Communicable Disease Control Manual
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Foreword

Much of the surveillance of communicable disease in New Zealand is underpinned by the legal requirement – under the Health Act 1956 and Tuberculosis Act 1948 – for medical practitioners, and laboratories that handle human specimens, to notify named diseases. The primary purpose of this notification system is to prompt public health action to manage the case and reduce risk.

The *Communicable Disease Control Manual* aims to assist this objective; specifically, it seeks to inform and assist those at the frontline of public health action, namely the medical officers of health, health protection officers and staff at public health units. The purpose of the manual is to provide national protocols that describe the standard practice public health services would normally follow in the prevention and control of notifiable communicable diseases.

Actions, policies and legislation for preventing and controlling communicable diseases develop and change with time. This manual has to keep pace with such changes, and for this reason it is now being published electronically and as a series of individual chapters, one for each disease. This will allow for individual disease chapters to be reviewed and updated separately in accordance with new evidence and best practice. This edition of the manual follows the format of earlier editions with some considered adjustments to content in addition to long-awaited updates. It includes references and electronic links to other guidelines and material for those requiring more detail.

The manual should be used in conjunction with other best practice guidelines, including the *Immunisation Handbook*. Users are also encouraged to supplement the content of this manual with existing evidence-based effective practices at their local level and to bring such practices forward for broader consideration and possible incorporation into standard procedures at a national level. Similarly, while the protocols set out in the manual reflect normal expectations, there will be circumstances from time to time that may require adaptation based on the professional judgement of the local medical officer of health (for example, in a significant outbreak or epidemic).

I hope you find this manual a valuable tool in assisting your work.

Mark Jacobs
Director of Public Health
Acknowledgements

The revision of the Communicable Disease Control Manual has been a significant undertaking over a long time, with a number of people providing valuable input. Particular thanks must go to the individuals, predominantly medical officers of health, who reviewed (more than once) the content of the manual. Thanks also to current and past Ministry of Health staff who were involved, especially the communicable disease and immunisation teams and the Office of the Director of Public Health; also to staff at ESR, and to all other individuals in the health sector and other agencies that contributed.

The revision of this manual has included input from many people, including the following:

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General considerations for the control of communicable diseases in New Zealand

Control of communicable diseases continues to be one of the highest public health priorities, both nationally and internationally. Emerging and re-emerging microbial threats and drug resistance pose an ever-increasing challenge to public health practitioners. Added to this are the high public expectations of protection from public health hazards and increasing media interest in public health safety.

The Communicable Disease Control Manual seeks to inform and assist those at the frontline of public health action, namely the medical officers of health, health protection officers and staff at public health units. The primary purpose of the manual is to describe the standard practice that public health services would normally follow in regard to the prevention and control of notifiable diseases.

Most of the information is contained within the disease-specific chapters. This includes case definitions and laboratory tests required for case confirmation. Some important general considerations are outlined below, and in the appendices.

Notifiable infectious diseases

Under the Health Act 1956, attending medical practitioners are required to notify their local medical officer of health of any notifiable disease they suspect or diagnose. Notification data are recorded on a computerised database installed in each public health service and are used to guide local control measures. The data are collated and analysed at the national level by the Institute of Environmental Science and Research (ESR): Kenepuru Science Centre on behalf of the Ministry of Health Communicable Diseases Team.

A revised schedule of notifiable diseases came into effect on 1 June 1996. The revision was the most comprehensive change to the schedule since the Health Act was enacted in 1956. Ten years later, the Health Amendment Act 2006 added the statutory obligation for laboratories to notify notifiable diseases to a medical officer of health on suspicion and confirmation. This requirement came into effect in December 2007. In an attempt to standardise laboratory notification across the country, an agreed set of algorithms for the notifiable diseases was produced in 2007. Another change since 1996 has been to add other notifiable infectious diseases to the schedule, including sudden acute respiratory syndrome (SARS), highly pathogenic avian influenza (HPAI), Enterobacter sakazakii invasive disease, invasive pneumococcal disease and non-seasonal influenza. The currently proposed Public Health Bill will result in a review of
the public health regulatory framework and an amendment to the schedule of notifiable diseases.

Notifications provide the basis for the surveillance and control of communicable (and some non-communicable) diseases in New Zealand. Public health control measures are required in response to individual cases of some diseases, such as meningococcal disease and tuberculosis, and in response to outbreaks of other diseases, such as campylobacteriosis and cryptosporidiosis.

The need for effective disease surveillance and control is increasing, as are people’s expectations of being protected from disease threats. Surveillance is seen as a key strategy in preventing infectious diseases. The notifiable diseases are specified in the Health Act 1956 as notifiable infectious diseases (First Schedule, Part 1) and non-infectious notifiable diseases (Second Schedule). Tuberculosis is notifiable under the Tuberculosis Act 1948.

Notification confers special status. It provides a legal requirement for reporting, enables cases of disease to be notified without breaching the Privacy Act 1993 and should assist in making a complete identification of cases and their contacts if required. The decision to make a disease notifiable is based on the disease’s public health importance, as measured by such criteria as incidence, impact and preventability.

Attending medical practitioners and laboratories notify a disease to the local medical officer of health, allowing the medical officer of health to:

- identify cases of disease and contacts that require immediate public health control measures
- monitor disease incidence, distribution and changes and alert health workers to changes in disease activity in their area
- identify outbreaks and support the effective management of such outbreaks
- assess disease impact and help set priorities for prevention and control activities
- identify risk factors for diseases to support the development of effective prevention measures
- evaluate prevention and control activities
- identify and assess emerging hazards
- generate and evaluate hypotheses about disease occurrence
- fulfil statutory and international reporting requirements.

For information on powers for isolation and restriction, refer to the Health and Infectious Diseases Regulations 1966.
### Diseases notifiable in New Zealand¹

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¹ During times of increased incidence, medical practitioners may be requested to report, with informed consent, to their local medical officer of health cases of communicable diseases not included on this list.

² Not every case of acute gastroenteritis is necessarily notifiable, only those where there is a suspected common source or from a person in a high-risk category (for example, a food handler, an early childhood service worker) or single cases of chemical, bacterial or toxic food poisoning, such as botulism, toxic shellfish poisoning (any type) and disease caused by verotoxin- or Shiga toxin-producing Escherichia coli (VTEC/STEC).

³ E. sakazakii is now more commonly referred to as Cronobacter spp. but has not yet been renamed in the notifiable infectious diseases schedule.

⁴ Currently only Rabies is listed in the notifiable infectious diseases schedule. Reporting of other lyssavirus infections by medical practitioners is recommended with informed patient consent.

⁵ Q fever was once considered part of the genus Rickettsia. It is now classified in a separate genus but the notifiable infectious diseases schedule has not yet been updated to include Q fever. Reporting by medical practitioners is recommended with informed patient consent.
Hepatitis C (HCV)  Highly pathogenic avian influenza (including HPAI subtype H5N1)
Invasive pneumococcal disease  Leptospirosis
Measles  Neisseria meningitidis invasive disease
Non-seasonal influenza (capable of being transmitted between human beings)  Poliomyelitis
Rheumatic fever  Rubella (including congenital)
Tetanus  Yellow fever

Other diseases notifiable to a medical officer of health
(Schedule 2, Sections A and B)

- Cysticercosis
- Trichinellosis
- Lead absorption equal to or in excess of 15 µg/dl (0.48 µmol/l)\(^6\)

Notifiable diseases under the Tuberculosis Act 1948

Notifiable to a medical officer of health

- Tuberculosis (all forms)

Māori health

There are a number of issues to consider when working with Māori whānau, hapū and iwi who have been in contact with others who have had a serious communicable disease. Many Māori whānau retain extended kinship ties, which involve collective sharing during times of stress, such as when someone is very ill or following a death. This collective community sharing enables affected whānau members to grieve in a supported environment. However, such collective community sharing can also put the health of other whānau members at risk through exposure to the disease. The larger the gathering, such as a tangi, the greater the potential risk. Cultural factors need to be given careful consideration, particularly when tracing contacts for communicable diseases.

There are some additional issues to consider to ensure an effective response when working with Māori and possible exposure to a communicable disease:

1. Use Māori networks to help identify contacts who may be at risk by:
   - including cultural expertise (for example, Māori community health workers) in the response team who are called on to deal with a communicable disease situation that involves Māori families

\(^6\) The blood lead level threshold of 15 µg/dl is for conditions arising from occupation, otherwise the notification level is 0.48 µmol/l).
• working with Māori family support networks (for example, whānau, hapū and iwi networks) to identify and contact people who may be at risk

• using Māori health professionals when appropriate and available (for example, Māori public health nurses) who may be better prepared to work in Māori-specific environments, such as marae

• using media (for example, iwi radio stations) to provide the public with factual information that can help them determine their own level of risk.

2. Disseminate health education information in a culturally effective manner by:

• working in partnership with kaumātua and whānau to access and work with affected Māori communities

• using appropriate settings that address diverse Māori realities (for example, sport clubs, marae)

• minimising barriers to using health education material by providing such material in te reo Māori as well as English where possible.

Pacific health

Pacific communities are culturally diverse. They include people from different ethnic groups and cultures with specific customs, beliefs and traditions. Within each group, there are also subgroups, such as those born in New Zealand versus those born overseas, church groups, community groups and sports groups. Again, cultural factors need to be given careful consideration when tracing contacts for communicable diseases.

Some issues that need to be considered when dealing with instances of a notified communicable disease include:

• recognising the cultural diversity among Pacific peoples

• ensuring that interpretation and translation services are available and accessible

• using Pacific health workers where possible

• involving Pacific forms of media where possible, and church, community and sports groups where appropriate, to help inform the public of health risks and requirements around a communicable disease.
Other ethnic minority groups

Most migrants from developing countries have been exposed to a wide spectrum of communicable disease, including many infectious and parasitic diseases not often seen in New Zealand. Such exposures often result in the development of immunity (for example, gastrointestinal infections), while other exposures may confer immunity but may also result in a carrier status (for example, hepatitis B) or latent infection (for example, tuberculosis). Lower immunisation uptake rates and incomplete immunisation also expose migrant children and adults to a variety of vaccine-preventable diseases that may pose high risks. This has particular significance during early pregnancy (for example, rubella).

Other issues that medical practitioners need to be aware of when dealing with minority groups include:

- cultural diversity
- the need for interpretation and translation services
- women feeling more comfortable with female doctors.

Refugees and asylum seekers

In 1987 New Zealand established a formal quota for resettling refugees. New Zealand currently accepts 750 refugees per year. These refugees often have poor health as infectious and parasitic diseases are common in many of the countries from which refugee people originate.

Currently all refugees arriving in New Zealand stay at the Mangere Refugee Resettlement Centre in Auckland for 6 weeks, where they undergo general health screening and medical assessment. The health assessment and screening consists of a physical examination, as well as laboratory and other tests – these include a core set of tests, plus those conditional on age and sex and as clinically indicated.

Asylum seekers are offered the same health screening and medical assessment before their status is determined. If their asylum or protection status is granted, they complete the standard New Zealand Immigration Service medical examination when they apply for permanent residence.

International Health Regulations

The International Health Regulations (IHR) 2005, which entered into force in June 2007, take an all-risks approach to the management of global threats to public health.
While all potentially serious hazards are covered, in practice the day-to-day focus remains on communicable diseases.

Under the IHR 2005, New Zealand must fulfil the following obligations.

1. New Zealand must develop and maintain the capacities to detect, investigate, manage and report all potentially serious disease-related events. These capacities must be in place locally/regionally, nationally and at the border, such as international airports.

2. New Zealand must establish an IHR National Focal Point (NFP) to provide a single point of contact between this country and the World Health Organization (WHO). This NFP performs a whole-of-health-sector, whole-of-government role in collating and dissemination relevant information. The Office of the Director of Public Health in the Ministry of Health performs this NFP role.

3. The Ministry of Health must receive, and rapidly assess the significance of, any reports of potentially serious public health events to determine whether or not the NFP should report the event urgently to WHO (see below). Such assessments include using the 'Decision Instrument' as provided for in Annex 2 of the IHR 2005.

4. Within 72 hours of the Ministry receiving relevant information, the NFP must notify WHO of events involving any case of smallpox, poliomyelitis, SARS or human influenza caused by a new subtype.

5. Within 48 hours of the Ministry of Health receiving information of any event involving cholera, pneumonic plague, yellow fever, viral haemorrhagic fevers, West Nile fever or any unusual or potentially serious public health event, the NFP must have assessed the event using the Decision Instrument, and, where notification is required, notify WHO within a further 24 hours.

Designated officers and public health units play a vital role in ensuring that New Zealand meets the obligations listed above, and in particular they should maintain close communication with the Ministry of Health to ensure that the requirements listed under points 4 and 5 above are able to be discharged in a timely manner.

As well as serious public health events, communications between IHR national focal points and WHO take place on disease cases and contacts that are of relevance to other countries – for example, where someone has been identified as being infectious while staying in another country or aboard a plane. Designated officers and public health units who are alerted to such instances should send this information to the Office of the Director of Public Health (ODPH) as the IHR National Focal Point for New Zealand. If in doubt about what information to notify, contact ODPH for advice.
Acquired immunodeficiency syndrome (AIDS)

Chapter last reviewed and updated in December 2018. A description of changes can be found at www.health.govt.nz/cdcupdates.

Acquired immunodeficiency syndrome (AIDS) is the late stage of the spectrum of disease caused by the human immunodeficiency virus (HIV). In New Zealand, both AIDS and HIV are notifiable conditions.

Epidemiology of HIV and AIDS in New Zealand

In New Zealand, the number of people developing AIDS declined in the mid-1990s, as it did in many developed countries as a result of improved treatments for people with HIV infection. The majority of people currently found with AIDS tested late for HIV, and therefore were not previously on anti-retroviral treatment that would have prevented AIDS developing.

The survival of those people who do progress to AIDS is also longer than it used to be due to improved treatment, and the annual number of deaths from AIDS is now consistently lower than the number of people notified with AIDS.

For the most up-to-date information on the epidemiology of HIV and AIDS in New Zealand, refer to AIDS – New Zealand, the newsletter produced by the AIDS Epidemiology Group (AEG) (www.otago.ac.nz/aidsepigroup), which is also posted on the Ministry of Health website (www.health.govt.nz/our-work/diseases-and-conditions/hiv-and-aids).

Case definition of AIDS

For surveillance purposes, in New Zealand, a person with HIV infection is said to have developed AIDS when one or more of a list of 25 AIDS-defining illnesses first develop. A CD4 count of less than 200 cells per cubic millimetre of blood, which is used in the United States as a criterion for AIDS, is not used in New Zealand. Medical practitioners will identify patients with a ‘late diagnosis’ of HIV by ascertaining the date of the HIV diagnosis and the date of the AIDS diagnosis.

The 25 AIDS-defining diseases are:

- candidiasis of bronchi, trachea or lungs
- candidiasis of oesophagus
- cervical cancer, invasive
- coccidioidomycosis, disseminated or extrapulmonary
• cryptococcosis, extrapulmonary
• cryptosporidiosis, chronic intestinal (> 1 month’s duration)
• cytomegalovirus disease (other than liver, spleen or nodes)
• cytomegalovirus retinitis (with impairment of vision)
• herpes simplex: chronic ulcer(s) (> 1 month’s duration), bronchitis, pneumonitis or oesophagitis
• histoplasmosis, disseminated or extrapulmonary
• HIV-related encephalopathy
• HIV-related wasting
• isosporiasis, chronic intestinal (> 1 month’s duration)
• Kaposi’s sarcoma
• lymphoma, Burkitt’s (or equivalent term)
• lymphoma, immunoblastic (or equivalent term)
• lymphoma, primary, of brain
• Mycobacterium avium complex or M. kansasii infection, disseminated or extrapulmonary
• Mycobacterium tuberculosis infection, any site (pulmonary or extrapulmonary)
• Mycobacterium, other species or unidentified species, infection, disseminated or extrapulmonary
• Pneumocystis jiroveci pneumonia
• pneumonia, recurrent
• progressive multifocal leukoencephalopathy
• Salmonella septicaemia, recurrent
• toxoplasmosis of brain.

For children, additional conditions in Category C7 are:
• serious multiple or recurrent bacterial infections; that is, at least two culture-confirmed infections (septicaemia, pneumonia, meningitis, bone or joint infection, or abscess of an internal organ or body cavity) within a two-year period.

**Laboratory testing for diagnosis**

AIDS is a clinical diagnosis. There is laboratory testing available for HIV but not for AIDS.

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7 The CDC classifies HIV-infected children by immunological status and clinical disease stage with clinical categories N, A, B and C, category C being severely symptomatic.
Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as confirmed or not a case.

- **Probable:** Not applicable.

- **Confirmed:** HIV infection with an AIDS-defining disease (as above).

- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

Spread of infection

Incubation period

Without treatment, the time from initial infection with HIV to clinical onset of AIDS in an untreated patient is variable, averaging 8–10 years in developed countries.

Mode of transmission

HIV is transmitted from person to person in four main ways:

- through anal and vaginal sex
- through the sharing of contaminated injecting equipment (needles and syringes)
- from an infected mother to her baby during pregnancy or childbirth or through breastfeeding
- through transfusion of infected blood or blood components and the transplantation of infected tissue or organs.

Period of communicability

While transmission of HIV can occur throughout an infected person’s life, the transmissibility varies with the viral load, which is typically high during initial seroconversion and later as the CD4 count falls. Anti-retroviral therapy that successfully suppresses the circulating viral load to low or undetectable levels greatly reduces infectivity.

Notification procedure

AIDS is a notifiable condition. Attending medical practitioners must initially notify all cases to the local Medical Officer of Health, using non-identifiable data, in the initial notification form that can be found at https://surv.esr.cri.nz/episurv/crf.php.

Entry of this information into EpiSurv by the local public health service will automatically result in the AEG receiving access to the information, and in the creation of a web-based detailed notification form. The AEG will send the health provider who notified the case a link to this form, for the health provider to complete online.
Section C of Part 1 of Schedule 1 of the Health Act 1956 covers notification of AIDS, HIV and other sexually transmitted infections. Under this legislation, the notification process must not include identifying information.

The AEG makes confidential quarterly reports to the Ministry of Health and Medical Officers of Health. It produces the *AIDS – New Zealand* newsletter annually and disseminates it widely, to stakeholders and the public.

**Management of case**

**Investigation**
Identify the mode of infection in consultation with the attending infectious diseases physician.

**Restriction**
No isolation precautions other than standard precautions are needed for HIV-positive cases in health care facilities. Staff who are asked to perform an invasive procedure on the case are commonly informed about the case’s infectious status. In almost all cases, there are no restrictions on attending work, early childhood services or schools or other community activities.

**Treatment**
The case should be under the care of a physician or paediatrician who has a special interest in HIV and AIDS.

**Counselling**
People found to be infected with HIV should receive counselling on the implications of the diagnosis from a medical practitioner and/or counsellor. The counselling should cover the practical and legal aspects of preventing transmission of HIV. Specific recommendations include:

- not donating blood
- not sharing drug-injecting equipment
- not sharing razors or toothbrushes
- following safe sex practices and informing sexual partners
- informing health care workers (including dentists) of infection.

**Management of contacts**

**Definition**
Contacts include:

- sexual or needle-sharing partners of an HIV-infected person
• individuals who have suffered a sharp injury with an object contaminated with HIV-infected blood or body fluid

• newborn babies whose mothers are HIV-positive

• individuals who have received HIV-infected body fluid (eg, blood, semen or cerebrospinal fluid) splashes to a mucosal surface or area of broken skin.

Investigation

All investigation and treatment, including management of HIV-infected pregnant women, should be undertaken under the supervision of an infectious diseases physician with a special interest in HIV.

Health practitioners must perform all HIV tests with the informed consent (verbal consent is sufficient in most cases) of the person, and with pre-test counselling that covers the reason for the test, the person’s right to decline testing, the date and means by which the results will be made available and an assurance that the practitioner will take steps to maintain confidentiality, including an offer to test under code. More comprehensive pre-test counselling is indicated when the person is at high risk of being HIV-positive.

Post-exposure prophylaxis

When considering post-exposure prophylaxis, practitioners should seek immediate advice from the infectious diseases service of the closest tertiary care hospital. An anti-retroviral prescriber must authorise the prophylaxis.

The need for anti-retroviral prophylaxis depends on:

• the period that has elapsed between the exposure and the availability of appropriate treatment (chemoprophylaxis has been shown to have some protective effect up to 36 hours after exposure)

• the type of exposure and source material (eg, a needle-stick injury or sexual contact).

Counselling

Health practitioners should offer the contact comprehensive counselling, ideally in conjunction with the supervising infectious diseases physician. The New Zealand AIDS Foundation is the lead Ministry of Health non-governmental agency for HIV and AIDS: see www.nzaf.org.nz

Other control measures

Identification of source

If there is a cluster of cases, investigate for a common exposure, including sexual contact, sharing of injecting drug equipment, health care or skin penetration practices
(eg, tattooing). If the case could be transfusion-related, contact the New Zealand Blood Service.

**Disinfection**

Clean equipment and surfaces potentially contaminated with blood or body fluids. For further details, refer to Appendix 1: Disinfection.

**Health education**

Information, including frequently asked questions regarding HIV infection and AIDS, is available from the Ministry of Health website (www.health.govt.nz/our-work/diseases-and-conditions/hiv-and-aids) and from the New Zealand AIDS Foundation website (www.nzaf.org.nz).

Advise injecting drug users on single-use injecting equipment. Needle and syringe exchange programmes exist in pharmacies and community groups throughout New Zealand. A list of outlets is available from the New Zealand Needle Exchange Programme website at www.needle.co.nz

The Ministry of Health offers an HIV screening programme for all pregnant women. Information is available on the National Screening Unit website at www.nsu.govt.nz

**References and further information**


Acute gastroenteritis (and toxin-related illnesses)

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Episodes and outbreaks of acute gastroenteritis are common in New Zealand. They are usually due to microorganisms. Outbreaks of poisoning due to a chemical contaminant of water or food have only rarely been reported.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.


Case definition

Acute gastroenteritis is a descriptive term for inflammation of the gastrointestinal tract from any cause. It commonly presents as the sudden onset of diarrhoea and/or vomiting. Diarrhoea is defined as more frequent (>= 3 per day) and loose stools three or more times per day. These symptoms can be present in many medical conditions, especially in children. Symptoms may be toxin-mediated and other than gastrointestinal. Acute gastroenteritis can be caused by ingestion of:

- toxins, for example, toxins produced by *Bacillus cereus*, *Staphylococcus aureus*, *Clostridium botulinum*, tutu plant (Coriaria)
- viruses, for example, norovirus, rotavirus
- bacteria, for example, *Campylobacter* spp., *Salmonella* spp., *Yersinia* spp, *E. coli*
- parasites, for example, *Giardia, Cryptosporidium*
- chemicals, for example, some metals

Acute gastroenteritis is not necessarily notifiable, unless:

1. there is a suspected common source

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8  www.ehinz.ac.nz/our-projects/hazardous-substances/hazardous-substances-surveillance-system
2. it is in a person in a high-risk category (food handler, early childhood service worker, other person at increased risk of spreading it)

3. it is an infectious gastroenteritis of public health importance.

Notification is required for single cases of chemical, or toxic food poisoning such as botulism, histamine (scromboid) poisoning and, toxic shellfish poisoning (any type).

In addition to acute gastroenteritis, there are also specific notifiable enteric diseases covered in other chapters; these are Shiga toxin-producing *Escherichia coli* (STEC, previously known as VTEC), *Campylobacter* and *Salmonella*.

**Clinical description**

An acute illness with vomiting and/or diarrhoea (three or more loose stools per day).

Toxin-related illnesses may present with clinical features additional to and dominant to the gastrointestinal clinical features. These may include neurological (change in sensation, muscle weakness, difficulty swallowing), dermatological (itch and flushing), musculoskeletal (painful muscles and joints) and cardiovascular (hypotension and bradycardia) features.

**Laboratory test for diagnosis**

Laboratory definitive evidence for a confirmed case requires isolation of the specific organism or detection of organism nucleic acid or detection of toxin.

Note: For some pathogens, detection of nucleic acid is insufficient to meet the case definition (isolation is required) – see specific notifiable enteric diseases chapters, eg, Shigellosis.

**Case classification**

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

- **Probable**: A clinically compatible illness.

- **Confirmed**:
  - A clinically compatible illness accompanied by laboratory definitive evidence, or
  - A clinically compatible illness and a common exposure associated with a laboratory confirmed case.

- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.
Notification procedure

Notification is required for single cases of chemical, bacterial or toxic food poisoning such as botulism, histamine (scombroid) poisoning and toxic shellfish poisoning (any type).

In addition to the specific enteric diseases covered in other chapters, the following categories of acute gastroenteritis must be reported without delay:

1. any suspected outbreak of acute gastroenteritis where there is a suspected common source (for example, two or more cases associated in time or place, commonly caused by norovirus, rotavirus, enteric adenoviruses, B. cereus, S. aureus)
2. single cases in a high-risk category (food handler, early childhood service worker, or other person at increased risk of spreading infection)
3. single cases of infectious gastroenteritis of public health importance, not listed on schedule (1) as individually notifiable, including but not exclusive to:
   - E. coli strains causing diarrhoea, for example, enteropathogenic E. coli (EPEC) and enterotoxigenic E. coli (ETEC)
   - Clostridium perfringens
   - Vibrio parahaemolyticus.
4. single cases caused by non-infectious gastrointestinal intoxicants (for example, fish or shellfish toxins; use of aluminium, copper or brass utensils to store acidic fruits or drinks; barbecued food where tannalised wood has been used).

Management of case

Investigation

Obtain a history of possible contacts, travel, food and water ingestion, in addition to any reported with the notification.

Ensure that laboratory confirmation by stool testing, when appropriate, has been attempted. Testing of stool (or vomit, although yield is lower than from stool) samples for norovirus should be considered in an outbreak situation where the clinical and epidemiological features suggest norovirus infection. Unfortunately, the rapid progress of most norovirus outbreaks and relatively long turnaround time for norovirus testing necessitate empirical diagnosis and management for at least the first 5–7 days in most of these events.

Restriction

In a health care facility, place patients with acute gastroenteritis of unknown cause under contact isolation precautions. If the cause of gastroenteritis is known, isolation precautions are only necessary for those infections with the potential for person-to-person spread. For example, all patients with norovirus and diapered or incontinent patients with rotavirus or enteric adenovirus infections require contact isolation for the duration of symptoms. Consider placing such patients, especially if vomiting, under airborne precautions in addition to contact precautions.
Food handlers with gastroenteritis of unknown cause should be withdrawn from food handling work while undergoing investigation and until symptoms resolve; they may be able to continue working as long as that work does not involve handling food. There is no additional restriction on food handlers found to have non-cholera vibrio infections, or shellfish or fish poisoning. For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric disease.

**Counselling**
Advised the case and/or caregivers of the nature of the disease and its mode of transmission. Educate about hygiene, especially hand cleaning.

**Management of contacts**

**Definition**
A person who has been exposed to an infected person or infectious material in such a way that transmission may have occurred.

**Prophylaxis**
For people known to have eaten *C. botulinum* toxin-containing food, consult an infectious diseases specialist. Also, Botulinum antitoxin may be recommended for close contacts who may have shared the implicated food with the case in the previous 72 hours following consultation with an Infectious Diseases specialist and the Ministry of Health.

**Counselling**
Advised all contacts of the incubation period and typical symptoms of the disease, and to seek early medical attention if symptoms develop.

**Other control measures**

**Identification of source**
Check for other cases in the community. Investigate potential food, water, or other common sources of infection (eg, young animals and farm animals) if there is a cluster of cases, an apparent epidemiological link or a single case of suspected botulism. When appropriate, collect specimens of suspect foods for analysis, ensuring samples are transported in sealed containers.

If indicated, check water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008).
Disinfection
Clean and disinfect surfaces and articles soiled with stool. For more details, refer to Appendix 1: Disinfection.

Health education
Educate the public about hand hygiene and safe food preparation (see Appendix 3: Patient information) and the risks posed by exposure to farm animals and their wastes.

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.

Epidemic control


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 Ministry for Primary Industries and the local territorial authority as appropriate.

References and further information


Anthrax

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

The last case of human anthrax in New Zealand was reported in 1940, and the last recorded outbreak among domestic livestock was in 1954. Human anthrax disease in New Zealand may occur in a traveller or through contact with illegally imported and contaminated animal products such as wool, hides, leather or bone.

Case definition

Clinical description

Anthrax is an illness with acute onset characterised by several distinct clinical forms including:

- a skin lesion that has evolved over 2–6 days from a papule, through a vesicular stage to a depressed black eschar, with considerable swelling around the lesion
- a respiratory illness of abrupt onset followed by the development of dyspnoea progressing to hypoxia, with X-ray evidence of mediastinal widening
- abdominal distress followed by fever and signs of septicaemia (rare).

Ninety percent of cases are cutaneous anthrax.

Laboratory test for diagnosis

Laboratory confirmation requires at least one of the following:

- isolation of *Bacillus anthracis* from a clinical specimen
- demonstration of *B. anthracis* in a clinical specimen by immunofluorescence
- significant antibody titres developing in an appropriate clinical case.

If anthrax is suspected, discuss testing with the Institute of Environmental Science and Research (ESR).

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as confirmed.
- **Probable:** Not applicable.
- **Confirmed:** A clinically compatible illness that is laboratory confirmed.
• **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

## Spread of infection

### Incubation period

- **Cutaneous:** Typically 1 day.
- **Inhalational:** From 1–7 days, although incubation periods up to 60 days are possible.
- **Gastrointestinal:** Typically 3–7 days.

## Mode of transmission

Humans can become infected with anthrax by handling or consuming products from infected animals, from being bitten by flies who have fed on infected animals, by inhaling anthrax spores (especially from contaminated animal products such as hides) or through cuts and abrasions that become infected with contaminated soil. In 2001 several people in the United States contracted anthrax from spores maliciously distributed through the postal system.

## Period of communicability

Anthrax is not transmitted person to person. Articles and soil contaminated with spores in endemic areas may remain infective for many years.

## Notification procedure

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

## Management of case

### Investigation

Obtain a history of travel and contact with imported animal products (for example, wool, hides, leather, bone) or unknown powder substances.

### Restriction

Standard infection control precautions apply for all direct clinical care. Although a cutaneous lesion will be sterile after 24 hours’ treatment, dressings soiled with discharges from lesions should be burned and reusable surgical equipment sterilised.

### Treatment

The case should be under the care of an infectious diseases physician.
**Counselling**
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

**Management of contacts**
Ensure that all people potentially at risk are provided with information about the disease including symptoms and decontamination if relevant.

When exposure to anthrax is considered credible, post-exposure prophylaxis should be recommended in consultation with an infectious diseases physician.

If the contact was a result of a suspected deliberate exposure to anthrax, then decontamination should occur with soap and copious amounts of shower water. Clothing and personal effects should be placed in a sealed plastic bag, which should be labelled with the owner’s contact details and an inventory of contents, and kept as evidence in case of a criminal trial or returned to the owner if the threat is unsubstantiated.

**Other control measures**

**Identification of source**
Check for other cases in the community, household and workplace. If the case may have acquired the infection in New Zealand, liaise with Ministry for Primary Industries staff on phone: 0800 809 966 to investigate potential animal sources of infection.

**Outbreak control measures**
These include:
- coordination with appropriate emergency services, including the police
- active case finding
- alerts for medical practitioners and hospitals
- release of appropriate public information
- control of contacts, including field workers involved in environmental control measures
- environmental control measures.

**Disinfection**
Clean and disinfect objects or surfaces soiled with discharges from cutaneous lesions. Use a sporicidal product (see Appendix 1: Disinfection).
Health education

Control and handling of imported fibres and other products to prevent transmission of anthrax is legislated under the Anthrax Prevention Regulations 1987. For further information, see the Environmental Health Protection Manual (available from the Ministry of Health).

Reporting

Ensure complete case information is entered into EpiSurv.

On receiving a notification, medical officers of health should immediately notify the Director of Public Health, Ministry of Health.

If the case may have been acquired in New Zealand, the Ministry of Health will notify the appropriate staff in the Ministry for Primary Industries and the Department of Labour (if the exposure is employment-related) so that further investigation of the source can be undertaken.

References and further information


Arboviral diseases

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

This chapter covers arthropod-borne viral infections of greatest relevance to New Zealand, except yellow fever, which is discussed in a separate chapter. Most of the viruses discussed here are transmitted by mosquito and belong to the Flavivirus or Alphavirus genus. Many species also have bird or mammal transmission options. Viral haemorrhagic fevers are specified separately.

All case notifications of arboviral infection to date have been in recent overseas travellers.

Flaviviruses

Murray Valley encephalitis; Kunjin; dengue 1, 2, 3, 4; Kokobera, Japanese encephalitis and West Nile virus.

Note: Yellow fever is also a flavivirus but is discussed in a separate chapter.

Alphaviruses

Ross River, Barmah Forest, Chikungunya and Sindbis.

The Sindbis-like alphavirus Whataaroa virus is established in bird populations on the West Coast of the South Island. Human infection without disease has been documented serologically.

Three mosquito species that have the potential to be vectors of human disease viruses are established in New Zealand: Culex quinquefasciatus (possibly a vector for encephalitis viruses), Aedes notoscriptus (a vector for dengue virus) and A. australis (a vector for dengue and Whataaroa viruses). All three are also potential vectors of Ross River virus. Compared with overseas species, however, these three New Zealand mosquito species are poor arboviral vectors and are unlikely to support long-term endemic transmission of arboviruses in New Zealand.

For more detailed epidemiological information, see the most recent annual reports on the Institute of Environmental Science and Research (ESR) website at www.surv.esr.cri.nz
### Table 1: Clinical description of arboviral diseases

<table>
<thead>
<tr>
<th>Virus</th>
<th>Clinical description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ross River and Barmah Forest viruses</td>
<td>Most cases are asymptomatic. Severity is variable. Typical symptoms include a rash, particularly on palms; polyarthritis/arthralgia; myalgia; lethargy and low-grade fever. Symptoms such as arthralgia, myalgia and lethargy may occasionally persist for months.</td>
</tr>
<tr>
<td>Chikungunya virus</td>
<td>Similar to Ross River and Barmah Forest. Flu-like, with high fevers, chills and muscle aches. Other symptoms include severe headaches; a rash on the arms, legs and trunk; and nausea and vomiting. In 80 percent of cases, there is pain or inflammation in the small joints of the hands and feet; this can persist for weeks or months.</td>
</tr>
<tr>
<td>Dengue fever</td>
<td>Classical dengue fever is more commonly seen in older children and adults. Symptoms include sudden onset of fever; headache, particularly retro orbital; myalgia and arthralgia; and a fine rash, which may be itchy and usually begins on the extremities but spares the palms and soles. Other symptoms include weakness, depression, anorexia, abnormal taste, sore throat, coughing, vomiting and abdominal pain.</td>
</tr>
<tr>
<td>Dengue haemorrhagic fever</td>
<td>This can occur when a person who has previously had one type of dengue fever becomes infected by another type. It is most commonly seen in children under 15 years of age but can also occur in adults. Onset same as classical dengue followed after 2–5 days by haemorrhagic manifestations and hypovolaemic shock (dengue haemorrhagic fever/dengue shock syndrome).</td>
</tr>
<tr>
<td>Murray Valley encephalitis, Japanese encephalitis and Kunjin</td>
<td>More than 99 percent of infections are asymptomatic. Symptoms are variable but typically include sudden onset of fever, anorexia and headache. Vomiting, nausea and diarrhoea, muscle aches and dizziness may also occur. Encephalitis: photophobia, lethargy, irritability, drowsiness, neck stiffness, confusion ataxia, aphasia, intention tremor, convulsions, coma and death. 25 percent of symptomatic cases of Murray Valley and Japanese encephalitis are fatal, and a further 25 percent result in permanent disability. It is rare for encephalitis to follow Kunjin infection.</td>
</tr>
<tr>
<td>Sinbis</td>
<td>Fever, arthritis, rash.</td>
</tr>
<tr>
<td>Tick-borne encephalitis</td>
<td>Most infections are asymptomatic. Symptoms can include fever, malaise, headache, nausea, vomiting, myalgia and muscle fasciculation. Within 1 week, these symptoms resolve spontaneously, but in less than 0.5 percent of infections, there is a relapse after 2–8 days with high fever, headache, vomiting, meningoitis, encephalitis or myelitis.</td>
</tr>
<tr>
<td>West Nile encephalitis</td>
<td>Most infections are symptomatic. Features can include fever, malaise, headache, arthralgia, myalgia, anorexia, nausea, vomiting, diarrhoea, coughing, sore throat, flushed face, conjunctival injection, generalised lymphadenopathy, maculopapular rash and hepatosplenomegaly. Encephalitis or myelitis occurs in less than 1 percent of cases.</td>
</tr>
</tbody>
</table>
Laboratory test for diagnosis
Consult ESR or LabPlus at Auckland District Health Board to discuss appropriate testing and interpretation of results.

Laboratory confirmation requires at least one of the following:
- isolation of the virus
- detection of arbovirus nucleic acid
- detection of arbovirus-specific IgM
- IgG seroconversion
- a significant increase (four-fold or greater) in antibody titres to specific arbovirus.

Note: Closely related arboviruses can be clinically indistinguishable and exhibit serologic cross-reactivity. Therefore, positive results of serologic tests should be investigated further by cross-neutralisation methods using a battery of viruses relevant to the region where the case was exposed.

Case classification
- **Under investigation**: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable**: A clinically compatible illness in a person who has come from an endemic area.
- **Confirmed**: A clinically compatible illness that is laboratory confirmed.
- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

Spread of infection

<table>
<thead>
<tr>
<th>Arbovirus</th>
<th>Incubation period (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ross River</td>
<td>7–9 (range 3–21)</td>
</tr>
<tr>
<td>Barmah Forest</td>
<td>Not clear, probably 7–10</td>
</tr>
<tr>
<td>Dengue</td>
<td>5–8 (range 3–14)</td>
</tr>
<tr>
<td>Murray Valley encephalitis</td>
<td>7–14 (range 5–26)</td>
</tr>
<tr>
<td>Kunjin</td>
<td>Unknown, possibly 5–26</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td>5–15</td>
</tr>
<tr>
<td>West Nile</td>
<td>Range 3–14</td>
</tr>
<tr>
<td>Chikungunya</td>
<td>3–12</td>
</tr>
</tbody>
</table>
Mode of transmission
Bite of infected mosquito (except tick-borne encephalitis). Specific viruses are associated with specific mosquito species.

Period of communicability
There is no person-to-person transmission. The virus is generally not detectable in human blood after onset of symptoms. Mosquitoes remain infective for life.

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

Management of case
Investigation
Confirm date of onset and symptoms of illness.
Confirm results of relevant pathology tests or recommend test to be done (advise attending medical practitioner to take convalescent sera to confirm diagnosis).
Obtain a history of travel, mosquito or other insect bite and protective measures taken against insect bites.

Restriction
Nil.

Treatment
Supportive and symptomatic.

Counselling
Advise the case and their caregivers of the nature of the disease and its mode of transmission. Explain that having this condition may predispose a case to dengue haemorrhagic fever, which requires them to take increased precautions against mosquito bites when travelling in regions where dengue infections occur.
Management of contacts

Advise those exposed to the same risk factors as the index case to protect against mosquitoes for at least 2 weeks after leaving the risk area. Advise also regarding the incubation period and common symptoms of arboviral infections and encourage contacts to seek early medical attention if symptoms develop.

Other control measures

Identification of source

If there is a possibility of locally acquired infection, check for other cases in the community and liaise with Ministry for Primary Industries staff to investigate potential mosquito vectors for infection. When mosquito vectors have been identified, they will be subject to surveillance or eradication to ensure they do not become established. For example, the southern saltmarsh mosquito, Ochlerotatus camptorhynchus, has established in several areas and is subsequently the target of eradication campaigns in the Kaipara, Whangaparoa and Wairau areas. This species is a vector for Ross River fever and possibly Barmah Forest and Murray Valley encephalitis viruses.

Disinfection

Nil.

Health education

For locally acquired cases, consider a media release and direct communication with health professionals to encourage prompt reporting of symptoms and assist with biosecurity investigations. In communications with doctors, include recommendations regarding diagnosis and treatment.

All travellers to arbovirus-endemic countries should get travel medicine advice on personal protection before travelling. This includes advice on mosquito protection in the form of repellents containing DEET, protective clothing and insecticide-impregnated mosquito nets as well as details of possible vaccines.

For further advice, consult an infectious diseases physician or ESR Kenepuru Science Centre.

Reporting

Ensure complete case information is entered into EpiSurv.

Medical officers of health should immediately notify the Ministry of Health Communicable Diseases Team if there is any suspicion that the infection was acquired locally.

If the case may have acquired an arbovirus in New Zealand, the Ministry of Health Communicable Diseases Team will notify the appropriate staff in the Ministry for
Primary Industries so that further investigation of a mosquito vector can be undertaken.

The International Health Regulations (IHR) National Focal Point in the Ministry must use the IHR Decision Instrument for any event involving cholera, pneumonic plague, yellow fever, viral haemorrhagic fevers, West Nile fever or any unusual or potentially serious public health event, and then notify the World Health Organization if required.

References and further information


Brucellosis

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

*Brucella* infections are usually seen in farmers, veterinarians and abattoir workers. Laboratory personnel are at increased risk. However, internationally, ingestion of unpasteurised goat cheese and milk is the most common risk factor for brucellosis.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

Clinical description

Frequently asymptomatic. Most commonly it is an acute illness with fever, arthralgia, headache, malaise, anorexia, constipation, respiratory tract symptoms and hepatosplenomegaly. If inadequately treated, especially in older cases and in the form of *Brucella melitensis* infections, persistent suppurative foci of infection in joints, bone, liver or spleen may develop. Other complications include epididymo-orchitis, meningoencephalitis, endocarditis and chronic fatigue syndrome.

