Salmonellosis in Ireland 2002

Dr Barbara Foley (NDSC), Prof Martin Cormican (NSRL) and Dr Paul McKeown (NDSC)

National Disease Surveillance Centre
25-27 Middle Gardiner Street
Dublin 1

Salmonella in Ireland, 2002

Key points

- The incidence of Salmonellosis in Ireland appears to be decreasing, as evident from the weekly clinical notification data
- The crude incidence rate per 100,000 population of Salmonellosis in Ireland in 2002 was 10.2, compared to 11.8 in 2001
- There were 416 clinical isolates of *Salmonella enterica* referred to the National Salmonella Reference Laboratory (NSRL) in 2002 for serotyping, phage typing and antimicrobial sensitivity tests
- 19.7% of cases were associated with travel outside of Ireland in 2002

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 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 2002. These data enable us to provide an overview of the epidemiology and burden of disease caused by *Salmonella* infections in Ireland today.

Results - NSRL data

Demographic information

There were 416 clinical isolates of *S. enterica* referred to NSRL in 2002. The male: female ratio was 1.05:1. The age groups and sex of those affected are shown in Table 1.

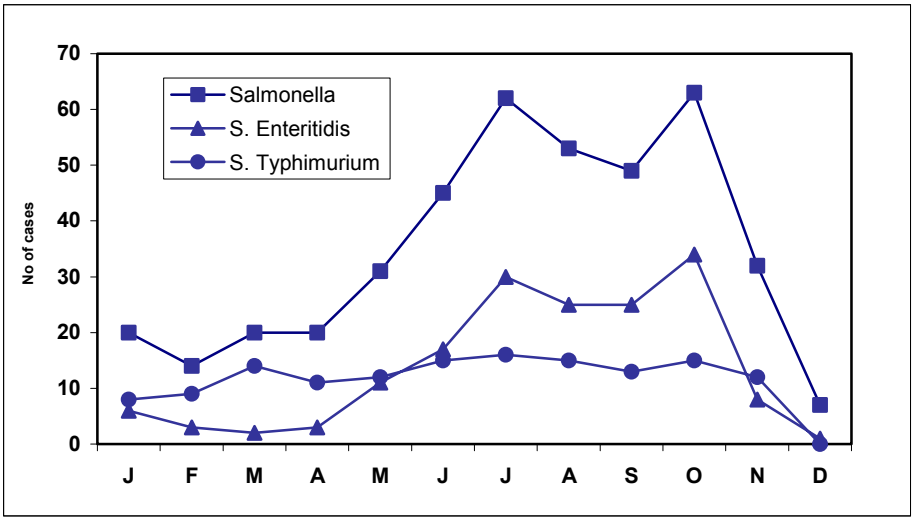
Table 1. *Analysis of clinical isolates of S. enterica (n=416) referred to NSRL, (2002) by age-group and gender.*

Age Group	No of isolates (%)	Male	Female	Unknown
0-4	89 (22)	43	38	8
5-14	39 (9)	22	16	1
15-24	59 (14)	32	26	1
25-34	66 (16)	30	33	3
35-44	40 (10)	21	19	0
45-54	42 (10)	20	22	0
55-64	30 (7)	15	14	1
65+	30 (7)	16	13	1
Unknown	21 (5)	7	12	2
Total	**416 (100)**	**206**	**193**	**17**

Seasonality

There was a marked seasonality in the overall number of human cases of *S. enterica* reported in 2002, with a peak seen in both July and October 2002 (see Figure 1 below). *S.* Enteritidis cases were also shown to have this seasonal variation, but this was not seen for *S.* Typhimurium cases.

Figure 1. *Isolates of Salmonella enterica, S. Enteritidis and S. Typhimurium referred to NSRL by month, 2002.*



(*Note*: month refers to the date the isolate was received in the reference laboratory).

