

Chapter 6: Infection Control in Acute & Non-Acute Healthcare Settings, Childcare Facilities and in the Home

I. Introduction

A General

VTEC (O157 and non-O157) infections are one of a number of gastrointestinal infections that require clear guidance and the application of standard infection control precautions in order to prevent transmission in acute and non-acute healthcare settings, childcare facilities and in the home. VTEC are particularly hazardous due to their low infectious dose (may be as low as 10 CFU ingested) and their ability to survive in the environment (102).

Although food-borne transmission is a primary cause of outbreaks of VTEC in nursing homes (103), (104), in institutions for people with intellectual disabilities (105), in childcare facilities (51) and in acute hospital facilities (106), person-to-person spread by the faecal-oral route also occurs (105) (107) (108) and is a particular risk factor in these settings. Transmission to staff from residents in a nursing home (104) and from a patient to a nurse (109), (110) have been reported and the converse can also happen.

People infected with VTEC, especially those with poor self-caring skills, may heavily contaminate their immediate surroundings (especially the toilet area) with faecal matter. Contaminated hands put directly to the mouth or involved in food preparation may also transmit infection.

Most gastrointestinal diseases including those caused by VTEC, can be prevented by adhering to good personal hygiene practices and safe food preparation. In health care facilities, implementation of appropriate infection control precautions including strict attention to hand washing, isolation of affected patients/residents, quality food hygiene and exclusion of ill health care workers have been credited with a marked decrease in new cases of VTEC in these settings (105).

This chapter will outline measures to prevent and control person-to-person transmission in acute and non acute healthcare settings, crèches and in the home. Aspects relating to the prevention of food and water borne transmission of VTEC are detailed in Chapter 7 (Prevention and Environmental Control of VTEC).

B Acute Hospital Setting

Hospital patients often have complex medical conditions requiring a variety of medical interventions for diagnosis and therapy. Such management may impair (temporarily) the host immune system. This, coupled with the close density of vulnerable patients in an acute setting, may facilitate person-to-person spread of VTEC infections.

C Nursing Homes/Residential Units

Elderly people have an increased susceptibility to VTEC infection and experience high rates of morbidity and mortality when infection occurs (103), (104). In a population where incontinence is common and many residents are confused and unable to maintain basic personal hygiene, the risk of cross infection is substantial.

Older children and adults in residential units, especially those with intellectual disabilities are also frequently unable to maintain good standards of personal hygiene. In one study of an outbreak of VTEC in a community home for young adults with intellectual disabilities, staff who had close contact with residents with severe diarrhoea were four times more likely to get infected than those who had no contact (105).

Implementation of basic infection control precautions can be extremely difficult in these settings and recommended infection control practices may have to be adapted.

Transmission may also be increased in these settings by poor hand hygiene, a shortage of single en-suite rooms and poorly designed hand washing facilities (111)

D Childminding facilities

Children aged less than 5 years who attend nurseries, nursery schools, playgroups, or other similar groups are one of the groups classified in the CDR guidelines as posing an increased risk of spreading infection, including VTEC (112). Numerous outbreaks of VTEC have been reported from these settings (113) (114) (115).

E Home

VTEC is readily transmitted in the home. Contacts of an affected person may excrete the organism and present a risk to the wider community e.g. through their occupation as a food handler perhaps, or through attendance at a crèche or nursery.

Poor hand hygiene is an important risk factor. In a recent study of sporadic O157 infections in Wales, Parry and Salmon (95) calculated that the household transmission rate from an index case was between 4 and 14%, even though many of the secondary cases were asymptomatic.

In some cases the true index case is in fact asymptomatic which can only be established through history finding and identifying a risk factor

F Infection Control Precautions

Infection control precautions including Standard Infection Control Precautions are recommended for the routine care of **all patients and residents** regardless of their infection status. (Appendix M)

In **addition**, e.g. when an individual has infectious gastroenteritis, Standard Precautions may need to be enhanced by the application of additional infection control precautions i.e. Contact Precautions (116).

II. Precautions to Prevent The Spread of VTEC In Acute, Non Acute Health Care Settings and Nursing Homes

A Hospitalisation

- Individuals/clients/residents who develop symptoms of gastrointestinal disease suggestive of VTEC should be medically assessed to determine whether hospital admission is warranted (3). Advice should also be sought from local Infection Control Nurse Specialists (ICNS).
- Hospitalisation should be considered for individuals with symptoms of VTEC infection who require medical attention and isolation, and reside in nursing homes, residential units, welfare homes or other community care group settings where facilities for isolation are unsuitable (90).