Laboratory test for diagnosis

**Laboratory confirmation requires** at least one of the following:

- isolation of *Brucella* species or detection of *Brucella* nucleic acid from a clinical specimen
- a four-fold or greater rise in *Brucella* antibody titre (by SAT, ELISA, Coombs, IFA) between acute and convalescent phase serum specimens (SAT slide agglutinin test). Consider the possibility of cross-reactivity in the *Brucella* SAT test with antibodies in people infected with *Yersinia enterocolitica*, other yersiniae, cholera, tularaemia or certain serotypes of *Salmonella*, *Escherichia coli* and *Pseudomonas*.

Case classification

- **Under investigation**: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable**: A clinically compatible illness that is epidemiologically linked to a confirmed source.
- **Confirmed**: A clinically compatible illness that is laboratory confirmed.
• **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

Consult an infectious diseases physician before the case is classified as confirmed.

**Spread of infection**

**Incubation period**
5–60 days; commonly 1–2 months.

**Mode of transmission**
The bacteria are excreted in milk and urine and found in the placentas and fetal tissues of infected animals. The bacteria can survive in soil for up to 10 weeks, in liquid manure for up to 2 years, in goat cheese for up to 6 months at 4–8ºC and in water for up to 2 months.

Humans may be infected through contact with infective material via cuts or abrasions in the skin, conjunctivae or inhalation, by ingestion of unpasteurised cheese or milk or by accidental needle stick or mucosal splash when vaccinating using live attenuated vaccine.

Aerosols may occasionally transmit *Brucella* to laboratory staff. Rare human-to-human transmission through sexual contact has been reported.

Rare person-to-person communicability. There may be a risk in endemic areas from animal fomites.

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

**Management of case**

**Investigation**
Obtain a history of travel, animal contact, microbiology laboratory work or consumption of unpasteurised cheese or milk.

Ensure laboratory confirmation has been attempted. Species-level identification of the organism through isolation or nucleic acid amplification aids investigation of the source.

**Restriction**
Cover draining wounds with a dressing.
**Treatment**

The case should be under the care of an infectious diseases physician. Cases 8 years of age or older should be treated with doxycycline plus either gentamicin or rifampicin. For cases younger than 8 years old, give co-trimoxazole plus either gentamicin or rifampicin.

**Counselling**

Advise the case and their caregivers of the nature of the disease and its mode of transmission. Discuss the need to cover draining wounds with a dressing and to use condoms for sexual intercourse.

**Management of contacts**

**Definition**

All people with a similar exposure to the case.

**Investigation and restriction**

Nil.

**Prophylaxis**

There is no recommendation for prophylaxis of contacts, but prescription of an oral regimen may be discussed with any contact who has a very high risk of developing infection, such as having consumed the same unpasteurised milk product as the case within the incubation period.

**Counselling**

Advise all contacts of the incubation period and typical symptoms of brucellosis. Encourage them to seek early medical attention if symptoms develop.

**Other control measures**

**Identification of source**

Check for other cases in the community, household and workplace. If the case may have acquired the infection in New Zealand, liaise with Ministry for Primary Industries staff to investigate potential animal sources of infection on phone: 0800 809 966.

**Disinfection**

Clean and disinfect surfaces and articles soiled with purulent discharges. For details, refer to Appendix 1: Disinfection.
Health education

If there is a cluster of cases, consider a media release and direct communication with relevant occupational groups and health professionals to encourage prompt reporting of symptoms. In communications with doctors, include recommendations regarding diagnosis, treatment and infection control.

Ensure there are safe procedures in place in meat-processing facilities to prevent exposure, including the use of personal protective equipment, covering broken skin lesions and good ventilation.

Educate farmers, veterinarians and hunters on the risks of handling potentially infected animals and carcasses, especially domestic and wild swine, placentas, discharges and fetuses. Practices aimed at reducing the risk of leptospirosis (for example, using gloves and covering scratches) will also reduce the risk of brucellosis.

Educate the public about the risks of consuming unpasteurised milk and cheese.

Reporting

Ensure complete case information is entered into EpiSurv.

On receiving a notification and where the case is suspected of having contracted the disease in New Zealand, medical officers of health should immediately notify the Director of Public Health at the Ministry of Health.

The Ministry of Health will notify the appropriate staff in the Ministry for Primary Industries so that further investigation of the source can be undertaken.

If the disease is thought to have been occupationally acquired, this should be notified to the Department of Labour via the notifiable occupational disease system (NODS).

If a contaminated commercial food source is identified, liaise with the Ministry for Primary Industries.
Campylobacteriosis

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Campylobacteriosis is the most frequently notified disease in New Zealand. There is marked seasonality in notifications, with the peak in spring and summer.

Traditionally, campylobacteriosis has mainly been attributed to C. jejuni, and to a lesser degree, C. coli and C. fetus, but other species are increasingly recognised as human pathogens.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

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

Case definition

Clinical description

An illness of variable severity with symptoms of abdominal pain, fever and watery diarrhoea, sometimes including bloody stools. Less frequently, Campylobacter can present as an invasive disease.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires identification of Campylobacter spp. from a clinical specimen by one of the following methods:

- isolation (culture)
- detection of Campylobacter nucleic acid
- detection of antigen.

All species of Campylobacter should be notified. Where possible, culture should be attempted. Diagnostic laboratories may choose to identify further than genus level but should refer isolates for confirmatory speciation to the Enteric Reference Laboratory at ESR.
Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it.
- **Probable:** A clinically compatible illness that either is a contact of a confirmed case of the same disease or has had contact with the same common source – that is, is part of a common-source outbreak.
- **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.

Spread of infection

Reservoir

Zoonotic infection. *C. jejuni* associated primarily with poultry; also cattle, sheep and domestic pets. *C. coli* associated with pigs and poultry and *C. fetus* with cattle. Asymptomatic carriage.

Incubation period

Usually 2–5 days, range 1–10 days.

Mode of transmission

Historically, most often by ingestion of contaminated food, typically poultry or unpasteurised milk. Cross-contamination from raw meat to other foodstuffs may occur via hands, utensils, chopping boards or incorrect storage. In New Zealand, consumption of faecally contaminated water and direct contact with farm or domestic animals are common routes of transmission. Person-to-person transmission is uncommon.

Period of communicability

*Campylobacter* spp. may be shed in the stool for several weeks after infection.

Notification procedure

Attending medical practitioners or laboratories must notify the local medical officer of health of cases of probable or confirmed campylobacteriosis.

All health care workers are encouraged to talk with a medical officer of health about any suspected outbreaks or cases in people who are in high-risk occupations.
Management of case

Investigation
Investigate and obtain a detailed history if there is an outbreak or if the case is in a high-risk occupation or attends an early childhood service. Obtain a food consumption history and details of water consumption and animal contact as well as details of occupation as appropriate per local protocol.

Ensure symptomatic cases submit stool samples for testing.

Restriction
In a health care facility, only standard precautions are indicated in most cases. If the case is diapered or incontinent, apply contact precautions for the duration of illness. For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric disease.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission. Educate about hygiene and risks of infrequent significant complications such as GBS and reactive arthritis.

Management of contacts
As set out in the exclusion and clearance criteria (Appendix 2: Enteric disease), screening or restriction is not indicated for contacts of infectious cases or for people who have been exposed to the same food material suspected to be the source of infection.

If symptomatic, investigate and manage as a case until the stool test results are known.

Other control measures
Identification of source
Check for other cases in the community. Investigate potential food or water sources of infection only if there is a cluster of cases or an apparent epidemiological link.

If indicated, check water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008). Liaise with the local territorial authority staff to investigate potential water sources of infection.

Disinfection
Clean and disinfect surfaces and articles soiled with stool. For more details, refer to Appendix 1: Disinfection.
Health education

Educate the public about safe food preparation (see Appendix 3: Patient information).

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 veterinarian 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.

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.

Reporting

Ensure complete case information is entered into EpiSurv.

Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.

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.

References and further information

Cholera

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Cholera is not endemic in New Zealand, but occasional imported cases occur, mainly in travellers from Asia.

There are over 200 serogroups of *Vibrio cholerae* but only serogroups O1 or O139 that produce cholera toxin are associated with clinical cholera and have pandemic potential.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

Case definition

Clinical description

An illness of variable severity characterised by watery diarrhoea and vomiting, which can lead to profound dehydration.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires isolation of *Vibrio cholerae* serogroup O1 or O139 from a clinical specimen and confirmation that the organism is toxigenic (can produce the cholera toxin).

All specimens should be referred to the Enteric Reference laboratory at ESR for serotyping, toxin detection and confirmation.

Case classification

All isolates of *Vibrio cholerae* are initially notifiable as suspected cholera until the strain has been determined. Unless the isolate is determined to be O1 or O139 and has the ability to produce cholera toxin, the case should be made ‘not a case’.

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

- **Probable**: A clinically compatible illness that is either a contact of a confirmed case of the same disease or has had contact with the same common source – that is, is part of a common-source outbreak.
• **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: Some strains of O1 and O139 do not possess the cholera toxin gene, and some strains of non-O1 non-O139 do possess the cholera toxin gene. Illness caused by these strains is not defined as ‘cholera’.

### Spread of infection

#### Reservoir

Contaminated water forms the reservoir with humans as the only host.

#### Incubation period

A few hours to 5 days, commonly 2–3 days.

#### Mode of transmission

Infection of humans occurs by ingestion of contaminated food (for example, rice, seafood, fresh vegetables and fruit) or water (for example, rivers, ponds, lakes, well water and even municipal water). Direct person-to-person transmission is probably rare because a large inoculum is necessary to transmit disease.

#### Period of communicability

Usually from the onset of symptoms until a few days after recovery but occasionally persists for several months or years. Individuals with asymptomatic infections may shed the organism in their faeces for 1-10 days post-infection, though the risk to others in this situation is unclear.

*V. cholerae* persists indefinitely in aquatic environments and may survive up to 14 days in some foods.

### Notification procedure

Attending medical practitioners or laboratories must notify the local medical officer of health immediately about cases of cholera. The Ministry of Health assesses cases of cholera, and if necessary reports them to the World Health Organization (WHO), in accordance with the International Health Regulations (IHR) 2005.

While laboratories speciate, samples must be further typed at ESR for genes encoding heat-stable enterotoxin (NAG-ST), that is, NAG *V. cholerae*. 
Management of case

Investigation
Obtain a history of travel, consumption of untreated water and possible contacts. Ensure laboratory confirmation by stool culture or rectal swab and further typing has been attempted. Ensure the laboratory is aware of any overseas travel history so that selective media for cholera can be used.

Restriction
In health care facilities, only standard precautions are indicated in most cases. If the case is diapered or incontinent, apply contact precautions for the duration of illness.

Exclude from work those in high-risk groups, such as food handlers and caregivers (of patients, children and the elderly), until symptom free for 48 hours. In exceptional circumstances, where workplace hygiene or sanitation is uncertain, exclude until the case has submitted two consecutive negative stools, taken at least 24 hours apart.

Recommendations regarding restriction for cases and contacts of foodborne and waterborne illness are summarised in the exclusion and clearance criteria in Appendix 2: Enteric Disease.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Educate about hand and food hygiene.

Management of contacts
Identify contacts for investigation and counselling as appropriate.

Definition
Household members or those exposed to a possible common food source during the 5 days before onset of symptoms.

Investigation
Obtain stool for vibrio culture from symptomatic contacts, especially if the infection was acquired in New Zealand. Inform the laboratory that cholera is suspected.

Restriction
Nil if asymptomatic. If symptomatic, restrict as for case (while awaiting stool culture results).
Prophylaxis
Antimicrobial prophylaxis for contacts is not generally recommended because the rate of secondary spread is very low in Western countries.

Counselling
Advise all contacts of the incubation period and typical symptoms of cholera, and to seek early medical attention if symptoms develop.

Educate about hand and food hygiene.

Other control measures

Identification of source
Check for other cases in the community. If the infection was acquired in New Zealand, undertake a thorough investigation to identify the source. This should include surveillance of contacts, stool testing of symptomatic contacts (see above) and assessment of possible food or water sources in association with the local territorial authority.

If indicated, check the water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008). Liaise with the local territorial authority staff to investigate potential water sources of infection.

Disinfection
Clean and disinfect surfaces and articles soiled with stool or vomit. For more details, see Appendix 1: Disinfection.

Health education
In the event of a locally acquired case, consider a media release and direct communication with the population at risk and health professionals to encourage prompt reporting of symptoms. In communications with doctors, include recommendations regarding diagnosis, treatment and infection control.

If a water supply is involved, liaise with the local territorial authority to inform the public. Advise on the need to boil water.
Reporting

Ensure complete case information is entered into EpiSurv.

Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.

If an outbreak occurs, contact the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.

Medical officers of health should also notify the Ministry of Health if even a single case of locally acquired cholera occurs. The IHR National Focal Point in the Ministry must use the IHR Decision Instrument for any event involving cholera, and then notify WHO if required.

References and further information

Creutzfeldt-Jakob disease and other spongiform encephalopathies

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Creutzfeldt-Jakob disease (CJD) is one of the transmissible spongiform encephalopathies that affect humans. There are generally three or four cases of CJD in New Zealand each year.

Other transmissible spongiform encephalopathies include kuru and hereditary forms such as Gerstmann-Straussler-Scheinker syndrome and fatal familial insomnia. CJD is subdivided into sporadic (previously known as classic), familial, iatrogenic and variant forms. The variant form of CJD (vCJD) is linked epidemiologically and through laboratory studies to bovine spongiform encephalopathy (BSE) in cattle.

All spongiform encephalopathies are caused by proteinaceous infectious particles (termed ‘prions’) that undergo conformational change, leading to cellular death and inducing a similar conformational change in other proteins around them.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

This is based on diagnostic criteria developed by the New Zealand CJD registry, which include case history and examination findings, cerebral magnetic resonance imaging (MRI), electroencephalogram (EEG), cerebrospinal fluid (CSF) 14-3-3 protein and definitively brain histopathology.

Clinical description

CJD is a rapidly progressive, universally fatal neurodegenerative disease. Subtypes of CJD are differentiated by causative mechanism and clinical picture, as summarised in Table 1.
## Table 1: Types of CJD

<table>
<thead>
<tr>
<th>Subtype</th>
<th>Description</th>
<th>Predominant features</th>
<th>Mean age of onset</th>
<th>Mean duration of illness before death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sporadic</td>
<td>Accounts for around 85 percent of all cases of CJD globally. Thought to arise spontaneously.</td>
<td>Dementia, myoclonus, ataxia</td>
<td>65 years</td>
<td>4.5 months</td>
</tr>
<tr>
<td>Familial</td>
<td>A hereditary form of CJD that accounts for 10–15 percent of all cases of CJD, occurring in geographic clusters. Autosomal dominant inheritance. Close blood relatives of people with genetic CJD have a 1 in 2 chance of carrying the gene and developing the disease.</td>
<td>Dementia, myoclonus</td>
<td>45–49 years</td>
<td>15 months</td>
</tr>
<tr>
<td>Variant</td>
<td>Suspected to occur from eating beef and beef products from cattle infected with BSE. Often starts with psychiatric symptoms, such as anxiety and depression. Infectious prion proteins are found outside the nervous system as well as within it, especially in the lymphoid tissues throughout the body. No cases of vCJD have been reported in New Zealand to date.</td>
<td>Mood and behavioural abnormalities, paraesthesias, dementia</td>
<td>26 years</td>
<td>14 months</td>
</tr>
<tr>
<td>Iatrogenic</td>
<td>Accounts for less than 1% of all cases of CJD. Infection passed on from treatment or procedures from any case (sporadic, familial, variant) can be considered iatrogenic. Historically from pituitary hormones and dura mater grafts derived from human cadavers (treatments no longer in use), and more recently through corneal transplantation and contaminated neurosurgical instruments. Infection with variant CJD has been linked with blood transfusion in 4 patients in the United Kingdom.</td>
<td>Lack of coordination, dementia (late)</td>
<td>Depends on age of exposure</td>
<td>4.5 months (8 months if related to human growth hormone)</td>
</tr>
</tbody>
</table>

Source: Health Protection Agency (United Kingdom), and personal communication Professor Martin Pollock, University of Otago
Laboratory tests for diagnosis

Histopathological examination of brain tissue confirms the diagnosis. The sensitivity and specificity of 14-3-3 protein detection in CSF are diagnostically helpful. Levels increase during the course of disease. Using a cut-off value of 8.3 ng/mL, the test has a sensitivity of 93 percent and specificity of 98 percent for sporadic CJD. The sensitivity is substantially lower for familial and variant subtypes. MRI [DWI] has a sensitivity and specificity in CJD of 91 and 96 percent respectively.

Case classification

This is largely based on specific diagnostic criteria of definite, probable or possible CJD or vCJD, and assessed by the CJD Registry and reporting clinician.

- **Under investigation:** Cases with neurological disease of unknown aetiology who do not fit the criteria for possible CJD or vCJD but where the diagnosis of CJD is being actively considered.
- **Probable:** Clinical criteria met for probable or possible CJD.
- **Confirmed:** Laboratory confirmation of CJD.
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

Spread of infection

Incubation period

Sporadic and familial cases

Arises spontaneously. See Table 1: Types of CJD, above, for mean age of onset.

Variant cases

Based on the small number of vCJD cases, the incubation period for foodborne transmission is approximately 13 years.

Iatrogenic cases

- Neurosurgical cases and EEG depth electrodes: 12–28 months
- Dural grafts: 1.5–18 years
- Growth hormone: 6–30 years
- Based on the small numbers of vCJD cases, the blood transfusion-related transmissions is around 5–9 years.
Mode of transmission

Sporadic and familial
Not applicable (arises spontaneously).

Variant

Variant CJD is most likely to have been caused by consumption of food products contaminated by BSE-infected cattle.

Iatrogenic

Infection passed on as a result of medical treatment or invasive medical intervention through exposure to infectious material from a case is considered iatrogenic. Most cases of iatrogenic CJD have been transmitted through cadaveric dural grafts or treatment with human pituitary hormones; a few cases have been transmitted through corneal transplantation, contaminated neurosurgical instruments or from EEG depth electrodes. Each acquired form involves the inoculation, implantation or transplantation of infectious material.

Transmission from cases

For sporadic, familial and iatrogenic cases of CJD, only the tissues of the central nervous system, including the brain, dura mater, spinal cord ganglia, CSF (low risk), posterior eye and the olfactory tract, appear to be infective. Infective material is rarely found in blood.

For variant CJD, abnormal prion protein has also been detected in various lymphoid tissues, including tonsils, spleen, gastrointestinal lymphoid tissues (for example, Peyers patches of the appendix and rectum), lymph nodes, thymus and adrenal gland. Some vCJD cases have been linked to blood transfusions, and it is thought that vCJD can be transmitted by blood components from people who are asymptomatic but later develop the disease.

There have been no isolations of infective material from human faeces, saliva, tears, vaginal secretions, semen or milk.

Period of communicability

Cases are increasingly likely to be infective during the last 40 percent of the incubation period (that is, approximately 8 years before the onset of symptoms for sporadic CJD). Central nervous system tissue is infective throughout symptomatic illness.

Notification procedure

Attending medical practitioners must immediately report suspected cases directly to the New Zealand CJD register, at the Department of Preventive and Social Medicine, University of Otago Dunedin School of Medicine, and inform the local medical officer of health and Director of Public Health at the Ministry of Health.
**Management of case**

**Investigation**

As for the CJD register protocol, completed by the clinician.

**Restriction**

There is no reason to defer, deny or in any way discourage the admission of a person with CJD into any health care setting. Based on current knowledge, isolation of patients is not necessary; they can be nursed in the open ward system using standard precautions. Private room nursing care is not required for infection control, but may be appropriate for compassionate reasons.

In regard to invasive medical interventions, people with confirmed or suspected CJD are the highest-risk patients. They must be managed according to infection control policies using specific precautions (see documents referred to in ‘other control measures’, below). Cases must not donate blood or organs.

**Treatment**

Supportive.

**Counselling**

Provided by the clinician or by a psychologist.

**Management of others at risk**

For infection control purposes, individuals with confirmed or suspected CJD are the highest-risk patients. Intermediate precautionary measures and counselling are also important for people who are identified as having been exposed to CJD or as being at risk of CJD (for example, have a family history).

<table>
<thead>
<tr>
<th>Table 2: Categorisation of individuals at risk of CJD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptomatic cases</strong></td>
</tr>
<tr>
<td><strong>Asymptomatic individuals at risk from familial forms of CJD linked to genetic mutations</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Asymptomatic individuals identified as potentially at risk due to iatrogenic exposures

<table>
<thead>
<tr>
<th>Recipients of hormone derived from human pituitary glands, for example, growth hormone, gonadotrophin. <em>(In New Zealand, the human pituitary hormone programme ceased in 1985.)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals who have received a graft of dura mater. <em>(In October 1988 the New Zealand Department of Health, now Ministry of Health, recommended that commercially produced dura mater not be used.)</em></td>
</tr>
<tr>
<td>Cases who have been contacted as potentially at risk, including individuals considered to be:</td>
</tr>
<tr>
<td>• at risk of CJD/vCJD due to exposure to certain instruments used on a case who went on to develop CJD/vCJD or was at risk of vCJD</td>
</tr>
<tr>
<td>• at risk of vCJD due to receipt of blood components or plasma derivatives</td>
</tr>
<tr>
<td>• at risk of CJD/vCJD due to receipt of tissues/organs</td>
</tr>
<tr>
<td>• at risk of vCJD due to the probability they could have been the source of infection for a case transfused with their blood who was later found to have vCJD.</td>
</tr>
</tbody>
</table>

Source: Adapted from UK Advisory Committee on Dangerous Pathogens (ACDP) 2007.

Note:
- Categorisation of individuals by risk is in descending order.
- This table does not include people who may theoretically be at increased risk because of food-related exposures (eg, eating beef from areas with previous BSE). This risk is thought to be extremely low.

Restrictions

Individuals at risk of disease must not donate blood or organs. They must notify their health care providers of their risk of developing prion disease as this has implications for lumbar puncture, endoscopy and surgical procedures and for transport and laboratory processing of samples.

Individuals who have spent 6 months or more in the United Kingdom, France or the Republic of Ireland between January 1980 and December 1996 must not donate blood; however, organ donation is allowed with informed consent.

Individuals who have a history of blood or blood product transfusion in the United Kingdom, France or the Republic of Ireland since 1980 must not donate blood. In addition, the New Zealand Blood Service does not accept tissues from individuals with the above blood transfusion history.

Other control measures

Identification of source

Follow the CJD register protocol.
Disinfection and decontamination

Comprehensive advice on case care, occupational exposure, laboratory safety, decontamination of instruments and surfaces, waste disposal and post-mortem care can be found in control guidance documents published by both the Australian Department of Health and Ageing and the United Kingdom’s Department of Health. These documents are the basis of New Zealand’s national policy approach recommended by the Ministry of Health. They can be located at the following website addresses:

- Department of Health and Ageing, Australia, *Creutzfeldt-Jacob Disease Infection Control Guidelines December 2007*

- National Health and Medical Research Council (NHMRC), Australia, *Australian Guidelines for the Prevention and Control of Infection in Healthcare (2010)*

- ACDP, Department of Health, UK, Transmissible Spongiform Encephalopathy Agents: Safe working and the prevention of infection, Infection control of CJD and related disorders in the health care setting:
  www.advisorybodies.doh.gov.uk/acdp/tseguidance/tseguidancepart4-30mar07.pdf

Reporting

Attending medical practitioners must immediately report suspected cases directly to the New Zealand CJD register, at the Department of Preventive and Social Medicine, University of Otago Dunedin School of Medicine, and inform the local medical officer of health and Director of Public Health at the Ministry of Health.

If there are risk factors associated with health care, then the Ministry of Health will convene the CJD Response Group.

References and further information


ACDP, Department of Health, UK, *Transmissible Spongiform Encephalopathy Agents: Safe working and the prevention of infection, Infection control of CJD and related disorders in the health care setting*: URL:
www.advisorybodies.doh.gov.uk/acdp/tseguidance/tseguidancepart4-30mar07.pdf
**Cronobacter species invasive disease**

**Chapter reviewed and updated in December 2017.** A description of changes can be found at [www.health.govt.nz/cdcupdates](http://www.health.govt.nz/cdcupdates).

*Cronobacter species* were previously known as *E. sakazakii*.

**Epidemiology in New Zealand**

*Cronobacter spp.* is naturally present in the environment and has been known to cause disease in people of all ages. The particular concern underlying the decision to make *Cronobacter spp* invasive disease notifiable is disease in premature neonates, including meningitis, necrotising enterocolitis and sepsis, often resulting in death, as a consequence of low-level *Cronobacter spp* contamination in powdered infant formula. In August 2004 all neonatal units were advised to cease using powdered infant formula, and instead use the prepared ‘ready-to-feed’ (RTF) infant formula that is recommended by the Ministry of Health and Ministry for Primary Industries.

- [www.foodsafety.govt.nz/elibrary/industry/Infant_Formula-Nzfsa_Have.htm](http://www.foodsafety.govt.nz/elibrary/industry/Infant_Formula-Nzfsa_Have.htm)


**Case definition**

**Clinical description**

Severe illness, usually in neonates and occasionally in elderly and immunocompromised, frequently presenting with hypo- or hyperthermia, lethargy, tachycardia, periods of apnoea and one or more of the following:

- meningitis including seizures
- encephalitis
- necrotising enterocolitis
- severe diarrhoea
- severe sepsis
- respiratory distress.

Only disease in infants less than 1 year old is notifiable.
Laboratory test for diagnosis

**Laboratory definitive evidence for a confirmed case requires** isolation of *Cronobacter spp.* from a normally sterile site, for example, blood, cerebrospinal fluid, or aspirated urine.

All invasive isolates of *Cronobacter spp.* or yellow-pigmented *Enterobacter* species (if unable to further speciate) from neonates or infants should be referred to the Enteric Reference Laboratory at ESR for confirmation.

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable:** Clinical deterioration with isolation of the organism from a non-sterile site, for example, faeces.
- **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.

Spread of infection

Incubation period

Not yet determined. In neonatal cases symptoms normally appear a few days after birth.

Mode of transmission

*Cronobacter spp.* has been known to contaminate infant formula through:

- the raw materials used for producing the formula
- contamination of the formula or other dry ingredients after pasteurisation
- contamination of the formula as it is being reconstituted by the caregiver just before feeding.

Period of communicability

Although faecal carriage may last for 8–18 weeks, secondary transfer is not known to occur.

Notification procedure

Attending medical practitioners or laboratories must immediately notify the local medical officer of health of suspected cases. Notification should not await confirmation.
• Only disease in infants less than 1 year old is reportable.

Management of case

Investigation

Obtain a history of pregnancy, medical co-morbidity and ingestion of potentially contaminated foodstuffs, in particular infant feed. Use the specific food-source questionnaire available through ESR to identify possible sources of contamination.

Ensure samples from the symptomatic patient and any foodstuffs, especially implicated infant feed, have been cultured for Cronobacter spp. Molecular subtyping should be used to determine the association between isolates from cases and any foodstuffs that test positive for Cronobacter spp. All invasive isolates of Cronobacter spp. should be referred to the Enteric Reference Laboratory at ESR for confirmation.

Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.

Restriction

Nil.

Counselling

The case and caregiver should be advised on the transmission of the infection and the symptoms.

Management of contacts

Definition

All neonates who have been exposed to the same food material suspected to be the source of infection, especially infant feed.

Investigation

Investigate contacts who are symptomatic.

Restriction and prophylaxis

Nil.

Counselling

Close observation of neonatal contacts.
Other control measures

All neonatal units have been advised not to use powdered infant formula, replacing it with appropriate liquid ready to feed formulae.

Identification of source

Liaise with the Ministry for Primary Industries.

Disinfection

Nil.

Health education

New Zealand Government policy advice on infant feeding is:

- breast milk is the best source of nutrition for newborn babies and breastfeeding benefits both the mother and the baby (Ministry of Health 2008).

- where a decision is made to use infant formula, the most important considerations are as follows:
  - powdered infant formula is not sterile, which means it may contain bacteria; however, these bacteria very rarely cause illness as long as the formula is prepared and stored properly (refer to Ministry of Health booklet ‘Feeding Your Baby Infant Formula www.healthed.govt.nz/resource/feeding-your-baby-infant-formula)
  - healthy full-term (37–42 weeks) babies have an extremely low risk of infection by Cronobacter spp. from powdered infant formula
  - if formula is being used, a dairy-based powdered infant formula is recommended
  - when preparing dairy-based powdered infant formula, it is recommended you only prepare the amount you need for your baby’s next feed and that you prepare formula as close as possible to feeding time.

The following recommendations are made for premature, low birth weight and sick babies (admitted to neonatal units).

- Breast milk is best for these babies too, but some may need formula

- If not breastfed, these babies who are more vulnerable to infection should be fed ready-to-feed liquid formula instead of powdered infant formula. Ready-to-feed liquid formula is sterilised in the bottle, which means there is no risk of infection for babies given this formula.

- If no alternative to powdered formula is available, then strict preparation and administration guidelines should be followed to minimise infection risk. Parents of premature babies should check with their neonatal unit staff.

**Reporting**

Ensure complete case information is entered into EpiSurv.

If any cases occur, contact the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.

**References and further information**

Cryptosporidiosis

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Cryptosporidiosis is caused by infection with the coccidian protozoan Cryptosporidium spp.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

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

Case definition

Clinical description

An acute illness that includes symptoms of diarrhoea (may be profuse and watery) and abdominal pain. The infection may be asymptomatic but to meet the case definition the individual must have compatible symptoms.

Laboratory test for diagnosis

- **Laboratory definitive evidence for a confirmed case requires** detection of Cryptosporidium spp oocysts in a faecal specimen by at least one of the following methods:
  - Cryptosporidium antigen detection by either:
    - detection of direct fluorescence using monoclonal antibodies
    - detection of antigens using a rapid antigen test
    - enzyme immunoassay.
  - detection of Cryptosporidium nucleic acid
  - visualisation by direct microscopy detection of Cryptosporidium cysts.

Case classification

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

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9. Once confirmed, the sample is anonymised and sent to Massey University for genotyping.
• **Probable:** A clinically compatible illness that either is a contact of a confirmed case of the same disease or has had contact with the same common source – that is, is part of a common-source outbreak.

• **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.

**Spread of infection**

**Reservoir**
The gastrointestinal tract of humans (C. hominis) and animals (C. parvum) including cattle, sheep, pigs, cats, dogs, poultry and fish. Asymptomatic carriage.

**Incubation period**
Probably 1–12 days, with an average of 7 days.

**Mode of transmission**
Faecal-oral, including person to person, from infected animals or from contaminated water or food.

**Period of communicability**
Oocysts, the infectious stage, appear in the faeces at the start of illness and are excreted for several weeks after symptoms resolve.

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

**Management of case**

**Investigation**
Obtain a history of contact with animals, consumption of untreated water, recreational water contact, overseas travel, exposure to faeces or contact with other symptomatic cases.

Investigate further if there is an outbreak, or if the case is in a high-risk occupation, such as a food handler or a staff member at an early childhood service, or attends an early childhood service (see ‘Other control measures’ below).

Ensure stool samples from people with diarrhoea have been tested for *Cryptosporidium* spp.
Restriction
In any health care facility, only standard precautions are indicated in most cases; if the case is diapered or incontinent, apply contact precautions for the duration of illness.

In the case of immunocompromised people, there is currently no available chemotherapeutic agent that can be used to treat the infection, hence infection prevention and control are of major importance to protect such people. For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric disease.

Cases should not use public swimming pools until 2 weeks after symptoms have resolved.

Cases should be particularly careful not to transmit disease to immunocompromised people, this includes avoiding close physical contact with immunocompromised individuals until 2 weeks after symptoms have resolved.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Educate about hygiene, especially hand cleaning, and the risk of co-bathing with siblings if the case is a child.

Management of contacts
Definition
All people who have had close physical contact (for example, household) with a symptomatic case or who have been exposed to the same animal, water, food or other material suspected to be the source of infection.

Counselling
Advise all contacts to seek early medical attention if symptoms develop.

Other control measures
Identification of source
Check for other cases in the community. Investigate potential food, water or swimming pool sources of infection only if there is a cluster of cases or an apparent epidemiological link.

If indicated, check water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008).

If a water supply is involved, liaise with the local territorial authority to inform the public. Advise on the need to boil water.
If indicated, check swimming pools for compliance with the Standard for Pool Water Quality (NZS 5826:2010). Liaise with the local territorial authority staff to investigate potential water or pool sources of infection.

**Disinfection**

Clean and disinfect surfaces and articles soiled with stool. For more details, refer to Appendix 1: Disinfection.

**Health education**

Consider a media release and direct communication with relevant early childhood services, schools and health professionals to encourage prompt reporting of symptoms. In communicating with doctors, include recommendations regarding diagnosis and infection control.

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.

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.

Educate the public about safe food preparation (see Appendix 3: Patient information).

**Reporting**

Ensure complete case information is entered into EpiSurv.

Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.

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.

**References and further information**

Cysticercosis

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Cysticercosis, taeniasis and hydatids are a subset of ‘cestode’ (tapeworm infection) and are all notifiable. Taeniasis and hydatids are discussed in separate chapters.

Tapeworm infection causes two clinical syndromes in humans:
- mature tapeworm infestation in the gut
- larval cysts embedded throughout the body, causing hydatosis, cysticercosis, coenurosis or sparganosis.

Cysticercosis refers to disease in the tissues caused by the larval stage of one species of tapeworm – *Taenia solium*, otherwise known as the pork tapeworm. Ingested eggs hatch in the small intestine, and the larvae migrate to various tissues and organs, particularly in the central nervous system (neurocysticercosis), and form cysts. These eventually degenerate and become calcified granulomata.

Taeniasis (discussed separately) refers to intestinal infection by adult tapeworms of the genus *Taenia* (for example, *T. saginatum*, *T. solium*).

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

Case definition

Clinical description

Cysticerci can cause symptoms by compression or inflammation. Outside the central nervous system, they are generally asymptomatic and, when calcified, present only as an incidental radiological finding. In the brain and spinal cord, however, cysticerci can be associated with mass effects (for example, sensorimotor or cognitive deficits), seizures, hydrocephalus, chronic meningitis and spinal cord compression. Cysticercosis can cause serious disability but has a low case-fatality rate. The clinical diagnosis of neurocysticercosis can be made by computed tomography (CT) or magnetic resonance imaging (MRI) of the brain or spinal cord.
Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires:

- microscopic or histological identification of cysticerci in tissue
- reactive serology on serum or CSF in the context of suggestive radiological features on CT/MRI.

Serological testing can be performed on serum and cerebrospinal fluid. Modern serological assays are highly sensitive and specific for diagnosis of infection in patients with more than one viable cyst. Assay sensitivity is lower in the context of a single or calcified (dead) cyst and slightly lower in CSF compared to serum. Therefore, a negative serological test does not necessarily exclude cysticercosis.

Note: Microscopic identification of proglottids or eggs in the faeces or in the perianal region is also used in the diagnosis of taeniasis, but is not diagnostic of cysticercosis.

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable:** A clinically compatible illness not accompanied by laboratory definitive evidence but with characteristic radiological features and occurs in a person who has lived in an endemic area.
- **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.

Spread of infection

Reservoir

Humans are the definitive source; pigs the intermediate host.

Incubation period

The time between infection and onset of symptoms can vary from weeks to 10 years or more after infection.

Mode of transmission

Cysticercosis is acquired either by ingestion of *T. solium* eggs shed in the faeces of another case (including indirectly via food contamination) or by ingestion of *T. solium* eggs shed in a case’s own faeces (auto-inoculation).
**Period of communicability**

Larvae remain viable in animal tissues for years. Adult tapeworms may live in the human intestine and shed eggs for up to 25 years, growing up to 8 metres in length. *T. solium* eggs are infectious both to humans and to pigs. Eggs may remain viable in the environment for months.

**Notification procedure**

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

**Management of case**

**Investigation**

Investigate for the presence of *T. solium* taeniasis in case and among case contacts. Obtain a history of travel, especially to developing countries, and consumption of food prepared by someone who has lived in or travelled to high risk areas.

Ensure laboratory confirmation has been attempted.

**Restriction**

Nil. However, in case of taeniasis due to *T. solium* cross-infection could occur via the faecal-oral route.

**Counselling**

Advise the case and their caregivers of the nature of the disease and its mode of transmission. Educate about hygiene, especially hand cleaning.

**Management of contacts**

**Definition**

A person from the same household(s) as the case.

A person who has travelled in developing countries together with the case.

People exposed to the same source of *T. solium* eggs via faecal-oral contamination if the source has been identified.

**Investigation**

Advise contacts to visit their general practitioner to arrange laboratory testing, especially testing for the adult worm (for example, stool testing for eggs and parasites) as taeniasis is the infectious manifestation of the parasite cycle. The laboratory needs to be informed of the contact risk and history. For faecal testing, normally three samples are required.
Restriction
Nil.

Prophylaxis
Nil.

Counselling
Nil.

Other control measures

Identification of source
If the case contracted cysticercosis in New Zealand, liaise with the Ministry for Primary Industries to investigate potential animal sources of infection.

Disinfection
Nil.

Health education
Advise on hygienic food handling and on the danger of food contaminated by human faeces.

Public education may be indicated to prevent faecal contamination of soil, water and food for humans and animals. Avoid the use of sewage effluents for pasture irrigation.

Advise about the health dangers of consuming raw or undercooked meat.

Freezing pork or beef below −5°C for more than 4 days effectively kills cysticerci, as does appropriate irradiation.

Reporting
Ensure that complete case information is entered into EpiSurv.

On receiving a notification of a case who may have acquired the infection in New Zealand, medical officers of health should notify the Director of Public Health at the Ministry of Health.

References and further information
Diphtheria

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Diphtheria is caused by toxin-producing strains of Corynebacterium diphtheriae. Rarely, diphtheria-like illness may result from infection with toxigenic Corynebacterium ulcerans.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

Clinical description

Respiratory diphtheria is characterised by infection primarily involving the tonsil(s), pharynx and/or larynx, low-grade fever, with or without an asymmetrical greyish-white adherent membrane of the tonsil(s), pharynx and/or nose. In moderate to severe cases there can be marked neck swelling (enlarged anterior cervical lymph nodes and oedema of the surrounding tissues), resulting in a ‘bull neck’ appearance. Toxic effects can arise, including cardiac and neurological symptoms (for example, myocarditis and neuropathies).

Cutaneous diphtheria is characterised by secondary infection of other skin conditions or chronic ulcers with a grey membrane. Cutaneous diphtheria can act as a reservoir of bacteria capable of causing pharyngeal disease. Toxic sequelae in cutaneous cases are uncommon. Other extra-respiratory presentations have also been described, including septic arthritis, conjunctivitis, and vaginal and external auditory canal infections.

Laboratory test for diagnosis

Laboratory confirmation requires isolation of diphtheria toxin-producing corynebacteria from a clinical specimen such as nose, throat and skin swabs.

Laboratories must be informed that the sample is from a suspected case of diphtheria as selective media are required.

Case classification

All isolates of C. diphtheriae and C. ulcerans are notifiable until toxigenicity is determined, including cutaneous isolates. If the isolate is determined to be non-toxigenic (does not have the ability to produce diphtheria toxin), the case should be denotified.
• **Under investigation**: A case that has been notified, but information is not yet available to classify it as probable or confirmed.

• **Probable**: A clinically compatible illness that is not laboratory confirmed.

• **Confirmed**: A clinically compatible illness that is laboratory confirmed or is epidemiologically linked to a laboratory confirmed case.

• **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

**Spread of infection**

**Incubation period**

Usually 2–5 days, occasionally longer.

**Mode of transmission**

Contact with respiratory droplets or infected skin of a case or carrier or, more rarely, contaminated articles.

Unpasteurised milk has also been identified as a source of infection.

**Period of communicability**

Variable; usually 2 weeks or less, seldom more than 4 weeks. Effective antimicrobial therapy promptly terminates shedding.

**Notification procedure**

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

**Management of case**

**Investigation**

Obtain history of vaccination, possible contacts, travel, any cutaneous lesions or existing skin conditions and consumption of unpasteurised milk.

Ensure laboratory is aware of suspected case and has attempted confirmation from clinical specimen(s) by nose, throat and/or skin swabs, including toxigenicity testing of *C. diphtheriae* or *C. ulcerans* isolates.

To date, most isolates in New Zealand have been non-toxigenic. The extent of public health action while awaiting laboratory confirmation should be based on available information and the judgement of the local medical officer of health.
Restriction
Standard and droplet precautions for toxigenic pharyngeal diphtheria (and standard and contact precautions for toxigenic cutaneous diphtheria) until microbiological clearance has been documented.

Exclude case from early childhood service, school, work and close contact with previously unexposed people until microbiologically cleared. See Health (Infectious Notifiable Diseases) Regulations 1966.

Microbiological clearance
Two cultures from both throat and nose (and from skin lesions in cutaneous diphtheria), taken not less than 24 hours apart and not less than 24 hours after finishing antimicrobials, fail to show C. diphtheriae or C. ulcerans.

Treatment
All cases should be under the care of an infectious diseases physician or paediatrician. Diphtheria antitoxin is usually indicated before laboratory confirmation when there is strong clinical suspicion of diphtheria.

Immunisation
Case should be immunised in the convalescent stage because clinical infection does not always induce adequate levels of antitoxin.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Management of contacts
Outbreak control measures should be instituted for each case. Every effort should be made to locate contacts and unreported cases of toxigenic diphtheria (including cutaneous infections).

Person-to-person transmission of C. ulcerans is rare, but contacts require the same management as for C. diphtheriae, described under ‘Management of case’ above.

Contacts who have a positive laboratory result should be managed as if they are a case until proven bacteriologically negative. This may include follow-up of their contacts.
Definition
Regardless of vaccination status, all those with a history of close contact with a case of diphtheria caused by toxigenic *C. diphtheriae* or *C. ulcerans* (whatever the clinical presentation) during the 7 days before onset of illness or during the subsequent period of communicability should be considered potentially at risk. Risk is directly related to the closeness and duration of contact. Close contacts include:

- household contacts
- kissing and/or sexual contacts
- students in halls of residence in the same corridor and/or sharing kitchen or bathroom facilities
- child minders and children regularly being supervised by the case
- health care staff (staff who have taken appropriate infection control precautions need not be considered contacts).

