Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

hpsc

VTEC (Verocytoxigenic *E. coli*) in Childcare Facilities

Decision Support Tool for Public Health

Introduction

The management of sporadic, single cases and outbreaks of VTEC in Childcare Facilities (CCF) is challenging. These incidents place a great burden on public health, laboratory and environmental health capacity. VTEC is a highly transmissible agent, requiring only a tiny infectious dose (as little as a single bacterial cell) that has the potential to produce extensive outbreaks of severe, sometimes fatal, illness, in a highly vulnerable population. Moreover, children under the age of five in a childcare setting present a challenge in two major ways:

1. They are a **VULNERABLE** population: they are at increased risk of acquisition of VTEC and, if infected, are at increased risk of developing complications (10% of paediatric VTEC cases will develop HUS, of which 25% will have long-term renal sequelae and 2-3% will die[1]).
2. They are a **RISKY** population: they are at increased risk of transmission as they not have yet learned to toilet themselves in an effective, hygienic manner and, if they undertake unsupervised post toilet hygiene, can readily contaminate their hands or clothes with faecal matter. There is considerable anecdotal evidence that children in nappies pose the greatest risk of onward transmission of all gastroenteric pathogens transmitted by the faeco-oral route.

This Decision Support Tool (DST) is intended to be used as the definitive guide on the minimum actions for determining if an outbreak of VTEC is occurring in a CCF and subsequent management of potential outcomes.

Children under the age of five who attend a childcare facility are considered to be one of four groups at increased risk of onward VTEC transmission (for a full list of Risk Groups see the table below).

Table: Risk Groups

Risk Group	Risk Categorisation
1	**High-risk food handlers** (e.g. those whose work involves touching unwrapped foods that will not undergo further heat treatment).
2	**Health care, CCF (e.g. preschool nursery), or other staff** who have direct contact, or contact through serving food, with highly susceptible patients or people in whom an intestinal infection would have particularly serious consequences (for example, the immunosuppressed).
3	**Children under 5 years of age attending CCFs (e.g. nurseries**, play groups, or other similar groups), who have not yet fully developed effective toilet hygiene.
4	**Older children and adults who are unable to implement good standards of personal hygiene** (particularly toilet hygiene) as a result of learning or physical disability.

1. Taylor C, Adak G, Locking M. et al. Haemolytic uraemic syndrome (HUS). In: Lynn R, Kirkbridge H, Rahi J, Verity C, editors. Royal College of Paediatrics and Child Health. British Paediatric Surveillance Unit. Annual Report 2000 - 2001. London, UK: ISBN 1-900954-54-0

Additionally, staff at a CCF (Risk Group 2) - since their work involves close contact with children including nappy changing, supervising post toilet hygiene, feeding and even food preparation - are at increased risk of acquisition of VTEC and, unless they practice scrupulous hand and other hygiene, of onward transmission between themselves, and to the children in their care.

Approach

The general principles underlying the control and prevention of infectious disease in childcare settings are laid out in the HPSC document *Management of Infectious Disease in Childcare Facilities and Other Childcare Settings*.[2] This document highlights the necessity to routinely implement Standard Infection Control Precautions in all childcare settings to minimise the risk of onward transmission of infection. In addition, detailed public health and clinical advice and information on the management of VTEC are available in the HPSC document *Infectious Intestinal Disease: Public Health & Clinical Guidance*.[3] Disease specific information on the public health and clinical approach to cases of VTEC and HUS are dealt with in a separate chapter.[4]

The steps in public health management of VTEC apply to a laboratory-confirmed case of VTEC or a patient with HUS[5] (laboratory confirmation may be by culture, PCR, or for HUS cases, also by serodiagnosis). The decision whether to proceed with an investigation prior to confirmation of toxin status must be made on a case-by-case basis. It is recommended that at a minimum cases of *E. coli* O157 and O26 should be treated as toxin-producing until established otherwise. The next step that must be immediately undertaken is to establish whether that child attends a childcare facility.

The initial approach is to undertake a VTEC Risk assessment. A crucial preliminary step in the management of a (suspected) case of VTEC is a simple, rapid risk assessment. The overall aims of this process are to:

1. Confirm the diagnosis in the index case
2. Transmission:
   - Determine the likelihood of spread from index case to close contacts
   - Determine the possibility of spread beyond immediate contacts (for example, is the index case in a risk category?)
3. Source:
   - Determine the likely mechanism of exposure
   - Determine if there could be a potential continuing source of infection
4. Assess what initial levels of control (if any) are required to be put in place.

