity reported than in the previous two seasons, when low influenza activity levels were observed. [14] This early influenza activity was also reflected throughout most of Western Europe, the US and Canada. [5] The ERHA school outbreaks were among the first influenza cases of the 2003/2004 season reported in Europe. [7, 8]

During the 2003/2004 season, some antigenic drift was detected in the A (H3N2) strains circulating in Europe, America, Australia and New Zealand. The A/Fujian-like strains are related to the A/Panama-like strain included in the 2003/2004 vaccine and antibodies induced against this vaccine strain cross-react with A/Fujian-like strains, but generally at a reduced level. The 2003/2004 influenza vaccine offered good protection against the virus strains in the vaccine, and a degree of cross protection against the A/Fujian-like strain.[5] The 2003/2004-influenza vaccine offered the best protection for those aged 65 years and over and those in at risk groups. The WHO published its recommendations on the composition of the influenza vaccine for use in the 2004/2005 Northern Hemisphere influenza season on the 27th February 2004. The vaccine will include the following strains: A/New Caledonia/20/99(H1N1)-like virus, A/Fujian/411/2002(H3N2)-like virus and B/Shanghai/361/ 2002-like virus. [12]

A/Fujian-like strains were first detected in very low numbers during the 2002/2003-influenza season in Europe and also in viruses circulating in Australia and New Zealand during July and August 2003.[5] The A/Fujian-like strains identified during the 2003/2004 season in Ireland resulted in higher incidence rates of influenza in 0-4 year olds and are likely to have been the cause of some clinically severe cases (identified through

the enhanced influenza surveillance system) and of two influenza associated deaths in this age group. Detection of higher incidence rates of influenza in younger age groups was not unexpected as there has been very little influenza in circulation for the last few seasons; therefore the opportunity for development of immunity particularly amongst younger age groups has been limited.
Avian outbreaks of influenza A (H5N1) have posed a significant threat to human health in 2004. In a number of outbreaks since the beginning of 2004 in Asia, the virus has jumped from infected chickens or ducks directly to humans. These direct human infections have produced severe and sometimes fatal outcomes. The risk of virus transmission to humans from infected poultry will continue as long as outbreaks are occurring in poultry. Of greatest concern is the risk that continuing transmission of the virus to humans will give avian and human influenza viruses an opportunity to exchange genes (reassortment), thereby acquiring the ability to transmit easily from human to human and thus triggering a pandemic.[13]

In light of the threat posed to human health from avian influenza outbreaks, a number of additional measures have been put in place in Ireland to strengthen and expand surveillance of ILI. Work is in progress to increase the number of sentinel GPs, thereby improving their geographical representation. Sentinel GPs are also working towards monitoring influenza on a year round basis. The NVRL will begin testing sentinel specimens for RSV, as well as influenza, in October 2004. In addition, influenza became a notifiable disease in Ireland on January 1st 2004. This information will in turn inform continuing progress on the Irish national influenza pandemic preparedness plan.

Acknowledgements

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

References

1. Salisbury D, Begg N. Immunisation against infectious diseases. HMSO 1996: **113**.
2. Atkinson W, Humiston S, Wolfe C, Nelson R eds. Epidemiology and prevention of vaccine-preventable diseases. Influenza. Sixth ed. Department of Health and Human Services, USA. 2000: 231-248.
3. Glezen PW. Emerging infections: pandemic Influenza. *Epidemiol Rev* 1996; **18**: 64-76.
4. Nicholson KG, Webster RG, Hay AJ. Textbook of influenza. 1998.
5. European Influenza Surveillance Scheme. Available at http://www.eiss.org/index.cgi
6. WHO global influenza surveillance programme. Available at http://www.who.int/csr/disease/influenza/en/
7. Fitzgerald M. Ireland's influenza season 2003/2004 begins with outbreak in Dublin. *Eurosurveillance Weekly*. 2003: **7** (40). Available at http://www.eurosurveillance.org/ew/2003/031002.asp
8. Fitzgerald M, Danis C, Conlon M, Connell J. Outbreak of influenza A H3N2 in another Dublin school predates previously reported outbreak in Ireland. *Eurosurveillance Weekly*. 2003: **7** (43). Available at http://www.eurosurveillance.org/ew/2003/031023.asp#3
9. Domegan L., Cotter S., O'Kelly E., Coughlan S., Condon B., O'Reilly P. Surveillance of respiratory syncytial virus in Ireland. *EPI-insight*. 2004; **5** (7): 2-3.
10. CDC. 2003/2004 U.S. Influenza season summary. Available at http://www.cdc.gov/flu/weekly/weeklyarchives2003-2004/03-04summary.htm
11. Health Canada. Flu Watch Canada. Available at http://www.hc-sc.gc.ca/pphb-dgspsp/fluwatch/index.html
12. WHO. Recommended composition of influenza virus vaccines for use in the 2004/2005 influenza season. *WER*. 2004; **9** (79): 88-92.
13. WHO Avian Influenza. Available at http://www.who.int/csr/disease/avian_influenza/en/
14. Domegan, L. Summary report of 2002/2003-influenza season. Available at http://www.ndsc.ie/Publications/InfluenzaWeeklySurveillanceReport/

Surveillance of Outbreaks of Infectious Intestinal Disease (IID) in Ireland, 2002

Key Points

- **188 outbreaks of IID were reported to the national outbreak surveillance system in 2002, compared to 64 in 2001**
- **These outbreaks were responsible for at least 8027 persons becoming ill**
- **Noroviruses have emerged as the primary cause of IID outbreaks being the causative pathogen in 154 (82%) of IID outbreaks in 2002**
- **In 2002, the majority of outbreaks occurred in healthcare settings i.e. hospitals and residential homes**

Introduction

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

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

More specific objectives include measuring the burden of illness caused by outbreaks, identifying high-risk groups in the population and estimating the workload involved in the management of outbreaks. The information gathered can be used to inform public health professionals on the causes and factors contributing to outbreaks, to target prevention strategies and to monitor the effectiveness of prevention programmes.

Outbreak definition

Outbreak

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

Methods

Since July 2001, public health professionals are requested to

Table 1. Number of outbreaks of IID and total numbers ill in each health board area 2002.

Health Board	Number of Outbreaks	Number ill
ERHA	83	4316
SEHB	32	1386
MHB	19	368
SHB	17	1008
MWHB	12	433
NEHB	9	219
NWHB	9	102
WHB	7	195
Total	**188**	**8027**

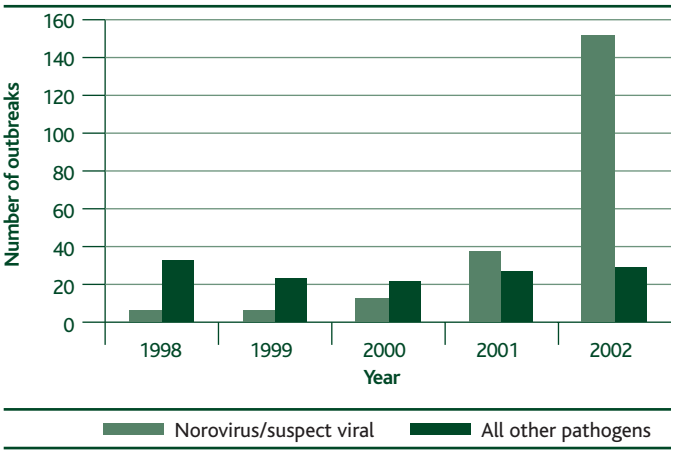

Figure 1. Confirmed or suspect norovirus outbreaks v. other causes, 1998-2002. (Data prior to July 2001 provided by FSAI)

Table 2. Pathogens associated with outreaks and numbers ill, 2002.

Pathogen	Number of Outbreaks	Number ill
Norovirus	98	6776
Suspect Viral	56	881
Salmonella spp	7	27
E. coli O157	7	19
Cryptosporidium spp	3	63
Rotavirus	2	18
Adenovirus	1	11
Campylobacter jejuni	1	7
Clostridium difficile	1	6
Enterovirus (suspect)	1	132
Shigella sonnei	1	4
Staph. aureus	1	7
Not known	9	76
Total	**188**	**8027**

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

Results

During 2002, 188 outbreaks of infectious gastrointestinal disease were reported to NDSC, resulting in at least 8027 people becoming ill. 1296 people were reported to have been hospitalised (16%). Table 1 shows the regional distribution of outbreaks during 2002. Most outbreaks were reported from the ERHA region (n=83).

Causative pathogen

The most notable feature of analysis of the IID outbreak data from 2002 is the dramatic increase in the number of outbreaks either confirmed or suspected to be due to norovirus. This is most evident in figure 1 when outbreak data from 1998 to 2002 are examined. The breakdown of the 2002 outbreaks by pathogen is shown in table 2. Noroviruses are seen to account for 154/188 (82%) of all outbreaks of IID reported to NDSC in 2002 (see figure 2). This compared to 2001 when suspect or confirmed norovirus accounted for 58% of all IID outbreaks. Other viral causes of outbreaks in 2002 included rotavirus, adenovirus and suspect enterovirus.

After norovirus, the next most commonly reported outbreaks were *Salmonella enterica* and *E. coli* O157. All of the *E. coli* 0157 outbreaks occurred in private homes and were identified as part of active case finding during epidemiological investigations of single cases. There was an increase in the number of *S. enterica* outbreaks reported compared to 2001. Two were identified as *S.* Typhimurium, two as *S.* Enteritidis and serotyping information was not available on the other three. There was one small general outbreak of salmonellosis that occurred in a residential institution, with all of the remainder being family outbreaks. There was one outbreak of *Campylobacter jejuni* reported in 2002, associated with eating in a restaurant.

Mode of transmission

In the majority of outbreaks of IID in 2002, the principal mode of transmission of the illness was reported as person-to-person (table 3). Not surprisingly, the majority of outbreaks with this mode of transmission were norovirus/suspect viral as shown in figure 3. This also serves to explain the high attack rates in these outbreaks.

Location

As is seen in table 4, the commonest location that outbreaks occurred in 2002 was health-care settings i.e. hospitals and residential institutions. 72% of all reported outbreaks occurred in these settings. The greatest number of people ill were also associated with outbreaks in these locations, with over 5000 people known to be ill as a result of outbreaks in the hospital sector alone.

Table 3. Principal mode of transmission reported in outbreaks of IID (2002)

Mode of Transmission	Number of Outbreaks
Foodborne	7
Person-to-person	185
P-P/Foodborne	4
Waterborne	3
Waterborne/Animal	1
Unknown	8
Total	**188**

Table 4. Outbreaks by location and numbers ill, 2002.

Location	Number of Outbreaks	Number ill
Hospital	72	5373
Residential institution	63	1638
Private house	14	47
Crèche	13	167
Hotel	11	452
Restaurant/café	4	37
School	4	181
Tour bus	1	15
Public house	1	7
Other	5	110
Total	**188**	**8027**

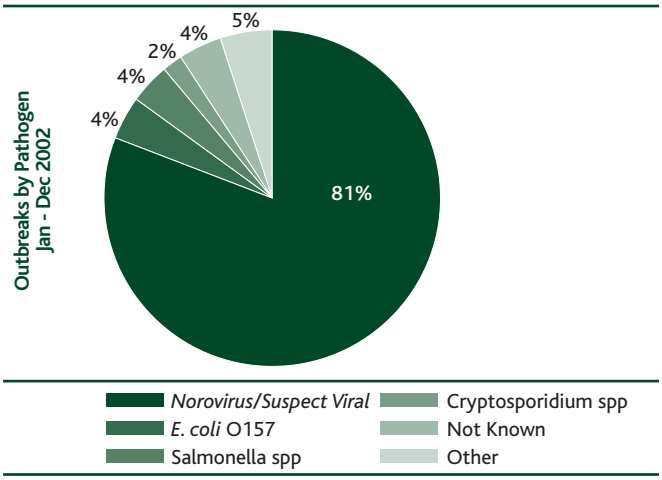

Figure 2. Outbreaks of IID reported in 2002 by pathogen

Seasonal distribution

When the outbreaks in 2002 are analysed by month of reporting, it is seen that the majority of outbreaks occurred in January-February followed by another peak in September (figure 4). Many of the norovirus outbreaks in hospitals and residential institutions occurred in the early months of 2002. The peak in September was linked to another wave of norovirus outbreaks in health-care settings as well as outbreaks of viral gastroenteritis linked to the tourist industry i.e. hotels and tour-bus outbreaks.

Discussion

In 2002, there was a very significant rise in the number of IID outbreaks reported to NDSC compared to previous years. From 1998 to 2000, there was on average 34 outbreaks of IID reported each year. This increased to 64 outbreaks in 2001, and rose further to 188 outbreaks in 2002. This figure represents all investigated and reported IID outbreaks and is possibly even an under-estimate of the true figure.

The dramatic increase in outbreak reporting in 2002 was due undoubtedly to the large upsurge in norovirus outbreaks that occurred. Eighty-two percent of all reported outbreaks were either suspected or confirmed to be caused by norovirus. Seventy percent of all outbreaks occurred in health-care settings and there was significant morbidity associated with these outbreaks with at least 7650 people reported ill.

In 2002 there was an epidemic of viral gastroenteritis due to norovirus seen across Europe, and Ireland was part of this wave of outbreaks[1]. Typing studies carried out in the UK reported that a new variant of the commonly circulating Lordsdale virus (genogroup II4) was responsible for these outbreaks[2].

There are a number of features of the virus that can explain the explosive nature of the outbreaks that were seen. Norovirus has a low infectious dose, can survive in the environment and be easily transmitted from person-to-person often by aerosolisation of viral particles during episodes of vomiting. Congregate and enclosed settings are perfect environments for the virus to spread. With the added factor of a vulnerable population in health-care settings, it is not surprising that these locations are prone to outbreaks of this virus.

In light of the epidemic of norovirus outbreaks that seriously affected, in particular, the acute hospital sector in 2002, a Viral Gastroenteritis sub-committee of the NDSC Scientific Advisory Committee was established. One of the main Terms of Reference was to develop national guidelines to assist professionals in managing outbreaks of noroviruses in healthcare settings. These guidelines[3] were published and launched by the Minister for Health and Children in December 2003.

Only 11% of outbreaks had a bacterial aetiology in 2003. The most commonly isolated pathogens were *Salmonella enterica* and *E. coli* O157. All of these outbreaks were small in size and the majority were family outbreaks. This is also reflected in the low percentage of outbreaks deemed to foodborne in 2002 (just 6%).

There were three outbreaks that were reported to have a

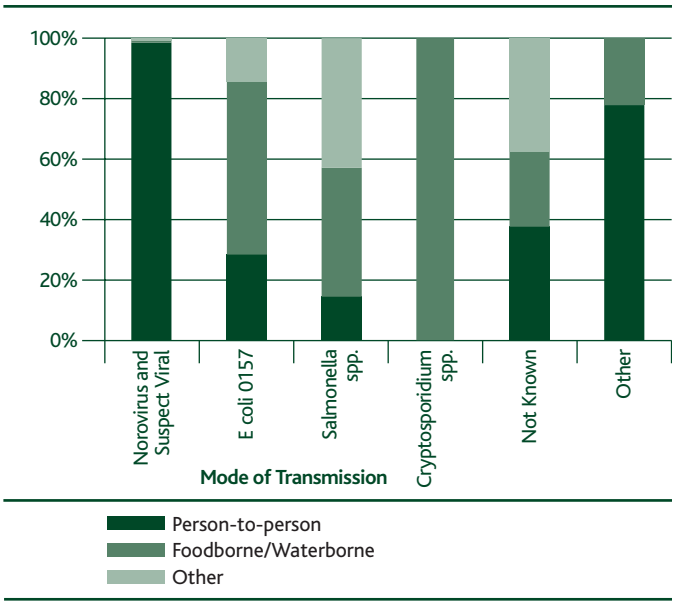

Figure 3. Mode of transmission in outbreaks of IID by pathogen (2002).

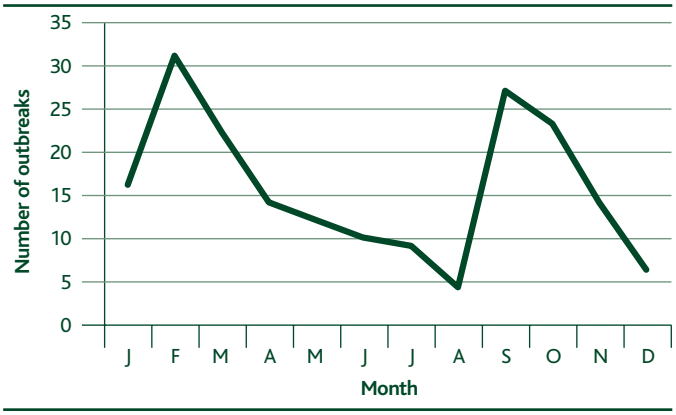

Figure 4. Number of outbreaks of IID reported by month, 2002.

waterborne mode of transmission (all *Cryptosporidium spp*) and one with a waterborne and animal-contact transmission route (family outbreak of *E. coli* O157). Sixty-three individuals were reported ill as a result of the three *Cryptosporidium spp* outbreaks. The potential for significant numbers of people including vulnerable populations to be affected in waterborne outbreaks reinforces the need for stringent early control measures to be implemented in these events.