Depending on duration of contact and immunisation status of contact, others at risk of being contacts may include anyone:

- regularly visiting the case’s residence
- in the same workplace space, class or early childhood service room.

Contacts on forms of public transport are thought to be at low risk, especially if the journey is less than 8 hours’ duration.

Investigation
All contacts identified as at risk (regardless of immunisation status) should have nose and throat swabs taken for diphtheria culture. All close contacts should also have any skin lesions swabbed, regardless of whether there is clinically apparent infection. All contacts should receive follow-up checks for 7 days from the date of last contact. Such checks may be conducted daily, or the contact may be provided with an information sheet that includes a full and clear list of symptoms and a phone number to call if they become unwell. The primary health care practitioner should be kept informed of the management of contacts and laboratory results.

Restriction
Contacts who have a positive laboratory result should be isolated as if they are a case until proven bacteriologically negative.

Prophylaxis
- **All contacts, after cultures have been taken and regardless of immunisation status:** A single dose of intramuscular benzathine penicillin (600,000 units or 400 mg) for contacts under 6 years of age and 1.2 million units (900 mg) for contacts 6 years of age or over); or 7 to 10 days of oral erythromycin
Diphtheria – May 2012

(children: 40 mg/kg/day, adults: 1 g/day, in four divided doses). Benzathine penicillin is preferred for contacts who cannot be kept under surveillance.

- **Contacts with a positive culture:** Two follow-up cultures obtained at least 24 hours apart after completion of therapy. If cultures are still positive following a course of antimicrobial therapy, discuss further management with an infectious diseases physician. The primary health care practitioner should be kept informed of the management of contacts and laboratory results.

**Immunisation**

All close contacts should also be offered a complete course of vaccine or a booster according to the following schedule.

- Fully immunised\(^{10}\) children up to and including 6 years of age who have only received three doses of diphtheria toxoid-containing vaccine within the last 5 years: give one injection of DTaP-IPV.

- Fully immunised individuals aged 7 years and older who have not received a booster dose of a diphtheria toxoid-containing vaccine within the last 5 years: If aged 7–15 years, give one injection of Tdap; if aged over 15 years, give one injection of Td or Tdap.

- Unimmunised individuals: Refer to the schedules in the *Immunisation Handbook* (Ministry of Health 2011).

**Counselling**

Advise all contacts to seek early medical attention if symptoms develop.

**Other control measures**

**Identification of source**

Check for other cases in the community. Notify doctors of the potential for outbreaks.

**Disinfection**

Disinfect all articles in contact with the case.

**Health education**

In early childhood services or other institutional situations, ensure that satisfactory facilities and practices are in place for hand cleaning; nappy changing; toilet use and training; food preparation and handling; and cleaning of sleeping areas, toys and other surfaces.

\(^{10}\) Full immunisation against diphtheria refers to the primary course, currently given at 6 weeks, 3 months and 5 months. The 4-year-old dose is a booster.
Reporting

Ensure complete case information is entered into EpiSurv.

On receiving a notification, medical officers of health should immediately notify the Ministry of Health Communicable Diseases Team and liaison staff at ESR, and complete the Outbreak Report Form.

References and further information


Giardiasis

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Children 1 to 4 years of age have the highest incidence rate for giardiasis in New Zealand.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

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

Case definition

Clinical description

An illness characterised by diarrhoea, abdominal cramps, bloating, flatulence, nausea, weight loss and malabsorption. The infection may be asymptomatic. Given the remitting/relapsing and variable nature of symptoms, the individual does not need to have compatible symptoms at the time of presentation but must have had a clinically-consistent illness in order to meet the case definition.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires at least one of the following from an appropriate gastrointestinal clinical specimen:

- Giardia antigen detection by either:
  - detection of direct fluorescence using monoclonal antibodies
  - detection of antigens using a rapid antigen test
  - enzyme immunoassay
- detection of giardia nucleic acid
- visualisation by direct microscopy detection of giardia cysts or trophozoites.

Case classification

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

- **Probable**: A clinically compatible illness that either is a contact of a confirmed case of the same disease or has had contact with the same common source – that is, is part of a common-source outbreak.

- **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.

**Spread of infection**

**Reservoir**

Humans are the primary reservoir but wild and domestic animals such as cats, dogs and cattle can carry the infection.

**Incubation period**

Usually 3–25 days or longer; median 7–10 days.

**Mode of transmission**

Transmission occurs from ingestion of faecally contaminated food or drinking-water, swallowing recreational water (for example, swimming and wading pools, streams and lakes), exposure to faecally contaminated environmental surfaces, and person to person by the faecal-oral route.

**Period of communicability**

Throughout the entire period of infection, often months.

**Notification procedure**

Attending medical practitioners or laboratories must immediately notify the local medical officer of health of cases of probable or confirmed giardiasis.

**Management of case**

**Investigation**

Investigate and obtain a risk exposure history. Obtain a history of any possible contacts and travel, recreational water contact and consumption of untreated water.

Ensure laboratory confirmation by stool testing has been attempted.

**Restriction**

In a health care facility, only standard precautions are indicated in most cases; if the case is diapered or incontinent, contact precautions should be applied for the duration
of illness. For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric disease.

Cases should not use public swimming pools until 2 weeks after symptoms have resolved.

**Counselling**

Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Educate about hygiene, especially hand cleaning.

**Management of contacts**

**Definition**

All people who have had close physical contact (for example, household) with a symptomatic case or who have been exposed to the same water, food or other material suspected to be the source of infection.

**Investigation**

Investigate contacts who are symptomatic.

**Restriction**

Contacts do not need to be excluded from work, school or other activities unless symptoms develop.

**Prophylaxis**

Not applicable.

**Counselling**

Advise all contacts of the incubation period and typical symptoms of giardiasis, and to seek early medical attention if symptoms develop.

**Other control measures**

**Identification of source**

Check for other cases in the community. Investigate potential food and water sources of infection only if there is a cluster of cases or an apparent epidemiological link.

If indicated, check water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008). Liaise
with the local territorial authority staff to investigate potential water or pool sources of infection.

**Disinfection**

Clean areas and articles soiled with stools (for details, see Appendix 1: Disinfection).

**Health education**

Consider a media release and direct communication with relevant early childhood services, other institutions and health professionals to encourage prompt reporting of symptoms. In communications with doctors, include recommendations regarding diagnosis, treatment and infection control.

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.

Educate the public about safe food preparation.

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 with diarrhoea should be taken to a veterinarian for assessment and treatment.

**Reporting**

Ensure complete case information is entered into EpiSurv.

Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.

If an outbreak occurs, contact the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.

**References and further information**

Gonorrhoea

Chapter last reviewed and updated in October 2018.

Case definition

Clinical description
Clinical evidence is not required for notification; for surveillance purposes, only laboratory-confirmed gonorrhoea is notifiable.

Infections due to Neisseria gonorrhoeae can cause dysuria and/or urethral discharge in males and dysuria and/or vaginal discharge in females. Asymptomatic genital infection occurs in up to 5 percent of males and 50 percent of females. Pharyngeal and rectal infections are usually asymptomatic. Untreated gonococcal infection may lead to serious disease, including pelvic inflammatory disease in females, epididymo-orchitis in males, and disseminated disease and severe conjunctivitis in neonates.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires at least one of the following:

- isolation (culture) of N. gonorrhoeae from a clinical specimen
- detection of N. gonorrhoeae nucleic acid (eg, nucleic acid amplification test, NAAT, or polymerase chain reaction, PCR).

Note:
1. Specificity of NAAT/PCR tests may be lower for non-genital sites. Many laboratories carry out supplementary testing, depending on the test regime they use.
2. Culture remains important for the ongoing surveillance of antimicrobial resistance.

Case classification

- Under investigation: A case that has been notified, but information is not yet available to classify it as a confirmed case.
- Probable: Not applicable.
- Confirmed: Laboratory definitive evidence.
- Not a case: A case that has been investigated and subsequently found not to meet the case definition.
**Spread of infection**

**Reservoir**

Humans.

**Incubation period**

Usually 1 to 14 days (but can be longer) for symptomatic cases, with most of the cases symptomatic 2 to 5 days after infection.

**Mode of transmission**

Transmission is through exudates from mucous membranes of infected people infecting other mucosal surfaces by:

- sexual contact (oral, vaginal or anal)
- sexual practices such as fingering, or sharing of sex toys
- vertical transmission from mother to baby at delivery (eg, neonatal conjunctivitis).

Disease may be communicable for months in untreated cases.

For information on **case management** and **contact tracing and management**, please refer to the New Zealand Sexual Health Society’s gonorrhoea management guidelines at www.nzshs.org/guidelines
Haemophilus influenzae type b invasive disease (Hib)

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Historically, Haemophilus influenzae type b (Hib) was an important cause of serious illness in children under 5 years of age in New Zealand. However, following the addition of Hib vaccine to the national immunisation schedule in 1994, the age-specific rate of the disease reduced from 36.4 cases per 100,000 in 1993 to 1.7 cases per 100,000 by 1999 and has remained at low levels since then.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

Clinical description

Invasive disease due to Hib may manifest as bacteraemia, meningitis, epiglottitis, cellulitis, septic arthritis, pneumonia, empyema, pericarditis or osteomyelitis.

Laboratory test for diagnosis

Laboratory confirmation requires isolation of H. influenzae type b, or detection of H. influenzae type b nucleic acid, from a normally sterile site.

Case classification

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

- **Probable:** A clinically compatible illness with detection of a positive antigen test in cerebrospinal fluid, or a confident diagnosis of epiglottitis by direct vision, laryngoscope or X-ray.

- **Confirmed:** A clinically compatible illness that is laboratory confirmed.

- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.
Spread of infection

Incubation period
Unknown; probably 2–4 days.

Mode of transmission
By droplet inhalation of or direct contact with respiratory tract secretions.

Period of communicability
May be prolonged. Non-communicable within 24–48 hours after starting effective antimicrobial therapy.

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

Management of case

Investigation
Obtain a history of vaccination, possible contacts and travel.

Ascertain if suspected or proven cases have occurred in the same household or early childhood service in the previous 60 days.

Ensure isolates from normally sterile sites are serotyped.

Restriction
Droplet precautions until 24 hours after the start of third-generation cephalosporin therapy (cefotaxime, ceftriaxone, ceftazidime) or until a 4-day course of rifampicin is completed.

Exclude case from any early childhood service or school and from close contact with previously unexposed people until 24 hours after commencing treatment.

Treatment
All cases should be under the care of a physician or paediatrician.

Cases treated with amoxycillin/clavulanate or amoxycillin alone should also receive oral rifampicin 20 mg/kg (maximum 600 mg) once daily for 4 days to eradicate carriage of the organism before discharge from hospital. Cases treated with a third-generation cephalosporin (cefotaxime, ceftriaxone, ceftazidime) do not need rifampicin.
Immunisation
Cases under 2 years of age should complete a course of Hib immunisation regardless of any previous Hib immunisation. The number of doses required will depend on the age at which the first dose is given after the illness. Re-immunisation should start 1 month after the onset of the disease.

Counselling
Advise the case’s parents or caregivers of the nature of the infection and its mode of transmission.

Management of contacts
Definition
Contacts for public health follow-up include members of the household, and staff and children at early childhood services – see below.

Duration of exposure of contacts to the case should be assessed on a case-by-case basis, but has been defined as spending four or more hours with the index case for at least 5 of the 7 days preceding the day of hospital admission of the index case (AAP Red Book 28th ed 2009).

Investigation
Nil. Routine throat or nasopharyngeal culture of contacts is not recommended.

Prophylaxis
To eradicate the carrier state and protect susceptible children, antimicrobial prophylaxis should be given to the following contacts as soon as possible and ideally within 7 days of the index case developing the disease, irrespective of their own immunisation status. Prophylaxis started after 7 days may still be of benefit and is recommended.

The relevant contacts are:

- all members of the case’s household (including adults) where there is at least one contact under the age of 4 years who is either unimmunised or partially immunised
- all members of a household where there is a child aged under 12 months, even if the child has had three doses (primary series) of the Hib vaccine
- all members of the case’s household where there is a person with immune suppression
- all staff and children at an early childhood service where two or more cases of Hib have occurred within 60 days.

Antimicrobial prophylaxis is not recommended for:
- occupants of households where there are no children aged under 4 years other than the index case
- occupants of households where all contacts aged under 4 years have completed their immunisation series, including the second-year-of-life dose.

Use oral rifampicin 20 mg/kg (maximum 600 mg) daily for 4 days.

Rifampicin is contraindicated in pregnant women. Pregnant women who are a contact should be offered i.m. ceftriaxone (1 gram) daily for 4 days (Ladhani 2009).

**Restriction**
When chemoprophylaxis is required at an early childhood service (see above), children and staff should be excluded from the service until prophylaxis has been started. Children entering the group while prophylaxis is being given should also receive it.

**Counselling**
Advise all contacts to seek early medical attention if symptoms develop. All children should have their immunisation status checked and, if it is incomplete, should complete their immunisation with an appropriate vaccine containing Hib.

**Other control measures**

**Disinfection**
Not applicable.

**Health education**
Stress the importance of full immunisation for all children.

Encourage early childhood services to keep up-to-date immunisation records of attending children.

**Epidemic control**
In a cluster or outbreak scenario, a larger group of individuals may need to be offered prophylaxis.

**Reporting**
Ensure complete case information is entered into EpiSurv.

If an outbreak occurs, inform the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.
References and further information


Hepatitis A

Chapter reviewed and updated in March 2018. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

The incidence of hepatitis A in New Zealand has decreased sharply since the 1960s, and currently about half the cases notified have a history of overseas travel.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

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

Case definition

Clinical description

Following a prodrome that may include fever, malaise, anorexia, nausea or abdominal discomfort, there is jaundice, and sometimes an enlarged tender liver. Infection may be indicated by the presence of elevated serum aminotransferase levels. Children are often asymptomatic and occasionally present with atypical symptoms, including diarrhoea, cough, coryza or arthralgia. Jaundice is very unusual in children younger than 4 years, and 90 percent of cases in the 4–6 years age group are anicteric.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires one of the following:

- detection of HAV nucleic acid
- in the absence of HAV vaccination in the preceding 12 weeks:
  - detection of anti-HAV IgM
  - seroconversion between paired sera tested in the same laboratory (in the absence of recent vaccination).

Samples from confirmed cases should be sent to ESR for genotyping and sequencing (preferably faecal and blood samples)

Case classification

- Under investigation: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
• **Probable:** A clinically compatible illness that is epidemiologically linked to a confirmed case.

• **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.

### Spread of infection

#### Reservoir

Humans and possibly certain non-human primates.

#### Incubation period

15–50 days, commonly 28–30 days.

#### Mode of transmission

Mainly person to person by the faecal-oral route.

Common-source outbreaks have been reported from contaminated water or food; foodborne outbreaks have been linked to an infected food handler, raw or undercooked shellfish harvested from contaminated water, and contaminated produce such as lettuce or berries. Transmission by injected drug use or sexual transmission is occasionally reported. Blood or blood-product transfusion related transmission (associated with a viraemic donor) is rare. Hepatitis A virus remains viable in the environment for long periods.

#### Period of communicability

Maximum infectivity is during the 1–2 weeks before and the first few days after the onset of jaundice. Most cases are probably non-infectious after the first week of jaundice although prolonged viral excretion (up to 6 months) has been documented in infants and children. The period of communicability recommended for contact tracing purpose is 2 weeks before and 1 week after the onset of jaundice.

#### Notification procedure

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

#### Management of case

##### Investigation

Obtain a history of travel (including overseas visitors within the incubation period), prior vaccination, possible contacts, consumption of shellfish or other suspect food (for
example, overseas food), and blood or blood-product transfusion. Injecting drug users and men who have sex with men may be at higher risk of infection.

Ensure laboratory confirmation by serology has been attempted. For all acute cases, diagnosed by positive IgM serology (in the absence of HAV vaccination in the preceding 12 weeks) or by detection of HAV by PCR/NAAT:

- patient serum and/or faecal specimens (preferably both) should be sent to Specimen Reception at ESR Kenepuru Science Centre, Porirua for HAV genotyping by the ESR Enteric, Environmental and Food Virology Laboratory.
- PHUs are requested to ensure these specimens are sent for genotyping

**Restriction**

In health care facilities, only standard precautions are indicated for the majority of patients with hepatitis A. Infants, young children and incontinent patients require contact isolation precautions until at least 1 week after the onset of jaundice (or symptoms) or for the duration of hospitalisation.

Patients in high-risk groups (see the exclusion and clearance criteria in Appendix 2: Enteric disease) should stay away from work or school for at least 1 week from onset of jaundice or symptoms. In the case of schoolchildren, discuss with the school about availability of hand-cleaning facilities.

**Counselling**

Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Educate about hand hygiene and advise not to prepare or handle food for others until no longer considered infectious.

**Management of contacts**

Identify contacts (household, sexual and other) for counselling about immunisation and/or immunoglobulin as appropriate. Contacts should be advised about possible symptoms, incubation period and the need to seek medical attention if unwell within the maximum incubation period of 50 days.

**Definition**

1. Contact with a case during the latter half of the incubation period and until 1 week after onset of jaundice, including:
   - all household and sexual contacts
   - staff and children in close contact with the case at an early childhood service.

   (Assessment of ‘close contact’ in an early childhood service will take into consideration: involvement with nappy changing, toilet hygiene practices and whether there has been more than one case associated with the service.)
2. Those exposed to hepatitis A-contaminated food or water in a common-source outbreak.

3. Those exposed through food where the original reservoir remains unknown (eg, imported produce).

4. Exposure to potentially contaminated food via an infected food handler (refer to ‘Special situations’ below).

**Investigation**

Laboratory screening of contacts is not usually indicated (see comment under ‘Vaccination’ below). Consider blood tests for any contact with compatible symptoms.

**Restriction**

Nil unless symptoms develop.

**Prophylaxis**

There is reasonably broad international consensus that vaccine is effective for preventing secondary cases in healthy contacts, and it now tends to be the preferred option as opposed to immunoglobulin. Immunoglobulin may have higher efficacy, but this needs to be balanced against the advantages of vaccination, including ease of administration, duration of effect and the lack of interaction with live vaccines.

**Vaccination**

Age-appropriate vaccination is recommended for all close contacts over the age of 1 year. If time allows, consider pre-vaccine serology if there is a history or likelihood of previous hepatitis A vaccination or infection (for example, previous residence in an endemic country). Post-exposure prophylaxis (PEP) with vaccine should be offered to contacts as soon as possible, and within 2 weeks of last exposure to an infectious case. The efficacy of vaccine when administered > 2 weeks after exposure has not been established.

**Immunoglobulin**

Where vaccine is contraindicated (or not immediately available), normal human immunoglobulin (NHIG) may be offered to a close contact who may have a reduced response to vaccine or has risk factors for severe disease. The dose of NHIG is 0.03 mL/kg given by intramuscular injection. PEP with NHIG should be offered to contacts as soon as possible, and within 2 weeks of last exposure to an infectious case. NHIG is available from the New Zealand Blood Service.

Close contacts under 1 year of age will require NHIG.

For further information refer to the medicine data sheets or the New Zealand Blood Service website (www.nzblood.co.nz).
Special situations

Early childhood service and other institutional outbreaks

If an outbreak occurs in an early childhood service, vaccination (and/or immunoglobulin if appropriate) may be indicated for all previously unimmunised staff and children at the service and unimmunised new staff and children for up to 6 weeks after the last case has been identified, including cases in the household of attendees. The number of infected cases should determine the extent of intervention.

Vaccination and/or immunoglobulin may also be indicated for adults and children at a school, hospital or custodial-care institution where an outbreak of hepatitis A is occurring. For sporadic cases in hospitals, schools or work settings, PEP is not routinely indicated, but careful hygiene practices should be maintained.

Contacts of an infected food handler

If a food handler is diagnosed with hepatitis A, vaccine (or immunoglobulin) should be given to other food handlers at the same premises. Vaccination of patrons is usually not needed but can be considered under the following conditions:

1. while infectious, the case directly handled uncooked foods or foods after cooking, and had diarrhoea or poor hygiene practices
2. vaccine (or immunoglobulin) may be given within 2 weeks of exposure.

Other control measures

Identification of source

Check for other cases in the community. Investigate potential food and water sources of infection only if there is a cluster of cases or an apparent epidemiological link.

If indicated, check water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008). Liaise with the local territorial authority staff to investigate potential water sources of infection.

Disinfection

Clean and disinfect surfaces and articles soiled with stools. For further details, refer to Appendix 1: Disinfection.

Health education

If there is a cluster of cases, consider a media release and direct communication with local parents, early childhood services, schools and health professionals to encourage early reporting of symptoms. In communications with doctors, include recommendations regarding diagnosis, treatment and infection control.
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.

**Reporting**

Ensure complete case information is entered into EpiSurv.

Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.

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.

**References and further information**


Hepatitis B

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Risk factors for acute hepatitis B in New Zealand include overseas travel and sexual contact, as well as household contact with a chronic carrier. An estimated 1–2 percent of the New Zealand population are carriers of hepatitis B. Chronic hepatitis B carrier status is currently not notifiable.

There has been a downward trend in the rate of acute hepatitis B notifications over the last 20 years in New Zealand.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

Case definition

Clinical description

The clinical manifestations of acute hepatitis B infection in adults range in severity from minimal symptoms to fulminant hepatitis (in less than 1 percent of cases). Adults may experience the insidious onset of fever, malaise, abdominal discomfort and anorexia with jaundice or elevated serum aminotransferase levels.

Acute hepatitis B infection in the first few months of life seldom causes clinical disease, and symptoms or signs are less common in children than in adults.

Laboratory test for diagnosis

Laboratory confirmation requires at least one of the following:

- HBsAg positive in an infant aged under 12 months
- change from HBsAg negative to HBsAg positive within a 12-month period (if testing is performed at the same laboratory and the cumulative history is readily available within the laboratory information systems)
- anti-HBcore IgM reactive (unless HBsAg positive more than 6 months ago and the history is readily available in laboratory information systems)
- detection of hepatitis B virus (HBV) nucleic acid.
Case classification

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

- **Probable:** A clinically compatible illness with a positive HBsAg (over 12 months of age).

- **Confirmed:** A clinically compatible illness that is laboratory confirmed (see laboratory criteria above, including positive HBsAg under 12 months of age).

- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

Spread of infection

Incubation period

45–180 days, commonly 60–90 days.

Mode of transmission

Many body substances and tissues (such as blood, semen and vaginal fluids) are capable of transmitting hepatitis B, via percutaneous (intravenous, intramuscular, subcutaneous or across broken skin) or permucosal exposure. This includes transmission through sexual contact, body piercing and tattooing.

Perinatal mother-to-infant transmission and transmission through occupational exposure to infected blood is now uncommon in New Zealand.

Period of communicability

The case is potentially infective 2–3 weeks before the onset of symptoms, during the clinical disease and usually for 2–3 months after acute infection or as long as HBsAg continues to be present in blood.

If a person continues to have HBsAg present in their blood, they are a carrier; defined as having two positive HBsAg tests taken at least 6 months apart. Carriers of hepatitis B continue to be infectious. Those who are both HBsAg and HBeAg (HB early antigen) positive have the highest infectivity. The carrier state may follow asymptomatic infection and is most common after perinatal infection, infection in infancy or in those with immunodeficiency.

Notification procedure

Attending medical practitioners and laboratories must notify the local medical officer of health of an acute illness, not the carrier status.
**Management of case**

**Investigation**

Obtain a history of possible risk factors including travel, body piercing or tattooing, infectious sexual or household contact, sharing of drug-injecting equipment, occupational exposure to or transfusion of blood or blood products, recent medical procedure or haemodialysis therapy over the last 6 months. Also obtain a history of vaccination and recent sexual and household contacts.

Ensure full hepatitis B serological testing of the case (including HBeAg and anti-HBe) and consider testing for other blood-borne virus infections.

Advise the case and primary health care doctor to repeat HBsAg testing after 6 months to identify the chronic carrier status.

Although chronic carriers are not notifiable, consider referral back to the primary health care doctor regarding follow-up for case care and testing and immunisation of contacts. See ‘Hepatitis B carriers’ below.

**Restriction**

Cases acutely infected with hepatitis B must not donate blood. Donors contracting acute hepatitis B may be acceptable 1 year after the acute episode providing there was clearance of HBsAg within 6 months and the New Zealand Blood Service medical officer has given medical clearance.

Employers must assess infected health care workers to determine whether any work restrictions are indicated (for example, regarding exposure-prone procedures and adoption of universal precautions).

**Counselling**

Advise the case and their caregivers of the nature of the infection and its mode of transmission. For example, advise the case to:

- not share drug-injecting equipment, razors or toothbrushes
- use safer sex practices
- avoid exposing others to their blood or other body fluids (including not donating blood or semen or registering as an organ donor)
- inform health care workers (including dentists) of their infectious status.
Management of contacts

Whenever immediate protection is required for contacts, a combination of vaccine and HBV immunoglobulin (HBIG) should be administered (at different sites). HBIG does not interfere with the response to vaccine.

Definition

Contacts include all household members and people who have had unprotected relevant contact (for example, perinatal, sexual or percutaneous, including sharing drug-injecting equipment or sharps injury, or mucosal exposure) with a case in the 3 weeks before onset of illness or during the subsequent period of communicability.

<table>
<thead>
<tr>
<th>Contact</th>
<th>Serological testing of contact (HbsAg, anti-HBs, anti-HBc IgM and IgG)</th>
<th>Immunoglobulin (if within 7 days of onset of case’s symptoms)</th>
<th>Immunisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any sexual contact, including protected sex</td>
<td>Yes</td>
<td>Yes, immediately after blood taken</td>
<td>Yes, immediately after blood taken</td>
</tr>
<tr>
<td>Household, mucosal or percutaneous</td>
<td>Yes</td>
<td>Yes, if serology negative</td>
<td>Yes, if serology negative</td>
</tr>
<tr>
<td>Other</td>
<td>Yes</td>
<td>No</td>
<td>Yes, if serology negative</td>
</tr>
</tbody>
</table>

Investigation

All contacts require serological testing for HbsAg, anti-HBs and anti-HBc, IgM and IgG. Public health should liaise with the contact’s primary health care doctor to determine who will do this. Results should be sent to both public health and the contact’s primary health care doctor.

Interpretation of results of serology

1. If HBsAg negative + anti-HBs negative + anti-HBc negative, the contact is susceptible and vaccination is required.
2. If HBsAg negative + anti-HBs negative + anti-HBc positive, the contact may still be susceptible and vaccination is required because the results may indicate (amongst other possibilities) a false positive anti-HBc or, if an infant, maternal antibody.
3. If the contact is HBsAg positive, ensure their primary health care doctor is aware of this and that follow-up is arranged.
No post-exposure prophylaxis is required for contacts who have had previous hepatitis B infection, or have a current protective level of antibodies from hepatitis B vaccination, or have documented previous seroconversion from hepatitis B vaccination to a protective level (see the *Immunisation Handbook 2011* for more information).

Any difficulties with interpreting serological results for cases and contacts should be discussed with an infectious diseases physician or the laboratory.

**Restriction**

As for a case, at least until results of initial (and any necessary follow-up) blood tests are known.

**Prophylaxis**

See Table 1 above.

**Immunoglobulin for contacts of hepatitis B cases**

HBIG is given at the same time as the vaccine but at a different site. Table 2 sets out the required dose by age group.

<table>
<thead>
<tr>
<th>Age</th>
<th>HBIG dose (IU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonates under 1 month</td>
<td>100</td>
</tr>
<tr>
<td>1 month–4 years</td>
<td>200</td>
</tr>
<tr>
<td>5–9 years</td>
<td>300</td>
</tr>
<tr>
<td>10 years and over</td>
<td>400</td>
</tr>
</tbody>
</table>

Most public health units will have agreed delivery systems in place for HBIG. HBIG is available from the New Zealand Blood Service.


**Counselling**

Advise all contacts of the nature of the infection and its mode of transmission, and to seek early medical attention if symptoms develop.
Other control measures
Consider referral to needle-stick management, as discussed under ‘Health education’ in the hepatitis C chapter.

Identification of source
Investigate potential relation to body piercing and/or tattooing or health care events. If the case could be transfusion-related, contact the New Zealand Blood Service.

Disinfection
Hepatitis B virus is stable on environmental surfaces (for example, inanimate objects) for at least 7 days.

Clean equipment and surfaces potentially contaminated with blood or body fluids. See Appendix 1: Disinfection.

Hepatitis B carriers
Although hepatitis B carriage is not notifiable, health care professionals looking after such carriers should ensure that close contacts have been offered immunisation and should provide carriers with appropriate information on how to protect others and how to look after themselves, with a referral if required.

The Ministry of Health contracts the Hepatitis Foundation of NZ to provide a hepatitis B surveillance programme to eligible carriers. This programme provides regular hepatitis serology and liver function testing, enabling timely referral in cases of early evidence of liver disease and/or cancer.

Immunoglobulin for contacts of hepatitis B carriers
HBIG can be considered for susceptible household, sexual, percutaneous and mucosal contacts, particularly if the exposure is of recent limited duration and highly significant (for example, exposure to a significant volume of infected blood) and the source case is HBeAg positive, has high serum levels of HBV DNA or the sexual contact was non-consensual.

Indications for hepatitis B vaccination are the same as for contacts of acute hepatitis B cases.

Reporting
Ensure complete case information is entered into EpiSurv.

If an outbreak occurs, inform the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.
References and further information


Hepatitis C

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Most cases of hepatitis C (HCV) in New Zealand have a history of injecting drug use or a history of sexual contact with a confirmed HCV case. Body piercing and tattooing are less common exposures.

The National Needle Exchange Blood-borne Virus Seroprevalence Survey (undertaken in 2004) found that the prevalence of HCV infection among injecting drug users was high (70 percent) and was strongly associated with age and duration of injecting.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

Clinical description

Hepatitis C infection is often asymptomatic but may present as an illness with variable symptoms of lethargy, anorexia and jaundice.

The current definition for acute hepatitis C\textsuperscript{11} includes cases where there has been documented seroconversion within a 12-month period, even in the absence of clinical illness.\textsuperscript{12}

Only acute cases of hepatitis C are notifiable.

Laboratory test for diagnosis

Laboratory confirmation requires positive anti-HCV serology or detection of HCV nucleic acid.

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**:

\textsuperscript{11} Also sometimes referred to as ‘incident’ cases.
\textsuperscript{12} Ministry of Health correspondence DS 20 07 0, 3 December 1999.
documented seroconversion to HCV when the most recent negative specimen was within the last 12 months, or

- a positive anti-HCV antibody test or nucleic acid test and a clinical illness consistent with acute HCV within the previous 12 months where other causes of acute hepatitis can be excluded.

- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

### Spread of infection

**Incubation period**

2 weeks to 6 months, commonly 6–9 weeks.

**Mode of transmission**

Almost all transmissions in New Zealand occur through sharing contaminated needles and other equipment during recreational intravenous drug abuse. Occupational sharps injuries, tattooing and body piercing have also been implicated. Sexual and vertical (mother to child) transmissions are uncommon. Percutaneous exposure to contaminated blood and blood products carries a risk of HCV infection. Before routine screening of donors for HCV was introduced in July 1992, people who received a blood transfusion or blood products were also at risk.

**Period of communicability**

From 1 week before onset of first symptoms. Infection usually persists indefinitely without treatment. Infectivity correlates with serum HCV RNA levels.

**Notification procedure**

Only confirmed cases are notifiable but attending medical practitioners or laboratories should immediately discuss any new cases with their local medical officer of health.

**Management of case**

**Investigation**

Obtain a history of intravenous drug use, sexual contacts, body piercing, tattooing, contact with a known case, blood or blood product transfusions, occupational sharps injuries and overseas travel.

Although newly diagnosed chronic HCV is not notifiable, a referral to a primary health care provider for appropriate clinical care should be offered in all cases.
Restriction
No precautions other than standard precautions are indicated for anti-HCV-positive cases in health care facilities.

In almost all cases, there are no restrictions on work, attendance at early childhood services or school or other community activities. Follow local protocols for high-risk occupations (for example, dentistry, surgery).

Disclosure
Cases should be counselled to disclose their condition to other health care workers and sexual partners. It may be appropriate for a doctor to inform other health professionals involved in the management of a case of the infectious status of that case when such information is relevant to clinical safety. Adherence to the Privacy Act 1993 and Codes and Medical Council Guidelines is essential.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Specific recommendations to prevent spread include:
- not donating blood, organs, semen or tissue
- not sharing drug-injecting equipment
- not sharing razors or toothbrushes
- using safe sex practices and informing sexual partners
- covering cuts and sores with dressings
- informing health care workers (including dentists) of infection.

Management of contacts
Identify contacts for investigation and counselling where appropriate.

Definition
All people who have shared drug-injecting equipment, suffered a sharp injury with a contaminated needle or some other significant percutaneous exposure, had long-term sexual exposure to a case during the suspected period of communicability or are newborn children of cases.

Members of the same household are not considered to be contacts unless they have met one or more of the above conditions.
Investigation
Ongoing primary health clinical care as the lead for appropriate specialist follow-up, including ongoing diagnostic testing and imaging.

Restriction and prophylaxis
Nil.

Counselling
The exposed contact should be advised regarding the risk of transmission and the need for follow-up testing by a professional counsellor(s) as part of the primary health care multidisciplinary team approach to ongoing clinical care.

The Ministry of Health contracts the Hepatitis Foundation of NZ to provide a hepatitis B surveillance programme to eligible carriers. This programme provides regular hepatitis serology and liver function testing, enabling timely referral in cases of early evidence of liver disease and/or cancer. The Hepatitis Foundation also provides some services for hepatitis C follow-up and information.

Other control measures
Identification of source
The medical officer of health is responsible for identifying and managing a cluster of cases.

Disinfection
Clean equipment and surfaces potentially contaminated with blood or body fluids.

Health education
See ‘Counselling’ above.

Needle and syringe exchange programmes exist in pharmacies and community groups throughout New Zealand. A list of outlets is available from the New Zealand Needle Exchange Programme website: www.needle.co.nz

Reporting
Ensure complete case information is entered into EpiSurv.

If a cluster of cases occurs, contact the Communicable Diseases Team at the Ministry of Health, and outbreak liaison staff at ESR, and complete the Outbreak Report Form.
Hepatitis (viral) – not otherwise specified

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Delta hepatitis (hepatitis D, HDV) may occur as an acute co-infection with hepatitis B or as a super-infection in people with chronic hepatitis B infection.

Hepatitis E (HEV) is an enteric infection with a similar course to hepatitis A.

Hepatitis G is usually associated with chronic hepatitis B or hepatitis C infection or human immunodeficiency virus (HIV). There is little proof that hepatitis G (HGV) causes serious liver disease at any age. It is possible that HGV may not be a true ‘hepatitis’ virus.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

Case definition

Clinical description
An illness with variable symptoms including fever, malaise, anorexia and nausea with jaundice and/or elevated serum aminotransferase levels. Hepatitis G has no recognised disease sequelae.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires negative tests for hepatitis A and C, and one of:
- a positive anti-HDV test or detection of HDV nucleic acid
- a positive anti-HEV test or detection of HEV nucleic acid
- A positive test for hepatitis G.

Hepatitis D requires simultaneous hepatitis B co-infection; testing for hepatitis D is indicated in clinically severe cases of suspected hepatitis B.
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.

Spread of infection

Reservoir
Hepatitis E: Humans are natural hosts; HEV strains have been detected in pigs, deer, sheep, cattle, rats and rabbits.

Incubation period
- Hepatitis D: 2–8 weeks.
- Hepatitis E: 15–64 days.
- Hepatitis G: Not known.

Mode of transmission
Depends on the causative virus. Consult with ESR and infectious diseases physician.

Period of communicability
Depends on the causative virus. Consult with ESR and infectious diseases physician.

Notification procedure
Attending medical practitioners or laboratories must notify the local medical officer of health of probable or confirmed cases.

Management of case

Investigation
Obtain a history of travel (including contact with overseas visitors within the incubation period), vaccination, possible contacts, consumption of shellfish or other suspect foods (for example, food from other countries) and blood or blood-product transfusions. Injecting drug users and men who have sex with men may be at higher risk of infection.

Ensure laboratory confirmation has been attempted.
**Restriction**
Depends on the causative virus. Consult with ESR and infectious diseases physician.

**Counselling**
Depends on the causative virus. Advise the case and their caregivers of the nature of the infection and its mode of transmission. Educate about hand hygiene and advise not to prepare or handle food for others until no longer considered infectious.

**Management of contacts**
Depends on the causative virus. Consult with ESR and infectious diseases physician.

**Definition**
Depends on the causative virus. Consult with ESR and infectious diseases physician.

**Investigation**
Laboratory screening of asymptomatic contacts is not usually indicated. Consider blood tests for any contact with compatible symptoms.

**Restriction**
Depends on the causative virus. Consult with ESR and infectious diseases physician.

**Prophylaxis**
Depends on the causative virus. Consult with ESR and infectious diseases physician.

**Other control measures**

**Identification of source**
Check for other cases in the community. Investigate potential food and water sources of infection if there is a cluster of cases or an apparent epidemiological link.

If indicated, check water supply for contaminants and for compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008). Liaise with the local territorial authority staff to investigate potential water sources of infection.

**Disinfection**
Clean and disinfect surfaces and articles soiled with stool. For further details, refer to Appendix 1: Disinfection.
In areas with modern and adequate sewage disposal systems, faeces and other bodily fluids or secretions can be discharged into sewers.

**Health education**

If there is a cluster of cases, consider a media release and direct communication with local parents, early childhood services, schools and health professionals to encourage early reporting of symptoms. In communications with doctors, include recommendations regarding diagnosis, treatment and infection control.

In early childhood services or other institutional situations, ensure that satisfactory facilities and practices are in place for: hand cleaning; nappy changing; toilet use and training; food preparation and handling; and cleaning of sleeping areas, toys and other surfaces.

**Reporting**

Ensure complete case information is entered into EpiSurv.

Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.

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.

**References and further information**

Highly pathogenic avian influenza

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Highly pathogenic avian influenza (HPAI) is caused by a genetically distinct strain of the influenza A subtype H5N1. Although human-to-human transmission of the HPAI H5N1 strain has been limited, emergence of HPAI outbreaks in domestic poultry, high rates of death in infected poultry and a 60 percent case-fatality rate in infected humans are significant causes for concern.

Note: Highly pathogenic avian influenza is a separate notifiable disease to non-seasonal influenza. A separate chapter relates to non-seasonal influenza.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

Clinical description

Rapid onset of respiratory and generalised signs and symptoms of influenza, which can include fever, chills, sweating, a cough and a sore throat.

Laboratory tests for diagnosis

Laboratory confirmation requires identification of H5N1 virus by at least one of the following:

- real-time reverse transcriptase polymerase chain reaction (RT-PCR)
- viral culture
- four-fold rise in H5N1 virus-specific neutralising antibodies.

Case classification

- Under investigation: A person who has been referred to the public health service for investigation of possible HPAI infection.
- Suspected: A clinically compatible illness in a person who, in the 7 days before the onset of symptoms, did one or more of the following:
  - was in an area where HPAI infections (in animals or humans) have been suspected or confirmed in the last month
Highly pathogenic avian influenza – May 2012

- consumed raw or undercooked meat from known source animals in an area where HPAI infections have been suspected or confirmed in the last month
- had close contact with suspected or confirmed HPAI-infected animals
- was working in a laboratory that is handling samples from people or animals that are suspected of HPAI infection.

- **Probable**: A clinically compatible illness with a strong epidemiological link to a confirmed case or defined cluster.
- **Confirmed**: A person with laboratory-confirmed HPAI infection.
- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

**Spread of infection**

**Incubation period**

A range of 1–4 days; however, person-to-person transmission of HPAI is currently rare.

**Mode of transmission**

Predominantly from source animals (birds, pigs) through exposure to infected body fluids or undercooked meat.

**Period of communicability**

Unknown.

**Notification procedure**

Attending medical practitioners must immediately notify the local medical officer of health of suspected cases of HPAI.

Laboratory notification of suspected cases of HPAI should be made directly to the Ministry of Health, preferably by telephone. This should be followed by a written (electronic) notification on confirmation.

**Management of cases and contacts including other control measures**


Note: A close contact is a person who has cared for, lived with, or had direct contact with respiratory secretions or bodily fluids of a probable or confirmed case.
**Reporting**

Ensure complete case information is entered into EpiSurv.

On receiving a notification, medical officers of health should immediately notify the Ministry of Health, including the Director of Public Health.

The International Health Regulations (IHR) National Focal Point (NFP) in the Ministry must notify the World Health Organization (WHO) of events involving any case of smallpox, poliomyelitis, severe acute respiratory syndrome (SARS) or human influenza caused by a new subtype. The NFP must also use the IHR Decision Instrument for any event involving cholera, pneumonic plague, yellow fever, viral haemorrhagic fevers, West Nile fever or any unusual or potentially serious public health event, and then notify WHO if required.

**References and further information**

Human immunodeficiency virus (HIV)

Chapter last reviewed and updated in December 2018. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Human immunodeficiency virus (HIV) acts by depleting the body’s normal immunological defense mechanism. Acquired immunodeficiency syndrome (AIDS) is the late stage of the spectrum of HIV disease.

HIV became notifiable in New Zealand in 2017. Voluntary surveillance was undertaken between 1985 and 2017. AIDS has been a notifiable condition in New Zealand since 1983.

HIV infections in New Zealand are mostly concentrated in men who have sex with men (MSM) and heterosexually infected individuals from sub-Saharan Africa and South-East Asia. In MSM infection is largely due to transmission in New Zealand.

For the most up-to-date information on the epidemiology of HIV and AIDS in New Zealand, refer to AIDS – New Zealand, the newsletter produced by the AIDS Epidemiology Group (AEG) (www.otago.ac.nz/aidsepigroup), which is also posted on the Ministry of Health website (www.health.govt.nz/our-work/diseases-and-conditions/hiv-and-aids).

