

3.3 Verotoxigenic *E. coli*

Summary

Number of cases, 2008: 226
 Number of cases, 2007: 167
 Crude incidence rate: 5.3/100,000

In 2008, 226 confirmed and probable cases of VTEC were notified to HPSC, a crude incidence rate (CIR) of 5.3 per 100,000 (table 1). This is the highest number of cases reported since data collection on VTEC cases began in 1999. If only confirmed VTEC cases are considered, the 213 confirmed cases (CIR=5.0 [4.4-5.0]) notified this year represent an 85% increase on the number of confirmed cases notified in 2007. Figure 1 shows the number of confirmed and probable VTEC O157 and non-O157 VTEC reported in Ireland since 1999.

Two additional (HUS) cases were reported as suspected VTEC cases. These cases are not notifiable but were reported voluntarily by clinicians.

In 2007, the last year for which data is available on an EU-wide basis, the highest CIRs for confirmed VTEC cases were reported by Sweden and Denmark, both of whom reported CIRs of 2.9/100,000². These were the only Member States reported to have higher rates of

VTEC infection than Ireland in 2007. Given the large increase in incidence here in 2008, it is likely that Ireland will have one of the highest incidence rates in Europe again in 2008.

The highest crude incidence rate for VTEC overall this year was reported in the HSE-M, where the rate was more than three times the national crude rate. As in previous years, the HSE-E reported the lowest overall crude incidence rate (Table 2), about half of the national rate this year.

The HSE-E, however, reported the highest numbers of non-O157 VTEC infections (table 2), in part because of a large VTEC O26 outbreak which occurred during quarter 2. Historically, the HSE-NW has also reported relatively high numbers of VTEC O26, and this year almost two-thirds of their VTEC cases were serogroup O26. While it is possible that there is a true geographical difference in risk for different serogroups, it is more likely that regional variation in the serogroup-specific incidence to some extent reflects regional differences in laboratory diagnostic practice for non-O157 infections.

Typically, VTEC cases are most commonly associated with late summer; overall this year, 43% of cases were reported in quarter 3, although this varied by HSE-area with the HSE-M reporting their highest incidence in

Table 1. Number and crude incidence rates confirmed and probable VTEC, Ireland 2004-2008

Year	Confirmed cases	Probable cases	Total VTEC	CIR VTEC ^a (95% CI)
2004	61	0	61	1.4 (1.1-1.8)
2005	125	0	125	3.0 (2.4-3.5)
2006	153	5	158	3.7 (3.2-4.3)
2007	115	52	167	3.9 (3.3-4.5)
2008 ^b	213	13	226	5.3 (4.6-6.0)

^a Data from the 2006 census were used to calculate rates

^b Confirmed cases include VTEC O157 (n=162), VTEC O26 (n=35), with 16 additional cases of other serogroups. Three of the VTEC O157 cases were co-infected with VTEC O26 strains. Five probable cases were reported on the basis of being epidemiologically-linked to known cases, and eight probable cases were reported on the basis of detection of verotoxin genes without isolation of the implicated strain (six VTEC O26 and two Ungroupable VTEC).

quarter 1 and the HSE-E reporting their highest number of cases in quarter 2 (Table 2).

The reported disease incidence was highest among young children (median age =6 years), which is consistent with previous years, although there were more cases reported this year among females (n=135) than among males (n=91) at all age groups.

155 notified cases were reported as symptomatic, 71% of the cases for whom this information was available (n=217). Reported symptoms included bloody diarrhoea in 74 cases, and HUS in fifteen cases (6.9%). This is an increase on the number of VTEC-associated HUS cases reported compared to last year (n=5), but is similar to the number of HUS cases reported in 2006 and 2007 (n=17 each year).

HUS cases this year ranged in age from less than 1 year to 67 years (median age 3 years), with non-O157 VTEC infections contributing up to half of these. This was the highest reported annual number of HUS cases associated with non-O157 VTEC since the surveillance system in Ireland was extended to include all VTEC strains in 2003. For the additional two HUS cases reported as suspected VTEC cases, one was young child and one was an adult.

216 human VTEC isolates were referred to the HSE PHL Dublin Mid Leinster, Cherry Orchard Hospital from 213

confirmed VTEC cases (table 3). In addition, laboratory findings are included in Table 3 from eight probable VTEC cases identified on the basis of detection of verotoxin genes in the absence of obtaining an isolate. As in previous years, PT32 was the commonest phage type reported (n=75), accounting for 46% of the confirmed VTEC O157 reported. Other common phage types in 2008 were PT21/28 (n=19), PT8 (n=16) and PT14 (n=16) –Table 3.