Outbreak investigations are an important and challenging component of epidemiology and public health, and help to identify the source of the outbreak, institute control measures and prevent additional cases. Extremely valuable information has been derived from analyses of the national IID outbreak data in 2002. As was clearly seen in light of the norovirus epidemic, the information collated from the outbreak data was used to formulate national guidelines on the management of these outbreaks in order to reduce the overall burden of illness due to this pathogen.

Acknowledgements

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References

1. Vipond IB, Caul EO, Hirst D, Carmen B, Curry A, Lopman BA, Pead P, Pickett MA, Lambden PR, Clarke IN. National epidemic of Lordsdale norovirus in the UK. *J Clin Virol*. (2004) **30**:243-7.
2. Lopman B, Vennema H, Kohli E, Pothier P, Sanchez A, Negredo A, Buesa J, Schreier E, Reacher M, Brown D, Gray J, Iturriza M, Gallimore C, Bottiger B, Hedlund KO, Torven M, von Bonsdorff CH, Maunula L, Poljsak-Prijatelj M, Zimsek J, Reuter G, Szucs G, Melegh B, Svennson L, van Duynhoven Y, Koopmans M. Increase in viral gastroenteritis outbreaks in Europe and epidemic spread of new norovirus variant. *Lancet* (2004) **363**:682-8.
3. http://www.ndsc.ie/Publications/Norovirus/d819.PDF

Antimicrobial Resistance in Ireland, 2003

Key Points

- **In 2003,1140 invasive isolates of *Staphylococcus aureus* were reported. The proportion of isolates that were methicillin-resistant *S. aureus* (MRSA) was 42.1%, which remains one of the highest in countries reporting to EARSS**
- **364 invasive isolates of *Streptococcus pneumoniae* were reported. The proportion that was penicillin-non-susceptible *S. pneumoniae* (PNSP) was 11.8%, which is moderately high compared to other European countries. Of the 43 PNSP isolates identified, eight were found to be high-level resistant [minimum inhibitory concentration (MIC) >2 mg/L] and 32 were determined to have intermediate levels of resistance (MIC 0.12–1.0 mg/L). No MICs were available for three isolates**
- **991 invasive isolates of *Escherichia coli* were reported. The proportions of isolates that were resistant to third-generation cephalosporins, fluoroquinolones and aminoglycosides were 2.4%, 9.5% and 3.9%, respectively. These figures are low compared with other European countries**
- **218 invasive isolates of *Enterococcus faecalis* were reported. The proportion of isolates that were vancomycin-resistant was 1.4%. Although this figure is low, it is still slightly higher than observed in most other European countries (<1%)**
- **135 invasive isolates of *Enterococcus faecium* were reported. The proportion of isolates that were vancomycin-resistant was 19.4%, which is moderately high compared with most other European countries**

Introduction

The European Antimicrobial Resistance Surveillance System (EARSS) was established in 1998 and is funded by DG SANCO of the European Commission. It is an international network of national surveillance systems, encompassing over 600 laboratories in 28 countries, which aims to collect comparable and reliable antimicrobial resistance data on invasive infections of *Staphylococcus aureus, Streptococcus pneumoniae, Escherichia coli,* and *Enterococcus faecium/faecalis* for public health action.

EARSS in Ireland started in 1999 with the surveillance of *S. aureus* and *S. pneumoniae* and expanded in 2002 to include three further pathogens, *E. coli* and the enterococci, *E. faecalis* and *E. faecium*. Five additional laboratories joined the program in 2003 bringing the total number of participating laboratories to 28. The method for determining the percentage population coverage has been revised from a very rough estimate of the catchment populations reported by each participating hospital laboratory in previous years to a calculation based on acute public hospital activity data obtained from DoHC. This revised calculation gives an estimated population coverage approaching 90%, which represents an increase from the revised 80% coverage in 2002.

Protocol

Data are collected on the first invasive isolate per patient per quarter of *S. aureus* and the enterococci (from blood only) and

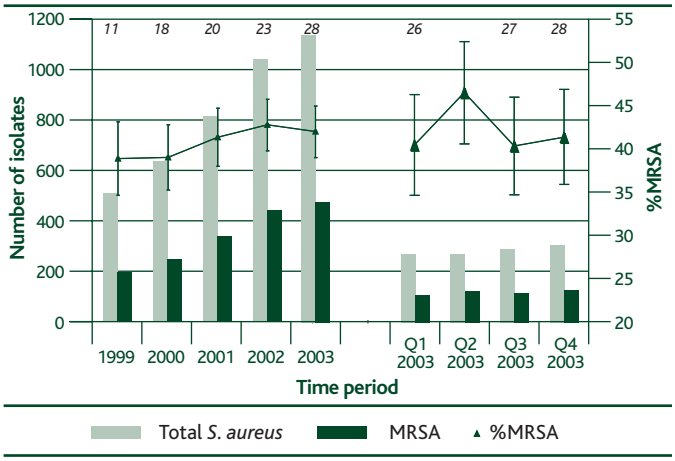

Figure 1. Trends for S. aureus by time period: by year for 1999-2003 and by quarter for 2003 (Q1-Q4) – total numbers of S. aureus/MRSA and percentage MRSA with 95% confidence intervals. Changes in the numbers of laboratories participating in the surveillance system by year-end are indicated above the chart

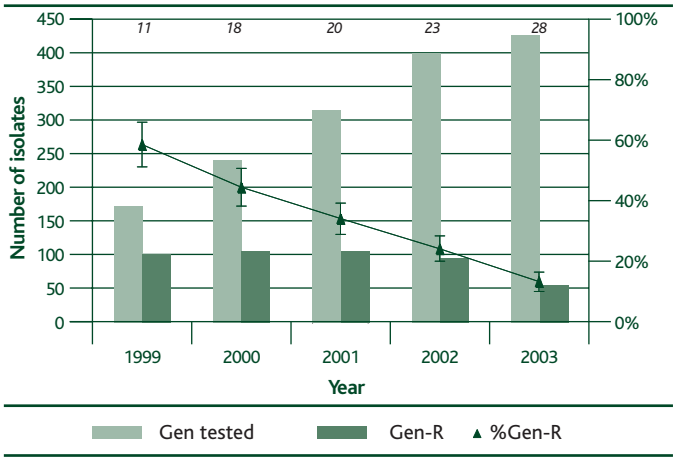

Figure 2. Trend in gentamicin resistance among MRSA isolates referred to NMRSARL between 1999 and 2003 - total numbers of MRSA isolates tested and gentamicin-resistant MRSA isolates identified and percentage gentamicin-resistant MRSA with 95% confidence intervals. Changes in the numbers of laboratories participating in the surveillance system by year-end are indicated above the chart

S. pneumoniae and *E. coli* [from blood and cerebrospinal fluid (CSF)]. Laboratories report routinely generated qualitative disc diffusion data on:

- oxacillin/methicillin for *S. aureus*
- oxacillin/penicillin and erythromycin for *S. pneumoniae*
- ampicillin, cetotaxime/ ceftriaxone and/or ceftazidime [third-generation cephalosporins (3GCs)], ciprofloxacin/ofloxacin (fluoroquinolones) and gentamicin/tobramycin (amino-glycosides) for *E. coli*. Laboratories are also asked to specifically test for the presence of extended-spectrum beta-lactamases (ESBLs)
- ampicillin, high-level gentamicin and vancomycin for enterococci

All methicillin-resistant *S. aureus* (MRSA) isolates are submitted to the National MRSA Reference laboratory (NMRSARL) at St James's Hospital, where minimum inhibitory concentrations (MICs) are determined for oxacillin and vancomycin. Laboratories are requested to submit data on MICs or Etests performed in-house for penicillin and cefotaxime or ceftriaxone on all penicillin-non-susceptible *S. pneumoniae* (PNSP) isolates.

Results

Staphylococcus aureus

In 2003, 1140 reports of *S. aureus* isolates from bacteraemia were received from 26 laboratories, of which 480 (42.1%) were resistant to methicillin. By comparison, the proportion of *S. aureus* isolates that were methicillin-resistant in 2002 was 42.7%. In 2003, there was a peak in Q2 when the proportion of MRSA was 46.5% compared with the other three quarters of the year when the proportion ranged from 40.3-41.4% (figure 1). A similar pattern was seen in 2002.

Data from the NMRSARL showed that gentamicin resistance among MRSA isolates decreased from 33.9% in 2001 (and an initial high of 58.4% in 1999) to 24.0% in 2002 and again in 2003 to 13.1% (figure 2). This continues to reflect the growing trend throughout Europe in which epidemic strains of MRSA that are less multi-resistant to antibiotics are becoming more prevalent.

The overall annual proportion of MRSA observed in Ireland remains high and is comparable with proportions observed in the UK, France and most Southern European countries (see figure 3). For the first time since EARSS commenced in 1999, a country (Greece) has reported a proportion of MRSA that is over 50%. Increases have also been observed in Finland and parts of Central Europe (Hungary and Slovakia). The Scandinavian countries and The Netherlands report the lowest proportions of MRSA.

Streptococcus pneumoniae

In 2003, 364 reports of *S. pneumoniae* isolates from bacteraemia/meningitis were received from 24 laboratories.

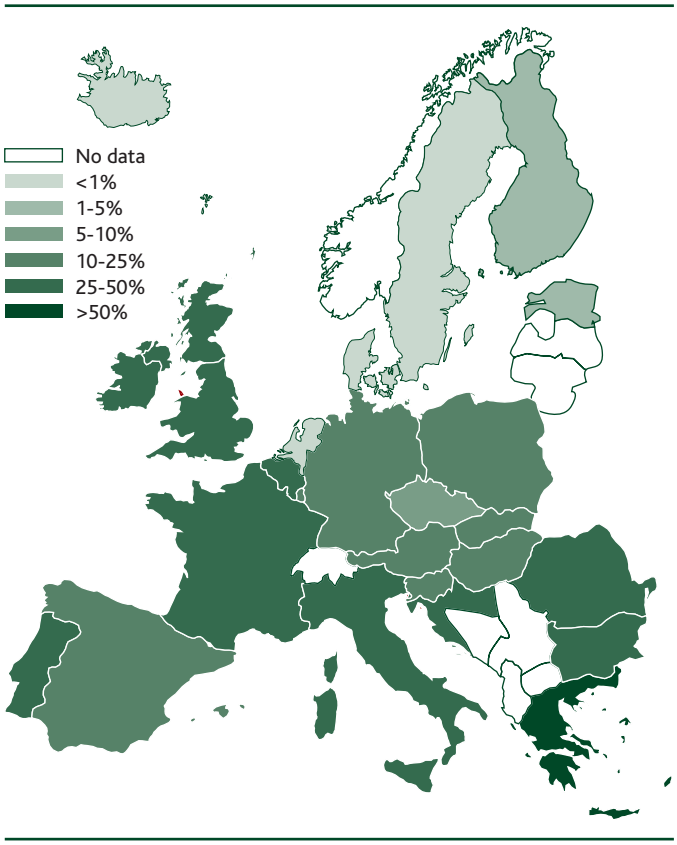

Figure 3. Map illustrating the distribution of MRSA in EARSS countries in 2003.

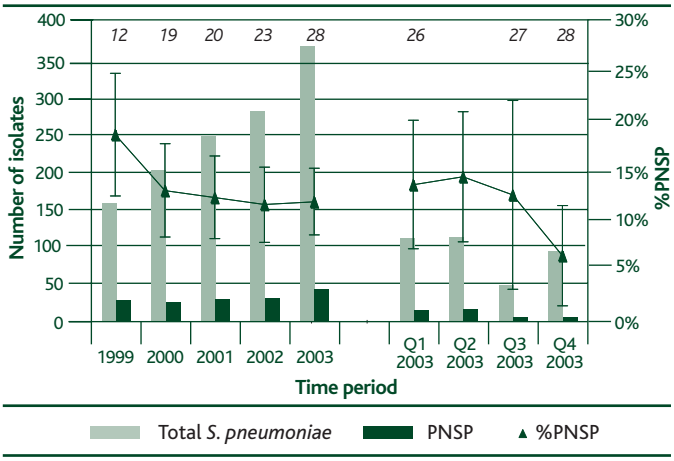

Figure 4. Trends for S. pneumoniae by time period: by year for 1999-2003 and by quarter for 2003 (Q1-Q4) – total numbers of S. pneumoniae/PNSP and percentage PNSP with 95% confidence intervals. Changes in the numbers of laboratories participating in the surveillance system by year-end are indicated above the chart

The majority of isolates (n = 359) were from blood but five were from CSF. Forty-three isolates (11.8%) were PNSP. By comparison, the proportion of *S. pneumoniae* isolates that were penicillin-non-susceptible in 2002 was 11.5%.

As in previous years, a seasonal variation was seen in the numbers of *S. pneumoniae* isolates reported with a trough in Q3, reflecting the quieter summer period (see figure 4).

Of the 43 PNSP isolates reported, MIC data for penicillin and cefotaxime were available for 40 and 24 isolates, respectively. Eight isolates were found to be high-level penicillin resistant (MIC ≥2 mg/L) and the remaining 32 isolates of the 40 tested were determined to have intermediate levels of resistance (MIC 0.12–1.0 mg/L). No MICs were available for three PNSP isolates. One isolate was intermediately resistant to cefotaxime (MIC 2 mg/L according to NCCLS non-meningitis breakpoints) in addition to being high-level resistant to penicillin (MIC 2 mg/L). The remaining 23 isolates of the 24 tested were susceptible to cefotaxime (MIC ≤1 mg/L).

Two additional isolates were reported that were oxacillin-resistant on screening by disc diffusion but were subsequently found to be penicillin-susceptible on MIC testing. This highlights the importance of MIC testing on all isolates that appear to be non-susceptible on the initial screening test.

Data on susceptibility to erythromycin or clarithromycin were available for 344 isolates. Forty (11.6%) were reported to be resistant.

Of the five CSF isolates reported in 2003, one (from a two-year old child) was intermediately resistant to penicillin (MIC 1 mg/L) but susceptible to cefotaxime (MIC 0.5 mg/L, interpreted using NCCLS meningitis breakpoints). The other four isolates (from three children under 4 years and one adult aged 48 years) were susceptible to penicillin.

Based on the total population of 3,917,203 in the Republic of Ireland as determined in the 2002 census and approximately 90% coverage of the population by the EARSS surveillance system, the crude incidence of invasive pneumococcal disease in Ireland is estimated to be 10.4 per 100,000 population. This represents an increase on the 8.8 per 100,000 population in 2002 (previously reported as 7.8 per 100,000 population but this figure has been revised based on acute public hospital activity data, which is considered to give a better estimate of population coverage). The corresponding revised figures for 1999, 2000 and 2001 are 8.2, 7.8 and 8.1 per 100,000 population, respectively. By comparison, the rates of invasive pneumococcal disease reported in England and Wales in 1999 and 2000 were 8.6 and 8.9 per 100,000 population, respectively.[1,2] In Scotland, a recent study reported that the overall incidence of invasive pneumococcal disease between 1999 and 2001 was 11 per 100,000.[3]

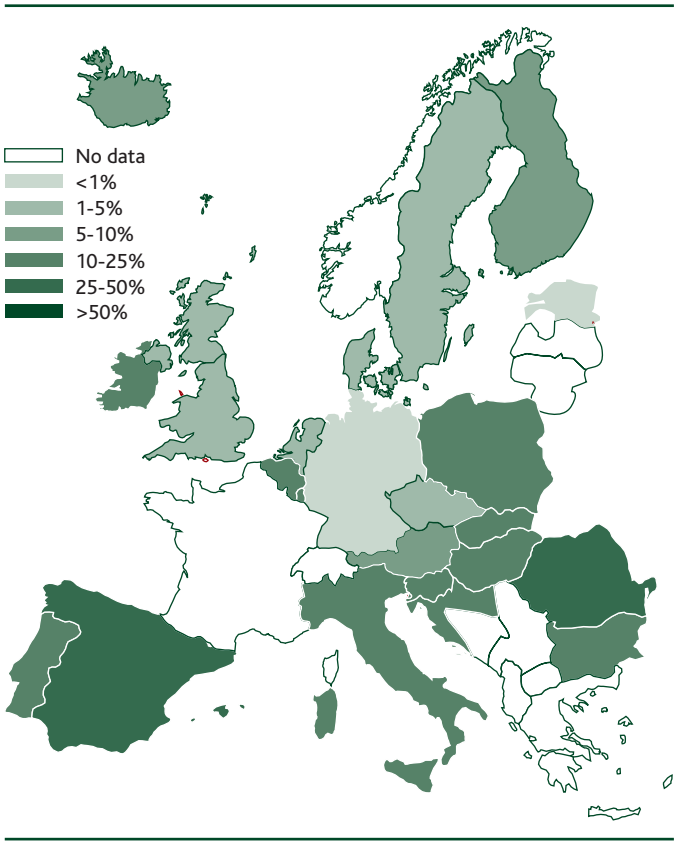

Figure 5. Map illustrating the distribution of PNSP in EARSS countries in 2003.