B Standard Precautions and Contact Precautions

Standard precautions are recommended for the routine care of **all patients/residents/clients** regardless of their infection status. When an individual has symptoms of infectious gastroenteritis (e.g. diarrhoea or vomiting), **Contact Precautions** are required in addition to **Standard Precautions**. Contact Precautions are recommended for patients/residents with symptoms of VTEC infection. These precautions are outlined hereunder and further detailed in Appendix M.

C Accommodation

- A single room with toilet and hand washing facilities is ideally recommended for symptomatic patients/residents, particularly those more likely to contaminate their environment i.e. patients with faecal incontinence, severe vomiting, patients/residents who are mentally confused or are unable to maintain their own personal hygiene. (116) (117) and children <5years (116).
- Alternatively, if a single room is not available, symptomatic individuals with confirmed VTEC infection may be nursed together (cohort nursed) in a designated room or ward. Advice should be sought from an ICNS and SPHM.

- A notice should be placed on the isolation room door advising those entering to report to staff-in-charge before entering
- The decision to isolate confused elderly residents in a nursing home/residential setting presents particular challenges as isolation is often not feasible or practical. Each case should be assessed individually to determine the risk to the individual, other residents and staff. Advice should be sought from an ICNS and SPHM.

D Risk Assessment

- A local risk assessment is required when deciding whether to implement Contact Precautions with individuals who are identified with VTEC in their faeces but do not have any symptoms of gastrointestinal illness. Advice should be sought from an ICNS, Microbiologist or SPHM.

E Hand Hygiene and the Use of Gloves

- Thorough hand washing with either soap/water, or an anti microbial liquid soap preparation is required before and after contact with symptomatic persons and/or contact with faeces.
- In addition, gloves should be worn if contact with body fluids or potentially contaminated environment or materials is likely. Gloves should be changed after contact with faeces or body fluids. Gloves should be removed before discarding apron/gown and prior to leaving the isolation room. Hands should then be washed.
- Patients/residents who are able to maintain their own hygiene should be encouraged to wash their hands after toileting and before meals (118). Certain groups (e.g. adults with learning difficulties, residents who are confused and young children) may require supervision.

F Personal Protective Equipment (PPE)

- A plastic apron should be worn on entry to the isolation room if contact with contaminated material is likely. The apron should be removed prior to leaving the room and discarded.
- PPE that is contaminated with blood or other body fluids should be discarded as healthcare risk waste/clinical waste in the appropriate yellow bag/container. (119).

G Environmental hygiene

- Decontamination of the clinical environment with detergent and water will generally be adequate. A chlorine based disinfectant e.g. 0.1% (1000ppm) hypochlorite should be used when body fluid contamination has occurred or during outbreak situations (3).

- Items such as toilet seats, flush handles, taps and toilet door handles should be cleaned and disinfected every day and more frequently in the event of patients/children having vomiting or diarrhoea.

H Spillages

- Spillages of blood, urine, faeces or vomit should be dealt with immediately wearing protective clothing (i.e. disposable gloves and apron).
- **For spillages of faeces or vomit,**
 - Soak up as much of the visible material as possible with disposable paper towels and carefully place the soiled paper towels in a yellow plastic bag.
 - Clean the area using hot water and general purpose detergent and dry. Discard gloves and apron into a yellow waste bag. Wash and dry hands thoroughly.

The frequency or intensity of cleaning in a particular area may need to be increased depending on the patient's/residents level of hygiene and the degree of environmental contamination, particularly in areas where faecal and urine incontinence are common.

I Kitchen hygiene

- Frequent hand contact surfaces should be cleaned with detergent and water and then wiped with a suitable disinfectant (e.g. a chlorine based agent at concentrations of 120-200ppm available chlorine). The recommended concentration of chlorine based disinfectants for infant feeding utensils, catering surfaces and equipment is 125ppm av chlorine.
- All premises involved in the preparation and handling of food should comply with current food legislation
- Staff responsible for food preparation and handling should receive appropriate training that includes storing, preparing, cooking and serving food safely and hygienically.
- Food handlers should receive ongoing training and instruction in the importance of personal hygiene and hand washing (120)

J Laundry

- Gloves and a disposable plastic apron should be used for handling linen soiled with blood or body fluids (i.e. urine, faeces, vomit).
- Soiled and infectious linen should be carefully placed in an alginate stitched or water soluble inner bag and then into a laundry bag prior to transport to an approved laundry capable of dealing with potentially contaminated linen (121).