The purpose of HIV surveillance is to:

- understand disease burden (to inform planning, policy development, prioritisation and resource allocation)
- identify emerging problems and outbreaks or clusters of disease
- evaluate the effectiveness of policies and programmes.

Case definition

For surveillance purposes, in New Zealand:

- An individual is reported with newly acquired HIV when they have first tested positive on a laboratory test, as detailed below.

- An individual is reported with previously acquired HIV when they have previously been diagnosed with HIV overseas, have no record of an earlier diagnosis in New Zealand, and are having a first viral load test (for monitoring of their infection) in New Zealand.
Laboratory testing for diagnosis of HIV

Laboratory definitive evidence of HIV infection in an individual aged 18 months or older requires:

- a repeatedly reactive result on an initial antigen/antibody combination immunoassay that detects HIV-1 and HIV-2 antibodies or HIV-1 p24 antigen and a reactive result on an HIV-1/HIV-2 antibody differentiation immunoassay
  
  or

- a repeatedly reactive result on an initial antigen/antibody combination immunoassay that detects HIV-1 and HIV-2 antibodies or HIV-1 p24 antigen and a reactive result on the HIV-1 nucleic acid test (NAAT) test.

Laboratory definitive evidence of HIV infection in an individual aged under 18 months requires:

- a repeatedly reactive result on the NAAT test on specimens taken at two different dates.

Case classification

- **Under investigation**: A case that has been notified, but information is not yet available to classify it as confirmed or not a case.
- **Probable**: Not applicable
- **Confirmed**: Laboratory definitive evidence of HIV infection.
- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

Spread of infection

Incubation period

Within two to four weeks after infection, people may experience a flu-like illness with generalised lymphadenopathy which may last a few weeks.

Without treatment, the time from initial infection with HIV to clinical onset of AIDS in an untreated patient is variable, averaging 8–10 years in developed countries.

Mode of transmission

HIV is transmitted from person to person in four main ways:

- through anal or vaginal sex
- through the sharing of contaminated injecting equipment (needles and syringes)
- from an infected mother to her baby during pregnancy or childbirth or through breastfeeding
• through transfusion of infected blood or blood components and the transplantation of infected tissue or organs.

**Period of communicability**

While transmission of HIV can occur throughout an infected person’s life, the transmissibility varies with the viral load, which is typically high during initial seroconversion and later as the CD4 count falls. Anti-retroviral therapy that successfully suppresses the circulating viral load to low or undetectable levels greatly reduces infectivity.

**Notification procedure**

HIV is a notifiable condition. New laboratory diagnoses are notified to the local Medical Officer of Health via the secure web-based EpiSurv portal administered by ESR (the Institute of Environmental Science and Research) using non-identifiable data. Acceptance of the incoming e-notification by the local public health service will automatically result in the AEG receiving access to the information, and in creation of a web-based notification form. The AEG will send the health provider who ordered the laboratory test a link to this form for the health provider to complete online.

Section C of Part 1 of Schedule 1 of the Health Act 1956 covers notification of AIDS, HIV and other sexually transmitted infections. Under this legislation, the notification process must not include identifying information.

The AEG makes confidential quarterly reports to the Ministry of Health and Medical Officers of Health. It produces the *AIDS – New Zealand* newsletter annually and disseminates it widely, to stakeholders and the public.

**Management of case**

**Investigation**

Identify the mode of infection in consultation with the attending infectious diseases physician.

**Restriction**

No isolation precautions other than standard precautions are needed for HIV-positive cases in health care facilities. Staff who are asked to perform an invasive procedure on the case are commonly informed about the case’s infectious status. In almost all cases, there are no restrictions on attending work, early childhood services or schools or other community activities.

**Treatment**

The case should be under the care of a physician or paediatrician who has a special interest in HIV and AIDS.
Counselling

People found to be infected with HIV should receive counselling on the implications of the diagnosis from a medical practitioner and/or counsellor. The counselling should cover the practical and legal aspects of preventing transmission of HIV. Specific recommendations include:

- not donating blood
- not sharing drug-injecting equipment
- not sharing razors or toothbrushes
- following safe sex practices and informing sexual partners
- informing health care workers (including dentists) of infection.

Management of contacts

Definition

Contacts include:

- sexual or needle-sharing partners of an HIV-infected person
- individuals who have suffered a sharp injury with an object contaminated with HIV-infected blood or body fluid
- newborn babies whose mothers are HIV-positive
- individuals who have received HIV-infected body fluid (eg, blood, semen or cerebrospinal fluid) splashes to a mucosal surface or area of broken skin.

Investigation

All investigation and treatment, including management of HIV-infected pregnant women, should be undertaken under the supervision of an infectious diseases physician with a special interest in HIV.

Health practitioners must perform all HIV tests with the informed consent (verbal consent is sufficient in most cases) of the person, and with pre-test counselling that covers the reason for the test, the person’s right to decline testing, the date and means by which the results will be made available and an assurance that the practitioner will take steps to maintain confidentiality, including an offer to test under code. More comprehensive pre-test counselling is indicated when the person is at high risk of being HIV-positive.

Post-exposure prophylaxis

When considering post-exposure prophylaxis, practitioners should seek immediate advice from the infectious diseases service of the closest tertiary care hospital. An anti-retroviral prescriber must authorise the prophylaxis.

The need for anti-retroviral prophylaxis depends on:
• the period that has elapsed between the exposure and the availability of appropriate treatment (chemoprophylaxis has been shown to have some protective effect up to 36 hours after exposure)

• the type of exposure and source material (eg, a needle-stick injury or sexual contact).

Counselling
Health practitioners should offer the contact comprehensive counselling, ideally in conjunction with the supervising infectious diseases physician. The New Zealand AIDS Foundation is the lead Ministry of Health non-governmental agency for HIV and AIDS: see www.nzaf.org.nz

Other control measures
Identification of source
If there is a cluster of cases, investigate for a common exposure, including through sexual contact, sharing of injecting drug equipment, health care or skin penetration practices (eg, tattooing). If the case could be transfusion-related, contact the New Zealand Blood Service.

Disinfection
Clean equipment and surfaces potentially contaminated with blood or body fluids. For further details, refer to Appendix 1: Disinfection.

Health education
Information, including frequently asked questions regarding HIV infection and AIDS, is available from the Ministry of Health website (www.health.govt.nz/our-work/diseases-and-conditions/hiv-and-aids) and from the New Zealand AIDS Foundation website (www.nzaf.org.nz).

Advise injecting drug users on single-use injecting equipment. Needle and syringe exchange programmes exist in pharmacies and community groups throughout New Zealand. A list of outlets is available from the New Zealand Needle Exchange Programme website at www.needle.co.nz

The Ministry of Health offers an HIV screening programme for all pregnant women. Information is available on the National Screening Unit website at www.nsu.govt.nz

References and further information


Hydatid disease

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

The larval (cystic or hydatid) stage of the dog tapeworm *Echinococcus granulosus* causes hydatid disease in humans and cattle. The Ministry of Agriculture and Forestry declared New Zealand provisionally free of hydatids in 2002.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

Case definition

Clinical description

Cysts usually develop in the liver or lung (occasionally the spleen, brain, heart, kidney or bones) and slowly grow to 5–10 cm in length. They may persist for years or decades without symptoms and often are detected incidentally. Local pressure effects in a confined space may lead to symptoms. Rarely, cysts rupture into the biliary tree or a bronchus causing obstruction, secondary bacterial infection, an allergic reaction or secondary spread.

Even asymptomatic cysts should be notified.

Radiologically, hydatid cysts are single or multiple and may have a rim of calcification. There may be peripheral blood eosinophilia.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires at least one of the following:

- identification of *E. granulosus* in cyst fluid or, rarely, sputum
- positive serological tests for *E. granulosus* (eg hydatid haemagglutination or complement fixation test) in the context of radiological or other organ imaging evidence of characteristic cystic disease.

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:** Histopathological or other demonstration of *E. granulosus* cysts or radiological or other organ imaging evidence of characteristic cystic disease with a positive serological test.

• **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

### Spread of infection

**Reservoir**
Definitive hosts are dogs and other canids; intermediate hosts include sheep, cattle, goats, pigs and horses.

**Incubation period**
Years to decades, depending on number and location of cysts and how rapidly they grow.

**Mode of transmission**
In New Zealand, the definitive host has been the dog. *E. granulosus* adult tapeworms inhabit the dog’s intestines, and eggs are excreted into the environment. Sheep, cattle, goats, pigs, horses and humans accidentally ingest these eggs, which hatch in the intestine, and the resultant onchospheres penetrate the mucosa, migrate to tissues and multiply within cysts. Hydatids is not directly transmitted from person to person.

**Period of communicability**
Dogs begin to pass eggs 5–7 weeks after infection. Most infections resolve in 6 months, although occasionally adult worms survive 2–3 years. Eggs are particularly resistant to environmental conditions and may survive months in paddocks or gardens.

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

**Management of case**

**Investigation**
Obtain a history of travel and dog contact, especially farm dogs. Ensure serological diagnosis has been attempted.

**Restriction**
Nil.
Counselling
Advise the case and their caregivers of the nature of the disease and its mode of transmission.

Management of contacts
Not applicable.

Other control measures
Identification of source
In instances where recent infection is suspected (within 2 years), liaise with the Ministry for Primary Industries to investigate potential dog infection in the region. See ‘Reporting’ below.

Disinfection
Nil.

Health education
The slaughtering of cows, sheep, deer, goats and pigs must be carried out in an approved killing facility within a dog-proof enclosure to prevent dogs from having access to uncooked viscera. The offal from these animals must not be fed to dogs unless it is first cooked by boiling for a minimum of 30 minutes.

Follow local territorial authority or regional council regulations on dog worm treatment.

Imported livestock should be tested and tracked.

Encourage hand washing after contact with dogs or dog faeces, especially before eating. Young children are especially at risk.

Reporting
Ensure complete case information is entered into EpiSurv. All species of Echinococcus are notifiable organisms in New Zealand under the Biosecurity Act 1993.

On receiving a notification, medical officers of health should immediately notify the Director of Public Health at the Ministry of Health.

The Ministry of Health will inform the appropriate staff in the Ministry for Primary Industries so that further investigation of the source can be undertaken.
Invasive pneumococcal disease

Chapter reviewed and updated in October 2016. A description of changes can be found at www.health.govt.nz/cdcupdates.

Invasive pneumococcal disease was added to the notifiable disease schedule primarily for the purposes of surveillance – in particular to monitor the effect of introducing the pneumococcal vaccine for children in June 2008 and the incidence of disease in the community. This epidemiological information, along with information on the distribution of serotypes from laboratory-based surveillance, helps inform future immunisation policy.

Local public health action is not expected in response to individual notifications of this disease.

Epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

*Streptococcus pneumoniae* (pneumococcus) is a gram-positive encapsulated coccus (gram-positive diplococcus). Most pneumococcal serotypes can cause disease, but only a few produce the majority of invasive pneumococcal infections. Invasive pneumococcal disease is defined as pneumococcal disease with detection of *S. pneumoniae* in a normally sterile site, such as the meninges, cerebrospinal fluid (CSF), blood, pleural fluid or joints.

Clinical description

Depending on the site of infection, the main presenting condition is meningitis, pneumonia or septicaemia.

In approximately 25 percent of the population, the bacteria are carried asymptomatically at the back of the nasopharynx. Invasive pneumococcal disease occurs most commonly in the winter months. The risk of disease is higher in infants, the elderly and those with predisposing conditions such as immune deficiency states. It is the most common cause of community-acquired pneumonia in all ages and probably the most common cause of bacterial meningitis in children.

Laboratory test for diagnosis

**Laboratory confirmation requires** at least one of the following:

- isolation of *S. pneumoniae* from blood, CSF or another normally sterile site (for example, joint fluid, pleural fluid)
• detection of *S. pneumoniae* nucleic acid from blood, CSF or another normally sterile site

• a positive newer generation *S. pneumoniae* antigen test on CSF or pleural fluid.\(^\text{13} \text{ 14}\)

Note, detection of *S. pneumoniae* from CSF by microscopy (detection of gram-positive diplococci) can be a useful diagnostic test, but is not sufficient for case confirmation.

**Case classification**

• Under investigation: Not applicable.

• **Probable:** Not applicable.

• **Confirmed:** A clinically compatible illness that is laboratory confirmed.

• **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

Note: in the absence of invasive disease, isolation of *S. pneumoniae* from a non-sterile site (such as sputum, nasal aspirates and ear discharge) is not notifiable. A positive urine antigen test is also not notifiable.

**Spread of infection**

**Incubation period**

Variable, but may be as short as 1–3 days. Illness usually occurs within 1 month of acquiring a new serotype in the respiratory tract.

**Mode of transmission**

By droplet inhalation or direct contact with respiratory tract secretions. Person-to-person transmission is common, but illness in casual contacts and hospital staff is uncommon.

**Notification procedure**

The laboratory undertaking the testing must notify the local medical officer of health of all confirmed cases of invasive pneumococcal disease.

**Reporting**

Ensure complete case information is entered into EpiSurv.

\(^\text{13}\) Occasionally, antigen test results are positive when culture results are negative.

\(^\text{14}\) Isolation of pneumococcus is preferred as this allows for serological identification and so informs the vaccination programme.
Medical officers of health should review the hospital case notes and/or contact the attending clinician or general practice to obtain information about immunisation history, clinical presentation, clinical course and outcome, and risk factors (such as prematurity, chromosomal or congenital abnormality, immunocompromised, chronic illness, smoking) and to ask about earlier vaccinations with either the pneumococcal polysaccharide or conjugate vaccine. It should only be necessary to contact the case or their family/whānau in exceptional circumstances.

If an outbreak occurs, contact the Ministry of Health Communicable Diseases Team and liaison staff at ESR, and complete the Outbreak Report Form.

References and further information


Legionellosis

Chapter reviewed and updated in July 2016. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Legionella bacteria are ubiquitous in the New Zealand environment, particularly in soil and aquatic environments, making it difficult to prevent pathogens from entering engineered water reticulation systems. The disease is more common in older people, smokers, chronic disease sufferers and the immunocompromised.

Most cases in New Zealand are caused by L. longbeachae and L. pneumophila. The primary sources of these bacteria are constructed warm-water systems (L. pneumophila) and composted vegetative material (L. longbeachae). Further information on Legionella species in New Zealand can be found in the Ministry of Health publication The Prevention of Legionellosis in New Zealand: Guidelines for the control of legionella bacteria (Ministry of Health 2011).

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

Clinical description

Infection with Legionella is an important cause of community-acquired pneumonia and occasionally multi-systemic disease, occurring both sporadically and in outbreaks. Legionella infections can cause a spectrum of symptoms, including subclinical infection (infection with no disease).

For notification purposes, the following three categories meet the clinical criteria for a clinically compatible illness:

1. pneumonia (Legionnaires’ disease)
2. non-pneumonic disease (eg Pontiac fever) – a self-limiting acute febrile illness which may be accompanied by cough
3. extrapulmonary disease – involving skin, joints, pericardium or other organs.

Although the most common clinical manifestation of legionellosis reported worldwide is Legionnaires’ disease, non-pneumonic disease is often clinically unrecognised and therefore likely to be under-reported.
Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires at least one of the following:

- isolation (culture) of *Legionella* species from respiratory secretions or other clinical samples
- detection of *Legionella* species nucleic acid (by PCR or other detection method)
- a fourfold or greater rise in IFA titre against *Legionella* species to $\geq 256$ between paired sera tested in parallel using pooled antigen at the same reference laboratory
- detection of *Legionella pneumophila* serogroup 1 (Lp1) antigen in urine.

Laboratory suggestive evidence for a probable case requires:

- one or more elevated *Legionella* species serology titres of $\geq 512$ tested using pooled antigen at a reference laboratory.

Case classification

- **Under investigation**: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable**: A clinically compatible illness that has laboratory suggestive evidence.
- **Confirmed**: A clinically compatible illness that has laboratory definitive evidence.
- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

Note:

- A single elevated titre is a useful screen, but can be a false positive, hence the need for confirmatory testing. Public health investigations should take account of all the information available.
- A positive nucleic acid amplification test (NAAT) (PCR or other nucleic acid detection method) is very useful for rapid diagnosis and case management but may not identify the causative agent. In this situation, further testing to identify the causative agent is required (*Legionella* culture or convalescent serology).
- Urine antigen testing is not completely specific for Lp1 and there can be cross-reactivity with other serogroups. Therefore convalescent serology may be useful to clarify the causative species/serogroup.
- Isolation of *Legionella* bacteria remains the gold standard for diagnosis of legionellosis.

Spread of infection

Incubation period

The time between exposure and the first sign of symptoms for:
• Legionnaires’ disease is usually 2–10 days but can be up to 14 days
• Pontiac fever is usually 24–48 hours, but can be between 5 hours and 3 days.

Mode of transmission
Transmission is through inhalation of aerosols of either water or dust particles carrying *Legionella* bacteria, or via aspiration of contaminated water. Common sources of water or soil colonised with *Legionella* bacteria include cooling towers, spa pools, potting mix and other compost-related products, and warm-water systems (including fittings).

Period of communicability
Person-to-person transmission has not been demonstrated.

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

Management of case
Investigation
Obtain a two-week history of places visited before the onset of symptoms (including social, work, educational and recreational settings) and exposure risks (including exposure to compost and potting mix, large-building water systems and aerosolised or sprayed water, such as from cooling towers, commercial or hand car-washing apparatuses, air conditioners, nebulisers, heated swimming pools, spa pools, water blasters and showers).

Establish if the case has been an inpatient or outpatient of a medical facility or had dental procedures in the two weeks before the onset of symptoms.

Ensure the attending medical practitioner has obtained laboratory confirmation, including identification to species and serotype level. Samples should also be referred to the Legionella Reference Laboratory at ESR for confirmatory testing or typing (for serology, this includes both acute and convalescent paired sera).

Treatment
To be coordinated by the notifying medical practitioner.

Restriction
Nil.
**Counselling**

Advise the case and their caregivers of the nature of the infection and its mode of transmission.

**Management of contacts**

**Definition**

A contact is any person who has experienced exposures similar to the case within the preceding three months.

**Investigation**

Because there is no person-to-person spread with legionellosis, advise contacts about the mode of infection and encourage them to go promptly to their general practitioner if symptoms develop.

**Prophylaxis**

Nil.

**Other control measures**

**Identification of source**

Refer to *The Prevention of Legionellosis in New Zealand: Guidelines for the control of legionella bacteria* (Ministry of Health 2011) for detailed information on investigation of cases.

The medical officer of health is responsible for coordinating an investigation into the source of infection.

The Ministry of Health liaises with the medical officer of health regarding the public health response and ESR regarding the laboratory testing and results.

The public health unit will take environmental samples to test for *Legionella* bacteria from potential sources.

Following any hospital-acquired case, infection prevention and control and building services for the hospital should be notified.

Suspected occupational sources and clusters of cases should be thoroughly investigated. In the case of a suspected occupational source, WorkSafe New Zealand is responsible for investigating specific risks in a workplace. Sporadic cases, however, may not warrant extensive investigation because of the difficulty in identifying the specific source and the likelihood of detecting a variety of natural or constructed water-distribution systems naturally colonised with other *Legionella* strains.
Even when cases appear to be sporadic, an assessment of space–time clustering with other cases should be considered.

For further information on environmental testing, please refer to:

- www.esr.cri.nz/health-science/specialist-testing/show/761
- www.who.int/water_sanitation_health/emerging/Legionella.pdf

**Disinfection**

Disinfection of contaminated water sources is an important control measure. Disinfection is obligatory:

- when *Legionella* bacteria are detected in a domestic water system
- in cooling towers when the level is at or above 10 colony-forming units/mL (refer to AS/NZS 3666).

For advice on disinfection of any contaminated site, contact the Legionella Reference Laboratory at ESR.

For further information on disinfection, refer to *The Prevention of Legionellosis in New Zealand: Guidelines for the control of legionella bacteria* (Ministry of Health 2011).

**Health education**

Medical officers of health are responsible for health education in the event of a non-occupational cluster of cases.

A fact sheet resource suitable for soil and compost product suppliers is available from WorkSafe New Zealand at www.business.govt.nz/worksafe/information-guidance/all-guidance-items/legionnaires-disease

Another educational resource is the Ministry of Health pamphlet on safe gardening, which is available at www.healthed.govt.nz/system/files/resource-files/HE4605.pdf

**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.

**References and further information**

Leprosy

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

All cases of leprosy in New Zealand have occurred in individuals who have contracted the disease overseas.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

Clinical description

A chronic bacterial disease characterised mainly by the involvement of skin and peripheral nerves. Clinical forms represent a spectrum reflecting the cellular immune response to *Mycobacterium leprae*. Anaesthetic skin lesions and nerve enlargements are characteristic of the disease. The disease includes:

- **tuberculoid leprosy (TT):** a few anaesthetic skin lesions and peripheral nerve abnormalities
- **borderline leprosy (BB):** skin lesions characteristic of both TT and LL forms
- **lepromatous leprosy (LL):** widespread erythematous papules and nodules with facial and aural infiltration, often accompanied by both individual peripheral nerve abnormalities and a symmetrical peripheral neuropathy.

Note: The World Health Organization classifies leprosy as multibacillary or paucibacillary based on the number of skin lesions and the presence or absence of bacteria found in skin smears. This classification determines the duration of multi-drug chemotherapy.

Laboratory test for diagnosis

**Laboratory confirmation requires** at least one of the following:

- demonstration of acid-fast bacilli in biopsy tissue or slit-skin smears
- a biopsy with characteristic pathological changes.

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
• **Probable**: A clinically compatible syndrome that lacks laboratory confirmation.

• **Confirmed**: A clinically compatible syndrome that is laboratory confirmed.

• **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

**Spread of infection**

**Incubation period**

Very lengthy, ranging from 9 months to more than 20 years with an average of 4 years for tuberculoid leprosy and 8 years for lepromatous leprosy.

**Mode of transmission**

Humans are the only significant reservoir. Infection probably spreads predominantly from nasal secretions of the case to the skin and respiratory tract of another person. Other respiratory secretions and open-skin lesions may also transmit infection. Transmission requires close contact. Although the bacillus can survive up to 7 days in dried nasal secretions, indirect transmission is thought unlikely. Transplacental transmission is probably responsible for cases under 1 year of age.

**Period of communicability**

Most cases treated with multi-drug regimens cease to be infectious within 1 day.

**Notification procedure**

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

**Management of case**

**Investigation**

Obtain a history of travel and possible contacts. Ensure laboratory confirmation has been attempted.

**Restriction**

Nil.

**Treatment**

Cases should be under the care of an infectious diseases physician.
Counselling
Advise the case and their caregivers of the nature of the disease and its mode of transmission. Open skin lesions should be covered.

Management of contacts
Definition
All people who have been in close contact with a case of leprosy (especially lepromatous leprosy) over a prolonged period.

Investigation, restriction and prophylaxis
Nil.

Counselling
Advise contacts to have an initial examination and periodic subsequent examinations by a medical practitioner to detect early signs of disease. Advise all contacts of the incubation period and typical symptoms of leprosy. Encourage them to seek early medical attention if symptoms develop.

Other control measures
Identification of source
Check family and travel history.

Disinfection
Nil.

Health education
Nil.

Reporting
Ensure complete case information is entered into EpiSurv.

On receiving a notification, medical officers of health should immediately notify the Director of Public Health at the Ministry of Health.

References and further information
Leptospirosis

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

The annual number of leptospirosis notifications fell dramatically between 1980 and 2000 and has fluctuated since.

Sources of infection can include contact with animals or with soil and water contaminated by animals. Leptospirosis is endemic worldwide with higher incidence in tropical countries. Travellers participating in recreational water activities such as rafting or kayaking are at higher risk of the disease, especially after heavy rainfall, which facilitates the spread of organisms.

Most cases in New Zealand have worked in the meat-processing industry or have had recent farm contact. Human leptospirosis is less likely to be seen where animals have been vaccinated.

Isolates seen in New Zealand include *Leptospira borgpetersenii* serovar hardjo, *L. interrogans* serovar Pomona, and *L. tarassovi*. The two most common serovars seen worldwide, canicola and icterohaemorrhagiae, are not considered endemic in New Zealand.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

Case definition

Clinical description

An acute illness characterised by fever, chills, headache, myalgia, nausea, diarrhoea, abdominal pain, meningitis, cough and conjunctival suffusion. Manifestations of severe disease can include jaundice, renal failure, haemorrhage, pneumonitis and haemodynamic collapse.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires at least one of the following:

- isolation of leptospires from a clinical specimen
- detection of leptospiral nucleic acid from a clinical specimen
• a four-fold or greater rise in leptospiral microscopic agglutination titre (MAT) between acute and convalescent sera
• single high antibody titre of ≥ 400 in the MAT.

**Laboratory suggestive evidence for a probable case requires** single raised agglutination titre by MAT of < 400.

It is recommended that both nucleic acid testing (NAT) and MAT testing be undertaken to improve diagnostic accuracy. MAT is the current gold standard serological test and is used to identify the probable causative serovar/serogroup. ESR-NCBID is the national reference laboratory for MAT.

**Serology**

IgM can be detectable within the first week of illness and can persist for months. Seroconversion can take up to 3 weeks from the onset of symptoms. IgM is useful as a screening test but not a confirmatory test because of potential cross-reactivity with other diseases. For confirmatory testing acute and convalescent samples need to be tested in parallel by MAT. There should be a minimum of 2 weeks between collection of acute and convalescent sera.

**Nucleic acid testing (for example, polymerase chain reaction – PCR)**

NAT is highly sensitivity for diagnosis of leptospirosis. NAT can be used to detect leptospires in blood during the acute leptospiraemic phase of the disease typically before an antibody response is mounted. NAT can also be used to detect leptospires in urine during the second week of illness; shedding may be prolonged and intermittent.

Leptospires can be excreted intermittently in the urine. Therefore, a negative result in the context of a compatible clinical illness cannot exclude the diagnosis of leptospirosis.

In cases of high clinical suspicion, a second urine sample should be submitted if the initial specimen tested negative by NAT.

**Case classification**

• **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
• **Probable:** A clinically compatible illness with laboratory suggestive evidence.
• **Confirmed:** A clinically compatible illness with laboratory definitive evidence.
• **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.
Spread of infection

Reservoir

Leptospirosis can infect all farm animals — cattle, pigs, goats, deer and dogs. Rats can also spread the disease. Serovars are adapted to one or more animal species such as:

- *L. interrogans* serovars Copenhageni and Icterohaemorrhagiae – rats
- *L. interrogans* serovar Hardjo and Pomona – cattle, sheep
- *L. interrogans* serovar Canicola – dogs.

Incubation period

Usually 10 days, with a range of 2–30 days.

Mode of transmission

Animals are the primary hosts and excrete leptospires in their urine. The organisms contaminate groundwater, soil and vegetation. Meat-processing staff may be exposed by direct contact with animal urine or organs of the renal tract. Leptospires enter humans through mucous membranes and skin (especially when abraded).

Period of communicability

Person-to-person transmission is very rare.

Animals may excrete leptospires in urine for months to years. The organisms may remain viable for weeks in groundwater and moist soil.

Notification procedure

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

All confirmed cases should be referred to WorkSafe New Zealand, for occupational investigation. The case must give their consent, which may be verbal, before they can be referred. A Department of Labour inspector will investigate and enforce prevention and control.
Management of case

Investigation
Obtain a history of occupational or other contact with farm animals, recreational water activities and travel. Ensure serovar-specific MATs are tested on the case’s serum.

Information on serovars can assist in investigating the source of infection. Exotic serovars in animals are notifiable to the Ministry for Primary Industries under the Biosecurity Act 1993. The Ministry for Primary Industries can assist with the investigation of animal sources.

Restriction
Nil.

Counselling
Advise the case of the nature of the infection and its mode of transmission.

Management of contacts

Definition
A contact is any person who has experienced similar exposures to the case within the preceding 10 days.

Investigation, restriction and prophylaxis
Nil.

Counselling
Advise all contacts to seek early medical attention if symptoms develop.

Other control measures

Identification of source
Check for other cases among contacts.

All confirmed cases should be referred to WorkSafe New Zealand, for occupational investigation. (Refer: ‘Notification procedure’ above).

In the case of a recreational water source, all swimming pools should comply with the New Zealand Standard for Pool Water Quality (NZS 5826:2010) S 5.
**Disinfection**
Articles soiled with urine should be cleaned and disinfected.

**Health education**
Educate the public to avoid swimming or wading in potentially contaminated waters.

**Reporting**
Ensure complete case information is entered into EpiSurv.

Medical officers of health are responsible for investigating a cluster of cases.

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.

**References and further information**

Listeriosis

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Although most cases of listeriosis are sporadic, outbreaks have occurred in New Zealand. The highest rates of disease are in immunocompromised individuals and neonates.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

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

Case definition

Clinical description

Listeriosis most commonly presents with diarrhoea, often associated with fever, myalgia and vomiting. Bacteraemia most often occurs in pregnant women (usually in the third trimester), the elderly and immunosuppressed. In pregnant women, the fetus may become infected, sometimes leading to miscarriage, stillbirth, premature delivery, newborn septicaemia or meningitis. The elderly and immunosuppressed may present with septicaemia, meningitis or pyogenic foci of infection.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires identification of Listeria monocytogenes from a normally sterile site, including the foetal gastrointestinal tract by one of the following:

• isolation (culture) of L. monocytogenes
• detection of L. monocytogenes nucleic acid.

Case classification

• Under investigation: A case that has been notified, but information is not yet available to classify it as 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.

Cases can be further classified, if appropriate, as follows.

• Pregnancy associated case:

• Cases are classified as pregnancy-associated if illness occurs in a pregnant woman, fetus, or infant aged ≤28 days old; for these cases it is the pregnant woman or mother who is notified as the case but information regarding the fetus or infant should be included on the case form.

• All other cases are considered not to be associated with pregnancy.

**Spread of infection**

**Reservoir**

*L. monocytogenes* can be detected in soil, water, silage and food. Reservoirs include humans, domestic and wild animals and fowl. *Listeria* can multiply in refrigerated foods, unlike most pathogens, and can grow in biofilms.

**Incubation period**

Variable. Outbreak cases have occurred 3–70 days following exposure to a contaminated food product. Median incubation period is estimated to be 3 weeks.

**Mode of transmission**

*L. monocytogenes* can survive and grow at normal refrigeration temperatures and ingestion of contaminated foods such as unpasteurised milk or cheese, contaminated pasteurised soft cheeses, contaminated vegetables or meat products such as pâté, or shellfish have been major sources of infection. In perinatal infections, the fetus is infected in utero or during delivery.

**Period of communicability**

Mothers of infected infants may shed the bacteria in vaginal discharges and urine for 7–10 days after delivery. Infected individuals may shed the organism in their stool for several months, even after resolution of symptoms.

**Notification procedure**

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

Investigation

Obtain a food history (use the specific food-source questionnaire available through ESR); details of pregnancy for cases of perinatal infection; and for other cases, medical co-morbidity and ingestion of potentially contaminated foodstuffs.

Ensure samples from symptomatic people and any foodstuffs implicated have been cultured for *L. monocytogenes*. Discretion should be applied before testing of food items linked to sporadic cases. Testing may be of value if food items were consumed shortly after purchase and were stored in their original unopened packaging before consumption; however, testing of leftover items that have been stored in previous-opened packaging is unlikely to be useful in the investigation of a sporadic case, and may not be a good use of resources. Testing may be more liberally undertaken in an outbreak situation.

Molecular subtyping may be used to determine the association between isolates from cases and any foodstuffs that test positive for *L. monocytogenes*. Investigate the source of contamination of any foods found to test positive for *L. monocytogenes*. Recall contaminated foodstuffs if necessary.

Restriction

Nil.

Counselling

Advise the case and their caregivers of the nature of the infection and its mode of transmission. Asymptomatic mothers of neonatal cases can shed the organism for up to 10 days after delivery.

Management of contacts

Definition

All people who have been exposed to the same food material suspected to be the source of infection.

Investigation

Investigate contacts who are symptomatic.

Restriction

Nil.

Prophylaxis

Nil.
Counselling
Advise all contacts to seek early medical attention if symptoms develop.

Other control measures

Identification of source
Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.

Disinfection
Nil.

Health education
Advise pregnant women, the elderly and immunosuppressed people to avoid the following foods:

- smoked fish or shellfish, pre-cooked fish and uncooked fish or seafood products (including sushi and sashimi) that are chilled or frozen (unless reheated thoroughly and eaten hot)
- pre-cooked meat products such as pâté and sliced deli meat (chicken, ham, salami)
- pre-prepared or stored salads (including fruit salad) and coleslaws
- raw (unpasteurised) milk and foodstuffs that contain unpasteurised milk
- soft-serve ice creams
- surface-ripened soft cheese (for example, brie, camembert, ricotta, blue vein, feta). Hard cheeses, processed cheeses, cream cheese, cottage cheese and yoghurt are safe.

(Refer also to Food safety: People with low immunity at www.mpi.govt.nz/food-safety/food-safety-for-consumers/people-with-low-immunity/.)

Educate the public about safe food preparation (see Appendix 3: Patient Information).

Advise pregnant women, the elderly and immunosuppressed people to avoid contact with potentially infective farm material, such as aborted animal fetuses.

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 Ministry for Primary Industries.
Malaria

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

All cases of malaria in New Zealand to date have occurred in travellers visiting the country or returning from overseas. There are no Anopheles species of mosquitoes in New Zealand, so there is no risk of local mosquito-borne transmission.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

Case definition

Clinical description

Malaria classically presents with high fever, rigors, sweats and headache, which may be paroxysmal. Other common symptoms include nausea, vomiting, diarrhoea, coughing, arthralgia, and abdominal and back pain. Anaemia, thrombocytopenia and abnormal liver function tests are typical. Infection with Plasmodium falciparum can be severe (sometimes fatal) and include neurological manifestations, hypoglycaemia, non-cardiogenic pulmonary oedema, renal failure, severe anaemia and vascular collapse.

Laboratory test for diagnosis

Laboratory confirmation requires demonstration of Plasmodium species in a blood film.

Positive antigen tests should be confirmed by blood film microscopy to identify the species. Nucleic acid testing can also be used to confirm Plasmodium species.

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as confirmed.
- **Probable:** Not applicable.
- **Confirmed:** A clinically compatible illness that is laboratory confirmed.
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.
Spread of infection

Incubation period

The time between the infective bite and the appearance of clinical symptoms for those travelling through an endemic area is approximately:

- 9–14 days for P. falciparum and P. knowlesi
- 12–18 days for P. vivax and P. ovale
- 18–40 days for P. malariae.

Some strains of P. vivax may have an incubation period of months to years.

Suboptimal prophylaxis and treatment of other conditions (for example, co-trimoxazole for UTI) may prolong the incubation period.

Residents of an endemic area may develop a state of chronic low-grade parasitaemia that is maintained with few or no symptoms; if such a person leaves that area, symptomatic infection due to increasing parasitaemia may appear months to years later.

Relapses of P. vivax or P. ovale infection may occur months to years after treatment as a result of dormant hypnozoites in hepatocytes. Although P. falciparum and P. malariae do not have a hepatic hypnozoite phase, inadequately treated infections with these species may recur months later.

Mode of transmission

By the bite of an infective female anopheline mosquito. Most Anopheles species feed at night, but some feed at dusk or in the early morning.

Transfusion of infected blood and sharing of contaminated needles and syringes associated with intravenous drug use rarely transmit malaria.

Period of communicability

This varies with malaria species and response to therapy. Untreated or insufficiently treated cases may be a source of mosquito or transfusional infection for several years in P. malariae infection, up to 5 years in P. vivax infection and up to 1 year in P. falciparum infection. Mosquitoes remain infective for their life.

Notification procedure

Attending medical practitioners or laboratories must immediately notify the local medical officer of health of laboratory-confirmed cases.
Management of case

Investigation
Obtain a detailed travel history and details of prophylactic measures taken in relation to travel and enter details in EpiSurv.

If the case has had no international travel history or proximity to an international airport, review the diagnosis and enquire regarding blood transfusion and intravenous drug use.

Restriction
Nil.

Treatment
The case should be managed in a partnership between their primary health care practitioner and an infectious diseases physician.

Counselling
Advise the case regarding the nature of the infection and its mode of transmission. The case should not donate blood until asymptomatic and off all treatment, when the plasma can be accepted for fractionation. The case can donate cellular components 3 years following symptoms.

Management of contacts
Those with exposure the same as or similar to the case should not donate blood within the common incubation period and should seek early medical attention if symptoms develop. No investigations, other restrictions or prophylaxis are indicated.

Consider testing asymptomatic contacts when there is more than one case in a group with a shared exposure.

Other control measures

Disinfection
Not applicable.

Health education
Provide pre-travel advice for travellers to malaria-endemic countries well before the date of transit. Such advice should include details on appropriate anti-malarial medication and protection from mosquitoes in the form of repellents containing DEET, protective clothing and insecticide-impregnated mosquito nets.
Chemoprophylaxis is only part of a comprehensive public health preventative approach.

**Reporting**

Ensure complete case information is entered into EpiSurv.

If there is any suspicion that the disease was acquired locally, contact the Ministry of Health Communicable Diseases Team. The Ministry of Health will liaise with the Ministry for Primary Industries regarding biosecurity issues.
Measles

Chapter last reviewed and updated in May 2018. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

In 2017, New Zealand was verified by the World Health Organization as having eliminated endemic measles. This means that no cases of measles have originated in New Zealand in the past three years. However, measles is often imported into New Zealand following international travel.

New Zealand has continued to experience outbreaks of measles in recent decades. This is due to historically low immunisation rates and therefore insufficient levels of immunity across the population to prevent community transmission.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

Case definition

Clinical description

An illness characterised by all of the following:
1. generalised maculopapular rash, starting on the head and neck
2. fever (at least 38°C if measured) present at the time of rash onset
3. cough or coryza or conjunctivitis or Koplik’s spots present at the time of rash onset.

Laboratory test for diagnosis

If the case received a vaccine containing the measles virus in the 6 weeks prior to symptom onset then laboratory confirmation requires:

- evidence of infection with a wild-type virus strain obtained through genetic characterisation.

If the case did not receive a vaccine containing the measles virus in the 6 weeks prior to symptom onset, then laboratory confirmation requires at least one of the following:

- detection of IgM antibody specific to the virus
• IgG seroconversion or a significant rise (four-fold or greater) in antibody level for the virus between paired sera tested in parallel where the convalescent serum was collected 10 to 14 days after the acute serum

• isolation of measles virus by culture

• detection of measles virus nucleic acid.

It is strongly recommended that, for any sporadic cases of suspected measles, two or more samples be taken: preferably blood for serology, and nasopharyngeal swab or urine sample for nucleic acid testing (NAT).

Genetic characterisation should be carried out in accordance with advice from the national measles laboratory, in particular for imported cases, for sporadic cases unrelated to a known outbreak, and during the course of a prolonged outbreak for cases without clear epidemiological links to previously confirmed cases.

The use of laboratory tests may change in an established outbreak.

**Interpreting serology**

Measles IgG detected within 1–2 days of a rash and no measles IgM strongly suggests prior immunity and that the rash is more likely due to causes other than measles.

After measles vaccination, measles IgM is produced as part of the seroconversion and can be detected for 1–2 months. Serologically diagnosed cases who have received a measles-containing vaccine 8 days to 6 weeks before testing should not be classified as confirmed measles cases unless they are also linked epidemiologically to another confirmed case before vaccination. Measles virus genetic characterisation can distinguish between vaccine and wild-type strains.

**Case classification**

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

• **Probable:** A clinically compatible illness.

• **Confirmed:** A clinically compatible illness that is laboratory confirmed or epidemiologically linked to a confirmed case.

• **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

**Spread of infection**

**Incubation period**

About 10 days, but may be 7–18 days, from exposure to onset of fever, and about 14 days, but may be 7–21 days, from exposure to the onset of rash. The incubation period may be longer in those given immunoglobulin after exposure.
Mode of transmission
Airborne spread or by direct contact with nasal or throat secretions of cases. The measles virus has a short survival time (less than 2 hours) and is rapidly inactivated by heat, sunlight and pH extremes.

Period of communicability
For public health purposes, this can usually be considered from 5 days before to 5 days after rash onset, counting the day of rash onset as day 1.

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

Management of case
Investigation
Wherever possible, all relevant clinical and demographic information on the suspected case should be collected within 1 working day.

Obtain a history of vaccination, immunodeficiency, contact with a probable or confirmed case and travel.

In consultation with the attending medical practitioner, obtain laboratory confirmation where possible and necessary. Testing may not be necessary or appropriate for cases with an epidemiological link to a confirmed case, or in outbreak situations.

Restriction
In health care facilities, airborne precautions should be taken until 5 days after the appearance of the rash.

Exclude from early childhood service, school or work and close contact with unexposed people for at least 5 days after the appearance of the rash.

Treatment (supportive)
Vitamin A treatment in hospital at the time of measles infection can reduce the risk of fatality and eye complications and should be considered particularly in cases with severe or complicated measles, immunodeficiency, malabsorption, malnutrition or documented vitamin A deficiency.
Counselling

Advise the case and their caregivers of the nature of the infection and its mode of transmission. If other vaccinations are incomplete, recommend the case catches up once they are through the acute illness.

Active case finding

Public health units should alert doctors and laboratories in areas where the case may have acquired the infection or was infectious and should ask these doctors and laboratories to notify all cases to the public health unit promptly. Part of the reason for this is that early prophylaxis given to susceptible contacts (see below) can reduce the risk of developing disease. Consider a media alert to assist in finding cases.

Management of contacts

Definitions

Contact

Any person who has been in a confined space with the case during the period of communicability. Confined settings may include an early childhood service, classroom, household, transportation, indoor occupational or social setting. Some judgement may be required by the local medical officer of health, but noting that measles is highly infectious and this should be taken into account when determining contacts and public health action.

Any person who has been in a waiting or consultation room with an infectious case, or has spent time in that room up to and including 1 hour after it has been vacated by the case must be treated as a contact.