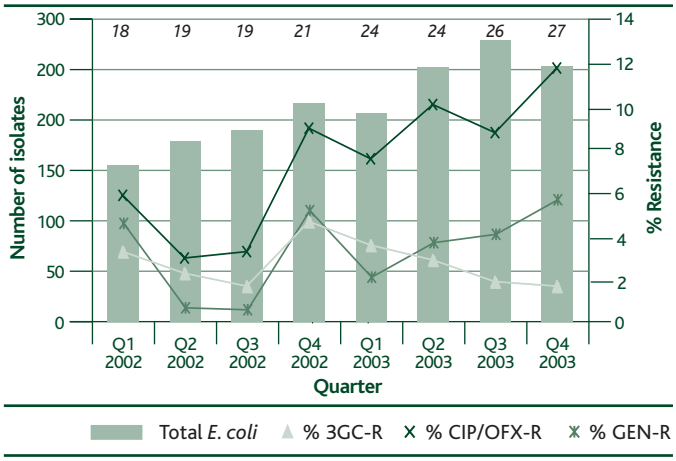

Figure 6. Trends for E. coli by quarter for 2003 – total numbers of E. coli and percentage resistance to 3GCs, ciprofloxacin/ofloxacin (CIP/OFX) and gentamicin (GEN). Number of participating laboratories is indicated for each quarter

The overall annual proportion of PNSP observed in Ireland remains moderately high (see figure 5) compared to the UK, Scandinavia and some Central European countries, such as Germany, which are generally associated with lower PNSP proportions. Higher proportions of PNSP are observed in Belgium, Southern Europe and some countries of the former Eastern Bloc.

Escherichia coli

In 2003, 991 reports of *E. coli* isolates from bacteraemia/meningitis were received from 27 laboratories. The majority of isolates (n = 989) were from blood but two were from CSF.

The proportions of isolates reported to be resistant to ampicillin, 3GCs, ciprofloxacin/ofloxacin (fluoroquinolones) and gentamicin were 61.9%, 2.4%, 9.5% and 3.9%, respectively, compared with 62.2%, 3.0%, 5.4% and 2.7%, respectively, reported in 2002.

The total numbers of *E. coli* isolates and proportion of resistance reported by quarter for 3GCs, fluoroquinolones and gentamicin are shown in figure 6.

Thirty-three isolates were identified as multi-drug resistant [defined as resistance to three or more of the mandatory antibiotics (ampicillin, 3GCs, fluoroquinolones and gentamicin)]:

- six isolates were resistant to ampicillin, 3GCs, fluoroquinolones and gentamicin - ESBL data were reported on five of these, all of which were positive
- eighteen were resistant to ampicillin, fluoroquinolones and gentamicin
- eight were resistant to ampicillin, 3GCs and fluoroquinolones. Four of these were ESBL-positive
- one was resistant to ampicillin, 3GCs and gentamicin

In total, 576 (58%) of the 991 isolates were examined for the presence of ESBLs. ESBLs were detected in 11 (1.9%) of these.

The two CSF isolates, both from newborns aged 11 and 16 days, respectively, were susceptible to 3GCs, fluoroquinolones and aminoglycosides. One of these isolates was resistant to ampicillin while the other was susceptible.

The proportion of ampicillin resistance reported in participating countries in Europe in 2003 was generally categorised as moderately high (25-50%) to high (>50%). The proportion in Ireland was high (61.9%) and was comparable with proportions seen in Italy, Spain and Portugal. The proportion of resistance to 3GCs, fluoroquinolones and gentamicin observed in Ireland in 2003 was low compared with most other European countries (figures 7-9). The lowest proportions of resistance were observed in the Scandinavian

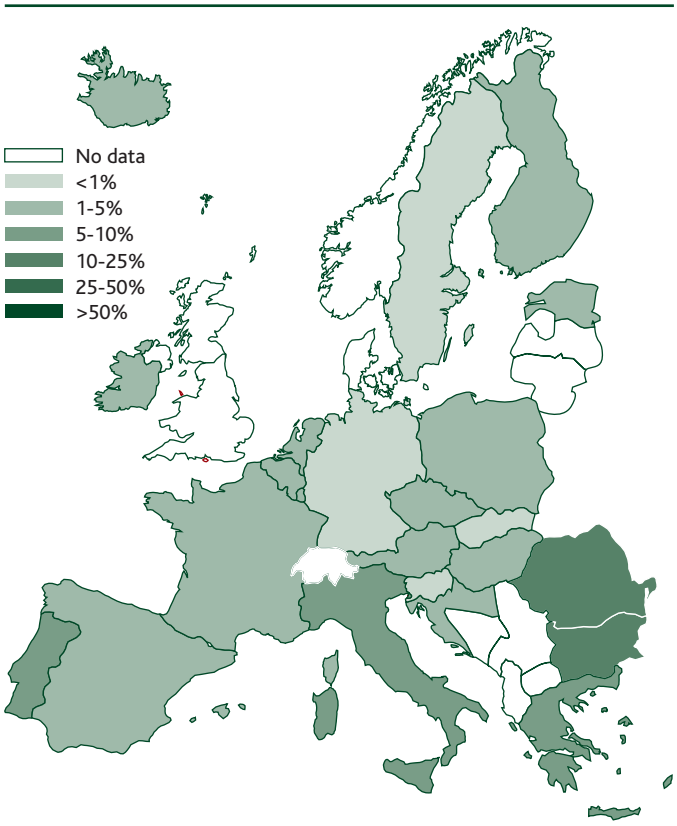

Figure 7. Map illustrating the distribution of resistance to 3GCs among E. coli in EARSS countries in 2003

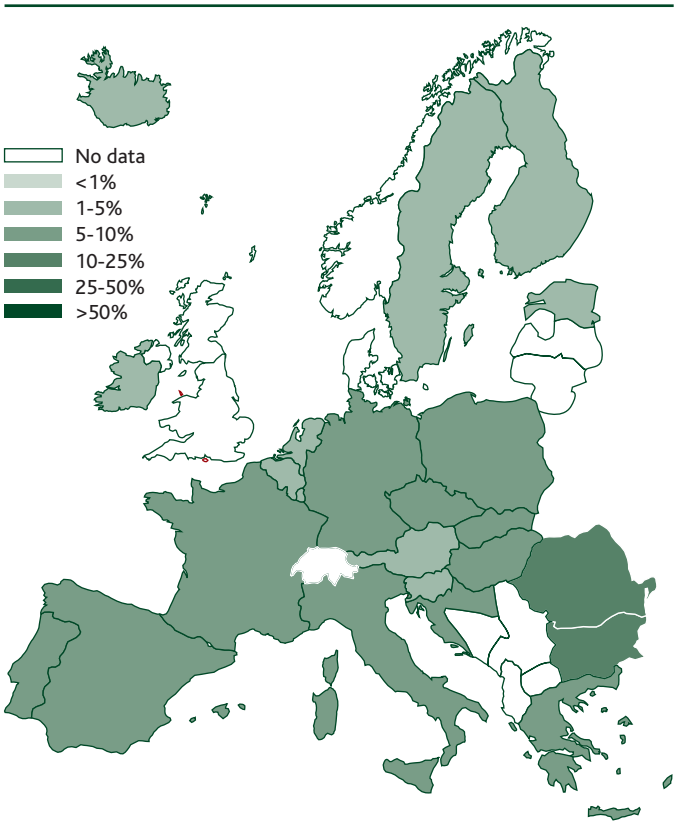

Figure 8. Map illustrating the distribution of resistance to aminoglycosides among E. coli in EARSS countries in 2003

countries while the highest proportions were seen in Southern and Eastern Europe.

Enterococcus faecalis

In 2003, 218 reports of *E. faecalis* isolates from bacteraemia were received from 19 laboratories.

The total numbers of *E. faecalis* isolates and proportion of resistance reported by quarter for ampicillin, high-level gentamicin and vancomycin are shown in figure 10.

Eleven isolates (5.1%) were reported to be ampicillin-resistant. Ampicillin resistance in *E. faecalis* is unusual and further investigation of these isolates is warranted to confirm their identity as it is generally acknowledged that speciation of enterococci can be problematic.

Sixty-one isolates (34%) of the 179 tested were reported to be high-level gentamicin resistant, of which 10 were confirmed by MIC determination. By comparison, 39% of isolates were reported to be high-level gentamicin resistant in 2002. The proportion of isolates tested for susceptibility to high-level gentamicin increased from 30% in 2002 to 82% in 2003, indicating increased awareness of this susceptibility testing issue and greater concordance with the protocol.

Three isolates (1.4%) were reported to be vancomycin resistant. Two of these were also resistant to teicoplanin. The other isolate was intermediately resistant to vancomycin (MIC 8 mg/L) and susceptible to teicoplanin, which would merit confirmation of the species identification. By comparison, 2.4% of isolates were vancomycin-resistant in 2002.

No isolates were resistant to ampicillin, high-level gentamicin and vancomycin. However, one isolate was resistant to high-level gentamicin and vancomycin and susceptible to ampicillin.

In 2003, the proportion of resistance to high-level gentamicin observed in Ireland, as well as in most other European countries (see figure 11), was generally high (≥25%). The majority of countries reported proportions of <1% for vancomycin resistance (see figure 12). The proportion of vancomycin resistance in Ireland was slightly higher and was comparable with France, Italy, the Netherlands and Poland.

Enterococcus faecium

In 2003, 135 reports of *E. faecium* isolates from bacteraemia were received from 17 laboratories.

The total numbers of *E. faecium* isolates and proportion of resistance reported by quarter for ampicillin, high-level gentamicin and vancomycin are shown in figure 13.

One hundred and twenty-one (91%) of the 133 isolates for which ampicillin susceptibility data were available were

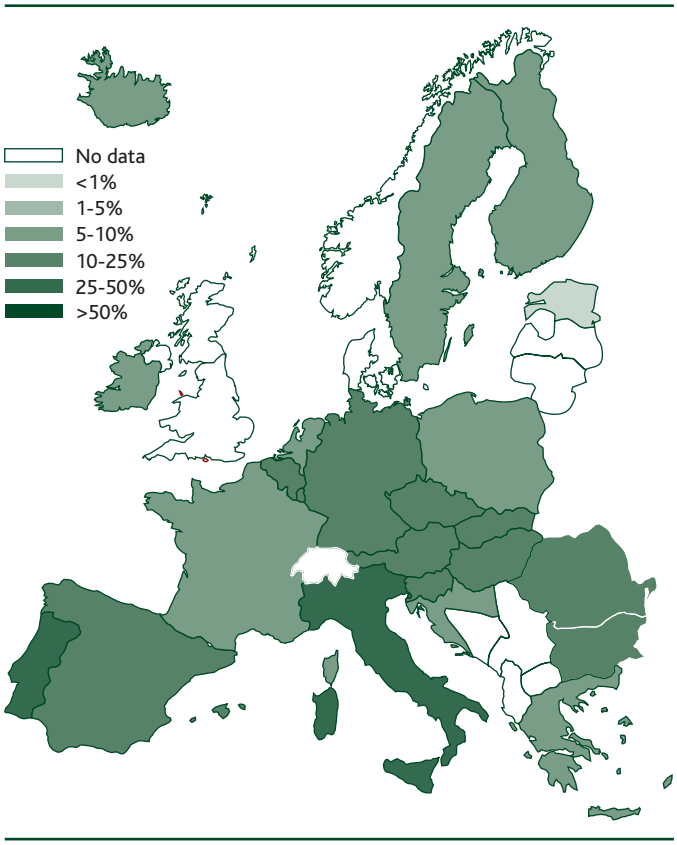

Figure 9. Map illustrating the distribution of resistance to fluoroquinolones among E. coli in EARSS countries in 2003

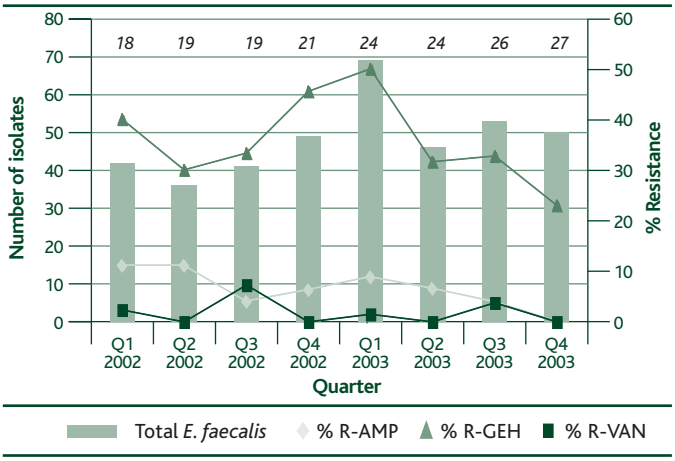

Figure 10. Trends for E. faecalis by quarter for 2003 – total numbers of E. faecalis and percentage resistance to ampicillin (AMP), high-level gentamicin (GEH) and vancomycin (VAN). Number of participating laboratories is indicated for each quarter

reported to be ampicillin-resistant, which is not unexpected as most *E. faecium* are resistant to this antibiotic.

Fifty-eight (54.7%) of 106 isolates tested were reported to be high-level gentamicin resistant, which is a substantial increase on 2002 when 16.7% of isolates tested were reported to be resistant. Twenty-two of the 58 isolates were confirmed by MIC determination. The proportion of isolates tested for susceptibility to high-level gentamicin increased from 35% in 2002 to 79% in 2003, which is similar to the situation observed with *E. faecalis* isolates.

Twenty-six isolates (19.4%) were reported to be vancomycin resistant (16 confirmed by MICs). This represents an increase on 2002 when 11.1% of isolates were vancomycin-resistant.

Twelve isolates were resistant to ampicillin, high-level gentamicin (six confirmed by MICs) and vancomycin (seven confirmed by MICs).

In 2003, the proportion of resistance to high-level gentamicin in Ireland was one of the highest observed across Europe (see figure 14). The majority of countries reported proportions of <5% for vancomycin resistance (figure 15). The proportion in Ireland was moderately high (10-25%) and together with Italy and Greece was one of the highest observed in Europe.

Additional information

The quarterly EARSS Newsletters produced by NDSC can be accessed on the NDSC website: http://www.ndsc.ie/Publications/AntimicrobialResistance-EARSSReports/

Antimicrobial resistance data, including the most up-to-date maps (in full colour) showing the distributions of resistance, for all five pathogens surveyed in the 28 countries participating in this surveillance system can be obtained from the interactive database available on the EARSS website: http://www.earss.rivm.nl/PAGINA/interwebsite/home_earss.html

The future

The recent change in the Infectious Diseases legislation has made reporting on the EARSS pathogens mandatory for all Irish laboratories. It is anticipated that coverage of the Irish population by EARSS will reach 100% in 2004 as the remaining Irish laboratories join the surveillance system. Using the acute public hospital activity data from DoHC, it is planned to produce both national and regional rates of invasive infections for the EARSS pathogens, which will be useful for SARI local and regional committees. Collection of enhanced clinical data has also commenced in a number of laboratories and analysis of this data is currently being undertaken.

