STEC

(Shiga toxin producing *Escherichia coli*)

Based on the MoH Communicable Diseases Control Manual 2012-May 2019 Update[1]

Important note: Shiga toxin-producing *E. coli* (STEC) may also be referred to as Verocytotoxin-producing *E. coli* (VTEC) or enterohemorrhagic *E. coli* (EHEC). However STEC is now the preferred term and will be used throughout the rest of this protocol.

Associated documents

Case Report Form:
K:\CFS\ProtectionTeam\FinalDocs\NotifiableConditions\VTEC\FormsStdLettersQuest\Forms\ESR_CaseReportForm_VTEC-STECInfection.pdf

Fact Sheet:
https://www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses

Ministry of Health pamphlet:
https://www.healthed.govt.nz/system/files/resource-files/HE1211_Campylobacter_E%20coli_and_Salmonella.pdf

The Illness[1-3]

STEC or EHEC (enterohemorrhagic *E. coli*) are strains of *E. coli* capable of producing Shiga toxin and typically cause bloody diarrhoea. Clinical manifestations may include blood visibly in faeces, abdominal tenderness but no fever.

The Shiga toxin-producing group of E. coli strains is capable of producing toxins very similar to the one produced by Shigella dysenteriae type 1. Two types of toxins have been described: Shiga toxin 1 (Stx1), which differs from true Shiga toxin by one to seven amino acid differences, and Shiga toxin 2 (Stx2), which shares about 60% homology to Stx1. Therefore, these bacteria are often called Shiga toxin-producing E. coli (STEC). Shiga toxins may be detected using Vero cell toxicity test [1]. This is why these bacteria were also called verotoxin or verocytotoxin-producing E. coli (VTEC).

The major complication of STEC/EHEC infection is the Haemolytic-uremic syndrome (HUS) characterised by the triad of acute renal failure, haemolytic anaemia, and thrombocytopenia. HUS typically begins 5 - 10 days after the onset of diarrhoea. There are many serotypes of toxigenic E.coli, the commonest being 0157 H7, but not all have been implicated in causing HUS. Some elderly patients with E. coli O157:H7 may also develop thrombotic thrombocytopenic purpura (TTP) which is associated with fever and neurologic symptoms. HUS generally complicates 6 - 9% of VTEC infections overall (a higher rate in children) and can be present in the absence of diarrhoea.

Pathogenic strains of E.coli can be divided into six groups:
- Enteropathogenic E. coli (EPEC)
- Enterotoxigenic E. coli (ETEC)
- Enteroinvasive E. coli (EIEC)
- Enterohaemorrhagic E. coli (EHEC)

Note: STEC equates with EHEC. ETEC, EPEC and EIEC are notifiable if they occur in the context of acute gastroenteritis in a person in one of the four high risk categories.

The **infectious dose** of *E. coli* O157:H7 for humans is only 10 to 100 organisms (similar to Shigella) which is low compared with that of most other enteric pathogens.[3]

The Shiga toxins produced by E. coli may cause anything from uncomplicated diarrhoea to haemorrhagic colitis, which can progress into haemolytic uremic syndrome (HUS), composed of a micro-angiopathic haemolytic anaemia, thrombocytopenia and severe acute renal failure requiring intensive care. /STEC is therefore also called enterohaemorrhagic E. coli (EHEC).

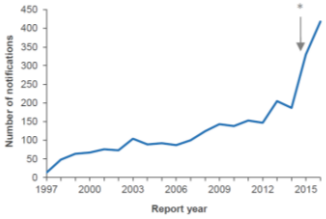
Epidemiology in New Zealand[4]

Since the first laboratory confirmed New Zealand case in 1993, the incidence of STEC infection has gradually increased. At least part of this increase is due to changes in laboratory methodology (screening stool samples using culture-independent diagnostic tests), which have been implemented by an increasing number of diagnostic laboratories since mid-2015. This has been associated with an increase in detection of non-0157 serotypes, in particular.

Infection with some STEC serotypes, notably 0157:H7, is associated with a higher frequency of bloody diarrhoea and hospitalisation than other serotypes. The spectrum of presentations associated with STEC infection ranges from no symptoms, to mild, watery diarrhoea, to frank bloody diarrhoea and abdominal cramping. Haemolytic Uraemic Syndrome (HUS) and Thrombotic Thrombocytopenic Purpura are rare complications of STEC, most commonly seen in children and the elderly. Antibiotic treatment for STEC can increase the risk of HUS. Of children with HUS, 12–30 percent will have severe sequelae, including renal and cerebral impairment.