Susceptible contact

- Anyone born from 1 January 1969\textsuperscript{15} who has not had measles infection or has not been fully vaccinated for their age.

- Anyone born between 1969 and 1981 who only received a single dose of measles vaccine between the ages of 10 and 15 months (because of possible interference from the mother’s antibodies).

Acceptable presumptive evidence of immunity

- Date of birth before 1 January 1969 (they are presumed to be immune following exposure to the wild virus).

- Documentation of immunity or previous infection.

- Documentation of two doses of measles vaccine.

\textsuperscript{15} Measles vaccine was introduced into New Zealand in 1969.
If in doubt, vaccinate as there are no undue effects from vaccinating an individual who is immune.

**Prophylaxis**

For susceptible contacts, consider the use of MMR vaccine, human normal immunoglobulin (HNIG) or intravenous immunoglobulin (IVIG) as described in the *Immunisation Handbook 2017*. There is some evidence that a single dose of measles–mumps–rubella (MMR) vaccine, when given to an unvaccinated person within 72 hours of first contact with an infectious person, may reduce the risk of developing disease.

HNIG is available from the New Zealand Blood Service and can be obtained by contacting the local hospital blood bank.

**Restriction**

Advise susceptible contacts to avoid attending school, early childhood services or community gatherings, and to avoid contact with other susceptible individuals, until 14 days after the last exposure to the infectious case. The medical officer of health should consider whether it is necessary to exclude children from early childhood services using the Education (Early Childhood Centres) Regulations 1998.

Given that post-exposure MMR vaccination cannot guarantee protection, susceptible contacts who have received their first MMR vaccination within the 72-hour period after first exposure should also be subject to these restrictions (unless they subsequently meet the criteria for immunity).

The Medical Officer of Health may decide in limited circumstances not to follow these exclusion recommendations. The Medical Officer of Health may allow a person back to school or work if the first dose of MMR is given within 72 hours of the first exposure, or the second dose of MMR is given greater than 72 hours of the first exposure if:

- this person will be exclusively returning to a setting where anyone without presumptive evidence of immunity has been excluded, and
- this person will continue to be monitored for signs and symptoms consistent with measles for at least one incubation period.


Non-susceptible contacts need no restrictions (see ‘Acceptable presumptive evidence of immunity’ above).
**Counselling**

Advise all contacts to seek early medical attention if symptoms develop and take precautions so as not to infect others. It is important they telephone and alert the health provider before attending their medical centre to prevent the risk of spreading the virus in health care settings.

**Other control measures**

**Health education**

Stress the importance of two doses of measles vaccination for all children and encourage early childhood services to keep up-to-date immunisation records of attending children.

Two doses of MMR vaccine are recommended for all children (without contraindications): the first at 15 months of age and the second at 4 years of age. Where dose/s have been delayed or missed, catch-up vaccination is recommended. This applies to anyone born from 1 January 1969.

All children and unimmunised adults are eligible for a free primary course (two doses of MMR vaccine).

Depending on circumstances, such as during an outbreak or prior to international travel, the first dose can be given from 12 months of age and the second dose 1 month after the first dose. During a generalised community outbreak, an extra dose may be offered to infants 6–12 months of age, but as effectiveness cannot be guaranteed, all children still need two further doses when they are over 15 months of age. This is because the seroconversion rate is lower when MMR is administered to an infant under 12 months of age.

**Infection control**

Ensure that the attending medical practitioner and laboratory collection rooms understand the importance of prompt isolation of a suspected case within their health care facility and the need to leave the consultation/examination room vacant for at least 1 hour after the suspected case has left it. Visits of cases and contacts (who may be entering the infectious period) to laboratory collection rooms should be planned ahead by telephone.

**Reporting**

Ensure complete case information is entered into EpiSurv.

If an outbreak occurs, inform the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.
References and further information


Meningoencephalitis – primary amoebic

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Primary meningoencephalitis is a rare condition. It was first recognised in New Zealand in 1968 among people who had been swimming in untreated thermal pools in the central North Island. There were eight fatal cases between 1968 and 1978, and a further death was reported in 2000.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

Clinical description

Symptoms may begin with a change in taste or smell, followed by headache, nausea, vomiting, confusion, fever, stiff neck and mental status changes. The infection typically affects the olfactory bulb and grey matter of the frontal, temporal and cerebellar lobes and usually runs a rapid course with death within 6 days of onset of symptoms.

Especially consider if not responding to treatment for bacterial causes of infection and there is a history of exposure to geothermal water.

Laboratory test for diagnosis

Laboratory confirmation requires demonstration in cerebrospinal fluid of the causative organism – usually *Naegleria fowleri*.

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable:** Clinically compatible illness with history of immersion in thermal pool.
- **Confirmed:** Compatible illness that is laboratory confirmed.
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.
Meningoencephalitis – primary amoebic – May 2012

Spread of infection

Incubation period
Three to seven days

Mode of transmission

*Naegleria* infection can be acquired by exposure of the nasal passages (by diving or swimming) to contaminated (usually warm) fresh or inadequately treated water.

Period of communicability
No person-to-person transmission.

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

Management of case

Investigation
Obtain history of submersion in thermal water. Ensure laboratory confirmation has been attempted.

Restriction
Nil.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Treatment
The case should be under the care of an infectious diseases physician.

Management of contacts

Definition
People who have swum in the same pool as the case within the last week.

Investigation, restriction and prophylaxis
Nil.
**Counselling**

Advise all contacts of the incubation period and common symptoms of meningoencephalitis. Encourage them to seek early medical attention if symptoms develop.

**Other control measures**

**Identification of source**

Identify pools where the case swam and, where practical and appropriate, advise against further recreational use. Liaise with local territorial authority staff to investigate potential sources of infection; see ‘Reporting’ below.

**Control at source**

Swimming pools containing residual-free chlorine of 1–2 ppm are considered safe. All pools should comply with the New Zealand Pool Water Quality Standard (5826: 2000). An additional means of minimising risk is to use a heat exchanger to heat non-geothermal water.

**Health education**

Consider a media release and direct communication with local schools and health professionals to encourage prompt reporting of symptoms in those who have used the implicated pool. In communications with doctors, include recommendations regarding diagnosis.

Advise the public of the danger of immersing head, especially the nose, in untreated thermal pools.

**Reporting**

Ensure complete case information is entered into EpiSurv.

On receiving a notification, medical officers of health should immediately notify the Ministry of Health Communicable Diseases Team.

The Ministry of Health will notify appropriate staff in the Ministry for Primary Industries so that further investigation of the source can be undertaken.
Middle East respiratory syndrome (MERS)

Chapter last reviewed and updated in February 2015.

Epidemiology in New Zealand

An outbreak of Middle East respiratory syndrome (MERS) began in the Arabian Peninsula in 2012. This coronavirus strain had not previously been detected in humans or animals. The disease has demonstrated a high mortality rate and is caused by a new coronavirus, termed MERS coronavirus (MERS-CoV). No cases of MERS have been diagnosed in New Zealand.

It is likely that the virus has come from an animal source. Experimental evidence identifies dromedary camels as the primary reservoir of MERS-CoV; many of the human cases reported to date have had close contact with camels. There are also limited reports that MERS-CoV has been detected in bats.

Most cases have occurred in the Middle East region, and all cases outside the Middle East have had a direct or indirect travel link with the Middle East. There has been no reported sustained person-to-person transmission of MERS-CoV. However, in some instances MERS-CoV has been transmitted to close contacts, including health care workers.

Case definition

Clinical description

Most confirmed cases have presented with, or later developed, acute, serious respiratory illness. Typical symptoms have included fever, coughing and breathing difficulties. Some cases have also presented with gastro-intestinal symptoms (vomiting or diarrhoea). Asymptomatic cases and cases with only mild flu-like symptoms have also been reported.

Most of the severe cases have occurred in people with underlying co-morbidities, particularly type II diabetes. Reported cases have also been more common in the middle-aged and elderly populations. The case fatality rate is higher in patients who are immunocompromised and elderly or who demonstrate significant co-morbidities.

Laboratory test for diagnosis

Laboratory confirmation requires molecular diagnostic testing, including either a positive PCR on at least two specific genomic targets or a single positive target with sequencing on a second.
While PCR testing for MERS-CoV may be undertaken in any PC2 laboratory, positive samples should be sent to Institute of Environmental Science and Research (ESR) for confirmatory testing.

The laboratory should be notified about the referral and samples should be transported in accordance with current regulatory requirements. Please refer to the Annex for the procedure for shipping respiratory samples.

For further information on testing, refer to the WHO website at: www.who.int/csr/disease/coronavirus_infections/WHO_interim_recommendations_lab_detection_MERSCoV_092014.pdf

**Case definitions for MERS-CoV**

**Suspected case (under investigation)**

A suspected case is a person who has an acute febrile respiratory illness with clinical, radiological or histopathological evidence of pulmonary parenchymal disease (eg, pneumonia or acute respiratory distress syndrome)\(^{16}\) and either:

- has a history of residence in, or travel to, the Arabian Peninsula\(^ {17}\) or neighbouring countries within 14 days before onset of illness or
- has had close contact with a probable or confirmed case within 14 days before onset of illness\(^ {18}\) or
- is a member of a cluster of patients with severe acute respiratory illness of unknown aetiology in which MERS-CoV is being evaluated.

**Probable case**

A probable case is a person:

- with an acute febrile respiratory illness with clinical, radiological or histopathological evidence of pulmonary parenchymal disease (eg, pneumonia or acute respiratory distress syndrome) and

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\(^{16}\) Immune-compromised patients may not present with typical or severe symptoms.

\(^{17}\) Countries of the Arabian Peninsula and immediate surrounding areas are: Bahrain, Iraq, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Palestinian territories, Qatar, Saudi Arabia, Syria, the United Arab Emirates (UAE) and Yemen. Transiting through an international airport (<24 hours’ stay, remaining within the airport) on the Arabian Peninsula is not considered to be a risk factor for infection.

\(^{18}\) Close contact includes:

1. anyone who provided care for the patient, including a health care worker or family member, or who had other similarly close physical contact
2. anyone who stayed at the same place as (eg, lived with or visited) a probable or confirmed case while the case was ill
3. where a case has travelled on an aeroplane, any passenger seated in the same row as the case or up to two rows in front of or behind the case, and any crew member who has had prolonged interaction with the ill person.
• for whom there is no possibility of laboratory confirmation for MERS-CoV because either the patient or samples are not available for testing and
• who has had close contact with a laboratory-confirmed case.

Confirmed case
A confirmed case is a person with laboratory confirmation of infection with MERS-CoV.

Spread of infection

Incubation period
The incubation period of infection has not yet been fully determined but is likely to be from 2–14 days (most commonly 5 days). This timeframe is based on what is known about other coronaviruses and the MERS-CoV cases in which exposures are known.

Mode of transmission
The mode of transmission of MERS-CoV has not yet been fully determined. Some cases have involved a strong history of exposure to camels or camel products (eg, milk). However, many cases have had no history of exposure to camels or other animals. A considerable proportion of MERS-CoV cases have been part of clusters in which limited, non-sustained, human-to-human transmission has occurred.

Period of communicability
The period of communicability of MERS-CoV has not yet been fully determined. Isolation precautions should be continued until 24 hours after the resolution of symptoms.

Notification procedure
The attending medical practitioner and laboratory should immediately notify any suspected case to the local medical officer of health. The medical officer of health should inform the Office of the Director of Public Health by phone and email.

Any contacts of a probable or confirmed case should also be reported to the local medical officer of health.

Management of case

Investigation
Any suspected cases (and/or family members) should be interviewed within the first 24–48 hours of the investigation to collect basic demographic, clinical and epidemiological information.
For further information on case investigation, refer to the WHO website at:  

Ensure laboratory confirmation has been attempted.

- It is recommended that both upper and lower respiratory tract specimens be collected whenever possible.
- Respiratory samples – including upper respiratory tract viral swabs, nasopharyngeal swabs and aspirates, sputum, endotracheal aspirate, bronchoalveolar lavage fluid, lung biopsies and postmortem tissues – are suitable for testing for MERS-CoV.
- Even after the initial detection of the virus, continued sampling and testing will add to current knowledge about the duration of virus shedding and are strongly encouraged.

For WHO recommendations on laboratory testing for MERS-CoV, refer to the WHO website at:
www.who.int/csr/disease/coronavirus_infections/WHO_interim_recommendations_lab_detection_MERSCoV_092014.pdf

Restriction

The use of standard precautions in conjunction with contact and airborne precautions is recommended for suspected, probable or confirmed cases until the transmission characteristics of MERS-CoV are better understood.19

In general, where cases do not meet the definition of a probable or confirmed case after investigation, standard, contact and droplet precautions should be applied. The exception is when respiratory samples are being taken, in which case airborne precautions are also required.

Transmission-based precautions should include:

- placement of suspected, confirmed and probable cases in an airborne infection isolation (negative pressure) room if available or, as a minimum, a single room with a closed door
- standard precautions, including wearing a mask and eye protection (goggles or a face shield) and an apron or gown
- additional contact and airborne precautions, including wearing a P2/N95 respirator and strictly adhering to hand hygiene.

If it is necessary to transfer the patient outside the airborne infection isolation room, the patient should wear a surgical mask while they are being transferred and follow

19 Please refer also to guidance from the US Centers for Disease Control and Prevention at:
www.cdc.gov/coronavirus/mers/infection-prevention-control.html
respiratory hygiene and cough etiquette. They should also be encouraged to perform hand hygiene.

**Treatment**
Consult an infectious diseases physician.

**Counselling**
Advise the case and their caregivers of the nature of the infection and what is known of its mode of transmission.

**Management of contacts**

**Definition**
Close contact includes:
- anyone who provided care for the patient, including a health care worker or family member, or who had other similarly close physical contact
- anyone who stayed at the same place as (eg, lived with or visited) a probable or confirmed case while the case was ill
- where a case has travelled on an aeroplane, any passenger seated in the same row as the case or up to two rows in front of or behind the case and any crew member who has had prolonged interaction with the case.

**Investigation**
Close contacts of probable and confirmed cases should be identified and monitored for up to 14 days for the onset of respiratory symptoms, and tested for MERS-CoV infection if respiratory symptoms develop (regardless of the severity of illness).

**Restriction**
Quarantine of asymptomatic contacts is not required as current evidence shows limited human-to-human transmission of MERS-CoV. Current evidence does not show that the disease is transmissible in the pre-symptomatic or early symptomatic stages.\(^{20}\)

**Prophylaxis**
Nil.

\(^{20}\) Refer to the WHO website at:
www.who.int/csr/disease/coronavirus_infections/MERS_home_care.pdf


Counselling
Advise all contacts of the estimated incubation period and typical symptoms of MERS-CoV infection. Encourage them to contact their local public health unit and seek early medical attention if symptoms develop.

Other control measures

Identification of source
Check for other cases in the community.

Disinfection
Clean and disinfect surfaces and articles soiled with respiratory secretions or faeces, using a product with antiviral activity. For further details, see Appendix 1: Disinfection.

Health education
Consider a media release and direct communication with local health professionals to encourage prompt reporting of symptoms and to provide advice (for both the public and health professionals).

Reporting
Public health units should enter cases into EpiSurv, using the Generic Case Report Form. If entering a case directly on the EpiSurv website then choose Middle East Respiratory Syndrome.

Any change in a case status (eg, case confirmation, death or de-notification) should also be immediately reported and updated in EpiSurv.

WHO will be notified of probable and confirmed cases through the National Focal Point for International Health Regulations (ie, the Office of the Director of Public Health, Ministry of Health).

If a cluster of cases occurs, contact the Ministry of Health Communicable Diseases Team and outbreak liaison staff at the Institute of Environmental Science and Research. Also complete the Outbreak Report Form.

References and further information

World Health Organization. 2013. Rapid advice note on home care for patients with Middle East respiratory syndrome coronavirus (MERS-CoV) infection presenting with mild


Mumps

Chapter reviewed and updated in November 2018. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

The incidence of mumps in New Zealand has been stable in recent years. Mumps epidemics in New Zealand occurred in 1989 and 1994 while the most recent began at the end of 2016 (mainly in Auckland region). Before the introduction of the measles–mumps–rubella (MMR) vaccine in 1990, mumps epidemics occurred every 3–5 years.

Detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website in the annual notifiable disease reports at https://surv.esr.cri.nz/surveillance/annual_surveillance.php.

Globally, mumps outbreaks continue to occur, especially in teenagers and young adults. These outbreaks are facilitated by mumps vaccine effectiveness (lower than for measles and rubella), waning vaccine-induced immunity and populations in settings more conducive to outbreaks (eg, schools, universities).

Given that mumps cases may only be mildly symptomatic, and that about a third of infections may be asymptomatic, infected (and possibly contagious) individuals may not consult health services. Therefore, identifying chains of transmission in an outbreak situation may be difficult.

Case definition

Clinical description

An acute illness with unilateral or bilateral tenderness and swelling of the parotid or other salivary gland/s, lasting more than 2 days, with or without fever and without other apparent cause. Other clinical manifestations of mumps infection may uncommonly include orchitis, mastitis, oophoritis, meningitis, encephalitis, pancreatitis and hearing loss.

Laboratory tests for diagnosis

Laboratory definitive evidence for a confirmed case requires at least one of the following:

- detection of mumps virus nucleic acid (PCR)
- isolation of mumps virus by culture.
If the case received a vaccine containing the mumps virus in the 6 weeks prior to symptom onset then laboratory definitive evidence requires also:

- evidence of infection with a wild-type virus strain obtained through genetic characterisation.

Case classification

- **Under investigation**: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable**: A clinically compatible illness.
- **Confirmed**: A clinically compatible illness that is laboratory confirmed or epidemiologically linked to a confirmed case.
- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

Spread of infection

**Incubation period**

About 16–18 days, ranging from 12–25 days.

**Mode of transmission**

By droplet spread or by direct contact with saliva or fomites from an infected person.

**Period of communicability**

People with mumps are most infectious from 2 days before to 5 days after the onset of parotitis. For contact tracing purposes the recommended period of communicability is also from 2 days before and 5 days after the onset of parotitis. However, mumps virus has been isolated in saliva from 7 days before to 9 days after the onset of parotitis. Asymptomatic cases also can be infectious.

**Notification procedure**

Attending medical practitioners or laboratories must immediately notify the local Medical Officer of Health of suspected cases. Notification should not await confirmation.

**Management of case**

**Investigation**

Ascertaining whether there is a history of vaccination and travel and identify any possible contacts, including travellers from overseas.
If no epidemiological link to a confirmed case is established, ensure laboratory confirmation by viral nucleic acid detection from a buccal swab taken ideally within 3 days, up to 7 days of parotitis onset. The buccal area to swab is the space near the upper rear molars between the cheek and gum (if unilateral parotitis, swab the affected side).

**Restriction**

In a health care facility, implement droplet (in addition to standard) precautions for 5 days after the onset of glandular swelling.

Exclude cases from school, university, sports, early childhood services, health care employment or other work, and from close contact with other susceptible people for 5 days from onset of glandular swelling.

**Counselling**

Advise the case and their caregivers of the nature of the infection and its mode of transmission. In particular, advise good hand hygiene, cough/sneeze etiquette, avoiding sharing food/drink/utensils, and social distancing.

**Management of contacts**

**Definition**

Any person with close contact (eg, through household, early childhood services, school, workplace, camp, cultural or sports-related activities, transportation or social mixing) with the case during the period of communicability.

**Susceptible contact**

Anyone born after 1981 who has not had mumps infection or has not been fully vaccinated for their age.

**Investigation**

In an outbreak, obtain a history of previous immunisation or natural illness with mumps to identify susceptible contacts.

Serological screening to identify susceptible contacts is not recommended. The presence of mumps-specific IgG does not necessarily predict protection from mumps disease despite it being considered as evidence of mumps immunity.

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21 For practical reasons close contact may be defined as face-to-face contact within 1 metre.

22 Mumps vaccine was first offered in the 1990 schedule as MMR at 15 months and a second dose was introduced in 1992 at 11 years. However, any person born between 1969 and 1981 who has not received two documented doses of MMR vaccine should be offered the vaccine to protect them against measles and rubella. People born between 1991 and 1996 may have only had 1 dose of MMR as the second dose was offered as part of a school catch up programme at this time.
**Restriction**

Advise exclusion of susceptible contacts in health care settings and for those working or living with immune-compromised people from 12 days after the first exposure to 25 days after last exposure to the infectious case. Documented full immunisation with two MMR doses should be required in these situations.

In general, consider advising exclusion of susceptible contacts with zero MMR doses from tertiary education, school or early childhood services or work from 12 days after the first exposure to 25 days after last exposure to the infectious case, if there is a high risk of mumps transmission.

Exclusion is more important in secondary and tertiary education settings as these settings are more conducive to outbreaks.

All excluded contacts in settings other than health care or with immunocompromised people can be readmitted immediately after they have received the first MMR dose. Those who have a history of one dose of MMR vaccination should be offered their second vaccine dose and be allowed to remain in tertiary education, school, early childhood services or work (except for those in health care settings and for those working or living with immunocompromised people). However, if the contact subsequently develops mumps symptoms they would need to be excluded.

These measures will increase overall immunity in these populations and limit the spread of mumps (as well as protecting against measles and rubella), but also minimise the disruption due to exclusion.

All vaccinations given should be recorded on the National Immunisation Register via the Practice Management Systems or by completing the NIR3 immunisation event form and sending this to the District Health Board NIR Administrator.

**Prophylaxis**

Passive immunisation is not effective. Active immunisation with MMR vaccine is not considered effective against incubating infection, but MMR should be offered to susceptible contacts for protection against future exposure.

**Counselling**

Advise good hand hygiene, cough/sneeze etiquette, avoiding sharing food/drink/utensils, and social distancing. Advise all contacts of the incubation period and typical symptoms of mumps. Encourage them to seek early medical attention and avoid contact with others if symptoms develop.
Other control measures

Prevention
Make sure that all those born after 1969 and who are susceptible are offered MMR vaccine, with priority given to those borne after 1981.

Identification of source
Check for other cases in the community.

Disinfection
Clean and disinfect surfaces and articles soiled with saliva or urine. For more details, refer to Appendix 1: Disinfection.

Health education
Encourage complete childhood vaccination with the MMR vaccine. This currently involves two doses, the first at 12–15 months of age and the second at 4 years of age, before school entry.

Encourage early childhood services to keep up-to-date immunisation records.

Outbreak response
The focus of the Public Health response should be:
- to increase population immunity against measles, mumps and rubella
- to limit outbreaks in settings where transmissions may be more intense and prompt public health intervention may be effective (especially secondary and tertiary education)
- to stop any spread in health care settings, and protect immune-compromised people.

Immunisation response should be prioritised.

Reporting
Ensure complete case information is entered into EpiSurv.

If a cluster of cases occurs, inform the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.

References and further information


Neisseria meningitidis invasive disease

Chapter reviewed and updated in October 2018. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Despite rates dropping significantly in recent years since the meningococcal B epidemic and vaccination programme, there are still a number of cases of invasive meningococcal disease in New Zealand each year and sometimes community outbreaks. As with the epidemiology in other temperate climates, there tends to be a seasonal pattern, with more cases seen in winter and spring.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

Case definition

Clinical description

Meningococcal disease is a serious invasive disease with an acute onset and may start as a mild flu-like illness and rapidly progress to fulminant septicemia and death. Cases typically experience acute fever, malaise, nausea, myalgia, arthralgia and prostration. A rash occurs in about two-thirds of cases – this may be ill defined and macular, petechial or purpuric. More severe infection leads to shock, disseminated intra-vascular coagulation (DIC), acrocyanosis and multi-organ failure.

Approximately 75 percent of cases with invasive disease have meningitis (typically causing headache, photophobia and neck stiffness). Infants present with less-specific features.

Other locations of invasive disease with Neisseria meningitidis are possible though rare, such as orbital cellulitis, septic arthritis, and pericarditis.

Nasopharyngeal carriage of meningococci is relatively common, in roughly 15 percent of the population, and is generally more prevalent in young adults, people who are living in conditions of severe overcrowding (Baker et al 2000), smokers and military recruits.

The events that cause meningococcal disease are poorly understood but include a combination of organism, host and environmental factors (Stephens 1999).
Laboratory tests for diagnosis

Laboratory confirmation requires at least one of the following:

- isolation of *Neisseria meningitidis* bacteria or detection of *Neisseria meningitidis* nucleic acid from blood, cerebrospinal fluid (CSF) or other normally sterile site (for example, pericardial or synovial fluid)
- detection of gram-negative intracellular diplococci in blood or CSF or skin petechiae
- detection of meningococcal antigen (latex agglutination test) in CSF.

Case classification

- **Under investigation**: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable**: A clinically compatible illness.
- **Confirmed**: A clinically compatible illness that is laboratory confirmed.
- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

Although not meeting the definition of a confirmed case, meningococcal infection of the conjunctiva is considered an indication for public health action because of the high immediate risk of invasive disease (refer Health Protection Agency 2011). Other sites may also require public health follow-up on a case-by-case basis, as determined by the local medical officer of health.

Spread of infection

**Incubation period**

2–10 days, commonly 3–4 days.

**Mode of transmission**

Transmission is from person to person through droplets or secretions from the upper respiratory tract, from a carrier or case.

**Period of communicability**

Therapy with rifampicin, ceftriaxone or ciprofloxacin eradicates *N. meningitidis* from mucosal surfaces within 24 hours, and the case is no longer considered infectious.

Notification procedure

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

Investigation
Obtain a history of vaccination and possible contacts.
Obtain a history of any antibiotic treatment, to help clarify if there may be partially treated disease.
Ensure laboratory confirmation has been attempted, including strain identification (group and subtype).

Restriction
Droplet precautions until 24 hours after the start of ceftriaxone, rifampicin or ciprofloxacin. Close contacts do not require isolation even if they are taking prophylaxis.

Pre-hospital treatment
Parenteral antibiotics should be administered to all cases as soon as meningococcal disease is suspected before admission to hospital or in hospital if delays and assessment in hospital are likely to be more than 30 minutes. See the latest edition of the Immunisation Handbook (Ministry of Health 2017), available at www.health.govt.nz

Eradication of carriage
It is important that the case receives an antibiotic that will eliminate throat carriage before discharge from hospital, usually rifampicin, ciprofloxacin or ceftriaxone. Unless one of these has been used in the course of treatment, it should be prescribed for the index case before discharge.

There are currently no specific recommendations for vaccinating cases with meningococcal vaccine, other than the general immunisation recommendations – see ‘Health education’ below and the Immunisation Handbook (Ministry of Health 2017).

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Management of contacts
Definition
Anyone who has had unprotected contact with upper respiratory tract or respiratory droplets from the case during the 7 days before onset of illness to 24 hours after onset of effective treatment.
Public health follow-up is most important for household contacts and contacts that have had similarly close exposure. Examples of such contacts are:

- those sleeping at least one night in the same household, dormitory, military barrack, student hostel bunkroom (not residents of nursing or residential homes who sleep in separate rooms) as the case or who have been in a seat adjacent to the case in a plane, bus or train for more than 8 hours
- health care workers who have had intensive unprotected contact (not wearing a mask) with a case during intubation, resuscitation or closely examination of the oropharynx
- exchange of upper respiratory tract secretions, including intimate kissing
- other contacts as determined by the medical officer of health on a case-by-case basis, such as children and staff attending an early childhood service

Note: Unless one of these criteria is met, low-level salivary contact such as kissing on the cheek or mouth or sharing food or drink does not require public health follow-up or treatment (given evidence that it does not increase risk of transmission).

**Post-mortem**

If the case has been treated with an effective antibiotic for at least 24 hours before death, any contact risk is low. If the case has not been treated, then occupational contacts should follow routine infection control practices with additional droplet and contact precautions.

Kissing the body is not considered a risk. Body bags are not necessary, and transport to other countries for burial or cremation does not pose a risk. There is no restriction on embalming.

**Laboratory workers**

Laboratory workers who handle high concentrations or large quantities of organisms or are routinely exposed to isolates should be protected with the quadrivalent vaccine.

**Investigation**

Nil. Routine throat or nasopharyngeal culture of contacts is not recommended because asymptomatic carriage is common.

**Restriction**

Nil.

**Antimicrobials**

Antibiotic prophylaxis should be given as soon as possible (ideally within 24 hours) after the diagnosis of the index case. After 24 hours, chemoprophylaxis (and vaccine if appropriate) should still be considered for close contacts; however, there is little value
in offering this more than 14 days after the diagnosis of illness (there is a low risk of further cases after this period, see CDC 2005b).

The purpose of antibiotic prophylaxis is to eradicate nasopharyngeal colonisation by meningococci and thus prevent transmission to other susceptible people. Prophylaxis will not treat illness that the person may be incubating, so it is essential that the contacts be advised to seek urgent medical attention if they become unwell.

**Options**

**Rifampicin**
- Children under 1 month old: Rifampicin 5 mg/kg twice daily for 2 days.
- Children over 1 month old, and adults: Rifampicin 10 mg/kg (maximum 600 mg) twice daily for 2 days.
- Avoid rifampicin if pregnant or breastfeeding.

**Ceftriaxone**
- 125 mg for children under 12 years of age, and 250 mg for older children and adults, intramuscularly as a single dose. This is the preferred prophylaxis for women who are pregnant or breastfeeding. Do not use in infants under 4 weeks of age.

**Ciprofloxacin**
- 500 mg or 750 mg orally as a single dose for children over 12 years of age and adults, except pregnant and lactating women. This is the preferred prophylaxis for women on the oral contraceptive pill. Also preferable for prophylaxis of large groups.

Ciprofloxacin has been recommended in all age groups in international guidelines (Public Health England 2018, Communicable Diseases Network Australia, 2017, European Centre for Disease Prevention and Control, 2010).

Consult Medsafe data sheets for appropriate use and dosages of ciprofloxacin in children. Treatment in children should only be initiated after careful benefit/risk evaluation and prescribing health practitioners should ensure they are familiar with their responsibilities when prescribing a medicine for ‘off-label’ use.

Resistance to ciprofloxacin is rare but has been described. A meningococcal C outbreak in 2018 in Fiji has shown to be resistant to ciprofloxacin. If such a strain is suspected, ciprofloxacin should not be used for antibiotic prophylaxis.

**Immunisation**

**If case is of group A, C, W135 and Y disease**

Immunisation is recommended for unimmunised contacts (as defined above) of a case of group A, C, W135 and Y disease, preferably within 1 week of diagnosis of the index
case, but can be considered up to 4 weeks. Ideally the strain, or at least the group, should be determined first; therefore timely laboratory results are important. If there are delays in grouping or this is not possible, consider using a quadrivalent vaccine (if over 2 years of age).

Conjugate vaccine has been shown to reduce nasopharyngeal carriage and is therefore the preferred type of vaccine for contacts of meningococcal disease (conjugate vaccines are currently available for group A, C, W and Y in New Zealand).

Current meningococcal vaccines have short-term efficacy, estimated to be around 3 to 5 years.

Discuss immunisation in the outbreak setting with the Ministry of Health Communicable Diseases and Immunisation teams.

**If case is group B**

In a multi-occupancy residential meningococcal B outbreak an emergency supply of meningococcal B vaccine (Bexsero) is available for use and will be supplied under section 29 of the Medicines Act 1981.

The process for obtaining the vaccine is as follows.

<table>
<thead>
<tr>
<th>Medical officer of health (MOsH) managing men B outbreak</th>
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<tbody>
<tr>
<td>Notifies the Ministry (ie, Manager Public Health Group / Director of Public Health) of their intention to use Bexsero in a multi-occupancy residential meningococcal B outbreak.</td>
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<tr>
<th>Manager Public Health / Director Public Health</th>
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<tr>
<td>Notifies PHARMAC (TGM – Vaccines) of:</td>
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<tr>
<td>• intent to use Bexsero</td>
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<tr>
<td>• the number of doses required</td>
</tr>
<tr>
<td>• MOsH details</td>
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<tr>
<td>• vaccine distribution details.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PHARMAC (TGM – Vaccines)</th>
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</thead>
<tbody>
<tr>
<td>Instructs Healthcare Logistics (HCL) to release the required stock to the MOsH at the specified public health service.</td>
</tr>
</tbody>
</table>
Under this scenario, HCL will be responsible for the supplier requirements of section 29, and the MOsH will be the prescriber under Section 25 of the Medicines Act 1981.

**Revaccination**

Information on revaccination is limited, but it may be appropriate for individuals with ongoing higher risk. See the *Immunisation Handbook* (Ministry of Health 2017) for more details.

**Counselling**

All contacts should be encouraged to seek medical advice if symptoms develop, especially fever and petechial rash.

**Other control measures**

**Management of contacts when there are large groups involved**

In instances where large groups of people have been exposed to a case, it is likely that contacts will have returned to a variety of health districts. Any follow-up needs to be coordinated by the appropriate medical officer of health to ensure that districts provide consistent advice and treatment.

**Definitions**

- **Outbreak**: Two or more cases of disease associated in time, place or person.
- **Sporadic case**: A single case in the absence of a previous known contact with another case.
- **Primary case**: A case that occurs in the absence of previous known close contact with another case.
- **Co-primary case**: A close contact who develops the disease within 24 hours of onset of illness in the primary case.
- **Secondary case**: A close contact who develops the disease more than 24 hours after onset of illness in the primary case where the microbiological characteristics of the organism are the same.
- **Organisation outbreak**: Two or more cases of the same strain (group and serotype) occurring within a 4-week period at the same early childhood service, school, sports group, social group, nursing home, university, etc.
- **Community outbreak**: Three or more confirmed cases of the same strain (group and serotype) within a 3-month period and an age-specific incidence or specific community population incidence of approximately 10 per 100,000, where there is no other obvious link between the cases (this is not an absolute threshold). The numerator is defined by the number of unlinked cases (that is, they are not close contacts of each other and do not share a common affiliation). The denominator is
defined as the population at risk that makes best sense in terms of population residence and movement, and therefore transmission of meningococcal bacteria.

The aim of the intervention in such settings is to eradicate carriage of the strain from a population at high risk. The medical officer of health determines necessary action in discussion with the Ministry of Health.

**Identification of source**
Check for other cases in the community. Do not perform screening cultures because asymptomatic carriage is common.

**Disinfection**
Clean and disinfect surfaces and materials soiled with respiratory secretions.

**Health education**
Key messages include being aware of signs and symptoms, and the importance of early medical advice and treatment.

Ensure people are aware of the availability of and recommendations for meningococcal vaccines.

General recommendations for meningococcal vaccination are for:
- people who have had or are having a splenectomy (an operation to partly or completely remove the spleen)
- children with functional asplenia (when the spleen does not work properly).

It is also recommended, but not funded, for:
- young people moving to hostels, especially in their first year
- people with sickle cell anaemia
- people with terminal complement deficiencies
- people with human immunodeficiency virus (HIV)
- military recruits
- microbiologists and laboratory workers who could be exposed to meningococcal bacteria
- travellers to regions where this disease is common – in particular, people participating in the hajj, and people travelling to sub-Saharan Africa (the so-called ‘Meningitis Belt’).

See the *Immunisation Handbook* (Ministry of Health 2017) for more details.
**Reporting**

Ensure complete case information is entered into EpiSurv.

If a cluster of cases occurs, inform the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.

**References and further information**


Non-seasonal influenza

Chapter last reviewed and updated in May 2012.

Non-seasonal influenza (capable of being transmitted between human beings) was added to the notifiable infectious diseases schedule of the Health Act 1956 (schedule 1) on 29 April 2009 with the intention of making notifiable any novel strains of influenza causing disease in humans, particularly where there is concern that the strain may have pandemic potential.

As a result, this is a category of notifiable disease that will only occasionally be activated, although when it is activated, activation is likely to happen quickly. Activation occurs when the Director of Public Health develops and disseminates clinical and related guidelines for the relevant strain. In the absence of any such current guidelines, this category will be inactive.

Further information on the surveillance and management of the strain of influenza will be provided through updates to these guidelines, and hence no further information is provided in this manual.

Note: A separate chapter relates to highly pathogenic avian influenza (HPAI).
Pertussis

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

New Zealand has continued to experience cyclic outbreaks of pertussis, occurring every few years, in recent decades. This is in part due to historically low immunisation rates and because immunity from both natural infection and immunisation wanes over time.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

The objectives of surveillance for pertussis are:

- to monitor and analyse the epidemiology of the disease, with emphasis on those at high risk of severe disease or complications, particularly infants
- to monitor the impact of immunisation
- to report on findings to inform effective and efficient prevention strategies.

The priority of the prevention strategies against pertussis is to protect infants by passive immunity transfer from their mothers with booster immunisation during each pregnancy, and timely immunisation of infants.

Case definition

Clinical description

A clinically compatible case characterised by cough and one or more of:

- paroxysms of cough
- cough ending in vomiting, cyanosis or apnoea
- inspiratory whoop.

Infants are less likely to have the inspiratory whoop and are more likely to present with gagging, gasping, cyanosis, apnoea, or non-specific signs such as poor feeding or seizures.

Adults and children partially protected by vaccination can present with illness ranging from a mild cough illness to classic pertussis.
Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires: isolation of *Bordetella pertussis* or detection of *B. pertussis* nucleic acid, preferably from a nasopharyngeal swab.

- **Laboratory suggestive evidence for a probable case requires:** *B. pertussis* toxin IgG test of > 100 IU/ml or a significant increase\(^{23}\) in antibody levels between paired sera at the same laboratory. Serology should only be requested for public health purposes after consultation between the Medical Officer of Health and the local microbiologist.

**Note**

There are several laboratory tests available for the diagnosis of pertussis and the timing of the test impacts on its sensitivity. Appropriate tests and specimens should be discussed with the testing laboratory or ESR.

A negative test does not necessarily rule out pertussis: consider exposure, clinical compatibility, the test used and the timing of the test.

**Polymerase Chain Reaction (PCR)**

PCR should be considered the **diagnostic method of choice**, unless the presentation is delayed until 4 weeks after onset of symptoms, or 3 weeks after the onset of paroxysmal cough. After that sensitivity declines as the amount of bacterial DNA in the nasopharynx diminishes. PCR is 2–3 times more likely to be positive than culture when symptoms of classic pertussis are present (eg, 2 weeks of paroxysmal cough). PCR can be affected by specimen collection but is less affected by prior antibiotic therapy since the organism does not need to be viable to be positive by PCR.

**Culture**

Culture is only useful during the catarrhal and very early paroxysmal phase of illness. The sensitivity of nasopharyngeal culture decreases rapidly after the onset of cough. Culture sensitivity is reduced by antibiotic treatment, immunisation, duration of illness and can also be affected by specimen collection, transportation and isolation techniques. Cultures are rarely positive after 2 weeks from the onset of the catarrhal stage of the illness, or 1 week of paroxysmal cough, or for more than a few days after antibiotic treatment. Cultures may also take up to 2 weeks to be finalised, so the results may not be clinically useful.

**Serology**

- The sensitivity and specificity of serology is low. Serology cannot be used as a confirmatory test. Therefore the use of serology is not recommended, except for public health purpose after consultation between the Medical Officer of Health and the local microbiologist. Serology can then sometimes be used late in the course of illness, generally when the patient is no longer infectious. Serologic tests measure antibodies that could result from either infection or vaccination. Anti-pertussis

\(^{23}\) A ‘significant increase’ is generally taken as a fourfold rise in titre, however interpretation of serology results should be discussed with the testing laboratory or ESR.
toxin IgG is the best serological marker of infection. IgA assays lack adequate sensitivity and specificity and should not be used for diagnosis.

**Case classification**

- **Under investigation**: A case that has been notified, but information is not yet available to classify it as suspect, probable or confirmed.
- **Suspect** (in children under 5 years of age): Any paroxysmal cough with whoop, vomit or apnoea for which there is no other known cause.
- **Probable**: A clinically compatible illness where the cough is lasting longer than 2 weeks. However in situations where serology has been requested after consultation between the Medical Officer of Health and the local microbiologist, a clinically compatible illness with laboratory suggestive evidence will also be considered as probable.
- **Confirmed**: A clinically compatible illness accompanied by laboratory definitive evidence, or is epidemiologically linked to a confirmed case.
- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

**Spread of infection**

**Incubation period**

Usually 7–10 days, ranging from 5–21 days.

**Mode of transmission**

Droplets of respiratory, oral or nasal secretions. Indirect spread via contaminated objects occurs rarely.

**Period of communicability**

Highly communicable in the catarrhal stage before the paroxysmal cough stage, and during the first 2 weeks of the paroxysmal stage of the cough. Transmissibility gradually decreases after that.

For control purposes, the communicable stage lasts from the catarrhal stage to 3 weeks after the onset of paroxysmal cough in a case not treated with antimicrobials. When treated with an effective antibiotic (eg, azithromycin), infectivity lasts until 2 days of antibiotics have been taken. This lengthens to 5 days if other antibiotics are used (eg, erythromycin).24

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24 Although Public Health England guidelines (updated 9 December 2016) recommend an exclusion of 2 days for all excluded cases (www.gov.uk/government/publications/pertussis-guidelines-for-public-health-management), the clearance of *B. pertussis* with other antibiotics may not be as rapid.
Notification procedure

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

Management of case

The highest priority should generally be given to the following cases:

- under 5 years of age, the younger cases before the older cases
- women known to be in the last month of pregnancy
- cases with a pre-existing health condition that may be exacerbated by a pertussis infection
- cases known to have close contacts, work or attend a setting with someone particularly vulnerable to pertussis (young child with < 3 doses of pertussis-containing vaccine, a woman in the last month of pregnancy or person with a pre-existing health condition that may be exacerbated by a pertussis infection).

Investigation

In consultation with the attending medical practitioner, ascertain pertussis immunisation status and determine whether there are close contacts for whom chemoprophylaxis is appropriate.

Ideally, a nasopharyngeal swab should be collected from all suspected cases of pertussis. However, testing may not be necessary or appropriate for cases with an epidemiological link to a confirmed case, or in outbreak situations.