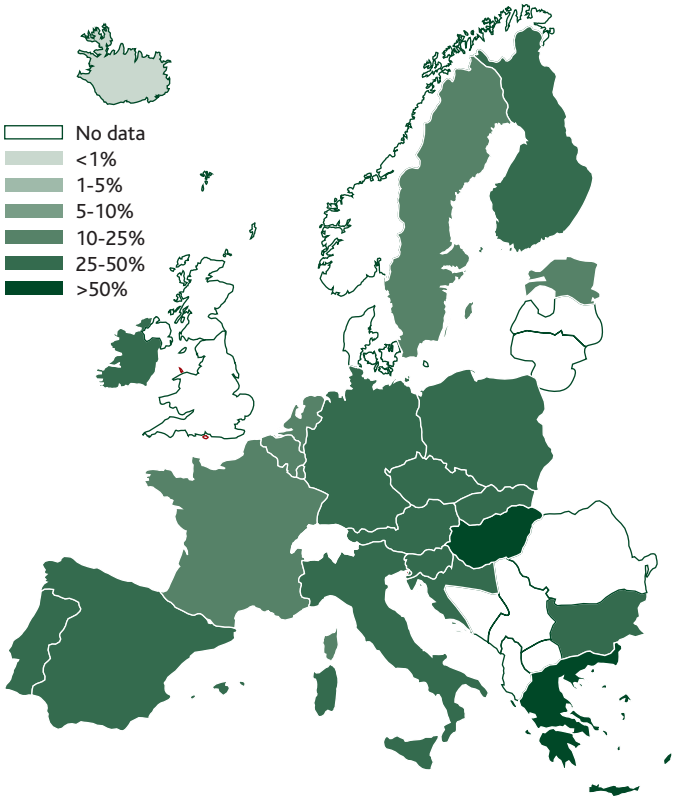

Figure 11. Map illustrating the distribution of resistance of high-level resistence to aminoglycosides among E. faecalis in EARSS countries in 2003

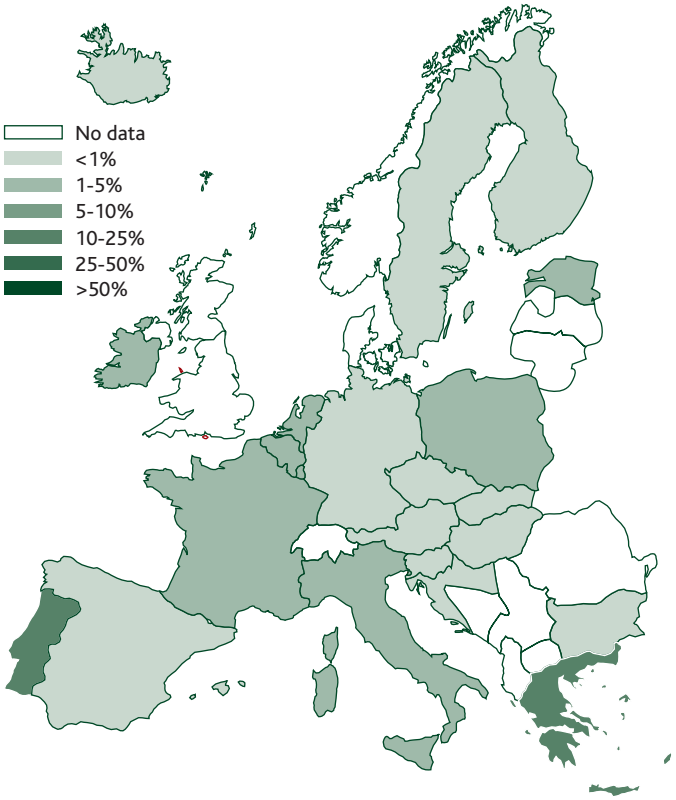

Figure 12. Map illustrating the distribution of resistance to glycopeptides among E. faecalis in EARSS countries in 2003

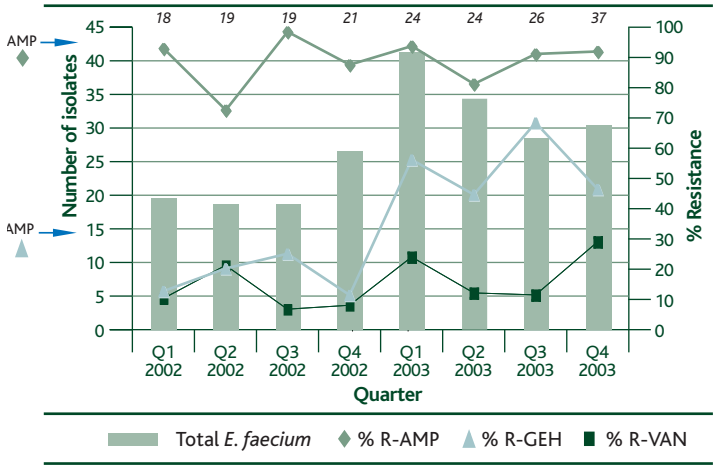

Figure 13. Trends for E. faecium by quarter for 2003 – total numbers of E. faecium and percentage resistance to ampicillin (AMP), high-level gentamicin (GEH) and vancomycin (VAN). Number of participating laboratories is indicated for each quarter

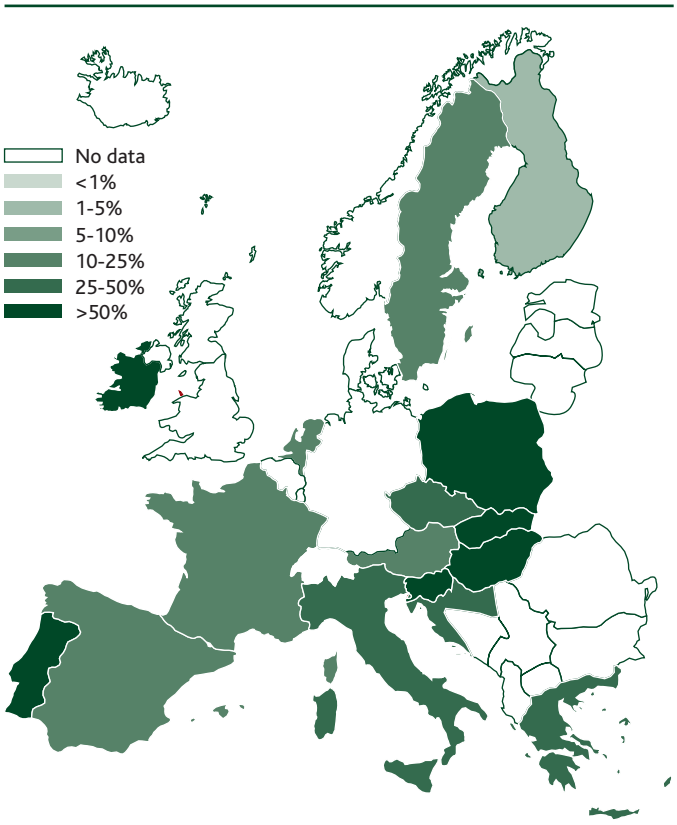

Figure 14. Map illustrating the distribution of high-level resistance to aminoglycosides among E. faecium in EARSS countries in 2003

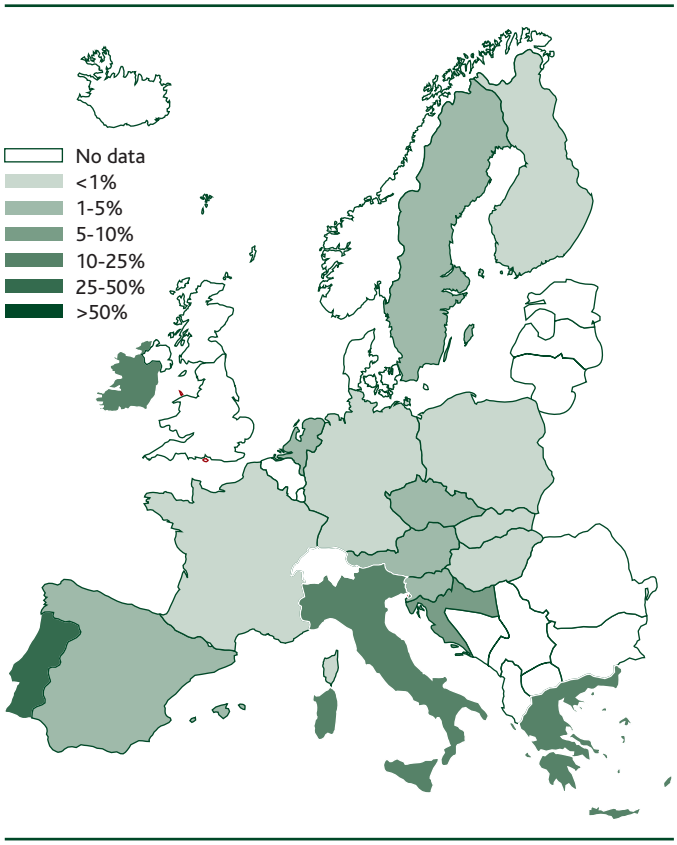

Figure 15. Map illustrating the distribution of resistance to glycopeptides among E. faecium in EARSS countries in 2003

Acknowledgements

Thanks to everyone involved in the surveillance system:

All participating laboratories, for their continued support and enthusiasm for EARSS; EARSS Steering Group, for their time and effort; Claire Grant from the Information Management Unit at DoHC, for the Acute Public Hospital Activity Data; John Stelling, for help with WHONET; and Paul Schrijnemakers, Jos Monen and the EARSS Management Team in the Netherlands, for their support, feedback and assistance.

References

1. CDSC. Invasive Pneumococcal Infection: England and Wales, 1999. *CDR Weekly* 2001; **11** (21). Available at http://www.hpa.org.uk/cdr/PDFfiles/2001/cdr2101.pdf
2. CDSC. Invasive Pneumococcal Infection: England and Wales, 2000. *CDR Weekly* 2003; **13** (21). Available at http://www.hpa.org.uk/cdr/PDFfiles/2003/cdr2103.pdf
3. Kyaw MH, Christie P, Clarke S, Mooney JD, Ahmed S, Jones IG, Campbell H. Invasive pneumococcal disease in Scotland, 1999–2001: use of record linkage to explore associations between patients and disease in relation to future vaccination policy. *Clin Inf Dis* 2003; **37**: 1283–1291.

Infectious Disease Notifications, 2003

Key Points

- **The Infectious Diseases Regulations were amended in March 2003 to specify Severe Acute Respiratory Syndrome (SARS) as a notifiable disease**
- **One probable SARS case was notified in 2003**
- **Food poisoning (bacterial other than salmonella) and measles notifications increased in 2003 compared to recent years**
- **Viral hepatitis type B notifications continued to rise in 2003**
- **Whooping cough notifications continued to decline in 2003**

Introduction

In Ireland the Health Act, 1947 entitles the Minister for Health and Children to declare by regulation diseases that are infectious, covered by legislation and that require notification to a medical officer of health. The list of infectious diseases notifiable in Ireland in 2003 was regulated in the 1981 Infectious Diseases Regulations that were revised in the Infectious Diseases (Amendment) Regulations of 1985, 1988, 1996 and 2003. The amendment, S.I. No. 115 of 2003, specified the newly emerging disease Severe Acute Respiratory Syndrome (SARS) as a notifiable disease.

Medical practitioners, who become aware of or who suspect that a person is suffering from or is a carrier of an infectious disease specified in the regulations, are required to notify the relevant medical officer in the appropriate health board. This notification data provides timely information about potential or actual outbreaks of infectious disease enabling the health boards to take action to prevent further spread of the disease.

The health boards forward the notification data to NDSC on a weekly basis where a weekly infectious disease report on national data is produced. The purposes of national surveillance include monitoring infectious disease trends at a national level, monitoring the need for and impact of national infectious disease prevention and control programmes, guiding national infectious disease policy development and meeting international reporting requirements, for example, providing infectious disease data to EU disease specific networks and the World Health Organization (WHO).

This review attempts to summarise the 2003 infectious

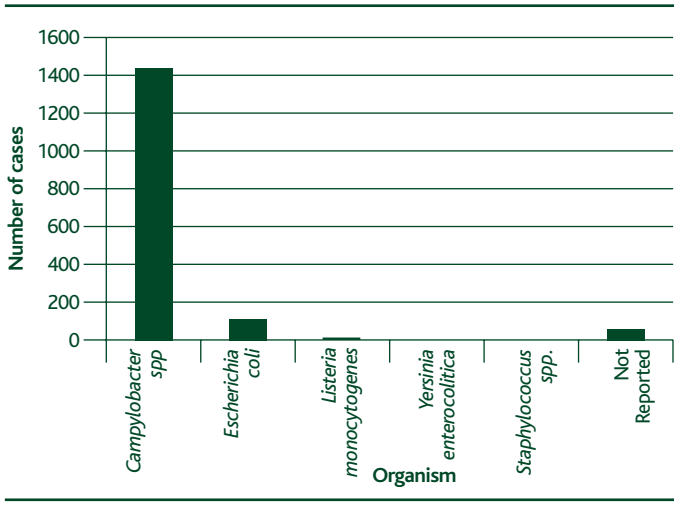

Figure 1. Food poisoning (bacterial other than salmonella) notifications in 2003 by organism

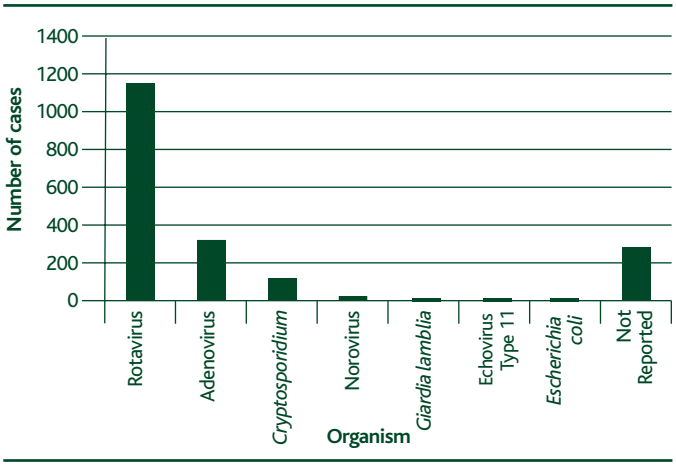

Figure 2. Gastroenteritis (when contracted by children under 2 years of age) notifications in 2003 by organism

disease notification data and to describe disease trends in 2003.

Materials and methods

Since July 2000, the health boards provide case-based information by the Wednesday of each week, to NDSC, on infectious diseases (excluding sexually transmissible infections) notified to them during the previous week. The agreed dataset for each case includes identification number, date of birth, age, sex, date of onset, date of notification/week of notification, Community Care Area, county, disease and organism (if available). At NDSC this information is entered on a Microsoft Access database.

Incidence rates were calculated using population data taken from the 2002 census. Data were analysed using MS Access and MS Excel.

Notifiable infectious diseases in 2003, excluding sexually transmissible infections (STIs), are presented in this report. A report on the 2002 notifiable STIs is presented elsewhere within this document.

Results

Notifiable infectious diseases

Table 1 compares annual notifiable infectious disease figures for 2003 with annual figures obtained from 1982-2002. In total, 6272 cases of notifiable infectious diseases (this figure includes the provisional 2003 TB figure and excludes STI data) were reported to NDSC during 2003, an increase of approximately 14% compared to 2002. Of these 6272 cases, 63% were due to gastrointestinal infections while 18% were due to vaccine preventable diseases (as per the childhood immunisation schedule in Ireland). There were several notable disease trends in 2003:

- food poisoning (bacterial other than salmonella) notifications increased in 2003 compared to the previous three years
- gastroenteritis (when contracted by children under 2 years of age) notifications increased slightly in 2003 compared to 2002
- measles notifications doubled in 2003 compared to annual figures for 2001 and 2002
- rubella notifications increased in 2003 compared to 2002
- salmonellosis notifications increased slightly in 2003 compared to 2002
- notifications of viral hepatitis type B continued to rise in 2003 compared to previous years
- whooping cough notifications continued to decline in 2003 compared to previous years, with cases declining threefold since 2002.

In 2003, no cases of acute anterior poliomyelitis, anthrax, cholera, variant Creutzfeldt Jakob disease (vCJD), diphtheria, ornithosis, plague, rabies, smallpox, tetanus, typhus, viral haemorrhagic disease or yellow fever were notified.

The breakdown of infectious diseases notified in 2003 by health board, age group and sex are presented in tables 2, 3 and 4, respectively.