In 2015, 330 cases of verocytotoxin- or Shiga toxin-producing *Escherichia coli* (STEC) infection were notified. The introduction of screening of all faecal specimens using PCR in an Auckland laboratory in July 2015 resulted in increased STEC detection and contributed to this change in notification rate (Fig. 1)

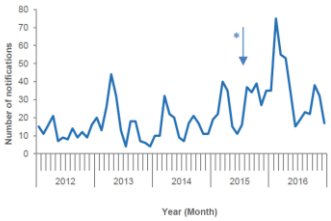
Fig.1 New Zealand STEC notifications 1997-2016
(arrow indicates start of PCR testing)



Eight of 14 paediatric cases of haemolytic uraemic syndrome (HUS) in 2015 were confirmed to be STEC-associated.

STEC infection notifications follow a seasonal pattern, with peaks occurring during autumn and spring each year (Fig. 2).

Figure 2. Seasonal notifications by month



2015 notifications

- Highest rates: Northland, Waikato, Waitemata and South Canterbury
- Highest rates by age: Children aged 1–4 years, children aged less than 1 year
- Highest rates by ethnicity: MEELA > European or Other
- 80 (24.7%) cases were hospitalised, 14 had HUS and there were no deaths
- Common risk factors: contact with pets, farm animals and animal manure.
- Common foods: dairy products, raw fruit or vegetables and chicken or poultry products
- 53.0% of isolates were O157:H7 and 29.3% were non-O157 serotypes.
- 17 outbreaks involving 94 cases.

CASE DEFINITION

Clinical description

An acute onset diarrhoeal illness[1] (with or without blood or mucus in stool)

or

Any case with Haemolytic Uraemic Syndrome (HUS) or Thrombotic Thrombocytopenic Purpura (TTP) with or without a history of an acute onset diarrhoeal illness.

Note: In the absence of HUS/TTP, asymptomatic infection or presentations with milder bowel symptoms (eg, occasional loose stools) and/or non-diarrhoeal abdominal symptoms do not meet the case definition.

Incubation: 2–10 days (median 2–3).

[1] WHO definition of diarrhoea: 'the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for the individual).

Transmission: In New Zealand, the majority of notified cases have been associated with animal or farm-environment contact. Raw drinking milk has been confirmed as the source in outbreaks. Overseas, outbreaks have been linked to food contaminated by ruminant faeces in contaminated undercooked hamburger and other meat products; unpasteurised milk; and produce (including melons, lettuce, spinach, coleslaw, apple cider and alfalfa sprouts). Outbreaks have also been linked to faeces-contaminated drinking and swimming pool water, direct contact with animals and person-to-person spread in households, early childhood services, and custodial institutions.

Communicability: Faecal shedding persists for up to 1 week in adults and is often longer and quite variable in children (up to 3 weeks in 30 percent of all children, with a median shedding of 4-6 weeks for children under 6 years).

Prevention: STEC infection can be minimised by avoiding ingestion of water contaminated by animal faeces, by hand washing after exposure to animals and other risk situations, properly cooking food, introducing regulatory standards for food processing and for meat during slaughter and processing, strict attention to food hygiene commercially and in the home and the implementation of measures to prevent person-to-person spread.

Notification Procedure

Attending medical practitioners or laboratories must immediately notify the local medical officer of health of suspected cases. Notification should not await confirmation.

Separate hospital-based surveillance of paediatric admissions of HUS is provided through the New Zealand Paediatric Surveillance Unit. This surveillance service does not involve medical officers of health.

CASE CLASSIFICATION
Under investigation: A case that has been notified, but information is not yet available to classify it as probable or confirmed.

Probable: Not applicable.

Confirmed: A clinically compatible illness accompanied by laboratory definitive evidence.

Not a case: A case that has been investigated and subsequently found not to meet the case definition. (Note: Asymptomatic people with positive laboratory results should be recorded under this category.)

Possible notification to WorkSafe
- Refer to Reporting section, page 6.