Restriction

Exclude the case from school, early childhood services, other institutions or work until they have received at least 5 days of an appropriate course of antibiotic treatment, or exclude them for 3 weeks from the date of onset of typical paroxysms of cough or until the end of the cough, whichever comes first.

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25 A epidemiological link is established when there is: contact between two people at a time when one of them is likely to be infectious (from the catarrhal stage, approximately 1 week before, to 3 weeks after onset of cough) AND the other has an illness which starts within 5 to 21 days after this contact AND at least one case in the chain of epidemiologically linked cases (which may involve many cases) is a confirmed case with either laboratory definitive or laboratory suggestive evidence.

26 This can be shortened to 2 days if azithromycin is used. Although Public Health England guidelines (updated 9 December 2016) recommend an exclusion of 2 days for all excluded cases (www.gov.uk/government/publications/pertussis-guidelines-for-public-health-management), the clearance of B. pertussis with other antibiotics may not be as rapid.
Treatment
The treatment of pertussis is primarily supportive, although antimicrobial treatment may modify the clinical course of the illness if administered during the catarrhal stage or the early paroxysmal stage (usually the first 2 weeks). Antimicrobial therapy reduces infectivity by eradicating the organism from secretions.

Recommended antibiotics include erythromycin, azithromycin, clarithromycin and co-trimoxazole.

Infants must be kept under close observation while on treatment with any of these drugs. Macrolides (for example erythromycin and azithromycin) are associated with hypertrophic pyloric stenosis in infants in the first 6 weeks of age, especially in the first 2 weeks. Monitoring for complications is therefore recommended for 4 weeks after completion of treatment (Immunisation Handbook 2017, Ministry of Health).

See the Immunisation Handbook 2017 (Ministry of Health), the New Zealand Formulary27 and medicine data sheets for more details, including the use of antibiotics during pregnancy, or consult an infectious diseases physician or obstetrician.

Counselling
Advising the case and their caregivers of the nature of the infection and its mode of transmission.

Management of contacts
Identifying contacts to alert them to the possibility that they could develop disease, for restriction, immunisation and chemoprophylaxis as appropriate.

Definition
A contact can be defined as someone who has been in close proximity (within 2 metres) of the index case for 1 hour or more, during the case’s infectious period. Contacts include household members, those who have stayed overnight in the same room, and those who have had face-to-face contact with the case.

Intensive public health follow-up of all contacts is not usually necessary or effective in preventing community transmission, although raising general awareness and promoting on-time immunisation is important.

The primary goal of public health follow-up for pertussis contacts is to protect infants, pregnant women, and people at high risk of severe or complicated illness.

High priority contacts for public health follow-up are therefore:

27 New Zealand Formulary for Children: www.nzfchildren.org.nz/nzf_3150.html
New Zealand Formulary for Adults: www.nzf.org.nz/nzf_3150.html
• children under 12 months old
• children and adults who live with, or spend much of their time around a child under 12 months old, including health care and education settings
• pregnant women (particularly in the last month of pregnancy)
• individuals that are at high risk of severe illness or complications because a pre-existing health condition that may be exacerbated by a pertussis infection (for example those with chronic respiratory conditions, congenital heart disease or immunodeficiency).

Factors to consider when determining public health follow-up and intervention include:
• degree of exposure. Most contacts at early childhood services, schools or work or who have only shared vehicle space or only had casual contact are not usually considered contacts for the purposes of public health follow-up, other than providing information and observation
• immunisation status. For example whether there is clearly documented full immunisation history or recent boosters28
• the health status of the contact
• side effects of prophylactic antibiotics.

Investigation
Children and staff at early childhood services, especially partially immunised children, should be observed for respiratory tract symptoms for 3 weeks after last exposure to an infectious case.

Restriction
Any contacts (high priority or otherwise) should be advised to avoid attending early childhood services, school, work or community gatherings if they become symptomatic. It is important to clearly explain that the early stage of pertussis is catarrhal, with symptoms that are indistinguishable from those of minor respiratory tract infections, and is highly contagious.

In general, susceptible contacts29 working or living with someone particularly vulnerable to pertussis (in particular: young child with < 3 doses of pertussis-containing vaccine, woman in the last month of pregnancy or person with a pre-existing health condition that may be exacerbated by a pertussis infection) should be given

28 The Immunisation Handbook 2017 currently recommends boosters (funded) for pregnant women between 28–38 weeks gestation in each pregnancy and boosters (not funded) at 10–yearly intervals for certain groups (pp. 383–385). Recommended timing will be kept under review, given that immunity wanes after 5–10 years from the last pertussis vaccine dose (MMWR Vol. 54 No. RR-14 December 9, 2005).

29 Susceptible contacts are defined as those who are not fully immunised for their age, or if they are over 16 years of age and have not received a booster of pertussis-containing vaccine in the last 5 years.
prophylaxis with antibiotics and not be excluded while taking prophylaxis as long as they don't have any symptom, or, in the absence of prophylaxis, be excluded/avoid close contact for 14 days after the last exposure to an infectious case.

Additional restrictions may be advised by the local Medical Officer of Health, in particular where there is a significant risk of transmission to high priority individuals. For example health care workers who work with children under 12 months old (such as on paediatric and maternity wards).

**Prophylaxis**

**Antimicrobials**

Evidence for the effectiveness of chemoprophylaxis of contacts is limited. Therefore, antibiotics are only recommended for high priority contacts (see above), and if administered within 3 weeks of exposure to an infectious case. Recommended antibiotics and dosages are the same as for case treatment.

**Immunisation**

Unless current immunity is likely, high priority contacts should be offered a dose of a pertussis containing vaccine$^{30}$ (only doses on the national immunisation schedule are funded, including the 11 year old booster and boosters for pregnant women between 28–38 weeks gestation).

Advise any unimmunised or partially immunised individuals to be fully immunised.

**Other control measures**

**Identification of source**

Not applicable.

**Disinfection**

Clean and disinfect surfaces and materials contaminated by respiratory secretions.

**Health education**

Encourage immunisation of pregnant women between 28–38 weeks gestation at every pregnancy.

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$^{30}$ Pertussis vaccine should be offered in every pregnancy (currently funded for pregnant women between 28-38 weeks gestation). Vaccination of pregnant women is likely to result in increased immunity in the newborn infant, as well as in the mother (also see Updated Recommendations for Use of Tetanus Toxoid, Reduced Diphtheria Toxoid, and Acellular Pertussis Vaccine (Tdap) in Pregnant Women — Advisory Committee on Immunization Practices (ACIP), 2012. MMWR. Vol. 62, No. 7, 22 February 2013).
Encourage on-time immunisation, particularly for infants at 6 weeks, 3 months and 5 months.

Encourage timely immunisation of older children against pertussis at aged 4 and 11 years as per the Immunisation Handbook 2017 (Ministry of Health)\textsuperscript{31}.

Encourage (re-)vaccination of immunosuppressed patients with pertussis-containing vaccine according to the existing guidance\textsuperscript{32} (funded).

Encourage close family contacts of young infants, such as grandparents, fathers and partners to have a booster dose of pertussis vaccine to reduce spread of the disease. Older siblings should be up-to-date with their immunisations.

Encourage a booster dose against pertussis every 10 years to all lead maternity carers and other health care personnel who work in neonatal units and other clinical settings (such as GPs, practice nurses and Well Child providers), where they are exposed to infants.

Encourage a booster dose against pertussis every 10 years to all those living or working with people with a pre-existing health condition that may be exacerbated by a pertussis infection, especially health care workers.

Encourage a booster dose against pertussis every 10 years to all early childhood workers.

Promote behaviours that protect infants, such as encouraging people with a cough to keep their distance from babies.

Promote behaviours that prevent the transmission of communicable respiratory diseases.

**Reporting**

Ensure complete case information is entered into EpiSurv.

If a cluster of cases occurs, inform the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.

**References and further information**


Plague

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Twenty-one cases of plague were recorded in New Zealand between 1900 and 1911, but none has been recorded since then. However, both species of rodent flea necessary for the transmission of the plague bacteria *Yersinia pestis* exist in New Zealand.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

Clinical description

A disease characterised by fever and leucocytosis presenting in one of the following ways:

- regional lymphadenitis (bubonic plague)
- septicaemia (septicaemic plague)
- pneumonia (pneumonic plague).

Laboratory test for diagnosis

**Laboratory confirmation requires** at least one of the following:

- isolation of *Y. pestis*
- four-fold or greater rise in antibody to *Y. pestis*.

Discuss laboratory testing with the Enteric Reference Laboratory at ESR.

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable:** A clinically compatible illness with a single serological positive test.
- **Confirmed:** A clinically compatible illness that is laboratory confirmed.
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.
Spread of infection
Incubation period
From 1–7 days; may be a few days longer in immunised people who develop illness. Primary plague pneumonia has a shorter incubation period of 1–4 days.

Mode of transmission
Most often transmitted by the bite of infected rodent fleas. Domestic pets or rodents can carry the infected flea into the house. Other potential routes of spread include handling the tissue of an infected animal (especially a rodent or rabbit), contact with pus from suppurating buboes, inhalation of respiratory secretions from infected pets (for example, cats) and inhalation of droplets from coughing cases with pneumonic plague.

Period of communicability
Fleas remain infective for some months. Person-to-person spread in bubonic plague occurs if the lesions are suppurating. The risk of transmission is substantially reduced after 48 hours of antimicrobial treatment. Pneumonic plague may be highly communicable under appropriate climatic conditions, such as overcrowding and cool temperatures.

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

Management of case
Investigation
Obtain a history of travel, vaccination, flea bites, contact with other human cases, recent hunting or trapping and contact with dead or sick animals.

Ensure laboratory confirmation by culture of blood, aspirated bubo fluid, sputum or cerebrospinal fluid has been attempted.

Restriction
In a health care facility, contact isolation precautions should apply to cases with suppurating buboes, and droplet isolation precautions should apply to cases with pneumonic plague. These precautions should continue at least until 48 hours of antimicrobial agents have been given and the case has clinically improved.

Exclude from work, early childhood service, school and close contact with previously unexposed people until the period of communicability is over.
Treatment
Cases should be under the care of an infectious diseases physician.

Counselling
Advise the case and their caregivers of the nature of the disease and its mode of transmission. Educate about hygiene, especially cough hygiene, hand cleaning and the need to cover discharging buboes with a dressing.

Management of contacts
Every effort should be made to locate contacts and unreported cases or undiagnosed cases.

Definition
All people with unprotected household or face-to-face contact with a case of pneumonic plague during the period of symptoms and until 48 hours after administration of effective antimicrobial therapy.

Investigation
Nil unless symptomatic.

Restriction
Contacts who refuse chemoprophylaxis must be quarantined and carefully observed for 7 days.

Prophylaxis
Options include doxycycline and ciprofloxacin. Standard adult doses are doxycycline 100 mg twice daily or ciprofloxacin 500 mg twice daily for 7 days after exposure ceases. Standard doses for children are doxycycline 2.5 mg/kg orally bd or ciprofloxacin 10 mg–15 mg/kg orally bd (not to exceed 1 g per day) (Health Protection Agency 2008).

Chloramphenicol can be used as an alternative – discuss with an infectious diseases physician.

Counselling
Advise all contacts of the incubation period and typical symptoms of plague. Encourage them to seek early medical attention if symptoms develop.
Other control measures

Identification of source

Look for other cases in the community. Assess pets in the household for infection or flea infestation. Rid cases, contacts and household pets of fleas. Follow intensive flea control with rodent control, if necessary.

If the case may have been acquired locally, liaise with Ministry for Primary Industries staff to investigate potential animal sources of infection.

Disinfection

Clean and disinfect surfaces and articles soiled with sputum or purulent bubo fluid. For further details, refer to Appendix 1: Disinfection.

Health education

In the event of a locally acquired case, consider a media release and direct communication with local parents, early childhood services, schools and health professionals to encourage prompt reporting of symptoms. In communications with doctors, include recommendations regarding diagnosis, treatment and infection control.

Travellers should be advised to avoid sick or dead animals, and rodent nests and burrows. Insect repellent can protect against rodent fleas.

Control rats on ships and docks and in containerised cargoes before shipment to and on arrival from locations endemic for plague.

Reporting

Ensure complete case information is entered into EpiSurv.

Laboratory notification follows the laboratory notification flowcharts from the Direct Laboratory Notification of Communicable Diseases: National guidelines (Ministry of Health 2007).

Immediately notify any suspected or confirmed cases to the Director of Public Health at the Ministry of Health.

The International Health Regulations (IHR) National Focal Point (NFP) in the Ministry must use the IHR Decision Instrument for any event involving cholera, pneumonic plague, yellow fever, viral haemorrhagic fevers, West Nile fever or any unusual or potentially serious public health event, and then notify the World Health Organization if required.
References and further information


Poliomyelitis

Chapter reviewed and updated in August 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Wild poliovirus has been eliminated from New Zealand with the last case of wild poliovirus occurring in New Zealand in 1977. No cases of vaccine-associated paralytic poliomyelitis (VAPP) have occurred in New Zealand since the introduction of inactivated polio vaccine (IPV) in 2002.

Internationally, and as of July 2017, states infected with wild poliovirus include Pakistan, Afghanistan and Nigeria. While there is an extremely low risk of cases being imported to New Zealand from these countries, all countries remain at risk of importing polio, especially those countries in the Lake Chad basin (including Cameroon, the Central African Republic, Chad and Niger). Unimmunised travellers who travel to infected states are at risk of infection.

On 5 May 2014 the Director-General of the World Health Organization declared the international spread of wild poliovirus a Public Health Emergency of International Concern (PHEIC) under the International Health Regulation, 2005.


Case definition

Clinical description

Poliomyelitis is caused by wild poliovirus types 1, or 3 or by live vaccine-derived poliovirus. Wild poliovirus type 2 was declared globally eradicated in 2015. Infection is established in the gastrointestinal tract. A minor illness (fever, malaise, headache, vomiting) occurs in about 10 percent of infections. Over 90 percent of infections are asymptomatic or involve non-specific fever. In a minority of cases (less than 1 percent), infection spreads to the central nervous system and is characterised by:

- having no other apparent cause
- acute flaccid paralysis (AFP) of one or more limbs with decreased or absent deep tendon reflexes in affected limbs
- no sensory or cognitive loss

• a possible effect on bulbar muscles.\textsuperscript{34}

• In children who develop paralysis the illness may be biphasic, with the initial phase of a mild febrile illness of one to three days’ duration indistinguishable from that of many other viral infections. The child appears to recover, only to be struck down abruptly two to five days later with meningism, followed by paralysis. In adults and adolescents, the illness usually presents with a gradual onset of paralysis and muscular pain without the early symptoms.

\textbf{Laboratory test for diagnosis}

Laboratory confirmation requires isolation of poliovirus or detection of poliovirus nucleic acid from a clinical specimen. Different types of poliovirus will need to be tested for, depending on the type of polio suspected (for example, wild polioviruses or vaccine-derived strains).

All specimens must be tested in a laboratory accredited by the World Health Organization (WHO). The national poliovirus reference laboratory at ESR is accredited for poliomyelitis testing. ESR tests for poliovirus by polymerase chain reaction (PCR) with a turnaround time of 48 hours and by viral culture with a turnaround time of 10 days.

The case should be urgently discussed with the local virologist/medical microbiologist. It is important to ascertain the presence or absence of poliovirus as quickly as possible.

The following clinical specimens can be collected for detecting the presence of polioviruses or related antibodies:

1. two stool samples collected 24 hours apart within 14 days’ onset of the paralysis (or rectal swab with faecal material if stool is not immediately available)
2. cerebrospinal fluid
3. a nasopharyngeal swab or throat swab
4. EDTA blood
5. serum.

Contact ESR for specific advice on specimens required and on packing and transporting the specimens.

\textbf{WHO National Poliovirus Reference Laboratory}
Institute of Environmental Science and Research
National Centre for Biosecurity and Infectious Disease
Wallaceville Science Centre
PO Box 40158
66 Ward Street
Wallaceville
Upper Hutt 5140
New Zealand

\textsuperscript{34} \url{http://medical-dictionary.thefreedictionary.com/Bulbar+muscles}: ‘Muscles of the mouth and throat responsible for speech and swallowing’.
Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable:** A clinically compatible illness with an epidemiological link.\(^{35}\)
- **Confirmed:** A clinically compatible illness that is laboratory confirmed.
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition, including cases under the age of 15 years who have been deemed to have a non-polio paralytic illness by the National Certification Committee for the Eradication of Polio.

Cases can be further classified as follows.

- **Vaccine-associated paralytic poliomyelitis (VAPP)** a rare event where neurological damage is caused by a virus ingested from the oral polio vaccine (OPV). A mutation of the vaccine virus known as a reversion causes previously attenuated poliovirus to revert to a more neuro-virulent form. The paralysis that results is identical to that caused by wild poliovirus.

- **Wild virus-associated poliomyelitis:** Any case not meeting the criteria for being vaccine associated. Such cases will be imported since New Zealand was declared free of poliomyelitis by WHO in 2000.

- **Imported:** A case occurring in a person who has travelled or resided in a polio-endemic area within 35 days of disease onset or who is epidemiologically linked to a person who has done so. Surveillance should be intensified at both local and national levels to detect any additional cases without delay.

- **Vaccine derived poliomyelitis:** Vaccine-derived poliovirus (VDPV) is the live, attenuated strain of the poliovirus contained in the OPV that has changed and reverted to a form that can cause paralysis in humans and has the capacity for sustained circulation. Vaccine-derived polioviruses differ from the parental (original) Sabin strains found in the vaccine by 1 percent to 15 percent of VP1 nucleotides. This is a measurement of genetic change that scientists use to monitor the circulation of viruses.

\(^{35}\) An epidemiological link is defined here as a history within the past 35 days of one or more of (a) travel to high-risk countries (wild poliovirus-endemic countries, see www.polioeradication.org/Infectedcountries/PolioEmergency.aspx for an up-to-date list), (b) exposure to high-risk individuals (a person with polio infection, a person immunised with OPV within the last two months, a person with a history of travel to high-risk countries within the last three months, a recent recipient of OPV, or a person working with poliovirus in a laboratory), (c) exposure to poliovirus in a laboratory.
Spread of infection

Incubation period

The incubation period for polio is usually 7–14 days for infections resulting in AFP, although the reported range is 3 to 35 days.

Mode of transmission

Poliovirus is passed person to person, principally via the faecal–oral route, but potentially also via respiratory droplets.

Period of communicability

The period of communicability of the poliovirus has not been precisely defined, but transmission is possible as long as the virus is excreted. Poliovirus has been detected in throat secretions as early as 36 hours, and in faeces 72 hours, after exposure to infection. It typically persists in the pharynx for about one week and in faeces for three to six weeks. However, it may be shed in the faeces of immunocompromised people for several years. Cases are most infectious in the days immediately before and after the onset of any symptoms.

Notification procedure

All people suspected of suffering from polio must be notified to the medical officer of health by the clinician caring for the patient, and they must be appropriately investigated.

Laboratories must immediately notify the local medical officer of health of any polio-positive VP1-based sequencing.

On receiving a notification, medical officers of health should immediately notify the Ministry of Health, including the Director of Public Health, and check that the paediatrician has notified the case to the New Zealand Paediatric Surveillance Unit (NZPSU).

There should be a higher index of suspicion if there is clinically compatible illness with an epidemiological link. The local medical officer of health is responsible for ensuring adequate isolation of the case after hospital discharge, and identification and management of the case contacts.

Ensure complete case information is entered into EpiSurv.

Under the WHO’s International Health Regulations 2005 (IHR), assessment of any suspected case of poliomyelitis must occur within 48 hours of initial identification, and any isolation of wild poliovirus must then be notified to the WHO via the National Focal Point within 24 hours of confirmation. This confirmation must have been undertaken by the WHO-accredited National Poliovirus Reference Laboratory at ESR. In New Zealand, the National Focal Point is the Office of the Director of Public Health, Ministry of Health.
Notifying cases of acute flaccid paralysis as part of the WHO global eradication programme

As part of the WHO initiative to eradicate polio, New Zealand has a programme of surveillance and investigation of all cases of AFP in children under the age of 15. Such cases are required to be reported by telephone to the New Zealand Paediatric Surveillance Unit at the Department of Women’s and Children’s Health, University of Otago, Dunedin, and to have a full clinical and epidemiological assessment and virological investigation of stool specimens. All cases are discussed by the National Certification Committee for the Eradication of Polio, and records of its deliberations are reported to the WHO.

All children with AFP should have two stool samples (or rectal swab with faecal material if stool is not immediately available) collected 24 hours apart within 14 days onset of the paralysis. These should be sent to ESR via the local laboratory, as per current AFP surveillance.

For more detailed information on AFP surveillance, see the NZPSU website at www.otago.ac.nz/nzpsu/polio/index.html

Management of case

The occurrence of a single non-vaccine-associated paralytic case in a community warrants immediate investigation.

Investigation

Early identification of other cases will help to control spread. Review of possible recent cases may provide evidence of the source of an indigenous case.

Obtain a history of vaccination, travel and contact with recently returned travellers. For poliomyelitis serology collect an acute serum specimen as early in the course of disease as possible, and a convalescent specimen should be obtained at least three weeks later. Ensure laboratory confirmation has been attempted.

Case details should be gathered as soon as possible by public health units, using the ESR case report form (surv.esr.cri.nz/episurv/crf.php). Details to be included are demographic details, vaccination history, history of recent travel, immune competency, onset and range of symptoms, and type and results of laboratory tests.

Infection prevention and control considerations

Enteric precautions are required during a person’s hospital stay if polio is suspected or confirmed, and droplet precautions are required if there are pharyngeal symptoms.

When the person with polio is discharged home, they should stay at home until six weeks have passed since the onset of symptoms, or until two consecutive stool specimens taken at least seven days apart are negative for poliovirus. Contact with others should be limited but strict isolation is not necessary.
At home, a high standard of hygiene must be maintained until two clear stool specimens are obtained. Hand hygiene is the single most important means of preventing the spread of infection. After going to the toilet, all cases should wash their hands well with soap and warm water for 15–20 seconds and then dry them thoroughly, preferably with a disposable hand towel. An antiseptic hand gel, rubbed in for 15–20 seconds, is a good alternative when hands are not visibly soiled. The usual bathroom and wash facilities may be used and the surfaces disinfected with dilute bleach. Within the home, contact with others should be limited but strict isolation is not necessary.

**Treatment**
Supportive care should be given to address symptoms. Cases of polio should be under the care of an infectious diseases paediatrician or physician.

**Management of contacts**

**Definition**
A contact is defined as any individual potentially exposed through (a) infectious faecal material, either from close physical contact or shared toilet facilities, or (b) droplet spread, with a suspected or confirmed case of polio during his/her potentially infectious period.

**High-risk contacts**
Those at high risk of acquiring and/or transmitting poliovirus include:

- household members who live with the index case
- close social contacts – family and friends who have spent a lot of time with the index case while he/she has been infectious
- children in shared day care with the index case while he/she has been infectious
- food handlers and childcare workers who may have had contact with the index case while he/she has been infectious.

**Low-risk contacts**
Those at low risk of acquiring and/or transmitting poliovirus include:

- individuals who may have had other contact with, or shared a toilet with, the index case while he/she has been infectious
- individuals who have been consumers of food prepared by the index case while he/she has been infectious.

High-risk contacts should be sought, and ways of communicating with low-risk contacts should be determined.

**General advice for all contacts**
All contacts, regardless of previous vaccination, should be informed about the infection, encouraged to use good hygiene practices, and asked to report any symptoms
to their medical practitioner. The local public health unit will ensure appropriate
general information is given to the local primary care practitioners.

If a contact suffers from an illness with neck, back or leg stiffness, severe muscle pain or
neurological symptoms, he/she should seek medical advice. The medical practitioner is
advised to:

• refer the patient to hospital as a suspected case of polio
• notify the local medical officer of health of a suspected case of polio.

If a contact suffers from a minor non-specific illness (eg, fever, malaise, headache,
nausea, or vomiting) or an influenza-like illness, the medical practitioner is advised to:

• test the contact for poliovirus (see ‘Laboratory test for diagnosis’ above)
• reinforce messages about hand hygiene and disinfection practices
• emphasise the importance of seeking medical attention if symptoms worsen or
  neurological symptoms occur
• notify the local medical officer of health of a possible case of polio.

Additional advice for high-risk contacts

As well as the above, high-risk contacts should:

• have two stool specimens taken 24 hours apart tested for poliovirus, and a throat
  swab or nasopharyngeal swab if respiratory symptoms are present
• be excluded from early childhood services, school or work for six weeks after
  contact with a case, or until two stool specimens, at least 24 hours apart, are
  negative for poliovirus
• wipe down surfaces in toilet and bathroom facilities with a disinfecting solution of
  dilute bleach36 (10 ml of bleach in ½ litre water) and make a fresh solution every 24
  hours
• avoid strenuous physical activity, intramuscular injections and potential causes of
  injury, and not undergo a tonsillectomy (as any of these might increase their risk of
  infection and paralysis)
• have a primary course or booster polio vaccination (see below).

The local public health unit should regularly monitor high-risk contacts to check for the
development of symptoms and provide information as needed, and inform the medical
practitioner they are doing so.

Laboratory investigation of other contacts is not necessary unless they develop
symptoms.

36 Use household bleach (sodium hypochlorite) with a concentration of at least 5% hypochlorous
acid/sodium hypochlorite.
Other contacts should be advised of the importance of hand hygiene and advised to see a medical practitioner for any illness but will not be restricted.

**Prophylaxis**

Although there is no known post-exposure protection from polio infection, vaccination of high-risk contacts is recommended even though some contacts may already be infected at the time of vaccination.

If there is a certain history of a completed course of polio vaccination (three doses using any combination of OPV – which is no longer used in New Zealand – and IPV given at least four weeks apart), a booster dose of IPV should be offered. If in any doubt, a full primary course of IPV should be offered.

A full primary course of IPV, with at least four weeks between doses, should be offered if the person has:

6. no history of polio vaccination
7. an uncertain history of polio vaccination
8. a history of an incomplete primary course.

OPV will not be used as part of the vaccination protocol for contacts during a polio outbreak response because (a) it is not currently available in New Zealand, (b) of the already high immunisation coverage in New Zealand, and (c) of the risk of VAPP.

For young, high-risk contacts, vaccination should be aligned with the National Immunisation Schedule, if possible, after the initial dose.

Although there are no known adverse effects on the foetus following polio vaccination during pregnancy, as a general precaution vaccination is not advised for pregnant women in the first and second trimester in a low-risk setting. However, pregnant high-risk contacts susceptible to paralytic polio should be immunised as per the vaccination protocol during a polio outbreak.

Because there is an absence of evidence on the protective role of IPV vaccination after possible exposure, contacts vaccinated need to be informed that they are not necessarily protected by vaccination, and that they should still contact a health provider if they develop any of the symptoms suggestive of polio.

**Health education**

In early childhood services or other institutional situations, ensure that satisfactory facilities and practices are in place for hand cleaning; nappy changing; toilet use and training; food preparation and handling; and cleaning of sleeping areas, toys and other surfaces.

**References and further information**

Rabies and other lyssaviruses

Chapter last reviewed and updated in May 2012.

Rabies virus is a species of the genus Lyssavirus of the family Rhabdoviridae. Seven lyssaviruses, all antigenically related, are now recognised: rabies and six rabies-related viruses, five of which are known to have caused fatal infection in humans. The differences are often associated with geographic location and mammalian species. Some of these rabies-like illnesses will be diagnosed as rabies using the standard (FA) test.

Currently only Rabies is listed in the notifiable infectious diseases schedule. Reporting of other lyssavirus infections by medical practitioners is recommended with informed patient consent.

Epidemiology in New Zealand

New Zealand has long been rabies free. Rabies and other lyssaviruses are, however, widely distributed throughout the developed and developing world, including Asia and some parts of Oceania, and cases in New Zealand could potentially occur in people who have travelled through rural parts of rabies-endemic countries.

Case definition

Clinical description

An acute encephalomyelitis that progresses to coma and death within 10 days of the onset.

Laboratory test for diagnosis

Laboratory confirmation requires at least one of the following:

• isolation of rabies virus from skin snips, saliva, cerebrospinal fluid (CSF) or neural tissue
• detection of viral antigen in tissue
• detection of rabies neutralising antibody at a titre of at least 1:5 in serum or CSF (provided the patient is not immunised).

37 Unless otherwise specified, the term ‘rabies’ in this chapter can be read as ‘rabies and other lyssaviruses’.

38 In this case, informed consent includes understanding and agreement by the patient that their name and some details will be provided by the responsible medical practitioner to the local medical officer of health for public health follow-up and inclusion in national infectious disease statistics.
These tests may not be available in New Zealand.

If other lyssavirus infection is suspected, discuss testing with the Institute of Environmental Science and Research (ESR); however, the testing is the same as for rabies.

**Case classification**

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

- **Probable:** A clinically compatible illness with a history of travel to an area where rabies is endemic.

- **Confirmed:** A clinically compatible illness that is laboratory confirmed.

- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

**Spread of infection**

**Incubation period**

Highly variable, usually 3–8 weeks (but may be as short as 9 days or up to 7 years).

**Mode of transmission**

Lyssaviruses are carried in the saliva of infected mammals and transmitted by percutaneous introduction through a bite or scratch into a fresh break in the skin or by contact with intact mucous membranes (eyes, nose, mouth) (Communicable Diseases Prevention and Control Unit 2008; BCCDC 2009). Transmission has also occurred through transplantation of organs (usually cornea; also liver, kidneys, vascular) taken from people who died with undiagnosed rabies. There have been rare reports of transmission by aerolisation of infectious material – in a laboratory setting and in a bat-infested cave.

**Period of communicability**

From dogs and cats: For 3–7 days before onset of clinical signs and throughout illness. Bats and skunks may shed the virus for 1–2 weeks before onset of disease. It remains unclear as to whether it is possible for animals in the wild to carry lyssaviruses asymptomatically.

**Notification procedure**

Attending medical practitioners or laboratories must immediately notify a medical officer of health of suspected cases of rabies. Notification should not await confirmation.
Other lyssavirus infections are not currently listed on the notifiable infectious diseases schedule. Reporting of other lyssavirus infections by medical practitioners is recommended with informed patient consent.39

The Ministry of Health reports to the World Health Organization (WHO) where appropriate, in accordance with the International Health Regulations (2005).

Management of case

Investigation
Obtain a history of travel, vaccination and animal bites.

Ensure laboratory confirmation has been attempted.

Restriction
Given the lack of evidence for person-to-person transmission of rabies (other than through corneal or solid organ transplantation), in 2008 the Centers for Disease Control and Prevention (CDC) Hospital Infection Control Practices Advisory Committee recommended that medical staff adhere to standard infection control precautions. Staff should wear gowns, goggles, masks and gloves, particularly during intubation and suctioning.

Post-exposure prophylaxis is only indicated when a contact has been bitten by a case. It is also indicated when the case’s saliva or other potentially infectious material such as neural tissue has contaminated an open wound or mucous membrane (CDC 2008).

Treatment
The case should be under the care of an infectious diseases physician.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Management of contacts
Identify contacts for prophylaxis and counselling where appropriate.

Definition
All those who have an open wound or mucous membrane exposure to the case’s saliva.

39 In this case, informed consent includes understanding and agreement by the patient that their name and some details will be provided by the responsible medical practitioner to the local medical officer of health for public health follow-up and inclusion in national infectious disease statistics.
All contacts bitten or scratched by, or with wound or mucous membrane exposure to, the same rabid animal.

**Investigation and restriction**
Nil.

**Prophylaxis**
Human disease caused by all known lyssaviruses, including Australian bat lyssavirus (ABL), may be prevented by initial first aid and specific treatment with rabies immunoglobulin (RIG) and vaccination.

Test any contact animal for the virus if possible.

Consult an infectious diseases physician for advice.

**Counselling**
Advise all contacts of the incubation period and typical symptoms of rabies. Encourage them to seek early medical attention if symptoms develop.

**Other control measures**

**Identification of source**
Attempt to identify the animal source so steps may be taken to minimise the risk of further transmission.

**Disinfection**
Clean and disinfect surfaces and articles soiled with saliva.

**Health education**
Pre-exposure prophylaxis rabies vaccination may be indicated for people travelling to rabies-endemic countries and who plan to be in contact with wild or domestic animals, visiting remote areas where medical care is difficult or staying longer than 1 month in an area where dog rabies is common. It is also recommended for research laboratory personnel working with live lyssaviruses.

Advise people travelling in a country with endemic rabies that, if they sustain an animal bite, they should wash the wound immediately and thoroughly with soap and water and then be assessed by a doctor as soon as possible to determine the need for post-exposure prophylaxis. Advise travellers they should obtain detailed, written information on the type of any immunoglobulin and/or vaccine they have received and the schedule.
**Reporting**

Ensure complete case information is entered into EpiSurv.

On receiving a notification, medical officers of health should immediately notify the Ministry of Health Communicable Diseases Team.

If the case may have acquired rabies in New Zealand, the Director of Public Health, Ministry of Health, will notify the appropriate staff in the Ministry for Primary Industries, on phone: 0800 809 966, so that further investigation of the source can be undertaken.

If the case has been acquired in another country, obtain as much information as possible about the case’s contacts in that country as it may be necessary to inform health authorities in that country. Such liaison with other countries will be conducted by the Ministry of Health.

**References and further information**


Rheumatic fever

Chapter reviewed and updated in December 2014. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

The incidence of rheumatic fever in New Zealand is much higher than in comparable countries and regions such as North America and the United Kingdom. Within New Zealand, the incidence varies greatly by geographic region and ethnicity. Māori and Pacific peoples, in particular, are disproportionately affected, for both acute rheumatic fever (ARF) and chronic rheumatic heart disease (RHD). Most cases of ARF are in children aged 5–14 years, although about one-third of cases occur in older teens and young adults.

For more detailed epidemiological information, see the Institute of Environmental Science and Research surveillance website (www.surv.esr.cri.nz).

ARF (including recurrence) is a notifiable disease; however rheumatic heart disease, in the absence of signs and symptoms of ARF, is not.

The purpose of ARF notification is to facilitate public health investigation and community education and to inform prevention strategies for addressing causative factors for cases and high-risk populations. Causative factors include economic deprivation, household crowding, poor health literacy and lack of access to health care. These factors prevent rapid investigation and effective treatment of group A Streptococcus (GAS) pharyngitis and access to secondary prevention of recurrences.

When rheumatic fever first became notifiable in 1986, guidance was given to medical professionals that presumed rheumatic heart disease in patients under the age of 20 years should be notified to the local medical officer of health (Department of Health circular letter to Medical Practitioners HP 1/87, January 1987). Notification of rheumatic heart disease under the age of 20 years is no longer required as the diagnosing medical professional is responsible for ensuring cases of rheumatic heart disease that require secondary prophylaxis receive active clinical follow-up. Local registers are useful to facilitate active follow-up and help prevent cases from being lost to follow-up. ARF registers in New Zealand have been shown to be effective at reducing admissions for ARF recurrences (National Heart Foundation 2006).

Case definition

Clinical description

ARF is an autoimmune consequence of a throat infection caused by the bacterium GAS, that is, Streptococcus pyogenes. It causes an acute generalised inflammatory response and an illness that affects only certain parts of the body, mainly the heart, joints, brain
and skin. All suspected cases of ARF should be referred to hospital for specialist assessment, investigation, education and treatment.

**Laboratory test for diagnosis**

ARF is a clinical diagnosis (see ‘Case classification’). Currently, there is no single laboratory test for ARF. Laboratory tests for evidence of preceding GAS infection are described below.

**Case classification**

The diagnosis of ARF relies on health professionals being aware of the diagnostic features of the condition, particularly when presentation is delayed or atypical. Diagnostic certainty may vary according to location and ethnicity. Diagnosis is largely based on the Jones criteria, which are divided into major and minor manifestations based on their prevalence and specificity. The original Jones criteria were modified in 1992 and reconfirmed by the World Health Organization in 2004 (WHO 2004) (see Table 1).

ARF episodes can be classified as initial attacks (no known past history of ARF) or recurrent attacks (an episode in a person with a known past history of ARF that fulfils the criteria for a suspect, probable or confirmed case or previously diagnosed rheumatic heart disease).

The case classification for both initial and recurrent attacks is described in Table 2 below. The table also describes how the classification aligns with the categories used in the New Zealand Guidelines for Rheumatic Fever: 1. Diagnosis, management and secondary prevention (National Heart Foundation 2006). Referral to a rheumatic fever register may still be recommended for some people who do not meet the case definitions (see ‘Reporting’).

<table>
<thead>
<tr>
<th>Table 1: Jones criteria for acute rheumatic fever</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manifestation</strong></td>
</tr>
<tr>
<td>Major manifestations modified from Jones 1992</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Minor manifestations</td>
</tr>
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<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

**Note:**
1. When carditis is present as a major manifestation (clinical and/or echocardiographic), a prolonged P-R interval cannot be considered an additional minor manifestation in the same person.
2. Other causes of arthritis/arthralgia should be carefully excluded, particularly in the case of monoarthritis, e.g., septic arthritis (including disseminated gonococcal infection), infective or reactive arthritis and autoimmune arthropathy (e.g., juvenile chronic arthritis, inflammatory bowel disease, systemic lupus erythematosus, systemic vasculitis and sarcoidosis). Note that if polyarthritis is present as a major manifestation, polyarthralgia cannot be considered an additional minor manifestation in the same person. References from National Heart Foundation (2006).
3 ESR = Erythrocyte sedimentation rate; CRP = C-reactive protein.
4 ECG = electrocardiogram.

Table 2: Case classification and diagnostic criteria for acute rheumatic fever

<table>
<thead>
<tr>
<th>Case classification</th>
<th>Heart Foundation guidelines’ diagnostic</th>
<th>Diagnostic criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under investigation</td>
<td>n/a</td>
<td>A case that has been notified, but information is not yet available to classify it as suspect, probable or confirmed</td>
</tr>
<tr>
<td>Suspect</td>
<td>Possible ARF</td>
<td>Strong clinical suspicion of ARF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insufficient signs and symptoms to fulfil diagnosis of confirmed or probable ARF</td>
</tr>
<tr>
<td>Probable</td>
<td>Probable ARF</td>
<td>Evidence of preceding group A streptococcal infection from positive throat culture or rapid antigen test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Two major, or one major and two minor manifestations in the Jones criteria (see Table 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Serological evidence of a preceding group A streptococcal infection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One major and one minor manifestation</td>
</tr>
<tr>
<td>Confirmed</td>
<td>Definite ARF</td>
<td>Serological evidence of preceding group A streptococcal infection¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Two major, or one major and two minor manifestations in the Jones criteria (see Table 1) are present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chorea (other major manifestations or evidence of group A streptococcal infection not required)</td>
</tr>
<tr>
<td>Not a case</td>
<td>n/a</td>
<td>A case that has been investigated and subsequently found not to meet the case definition</td>
</tr>
</tbody>
</table>

Note:
1 Elevated or rising streptococcal antibody titres are essential for confirming preceding GAS infection. Other laboratory tests, including culture and rapid antigen test, cannot distinguish between infection and carriage.

Spread of infection

ARF is not infectious but the precursor condition GAS pharyngitis is moderately infectious within households. For further information on GAS management, see the New Zealand Guidelines for Rheumatic Fever: 2. Group A streptococcal sore throat management (National Heart Foundation 2008).

Notification procedure for ARF

It is expected that the attending medical practitioner will notify the local medical officer of health of suspected initial or recurrent cases of ARF within seven days. Notification should not await a confirmed diagnosis (see also ‘Reporting’).

If cases of ARF are identified through other processes, such as audits, there is no legal requirement for the audit team to notify these cases to the local medical officer of health or for these cases to be recorded on EpiSurv (although cases identified through
audit activities should still be entered into the local register if prophylaxis or follow-up is indicated). However, if a case identified via audit is notified to a medical officer of health by the attending medical practitioner, this case should be recorded on EpiSuv.

Management of a case of ARF

Investigation

- **Initial attack**: Ascertain if the case has had sufficient investigation to confirm diagnosis (ie, throat swab, serology, ESR/CRP, echocardiogram, ECG). Any GAS isolated from the throat of a person suspected of having ARF should be referred to the Institute of Environmental Science and Research for emm typing. Obtain a history of possible household contacts and recent throat infection. See also ‘Reporting’.

- **Recurrent attack**: Follow the procedure as above for initial attack but also investigate the reason for recurrence. Recurrent attacks may represent a treatment or systems failure and should be investigated.

Restriction

**Acute rheumatic fever**
Cases of ARF do not require isolation unless they have known or suspected acute GAS pharyngitis. For information on GAS management, see *New Zealand Guidelines for Rheumatic Fever: 2. Group A streptococcal sore throat management* (National Heart Foundation 2008).

Treatment

Ideally all those with suspected ARF (first episode or recurrence) should be hospitalised as soon as possible after onset of symptoms, and should be under the care of a specialist paediatrician or physician. The main priority in the first few days after presentation is confirmation of the diagnosis. The treating clinician is responsible for treatment, prophylaxis, education, dental referral, notification to public health, and informing the case’s general practitioner.

Treatment options for arthritis/arthralgia, fever, carditis/heart failure and chorea are outlined in the *New Zealand Guidelines for Rheumatic Fever: 1. Diagnosis, management and secondary prevention* (National Heart Foundation 2006).

One episode of rheumatic fever significantly increases the risk of further episodes, often with further cardiac damage. Antibiotic prophylaxis to prevent recurrent attacks of rheumatic fever should therefore be started before discharge from hospital. The appropriate duration of secondary prophylaxis depends on a number of factors, including age, clinical pattern, environment and time elapsed since the last episode of ARF.

All cases should receive regular primary care review, and outpatient follow-up should be initiated before discharge from hospital.
Rheumatic heart disease leads to a lifelong increased risk of bacterial endocarditis, and antibiotic prophylaxis may be required at the time of dental, oral, respiratory tract, oesophageal, gastrointestinal and genitourinary procedures. Ongoing dental care is essential, and each case should be notified to the appropriate school dental service or dentist.