K Patient care equipment e.g. bedpans, commodes

- If single en-suite facilities are not available, reusable bedpans may be used, and should be heat disinfected in a bed pan washer disinfector (e.g. 80°C for 1 minute) (122) after each use.

- Alternatively, disposable bedpans may be used and disposed of in a bedpan macerator (123). Supports for disposable bedpans are reusable and should be washed with general purpose detergent and water, then wiped with a chlorine based disinfectant (e.g. 0.1% hypochlorite solution (1,000ppm available chlorine), and dried after each use. An individual support is recommended for each patient (124).
- Commodes (if used) should be reserved for use by individual patients/residents. Commode pans should be decontaminated after each use in a bedpan washer disinfector (124). The commode seat and armrests should be cleaned with warm water and detergent (using disposable wipes or paper towels) then wiped with a chlorine based disinfectant (e.g. 0.1% hypochlorite solution (1,000ppm available chlorine), rinsed and dried before reuse.
- Chemical disinfection is not as effective as heat disinfection and is generally not recommended. (124).

L Patient transfer

- Movement of patients with VTEC infection to other departments should be restricted to essential purposes only. Staff in relevant departments should be informed of recommended precautions prior to transfer of a patient/resident.

M Visitors

- Visitors to patients/residents with diarrhoea need not be restricted but the importance of infection control measures should be explained to them. Caution should be exercised with young children who visit a patient/resident with profuse diarrhoea.
- Visitors are not required to wear protective clothing unless they are giving care to the patient/resident. Visitors should be instructed to wash their hands before leaving the infected patient/residents room (3)
- Visitors should be advised not to store raw or uncooked food in the patients/residents room, especially grapes or other fruit that does not require the outer skin to be removed before being eaten.
- Visitors should not enter an isolation room without checking with the person in charge.

N Duration of isolation precautions

- Contact precautions should be discontinued and patients/residents allowed to return to their normal routine once they are symptom free for a period of 48 hours (3). The importance of good hand hygiene after using the toilet should be emphasised.

O Notification to the Department of Public Health

- All confirmed and probable cases of VTEC should be notified to the Department of Public Health (SI 707 of 2003, Chapter 2)

P Outbreak Investigation Procedures

- For investigation of outbreaks see Chapter 5.

III. Specific Recommendations for Preventing the Spread of VTEC in Childcare Facilities

A Hand Hygiene

Appropriate hand washing facilities must be provided in staff and children's toilet facilities, nappy changing areas, kitchens and the laundry area. They include: accessible sinks with hot and cold running water, disposable paper towels for hand drying, (125) and liquid soap.

Wash hands thoroughly before and after contact with children, toileting, nappy changing, or contact with potentially contaminated materials or environment.

- Childcare staff should wear gloves and a plastic apron when handling soiled linen, paper and nappies, when changing babies' nappies and when cleaning up spillages of excreta or body fluids.
- Children's hand washing should be supervised, especially after using the toilet and before eating (3). The CDR guideline recommends supervision for children under 5 years (112), but older children are also likely to require supervision, depending on their level of maturity.
- If a child has diarrhoea² while on the premises, the parent / guardian should be advised to take the child home. The affected child should be separated from other children until he/she is collected.

B Nappies

Nappy changing areas must be separate from play or food preparation areas.

- Changing mats should be waterproof and should be protected with paper towels. Towels should be changed between each child's nappy change
- Any surfaces that are soiled or touched during nappy changing should be cleaned with a general detergent solution followed by a disinfectant (using paper towels) and the surface dried thoroughly (126)

² Diarrhoea: three or more watery or loose stools in a 24-hour period, a loose stool being one that would take the shape of the container (WHO, 1996)

C Toys:

Toys must be cleaned and disinfected regularly - indoor toys, in order to prevent spread through contamination of the toys by infected children, and outdoor toys because of the additional possibility of contamination by animals.

- Toys that are visibly soiled or contaminated with body fluids should be taken out of use immediately, then cleaned with detergent and water and wiped with a disinfectant. Toys that are soiled and cannot be appropriately cleaned/disinfected should be discarded (127).
- Certain communal play activities (e.g. sand or water play, cookery) should be suspended during outbreaks of diarrhoea and vomiting, to help prevent further transmission.

D Laundry

- Soiled clothing or bed linen should be washed using detergent and hot water (at least 60° C) (127) (126). Soiled items should not be rinsed by hand. Solid material (e.g. vomit, faeces) should be flushed down the toilet and the item/s placed in the washing machine using the pre-wash/cycle followed by a hot wash cycle.
- Cloths (if non-disposable) and towels used in the kitchen should be laundered separately from clothes and bed linen.