Laboratory Testing

Laboratory definitive evidence for a confirmed case requires evidence of shiga toxin, which comprises either:
- isolation of shiga toxin-producing *Escherichia coli*
- detection of the genes (*stx1* and/or *stx2*) associated with the production of shiga toxin in *E. coli*.

All isolates should be referred to the Enteric Reference Laboratory at ESR for further characterisation.

Isolates producing shiga toxin 2 (stx2) are more likely to cause serious human disease than isolates producing shiga toxin 1 (stx1) or both toxins together. Any positive toxin test should be reported as a confirmed case of STEC.

Note: The *eae* (intimin) and *hlyA* (enterohaemolysin) genes are accessory virulence factors strongly associated with enterohaemorrhagic *E. coli* (EHEC). However, finding these genes without the presence of a *stx* gene does not constitute a positive toxin test.

Management of Case

Investigation

- Action on day of notification or immediately if an outbreak.
- Administer questionnaire by telephone and post out disease information. In speaking with the case use the VTEC Contacts form: Y:\CFS\ProtectionTeam\FinalDocs\NotifiableConditions\VTEC\FormsStdLettersQuest – Contacts Table VTEC, for recording details of contacts, and for providing advice and for guidance regarding which contacts require faecal specimens.

  {Note: The letter accompanying the questionnaire mentions that if the case is a child, the letter and disease information are to accompany the child if he/she stays in another household, until a clearance is given.}

  - In consultation with the attending medical practitioner, obtain a history of ingestion of raw drinking milk or raw milk cheese products, meat products (especially rare ground beef) and produce (especially leafy greens), exposure to recreational water or untreated water, contact with ruminant animals or their faeces, possible human contacts, and travel.
  - Ensure laboratory confirmation by stool culture or rectal swab has been attempted. Inform the laboratory if STEC is suspected.
  - Investigate and obtain a more detailed history if there is an outbreak and ensure symptomatic persons are tested for STEC spp.
  - Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved.
  - Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

Outbreak

It is the responsibility of all Communicable Diseases staff to be vigilant regarding any increased incidence of STEC. Such an increase is to be promptly reported to the MOH. Refer to;

- ◊ the CPH Outbreak Response Procedure (accessed via CPH Policies & Procedures intranet site> ComDis Outbreak Response Plan): http://cdhbdepartments/corporate/documentmanagement/CDHB%20Libraries/Policies%20and%20procedures,%20guidelines,%20protocols,%20staff%20information%20etc/Com-Dis-Outbreak-Response-Plan.docx
- ◊ the CPH Outbreak Guide Template: Y:\CFS\ProtectionTeam\FinalDocs\NotifiableConditions\OUTBREAK GENERAL\FormsStdLettersQuest.
- ◊ Organise faecal screening (through ESR) of symptomatic persons involved in the event or associated with the facility. These persons are to be managed as cases until results are known.

- Attempt to identify source of infection such as ingestion of suspect foods, exposure to human cases, animal faeces or recent overseas travel.
- Refer to Investigation (above) for circumstances requiring involvement of MPI and local authority EHO.

Restriction and Clearance

- In a health care facility, only standard precautions (http://www.cdhb.health.nz/Hospitals-Services/Health-Professionals/CDHB-Policies/Infection-Prevention-Control-Manual/Documents/Standard%20Precautions.pdf) are indicated in most cases.
- For documenting clearances use this form: Y:\CFS\ProtectionTeam\FinalDocs\NotifiableConditions\VTEC\FormsStdLettersQuest\Forms – Clearance Chart VTEC.
- If the case is in nappies or an incontinent child, apply contact precautions for the duration of illness.
- For exclusion and clearance criteria from work, school or an early childhood service see Table 1.

Table 1[5] **Exclusion and clearance criteria for people at increased risk of transmitting an infection to others***

Pathogen	Exclusion* and Clearance	Contacts
STEC	Until symptom free for 48 hours	All close contacts: if symptoms present, test and exclude until symptom-free for 48 hours

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NOTE: The Health (Infectious and Notifiable Diseases) Regulations 2016 do not contain any exclusionary powers for people at increased risk of transmitting an infection to others (groups 1-4 following). Instead the medical officers of health can resort to broader powers in Part 3A of the Health Act 1956, which include directions to cases and contacts to remain at home until no longer infectious.