Table 1. Annual number of infectious diseases notified in Ireland, 1982-2003

Infectious disease	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Acute Anterior Poliomyelitis	1	0	1	0	0	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	4	6
Acute Viral Meningitis	54	191	163	120	161	81	101	52	300	86	104	39	90	74	77	32	32	27	98	161	36	39
Anthrax	0	0	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	26	36
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	297	311
Brucellosis	159	126	126	115	53	38	22	20	15	27	26	28	14	6	10	7	15	19	15	14	4	5
Cholera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Creutzfeldt Jakob Disease†	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	3	6	1	2	6	5	2
vCreutzfeldt Jakob Disease†	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	0	0	1	0	0	0	0
Diphtheria	0	0	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	1394	1623
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	1747	1835
Infectious Mononucleosis	55	196	233	214	145	186	286	211	208	188	208	206	183	156	216	212	217	198	151	150	173	122
Infectious Parotitis (Mumps)‡	NN	NN	NN	NN	NN	NN	271	709	48	53	43	44	33	27	422	285	57	38	52	40	32	40
Influenzal Pneumonia	6	76	93	37	153	53	73	42	94	139	48	55	6	31	54	29	4	15	20	2	2	6
Legionnaires' Disease	2	2	1	0	0	0	4	2	1	0	2	0	1	1	2	6	2	2	9	3	6	7
Leptospirosis	4	14	8	5	4	6	3	5	5	4	9	5	2	1	6	8	12	6	7	9	8	9
Malaria	33	17	12	32	41	28	30	23	12	11	15	9	12	9	14	8	17	17	19	11	20	21
Measles	1897	6180	5725	9903	451	201	936	1248	556	135	179	4328	1233	235	228	185	204	147	1603	241	243	572
Ornithosis	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	3	0	0
Plague	0	0	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	0	0
Rubella	166	2395	2060	668	799	444	1156	440	258	206	155	179	206	100	602	113	83	62	97	57	33	59
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	369	449
Severe Acute Respiratory Syndrome (SARS)§	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	1
Smallpox	0	0	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	0	0
Tuberculosis‖	975	924	837	804	602	581	575	638	613	640	604	598	524	458	434	416	424	469	395	381	408	421‖
Typhoid & Paratyphoid	2	4	3	1	1	0	2	0	0	4	3	1	1	4	4	0	3	0	1	4	5	11
Typhus	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	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	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	26	25
Viral Hepatitis Type B	26	54	33	57	55	63	32	20	11	15	13	11	20	11	11	31	155	160	187	342	458	547
Viral Hepatitis Unspecified	1066	1192	1022	731	544	381	253	371	398	152	240	190	60	66	67	122	147	125	65	90	89	85
Whooping Cough	1073	1728	3061	3689	1482	1717	1170	2217	803	843	860	869	353	436	261	459	252	179	152	142	131	40
Yellow Fever	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0

Note: 1982-1999, data collated by DoHC
**Since 1997, figures taken from the Enhanced Bacterial Meningitis Surveillance System*
†CJD and vCJD not notifiable (NN) in Ireland prior to 1997
‡Infectious Parotitis (Mumps) not notifiable (NN) in Ireland prior to 1988
§SARS not notifiable (NN) prior to 2003
‖Since 1998, figures taken from the Enhanced TB Surveillance System, figure for 2003 provisional

Table 2. Number of notifiable infectious diseases by health board in 2003

Infectious disease	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
Acute Encephalitis	3	1	0	0	0	1	1	0	6
Acute Viral Meningitis	24	1	0	4	1	5	3	1	39
Bacillary Dysentery (Shigellosis)	19	1	5	4	0	2	3	2	36
Bacterial Meningitis (including meningococcal septicaemia)*	107	25	29	29	15	38	54	14	311
Brucellosis	0	1	3	0	0	0	1	0	5
Creutzfeldt Jakob Disease	**	**	**	**	**	**	**	**	2
Food Poisoning (bacterial other than salmonella)	583	137	75	87	67	245	231	198	1623
Gastroenteritis (when contracted by children under 2 years of age)	544	156	29	79	68	267	368	324	1835
Infectious Mononucleosis	18	1	11	42	0	6	21	23	122
Infectious Parotitis (Mumps)	20	4	1	4	0	4	5	2	40
Influenzal Pneumonia	1	0	0	0	2	2	0	1	6
Legionnaires' Disease	3	0	0	2	0	1	0	1	7
Leptospirosis	2	1	0	2	0	3	0	1	9
Malaria	11	2	4	2	0	1	1	0	21
Measles	363	123	24	15	1	6	5	35	572
Rubella	35	3	0	1	1	15	2	2	59
Salmonellosis (other than typhoid or paratyphoid)	168	29	19	40	19	64	59	51	449
Severe Acute Respiratory Syndrome (SARS)	**	**	**	**	**	**	**	**	1
Tuberculosis†	168	13	46	27	13	33	95	26	421†
Typhoid & Paratyphoid	4	0	2	3	0	0	0	2	11
Viral Hepatitis Type A	8	4	3	3	0	3	3	1	25
Viral Hepatitis Type B	174	25	13	20	0	39	264	12	547
Viral Hepatitis Unspecified	37	8	4	2	3	18	12	1	85
Whooping Cough	14	1	2	5	2	6	7	3	40

**Taken from the Enhanced Bacterial Meningitis Surveillance System*
***Data not reported to health board level when total figures for Ireland less than 5 cases*
†Taken from the Enhanced TB Surveillance System, figure for 2003 provisional

Table 3. Number of notifiable infectious diseases by age group (years) in 2003

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	2	1	0	0	1	0	0	1	1	0	0	6
Acute Viral Meningitis	15	4	4	3	1	5	5	0	0	0	2	39
Bacillary Dysentery (Shigellosis)	10	0	2	1	5	9	2	3	1	3	0	36
Bacterial Meningitis (including meningococcal septicaemia)*	183	21	21	28	12	17	5	4	11	9	0	311
Brucellosis	0	0	0	0	0	1	0	2	2	0	0	5
Creutzfeldt Jakob Disease	0	0	0	0	0	0	0	0	0	2	0	2
Food Poisoning (bacterial other than salmonella)	430	79	62	66	146	252	167	124	99	148	50	1623
Gastroenteritis (when contracted by children under 2 years of age)	1810	0	0	0	0	0	0	0	0	0	25	1835
Infectious Mononucleosis	5	2	17	74	14	6	0	1	1	0	2	122
Infectious Parotitis (Mumps)	11	8	3	6	3	4	1	1	0	1	2	40
Influenzal Pneumonia	4	0	1	0	1	0	0	0	0	0	0	6
Legionnaires' Disease	0	0	0	0	0	1	0	0	2	4	0	7
Leptospirosis	0	0	0	0	0	1	1	2	2	2	1	9
Malaria	4	3	1	1	0	5	2	1	2	1	1	21
Measles	377	107	60	6	13	0	0	0	0	0	9	572
Rubella	50	4	1	0	1	1	2	0	0	0	0	59
Salmonellosis (other than typhoid or paratyphoid)	89	32	24	25	44	65	62	46	21	35	6	449
Severe Acute Respiratory Syndrome (SARS)	0	0	0	0	0	0	0	1	0	0	0	1
Tuberculosis†	10	7	6	19	52	89	51	50	33	101	3	421†
Typhoid & Paratyphoid	1	0	1	1	4	3	0	0	0	0	1	11
Viral Hepatitis Type A	3	2	3	2	4	4	6	0	0	1	0	25
Viral Hepatitis Type B	8	4	12	43	69	282	84	26	8	0	11	547
Viral Hepatitis Unspecified	0	0	0	2	19	36	18	6	2	0	2	85
Whooping Cough	29	5	1	2	1	0	0	0	1	0	1	40

**Taken from the Enhanced Bacterial Meningitis Surveillance System*
†Taken from the Enhanced TB Surveillance System, figure for 2003 provisional

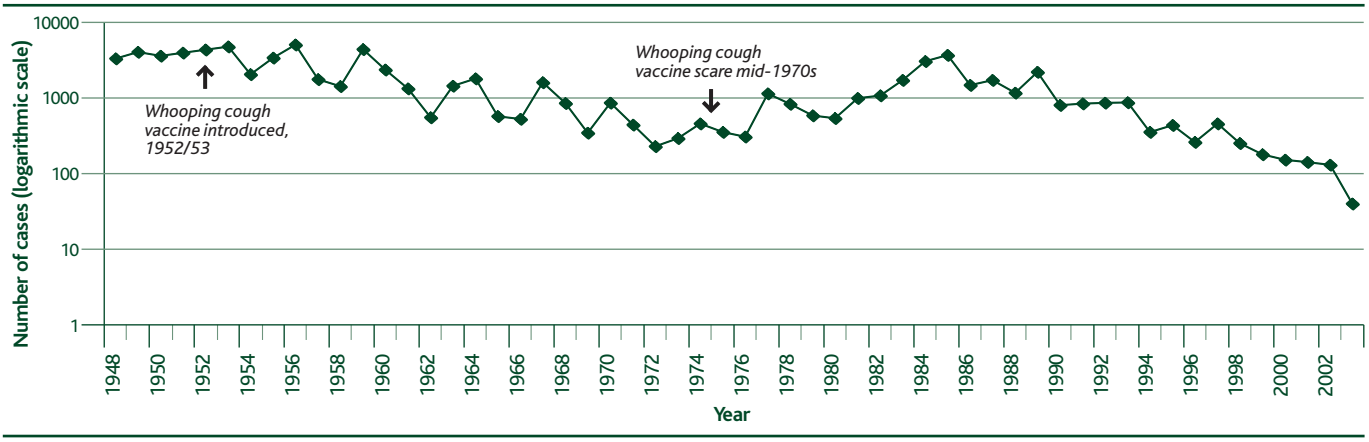

Figure 3. Annual number (log scale) of whooping cough notifications in Ireland 1948-2003

Acute encephalitis

During 2003, six cases of acute encephalitis were notified, similar to four cases in 2002. For one case in 2003 the causative organism was reported as herpes virus, while the causative organisms were not reported or were unknown for the remaining five cases. Three of the cases in 2003 were aged less than ten years.

Acute viral meningitis

In 2003, 39 (1.0/100,000) cases of acute viral meningitis were notified, similar to 36 cases in 2002. Two thirds of the cases (n=26) in 2003 occurred in those aged less than 20 years while just over one third of cases (n=15) were in the age group 0-4 years. The causative organisms were not reported for any of the acute viral meningitis notifications in 2003.

Non-polio enteroviruses (NPEV) are the most common cause of viral meningitis. The National Virus Reference Laboratory reported 36 laboratory confirmed NPEV isolates in 2003, 20 (56%) of these isolates were echovirus type 11.[1] Suspected viral meningitis was known to be the clinical diagnosis for six of the 36 NPEV isolates.

Bacillary dysentery (Shigellosis)

Thirty-six cases (0.9/100,000) of bacillary dysentery were notified in 2003 compared to 26 cases in 2002. The majority of cases (64%) in 2003 occurred in those aged 20 years or older, however, the rate in the age group 0-4 years increased slightly in 2003 (3.6/100,000) compared to 2002 (1.4/100,000). Of the 36 cases notified, 13 were due to *Shigella sonnei*, 12 due to *Shigella flexneri*, one due to *Shigella boydii*, one due to *Shigella dysenteriae* while species was not reported for nine cases. For comparison, of the 26 cases notified in 2002, 11 were due to *S. sonnei*, four due to *S. flexneri*, two due to *S. boydii* while species was not reported for nine cases. This suggests a slight increase in the number of *S. flexneri* reported in 2003 compared to 2002.

Bacterial meningitis (including meningococcal septicaemia)

During 2003, 311 bacterial meningitis (including meningococcal septicaemia) cases were notified, similar to 297 in 2002. An enhanced surveillance system for bacterial meningitis (including meningococcal septicaemia) commenced in Ireland in 1997. Data obtained through this system, during 2003, are discussed in detail in a separate chapter within this document.

Brucellosis

Five cases of brucellosis were notified in 2003, similar to four cases in 2002. All five cases in 2003 were male and were aged between 34 and 58 years.

Creutzfeldt Jakob disease (CJD)

In 2003, two cases of classical CJD were notified, compared with five in 2002. Both cases in 2003 occurred in males and were aged greater than 65 years.

Food poisoning (bacterial other than salmonella)

Food poisoning notifications increased by 16% in 2003 with 1623 cases (41.4/100,000) notified, compared to 1394 cases in 2002. In 2003, the highest number of cases (n=430) and the highest incidence rate (154.9/100,000) occurred in those aged 0-4 years. The causative organisms were reported as *Campylobacter* species (n=1440, 89%), *Escherichia coli*

(n=114, 7%) including verocytotoxigenic *E. coli* (VTEC), *Listeria monocytogenes* (n=4), *Yersinia enterocolitica* (n=3) and *Staphylococcus* species (n=2). The causative organism was not provided for 60 (3.7%) cases (figure 1).

Comprehensive reports on campylobacteriosis and VTEC in Ireland are presented as separate chapters elsewhere within this document.

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

Notifications of gastroenteritis in those under two years of age increased slightly in 2003 (n=1835) compared to 2002 (n=1747). In 2003, the causative organisms were reported as rotavirus (n=1149, 63%), adenovirus (n=315, 17%), *Cryptosporidium* (n=106, 5.8%), norovirus (n=14), *Giardia lamblia* (n=2), echovirus type 11 (n=1) and *Entamoeba coli* (n=1). No organism details were provided for 247 (13.5%) cases (figure 2).

Infectious mononucleosis

Infectious mononucleosis notifications declined in 2003 with 122 cases (3.1/100,000) notified compared to 173 in 2002. In 2003, the highest number of cases (n=74) and the highest age specific incidence rate (23.6/100,000) occurred in the age group 15-19 years. Nearly two-thirds of cases in 2003 were female (n=78).

Infectious parotitis (Mumps)

Forty cases (1.0/100,000) of mumps were notified in 2003 compared to 2002 when 32 cases were notified. In 2003, for the 38 cases where age was provided, the cases were aged between <1 year and 79 years (mean age, 15 years; median age, 9 years) with just over half of all cases aged less than 15 years. Twenty-two of the cases were male and 18 were female.

Influenzal pneumonia

Six cases of influenzal pneumonia were notified in 2003 compared to two cases in 2002. Four of the cases in 2003 were male and two were female. All six cases were notified during November and December 2003. The influenzal pneumonia cases coincided with an increase in influenza activity in late 2003 that predominantly affected children in the age group 0-4 years. All six influenzal pneumonia notifications in 2003 were aged less than 25 years with four of these in the age group 0-4 years, in contrast, both influenzal pneumonia cases notified in 2002 were in the age group 45-54 years. A report on influenza activity during the 2003/2004 season is included elsewhere in this document.

Legionnaires' disease

Seven cases of Legionnaires' disease were notified in 2003 while six cases were notified in 2002. The seven cases in 2003 were aged between 27 and 78 years (mean age, 62 years; median age, 69 years). Five of the cases were male and two were female. One of the seven cases of *Legionella* was confirmed by serology while six were confirmed by urinary antigen detection. Two of the cases in 2003 died.

A case of Legionnaires' disease is defined as travel-associated if the patient spent one or more nights away form their home in accommodation used for commercial or leisure purposes e.g. hotels, holiday apartments etc. in the 10 days before the onset of illness. Travel-associated cases may involve travel within Ireland or travel abroad. In 2003, three of the cases were travel-associated (Ireland, Malta & Tunisia) and were notified to the European Working Group for Legionella Infections (EWGLI) surveillance scheme. The aim of this surveillance scheme (EWGLI) is to detect cases of travel-associated Legionnaires' disease and thereby rapidly identify outbreaks and implement control measures.[2]

Leptospirosis

Nine cases of leptospirosis were notified in 2003. This was similar to the number notified in previous years. All nine cases were male and for the eight cases where age was known all were aged between 34 and 73 years (mean age, 54 years; median age, 57 years). The possible source of infection was; contact with animals (n=4), contaminated water (n=1), gardening (n=1) and unknown (n=3). Seven of the cases were reported to have survived while the outcome was not reported for two cases.

Malaria

During 2003, twenty-one cases of malaria were notified. Ten cases were male and eleven were female. Age was reported for 20 cases, these cases ranged in age from one year to 67 years with a median age of 28 years. Six of these cases were Irish, three were Nigerian, one was French and nationality was not reported for the remaining cases. Countries where the malaria infection was acquired included Nigeria (n=5), Sudan (n=4) and Congo, Gambia, Ghana, Kenya, Mali, Sierra Leona, Tanzania, Uganda, and Zimbabwe (n=1 each). The reasons for travel to a malarious region were: holiday (n=5), business/ professional travel (n=3), new entrant to Ireland (n=1), visiting family in country of origin (n=1), Irish citizen living abroad (n=1) and unknown (n=9). There was also one case believed to have been congenitally acquired.

In nine cases *Plasmodium falciparum* was the causative organism, *Plasmodium vivax* in three cases and the malarial parasite was not reported for the remaining nine cases. Information on malaria prophylaxis was available for eight of the cases. Three cases did not take any malaria prophylaxis while inappropriate prophylaxis was taken by one case. Of the remaining four cases who took malaria prophylaxis while abroad, all discontinued prophylaxis before one month after their return to Ireland (it should be noted however that at least two of these patients already displayed symptoms of malaria within one month of return to Ireland).

Measles

During 2003, 572 measles cases (14.6/100,000) were notified. This was more than double the number notified during 2002 (n=243) and 2001 (n=241). Enhanced details including laboratory data were obtained on some of the measles notifications in 2003, this data is discussed further in a separate measles report elsewhere in this document.

Rubella

In 2003, 59 cases (1.5/100,000) of rubella were notified, compared to 33 in 2002 and 57 in 2001. Fifty-five of the cases (93%) notified in 2003 were less than 15 years, with 50

(85%) of the cases aged less than five years. Thirty-two cases were female, 26 cases were male while sex was not reported for one case.

Salmonellosis (other than typhoid or paratyphoid)
Salmonella notifications increased slightly in 2003 compared to 2002 with 449 cases (11.5/100,000) notified. In 2003, the highest number of cases (n=89) and the highest age specific incidence rate (32.1/100,000) were in those aged less than five years. In 2003, the breakdown by serotype was as follows: *Salmonella* Enteritidis (n=85), *S*. Typhimurium (n=60), *S*. Kentucky (n=6), *S*. Virchow (n=6), *S*. Agona (n=4), *S*. Anatum (n=4), *S*. Stanley (n=4), *S*. Newport (n=3), *S*. Saintpaul (n=3), *S*. Bredeney (n=2), *S*. Hadar (n=2), *S*. Infantis (n=2), *S*. Reading (n=2) and *S*. Arizonae, *S*. Blockley, *S*. Braenderup, *S*. Brandenburg, *S*. Chester, *S*. Corvallis, *S*. Cotham, *S*. Durban, *S*. Hato, *S*. Heidelberg, *S*. Java, *S*. Javiana, *S*. Litchfield, *S*. Mbandaka, *S*. Mikawasima, *S*. Munchen, *S*. Ohio, *S*. Panama, *S*. Seftenberg, *S*. Wangata and *S*. Welikade (n=1, each) while serotype details were not provided for 55% of cases (n=245). A separate and comprehensive report on salmonella is presented elsewhere within this document.