Serotyping, phage typing and antibiotic susceptibility results

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

Table 2. *Serotypes of Salmonella enterica by health board, 2002.*

Serotype	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
Adelaide	0	0	0	0	1	0	0	0	1
Agama	0	0	0	0	0	0	1	0	1
Agona	1	0	0	3	0	1	0	0	5
Alachua	0	0	0	0	0	0	0	1	1
Apapa	1	0	0	0	0	0	0	0	1
Bareilly	1	0	0	0	0	0	0	0	1
Braenderup	0	1	0	1	0	0	0	0	2
Brandenburg	2	0	1	0	0	0	0	0	3
Bredeney	0	0	1	0	0	1	0	0	2
Colindale	1	0	0	0	0	0	0	0	1
Corvallis	1	0	0	0	0	0	0	0	1
Dublin	1	0	4	0	2	0	0	2	9
Durban	2	0	0	0	0	0	0	0	2
Enteritidis	57	8	16	10	10	15	29	20	165
Give	2	0	0	0	0	0	0	0	2
Hadar	2	0	1	0	0	2	1	0	6
Heidelberg	1	0	0	0	1	0	0	0	2
Infantis	1	0	0	0	0	0	2	0	3
Java	0	0	0	0	2	0	0	1	3
Johannesburg	1	0	0	0	0	0	0	0	1
Kentucky	0	0	0	0	0	0	0	1	1
Kottbus	1	1	0	4	0	0	0	0	6
Lexington	0	0	0	0	0	1	0	0	1
Mbandaka	0	0	1	0	0	1	0	1	3
Menston	0	0	0	0	0	0	0	1	1
Muenster	0	0	0	0	0	0	0	1	1
Newport	3	0	0	0	0	0	1	1	5
Ohio	1	1	0	0	1	0	0	0	3
Oranienburg	1	0	0	0	0	0	0	0	1
Panama	1	0	0	0	0	1	0	0	2
Poona	0	0	0	2	0	0	0	0	2
Putten	0	0	0	0	0	0	0	3	3
Redhill	1	0	0	0	0	0	0	0	1
Rissen	0	0	0	1	0	0	0	0	1
Rough	0	0	0	0	0	1	0	0	1
Schwarzengrund	0	0	0	0	1	0	0	0	1
Senftenberg	1	0	0	1	0	0	0	0	2
Singapore	0	0	1	0	0	0	0	0	1
Stanley	3	0	1	0	0	1	1	1	7
Thompson	1	0	0	0	0	0	0	0	1
Typhi	3	0	1	0	1	0	0	0	5
Typhimurium	45	12	10	15	11	28	4	15	140

Urbana	1	0	0	0	0	0	0	0	1
Virchow	5	0	0	0	2	2	0	1	10
Worthington	0	0	0	0	0	0	1	0	1
Unknown	0	1	0	2	0	0	0	0	3
Total	**141**	**24**	**37**	**39**	**32**	**54**	**40**	**49**	**416**
CIR*	**10.9**	**11.7**	**11.7**	**12.7**	**15.2**	**13.8**	**7.3**	**13.9**	**11.5**

CIR: crude incidence rate per 100,000 population

The trend which began in 2001 of *S.* Enteritidis taking over from *S.* Typhimurium as the predominant serotype associated with human salmonellosis in Ireland, was again continued in 2002 (see Table 3). The next most commonly isolated serotypes in 2002 were *S.* Virchow and *S.* Dublin. There were 5 isolates of *S.* Typhi detected. Three of these were travel-associated.

Table 3. Serotypes of *S. enterica* referred to NSRL (1998-2002).

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

Travel-association

82 isolates (19.7%) reported to NSRL in 2002 were found to be travel-associated. The majority of these cases were associated with travel to Spain (n=26). The next most common country reported was Tunisia (n=6), followed by Thailand (n=5), Pakistan (n=4) and Portugal (n=4).

Further analysis of the 26 cases associated with travel to Spain revealed that 19 of these were S. Enteritidis. Interestingly a variety of different phage types of S. Enteritidis were reported viz., 7 of PT1, 4 of PT6, 2 of PT4 and one each of PT12, PT14b, PT3, PT5a, and PT8.

Antimicrobial resistance

The antimicrobial susceptibility of the most commonly isolated serotypes in 2002 are presented in Table 4. High levels of resistance were again found among *S.* Typhimurium isolates, particularly *S.* Typhimurium DT104. Many of these were found to be resistant to at least five antimicrobial agents, *viz*. ampicillin, chloramphenicol, streptomycin, sulphonamide and tetracycline (ACSSuT).

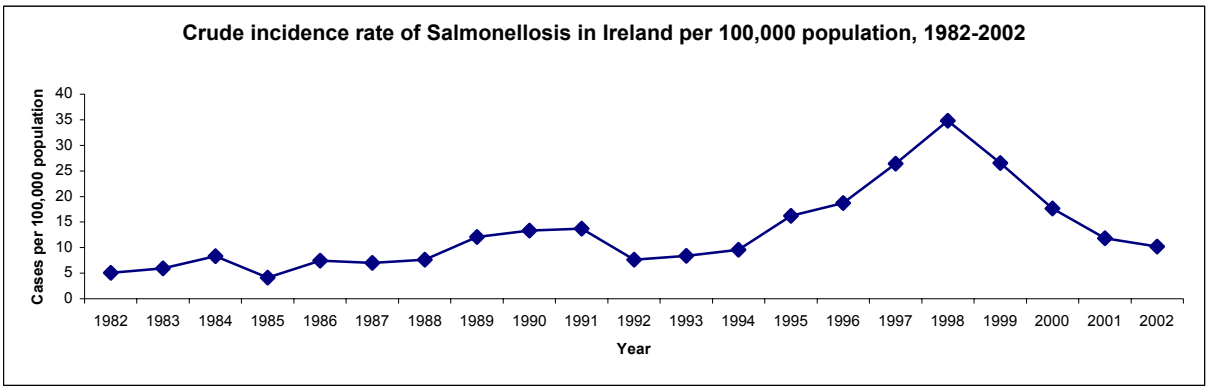
Table 4. *Antimicrobial susceptibilities of human Salmonella enterica serotypes isolated in Ireland in 2002.*