Treatment[6]

- Supportive care and monitoring for the development of HUS complications.
- Antibiotics and antimotility drugs (such as anticholinergic agents and narcotics) do **not** reduce the progression to HUS due to STEC infections, but in fact appear to increase the risk of subsequent development of STEC-HUS, and should **not** be given to patients with confirmed or suspected EHEC.

Counselling

- Minimise person to person transmission by educating on the importance of hand-cleaning before handling food. Hand-cleaning facilities should be available and used after contact with animals. Young children should be supervised during contact with animals and during hand cleaning. Keep farm animals (likely reservoirs) away from food preparation areas. Domestic animals with diarrhoea should be taken to a veterinarian for assessment and treatment.
- Implement food safety measures, including checking that water supplies are safe, that produce is not fertilised with animal or human manure, that raw minced meats are cooked properly, that kitchen-handling is hygienic (eg, cooked meats are not returned to the same plate as the raw meat), that fermentation is adequate as per MPI guidelines, and whether or not raw drinking milk is being consumed.
- Educate high risk groups about avoiding eating sprouts and consuming raw drinking milk.
- If a water supply is involved, liaise with the local territorial authority to inform the public. Advise on the need to boil water.
- In early childhood services or other institutional situations, ensure satisfactory facilities and practices regarding hand cleaning; nappy changing; toilet use and toilet training; preparation and handling of food; and cleaning of sleeping areas, toys and other surfaces.

Fact Sheet:
https://www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses

Ministry of Health pamphlet:
https://www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses

Information Sheet for Cases/Caregivers:
https://www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses

Management of Contacts

Definition of a Contact
All those with close (for example, household) contact with a case during the period of communicability or who have been exposed to the same contaminated food, water or other source in a common-source outbreak.

Investigation
- Identify contacts for investigation, restriction and counselling as appropriate. Use the STEC Contacts form: Y:\CFS\ProtectionTeam\FinalDocs\NotifiableConditions\VTEC\FormsStdLettersQuest – Contacts Table VTEC for recording details of contacts, for providing advice and for guidance regarding which contacts require faecal specimens.
- If symptomatic, contact is to be advised to consult GP and have a faecal test. Manage as a case until the result is known.
- **Preschool situation**: screen only close contacts who are symptomatic and those who were at increased risk of exposure to faecal-oral spread from the case.

Restriction
- All high risk contacts are to be excluded until one negative faecal specimen has been provided (refer Table 1).

Prophylaxis
Nil.

Counselling
- Advise all contacts of the incubation period, typical symptoms of STEC and to seek early medical attention if symptoms develop.
- Educate about hygiene especially hand hygiene.
- Fact Sheet:
https://www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses

Ministry of Health pamphlet:
https://www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses

Outbreak
Refer to Management of Case/Outbreak.

Other Control Measures

Identification of source

- Check for other cases in the community. Investigate potential food, water or animal sources of infection only if there is a cluster of cases or an apparent epidemiological link (eg, consumption of raw drinking milk, sprouts or bagged leafy greens).
- If indicated, check the water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2018)[7].

Disinfection
Clean and disinfect surfaces and articles soiled with faecal material. For more details, refer to Appendix 1 and reference 8.

Health education
- Educate the public about safe food preparation (refer to Appendix 3 and reference 9).
- Hand-cleaning facilities should be available and used after contact with animals.
- Young children should be supervised during contact with animals and during hand cleaning.
- Food-related activities should be separated from areas that house animals.
- Domestic animals that have diarrhoea should be taken to a vet for assessment and treatment.
- If a water supply is involved, liaise with the local territorial authority to inform the public. Advise on the need to boil water.[7]

- In early childhood services or other institutional situations, ensure satisfactory facilities and practices regarding hand cleaning, nappy changing, toilet use and toilet training, preparation and handling of food, and cleaning of sleeping areas, toys and other surfaces.
- Check that raw meats are cooked properly or that fermentation is adequate as per MPI guidelines[10] that kitchen-handling is hygienic, and whether or not raw drinking milk is being consumed.