Severe Acute Respiratory Syndrome (SARS)
Severe Acute Respiratory Syndrome (SARS) was recognised in Asia as a newly emerging infectious disease during February 2003. In Ireland, SARS was specified as a notifiable disease in March 2003. One probable case was notified in Ireland during 2003 in a patient who had travelled to Hong Kong. The patient recovered. SARS is discussed further in a separate chapter in this document.

Tuberculosis
The national enhanced TB surveillance system collects information on all TB notifications. At present only a provisional figure of 421 for TB notifications is available for 2003. Once follow up information on all cases has been received and validation completed a final figure will become available. During 2002 408 cases were notified. A comprehensive report on the finalised 2002 data is included as a separate chapter within this document.

Typhoid and paratyphoid
Eleven cases of typhoid and paratyphoid were notified in 2003 compared to five cases notified in 2002. Seven (64%) of the 11 cases were aged between 20 and 34 years while one case was less than five years of age. The majority (73%) of cases were male. Of the 11 cases notified seven were due to *Salmonella typhi* and four due to *Salmonella paratyphi*. The countries of infection were Pakistan (n=5), Bangladesh (n=2), India (n=1) and not reported (n=3).

Viral hepatitis type A
There were 25 cases (0.6/100,000) of viral hepatitis type A notified in 2003. This was similar to the number notified in 2002 (n=26). A comprehensive report on viral hepatitis is presented as a separate chapter within this document.

Viral hepatitis type B
Viral hepatitis type B notifications continued to increase in 2003 with 547 cases notified (14.0/100,000) compared to 458 and 342 cases notified in 2002 and 2001, respectively. A comprehensive report on viral hepatitis is presented as a separate chapter within this document.

Viral hepatitis unspecified
In 2003, 85 cases (2.2/100,000) of viral hepatitis type unspecified were notified, similar to 89 cases notified in 2002 and 90 cases in 2001. A comprehensive report on viral hepatitis is presented as a separate chapter within this document.

Whooping cough
Following the introduction of a vaccine in the 1950s whooping cough notifications had declined to a low in 1972 compared to previous years with 231 cases notified, however, following a whooping cough vaccine scare in the mid-1970s notifications started to increase (figure 3). This trend was reversed in the 1990s as notifications started to decline again, notifications declined from nearly 900 per year in the early 1990s to 131 in 2002. Compared to 2002 notifications decreased threefold in 2003 with 40 cases (1.0/100,000) notified, this is the lowest number of whooping cough notifications on record. The majority (73%) of cases in 2003 were in the age group 0-4 years. Twenty-one cases were male while 19 cases were female.

Discussion
Overall there was an increase in the numbers of infectious diseases notified during 2003 compared to 2002, in particular, notifications of food poisoning (bacterial other than salmonella) and measles increased compared to the previous year. The majority (63%) of notifications in 2003 were related to gastrointestinal illness while 18% were due to vaccine preventable diseases (as per the childhood immunisation schedule in Ireland).

During 2003, one probable case of the infectious disease SARS was notified in Ireland. SARS is a viral respiratory illness and is spread mainly by close person-to-person contact. Respiratory droplets produced when an infected individual sneezes or coughs are believed to spread the virus that causes SARS the most readily. The main symptoms of the disease include fever, chills, muscle aches, sore throat and headache. These develop into pneumonia with some developing acute breathing problems requiring respirators. SARS was first recognised as a newly emerging infectious disease during February 2003 in Asia. The illness subsequently spread to a number of countries around the world, mostly through international air travel, but was successfully contained by July 2003. The WHO reported a total of 8,096 SARS cases worldwide and 774 deaths during the 2003 outbreak. In Ireland the Infectious Diseases Regulations were amended in March 2003 to specify SARS as a notifiable disease. One probable case of SARS was notified in Ireland, during 2003, in an individual who had travelled to Hong Kong. The case recovered fully.

The list of diseases notifiable during 2003 was regulated in the 1981 Infectious Diseases Regulations, which were revised in 1985, 1988, 1996 and 2003. In an amendment to these regulations that came into effect on 1st January 2004 a new list of notifiable diseases was specified. This new list of notifiable diseases specifies food-borne illness such as

Table 4. Number of notifiable infectious diseases by sex in 2003

Infectious disease	Male	Female	Unknown	Total
Acute Encephalitis	2	4	0	6
Acute Viral Meningitis	16	22	1	39
Bacillary Dysentery (Shigellosis)	17	19	0	36
Bacterial Meningitis (including meningococcal septicaemia)*	171	140	0	311
Brucellosis	5	0	0	5
Creutzfeldt Jakob Disease	2	0	0	2
Food Poisoning (bacterial other than salmonella)	824	768	31	1623
Gastroenteritis (when contracted by children under 2 years of age)	946	857	32	1835
Infectious Mononucleosis	42	78	2	122
Infectious Parotitis (Mumps)	22	18	0	40
Influenzal Pneumonia	4	2	0	6
Legionnaires' Disease	5	2	0	7
Leptospirosis	9	0	0	9
Malaria	10	11	0	21
Measles	283	282	7	572
Rubella	26	32	1	59
Salmonellosis (other than typhoid or paratyphoid)	225	218	6	449
Severe Acute Respiratory Syndrome (SARS)	1	0	0	1
Tuberculosis†	261	156	4	421†
Typhoid & Paratyphoid	8	3	0	11
Viral Hepatitis Type A	16	9	0	25
Viral Hepatitis Type B	259	275	13	547
Viral Hepatitis Unspecified	49	30	6	85
Whooping Cough	21	19	0	40

**Taken from the Enhanced Bacterial Meningitis Surveillance System*
†Taken from the Enhanced TB Surveillance System, figure for 2003 provisional

campylobacter infection and staphylococcal food poisoning individually, whereas previously these were only notifiable under the category of food poisoning (bacterial other than salmonella). This new list also specifies cryptosporidiosis individually, whereas previously it was only notifiable under the disease category gastroenteritis (when contracted by children under two years of age). Other additions to the list include hepatitis C, influenza, biological threat agents such as botulism and tularemia and several pathogens important in the monitoring of antimicrobial resistance including *Staphylococcus aureus* and *Enterococcus* species.

The amendment introduces the use of case definitions for infectious diseases for the first time in Ireland, allowing more effective analysis and interpretation of notification data. This amendment also requires clinical directors of diagnostic laboratories, in addition to medical practitioners, to notify infectious diseases specified in the regulations. Diagnostic laboratories are an important source of infectious disease data. Prior to the revised legislation there was no requirement for laboratories to notify infectious diseases although voluntary reporting was occurring in some health board regions. Unusual clusters or changing pattern of illness that may be of public health concern must now also be reported. The changes to the legislation were based on recommendations from a subgroup of NDSCs' Scientific Advisory Committee following a review of the notification system in Ireland. This review was carried out at the request of the Department of Health and Children. The new regulations came into effect at the beginning of 2004 and are a welcome advancement in the surveillance of infectious disease in Ireland.

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References

1. Personal communication; Tuite G. National Virus Reference Laboratory.
2. The European Working Group for Legionella Infections. European guidelines for control and prevention of travel-associated Legionnaires' disease. London: EWGLI, 2002. Available at http://www.ewgli.org/public_info /publicinfo_ europeanguideline_download.asp

Immunisation Uptake in Ireland, 2003

Key Points

- **Annual immunisation uptake rates for all vaccines at both 12 and 24 months increased in 2003 when compared with 2002**
- **Nationally, D_3, P_3, T_3, $Polio_3$ and Hib_3 uptake at 24 months was 85-86% in 2003**
- **National MMR_1 uptake at 24 months was 78% in 2003**
- **National $MenC_3$ uptake at 24 months was 84% in 2003**

Introduction

The current primary childhood immunisation schedule was revised in 2002.[1] In Ireland, it is recommended that children receive three doses of vaccines against diphtheria, pertussis, tetanus, *Haemophilus influenzae* type b, polio and meningococcal group C at two, four and six months of age. It is also recommended that children receive one dose of BCG vaccine at birth or by one month of age and one dose of vaccine against measles, mumps and rubella at 12-15 months. A booster dose of DTaP/Polio is scheduled for children at four-five years of age, as is a second dose of MMR vaccine.

The importance of vaccination in controlling disease cannot be underestimated. In order to effectively control these preventable diseases, it is recommended that at least 95% of children complete the childhood immunisation schedule, thereby decreasing the number of susceptible children in the population and ensuring that outbreaks of these diseases are prevented.

Immunisation uptake statistics for 2003 are presented. These statistics relate to all children who are registered in the immunisation databases at health board level. The proportion of these children who completed the recommended immunisation schedule by 12 or 24 months of age is reported.

Materials and methods

In 2003, each health board provided NDSC with immunisation uptake data on a quarterly basis. These data were calculated

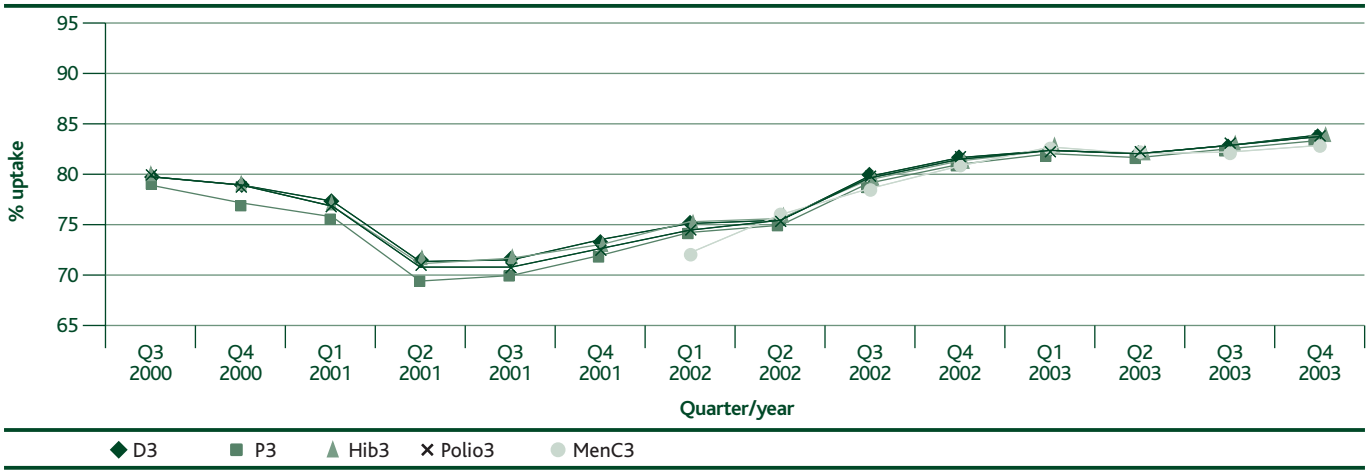

Figure 1. Quarterly immunisation uptake rates at 12 months in Ireland (Note scale ranges from 65-95% on this figure)

for all children on the health board immunisation databases who reached their first or second birthday (uptake rates at 12 and 24 months, respectively) during the quarter in question. Data included the number of children who had completed the recommended immunisation schedule as well as the number of children eligible for immunisation in each cohort and the percentage of children immunised. Data were collected for children who had received three doses of vaccine against diphtheria (D_3), pertussis (P_3), tetanus (T_3), *Haemophilus influenzae* type B (Hib_3), polio ($Polio_3$), meningococcal type C ($MenC_3$), one dose of vaccine against measles, mumps and rubella (MMR_1; uptake measured at 24 months only) and one dose of BCG vaccine (uptake measured at 12 months only).

NDSC collated and analysed these data in MS Excel and quarterly reports were produced which are available from the NDSC website. The annual uptake rates presented here represent the collation of data collected from quarter 1 to quarter 4, 2003 (cohorts born between 01/01/2002 & 31/12/2002 and 01/01/2001 & 31/12/2001, respectively). These rates were calculated from quarterly data on the number of children who had completed the recommended immunisation schedule and the number of children eligible for immunisation in each cohort submitted by the health boards. Data for BCG immunisation uptake rates, calculated at 12 months of age, were available from Quarter 3 2003 onwards only.

Results

Immunisation uptake rates at 12 months in 2003

National immunisation uptake at 12 months in 2003 (cohort born between 01/01/2002 & 31/12/2002) was 81% for D_3, T_3, Hib_3 and $Polio_3$ and 80% for P_3 and $MenC_3$. National uptake rates at 12 months increased by 6% for each of these vaccines when compared with 2002. The uptake rate for BCG vaccine at 12 months was 89% (based on returns from 5 health boards for Q3 and Q4, 2003 only).

Uptake rates at 12 months in 2003 by health board are presented in table 1. Uptake rates for D_3, P_3, T_3, Hib_3, $Polio_3$ and $MenC_3$ ranged from 73-76% (WHB) to 86-89% (NWHB). Five health boards were in a position to provide uptake data for the BCG vaccine in Q3 and Q4, 2003. Where data were available, uptake ranged from 83% (MHB) to 92% (SEHB).

Figure 1 presents trends in quarterly immunisation uptake rates at 12 months from Q3-2000 to Q4-2003. In 2003, a slight decrease in uptake was observed between Q1 and Q2 with uptake increasing in Q3 and Q4. The highest immunisation uptake rates for all vaccines in 2003 were reported in Q4. The rates from Q4-2003 also represent the highest uptake rates reported in children at 12 months in Ireland since collection of these data began (Q3-2000). The target rate of 95% uptake was achieved for BCG vaccination in Q4-2003 in the SEHB.

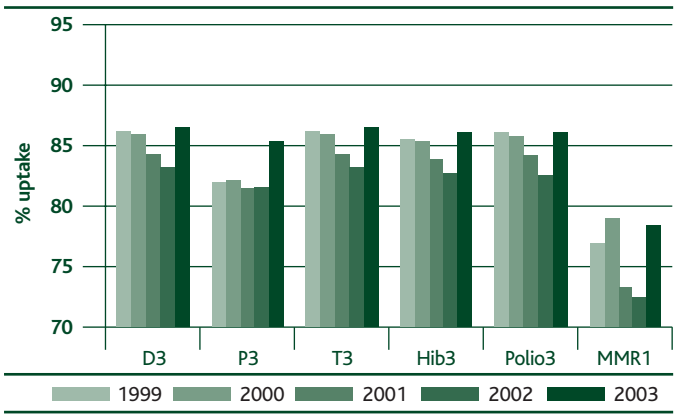

Figure 2. Annual immunisation uptake rates at 24 months, 1999-2003 (Note scales range from 70-95% on this figure)

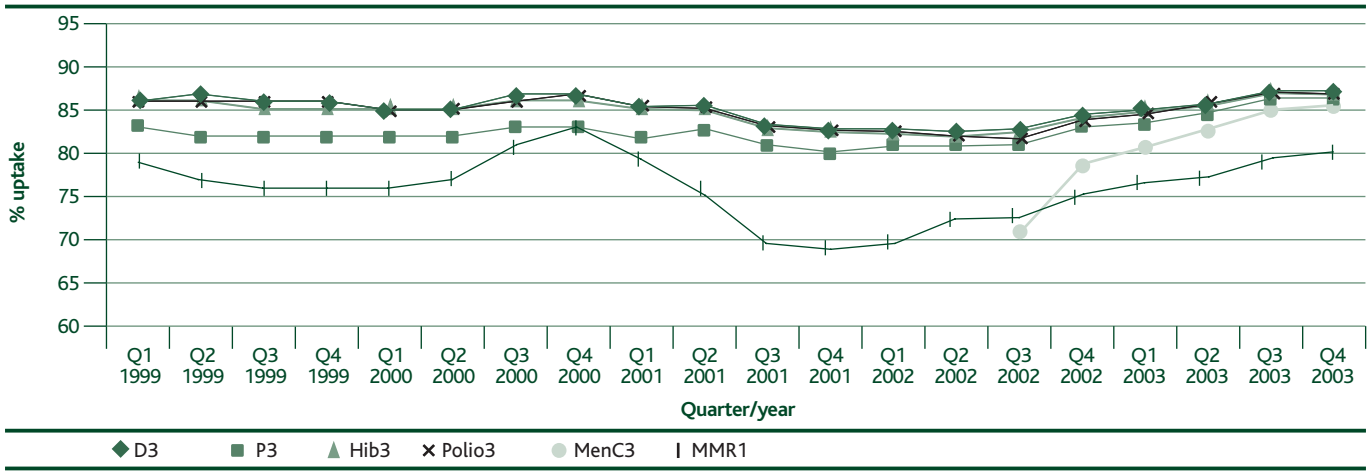

Figure 3. Quarterly immunisation uptake rates at 24 months in Ireland (Note scale ranges from 60-95% on this figure)

Immunisation uptake at 24 months in 2003

National annual immunisation uptake rates at 24 months in 2003 (cohort born between 01/01/2001 & 31/12/2001) were 86% for D_3, T_3, Hib_3 and $Polio_3$, 85% for P_3 and 84% for $MenC_3$. The national uptake rate for MMR_1 in 2003 was 78%. Uptake rates at 24 months in 2003 by health board are presented in table 2.