		% Resistance						
Serotype	**N**	**Amp**	**Chl**	**Strep**	**Sulph**	**Tet**	**Trim**	**Nal**
S. Enteritidis	165	8	0	2	2	4	1	31
S. Typhimurium	140	72	56	74	78	79	17	4
S. Virchow	10	30	0	0	40	40	40	90
S. Dublin	9	0	0	0	11	0	0	0
S. Stanley	7	0	28	57	57	71	28	28
S. Heidelberg	2	0	0	50	0	50	0	0
S. Bredeney	2	50	0	50	0	50	0	0

Results - Clinical notification data

Salmonellosis is a notifiable disease. Medical practitioners are legally obliged to report all suspected cases. Information on trends in salmonellosis notifications shows that the crude incidence rate rose in the 1990s to peak in 1998, and has been steadily decreasing since then (Figure 2). The total number of notifications in 2002 was 369 compared to 433 in 2001, and 640 in 2000.

Figure 2. Crude rate of Salmonellosis in Ireland per 100,000 population, 1982-2002.



Discussion

The importance of *Salmonella enterica* as an enteric pathogen and the significant burden of human illness that it remains to be responsible for, is evident from the data presented in this report.

Similar trends regarding the epidemiology of this pathogen were noted in 2002 as in previous years. All age-groups were seen to be affected but the highest incidence was again noted in the 0-4 age-group. Both males and females were equally affected. There was a marked seasonality as reported in previous years with a peak in cases noted in July and October 2002. Interestingly when the two commonest serotypes are compared in terms of seasonality, *S*. Enteritidis is seen to follow this pattern, but it is not evident for *S*. Typhimurium (as shown in Figure 1).

Analyses of the serotyping results revealed that in 2002, *S*. Enteritidis was the predominant serotype, followed by *S*. Typhimurium. This followed the change in

trend that was first seen in 2001. For three years prior to that (1998-2000), *S.* Typhimurium had been the commonest serotype in Ireland.

Improvements and advances in the detailed typing laboratory data being generated by the National Salmonella Reference Laboratory is enabling us to monitor salmonella trends more accurately and is providing us with comprehensive information regarding the epidemiology of this pathogen in Ireland. In particular, the advent of molecular typing methods being employed by NSRL such as plasmid profiling and PFGE has greatly enhanced our ability to identify clusters and outbreaks and examine trends in human, food and veterinary isolates to track this zoonotic agent through the food chain.

On a European and international level, the European-based network Enter-net has proven in recent years to be invaluable in terms of sharing knowledge and expertise in order to enable ourselves and our international colleagues to track clusters and epidemics of salmonellosis and trace back through a complex global food chain to identify the source of outbreaks.

When the antimicrobial susceptibilities of the various serotypes isolated in 2002 were examined, high levels of resistance were again found among *S.* Typhimurium isolates, particularly *S.* Typhimurium DT104. Many of these isolates were found to have the penta-resistance phenotype (ACSSuT) that was reported in previous years. This continues to be a worrying trend.

One of the more notable features of the data reported to NSRL in 2002 has been the emergence of travel-associated cases with almost 20% of the cases identified by NSRL having acquired the illness outside of Ireland. The majority of cases were associated with travel to Spain and the serovar most commonly linked with Spain was *S.* Enteritidis. However a wide variety of phage types of *S.* Enteritidis were reported in these travel-associated cases. It is quite probable that the overall proportion of travel-associated cases will increase in coming years and a greater diversity of serotypes and sub-types will be detected.

In conclusion, although the overall incidence of human salmonellosis has decreased in Ireland over the past number of years (in line with the control programmes in place for *S.* Enteritidis and *S.* Typhimurium), there is still no room for complacency regarding this pathogen as it is quite likely that the relative importance of other serotypes will increase, and the burden of illness due to this pathogen remains very significant.

Acknowledgements

We wish to sincerely thank Prof. Martin Cormican and all of his staff in 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.