Reporting

- Ensure complete case information is entered into EpiSurv.
- If a cluster of cases occurs, contact the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.
- Where food/food businesses are thought to be involved inform the Food Compliance group from the Ministry for Primary Industries.
- If an outbreak, write report for Outbreak Report File: Y:\CFS\ProtectionTeam\FinalDocs\NotifiableConditions\VTEC\Outbreaks.
- If suspected that the infection was acquired at work, complete the WorkSafe notification form Notifications under sections 197 and 199 of the Health and Safety at Work Act 2015, Notifications by Medical Officers of Health' (paper copies are kept in the office).
- File.

Appendix 1

Extract from the MoH Communicable Disease Control Manual 2012 - December 2017:Appendix1: Disinfection[8]

Disinfection and cleaning the environment
Diseases that are notifiable have public health implications. Therefore decontamination of the environment is recommended when cross-infection from the source is possible. Disinfection is also indicated for contamination with y resistant bacteria.

Concurrent disinfection is the application of disinfection measures as soon as possible after the discharge of infectious material from the body of an infected person, or after articles have been soiled with such infectious discharges.

Personal protective equipment (PPE) must be used during environmental disinfection to prevent self-contamination.

Procedures
Disposable items: Any items that can be disposed of should be categorised as in NZS 4304:2002 New Zealand Waste Standard and disposed of.

Solid surfaces and/or equipment (including children's toys): Before disinfection, solid surfaces and/or equipment should be cleaned with detergent and dried. Before disinfection chemicals are applied, it should be established that they are fit for purpose a clear process on how to use them and manufacturer's recommendations are followed

Source: Ministry of Health. 2009. *Guidelines for the Management of Norovirus Outbreaks in Hospitals and Elderly Care Institutions*. Wellington: Ministry of Health.

Appendix 2

Extract from the MoH Communicable Disease Control Manual 2012 - December 2017 Appendix 2: Enteric Disease[5]

Exclusion/Restriction
Cases of most enteric disease should be considered infectious and should remain off work/school until 48 hours after symptoms have ceased. Certain individuals pose a greater risk of spreading infection and additional restriction/exclusion criteria may apply. Microbiological clearance may be required for individuals infected with/exposed to certain pathogens.
The key criteria are:

- the decision to exclude any worker is based on individual risk assessment. As a general rule, any worker with symptoms of gastrointestinal infection (diarrhoea and/or vomiting) should remain off work until clinical recovery and stools have returned to normal (where the causative pathogen has not been identified). Where the pathogen has been identified, specific criteria are summarised in Table 2.4

- the overriding prerequisite for fitness to return to work is strict adherence to personal hygiene, whether symptomatic or not.

The circumstances of each case, carrier or contact should be considered and factors such as their type of employment, availability of toilet and hand washing facilities at work, school or institution and standards of personal hygiene taken into account. For example, a carrier may be relocated temporarily to a role that does not pose an infectious risk.

Pathogen specific exclusion criteria for people at increased risk of transmitting an infection to others

Pathogen specific exclusion (restricting criteria for people from work, school or an early childhood service and for subsequent clearance are summarised in Table 2.4. Additional information is also included in the table for the following groups:

1. people whose work involves preparing or serving unwrapped food to be served raw or not subject to further heating (including visitors or contractors who could potentially affect food safety)

2. staff, inpatients and residents of health care, residential care, social care or early childhood facilities whose activities increase risk of transferring infection via the faecal-oral route

3. children under the age of 5 attending early childhood services/groups

4. other adults or children at higher risk of spreading the infection due to illness or disability.

The Health (Infectious and Notifiable Diseases) Regulations 2016 do not contain any exclusionary powers or incubation periods for infectious children, or for high risk occupational groups such as people who work with children or food handlers. Instead the medical officers of health can resort to broader powers in Part 3A of the Health Act 1956, which include directions to cases and contacts to remain at home until no longer infectious. This Manual contains the recommended exclusion periods for specific diseases (Refer: Table 2.4). There is guidance published about the 2016 regulations and Part 3A of the Health Act in www.health.govt.nz/our-work/diseases-and-conditions/notifiable-diseases/summary-infectious-disease-management-under-health-act-1956

The legislation is principles based. In this context this means that medical officer of health must weigh protection of public health (the paramount consideration) with the following principles: trying voluntary means first if likely to be effective, choosing a proportionate, and the least restrictive measure required in the circumstances, fully informing the case or contact of the steps to be taken and clinical implications, treating them with dignity and respect for their bodily integrity and taking account of their special circumstances and vulnerabilities, and applying the measures no longer than is necessary (sections 92A to 92H).