Two sorbitol-fermenting VTEC O157 were reported, both of which were PT RDNC.

The verotoxin profiles of VTEC O157 strains were similar to those reported historically for human VTEC isolates in Ireland (Table 3). Eighty-three per cent of VTEC O157 strains carried the genes for VT2 only while 17% carried the genes for both VT1 and VT2. In contrast, 21.7% of non-O157 VTEC isolates carried the genes for VT1 only, 20% for VT2 only, and 58.3% VT1 and VT2.

Forty-two VTEC outbreaks were reported in 2008, which included 145 of the 213 confirmed cases notified. Nine outbreaks were described as general outbreaks and 33 as family outbreaks. Twenty-nine outbreaks were due to VTEC O157, seven due to VTEC O26, and six were caused by a mixture of VTEC strains. The suspected modes of transmission reported are listed in table 4.

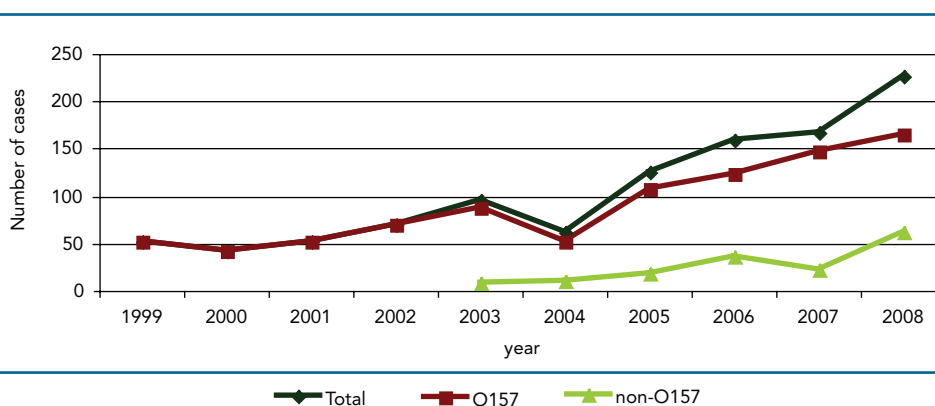


Figure 1. Annual number of confirmed and probable VTEC cases by serogroup, Ireland 1999-2008

Person-to-person spread is an important mode of VTEC transmission in households, child-care facilities and institutions, and was suspected to have played a role in 21 VTEC outbreaks in 2008 (Table 4). These included three outbreaks associated with crèches. For two additional crèche outbreaks, the transmission route was reported as unknown.

The second most common transmission route reported for outbreaks in 2008 was waterborne, with drinking water believed to have contributed to eight outbreaks (Table 4). For two family outbreaks, examination of water from the private wells of the affected households confirmed the presence of the same VTEC strain in the water as was identified in some or all of the associated

patients. For two further outbreaks, although the VTEC strains identified in the household wells were not identical to the strains detected in the associated cases, the detection of VTEC in their drinking water was strongly suggestive that their private wells were responsible for their infections. For three of the remaining four waterborne outbreaks, evidence was circumstantial in that *E. coli* and/or coliforms were detected in the private wells of the affected households.

In addition for two sporadic VTEC cases, environmental investigations identified VTEC of the same type in private well samples as was found in the associated patients. And finally, a water sample from the private well of a suspected VTEC case was found to contain

Table 2. Number of confirmed and probable VTEC cases by quarter and HSE area, and crude incidence rate by HSE area, Ireland 2008

Quarter	E	M	MW	NE	NW	SE	S	W	Total
Q1	0	21	4	4	2	0	0	2	33
Q2	20	4	2	5	4	2	12	4	53
Q3	16	8	12	8	9	14	21	10	98
Q4	5	8	10	0	1	6	5	7	42
VTEC O157	15	35	21	13	6	22	36	14	162
VTEC O26	16	5	3	4	10	0	2	3	43
Other VTEC	9	0	4	0	0	0	0	5	18
Mixed infection	1	1	0	0	0	0	0	1	3
Total	41	41	28	17	16	22	38	23	226
CIR VTEC* (95% CI)	2.7 (1.9-3.6)	16.3 (11.3-21.3)	7.8 (4.9-10.6)	4.3 (2.3-6.4)	6.6 (3.4-10.0)	4.8 (2.8-6.8)	6.1 (4.2-8.1)	5.6 (3.3-7.8)	5.3 (4.6-6.0)

