Chapter 2: Surveillance of Human Clinical VTEC Infection

I. Statutory Notification

Most countries have a list of infectious diseases that are statutorily notifiable, meaning that there is a legal requirement for the diagnosing clinician to report the cases to public health authorities. Each disease category is governed by a clinical case definition and each notification is accompanied by a basic demographic dataset.

A Statutory notification of VTEC in Ireland

In Ireland, the Infectious Disease Regulation 1981 (S.I. 390 of 1981), the Infectious Disease (Amendment) (No. 3) Regulations 2003 (S.I. No 707 of 2003) and S.I. No. 452/2011 provide for the written notification to the Medical Officer of Health (MoH) in each HSE Area of specified infectious diseases by **medical practitioners** and by **clinical directors of diagnostic laboratories** "as soon as he or she becomes aware or suspects that a person on whom he or she is in professional attendance is suffering from or is a carrier of an infectious disease".

Prior to 2004, there was no statutory requirement to specifically notify *E. coli* infections. *E. coli* O157 and other VTEC were generally notified under the category of 'Food Poisoning (bacterial other than Salmonella)'. With the amendment to the Regulations in 2003 (S.I. No 707 of 2003), the list of notifiable diseases was revised, and all **confirmed** and **probable** VTEC cases were notifiable under the category of EHEC.

The list of notifiable diseases were revised again in 2011 (S.I. No. 452/2011), and the term VTEC was introduced, with a new case definition (Box 1) in use from January 1st 2012.

Notably, this change in case definition resulted in a new category 'possible case' being introduced**,** which means that now persons meeting the clinical criteria for Haemolytic-Uraemic Syndrome (HUS) are notifiable as possible VTEC cases, even in the absence of laboratory or epidemiological evidence of VTEC infection.

In the case of VTEC (along with a limited number of other diseases and serious outbreaks), the legislation requires that, in addition to written notification, **immediate** preliminary notification (of cases and suspected outbreaks) should also be given to the MOH by telephone, given the potentially serious nature and high transmissibility of this pathogen (see S.I. No. 707 of 2003 Infectious Diseases (Amendment) (No. 3) Regulations available at http://www.irishstatutebook.ie/2003/en/si/0707.html). The contact details for each MoH are listed at http://www.hpsc.ie/hpsc/NotifiableDiseases/Whotonotify/

Laboratory directors should notify, by telephone, all verotoxin (VT) positive isolates of *E. coli* to the MoH on the day of confirmation and through the Computerised Infectious Disease Reporting (CIDR) system as soon as possible. In addition, as there are five *E. coli* serogroups which, according to the World Health Organisation, are strongly associated with severe or complicated

VTEC infection (O157, O26, O111, O145 and O103), it is recommended that, at a minimum, laboratory directors immediately inform the MoH (including through CIDR) of isolations of any of these five serogroups without waiting for confirmation of VT status, in order that Departments of Public Health can assess if any immediate public health action needs to be taken in advance of confirmation of the VT status. The results of VT analyses should follow as soon as available, allowing the Dept of Public Health to eliminate VT negative cases from their investigations as appropriate.

Box1: Verotoxigenic *Escherichia coli* infection
(Verotoxin producing *Escherichia coli*)

Clinical criteria
VTEC
Any person with at least one of the following three:
- Diarrhoea
- Abdominal pain
- Haemolytic-uraemic syndrome (HUS)

HUS
Any person with acute renal failure AND at least one of the following two:
- Microangiopatic haemolytic anaemia
- Thrombocytopenia

Laboratory criteria
At least one of the following three:
- Isolation of an *E. coli* strain that produces verotoxin or harbours *vt1* or *vt2* gene(s)
- Direct detection of *vt1* or *vt2* gene(s) nucleic acid (without strain isolation)
- Detection of free verotoxin in faeces

Only for HUS the following can be used as laboratory criterion to confirm VTEC:
- *E.coli* serogroup-specific (LPS) antibody response

Isolation of a VTEC strain and additional characterisation by serotype, phage type, *eae* genes, and subtypes of *vt1/vt2* should be performed if possible.

Epidemiological criteria
At least one of the following two:
- Human to human transmission
- Exposure to a common source

Case classification
A. **Possible case**
Any person meeting the clinical criteria for HUS (see note 1)
B. **Probable case**
Any person meeting the clinical criteria for VTEC and with an epidemiological link OR a laboratory confirmed case not meeting the clinical criteria, e.g. asymptomatic (see note 2)
C. **Confirmed case**
Any person meeting the clinical and the laboratory criteria

Note 1: A person whose presentation meets the definition of HUS above, but whose condition is demonstrated to have been caused by another infectious agent, is not notifiable as a possible case of VTEC. Where that alternative infectious disease is notifiable, notification should be made according to that case definition.
Note 2: Where no clinical information is available, laboratory confirmed cases should be notified as confirmed cases

All VTEC notification data is now maintained on the Computerised Infectious Disease Reporting (CIDR) database as 'events[1]' of infectious disease. On the date of first notification to the MoH, an event should be created on CIDR for each VTEC case.