Under Part 3A a medical officer of health can direct a case or a contact to stay home (section 92I(4)(b) or 92J(4)(b)). This is when the officer believes on reasonable grounds that the case or contact poses a public health risk (as defined in the s2 Act). The direction must specify duration.

Alternatively, in the context of attendance at an educational institution, if the officer believes the infection risk is unlikely to be effectively managed by directing the case or contact, he or she can approach the head and direct them to direct the case or contact to remain at home. In serious cases, the medical officer of health can also direct the head to close the institution or part of it (s 92L).

Medical officers of health have no powers to direct closure of premises or places where people congregate, other than educational institutions. If a medical officer of health needs to manage a public health risk by excluding infectious people from certain occupations, public pools, campsites, concerts and other public environments, he or she can use directions to the individuals concerned – to stay away from a certain place, or not to associate with certain people.

The Ministry for Primary Industries has powers to close commercial food premises. In contrast, medical officer of health powers focus on the risk the person poses.

Note that while there are provisions that apply to early childhood service workers, there are no provisions for health care workers – instead, advice should be provided to employers in terms of the Health and Safety at Work Act 2015.

Employers may decide to implement more stringent exclusion/restriction criteria in response to their own or their customers' requirements.

Appendix 3

Extract from the MoH Communicable Disease Control Manual 2012 - December 2017 Appendix 3: Patient Information[9]

Health education resources
Pamphlets, posters and other resources available from the Ministry of Health at www.healthed.govt.nz.

Food Safety Practices
The Ministry for Primary Industries
The Ministry for Primary Industries (MPI) leads New Zealand's food system, ensuring the food we produce is safe and protecting the health and wellbeing of consumers. MPI is responsible for legislation covering food for sale on the New Zealand market, primary processing of animal products and official assurances related to the export of animal and plant products and the controls surrounding registration and use of agricultural compounds and veterinary medicines. MPI is the New Zealand competent authority for imports and exports of food and food-related products.
MPI contact information: www.mpi.govt.nz/contact-us

Food safety practices in preparing and cooking a hangi: He whakatairanga i nga ahuatanga mahi mo te tunu hangi:
www.mpi.govt.nz/food-safety/community-food/marae-food-safety

Safe food preparation – key messages
Educate the public about safe food preparation.

- Avoid working with food when you:
  - are unwell especially with a gastro infection
  - have open skin sores, boils or abscesses.
- Clean your hands thoroughly after using the toilet or changing nappies or other incontinent products for others and before and after preparing food.
- Wash raw vegetables and fruits thoroughly before juicing them or eating them fresh.
- Cook meat thoroughly before eating.
- Cook eggs and egg products properly. Avoid eating raw, incompletely cooked eggs or using dirty or cracked eggs.
- Keep hot food hot between cooking and eating it.
- Wash hands, utensils and chopping boards in hot, soapy water after handling uncooked food.
- Keep raw meat, poultry and fish separate from and below other foodstuffs so that any raw meat juice does not contaminate other foods stuffs especially ready-to-eat foods.
- Cover all stored food.
- Cover and put uneaten, cooked food in the refrigerator within 1 hour of cooking.
- Defrost food by placing it on the lower shelves of a refrigerator (if raw meat place on bottom shelf to avoid raw meat juice contaminating other foods) or use a microwave oven according to defrosting instructions. Avoid defrosting food at room temperature.
- Thoroughly reheat (until internally steaming or piping hot, at least 70ºC) leftover or ready-to-eat foods before eating.
- Strictly follow use-by and best-before dates on refrigerated foods.