Uptake rates for D_3, P_3, T_3 and $Polio_3$ ranged from 83% in the ERHA to 92-94% in the NWHB. Uptake rates for Hib_3 and $MenC_3$ ranged from 80-83% in the ERHA to 91-92% in the MHB and NWHB. Uptake rates at 24 months for MMR_1 ranged from 74% in the ERHA and WHB to 88% in the MHB.

Figure 2 presents annual national immunisation uptake rates from 1999 to 2003. In 2003, annual immunisation uptake rates for all vaccines at 24 months increased when compared with 2002. Uptake of D_3, P_3, T_3, Hib_3 and $Polio_3$ rose by 3% while uptake of the MMR_1 vaccine rose by 5%. The largest increase was reported for the $MenC_3$ vaccine, which increased by 9% from 75% in 2002 to 84% in 2003.

Figure 3 presents trends in quarterly immunisation uptake rates at 24 months from Q1-1999 to Q4-2003. In 2003, the lowest uptake was reported in Q1 with increases in Q2 and Q3. Uptake rates reported in Q4 were comparable with those reported in Q3-2003. The national uptake rates for P_3, Hib_3 and $MenC_3$ reported in Q3 and Q4-2003 represent the highest rates reported for these vaccines in Ireland at 24 months since collection of these data began (Q1-1999). Uptake rates for D_3, T_3 and $Polio_3$ are the highest reported since Q4-2000 while MMR_1 uptake is still 3% lower than the levels reported in Q4-2000. The target rate of 95% was achieved in both Q3 and Q4 for D_3 and T_3 by the NWHB.

Discussion

Annual national immunisation uptake figures at 12 months in 2003 (80-81%) increased by 6% for D_3, P_3, T_3, Hib_3, $Polio_3$ and $MenC_3$ when compared with 2002 (74-75%).[2] In addition, uptake rates at 24 months in 2003 (78-86%) improved by 3-9% when compared with 2002 (73-83%).[2] This is the first increase observed in annual national uptake rates calculated at 24 months since these data were first reported in 1999.

In general, quarterly uptake rates improved over the course of 2003 and were highest in Q3 and Q4. While the target rate of 95% uptake was achieved in the NWHB for D_3 and T_3 (Q3 and Q4) and in the SEHB for BCG (Q4), national immunisation uptake rates for D_3, P_3, T_3, Hib_3 and $Polio_3$ and $MenC_3$ in Q4-2003 were still 8-9% below the target rate of 95% while MMR_1 uptake was 15% below the 95% target rate. BCG was 4% below target rate of 95% but these data are only representative of 5 health boards which account for less than half the birth cohort for each quarter.

Table 1. Immunisation uptake rates in children 12 months of age in 2003

% Uptake at 12 months
Cohort born 01/01/2002 - 31/12/2002

Health Board	No. in cohort	D_3	P_3	T_3	Hib_3	$Polio_3$	$MenC_3$	BCG*
ERHA	22,750	77	77	77	77	77	78	na†
MHB	3,854‡	86	85	86	86	86	85	83
MWHB	5,001	83	82	83	83	83	82	90
NEHB	6,039	81	81	81	81	81	81	na
NWHB	3,153	89	87	89	88	88	86	91
SEHB	6,614	85	85	85	85	85	84	92
SHB	8,628‡	83	82	83	82	83	82	87§
WHB	5,449	76	76	76	76	76	73	na
Ireland	**61,488‡?**	**81**	**80**	**81**	**81**	**81**	**80**	**89**

**BCG data available for Q3-2003 and Q4-2003 only*
†Not available at this time
‡As the number in cohort varied depending on the vaccine, the most commonly used number was taken
§SHB: part coverage of neonatal BCG (Kerry only)
?The number in cohort for BCG vaccine was 10,275

Table 2. Immunisation uptake rates in children 24 months of age in 2003

% Uptake at 24 months
Cohort born 01/01/2001 - 31/12/2001

Health Board	No. in cohort	D_3	P_3	T_3	Hib_3	$Polio_3$	$MenC_3$*	MMR_1
ERHA	21,753	83	83	83	83	83	80	74
MHB	3,616*	91	89	91	92	92	91	88
MWHB	4,881	87	85	87	86	87	84	80
NEHB	6,025	91	91	91	91	93	88	81
NWHB	3,124	94	92	94	92	94	91	83
SEHB	6,652	88	87	88	88	88	86	83
SHB	8,233*	85	84	85	85	85	84	80
WHB	5,270*	85	84	85	85	84	81	74
Ireland	**59,554†**	**86**	**85**	**86**	**86**	**86**	**84**	**78**

**As the number in cohort varied depending on the vaccine, the most commonly used number was taken.*
†Sum of the 8 birth cohorts listed in table 1

Despite the increases in immunisation uptake rates reported over the course of 2003, further improvements are necessary in order to prevent outbreaks of these vaccine preventable diseases. For example, in 2003 the number of measles cases more than doubled when compared with 2002. In order to prevent such increases in disease in the future it is necessary to extend the current upward trend to meet the WHO recommended target rates for immunisation uptake.

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References

1. Immunisation Guidelines for Ireland, 2002. A report by the National Immunisation Committee of the Royal College of Physicians of Ireland. Available at http://www.ndsc.ie/Publications/Immunisation/ImmunisationGuidelines/
2. Immunisation uptake in Ireland, 2002. NDSC Annual Report 2002. Available at http://www.ndsc.ie/Publications/AnnualReports/
3. Quarterly immunisation uptake reports. Available at http://www.ndsc.ie/Publications/Immunisation/immunisationuptakequarterlyreports/

Computerised Infectious Disease Reporting System (CIDR)

Key Points

- **CIDR is an integrated electronic information system, based on modern internet technologies, for surveillance of clinical and laboratory information on communicable diseases, outbreaks and antimicrobial resistance in Ireland**
- **This shared national system has been developed in partnership by the NDSC, Health Boards, FSAI, FSPB and the DoHC**
- **Go live pilot implementation of CIDR started in May 2004 in NDSC, all laboratory, community care and public health sites in the NEHB, and in the 4 national reference laboratories. Recommendations on national implementation of CIDR will be made shortly**
- **CIDR is a robust, enterprise-strength solution that will be adaptable with changing surveillance needs**

Introduction

Computerised Infectious Disease Reporting (CIDR) is a system that has been developed by the NDSC in collaboration with its partners, the DoHC, the Health Boards, the FSAI and the FSPB, utilising modern internet-based technologies. 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. CIDR provides:

- An easily accessible one-stop shop for surveillance and control of communicable diseases and antimicrobial resistance
- One common system for all surveillance work
- Standard reports on line and the ability to customise reports to your needs
- Controlled and secure access to information
- An adaptable and flexible system that can meet future needs

CIDR system development

CIDR was designed in 2002, and development of the system commenced early in 2003. By April 2004, both development and user acceptance testing of the system were completed.

The CIDR system has been built using the latest .NET development environment with SQL Server 2000 as the backend database and makes extensive use of XML

technology, in line with the inter-operability requirements of e-government initiatives.

To ensure that information within CIDR is stored and accessed appropriately, the core system is firewall-protected and access to the system is limited to authorised users. In addition to usernames and passwords these users require authentication provided by unique key fob tokens. Information transmitted from local PCs to the core system is protected by 128-bit encryption.

Access to the CIDR system is provided via the Government Virtual Private Network (G-VPN). This provides a cost-effective network with increased security and enhanced bandwidth for public sector organisations, including the health service.

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

The information in CIDR comes from two principal sources. Public health doctors working in community care offices and public health departments register clinical notifications on the system. Clinical microbiology laboratories in hospitals upload files exported from their laboratory information systems into CIDR, again using standard browser software. These files are transformed and translated by the core system in the CIDR format. Laboratories authorise all information prior to its release for view by public health and other CIDR partners. Alternatively, laboratories can enter data into CIDR manually.

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

CIDR pilot implementation

Pilot go live implementation commenced in the NEHB, in NDSC and in the 4 reference laboratories, namely the NVRL, the Irish Meningococcal and Meningitis Reference Laboratory, the Salmonella Reference Laboratory and the Methicillin Resistant *Staphylococcus Aureus* Laboratory in May 2004. This four month pilot implementation period is due to end shortly.

In May 2004, CIDR Project Board established a pilot implementation evaluation committee. This committee is due to report shortly on the findings of the evaluation and make recommendations on the best way forward for national implementation.

CIDR training
NDSC has a team of six surveillance scientists and 2 surveillance assistants available to train users in CIDR. Training is provided in the CIDR application, in CIDR business processes, and in the use of Business Objects within the CIDR environment. Modular structures are used to allow courses to be tailored for each user group. Materials include a user manual, and user guide, training slides, CD simulation and hands-on exercises. Feedback from the training delivered during pilot implementation has been very positive.

CIDR helpdesk
The CIDR helpdesk is based at NDSC. Helpdesk staff are available to answer any queries about CIDR, whether they are technical or relate to the business process. They provide a quick turnaround time for providing answers to queries.

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

IT aspects of implementation
In advance of implementation, there needs to be a connection for each CIDR user to the services configuration of Government VPN. In addition there need to be modern PC(s) available at each CIDR user site, though they do not need to be dedicated to CIDR. Finally, local IT support is needed to configure local CIDR user PCs appropriately.

Public health, business process issues during implementation
The approach taken with regard to managing public health,

business process issues was to initially identify a key individual responsible for managing and coordinating all aspects of the implementation. A steering committee was established locally, with laboratory, community care, public health and IT representation. The CIDR team held a joint meeting to initiate the process. Several key decisions were taken locally, e.g. whether to manage surveillance and control within CIDR on a regional or a community care basis given the requirements for daily interaction with CIDR, identification of persons locally who would monitor data quality in CIDR, remove duplicates and assign community care areas to information that was not assigned below health board level etc All CIDR users were identified and assigned the level of access to CIDR appropriate to each user. The business rules template document, nationally agreed in 2002, was adapted and signed by the CEO of each pilot implementation organisation. A readiness for implementation checklist was prepared and discussed with the users in advance of go live. This dealt with data handling issues, whom to contact if problems arose, IT configuration, access control etc.

CIDR communications

In 2004, a CIDR newsletter was initiated. There have been four editions to date, and the CIDR section of NDSC's website is actively updated. It includes a Frequently Asked Questions section. During the summer of 2004, demonstrations of the CIDR application were held in each Health Board, giving an opportunity for hands-on practice with CIDR. These demonstrations were very well received.

CIDR Disaster Recovery / Business Continuity

The core CIDR system is physically located within the premises of NDSC and whilst there is some resilience within the existing system, and data is backed up daily and stored securely off-site, loss of equipment or access to that equipment could result in significant downtime. To mitigate this risk, a disaster recovery / business continuity solution is being developed, in conjunction with Fujitsu, which replicates data via the Government VPN to a Disaster Recovery CIDR environment hosted in the Fujitsu data centre in Swords, Co. Dublin. This is designed to be as transparent as possible to the end user i.e. utilising the same URL, user accounts / profiles etc and offering access to the same transactional data and reports. This system would provide a working CIDR system until the main system is restored.

Antibiotic Consumption in the Community, 2003

Key Points

- **Overall community antibiotic consumption rate for Ireland in 2003 was 20.6 DID (Defined Daily Doses per 1000 Inhabitants per Day) representing a mid-range usage rate among EU participants**
- **Rate for the last quarter of 2003 was 24.2 DID, the highest in any individual quarter in the previous decade**
- **The relative proportion of narrow-spectrum penicillin usage (8%) was consistent with those countries having a higher level of resistance in key pathogens and much lower than countries having low levels of resistance, where the relative reliance on narrow-spectrum penicillin was at 60-70%**
- **Consumption of two individual antibiotics – Amoxicillin with enzyme inhibitors and Amoxicillin - formed a high proportion of total antibiotics used, 22.4% and 17.5% respectively, and also represented some of the most frequently prescribed pharmaceutical products in 2003**
- **Data for 2003 showed that geographical variation in antibiotic utilisation that may reflect differences in socio-economic factors and regional prescription practices**
- **Sharp rise of 40% in total antibiotic distribution from August (15.8 DID) to September (22.3 DID) for Ireland for 2003, which stayed high for the last quarter. This seasonal fluctuation has been seen every year and is probably related to prescription of antibiotics for respiratory tract infections in winter months**

Introduction and methods

Surveillance of antimicrobial utilisation has been identified as a key component of the Strategy for the Control of Antimicrobial Resistance in Ireland (SARI).

Ireland now participates in the European Surveillance of Antimicrobial Consumption (ESAC) which aims to construct an inventory of antibiotic usage in the EU at national level by collating data from both community and hospital areas on a quarterly basis. This report covers community antibiotic consumption for Ireland collected under ESAC guidelines for 2003 (http://www.ua.ac.be/main.asp?c=*ESAC).

In order to facilitate international comparisons, consumption is expressed as Defined Daily Dose (DDD) per 1000 Inhabitants per Day (DID). DDD is the assumed average maintenance dose per day for a drug used for its main indication in adults. ESAC also uses the WHO Anatomical Therapeutic Chemical (ATC) index to classify drugs through five hierarchical levels. For example, all anti-infective systemic drugs are grouped under J, antibacterial agents (antibiotics) are denoted as J01, penicillins are classed as J01C, broad-spectrum penicillins as J01CA and Amoxicillin as J01CA04.

NDSC has purchased Irish pharmaceutical sales data from a commercial organisation specialising in pharmaceutical market research, IMS Health. This dataset contains regional,

Table 1. Top ten most commonly used antibiotics in the community in Ireland, 2003.

Antibiotic	DID	Cumulative
J01CR02 Amoxicillin and enzyme inhibitor	4.63	22.4%
J01CA04 Amoxicillin	3.61	39.9%
J01FA09 Clarithromycin	2.00	49.6%
J01AA08 Minocycline	1.30	55.9%
J01AA02 Doxycycline	1.26	62.0%
J01DA08 Cefaclor	1.15	67.6%
J01CF05 Flucloxacillin	0.88	71.8%
J01CE02 Phenoxymethylpenicillin	0.77	75.6%
J01FA01 Erythromycin	0.75	79.2%
J01AA06 Oxytetracycline	0.73	82.7%
Others	3.57	100.0%
Total	**20.64**	

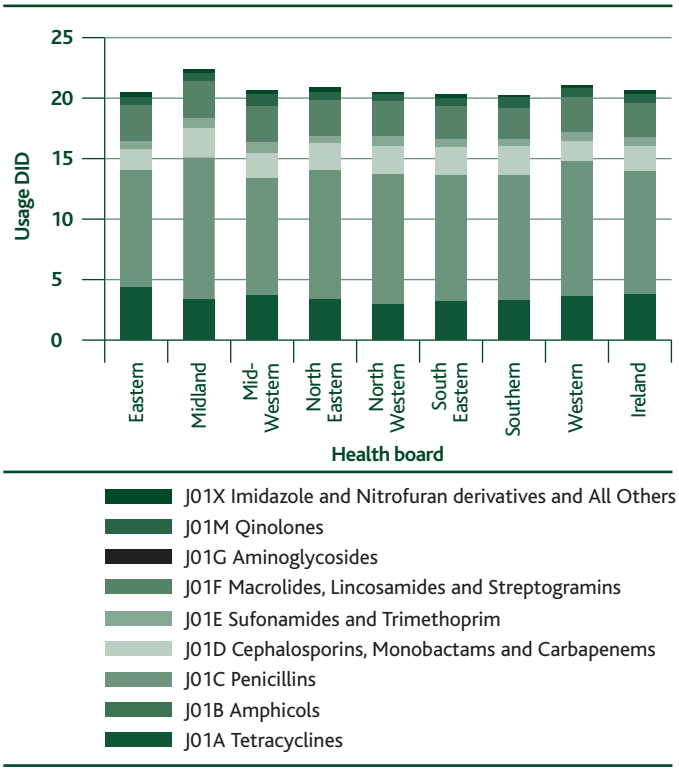

Figure 1. Community antibiotic consumption by therapeutic class in each health board in Ireland, 2003.

monthly wholesaler to retail community based pharmacy sales data for 2003 from over 95% of the wholesalers and manufactures in Ireland. An automated data-extraction protocol was devised at NDSC to obtain the ATC/DDD outputs for antibiotics.

Results

The overall community antibiotic consumption for Ireland in 2003 was 20.6 DID. Figure 1 shows the breakdown by antibiotic class for each health board and for Ireland as a whole. Penicillins accounted for the largest class of antibiotics used (50% of total at 10.3 DID), followed by tetracyclines (18%, 3.7 DID), macrolides (14%, 2.9 DID), cephalosporins (10%, 2.1 DID), quinolones (4%, 0.7DID) and sulphonamides (3%, 0.7 DID).

There was little variation among the health boards in terms of total consumption. This is reflected in the apparent lack of a geographical pattern in the regional distribution of total DID for each county for the year 2003 (figure 2). However, the proportion of tetracyclines over total usage by county for 2003 shows a much higher relative use in Dublin and much lower relative use in the Midland and the North Western counties (figure 3).