Key Message: Under Regulations (S.I. 452 of 2011), medical practitioners and directors of clinical laboratories are required to immediately notify all confirmed, probable and possible cases of VTEC infection to the Medical Officer of Health in their local Department of Public Health. The latest change in the case definition means that, after SI 452, all persons meeting the clinical criteria for Haemolytic-Uraemic Syndrome (with or without diarrhoea) are now notifiable as possible VTEC cases, even in the absence of laboratory or epidemiological evidence of VTEC infection.

II. Enhanced Disease Surveillance.

In order to provide information about those diseases that are of such public health importance that more complete information is required, enhanced systems of surveillance may be developed. Enhanced datasets can include clinical data, laboratory data, as well as information on risk factors and associated cases. They are useful for identification of related cases and for describing the burden of illness for all cases not just outbreak-associated cases.

A Enhanced surveillance of VTEC in Ireland

Enhanced surveillance should be performed on all possible, probable and confirmed VTEC cases using the VTEC Enhanced Surveillance Form (Appendix B at http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/VTEC/Guidance/ReportoftheHPSCSub-CommitteeonVerotoxigenicEcoli/File,4552,en.pdf)

Following initial interviewing of the case (see Chapter 5), the VTEC Enhanced Surveillance Form should be used by the public health physician responsible for management of the case to record socio-demographic data, clinical data, possible risk factors and information on links between cases. The public health physician should ensure that these enhanced data are added as soon as possible to the appropriate VTEC 'event' on CIDR.

Key message: An Enhanced Surveillance Report Form should be completed by the investigating public health physician on each possible, probable and confirmed case of VTEC.

Since 2004, validation between HPSC and Departments of Public Health is undertaken on a quarterly and annual basis, and quarterly and annual reports are produced by HPSC. Reports are also published in the HPSC infectious disease newsletter Epi-Insight. This is emailed to those involved in infectious disease control and can also be downloaded from the HPSC web site.

[1] An 'event' is the term used within CIDR to describe a notified case. The clinical notification, laboratory reports and enhanced data on a case are linked together on the database as one 'event' of disease.

III. Surveillance at EU level

VTEC is a notifiable disease at EU level. Data are collated by the European Centre for Disease Prevention and Control (ECDC).
[http://ecdc.europa.eu/en/activities/surveillance/Pages/Activities_Surveillance.aspx]

IV. Outbreak Surveillance

An outbreak, for practical purposes, can be considered to be an episode in which two or more people, thought to have a common exposure, experience a similar illness or proven infection. (See Appendix C for a full definition under legislation).

- Outbreaks of infectious disease provide useful information about the behaviour of pathogens and people, and the risk factors and conditions that promote the spread of disease. Outbreak surveillance data provides useful clinical information on cases. In Ireland, information on foodborne outbreaks of infectious intestinal disease (IID) have been collected since 1998, and on all IID outbreaks since 2001. Data on outbreaks are maintained on the CIDR database.
- Under the Infectious Disease (Amendment) (No. 3) Regulations 2003 (S.I. No 707 of 2003), clinicians and directors of clinical laboratories should notify the local Dept of Public Health of outbreaks, or unusual clusters or changing patterns of illness, that may be of public health concern.
- Historically data on Infectious Intestinal Disease Outbreaks were collected using preliminary and final outbreak reporting forms (http://www.hpsc.ie/hpsc/A-Z/Outbreaks/SurveillanceForms/) Since the implementation of CIDR, surveillance of outbreaks is performed directly using CIDR. Initial information should be provided to CIDR by a public health professional using the available information at the time of notification.
- Once more complete data are available, the outbreak fields should be updated on CIDR to reflect the final findings. The data requested includes 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. The final data provided on outbreaks is crucial in providing information on the reasons why outbreaks occur, the factors that lead to the spread of disease and the lessons that can be learnt to prevent further such outbreaks.
- Any VTEC events which form part of an outbreak should be electronically linked to the outbreak on CIDR.

Under the Infectious Disease (Amendment) (No. 3) Regulations 2003 (S.I. No 707 of 2003), clinicians and directors of clinical laboratories are require to notify the local Dept of Public Health of unusual clusters or changing patterns of illness that may be of public health concern, including suspected or confirmed VTEC clusters/outbreaks.

V. Computerised Infectious Disease Reporting

The CIDR system is a real-time internet-based infectious disease reporting database developed in partnership between HPSC, the HSE Departments of Public Health, hospital laboratories**,** the Food Safety Authority of Ireland, *Safe*food and the Department of Health and Children. All data reported on infectious disease cases and outbreaks are stored in a central core repository with secure regulated access by CIDR users.

On-line access to the information in CIDR is controlled so that personally identifiable information is visible only to those with a need to manage the individual case. All CIDR information is protected by appropriate security and confidentiality mechanisms. CIDR users in Departments of Public Health have access to anonymised national datasets to allow them to have an aggregate view of national data.

VI. Summary

- Medical practitioners and clinical directors of diagnostic laboratories are required to immediately notify by telephone, all confirmed, probable and possible cases of VTEC to the MoH, whether sporadic or as part of an outbreak.
- Enhanced information should be gathered on all VTEC cases by the public health physician investigating the case and should be input into CIDR
- Clinicians and directors of clinical laboratories are required to notify the local Dept of Public Health of outbreaks, or unusual clusters or changing patterns of illness, that may be of public health concern
- All outbreaks should be reported by a public health professional to CIDR as soon as possible. Once fully investigated, CIDR outbreak fields should be updated to reflect the final outbreak information.