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Epidemiology of Cryptosporidiosis in Ireland, 2007

Patricia Garvey and Paul McKeown

**Health Protection Surveillance Centre,
25-27 Middle Gardiner Street, Dublin 1**

Introduction

Cryptosporidium is a protozoal parasite that causes a diarrhoeal illness in humans known as cryptosporidiosis. It is a relatively common gastrointestinal pathogen in Ireland, with the highest burden of illness generally reported in young children in rural areas.

Two aspects of *Cryptosporidium* make it of particular public health significance. While it causes severe watery non-bloody diarrhoea in immuno-competent individuals, it can cause chronic persistent gastroenteritis in the immuno-compromised. The second important feature of *Cryptosporidium* from a public health perspective is its relative resistance to chlorination, which results in the potential for outbreaks associated with swimming pools, and with drinking water supplies that rely primarily on chlorination for treatment.¹⁻³

The main subtypes of *Cryptosporidium* that are reported associated with human illness in the United Kingdom are *C. parvum* (also associated with disease in young ruminant animals), and *C. hominis* (a pathogen primarily associated with humans), with smaller numbers of other species also detected.⁴ Both ruminants and humans can serve as reservoirs in disease transmission, and speciation of human and/or environmental specimens can provide information on possible sources of infection during human case/outbreak investigations.

This report describes the burden of illness and epidemiology of human cryptosporidiosis in Ireland in 2007.

Materials and Methods

Cases of cryptosporidiosis are notified, by both clinicians and laboratory directors, to the Medical Officer of Health in each HSE area. Notification data are maintained in the Computerised Infectious Disease Reporting system (CIDR). The data used in this report are based on information retrieved from CIDR on cryptosporidiosis cases notified in 2007. Census data from 2006 (CSO) were used to calculate incidence rates.

Results

Disease incidence

In 2007, 609 cases of cryptosporidiosis were notified in Ireland, a crude incidence rate of 14.4 per 100,000 population (Table 1). This was a 66% increase on the number of cases notified in 2006, and was the highest annual number of cases reported since the disease became notifiable in 2004. Typically, the highest reported incidence rates are in children under 5 years, and this year, the trend was similar. And overall, there were more males (n=327) than females (n=278) reported.

Geographical distribution

The crude incidence (CIR) and age standardised incidence (ASIR) rates by HSE area for 2007 are reported in table 1. The main reason for the increased incidence in 2007 was the very high number of notifications in the HSE-W associated with a large outbreak in the spring.⁵ In contrast, CIRs in other areas were similar, and in some cases, lower than in previous years.⁶⁻⁸ As in previous years, the HSE E reported the lowest crude incidence rate. When interpreting these

data, it should be borne in mind that in addition to a true difference in disease risk, regional variation may also reflect regional variation in laboratory screening and case finding policies.

Table 1. Number of notified cases, crude incidence rate and age-standardised incidence rate cryptosporidiosis by HSE area, 2007, and annual number of cryptosporidiosis notifications and crude incidence rate, Ireland 2004-2006

HSE area	Number of notifications	CIR (95% CI)*	ASIR (95% CI)*
E	22	1.5 (0.9-2.1)	1.4 (0.8-2.0)
M	34	13.5 (9.0-18.1)	12.8 (8.5-17.1)
MW	57	15.8 (11.7-19.9)	16.0 (11.9-20.2)
NE	24	6.1 (3.7-8.5)	5.6 (3.3-7.8)
NW	25	10.5 (6.4-14.7)	10.6 (6.4-14.7)
SE	79	17.1 (13.4-20.9)	16.9 (13.1-20.6)
S	60	9.7 (7.2-12.1)	9.9 (7.4-12.4)
W	308	74.4 (66.1-82.7)	75.8 (67.3-84.2)
Total 2007	609	14.4 (13.2-15.5)	-
Total 2006	367	8.7 (7.8-9.5)	-
Total 2005	570	13.4 (12.3-14.5)	-
Total 2004	431	10.2 (9.2-11.1)	-

*Rates calculations based on CSO census 2006, and may differ from rate published previously based on 2002 census

Seasonal Distribution

Disease incidence peaked slightly earlier than in previous years (Figure 1) with 62% of cases occurring between March and May. However, this was strongly influenced by the HSE-W outbreak. When notifications from the HSE-W are excluded, the seasonal pattern was comparable to previous years (i.e. peak incidence April-June).