**Counselling**

At the time of diagnosis, it is essential to explain the disease process to the case and their family in a culturally appropriate way. On discharge, all cases should have a good understanding of the cause of rheumatic fever and the need for any family member to have sore throats treated early. Cases and their families should understand the consequences of missing antibiotic doses. Also remind them of the importance of additional antibiotic prophylaxis for dental and other procedures to protect against endocarditis.

**Management of contacts**

Clustering of cases of rheumatic fever in families has been documented for more than a century. Familial clustering persists when socioeconomic factors and environment are controlled for, suggesting there is some inherited susceptibility to rheumatic fever.

**Definition**

Contacts include all people in close contact with a case (for example, members of the case’s household) during the period up to one month before the onset of illness in the case.

**Investigation**

All household contacts of the index case should have a throat swab if the contact was within one month of onset of ARF. GAS isolated from a household contact should be referred to the Institute of Environmental Science and Research for emm typing.

Emm typing of GAS isolated from household contacts may aid understanding of circulating GAS strains in household contacts of cases of ARF and may inform our knowledge of rheumatogenic strains in New Zealand.

Note: There is little evidence available with which to evaluate how effective contact tracing is in preventing future cases of ARF. However, streptococcal acquisition rates of 25% or greater have been recorded in family contacts of GAS pharyngitis.

For further information on GAS management, see the *New Zealand Guidelines for Rheumatic Fever: 2. Group A streptococcal sore throat management* (National Heart Foundation 2008).

**Restriction**

Asymptomatic contacts do not need to be restricted.
Treatment
For information on treatment of contacts diagnosed with GAS pharyngitis, see the New Zealand Guidelines for Rheumatic Fever: 2. Group A streptococcal sore throat management (National Heart Foundation 2008).

Counselling
Advise contacts about GAS throat infection as well as its mode of transmission and the relationship of untreated disease with ARF. Also provide education on respiratory hygiene. Advise all contacts to seek early medical attention if a sore throat develops.

Other control measures
A case of ARF can be an indicator of high GAS load in the case’s community. Therefore, a case of ARF in a community may warrant a range of control measures aimed at addressing GAS transmission. For more information about when and how to implement community-wide strategies to reduce rheumatic fever rates, see the National Heart Foundation’s New Zealand Guidelines for Rheumatic Fever: 3. Proposed rheumatic fever primary prevention programme (National Heart Foundation 2009).

Strategies that address the multiple determinants of rheumatic fever are more likely to have long-term success, including:

- prevention of transmission of GAS infections, for example, by addressing household crowding and socioeconomic factors that predispose to it
- early detection and treatment of GAS infections, for example, by improving health literacy, health service access and early diagnosis and treatment (community- or school-based interventions may be useful)
- early diagnosis of ARF to reduce the risk of severe rheumatic heart disease
- ensuring good follow-up for antibiotic prophylaxis (secondary prevention) for those with a diagnosis of ARF.

Health education
Schools and general practitioners should be alerted to a case of ARF in the community. The community should be educated on the relationship between streptococcal sore throats, ARF and RHD. Public health providers should promote the key messages of the rheumatic fever prevention programme with population groups that have a high incidence of ARF. Additionally, such professionals should educate on respiratory hygiene, referral systems between health, housing and social welfare sectors and the importance of completing a full course of antibiotics.
**Reporting**

Ensure complete case information is entered into EpiSurv. Demographic and other risk factor/exposure information on the case report form is used to inform the public health response. For instructions on completing the case report forms, see the EpiSurv website (www.surv.esr.cri.nz/episurv/crf.php).

If a cluster of cases occurs, discuss it with the Director of Public Health at the Ministry of Health.

In addition to public health notification and recording on EpiSurv, all cases of ARF (suspect, probable and confirmed) should be referred to and recorded on a clinical register to ensure appropriate follow-up and any necessary antibiotic prophylaxis.

Cases of RHD that require secondary prophylaxis should also be recorded on a register.

**References and further information**


Rickettsial disease and Q fever

Chapter last reviewed and updated in May 2012.

Note: The description for Q fever follows the description for Rickettsial disease in this chapter.

Q fever was once considered part of the genus Rickettsia. It is now classified in a separate genus but the notifiable infectious diseases schedule has not yet been updated to include Q fever. Reporting by medical practitioners is recommended with informed patient consent.40

Rickettsial disease

Epidemiology in New Zealand

Rickettsial disease in humans (spotted fevers, typhus or scrub typhus) is caused by a number of related species of intracellular bacteria of the genus Rickettsia that have blood-feeding arthropod vectors. Each species is associated with a different spectrum of clinical features, geographical distribution, insect vector (tick, louse, flea, mite or chigger), seasonal incidence and other epidemiological factors.

R. typhi is endemic in some parts of New Zealand.

R. felis has been detected in fleas taken from dogs and cats in the central-lower North Island, but no human cases have been reported.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

Case definition

Clinical description

Rickettsial disease characteristically presents with fever, headache and malaise; there is often lymphadenopathy, myalgia and a rash, either macular or haemorrhagic. Some cases may form an inoculation eschar (ulcer or papule often with a black crust). Neutropenia, thrombocytopenia and moderate increases in transaminases are common laboratory abnormalities. There is great variation in the severity of illness, depending

40 In this case, informed consent includes understanding and agreement by the patient that their name and some details will be provided by the responsible medical practitioner to the local medical officer of health for public health follow-up and inclusion in national infectious disease statistics.
on the organism involved, but continuing fever, cough and signs of bronchitis or pneumonia, photophobia, conjunctivitis, delirium, deafness and hepatosplenomegaly may be present.

**Laboratory test for diagnosis**
Consult ESR or LabPlus, Auckland District Health Board for appropriate testing.

**Laboratory confirmation requires** isolation of *Rickettsia* spp. in a clinical specimen.

The following serological tests are available at LabPlus:

- *Rickettsia typhi* (formerly *R. mooseri*) for murine typhus
- Orientia tsutsugamushi (formerly *R. tsutsugamushi*) for scrub typhus group
- *Rickettsia conori* for tick typhus group.

**Case classification**

- **Under investigation**: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable**: A clinically compatible illness with a single raised antibody titre.
- **Confirmed**: A clinically compatible illness that is laboratory confirmed.
- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

Cases can be further classified in Episurv by disease:

1. **typhus**: caused by *R. prowazekii* (the agent of classical epidemic typhus)
2. **murine typhus**: caused by *R. typhi* (formerly called *R. mooseri* endemic or ‘shop’ typhus)
3. **rickettsial disease**: all other diseases caused by organisms of the *Rickettsia* genus. This includes scrub typhus, caused by *Orientia tsutsugamushi*. Record species, if laboratory confirmed, in ‘Other lab details’.

**Spread of infection**

**Incubation period**

- Rickettsial disease: Variable dependent on the disease agent (usually between 1–3 weeks).
- Murine typhus fever: 1–2 weeks.
- Scrub typhus: 10–12 days (6–21 days).
- Tick typhus: 5–7 days.
Mode of transmission
Rickettsia spp. live harmlessly in the salivary glands or gut of arthropods, especially fleas and ticks, and are perpetuated in the vector by trans-ovarian spread to the young. Transmission to humans occurs when arthropod faeces, regurgitated material or saliva is inoculated into a bite wound.

Period of communicability
There have been no known direct transmissions of rickettsial disease between people.

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

Management of case

Investigation
- Obtain a history of travel, contact with animals and insect bites. Ensure acute and convalescent serological diagnosis has been attempted.
- When applying for laboratory testing, ensure that the travel history and likely incubation period are recorded on the laboratory form as these details inform the laboratory's choice of test kit. For infections probably acquired overseas, it may be useful to discuss testing with the laboratory.

Restriction
Nil.

Treatment
Consult an infectious diseases physician. Tetracyclines and chloramphenicol are the drugs of choice.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Management of contacts
Advise anyone exposed to the same potential animal or arthropod source of the incubation period and typical symptoms of the infection. Encourage them to seek medical attention if symptoms develop.
Other control measures

Identification of source

Check for other cases in the community. If the infection may have been acquired in New Zealand, liaise with staff at the Ministry for Primary Industries and/or territorial authority to investigate potential animal reservoirs of infection. See ‘Reporting’ below.

If the infection has been acquired overseas, advise the case to check for retained vectors (for example, embedded ticks on body) and liaise with Ministry for Primary Industries staff to aid with identification and destruction after removal.

Disinfection and cleaning

Nil.

Health education

In the event of a New Zealand-acquired *Rickettsia* infection, consider direct communication with local parents, schools and health professionals to encourage prompt reporting of symptoms. In communications with doctors, include recommendations for diagnosis and treatment.

In the event of an endemic *Rickettsia* infection, take steps to eliminate rodents and fleas from affected households.

Reporting

Ensure complete case information is entered into EpiSurv.

On receiving a notification, medical officers of health should immediately notify the Communicable Diseases Team at the Ministry of Health. The Ministry will then notify the appropriate staff in the Ministry for Primary Industries so that further investigation of the source can be undertaken.

Further information


Q fever

Epidemiology in New Zealand

*Coxiella burnetii*, the only member of an intracellular bacteria genus that is related to the *Rickettsia* genus, causes Q fever. *C. burnetii* is not endemic in New Zealand. *C. burnetii* has a reservoir in birds and mammals, especially cattle, sheep and goats, and is most often an occupational disease affecting farmers, veterinarians and abattoir workers.

More detailed epidemiological information is available on the ESR surveillance website at [www.surv.esr.cri.nz](http://www.surv.esr.cri.nz)

Case definition

Clinical description

Q fever causes a variety of clinical syndromes. Asymptomatic infection may occur, but the onset of infection is usually acute and characterised by fever, rigors, sweats, severe headache, weakness and myalgia. Pneumonia may be a feature, and abnormal liver function tests are common. Features of chronic infection include non-specific febrile illness, pneumonia, subacute endocarditis, hepatitis and, less commonly, granulomatous lesions in bone, soft tissues or body organs. A post-Q fever fatigue syndrome has been described.

Laboratory test for diagnosis

Consult ESR or LabPlus, Auckland District Health Board for appropriate testing and interpretation of results.

Laboratory confirmation requires at least one of the following:

- detection of *C. burnetii* nucleic acid
- seroconversion or significant increase in antibody level to Phase II antigen in paired sera tested in parallel in the absence of recent Q fever vaccination
- isolation of *C. burnetii* by culture. (Note: This practice should be strongly discouraged, except where appropriate facilities and training exist.)

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable:** A clinically compatible illness with a single raised antibody titre.
- **Confirmed:** A clinically compatible illness that is laboratory confirmed.
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.
Spread of infection

Incubation period

2–3 weeks.

Mode of transmission

*C. burnetii* can be found in many different body fluids and excreta of infected animals but are particularly concentrated in placental tissues. Humans acquire *C. burnetii* by inhaling contaminated aerosols or dust generated by placental tissues, birth fluids or excreta of infected animals. Airborne particles containing organisms may travel for more than 1 km. Transmission may also occur from direct contact with infected animals or other contaminated matter such as wool, straw or fertiliser.

Period of communicability

Q fever rarely spreads from person to person, reported only from cases with pneumonia. *C. burnetii* is highly resistant to drying and to a variety of physical and chemical agents, so viable organisms may remain in contaminated soils for several months.

Notification procedure

Q fever was once considered part of the genus *Rickettsia*. It is now classified in a separate genus but the notifiable infectious diseases schedule has not yet been updated to include Q fever. Reporting by medical practitioners is recommended with informed patient consent.41

Management of case

Investigation

Obtain a history of travel and direct contact with animals, wool, straw or fertiliser. Ensure acute and convalescent serological diagnosis has been attempted.

When applying for laboratory testing, ensure that the travel history and likely incubation period are recorded on the laboratory form as these details inform the laboratory’s choice of test kit. For infections probably acquired overseas, it may be useful to discuss testing with the laboratory.

Restriction

Nil.

41 In this case, informed consent includes understanding and agreement by the patient that their name and some details will be provided by the responsible medical practitioner to the local medical officer of health for public health follow-up and inclusion in national infectious disease statistics.
Treatment
Consult an infectious diseases physician. Tetracyclines and chloramphenicol are the drugs of choice.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Management of contacts
For anyone exposed to the same potential animal or arthropod source, advise them of the incubation period and typical symptoms of the infection. Encourage them to seek medical attention if symptoms develop. Prophylactic doxycycline may prevent clinical Q fever illness when begun 8–12 days after exposure and continued for 5 days.

Other control measures
Identification of source
- If the infection may have been acquired in New Zealand, liaise with Ministry for Primary Industries staff to investigate potential animal or bird reservoirs of infection.

Disinfection and cleaning
Nil.

Health education
In the event of a New Zealand-acquired Q-fever infection, consider direct communication with local parents, schools and health professionals to encourage prompt reporting of symptoms. In communications with doctors, include recommendations for diagnosis and treatment.

Reporting
Ensure complete case information is entered into EpiSurv. The current disease option for Q fever in EpiSurv is caused by C. burnetii.

On receiving a notification, medical officers of health should immediately notify the Ministry of Health Communicable Diseases Team. The Ministry will then notify the appropriate staff in the Ministry for Primary Industries so that further investigation of the source can be undertaken.
References and further information


Rubella

Chapter last reviewed and updated in May 2012.

Note: congenital rubella is covered in a separate chapter.

Epidemiology in New Zealand

The incidence of rubella in New Zealand has decreased since the last national epidemic in 1995. A cohort of women born in the years 1965 to 1967 may be less likely to have been immunised as children than women born before or later.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

Case definition

Clinical description

An illness with a generalised maculopapular rash, fever and one or more of the following:

- arthralgia/arthritis
- lymphadenopathy
- conjunctivitis.

Rubella often presents atypically and is difficult to diagnose clinically with certainty. Up to 50 percent of rubella infections are subclinical. If accurate diagnosis is important, it must be laboratory confirmed.

Laboratory tests for diagnosis

If the case received a vaccine containing the rubella virus in the 6 weeks prior to symptom onset then laboratory confirmation requires:

- evidence of infection with a wild-type virus strain obtained through genetic characterisation.42

If the case did not receive a vaccine containing the rubella virus in the 6 weeks prior to symptom onset, then laboratory confirmation requires at least one of the following:

- detection of IgM antibody specific to the virus

42 In New Zealand, genetic characterisation is generally only performed for measles virus.
• IgG seroconversion or a significant rise (four-fold or greater) in antibody level for the virus between paired sera tested in parallel where the convalescent serum was collected 10 to 14 days after the acute serum
• isolation of rubella virus by culture
• detection of rubella virus nucleic acid.

Consult a reference laboratory if testing is unavailable locally.

Case classification
• Under investigation: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
• Probable: A clinically compatible illness.
• Confirmed: A clinically compatible illness that is laboratory confirmed or epidemiologically linked to a confirmed case.
• Not a case: A case that has been investigated and subsequently found not to meet the case definition.

Note: Recent immunisation with the measles-mumps-rubella vaccine (MMR) may also result in detectable anti-rubella IgM or a significant increase in anti-rubella IgG. Because laboratories do not necessarily have access to this information, all results consistent with possible rubella infection should be reported to a medical officer of health.

Spread of infection
Incubation period
14–23 days, commonly 16–18 days.

Mode of transmission
Children and adults transmit the virus in their nasopharyngeal secretions by droplet spread or direct contact.

Period of communicability
From about 1 week before to 1 week after the onset of the rash.

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

Investigation
Ascertained if there is a history of vaccination, possible contacts and travel. Ensure laboratory confirmation by serology or detection of virus in clinical specimens has been attempted. Nasal, throat, urine, blood and cerebrospinal fluid specimens can yield the virus. Discuss testing with an infectious diseases physician or a microbiologist.

Restriction
In health care facilities, apply droplet and contact precautions until at least 7 days after onset of a rash in postnatal rubella. Non-immune pregnant women, in particular, should not have contact with an infectious case.

Exclude from any early childhood service, school, institution or work until fully recovered and for 7 days after onset of rash. Cases should avoid contact with women of childbearing age.

Treatment
Nil specific.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Management of contacts
Identify contacts for investigation, immunoglobulin and counselling where appropriate.

Definition
All people with close unprotected contact (for example, household, school, workplace, military camp) with the case during the week before onset of illness or during the subsequent period of communicability.

Investigation
Check immunisation status of contacts.

Advise any pregnant contact to get in touch with her lead maternity carer (LMC) to check her rubella status.

Pregnant contacts with confirmed immunity can be reassured that the likelihood of rubella infection is remote. This applies if:

- a previous antibody screening test has detected a protective level of antibodies, and this has been documented, OR
• she has received at least two documented doses of rubella vaccine, OR
• one dose of vaccine followed by a rubella antibody screening test showing a protective level of antibodies has been documented.

Pregnant contacts whose immunity to rubella has not been confirmed must be investigated serologically as soon as possible in liaison with their LMC and primary health care doctor. The rash is not diagnostic and infection can occur without clinical symptoms. Discuss testing with an infectious diseases physician or a microbiologist.

The laboratory should test for rubella IgM and IgG. No pregnant woman under 20 weeks’ gestation should have rubella diagnosed on IgM alone. The laboratory should store (frozen) an aliquot of serum for later testing in tandem with a follow-up sample.

• If the sample is IgM positive, regardless of IgG, then a full assessment of the serological status is needed. Results must be interpreted in conjunction with the time lapse since exposure to determine whether or not acute infection has occurred. Consider further serum samples and/or testing in a reference laboratory.

• If the sample is negative for both IgM and IgG, then the woman is susceptible, and if she remains asymptomatic then a second blood specimen should be obtained 28 days after last exposure to the case. If, however, the woman develops clinical symptoms suggestive of rubella, a second blood specimen should be obtained as soon as possible. A third blood specimen may be necessary 7 days after the onset of symptoms.

• If IgG is detected and IgM is not detected, and the IgG is less than 15 IU/mL and there is a history of onset of rash in the previous 10 days, request further serum.

Diagnosis and management based on any the above tests should be discussed with an obstetrician or infectious diseases physician. Management of primary rubella or secondary re-infection depends on the gestation of the pregnancy and when the infecting occurred.

Pregnant contacts who are not immune should also be offered MMR vaccination after delivery.

**Restriction**

Nil.

**Prophylaxis**

The routine use of immunoglobulin (IG) for post-exposure prophylaxis of rubella in early pregnancy is not recommended. It may be considered if termination of the pregnancy is not an option. Although IG has been shown to reduce clinically apparent infection in the mother, there is no guarantee that it will prevent fetal infection.

Post-exposure immunisation of non-pregnant women is recommended, especially if given within 3 days of exposure. All women of childbearing age should be screened for rubella antibody and immunised if necessary.
Pregnant women should be screened antenatally. Those with a rubella antibody level below 15 IU/mL should be counselled to avoid contact with cases of rubella while pregnant, and should be offered MMR vaccination after delivery. See the *Immunisation Handbook* (Ministry of Health 2011) for further information.

Immunisation of a person who is incubating natural rubella or who is already immune is not associated with an increased risk of adverse effects.

**Counselling**

Advise all contacts of the incubation period and typical symptoms of rubella. Encourage them to seek early medical attention if symptoms develop. Pregnant contacts may require additional advice; refer to an appropriate specialist.

**Other control measures**

**Identification of source**

Check for other cases in the community and look for associations. Also check any recent travel and possible outbreaks in areas visited.

**Disinfection**

Generally not needed. Clean and disinfect surfaces and articles soiled with upper respiratory tract secretions, urine or other infectious bodily fluids.

**Health education**

Medical officers of health are responsible for health education.

**Reporting**

Ensure complete case information is entered into EpiSurv.

If a cluster of cases occurs, inform the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.

**References and further information**

Rubella: congenital

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

There have been no reported cases of congenital rubella in New Zealand since 1998. Internationally, the number of rubella and congenital rubella cases remains high in developing countries, including many Pacific Islands, where routine childhood vaccination is not available or has only recently become available.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

Case definition

Clinical description

In general, the younger the fetus when infected, the more severe the illness. Severe cases may spontaneously abort, or have multiple manifestations in infancy; mild cases may have only a single manifestation. The most common anomalies are deafness, cataract or glaucoma, congenital heart disease and mental retardation. In addition, infants with congenital rubella syndrome are often growth retarded and may have radiolucent bone disease, hepatosplenomegaly, thrombocytopenia and purpuric skin lesions.

Laboratory criteria for diagnosis

Laboratory confirmation requires at least one of the following:

- demonstration of rubella-specific IgM antibody
- infant rubella antibody level that persists at a higher level and for a longer period than expected from passive transfer of maternal antibody (that is, rubella titre that does not drop at the expected rate of a twofold dilution per month)
- isolation of rubella virus by culture
- detection of rubella virus nucleic acid.

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable:** A clinically compatible illness.
• **Confirmed**: A clinically compatible illness that is laboratory confirmed.

• **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

**Spread of infection**

**Incubation period**

14–23 days, commonly 16–18 days.

**Mode of transmission**

Infants with congenital rubella shed rubella virus in their pharyngeal secretions and urine.

**Period of communicability**

Infants with congenital rubella may shed the virus for months after birth and should be considered infectious until they are 1 year of age.

**Notification procedure**

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

**Management of case**

**Investigation**

Ascertain relevant history of maternal vaccination, any maternal symptoms, possible contacts and travel.

Ensure laboratory confirmation by serology or detection of virus in clinical specimens has been attempted. Nasal, throat, urine, blood and cerebrospinal fluid specimens can yield the virus, especially in congenitally infected infants.

**Restriction**

In health care facilities, infants with congenital rubella syndrome should be managed under contact and droplet isolation precautions until urine and pharyngeal cultures are negative or until approximately 1 year of age. Non-immune pregnant women, in particular, and also non-immune women of childbearing age should not have contact with an infectious case.

**Treatment**

Nil specific.
Counselling
Advise caregivers of the nature of the infection and its mode of transmission.

Management of contacts
Identify contacts for investigation, immunoglobulin and counselling where appropriate.

Refer to ‘Management of contacts’ in the separate chapter on rubella.

Definition
All people with close unprotected contact (for example, household, workplace, school, military camp) with the case during the week before onset of illness or during the subsequent period of communicability.

Other control measures
Refer to ‘Other control measures’ in the separate chapter on rubella.

Reporting
Ensure complete case information is entered into EpiSurv.

If a cluster of cases occurs, inform the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.
Salmonellosis

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Note: There are separate chapters for typhoid and paratyphoid fevers.

Common routes of infection in New Zealand for salmonellosis are via food, water, animal contact and exposure to the farm environment, and outbreaks are common. The highest rate of disease is reported in young children.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

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

Case definition

Clinical description

Salmonellosis presents as gastroenteritis, with abdominal pains, diarrhoea (occasionally bloody), fever, nausea and vomiting. Asymptomatic infections may occur and symptoms are not necessary to meet the case definition.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires identification of *Salmonella* species from a clinical specimen by one of the following methods:

- isolation (culture)
- detection of *Salmonella* nucleic acid.

Where possible culture should be attempted to facilitate serological or molecular typing to inform epidemiological investigations.

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

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
• **Probable**: A clinically compatible illness that either is a contact of a confirmed case of the same disease or has had contact with the same common source as a confirmed case – that is, is part of a common-source outbreak.

• **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.

### Spread of infection

#### Reservoir

Domestic and wild animals including birds especially poultry, reptiles, amphibians, pigs, cattle, rodent and pets; also humans.

#### Incubation period

6–72 hours, commonly 12–36 hours.

#### Mode of transmission

Ingestion of organisms in contaminated foodstuffs, including meat products and imported foodstuffs. Many animals and birds are asymptomatic carriers of *Salmonella* spp. Undercooking of contaminated foodstuffs and cross-contamination (especially of raw fruits and vegetables) in the kitchen are thought to be responsible for many cases. Ingestion of faecally contaminated water causes frequent cases in New Zealand.

Infection may be a result of direct contact with an infected farm or domestic animal. Person-to-person spread is possible, notably from infants and stool-incontinent adults. Commonly reported risk factors identified in New Zealand cases include consuming food from retail premises, contact with animals (farm animals and pets, including fish and reptiles), consumption of untreated water and overseas travel. Recreational water contact and contact with symptomatic people during the incubation period are less commonly reported.

#### Period of communicability

Variable; typically several days to several weeks. Approximately 1 percent of infected adults and 5 percent of infected children under 5 years of age excrete *Salmonella* spp. for more than 1 year.

### Notification procedure

Attending medical practitioners or laboratories must immediately notify the local medical officer of health of probable or confirmed cases including asymptomatic cases when identified.
All health care workers are encouraged to talk with a medical officer of health about any suspected outbreaks of acute gastroenteritis or cases in people working in high-risk occupations.

**Management of case**

**Investigation**
Obtain a food history and details of water consumption, animal contact and travel as well as details of occupation.

Investigate and obtain a more detailed history (using the ESR *Salmonella* questionnaire) if there is an outbreak or the case is in a high-risk occupation or attends an early childhood service.

Ensure symptomatic cases submit stool samples for testing.

**Restriction**
In a health care facility, only standard precautions are indicated in most cases; if the case is diapered or incontinent, apply contact precautions for the duration of the illness. For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric disease.

**Counselling**
Advise the case and/or caregivers of the nature of the infection and its mode of transmission. Educate about hygiene, especially hand cleaning.

**Management of contacts**
Diagnosis should be sought from contacts who are symptomatic.

**Other control measures**

**Identification of source**
Check for other cases in the community. Investigate potential food or water sources of infection only if there is a cluster of cases or an apparent epidemiological link.

If indicated, check water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008). If a water supply is involved, liaise with the local territorial authority to inform the public. Advise on the need to boil water.

**Disinfection**
Clean and disinfect surfaces and articles soiled with stool. For further details, refer to Appendix 1: Disinfection.
Health education

Educate the public about safe food preparation (see Appendix 3: Patient information).

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 with diarrhoea should be taken to a veterinarian for assessment and treatment.

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.

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 Ministry for Primary Industries.

References and further information

Severe acute respiratory syndrome (SARS)

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

A large outbreak of a new respiratory disease, termed severe acute respiratory syndrome (SARS), began in the Guangdong province of southern China in November 2002. The disease had a high mortality rate and was caused by a new coronavirus, termed SARS coronavirus (SARS-CoV), thought to have been transmitted from animals (such as the palm civet) to humans in wild animal markets. No cases of SARS have been diagnosed in New Zealand.

Since July 2003 there has been no reported human-to-human transmission at outbreak sites. There have, however, been a few international incidents of laboratory worker infection, with secondary spread to two close contacts in one instance.

Case definition

Clinical description

Relatively insidious onset with fever, myalgia, malaise and headache, followed a few days to 1 week later by dry cough and dyspnoea. About 25 percent of cases have diarrhoea. Symptoms of upper respiratory tract infection (rhinorrhea and sore throat) are uncommon. Chest X-rays typically show scattered peripheral and lower zone opacification. About 25 percent of cases develop severe pulmonary disease that may lead to death from respiratory failure.

The illness is similar but a little milder in children.

Laboratory test for diagnosis

Laboratory confirmation requires at least one of the following:

- detection of diagnostic levels of serum antibody to SARS-CoV
- isolation (for example, in cell culture) of SARS-CoV from a clinical specimen
- detection of SARS-CoV nucleic acid in two clinical specimens either collected from different sources or collected from the same source on different days.

Consult a reference laboratory to discuss testing. Information regarding the current World Health Organization (WHO) advice for laboratory diagnosis of SARS-CoV is available at: www.who.int/csr/sars/guidelines/en/SARSLabmeeting.pdf and www.who.int/csr/sars/guidelines/en
Case classification

- **Under investigation:** A person who has been referred to the public health service for investigation of possible SARS-CoV infection.

- **Suspected case:** A person presenting with all of the following:
  - sudden onset of high fever (> 38°C)
  - one or more of the following respiratory symptoms: cough, sore throat, shortness of breath, difficulty breathing
  - onset of symptoms within 10 days of either travelling to one of the areas that has been listed as a focus area of transmission of SARS or being in close contact with a person who has travelled to such an area.

- **Probable case:**
  - a suspected case with chest X-ray findings of pneumonia or adult respiratory distress syndrome, or
  - a person with an unexplained respiratory illness resulting in death, with a post-mortem examination demonstrating the pathology of respiratory distress syndrome without an identifiable cause.

- **Confirmed case:** A clinically compatible illness that is laboratory confirmed.

- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

Spread of infection

**Incubation period**

Range of 2–10 days, with a median of 5 days. Case reports suggest incubation periods longer than 10 days have occurred.

**Mode of transmission**

Person to person, by droplet transmission, direct contact with respiratory tract secretions and possibly fomites. Health care workers are at high risk, especially those undertaking aerosol-generating procedures, such as intubation or nebulisation.

**Period of communicability**

From onset of symptoms until 10 days after resolution of fever. Communicability is variable: it is higher in cases with more severe disease and in a subgroup of cases known as ‘super-spreaders’. The virus is stable in faeces from cases with diarrhoea for up to 4 days and has been detected by polymerase chain reaction for more than 1 month in stool specimens from cases in whom the initial illness has resolved.
Notification procedure
Attending medical practitioners or laboratories must immediately notify the local medical officer of health of suspected cases. Notification should not await confirmation.

Laboratory notification of suspected cases should also be made directly to the Ministry of Health, including the Director of Public Health, preferably by telephone.

Management of case

Investigation
Obtain a history of travel, possible contacts and any occupational risk activities. Ensure laboratory confirmation has been attempted; for example, SARS-CoV has been detected in upper and lower respiratory tract, blood, stool and urine specimens of cases. Stool samples in the second week of illness give the highest rate of positivity.

Restriction
In hospital, place cases under airborne and contact precautions throughout the period of communicability. Staff should also wear eye protection and footwear that can be decontaminated or disposed of and use disposable equipment for the case wherever possible.

Outside hospital, cases should be isolated at home or in some other suitable facility throughout the period of communicability. During this time, household members who are not providing care should be relocated if possible. If household members cannot be relocated, they should minimise their contact with the case. People at risk of serious SARS complications (for example, people with underlying heart or lung disease or diabetes mellitus or who are elderly) should not have contact with the case.

Treatment
Consult an infectious diseases physician.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Management of contacts

Definition
All those who have cared for, lived with or had unprotected direct contact with respiratory secretions and/or body fluids of a case or suspected case during the period of clinical illness or subsequent communicability.
Investigation
Nil.

Restriction
Recommend voluntary isolation at home and record temperature daily for 10 days following contact. Ensure contact is visited or telephoned daily by a member of the public health service to determine whether fever or other symptoms of SARS-CoV infection are developing. Clinical evidence of SARS in a contact requires immediate clinical assessment and isolation.

Prophylaxis
Nil.

Counselling
Advise all contacts of the incubation period and typical symptoms of SARS-CoV infection. Encourage them to seek early medical attention if symptoms develop.

Other control measures

Identification of source
Check for other cases in the community.

Disinfection
Clean and disinfect surfaces and articles soiled with respiratory secretions or faeces, using a product with antiviral activity. For further details, see Appendix 1: Disinfection.

Health education
Consider a media release and direct communication with local health professionals to encourage prompt reporting of symptoms and to provide advice (for both the public and professionals).

Reporting
Ensure complete case information is entered into EpiSurv.

On receiving a notification, medical officers of health should immediately notify the Communicable Diseases Team and the Director of Public Health at the Ministry of Health.

The International Health Regulations National Focal Point in the Ministry must notify WHO of events involving any case of smallpox, poliomyelitis, SARS or human influenza caused by a new subtype.
If a cluster of cases occurs, contact the Ministry of Health Communicable Diseases Team and outbreak liaison staff at the Institute of Environmental Science and Research (ESR), and complete the Outbreak Report Form.
Shigellosis

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Outbreaks of shigellosis in New Zealand are often caused by person-to-person transmission. Many cases of shigellosis are the result of overseas travel, but occasional outbreaks occur.

*Shigella* comprises 4 species or serogroups: group A (*S. dysenteriae*), group B (*S. flexneri*), group C (*S. boydii*) and group D (*S. sonnei*). *S. dysenteriae* type 1 can spread in epidemics and is associated with serious disease and complications; *S. flexneri* can cause reactive arthritis. By contrast, *S. sonnei* is generally associated with mild illness.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

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

Case definition

Clinical description

Acute diarrhoea with fever, abdominal cramps, blood or mucus in the stools and a high secondary attack rate among contacts.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires isolation of any *Shigella* spp. from a stool sample or rectal swab and confirmation of genus by a reference laboratory.

While nucleic acid testing may be used for screening, a positive nucleic acid test does not meet the criteria for laboratory confirmation.

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

Case classification

- Under investigation: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
• **Probable**: A clinically compatible illness that is either epidemiologically linked to a confirmed case or has had contact with the same common source as a confirmed case— that is, is part of a common-source outbreak.

• **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.

### Spread of infection

**Reservoir**

Humans.

**Incubation period**

Range of 12 hours to 1 week; usually 1–3 days.

**Mode of transmission**

Direct or indirect faecal-oral transmission. Food or water may become contaminated. The infective dose can be as low as 10–100 organisms.

**Period of communicability**

Up to 4 weeks after infection. Asymptomatic carriage may also occur. Faecal shedding rarely persists for months. Appropriate antimicrobial treatment reduces the duration of carriage to a few days.

### Notification procedure

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

### Management of case

**Investigation**

Obtain a history of travel, a food history and history of water exposure, as well as a list of possible contacts. Ensure laboratory confirmation by stool or rectal swab culture has been attempted.

**Restriction**

In a health care facility, only standard precautions are indicated in most cases; if the case is diapered or incontinent, apply contact precautions for the duration of illness. For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric disease.
Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission. Educate about hand and food hygiene.

Management of contacts
Identify contacts for investigation and counselling as appropriate.

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

Investigation
All close (for example, household) contacts in one of the high-risk groups (1–4, see the exclusion and clearance criteria in Appendix 2: Enteric disease) should be asked to provide clearance of one negative faecal sample. Contacts with symptoms, even mild, should be investigated as cases.

Restriction
For high risk groups and symptomatic contacts (enteric or otherwise) refer to the exclusion and clearance criteria in Appendix 2: Enteric disease.

Prophylaxis
Nil.

Counselling
Advise all contacts of the incubation period and typical symptoms of shigellosis, and to seek early medical attention if symptoms develop.

Other control measures
Identification of source
Check for other cases in the community. Investigate potential food or water sources of infection only if there is a cluster of cases or an apparent epidemiological link.

If indicated, check the water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008).
Disinfection
Clean and disinfect surfaces and articles soiled with stools. For further details, refer to Appendix 1: Disinfection.

Health education
In an outbreak, consider a media release and direct communication with local parents, early childhood services, schools and health professionals to encourage prompt reporting of symptoms. In communications with doctors, include recommendations regarding diagnosis, treatment and infection control.

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.

Educate the public about safe food preparation (see Appendix 3: Patient information).

Reporting
Ensure complete case information is entered into EpiSurv.

Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.

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.

References and further information
Syphilis

Chapter last reviewed and updated in October 2018.

Case definition – infectious syphilis
(see the next section for congenital syphilis)

Infectious syphilis is notifiable in New Zealand. This includes syphilis of less than 2 years’ duration (primary, secondary and early latent) and syphilis of unknown duration. Late latent syphilis and tertiary syphilis are not notifiable in New Zealand.

Clinical description

For notification purposes, any of the following findings provide clinical evidence for infectious syphilis.

- **Primary syphilis**: A primary chancre (or ulcer) is present. It is usually a painless, solitary oral, genital or anal ulcer.
  Note: Some ulcers may be painful or multiple. Chancre occurs at site of contact with another person’s infectious lesions and may appear as a papule before ulcerating.

- **Secondary syphilis**: Signs of secondary syphilis include: oral or genital mucocutaneous ulceration; rash affecting the body, palms or soles; condylomata lata (large, raised, whitish or grey, flat-topped warty lesions found in warm, moist areas); patchy alopecia; and lymphadenopathy.
  Note: The rash of secondary syphilis often resembles a drug reaction, pytariasis rosea or guttate psoriasis.

- **Early latent syphilis**: Syphilis is of less than 2 years’ duration in a person who has no symptoms or signs of infection at the time of diagnosis. This includes currently asymptomatic people who have a history of symptoms consistent with primary or secondary syphilis within the last 2 years.

Laboratory test for diagnosis

**Laboratory definitive evidence requires** at least one of the following:

- seroconversion in the past 2 years: a reactive treponemal-specific test (EIA, TPPA, TPHA or FTA-Abs) when a previous treponemal-specific test was non-reactive within the past 2 years and the latest result is confirmed by either a reactive non-treponemal test (RPR or VDRL) or a different reactive treponemal-specific test

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43 Treponemal-specific tests are IgG immunoassay (EIA), *Treponema pallidum* haemagglutination assay (TPHA), *Treponema pallidum* particle agglutination assay (TPPA), fluorescent treponemal antibody absorption (FTA-Abs) and IgM immunoassay (IgM-EIA).

44 Non-treponemal tests are rapid plasma reagin (RPR) and venereal disease research laboratory (VDRL).
• documented fourfold or greater rise in non-treponemal antibody titre (RPR or VDRL) compared with the previous titre within the past 2 years and there is a reactive treponemal-specific test (EIA, TPPA, TPHA or FTA-Abs).

**Laboratory suggestive evidence requires** at least one of the following:

• detection of *Treponema pallidum* by direct fluorescent antibody microscopy (direct antigen test) or by nucleic acid testing (eg, polymerase chain reaction, PCR)

• a reactive treponemal-specific test (EIA, TPPA, TPHA or FTA-Abs) and either a reactive non-treponemal test (RPR or VDRL) or confirmation by a different reactive treponemal-specific test.

Note:

• IgM assays should not be used for screening purposes for infectious syphilis.

• *T. pallidum*-specific rapid immunochromatography (ICT) assays for use as point-of-care tests are becoming available, but their performance has not yet been fully established. Positive ICT results should be confirmed with a second treponemal-specific assay.

**Case classification**

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

• **Probable:** The case definition for a confirmed case is not met and either:
   1) **the person has no known previous reactive serology, and** has no history of adequate treatment of syphilis or endemic treponemal disease, and has laboratory suggestive evidence, and has at least one of the following:
      - history of sexual contact with an infectious case within the last 2 years
      - RPR ≥16
      - history of symptoms consistent with primary or secondary syphilis within the last 2 years (discussion with a sexual health or infectious diseases physician is recommended)
      - positive syphilis IgM
   or:
   2) **the person has previous reactive serology, and** has a fourfold or greater rise in non-treponemal antibody titre (RPR or VDRL) when the previous serology was done more than 2 years ago, and has at least one of the following:
      - contact with an infectious case within the last 2 years
      - positive syphilis IgM.

• **Confirmed:** A case that has laboratory definitive evidence alone or laboratory suggestive evidence and clinical evidence.

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45 Endemic treponemal diseases include yaws, bejel and pinta.
• **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

Note: Direct detection of *T. pallidum* in mucocutaneous lesions is evidence of a confirmed case even if the serology is negative as seroconversion may not occur for up to 3 months after infection.

**Case definition – congenital syphilis**
*(see previous section for infectious syphilis)*

**Clinical description**

*T. pallidum* crosses the placenta and infects the fetus at any time in pregnancy. If untreated, this can result in intrauterine fetal death, stillbirth or a premature baby with congenital syphilis. In early congenital syphilis, the baby may be severely affected at birth (eg, hepatomegaly, ascites, hydrops, fetal anaemia) or, more frequently, may appear normal. If the diagnosis is not made at that time, the baby will present later – nearly always within 3 months of birth – with non-specific complaints (eg, rhinitis, failure to thrive, pneumonia).

**Any one of the following four findings** meets the clinical criteria for notification of a probable case:

- any evidence of congenital syphilis on physical examination (includes stillbirth)
- any evidence of congenital syphilis on radiographs of long bones
- an elevated cerebrospinal fluid (CSF) white cell count or protein (without other cause) in the child
- the mother is seropositive in the perinatal period and has no documented evidence of adequate treatment in line with the New Zealand Sexual Health Society’s syphilis guidelines.

**Laboratory test for diagnosis**

**Laboratory definitive evidence requires:**

- a treponemal-specific test (EIA, TPPA, TPHA or FTA-Abs) confirming both mother and child are seropositive and

- at least one of the following:
  - detection of *T. pallidum* by either nucleic acid testing (eg, PCR) or direct fluorescent antibody (DFA) in specimens from lesions, nasal discharge, CSF, placenta, umbilical cord, amniotic fluid or autopsy material
  - detection of *T. pallidum*-specific IgM in the child

46 A stillbirth where fetal death has occurred after a 20-week gestation or in a fetus that weighs more than 500 g should be counted as clinical evidence towards a case where laboratory suggestive or definitive evidence exists.
the child's serum non-treponemal (RPR or VDRL)\textsuperscript{44} serology titre at birth is at least fourfold greater than the mother's titre.\textsuperscript{47}

**Laboratory suggestive evidence requires** at least one of the following:

- detection of *T. pallidum* by either nucleic acid testing (eg, PCR) or DFA **but** without serological confirmation in the child
- the child is seropositive on non-treponemal testing (RPR or VDRL) in the absence of IgM testing
- a reactive CSF non-treponemal test (RPR or VDRL) in the child
- the child remains seropositive by a treponemal-specific test (EIA, TPPA, TPHA or FTA-Abs) at 15 months of age, **and** this test is confirmed by a different reactive treponemal-specific test or a reactive non-treponemal test (RPR or VDRL), in the absence of postnatal exposure to *T. pallidum*, including the non-venereal subspecies *T. pallidum* subspecies *pertenue* (yaws) or subspecies *endemicum* (bejel), or to *T. carateum* (pinta).

**Case classification**

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable:** Clinical evidence and laboratory suggestive evidence.
- **Confirmed:** Laboratory definitive evidence.
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

**Spread of infection**

**Reservoir**
Humans.

**Incubation period**

Primary syphilis: usually 3 weeks; range 10 days to 3 months.

Note: Secondary syphilis may occur immediately after primary syphilis or up to 6 months later.