In the case of VTEC in a child under five, the immediate first step is to determine if the case attends a CCF[6]. If a child under the age of five with confirmed/suspected VTEC, or displaying clinical features of HUS, has attended a CCF on any basis at all (i.e. for even a few hours or on one half day per week), within one week of the onset of their diarrhoea (or within two weeks from the onset of HUS), all the child's childcare arrangements must be investigated immediately. The questions to be answered are:

2. The Health Protection Surveillance Centre. *Management of Infectious Disease in Childcare Facilities and Other Childcare Settings.* HPSC, 2012: Dublin. Available at http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/GastroenteritisorIID/Guidance/.
3. The Health Protection Surveillance Centre. *Infectious Intestinal Disease: Public Health & Clinical Guidance.* HPSC, 2012: Dublin. Available at http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/GastroenteritisorIID/Guidance/.
4. The Health Protection Surveillance Centre. Infectious Intestinal Disease: Public Health & Clinical Guidance. Chapter 17: Verocytotoxigenic Escherichia coli (VTEC) and Haemolytic Uraemic Syndrome. Available at http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/GastroenteritisorIID/Guidance/IIDPublicHealthandClinicalGuidancediseasespecificchapters/File,13525,en.pdf
5. Cases of HUS should all be considered as being due to VTEC
6. It is important to determine if the case is attending more than one CCF – if they do, all CCFs attended must be investigated.

1. Where might this child have acquired their illness?
2. Are there other children or staff that attend the CCF who have suggestive symptoms?
3. Is there any initial descriptive evidence of intra-CCF transmission?

In answering the first question, the child's parents should provide information to allow completion of the National Single Case VTEC Trawling Questionnaire (available at http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/VTEC/SurveillanceInvestigativeForms). This will explore all potential sources of exposure.

As regards whether the case could have acquired their infection from the CCF and could there have been onward transmission within the CCF, certain pointers will give clues as to how likely this is;

- If there are other symptomatic family members, it suggests that the source may be external to the CCF. This is probably more likely to be the case if the date of onset of the child's symptoms is later than that of other family members.

- Other pointers that might suggest the possibility that the child's exposure may have been outside the CCF include:

    - Visits to a petting, or other, farm and with contact with animals/animal faeces or parental recall of the child's hands being visibly soiled
    - Consumption or contact with untreated water (private wells, streams and rivers, ponds and lakes or sea water)
    - Consumption of, or contact with raw milk/cheese
    - Consumption of, or contact with raw/inadequately cooked meat
    - Contact with, or exposure to ill companion animals
    - Exposure to farmland, pastureland, manure or silage (including slurry spreading)
    - Exposure to rural environments
    - Foreign travel

Such factors would form part of the initial risk assessment in determining the source of the child's infection.

1. *Approach to a Sporadic VTEC case (confirmed or awaiting confirmation) attending a Childcare Facility*
   The CCF should be contacted and (a) alerted that there is a possible case of VTEC in an attendee of theirs, (b) asked if they are aware of any recent diarrhoeal illness at the facility, (c) advised that an explanatory email/letter to the CCF manager [*Appendix (a)*] will follow, and (d) that specific Public Health advice letters for parents of all children [7] and for staff (including those on part-time or job-share basis) [*Appendices (b) & (c)*] will require circulation by management.

The **explanatory email/letter to the CCF manager** [*Appendix (a)*] will contain the following information:

- That an attendee is being investigated for VTEC
- That the CCF manager should forward the standard letter from the Public Health Dept [*Appendices (b) & (c)*] to all parents and staff (alerting re the possible VTEC case, requesting that diarrhoea / symptoms of HUS be reported to Public Health, advising re prevention etc) . NB it is important that the CCF Manager should alert the Department of Public Health staff of any absenteeism among children and staff as this might be due to possible VTEC infection
- An outline of potential actions resulting from the investigation.

[7] Irrespective of what length of time the child spends in the CCF

The **advice letters to parents & staff** [*Appendices (b) & (c)*] will alert all regarding the possible VTEC case, will request the reporting of child/staff diarrhoea in the seven days before the index became ill with VTEC (or two weeks from the onset of HUS), and will give advice re prevention, etc.