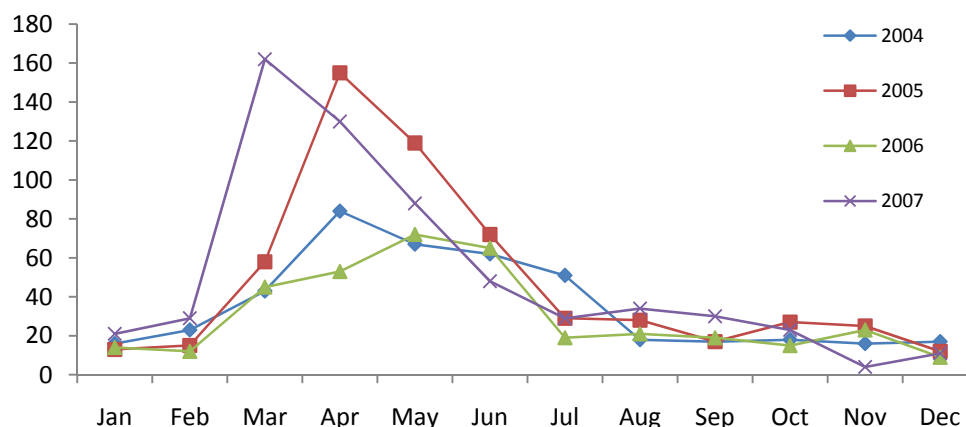


Figure 1. Seasonal distribution of cryptosporidiosis cases, Ireland 2004-2007

Hospitalisation rates

A crude indicator of disease severity can be obtained from reviewing rates of hospitalisation among cases. This information is available for cases reported in those HSE-areas whose data is recorded live on CIDR (HSE-W and HSE-MW are excluded from this calculation as CIDR is not yet implemented in those areas). Using data from these 6 HSE-areas (244 notifications), 33% of

cases were reported as hospital in-patients (Table 2). Hospitalisation rates were higher among children (36%) and the elderly (67%) than among adult cases (13%).

Table 2. Number of cryptosporidiosis notifications by patient type and age group, CIDR-Live HSE-areas Ireland 2007

Patient Type	<15 years	15-64 years	65+ years	Age Unknown	Total (%)
Hospital In-Patient	69	6	4	1	80 (33%)
Hospital Out-patient	1	2	0	0	3 (1%)
Hospital Day patient	2	0	0	0	2 (1%)
GP patient	97	30	1	0	128 (52%)
Other	3	1	0	0	4 (2%)
Not known/not specified	19	7	1	0	28 (11%)
Total	191	46	6	1	244

Note: includes data from HSE-E, HSE-M, HSE-NE, HSE-NW, HSE-SE & HSE-S only

Species distribution

In 2007, information was available on species for 370 cases, largely from the HSE-SE, HSE-NW and HSE-W areas (Table 3). Roughly equal numbers of *C. parvum* and *C. hominis* cases were notified, along with a small number of *C. cervine* and non-typeable strains. The large outbreak in Galway strongly skewed the national picture. Over 80% of the reported *C. hominis* cases were reported from the HSE-W, while for non-HSE-W areas, overall *C. parvum* was more common, suggesting that *C. parvum* may be more common among non-outbreak cases.

Table 3. Species distribution of *Cryptosporidium* cases by HSE-area, Ireland 2007

Species	E	M	MW	NE	NW	SE	S	W	Total
<i>C. parvum</i>	1	0	1	3	8	47	6	65	131
<i>C. hominis</i>	1	2	0	0	7	14	0	110	134
<i>C. cervine</i>	0	0	0	0	0	1	0	0	1
Non-typeable	0	0	0	0	0	4	0	0	4
Not specified	20	32	56	21	10	13	54	133	339
Total	22	34	57	24	25	79	60	308	609

Outbreaks

Sixteen outbreaks of cryptosporidiosis were reported in 2007: six general outbreaks and ten family outbreaks (Table 4). Three hundred and fifty-eight people were reported ill as a result of these outbreaks. The suspected mode of transmission for nine outbreaks was person-to-person, and for three outbreaks, water was suspected to have played a role in transmission. Three general outbreaks were community outbreaks and two small general outbreaks were reported in crèches.