Penicillins

Penicillin in combination with beta-lactamase inhibitor (such as amoxicillin/clavulanate) accounted for the largest proportion of penicillins, 45% at 4.6 DID. This was followed by broad-spectrum (such as ampicillin and amoxicillin) at 39%, 4.0 DID, and then by beta-lactamase resistant penicillins (such as cloxacillin and flucloxacillin) at 9%, 0.9 DID. The use of narrow spectrum penicillins, such as benzylpenicillin formed the lowest proportion of all penicillins at 8%, 0.8 DID.

Figure 4 shows that there was a slight difference in the proportion of sub-classes of penicillins used in different health boards. Furthermore, reliance on narrow-spectrum penicillin was higher among the Western counties as illustrated in figure 5.

Most commonly consumed antibiotics

Table 1 shows the top ten most commonly consumed antibiotics in Ireland, which cumulatively accounted for 83% of all antibiotics consumed by DID. The most commonly used antibiotic, J01CR02 Amoxicillin and enzyme inhibitor, accounted for 22% of all antibiotics at 4.6 DID.

Time series

Figure 6 shows the consumption of antibiotics in the community, in DID, for Ireland by quarter since 1993. Antibiotic usage has been rising steadily and rose to 24.2 DID for the last quarter of 2003, the highest in any quarter in the entire study period. Overall antibiotic use was highest during the winter months. The mean difference between troughs

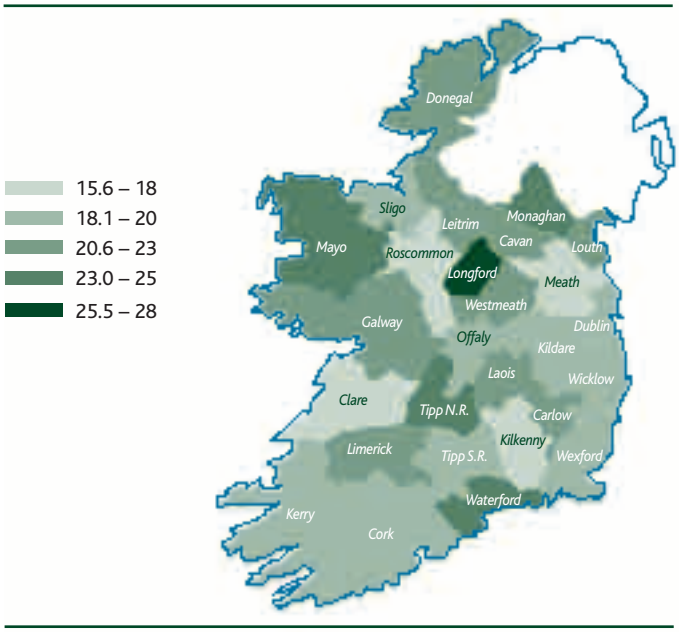

Figure 2. Total community antibiotic consumption in Defined Daily Doses per 1000 Inhabitants per Day by county, 2003.

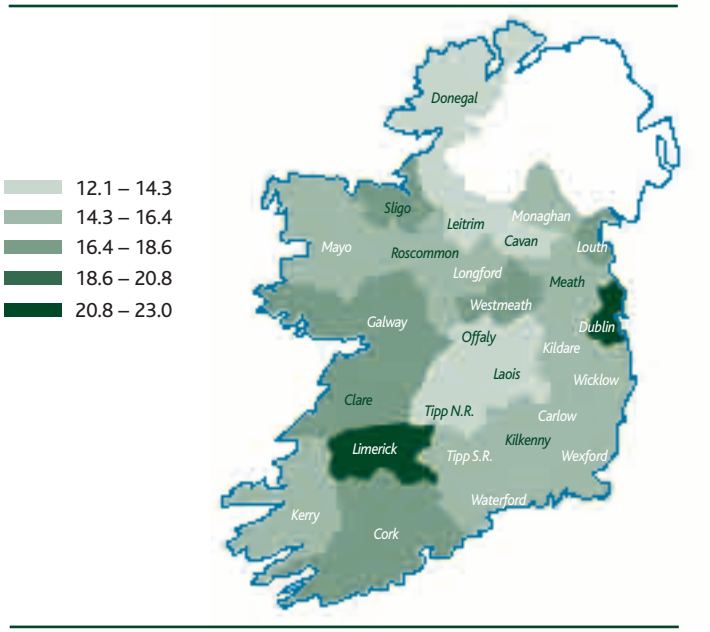

Figure 3. Proportion of tetracylcine over total antibiotic usage by county, 2003.

(quarters 2 and 3) and peaks (quarters 1 and 4) in antibiotic use was 23% (range 12% - 34%) and 22% for 2003.

The fluctuation in antibiotic utilisation during the course of a year is further demonstrated in figure 7. The mean monthly rate for the last four years (2000 – 03), dropped steadily from 21.6 DID in January to 15.3 DID in July and stayed low for August. The level rose sharply to a plateau in September, October and November to about 21 DID, then peaked to 22.0 DID in December.

Discussion

Although the IMS dataset used in this report is very comprehensive it does have some limitations. Firstly, the data are based on pharmacy wholesale dataset, rather than on individual prescriptions. Thus the data cannot be used to determine the actual number of antibiotic courses taken and do not provide information on dose or duration of therapy. Secondly, factors such as stockpiling of antibiotics in pharmacies and drug wastage (e.g. when antibiotics pass their sell-by date) may introduce biases that cannot be corrected for within the current method. Nevertheless the data do show consistency over time and similar data sources have been successfully used to calculate antibiotic consumption in other countries.

There is a strong relationship between the level of antibiotic use in the community and the level of antibiotic resistance. This has been demonstrated for beta-lactam antibiotic use and penicillin resistance in *Streptococcus pneumoniae* in a number of European countries.[1] A similar association has been shown for macrolide use and resistance in group A streptococci.[2] In general the ESAC participants reporting the lowest levels of antibiotic consumption are those with the lowest levels of antibiotic resistance, while the reverse is true of those reporting the highest levels of antibiotic consumption. The overall level of antibiotic use here places Ireland in the medium-range of usage among ESAC participants.[3]

Variation in terms of overall antibiotic consumption among the different health boards was minimal, however, variance was observed at county level in two key areas. Firstly, the proportion of tetracycline over total antibiotic usage was shown to be much higher in the more prosperous Dublin region and lower in the Midland and the North Western counties. This may reflect that socio-economic factors are associated with tetracycline usage. Overuse of tetracycline, which is prescribed predominantly for respiratory tract and skin infections, as well as for prophylactic prescription against malaria, could lead to the selection of multi-resistant pathogens. Secondly, the fact that there is a strong geographical pattern in the relative reliance of narrow-spectrum antibiotics in the Western counties indicates that regional practices may also drive prescription patterns. For the whole of Ireland, the relative proportion of narrow-

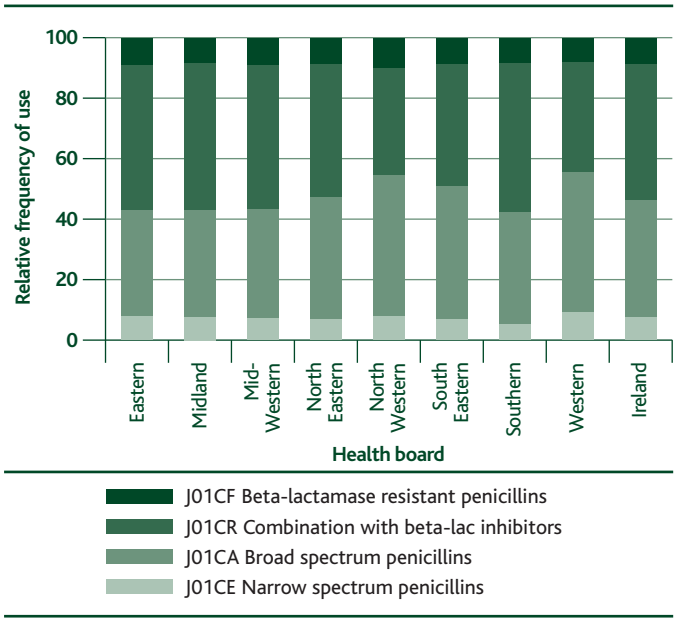

Figure 4. Relative proportions of pencillins used in each health board in Ireland, 2003.

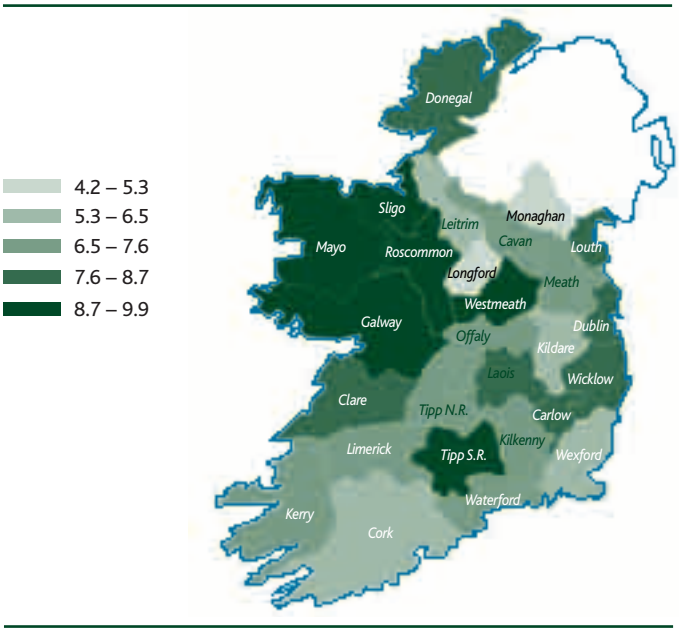

Figure 5. Proportion of narrow-spectrum over all penicillins used by county, 2003.

spectrum penicillins (8%) is consistent with those countries having a higher level of resistance among key indicator pathogens, as in Belgium, Greece and the UK, and much lower than the Nordic countries, which generally have low levels of resistance, where the relative reliance on narrow-spectrum penicillins is at 60-70%.[4]

The most commonly used antibiotic, J01CR02 Amoxicillin and enzyme inhibitor, which accounted for 22% of all antibiotics, is the sixth most commonly prescribed pharmaceutical product in Ireland under the General Medical Services (GMS) reimbursement scheme and the broad-spectrum penicillin, J01CA04 Amoxicillin was the second most commonly used antibiotic, ranking twelfth in the GMS scheme of all products prescribed. Antibacterials for systemic use (J01) account for 3.49% of the total cost of the GMS reimbursement scheme.[5]

Seasonal variation in antibiotic consumption has been observed in all ESAC participating countries and is most likely related to increased prescribing for respiratory tract infections during the winter months. Countries with high levels of antibiotic consumption and resistance generally show a very marked seasonal fluctuation (>30% difference between winter and summer months), compared to those with low levels (<25% fluctuation).[4] The mean seasonal fluctuation for Ireland over the last eleven years was 23%. However, this calculation needs to be interpreted with

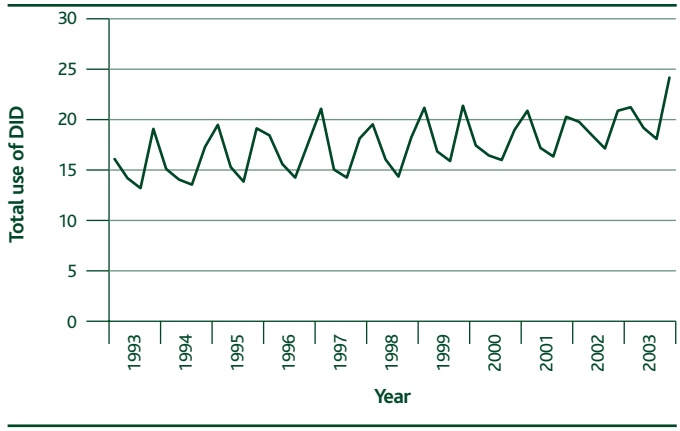

Figure 6. Seasonal variation in community antibiotic consumption in Ireland, 1993-2003.

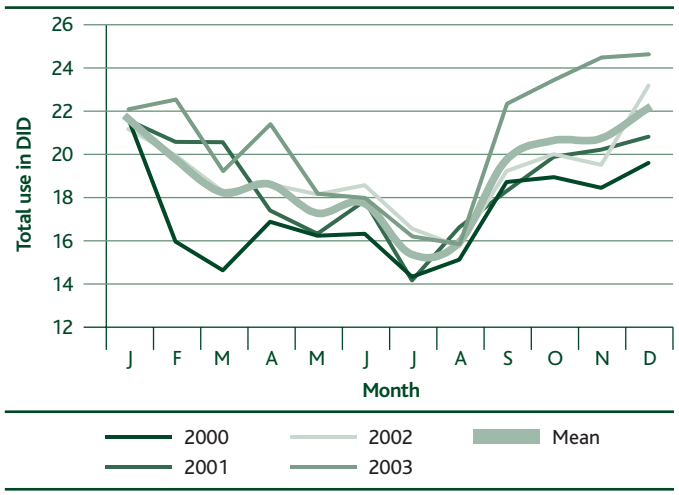

Figure 7. Amount of antibiotics consumed in Defined Daily Doses per 1000 Inhabitants per Day in Ireland for each month for the last four years.

caution as antibiotic-purchasing practices by pharmacies may affect data on seasonality. For example, antibiotics purchased during quarter three may not be dispensed until quarter four, flattening the seasonality curve. Furthermore, there was a sharp rise in total antibiotic distribution from August (15.8 DID) to September (22.3 DID) for Ireland for 2003, a rise of over 40%.

In the coming year, expansion of the surveillance of antimicrobial consumption is planned to include data from the GMS scheme at prescription level using the same ATC/DDD classification protocol as used in this report for wholesaler dataset, thus addressing some of the limitations encountered. Furthermore, it is hoped that sufficient numbers of hospitals take part in the surveillance strategy to allow Ireland to fully participate with ESAC.

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References

1. Bronzwaer SL, Cars O, Buchholz U, *et al*. A European study on the relationship between antimicrobial use and antimicrobial resistance. *Emerg Infect Dis* 2002;**8**:278-82
2. Seppala H, Klaukka T, Vuopio-Varkila J, *et al*. The effect of changes in the consumption of macrolide antibiotics on erythromycin resistance in group A streptococci in Finland. *N Engl J Med* 1997;**337**:441-6
3. Cunney R and Oza A. Antibiotic Consumption in Ireland, 1993 to 2002. *Epi-Insight* April 2004;**5(4)**:2-3
4. European Surveillance of Antimicrobial Consumption – results of the retrospective data collection 1997-2001. Posters ECCMID Glasgow 2003
5. General Medical Services (Payments) Board, Financial and Statistical Analysis of Claims and Payments – 2003

Glossary of Terms

ACE – Assistant Chief Executive
CIR – Crude Incidence Rate
CFR – Case Fatality Rate
CSF – Cerebo Spinal Fluid
CSSD – Central Sterile Suppliers Department
EARSS – European Antimicrobial Resistance Surveillance System
ECEH – European Centre for Environment and Health
EHSS – Eastern Health Shared Services
EHA – Eastern Regional Health Authority (Dublin, Kildare, Wicklow)
ESAC – European Surveillance of Antimicrobial Consumption
ESEN – European Sero-Epidemiology Network
FBHM – Faculty of Public Health Medicine
FSAI – Food Safety Authority of Ireland
FSPB – Food Safety Promotion Board
GBS – Guillain Barré Syndrome
HPA – Health Protection Agency
HUS – Haemolytic Uraemic Syndrome
IBTS – Irish Blood Transfusion Service
ICGP – Irish College of General Practioners
IDU – Injecting Drug User
IMMRL – Irish Meningococcal and Meningitis Reference Laboratory
IMU – Information Management Unit
MDR – Multi-Drug Resistant
MHB – Midlands Health Board (Laois, Offaly, Longford, Westmeath)
MMR – Measles Mumps Rubella
MSM – Men who have Sex with Men
MWHB – Mid-Western Health Board (Clare, Limerick, Tipperary NR)
NASC – National AIDS Strategy Committee
NDSC – National Disease Surveillance Centre
NEHB – North Eastern Health Board (Cavan, Monaghan, Louth, Meath)
NGO – Non-Governmental Organisation
NTBSS – National Tuberculosis Surveillance System
NVRL – National Virus Reference Laboratory
NWHB – North Western Health Board (Donegal, Sligo, Leitrim)
OLHSC – Our Lady's Hospital for Sick Children
PCR – Polymerase Chain Reaction
RCPI – Royal College of Physicians Ireland
SARI – Strategy for the control of Antimicrobial Resistance in Ireland
SARS – Severe Acute Respiratory Syndrome
SEHB – South Eastern Health Board (Carlow, Kilkenny, Tipperary SR, Waterford, Wexford)
STI – Sexually Transmitted Infection
TCD – Trinity College Dublin
TTP – Thrombotic Thrombocytopenic Purpura
UCD – University College Dublin
UCH – University College Hospital
WHB – Western Health Board (Galway, Mayo, Roscommon)
WHO – World Health Organisation