2. If any of the children/staff report symptoms of HUS in the previous two weeks, an outbreak should be declared.
3. If any of the children/staff report even a single episode of bloody diarrhoea within the previous week, an outbreak should be declared.
4. If **any of the** children/staff **report diarrhoea in the week before the index became ill**, these children/staff should **submit a stool sample** for analysis and should not attend the CCF.
5. In addition, if any of the children/staff develops diarrhoea in the week following the last attendance of the index at the CCF, these symptomatic children/staff should provide a single stool sample for testing and not attend the CCF.
6. *Presence of other cases of VTEC/HUS/Bloody Diarrhoea:* If, when the results of testing are returned, any other children/staff are VTEC positive (or if other children/staff subsequently report symptoms of HUS/bloody diarrhoea) an outbreak should be declared.
7. *If any of the results return a toxin-producing E. coli that is of a different serogroup or VT type than that of the index*, a risk assessment should be performed to determine the potential impact of this finding.
8. *Once an outbreak is declared,*
    - All staff and children are to be excluded
    - All children regardless of age and all staff should submit two stool samples taken at least 48h apart to establish microbiological clearance
    - Parents should be instructed not to allow their children to attend other childcare facilities while awaiting microbiological clearance
    - Children and staff should be allowed back on an individual basis once they are asymptomatic for 48 hours and have two negative stool samples, taken at least 48 hours apart (these 2 negative samples must be taken after symptoms have subsided if symptomatic)
    - The **Follow-up letters [***Appendix (d) & (e)***]** should be sent to all parents and to staff explaining that an outbreak has occurred and is being investigated, the need for microbiological clearance of all staff and children and the need for children/staff not to attend other CCFs during the investigation.
    - Prior to development of this guidance, when a risk assessment indicated the necessity, all children (symptomatic and asymptomatic) would have been screened. Latest evidence from Denmark indicates that screening of symptomatic individuals (children and staff) is sufficiently sensitive to quantify the potential risk of transmission in a CCF. [8]

9. *In the event that a VTEC outbreak is **not** suspected,*
    - Clinical surveillance should be continued for one week after initial letter and a new risk assessment of the childcare facility should be undertaken if any new clinical cases emerge

8. Statens Serum Institut. Vejledning om lægers anmeldelse af hæmolytisk uræmisk syndrom (HUS) og verocytotoksinproducerende *E. coli* (VTEC). [Guidance on the notification of Haemolytic Uremic Syndrome (HUS) and verocytotoxin-producing *E. coli* (VTEC)]. SSI, Copenhagen: 2011. Available at http://www.ssi.dk/Smitteberedskab/Referencelaboratorier/Bakterier/~/media/Indhold/DK%20-%20dansk/Sygdomsleksikon/Ændring%20til%20vejledning%20om%20VTEC%20og%20HUS_23-02-2012.ashx

Returning Post Outbreak

Two key principles should be borne in mind:

a) Small children can continue to shed VTEC for a considerable period of time following infection. All parents should be alerted to this fact at the outset and should be warned that their children will NOT be allowed back under any circumstances to the CCF as long as they continue to shed VTEC as determined by regular stool testing. Occasionally, some children continue to pass VTEC in their stools for many, many weeks. If this should happen, expert paediatric advice will be sought in the management of such children.
b) The reasons for 'Outbreak declaration' should be documented carefully by the OCT. In considering return of individuals post outbreak the following conditions must be met to the satisfaction of the OCT:
    a. *Microbiological Clearance*: Only children and staff who have met the conditions for microbiological clearance will be allowed to return to the CCF
    b. *Hygiene Review:* There must be a satisfactory review of hygiene in the CCF:
        i. Food/kitchen hygiene
        ii. Handwashing facilities
        iii. Nappy changing facilities
        iv. Toilet hygiene
        v. Waste disposal
        vi. Drinking/washing water hygiene
        vii. Pet/external environment hygiene
        viii. Internal environmental hygiene (toys, door handles and other touch surfaces, etc)
    c. *Deep Cleaning*: There must have been adequate deep cleaning of the CCF, carried out either by an external company OR by staff who are non-shedders or who have met the requirements of microbiological clearance
    d. *Sufficient Personnel*: there must be sufficient numbers of staff who have met the requirements for microbiological clearance to enable children to return to the CCF in a safe manner that meets the legislative requirements for the satisfactory running of a CCF.

In general, if a childcare facility is subdivided into discrete groups that do not share space, facilities, food handlers or childcare staff, then the groups may be managed individually, subject to risk assessment.
If there is no such subdivision then the childcare facility should be considered a single unit.
Where groups within a childcare facility are managed individually, clinical surveillance within other groups should continue, and should form part of an ongoing risk assessment of the situation.

Conclusion

Cases of VTEC in a CCF present one of the most challenging aspects of clinical Public Health practice. In general, the appearance of a case of VTEC among children attending a CCF should prompt an urgent assessment. Screening should be restricted to symptomatic cases only unless an outbreak is suspected.