The waterborne outbreak of cryptosporidiosis in Galway was the largest such outbreak reported in Ireland since surveillance for outbreaks began. In all, 304 laboratory-confirmed cases were reported. A preliminary report on the outbreak showed that it was primarily due to *C. hominis*.⁵ Cases were clustered in areas supplied by water treatment plants which used water from Lough Corrib. Boil water notices were issued for four supplies in March 2007, and were lifted in July and August 2007 following closure of the two older plants and upgrading of the two newer plants.⁹ No specific point source of contamination was identified.⁵

Table 4. *Cryptosporidiosis outbreaks, Ireland 2007*

Month	HSE area	Transmission route	Location	Type	No. ill
Jan	SEHB	Waterborne	Community outbreak	General	7
Mar	WHB	Waterborne	Community outbreak	General	304
Apr	SEHB	Unknown	Private house	Family	3
Apr	SEHB	Unknown	Private house	Family	2
May	SEHB	Person-to-person	Private house	General	3
May	SEHB	Person-to-person	Private house	Family	2
May	SEHB	Person-to-person	Private house	Family	2
May	SEHB	Person-to-person	Private house	Family	5
Jun	SEHB	Person-to-person	Community outbreak	General	14
Jun	SHB	Person-to-person	Private house	Family	2
Jul	MWHB	Unknown	Creche	General	4
Jul	SHB	Waterborne	Private house	Family	2
Aug	NWHB	Person-to-person	Private house	Family	2
Oct	ERHA	Not Specified	Private house	Family	2
Oct	SHB	Person-to-person	Creche	General	2
Nov	SEHB	Person-to-person	Private house	Family	2

Discussion

Since 2004 when human cryptosporidiosis became notifiable in Ireland, this was the largest annual number of cases notified, with the national crude incidence rate rising from 8.7 in 2006 to 14.4 per 100,000 population this year. For those areas where the data was available, about one third of cases were hospitalised, confirming the importance of cryptosporidiosis as a gastroenteric disease in Ireland.

The large waterborne outbreak in Galway dominated the dataset, comprising almost 50% of all cases reported this year. In contrast, incidence rates in other HSE-areas were largely below average, with four areas reporting their lowest annual numbers of cases since the disease became notifiable (HSE-M, HSE-NE, HSE-NW and HSE-S). While there have been a few general outbreaks in recent years in Ireland, the epidemiology of the disease has been largely influenced by apparently sporadic cases. The Galway outbreak is a reminder of the massive outbreak potential of this organism when a public water supply becomes contaminated.

In April 2008, the EPA published their Remedial Action List –a list of public water supplies in Ireland which ‘required examination from source to consumer to determine whether replacements or upgrades were needed, or whether operational practices should be improved’.¹⁰ Several supplies have been placed on the list on the basis that they may have inadequate treatment for *Cryptosporidium*. The work arising from this prioritisation exercise, and the ongoing work on upgrading Group Water Schemes under the Rural Water Program,¹¹⁻¹² should lead to a reduction in waterborne illness in Ireland in the coming years.

While waterborne transmission is clearly important for human cryptosporidiosis, the most common mode of transmission reported this year for outbreaks was person-to-person spread, accounting for 56% of outbreaks. However, all except one of these occurred in a private household, and together they accounted for only 11% of outbreak cases. Other important

transmission routes for cryptosporidiosis reported internationally are recreational water and direct contact with ruminant animals.^{3,13}

An interesting development in 2007 has been the routine referral of positive *Cryptosporidium* specimens for speciation by a small number of Irish hospital laboratories to the UK *Cryptosporidium* Reference Unit in Swansea. Prior to this, typing of positive human specimens was only rarely undertaken except in the event of outbreaks. The results of these studies provide the first systematic evidence of the relative importance of different *Cryptosporidium* species here. The evidence suggests that *C parvum* may be more common among sporadic cases in Ireland, in particular in spring, although in 2007, *C. hominis* was equally important, largely as a result of the outbreak in Galway, which was primarily due to this species. This concurs with a research study by Zintl et al. published this year.¹⁴

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