Find out more about how to prepare and store food safely and when you need to take extra care with some types of food at www.mpi.govt.nz/food-safety/food-safety-for-consumers

References and further information

1. New Zealand Communicable Diseases Control Manual 2012-May 2019 Update, Verotoxin- or Shiga-toxin producing *E.coli:* https://www.health.govt.nz/our-work/diseases-and-conditions/communicable-disease-control-manual/verocytotoxin-or-shiga-toxin-producing-escherichia-coli-vtec-stec

2. ECDC/EFSA JOINT TECHNICAL REPORT, Shiga toxin, verotoxin-producing Escherichia coli in humans, food and animals in the EU/EEA, with special reference to the German outbreak strain STEC O104, http://www.ecdc.europa.eu/en/publications/Publications/1106_TER_EColi_joint_EFSA.pdf

3. Up-to-date/Pathogenic E coli: https://www.uptodate.com/contents/microbiology-pathogenesis-epidemiology-and-prevention-of-enterohemorrhagic-escherichia-coli-ehec]

4. ESR, Notifiable diseases in NZ: 2016 summary. https://surv.esr.cri.nz/PDF_surveillance/AnnualRpt/AnnualSurv/2016/2016AnnualNDReportFinal.pdf

5. NZ Communicable Diseases Control Manual 2012 – May 2019, Appendix 2: Enteric disease https://www.health.govt.nz/our-work/diseases-and-conditions/communicable-disease-control-manual/appendix-2-enteric-disease

6. Up-to-date/EHEC/Clinical manifestations, diagnosis and treatment of enterohemorrhagic Escherichia coli (EHEC) infection: [http://www.uptodate.com/contents/treatment-and-prognosis-of-shiga-toxin-producing-escherichia-coli-stec-hemolytic-uremic-syndrome-hus-in-children?source=see_link]

7. Ministry of Health. 2008. Drinking-water Standards for New Zealand 2005 (Revised 2018): https://www.health.govt.nz/publication/drinking-water-standards-new-zealand-2005-revised-2018

8. NZ Communicable Diseases Control Manual 2012 – December 2017, Appendix 1: Disinfection http://www.health.govt.nz/system/files/documents/publications/cd-manual-appendix-1-dec17.pdf

9. NZ Communicable Diseases Control Manual 2012 – December 2017, Appendix 3: Patient education http://www.health.govt.nz/system/files/documents/publications/cd-manual-appendix-3-dec17.pdf

10. MPI, Food and Beverages, Manuals and Guidelines. www.mpi.govt.nz/processing/food-and-beverages/manuals-and-guidelines

Further information

Further information on foodborne illness is available at www.mpi.govt.nz > Search STEC.

Document Control

Protocol review task	Responsibility	Date completed
Advise team of review (partial review to incorporate MoH CDCM changes)	PHS	5/8/19
Create draft update document, including this table, and save in: Y:\CFS\Quality\NewDraftDocuments\CDProtocols	PHS	22/8/19
Review Ministry of Health (MoH) advice, literature, other protocols, and write draft update	PHS	22/8/19
Update Fact Sheet (or source link from MoH website)	Team Leader	19/8/19
Send drafts to MOsH, CD, Team Leader, and HPO for feedback	PHS	22/8/19
Update drafts further as required	PHS	22/8/19
Send final drafts to Com Dis MOH	PHS	22/8/19
Com Dis MOH sign-off	Com Dis MOH	22/8/19
Send final drafts to Clinical Director for approval	Com Dis MOH	22/8/19
Clinical Director approval (by email to PHS and QC, who will save in Y:\CFS\Quality\ApprovedDocuments\DAFApprovals).	CD	22/8/19
Complete **electronic** document control tasks incl. header; footer; eMDS metadata. Check CPH P&P site page links work, or add new links as required. Create .pdfs (for external links), and save to: • Protocols – Y:\CFS\Quality\ApprovedDocuments\ProtectionTeam\ IntranetPROTOCOLS • Fact Sheets – Y:\CFS\Quality\ApprovedDocuments\ProtectionTeam\ FactSheets Above folders are checked once a week and new documents are uploaded to: • Protocols – Surveillance (PHU server) website and Dropbox • Fact Sheets – CPH website or links are checked to MoH website	QC	V2, 23/11/22
Update **paper** copies (on-call folder/ vehicle)	HPO	
Advise operational/ regional staff of update, summarising any substantial changes (text highlighted in **blue** in document)	HPO	
Once finalised, save the original draft document incl. this table (recording update process) in: Y:\CFS\Quality\Archive\Protection\ComDisProtocolsArchive	QC	
Minor update to align response time with CPH guidance at https://cdhbintranet.cdhb.health.nz/communitypublichealth/cphpoliciesandprocedures/Documents/ComDis%20Notifiable%20Disease%20Response%20Times%20Guidelines.aspx	PHS	V2, 23/11/22