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Epidemiology of Cryptosporidiosis in Ireland, 2004

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Introduction

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

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

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

With both humans and animals serving as potential reservoirs, multiple routes of transmission are possible. The consumption of contaminated water is regarded as being an important transmission route,[1] but infection can also occur as a result of recreational bathing,[2] consumption of contaminated foods, and animal-to-person[3] and person-to-person transmission. A primary public health concern regarding *Cryptosporidium* is its relative resistance to chlorination.

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

Methods

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

Clinical description
Clinical picture compatible with cryptosporidiosis, characterised by diarrhoea, abdominal cramps, loss of appetite, nausea and vomiting.
Laboratory criteria for diagnosis
One of the following:
• Demonstration of *Cryptosporidium* oocysts in stool
• Demonstration of *Cryptosporidium sp*. in intestinal fluid or small-bowel biopsy specimens
• Demonstration of *Cryptosporidium* antigen in stool
Case classification
Possible: N/A
Probable: A clinically compatible case with an epidemiological link*
Confirmed: A case that is laboratory confirmed.

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

Results

Incidence

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

Geographical distribution

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

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

Health Board	Number of notifications	CIR (95% CI)
ERHA	23	**1.6** (0.9-2.3)
MHB	62	**27.5** (20.7-34.3)
MWHB	45	**13.3** (9.4-17.2)
NEHB	30	**8.7** (5.6-11.8)
NWHB	41	**18.5** (12.8-24.2)
SEHB	80	**18.9** (14.8-23.0)
SHB	74	**12.8** (9.9-15.7)
WHB	77	**20.2** (15.7-24.7)
Total	**432**	**11.0** (10.0-12.0)

Age distribution

The highest reported incidence was in children under the age of 5 years (figure 1). The majority of health boards reported a similar age profile for cases. However, the age

profile for the ERHA was atypical with a much larger proportion of adult cases. The SEHB also reported a higher proportion of adult cases (Table 2).

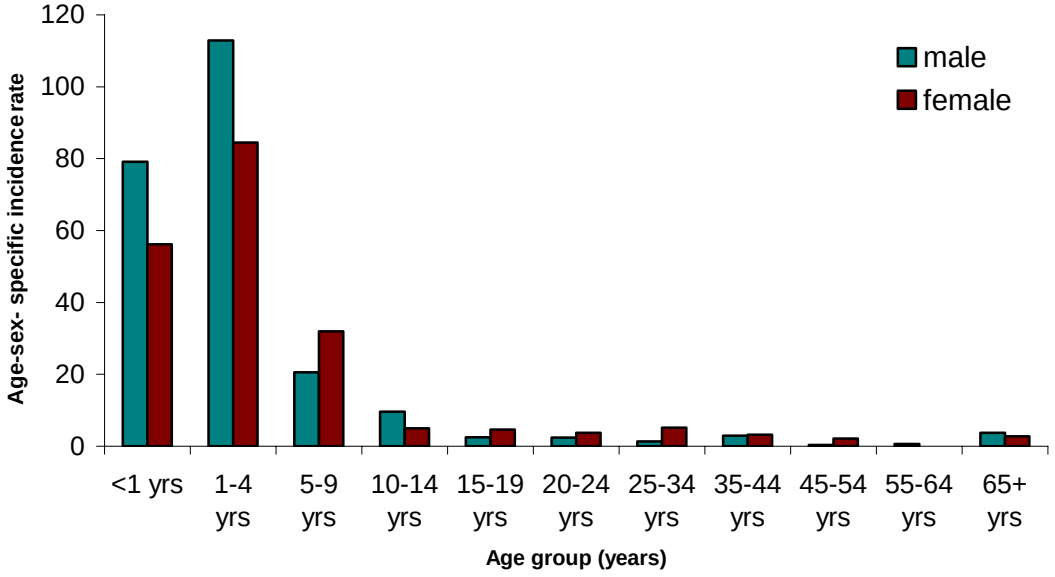

Figure 1. Age- and sex-specific incidence rates for cryptosporidiosis in Ireland, 2004

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

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

Seasonality

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

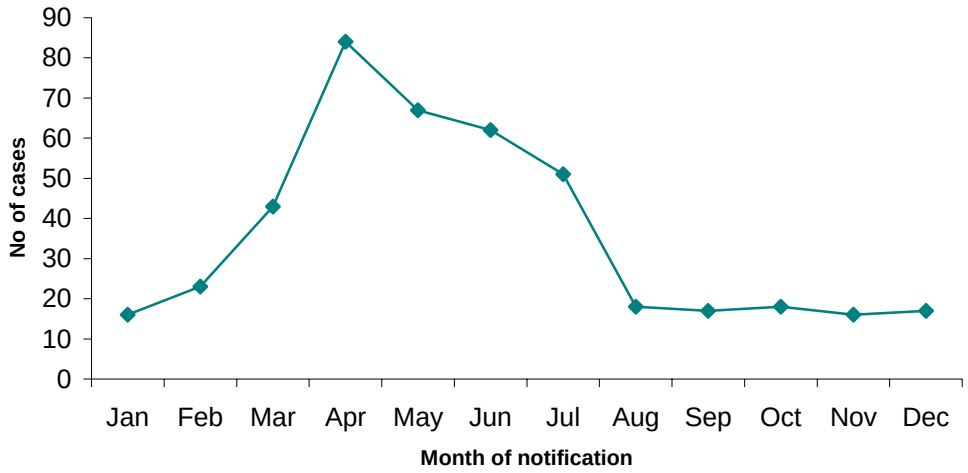

Figure 2. Seasonal distribution of cryptosporidiosis cases 2004

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

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

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

The seasonal effect reported here is consistent with that reported previously for Ireland[6] but differs significantly from the pattern reported in England and Wales where between

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

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

Acknowledgements

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