*Rates calculated using CSO census 2006

Table 3. Verotoxin and phage typing results for VTEC referred to the PHL HSE Dublin Mid Leinster, Cherry Orchard Hospital in 2008

Serogroup	PT	VT1 only	VT2 only	VT1 & VT2	VT not reported	Total
O157	2		2			2
	4		1			1
	8			16		16
	14		16			16
	31		11			11
	32		70	5		75
	34		1			1
	38		1			1
	51		5			5
	72		1			1
	21/28		19			19
	RDNC		4			4
	Untypable		1			1
N/K		2		7		9
O26	-	10	8	26		44
O ungroupable	-	1	2	6	2	11
O103	-	1		1		2
O113	-			1		1
O153	-		1			1
O75	-			1		1
O76	-	1				1
O8	-		1			1
Total	-	13	146	63	2	224

Note that for five probable cases reported on the basis of epidemiological linkage, isolates were not available for typing. Includes all strains isolated from single and mixed confirmed VTEC infections, and in addition contains information on laboratory findings from 8 probable cases identified on the basis of detection of vt genes in the absence of obtaining an isolate.

VTEC O145, suggesting that VTEC in their drinking water may have been the source of their infection, although no VTEC isolate was obtained from the individual. In total, these known waterborne incidents gave rise to 35 cases (31 confirmed, three probable and one suspected), six of whom developed HUS.

Over the last number of years, considerable evidence has been accumulating demonstrating that drinking untreated water from private wells is a strong risk factor for VTEC in Ireland.^{1,3,4} VTEC case numbers were particularly high during August 2008; in the HSE-S, this rise in incidence was reported to be linked to drinking water from contaminated private wells following exceptional rainfall.⁵ It appears that VTEC activity in Ireland may have been influenced by the particularly high levels of rainfall that occurred last summer.^{5,6} Drinking water from untreated private water supplies remains a very important risk factor for VTEC infection in Ireland.

Of particular concern is the number of VTEC cases reported among small children from urban backgrounds after visiting friends/relatives in rural areas either with an untreated water supply or close to grazing animals. Cases such as these were reported from Irish urban areas, and among visitors from the United Kingdom and the United States. This underlines the ongoing risk to immunologically naïve young children from untreated drinking water and the faeces of grazing animals.

Moreover in Ireland, VTEC cases of all ages are more likely to report having exposure to a private well than would be expected based on private well ownership data published by the CSO. During periods of heavy rainfall, those with private wells may need to consider boiling their water or taking other appropriate measures particularly if vulnerable groups such as children, the elderly or immunocompromised persons use the well water, or in the event of a change in the character of the well water e.g. colour/taste/odour.

References

1. Garvey, P. et al. 2009. Epidemiology of verotoxigenic E. coli in Ireland, 2007. *Epi-Insight*: 10(3): 1-3
2. EFSA. 2008. The Community Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents, Antimicrobial resistance and Foodborne outbreaks in the European Union in 2007. Accessible online at http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1178671312912.htm
3. Garvey P et al. 2006. Epidemiology of Verotoxigenic E. coli in Ireland, 2005. *Epi-Insight* 2006; 7(9):2-3.
4. Garvey, P. et al. 2005. Epidemiology of Verotoxigenic E. coli in Ireland, 2004. *Epi-Insight* 6(12):2-3
5. O'Sullivan et al. 2008. Increase in VTEC cases in the south of Ireland: link to private wells? *Eurosurveillance* 13(39) <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=18991>
6. HPSC. 2008. Press release. Household water supplies must properly maintain private water supplies following increase in contamination – HPSC. <http://www.hpsc.ie/hpsc/PressReleases/2008PressReleases/MainBody,3127,en.html>

Table 4. VTEC outbreaks in Ireland 2008 by suspected mode of transmission

Suspected mode of transmission	Number of outbreaks	Number confirmed cases	Number ill
Animal contact	1	3	1
Environmental/fomite	1	14	10
Foodborne	2	4	3
Foodborne/waterborne	1	3	3
Person-to-person	16	52	41
Person-to-person & waterborne	5	18	21
Waterborne	2	9	8
Other	2	9	3
Unknown/Not specified	12	33	28
Total	42	145	118