E Waste

- Contaminated paper, cleaning cloths and nappies, together with used gloves and aprons, should be placed immediately into plastic bags, which are tied securely, and removed to a suitable refuse storage area outside the premises.
- The handling, transport and disposal of these materials must be carried out in a manner that will not expose childcare workers, children or the environment to contamination.

F Food Safety

- Prevention and control measures detailed in section 5.3 of Appendix P apply to childcare facilities that provide meals to children.
- Staff responsible for food preparation and handling must receive appropriate training/instruction that includes storing, preparing, cooking and serving food safely and hygienically.

G Exclusion criteria

- The following should be excluded from childcare facilities until two consecutive negative specimens, taken after recovery and at least 48 hours apart, are obtained ((112) and Table 5.1)³:
 - Childcare staff with VTEC infection
 - Children under 5 years of age with VTEC infection
 - Childcare staff who are household or close contacts of a VTEC case
 - Children under 5 years of age who are household or close contacts of a VTEC case
- Staff who are food workers in crèches with VTEC infection, or who are household contacts of a VTEC case, should be excluded from the pre-school service until two consecutive negative stool specimens, taken after recovery and at least 48 hours apart, are obtained ((112) and Table 5.1).

IV. Specific Recommendations for Preventing the Spread of VTEC in the Home Environment

VTEC cases in occupations or situations where there is an increased risk of spreading gastrointestinal infections should be excluded from work or school until they have no symptoms of diarrhoea or vomiting, 48 hours have elapsed since first normal stools and appropriate clearance tests have been completed (see Table 5.1 and Appendix L).

Similarly, persons in occupations or situations where there is an increased risk of spreading gastrointestinal infections, if contacts of VTEC cases, should be excluded from work or school until appropriate clearance tests have been completed (see Table 5.1 and Appendix L)

Thorough hand washing and drying coupled with scrupulous food hygiene are the two key factors for preventing the spread of VTEC infection in the home environment.

To reduce the risk of spreading VTEC infection in the home it is important that all family members wash their hands.

Hands should be washed

- After using the toilet or changing a nappy
- After assisting ill persons or touching their bedding, clothing or equipment
- Before preparing or serving food
- Before eating
- Immediately after touching raw foods such as poultry and meat

³ Where persons are asymptomatic, they should be excluded until two consecutive negative specimens, taken at least 48 hours apart, are obtained

- After touching blood or body fluids (e.g. faeces, vomit, nasal secretions, saliva)
- After touching pets or their feeding equipment and toys
- If hands look dirty

- Towels and flannels should not be shared.
- Affected individuals should use a flush toilet. If bedpans are used, the relative or attendant should, if possible, wear gloves.
- Carers should wash their hands thoroughly after attending to individuals with diarrhoea /or vomiting.
- Soiled clothing and bed linen should be washed separately in a domestic washing machine with a “hot cycle” (i.e. 60 ° C). Excess faecal material should be flushed into the toilet bowl before placing soiled items in washing machine.
- Toilet flush handles, sink taps and bathroom door handles should be cleaned at least daily. Toilet seats should be cleaned if visibly soiled using a disposable cloth or paper towel, then disinfected in a dilute 0.1% hypochlorite solution (1,000ppm av chlorine) and rinsed.
- Bedpans (if required) should be emptied into the toilet bowl, washed with detergent and water, dried, then wiped with a 0.1% hypochlorite (1,000ppm av chlorine) solution, rinsed and dried.
- Hands should be carefully washed prior to preparing food. Clean washed utensils should be used.
- Food should be adequately refrigerated.

Key Messages

- Infection with VTEC can occur as a result of ingestion of contaminated food and water or be transmitted from individuals already infected
- VTEC frequently causes outbreaks in the community because of the ease of transmission among the elderly population, children and among individuals with learning disabilities
- Person to person transmission is usually by ingestion of an object contaminated with faecal matter-hence the term-faecal-oral transmission
- Spread of infection is more likely during the diarrhoea phase when faeces contain higher numbers of bacteria
- HCW's can become contaminated as a result of contact with a patient/resident or following contact with the contaminated environment. Contaminated hands put directly to the mouth or used in preparation of food may transmit infection
- HCW's assisting or reassuring patients/residents who are vomiting or have diarrhoea are at increased risk of becoming infected
- HCW's should consider all body fluids, particularly faeces and vomit as potentially infectious and should implement Standard Precautions with all patients/residents/clients in order to prevent exposure to these substances (116) & HICPAC 1996)