\textsuperscript{47} Any positive sera should be tested by serial dilution to provide an end-titre. Mother and child sera should be collected at the same time and tested in parallel. Cord blood should not be used for the investigation of congenital syphilis.
Mode of transmission

Transmission most commonly occurs by sexual contact (oral, vaginal or anal sex), and less commonly by non-sexual contact, with skin lesions and mucous membranes of an infected person.

Transmission can also occur transplacentally and through blood transfusions.

Infected infants may also have infectious mucocutaneous lesions.

Period of communicability

If untreated, the infectious period is defined as the first 2 years of infection. However, syphilis is most infectious during the primary and secondary stages of the disease when moist mucocutaneous lesions are present.

Transplacental transmission may occur for at least 4 years after infection.

Transmission through blood transfusions can occur if the donor is in the early stages of disease.

For information on case management and contact tracing and management, please refer to the New Zealand Sexual Health Society syphilis management guidelines at www.nzshs.org/guidelines
Taeniasis

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Cysticercosis, taeniasis and hydatids are a subset of ‘cestode’ (tapeworm infection) and are all notifiable. Cysticercosis and hydatids are discussed in separate chapters.

Tapeworm infection causes two clinical syndromes in humans:

- mature tapeworm infestation in the gut
- larval cysts embedded throughout the body, causing hydatosis, cysticercosis, coenurosis or sparganosis.

Taeniasis refers to intestinal infection by adult tapeworms of the genus *Taenia* (for example, *T. saginatum*, *T. solium*).

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz

Case definition

Clinical description

Gastrointestinal infestation with *Taenia* spp. is usually asymptomatic. Cases occasionally suffer nervousness, insomnia, anorexia, weight loss, abdominal pain and digestive disturbances. Long motile proglottids can migrate out of the anus and be seen on the perineum, on clothing or in the faeces.

Laboratory test for diagnosis

**Laboratory confirmation requires** microscopic identification of proglottids or eggs in the faeces or in the perianal region. However, these are not developed for up to 3 months after infection and even then can be indistinguishable from other species of *Taenia*. Microscopic identification of gravid proglottids allows species determination.

Possible use of serology should be discussed with ESR on a case-by-case basis.

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as confirmed.
- **Probable:** Not applicable.
• **Confirmed**: Identification by microscopy.
• **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

### Spread of infection

#### Incubation period
The time from ingestion of larvae until segments are passed in the faeces is 2–3 months.

#### Mode of transmission
Taeniasis is acquired by consuming cysts in raw or undercooked pork or beef. *T. saginata* eggs are not infectious to humans.

#### Period of communicability
Larvae remain viable in animal tissues for years. Adult tapeworms may live in the human intestine and shed eggs for up to 25 years, growing up to 8 metres in length. *T. saginata* is not directly transmissible from person to person, releasing eggs that are only infectious to cattle. *T. solium* is directly transmissible, having eggs that are infectious both to humans and to pigs. Eggs may remain viable in the environment for months.

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

Note: This is a requirement under either section A (conditions arising from occupation) or section B (other conditions) of Schedule 2 of the Health Act 1956.

### Management of case

#### Investigation
Obtain a history of travel, possible contacts and consumption of raw or undercooked beef or pork. Ensure laboratory confirmation has been attempted.

#### Restriction
Nil before isolation. However, *T. solium* cross-infection could occur via the faecal-oral route.
Counselling
Advise the case and their caregivers of the nature of the disease and its mode of transmission. Educate about hygiene, especially hand cleaning.

Management of contacts
Definition
A person with the same history as the case of consuming raw or undercooked beef or pork. In the case of *T. solium*, contacts also include people potentially exposed to eggs via faecal-oral contamination.

Investigation
Advise contacts to visit their general practitioner to arrange stool testing for eggs and parasites. Normally three samples are required. The laboratory needs to be informed of the history of overseas travel or other risks.

Restriction
Nil.

Prophylaxis
Consider treatment of contacts who are found to have taeniasis, especially *T. solium* infestation, to reduce the risk of cysticercosis and transmission to others.

Counselling
Nil.

Other control measures
Identification of source
If the case contracted taeniasis in New Zealand, liaise with the Ministry for Primary Industries to investigate potential animal sources of infection.

Disinfection
Nil.

Health education
Advise on hygienic food handling and the health dangers of consuming raw or undercooked meat.

Public education may be indicated to prevent faecal contamination of soil, water and food for humans and animals. Avoid the use of sewage effluents for pasture irrigation.
**Reporting**

Ensure that complete case information is entered into EpiSurv.

Medical officers of health should immediately notify the Director of Public Health at the Ministry of Health on receiving a notification themselves regarding a case who may have acquired the infection in New Zealand.

The Ministry of Health will notify the appropriate staff in the Ministry for Primary Industries so that further investigation of a potential animal source can be undertaken.

**References and further information**


Tetanus

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

There has been a median of two cases of tetanus per year since routine infant vaccination against tetanus was begun in New Zealand in 1960. The last death attributed to tetanus occurred in 2007.

Most reported cases follow traumatic wounds in elderly people who have either never received tetanus vaccination or have waning immunity from tetanus vaccination.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

Case definition

Clinical description

Most commonly presents with gradual onset of muscular rigidity and painful spasms, starting in the jaw (lockjaw, trismus) then spreading to the neck, trunk and extremities. Tetanus may cause laryngeal spasms, respiratory failure and autonomic dysfunction (fluctuations in pulse and blood pressure), leading to death, even with modern intensive care.

In less than 20 percent of cases, muscle rigidity and spasms are limited to a confined area close to the site of injury.

Laboratory test for diagnosis

Isolation of Clostridium tetani from culture of the wound site supports the diagnosis but yield is poor, and a negative culture does not rule out tetanus. In general, laboratories have a reduced role in the diagnosis of tetanus.

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as confirmed.
- **Probable:** Not applicable.
- **Confirmed:** A clinically compatible illness, as diagnosed by a medical practitioner.
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.
Spread of infection

Incubation period
Usually 3–21 days, although may range from 1 day to several months, depending on the character, extent and location of the wound.

Mode of transmission
The disease is not directly transmitted from person to person. Tetanus spores are usually introduced into the body through a wound contaminated with soil, street dust or animal or human faeces. Implicated wounds are often necrotic and most often a result of puncture injury but may include lacerations, splinters, grazes, burns, chronic ulcers and even surgical wounds. Some cases do not recall a wound. Neonatal tetanus usually follows infection of the umbilical stump. Intravenous drug users may be infected from contaminated drugs.

Period of communicability
Tetanus spores remain viable for many years in the environment.

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

Management of case

Investigation
Ascertain whether there is a history of vaccination, recent injury or intravenous drug use. Culture of swab or tissue sample from the wound may be attempted but \textit{C. tetani} is not often recovered.

Restriction
Nil.

Treatment
All cases should be under the care of a physician or paediatrician in a centre with intensive care facilities. Advice should be sought from an infectious diseases physician.

Counselling
Advise the case and their caregivers of the nature of the infection, its mode of transmission and the role of immunisation.
Management of contacts
Not applicable.

Other control measures
Identification of source
Nil.

Restriction
Nil.

Disinfection
Nil.

Health education
Medical officers of health are responsible for health education.
Trichinellosis

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Trichinellosis is caused by intestinal roundworms of the genus *Trichinella*. Most human infections are caused by *T. spiralis*, which is found worldwide and is hosted by a variety of carnivorous animals.

Since 1969 New Zealand authorities have undertaken various forms of surveillance for *Trichinella* spp. in such areas as domestic farmed pigs, feral pigs, slaughtered horses and meat export premises. No *T. spiralis* has been found. *T. spiralis* is present, although at low prevalence, in New Zealand feral cats and rats and has, on rare occasions, entered the domestic pig population.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

Case definition

Clinical description

A disease caused by ingestion of *Trichinella* larvae, and invasion of the larvae into muscle tissues. The disease has variable clinical manifestations. Common signs and symptoms among symptomatic people include fever, myalgia and periorbital oedema. Eosinophilia is also common.

Laboratory criteria for diagnosis

**Laboratory confirmation requires** at least one of the following:

- demonstration of *Trichinella* larvae in tissue obtained by muscle biopsy
- positive serologic test for *Trichinella*.

Case classification

- **Under investigation**: A case that has been notified, but information is not yet available to classify it as confirmed.
- **Probable**: Not applicable.
- **Confirmed**: A clinically compatible case that is laboratory confirmed.
- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.
Spread of infection

Incubation period

Gastrointestinal symptoms may appear 1–2 days after ingestion of infected meat; systemic symptoms usually appear 8–15 days (range 5–45 days) after ingestion of infected meat.

Mode of transmission

Humans become infected by eating raw or insufficiently cooked domestic or feral meat containing viable, encysted *Trichinella* larvae. Stomach acids degrade cysts encapsulating ingested larvae, resulting in maturation of adult worms in the small intestinal mucosa. Fertilised female worms produce hundreds of larvae over a period of 2–3 weeks and are then expelled in faeces. Newborn larvae migrate via the bloodstream to skeletal muscles, where they may remain viable for several years.

The animal reservoir is perpetuated in carnivorous wild animals and in domestic animals (especially pigs) that are fed uncooked meat (for example, swill), eat infected rodent carcasses or cannibalise infected carcasses. Horses and pigs may also become infected through ingestion of larvae passed in rat faeces that contaminate feed.

Period of communicability

Not transmitted from person to person.

Animals may remain infected for several years. Meat requires cooking, freezing or irradiation to kill the larvae. Freezing kills *T. spiralis* but not some other *Trichinella* spp.

Notification procedure

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

Management of case

Investigation

Ascertaining if there is a history of travel and ingestion of inadequately cooked domestic or wild meat and the source of such meat. A definitive diagnosis is important given the potential implications for livestock and export markets. Liaise with an infectious diseases physician or microbiologist to ensure laboratory confirmation by serology has been attempted; antibodies may not become detectable until 3 weeks after infection. When a muscle biopsy is necessary (uncommon), it should be taken from a tender, swollen area of muscle. If infection is present, the uncalcified parasitic cyst will be demonstrated.
Restriction
Nil.

Treatment
The treating doctor should liaise closely with an infectious diseases physician or microbiologist who will advise on management and treatment. Bed rest and anti-inflammatory analgesics are the main treatments. Mebendazole, or albendazole as an alternative, should be started as soon as possible, but these treatments may have little benefit. Corticosteroids are used for severe inflammatory manifestations but are of unknown benefit.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Management of contacts
Identify contacts for prophylaxis and counselling where appropriate.

Definition
All people who have ingested trichinous meat in the past 1–2 weeks.

Investigation and restriction
Nil.

Prophylaxis
Offer contacts albendazole 5 mg/kg orally twice daily for 1 week or mebendazole 5 mg/kg orally twice daily for 1 week. These drugs are active against the intestinal worms but not muscle-embedded larvae.

Counselling
Advise all contacts of the incubation period and typical symptoms of trichinellosis. Encourage them to seek early medical attention if symptoms develop.
Other control measures

Identification of source
Check for other cases in the community. Liaise with Ministry for Primary Industries staff to investigate potential animal sources of infection. See ‘Reporting’ below.

Disinfection
Nil.

Health education
General information on safe food preparation, home-kill practices and consumption of recreational catch with relevance to trichinellosis can be found on the Ministry for Primary Industries foodsafety webpages.

Reporting
Ensure complete case information is entered into EpiSurv.

Medical officers of health should immediately notify the Ministry of Health Communicable Diseases Team on receiving a notification themselves.

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.

If the case may have acquired trichinellosis in New Zealand, the Ministry of Health will notify the appropriate staff in the Ministry for Primary Industries on phone: 0800 809 966 so that further investigation of the source can be undertaken.
Tuberculosis

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Tuberculosis (TB) remains an important communicable disease in New Zealand. Incidence rates in recent years have been higher than those in Australia, the United States, and Canada, and slightly lower than the rate in the United Kingdom.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

Case definition

Clinical description

A chronic bacterial infection caused by Mycobacterium complex, including M. tuberculosis or M. bovis, characterised histopathologically by the formation of granulomas. Most infections are asymptomatic or non-progressive. The most common site of infection is the lung (pulmonary TB), where TB infection classically causes an asymmetrical pulmonary infiltrate, which undergoes caseation, cavity formation and fibrosis if it progresses. Young children with active TB disease may present with symptoms of fever, lassitude and cough. Older children and adults with active TB disease may present with symptoms of anorexia, fatigue, weight loss, chills, night sweats, cough, haemoptysis and chest pain.

Any organ can be affected by extrapulmonary TB, causing meningitis, pleurisy, pericarditis, bone or joint infection, renal infection, gastrointestinal tract infection, peritonitis or lymphadenitis, or disseminating via the bloodstream and affecting multiple organs (disseminated TB).

Types of tuberculosis

- **Tuberculosis disease: new case:** Active TB in a person who has never been treated for TB before, or has active disease from a new genotype.

- **Tuberculosis disease: relapse or reactivation:** Active TB in a person whose tuberculosis has been non-infectious or quiescent following full, partial or no treatment.

- Tuberculosis: latent infection (LTBI): A person with both of the following:
  - positive Mantoux test, Mantoux conversion or positive interferon-gamma release assay (IGRA) test
  - no evidence of active disease.
• Tuberculosis: old disease on preventive treatment: no active disease or latent infection.

For more information, see the *Guidelines for Tuberculosis Control in New Zealand 2010* (Ministry of Health 2010).

**Laboratory test for diagnosis**

- **Laboratory confirmation requires** at least one of the following:
  - positive culture for *M. tuberculosis* complex
  - positive microscopic examination for acid-fast bacilli when a culture has not been or cannot be obtained
  - demonstration of *M. tuberculosis* complex nucleic acid directly from specimens
  - histology strongly suggestive of tuberculosis when there is a strong clinical probability.

Note: Positive nucleic acid tests do not show whether the organisms are viable or not and may be positive after successful treatment. They should not be used to diagnose treatment failure.

**Case classification**

For active TB:

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

- **Probable**: Presumptive (without laboratory confirmation). There is no laboratory confirmation but:
  - there are symptoms or signs compatible with active tuberculosis, such as compatible radiology or clinical evidence of current disease, and
  - full anti-tuberculous treatment has been started by a clinician.

- **Confirmed**: A clinically compatible illness that is laboratory confirmed.

- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

There is no legal obligation to notify latent TB infection or old disease on preventive treatment, but such notification is useful for surveillance purposes. All cases of latent TB infection under treatment should be reported to the medical officer of health, with patient consent, and details should be entered into EpiSurv.
Spread of infection

Incubation period

The period from infection to demonstrable primary lesion or significant tuberculin (Mantoux) reaction is between 2 and 10 weeks. The lifetime risk of developing active TB disease after infection is about 5–10 percent in adults overall. However, the risk is inversely proportional to age at the time of infection (that is, young children have a greater risk of developing active disease). The risk is also greater in people with predisposing medical conditions and immunosuppression (and of these, HIV is the strongest risk factor). While the risk of developing active TB disease is greatest within the first year or two after infection, the risk can persist for a lifetime.

Mode of transmission

Transmission is by inhalation of airborne droplets produced by people with pulmonary or laryngeal TB, especially during coughing or sneezing. People with extrapulmonary TB alone cannot transmit the infection to others. People with latent TB infection are not infectious. Bovine TB (M. bovis) may also be transmitted from infected cattle to humans by ingestion of contaminated unpasteurised milk or milk products or by airborne droplet spread to people who work closely with cattle.

Period of communicability

Untreated adults and adolescents with pulmonary TB may be intermittently infectious for years. Children under the age of 12 years are rarely infectious. For the purposes of contact tracing, the Guidelines for Tuberculosis Control in New Zealand 2010 (Ministry of Health 2010) recommend that the onset of communicability be taken as the onset of cough for the index case, or as 3 months before diagnosis if the onset of cough is not known or there is no history of cough. This period may need to be extended if the source case is strongly sputum smear-positive or if a large proportion of contacts are found to have been infected.

Once a person with pulmonary TB has been commenced on effective treatment, the risk of transmission declines over 2–4 weeks to negligible levels in most cases. Therefore most people with pulmonary TB who have been on at least 2 weeks of effective anti-tuberculous treatment can be considered non-infectious to others. However, this may not apply in cases who are initially sputum smear-positive or have extensive lung involvement at diagnosis. In these cases, sputum may remain culture-positive for 2–3 months or longer. The duration of infectivity on treatment is correlated with the pre-treatment smear grade (acid-fast bacilli per high-powered field).

For further details regarding the period of infectiousness, see the Guidelines for Tuberculosis Control in New Zealand 2010 (Ministry of Health 2010).

48 Mantoux conversion occurs within 8 weeks of infection. Therefore, when testing contacts of infectious TB cases for conversion, the first Mantoux test should be done as soon as possible and the second Mantoux test should be done 8 weeks after the date of the last contact with the source case. see the Guidelines for Tuberculosis Control in New Zealand 2010 (Ministry of Health 2010).
Notification procedure
Attending medical practitioners or laboratories must immediately notify the local medical officer of health of suspected or confirmed cases.

Management of case

Investigation
In partnership with primary health care, respiratory and infection diseases physicians. Obtain a history of travel, possible human sources and exposure to cattle or unpasteurised milk. Ensure laboratory confirmation by culture of clinical specimens, especially sputum, has been attempted.

Investigation of the case and contacts should begin without waiting for full culture results if history, sputum smears or chest radiographs are suggestive of TB. The investigation should follow the recommendations in the Guidelines for Tuberculosis Control in New Zealand 2010 (Ministry of Health 2010).

An outbreak is defined as two or more cases that are linked by epidemiological investigation or DNA fingerprinting and that do not all live in the same household.

Restriction
In a health care facility, isolation and airborne precautions are indicated for cases with active pulmonary or laryngeal TB. Cases who do not warrant hospitalisation and who will comply with infection control precautions may be isolated at home. Details of isolation precautions and criteria for removal of precautions are listed in the Guidelines for Tuberculosis Control in New Zealand 2010 (Ministry of Health 2010). For information on applying to a District Court judge for an order to isolate an infectious case (as a last resort for non-compliant infectious cases), see A Guide to Section 16 of the Tuberculosis Act 1948 (Ministry of Health 1996).

Treatment
Ideally the case would be under the care of a specialist respiratory or infectious diseases physician. Combination therapy is used for at least 6 months but may extend to 9–12 months or longer in some cases. Please refer to the Guidelines for Tuberculosis Control in New Zealand 2010 (Ministry of Health 2010).
Counselling

Advise the case and their caregivers of the nature of the infection and its mode of transmission. Emphasise the need to complete the full course of medication and for contact investigation and follow-up of both case and contacts.

Public health staff should also assess whether directly observed therapy (DOT) is indicated. Please refer to the Guidelines for Tuberculosis Control in New Zealand 2010 (Ministry of Health 2010).

Management of contacts

Definition and investigation

Refer to the Guidelines for Tuberculosis Control in New Zealand 2010 (Ministry of Health 2010).

Restriction

Nil if well. If symptomatic of pulmonary TB, restrict social interaction until urgent chest radiographs can be taken.

Prophylaxis

For advice on treatment of latent TB infection in contacts, refer to the Guidelines for Tuberculosis Control in New Zealand 2010 (Ministry of Health 2010). For treatment of active TB disease in contacts (who, if active TB disease is diagnosed, are cases), see ‘Management of case’ above.

BCG vaccination is targeted at babies at high risk (for eligibility criteria, see the Immunisation Handbook 2011).

Counselling

Advise contacts of the risk of TB, the screening needed and the role of treatment for latent TB infection. For those identified as having been exposed to TB (whether given anti-tuberculosis treatment or not), advise on the lifelong risk of developing active disease, the typical symptoms of TB and the need to seek early medical attention if symptoms develop.

Other control measures

Identification of source

Refer to the Guidelines for Tuberculosis Control in New Zealand 2010 (Ministry of Health 2010).
**Disinfection**

Clean and disinfect surfaces and articles soiled with sputum or other contaminated bodily fluids. For further details, refer to Appendix 1: Disinfection.

Recommendations for cleaning, disinfecting and sterilising equipment are contained in the following standards:

1. SNZ HB 8149:2001 *Microbiological Surveillance of Flexible Hollow Endoscopes*
2. AS/NZS 4815:2006 *Office-based Health Care Facilities. Reprocessing of reusable medical and surgical instruments and maintenance of the associated environment*
3. AS/NZS 4187:2003 *Cleaning, Disinfecting and Sterilising Reusable Medical and Surgical Instruments and Equipment, and Maintenance of Associated Environments in Health Care Facilities.*

**Health education**

Medical officers of health are responsible for health education in the event of a cluster of cases. For details on communication with the community and other health professionals, see the *Guidelines for Tuberculosis Control in New Zealand 2010* (Ministry of Health 2010).

**Reporting**

Ensure complete case information is entered into EpiSurv.

If a cluster of epidemiologically linked cases occurs, complete the Outbreak Report Form in EpiSurv.

All new cases of multi-drug resistance (MDR) or extreme drug resistance (XDR), and cases where an overseas source of infection is suspected, should be discussed with the Communicable Diseases Team at the Ministry of Health.

**References and further information**


Typhoid and paratyphoid fever

Chapter reviewed and updated in March 2018. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Most cases of typhoid and paratyphoid fever notified in New Zealand are associated with overseas travel. Chronic carriage of Salmonella Typhi may occur and act as a source of infection.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

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

Case definition

Clinical description

Typhoid fever typically presents with insidious onset of fever, headache, malaise, anorexia, dry cough, relative bradycardia and hepatosplenomegaly (50 percent of cases). Less commonly, there may be rose spots on the trunk (30 percent of Caucasian cases), abdominal pain (20–40 percent of cases), constipation (38 percent of cases), diarrhoea (10 percent of cases) and cerebral dysfunction. If untreated, the illness may last for 3–4 weeks and be complicated by intestinal perforation (3–10 percent) or haemorrhage, death (12–30 percent) or relapse (up to 20 percent).

Paratyphoid fever is a similar illness to typhoid fever but the clinical manifestations tend to be milder, the duration is shorter and the case-fatality rate is much lower. It often manifests as acute gastroenteritis.

Note: Salmonella Paratyphi B var Java does not cause enteric fever and produces a less serious disease than other Typhi and Paratyphi variants.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires isolation of Salmonella Typhi or Salmonella Paratyphi from a clinical specimen. Salmonella Paratyphi B var Java infections should still be notified as Salmonella cases rather than cases of Paratyphi.

All isolates should be referred to Enteric Reference laboratory at ESR for further characterisation.
Case classification

- **Under investigation**: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable**: A clinically compatible illness that either is a contact of a confirmed case of the same disease or has had contact with the same common source as a confirmed case – that is, is part of a common-source outbreak.
- **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.

Spread of infection

Reservoir

Human cases and carriers for Typhi and Paratyphi A; human and possibly domestic animals for the other serovars.

Incubation period

- **Typhoid fever**: From 3 to 90 days (usual range 8-14 days).
- **Paratyphoid fever**: Usually 1–10 days, but may be longer (up to about a month).

Mode of transmission

Ingestion of food and water contaminated by faeces and urine of patients or carriers. In New Zealand, food vectors have included shellfish taken from sewage-contaminated beds. In other countries, shellfish, raw fruits and vegetables, contaminated milk and milk products have been vectors. Flies may spread organisms to food. Large epidemics are most often related to faecal contamination of water supplies or street-vended foods.

Person-to-person direct transmission is uncommon.

Period of communicability

Usually from the first week of illness throughout convalescence. About 10 percent of untreated typhoid patients shed the organism in stool for more than 3 months, and 2–5 percent become permanent carriers.

Chronic carriage (that is, *Salmonella* Typhi excreted for more than 1 year) is most common among people infected in middle age, especially women. Carriers frequently have biliary tract abnormalities such as calculi or a non-functioning gall bladder. Fewer *Salmonella* Paratyphi patients become chronic carriers.
Notification procedure

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

Management of case

Investigation

Obtain a detailed food history, a history of travel, exposure to untreated water or sewage or exposure to possible contacts with a similar illness.

Restriction

In a health care facility, only standard precautions are indicated in most cases; if the case is diapered or incontinent, apply contact precautions for the duration of illness.

For carriers (including chronic carriers) in occupational groups at high risk of transmitting an infection to others (including school children), a risk assessment should be carried out to consider safe arrangements for continuing work, or for alternative work, and for continuing need for strict hygiene both within household and at work. Treatment for carriage should follow discussion with a specialist microbiologist or ID physician.

For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric disease.

Counselling

Advise the case, carrier, and their caregivers of the nature of the infection and its mode of transmission.

Educate about hygiene, especially hand cleaning.

For carriers, a risk assessment should be carried out to consider safe arrangements for continuing work or alternative occupations and for continuing need for strict hygiene both within household and at work. Treatment for carriage should follow discussion with a specialist microbiologist or ID physician.

Management of contacts

Identify contacts for investigation, restriction and counselling as appropriate.

Definition

All those with unprotected household or other close contact with a case during the period of communicability or who have been exposed to the same contaminated food or water. This includes all members of a travel group associated with an identified case.
Investigation and restriction
For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric Disease.

Counselling
Advise all contacts of the incubation period and typical symptoms of typhoid or paratyphoid infection, and to seek early medical attention if symptoms develop. Educate about hygiene, especially hand cleaning.

Other control measures
Identification of source
Check for other cases in the community or at-risk groups. Investigate potential food or water sources of infection in all cases.

If indicated, check water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008).

If a water supply is involved, liaise with the local territorial authority to inform the public. Advise on the need to boil water.

Disinfection
Clean and disinfect surfaces and articles soiled with stool or urine. For further details, refer to Appendix 1: Disinfection.

Health education
Educate the public about safe food preparation (see Appendix 3: Patient information).

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.

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 Ministry for Primary Industries.
References and further information

Verocytotoxin- or Shiga toxin-producing *Escherichia coli* (VTEC/STEC)

Chapter reviewed and updated in May 2019. A description of changes can be found at www.health.govt.nz/cdcupdates.

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

**Epidemiology in New Zealand**

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.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

Further information on foodborne illnesses and STEC is available at www.mpi.govt.nz.

**Case definition**

**Clinical description**

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

[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).’

**Laboratory tests for diagnosis**

**Laboratory definitive evidence for a confirmed case requires** evidence of shiga toxin, which comprises either:

- culture and isolation of shiga toxin-producing *Escherichia coli*
- PCR 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.

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.

**Case classification**

- **Under investigation**: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable**: A clinically compatible illness that is either epidemiologically linked to a confirmed case of the same disease or has had contact with the same common source as a confirmed case – ie, is part of a common-source outbreak.
- **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: In the absence of HUS/TTP, asymptomatic infection or presentations with milder bowel symptoms (e.g. occasional loose stools) and/or non-diarrhoeal abdominal symptoms do not meet the case definition even if they have positive laboratory results.)
Spread of infection

Reservoir

Commensal of animals. Cattle, sheep, goats, and deer are the primary reservoirs of VTEC/STEC organisms carrying the stx genes. Humans may serve as a reservoir.

Incubation period

2–10 days; median 2–3 days.

Mode of 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.

Period of communicability

Faecal shedding persists for up to 1 week in adults and is often longer and quite variable in children.

Notification procedure

Attending medical practitioners or laboratories must immediately notify the local medical officer of health of confirmed cases, or if they suspect HUS/TTP.

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.

Management of case

Investigation

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

49 Up to 3 weeks in 30 percent of all children, with a median shedding of 4 to 6 weeks for children under 6 years.
travel. Ensure laboratory confirmation by stool culture or rectal swab has been attempted. Inform the laboratory if STEC is suspected.

**Restriction**

In a health care facility, only standard precautions are indicated in most cases; if the case is diapered or incontinent, apply contact precautions for the duration of the illness. All cases should remain off work/school until 48 hours after symptoms have ceased. For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric disease.

**Counselling**

Advise the case and their caregivers of the nature of the infection and its mode of transmission. Educate about hygiene, especially hand cleaning.

**Management of contacts**

Identify contacts for investigation, restriction and counselling as appropriate.

**Definition**

All those with close (eg, 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 and restriction**

All symptomatic contacts should be tested and remain off work/school until 48 hours after symptoms have ceased. No exclusion or testing is required for asymptomatic contacts. For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric Disease.

**Prophylaxis**

Nil.

**Counselling**

Advise all contacts of the incubation period and typical symptoms of STEC infection, and to seek early medical attention if symptoms develop. Educate about hygiene, especially hand cleaning.
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).

Disinfection

Clean and disinfect surfaces and articles soiled with stool. For further details, refer to Appendix 1: Disinfection.

Health education

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\(^50\), 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.

Reporting

Ensure complete case information is entered into EpiSrv.

\(^{50}\) www.mpi.govt.nz/processing/food-and-beverages/manuals-and-guidelines
Where food/food businesses are thought to be involved, inform the Food Compliance group from the Ministry for Primary Industries.

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.

References and further information


Viral haemorrhagic fevers

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Viral haemorrhagic fevers (VHF) are caused by viruses from four taxonomic families (Arenaviridae, Bunyaviridae, Filoviridae and Flaviviridae) and share the following features.

- All are enveloped RNA viruses.
- Most have animal (usually a rodent) or arthropod hosts; humans are not a natural reservoir.
- All are geographically restricted (by the distribution of the host species).
- All cause sporadic and irregular cases or outbreaks in humans.
- Most have the stability and infectivity characteristics (aerosol infectivity) to be able to be used as bioterrorism agents with the potential for large numbers of casualties.

There has never been a reported endemic or imported case of VHF in New Zealand, but it is possible that a sick traveller will bring the disease to New Zealand, where it may spread from person to person.

**Note:** Dengue haemorrhagic fever (under Arboviral Diseases) and yellow fever are discussed in separate chapters.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Geography</th>
<th>Reservoir</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crimean-Congo haemorrhagic fever</td>
<td>Africa, Middle East, Balkans, southern Soviet Union and western China</td>
<td>Ticks, mammals</td>
<td>Common in those with animal contact. Nosocomial epidemics occur.</td>
</tr>
<tr>
<td>Haemorrhagic fever with renal syndrome</td>
<td>Korea, China, Japan, Russia, Bulgaria, France and Scandinavia</td>
<td>Rodents</td>
<td>150,000 cases per year worldwide. Seasonal. Rural, farming or construction work is a risk factor.</td>
</tr>
<tr>
<td>Hantavirus pulmonary syndrome</td>
<td>Americas, especially southwest United States</td>
<td>Rodents</td>
<td>Indoor exposure in poorly ventilated and rodent-infested buildings or vehicles is a high-risk factor.</td>
</tr>
<tr>
<td>Lassa fever</td>
<td>West Africa, especially Guinea, Liberia, regions of Nigeria and Sierra Leone</td>
<td>Wild rodents</td>
<td>The most commonly exported haemorrhagic fever. Major cause of severe febrile illness in West Africa.</td>
</tr>
</tbody>
</table>
### Case definition

#### Clinical description

The clinical course varies among the VHF s, but a typical case might experience a prodrome of fever, headache, myalgia, facial flushing, conjunctival suffusion and malaise that lasts 3–4 days, followed by worsening of these symptoms with prostration, evidence of capillary leak (non-dependent oedema, effusions), haemorrhage, shock and impaired consciousness. Low platelets, disseminated intravascular coagulopathy (DIC) and liver damage are common.

Additional clinical features that are relatively specific to the main VHF s include:

- haemorrhagic fever with renal syndrome: acute renal failure
- **hantavirus pulmonary syndrome**: pulmonary infiltrate and respiratory failure
- **Lassa fever**: upper and lower respiratory tract symptoms, including exudative pharyngitis. Eighth cranial nerve deafness in 25 percent of survivors
- **Marburg, Ebola**: pharyngitis, diarrhoea and vomiting, maculopapular rash.

#### Laboratory test for diagnosis

Discuss laboratory testing with the Institute of Environmental Science and Research (ESR). These tests are not available in New Zealand. Diagnosis is made by viral isolation or serology.

#### Case classification

- **Under investigation**: A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable**: A clinically compatible illness with a history of travel to an appropriate country.
- **Confirmed**: A clinically compatible illness that is laboratory confirmed.
- **Not a case**: A case that has been investigated and subsequently found not to meet the case definition.

#### Notification procedure

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

Table 2 summarises the incubation period, mode of transmission and period of communicability of VHFs.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Incubation (range)</th>
<th>Mode of transmission</th>
<th>Period of communicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crimean-Congo haemorrhagic fever</td>
<td>Usually 1–3 days (1–12 days)</td>
<td>Tick bite or crushing tick. Health care workers frequently infected by exposure to blood and secretions from cases.</td>
<td>At least for duration of illness.</td>
</tr>
<tr>
<td>Haemorrhagic fever with renal syndrome</td>
<td>2–4 weeks (few days to 2 months)</td>
<td>Aerosol from infected rodent excreta (urine, respiratory secretions, saliva, faeces).</td>
<td>Not well defined: person-to-person transmission is rare.</td>
</tr>
<tr>
<td>Hantavirus pulmonary syndrome</td>
<td>2 weeks (few days to 6 weeks)</td>
<td>Aerosol from infected rodent excreta (urine, respiratory secretions, saliva, faeces).</td>
<td>Not well defined: person-to-person transmission is rare.</td>
</tr>
<tr>
<td>Lassa fever</td>
<td>6–21 days</td>
<td>Aerosol or direct contact with excreta of infected rats (commonly eaten). Needle-stick injury. Contact with case’s pharyngeal secretions or urine. Sexual contact.</td>
<td>Virus present in throat during acute febrile phase, in urine for 3–9 weeks and in semen for 3 months after infection.</td>
</tr>
<tr>
<td>Marburg, Ebola</td>
<td>2–21 days</td>
<td>After handling dead animals in the rainforest or the blood and tissues of infected monkeys. Person-to-person spread through infected blood, secretions, organs, semen and contaminated needles.</td>
<td>Low risk in incubation period. Highest in late stages of illness. Cadaver can be infectious. May be passed through semen up to 7 weeks after illness.</td>
</tr>
</tbody>
</table>

Management of case

Investigation

Obtain a history of travel, contact with animals, insect bites, possible contacts with infected cases, needle-stick accidents, occupation, recreational activities and any other at-risk activities.

Ensure laboratory confirmation has been attempted.

Restriction

In health care facilities, the following isolation precautions are indicated:

- Crimean-Congo haemorrhagic fever: contact isolation
- haemorrhagic fever with renal syndrome: standard precautions
- hantavirus pulmonary syndrome: standard precautions
• **Lassa fever**: droplet and contact isolation
• **Marburg, Ebola**: contact isolation.

Laboratory samples from Crimea-Congo haemorrhagic fever, Lassa fever and Marburg, Ebola virus cases should be kept to a minimum as they represent a significant biohazard. All samples should be handled with gloves and in a biological safety cabinet. Disinfect all surfaces in contact with samples. Serum may be heat inactivated (at least 60°C for at least 1 hour) before testing for heat-stable electrolytes and creatinine.

Cases with Crimea-Congo haemorrhagic fever, Lassa fever and Marburg, Ebola virus may transmit infection through close contact for weeks after illness. Cases should be advised not to have sex for 3 months after illness.

**Treatment**
Supportive. For Lassa fever, intravenous ribavirin reduces mortality, especially if given within the first week of illness. Ribavirin may also be effective in Crimea-Congo haemorrhagic fever.

**Counselling**
Advise the case and their caregivers of the nature of the infection and its mode of transmission. Advise on measures to reduce transmission to household or other close contacts. Cases must not donate blood for 3 months.

**Management of contacts**
**Definition**
All people who have been exposed to an infected case of Crimea-Congo haemorrhagic fever, Lassa fever or Marburg, Ebola virus or the case’s blood, excretions or tissues during the case’s period of communicability.

Table 3 summarises the requirements for investigation, restriction and prophylaxis for contacts.
### Table 3: Investigation, restriction and prophylaxis for contacts of VHF cases

<table>
<thead>
<tr>
<th>Level of risk</th>
<th>Definition</th>
<th>Investigation, restriction and prophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casual contact</td>
<td>No close personal contact, for example, travelling on the same aeroplane, residing in the same hotel, visiting the case’s home.</td>
<td>Nil. If becomes unwell, then place under surveillance.</td>
</tr>
<tr>
<td>Close contact (without use of personal protective equipment)</td>
<td>Living with case, nursing or serving the case, skin-to-skin contact (for example, hugging), handling laboratory specimens before recognising the disease.</td>
<td>Limit contact with other people (for example, work, school) for a full incubation period after last contact with the case. Record temperature twice daily for a full incubation period after last contact with the case and report if greater than 38°C. If symptoms develop or fever is greater than 38°C, then hospitalise immediately under isolation precautions.</td>
</tr>
<tr>
<td>High-risk contacts</td>
<td>Mucous membrane contact from kissing or sexual intercourse, or having a needle-stick or other penetrating injury involving contact with the case’s secretions, excretions, blood, tissues or other body fluids.</td>
<td>As for close contact but consider prophylactic ribavirin if Lassa fever contact.</td>
</tr>
</tbody>
</table>

### Other control measures

#### Identification of source
Check for other cases in the household and community.

#### Disinfection
Clean and disinfect surfaces and articles soiled with the case’s excretions or blood or that the case has had contact with. For further details, see Appendix 1: Disinfection.

#### Health education
Consider a media release and direct communication with local health professionals to encourage prompt reporting of symptoms. In communications with doctors, include recommendations regarding diagnosis, treatment and infection control.

#### Reporting
Ensure complete case information is entered into EpiSrv.

On receiving a notification, medical officers of health should immediately notify the Director of Public Health at the Ministry of Health.
The International Health Regulations (IHR) National Focal Point in the Ministry must use the IHR Decision Instrument for any event involving cholera, pneumonic plague, yellow fever, viral haemorrhagic fevers, West Nile fever or any unusual or potentially serious public health event, and then notify the World Health Organization if required.

If the case may have acquired a VHF in New Zealand, the Ministry of Health will notify the appropriate staff in the Ministry for Primary Industries so that further investigation of the source can be undertaken.
Yellow fever

Chapter last reviewed and updated in May 2012.

Epidemiology in New Zealand

Yellow fever is a mosquito-transmitted viral haemorrhagic fever (VHF) with an available vaccine. A valid International Certificate of Vaccination against yellow fever may be required for travel through endemic or enzootic countries. Vaccination may also be recommended for personal protection.

There has never been an imported case of yellow fever in New Zealand, and the vector mosquitoes *Aedes aegypti* (also named *Stegomyia aegypti*) and *Haemagogus* are not established here. It is possible, however, that people in New Zealand could develop yellow fever after travelling through endemic or enzootic areas in the Americas or Africa.

Case definition

Clinical description

Ranges from an asymptomatic or mild, undifferentiated febrile illness to a haemorrhagic fever with 50 percent mortality. Fever, headache, myalgia, conjunctival infection, facial flushing and relative bradycardia are common. In severe cases, these symptoms remit for a few hours to days then recur with high fever, headache, lumbosacral pain, nausea, vomiting, abdominal pain, impaired level of consciousness, severe hepatitis, shock and multisite haemorrhage.

Laboratory tests for diagnosis

Refer to World Health Organization (WHO 2010, p 470) for revised case definitions for public health surveillance of yellow fever (www.who.int/wer/2010/wer8547.pdf).

Relevant tests include:

- yellow fever virus specific IgM serology testing
- increase in antibody levels in paired serum samples
- neutralisation testing
- detection of yellow fever virus nucleic acid test
- isolation of yellow fever virus. (Note: Field strains of yellow fever virus are listed as PC3 organisms, so isolation attempts should be undertaken with caution and in the appropriate laboratory containment.)
Yellow fever IgM suggests recent infection with yellow fever or another closely related flavivirus. Serological test results should be interpreted in the light of clinical, travel and vaccination information. Testing against a panel of flaviviruses would be necessary to exclude cross-reaction with other flaviviruses. Confirmation by neutralisation is advisable.

**Serodiagnosis after vaccination**
Seroconversion occurs after yellow fever vaccination but rarely produces an IgM response.

**Case classification**
Refer to WHO (2010, p 470) for revised case definitions for public health surveillance of yellow fever (www.who.int/wer/2010/wer8547.pdf).

- **Under investigation:** A case that has been notified but information is not yet available to classify it as probable or confirmed (must have travelled to Africa and/or South America).
- **Suspected:** Any person who has visited or travelled in a yellow fever endemic area who presents with acute onset of fever, with jaundice appearing within 14 days of onset of the first symptoms.
- **Probable:** A clinically compatible illness that meets the WHO definition of a probable case (requires laboratory testing).
- **Confirmed:** A clinically compatible illness that meets the WHO definition of a confirmed case (requires laboratory testing).
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

**Spread of infection**

**Incubation period**
3–6 days.

**Mode of transmission**
The bite of an infective mosquito. Non-human primates are a reservoir of infection worldwide. There is no person-to-person transmission; however, to prevent an infectious human from possibly infecting susceptible local mosquitoes (if they were to feed on the case during the viraemia), the case should be quarantined until yellow fever has been excluded.

**Period of communicability**
Blood of the case is infective for mosquitoes from shortly before onset of fever and for the first 3–5 days of illness.
Notification procedure
Attending medical practitioners or laboratories must immediately notify the local medical officer of health of suspected cases. Notification should not await confirmation.

Management of case
Investigation
Obtain a history of travel, vaccination, mosquito bites and mosquito avoidance efforts. Ensure laboratory confirmation has been attempted.

Restriction
Nil in New Zealand.

Treatment
Supportive.

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Management of contacts
Definition
Any unimmunised person arriving in New Zealand who has travelled through a yellow fever endemic country with the case.

Counselling
Advise contacts of the incubation period and common symptoms. Encourage them to seek early medical attention if symptoms develop.

Other control measures
Identification of source
Identify the country of origin of the infection.

Disinfection
Nil for cases in New Zealand.
Health education

Travellers to or from yellow fever endemic countries in Africa and the Americas may need to have valid yellow fever vaccinations. They should be encouraged to protect themselves by using mosquito repellents containing DEET, protective clothing and insecticide-impregnated mosquito nets.

Reporting

Ensure complete case information is entered into EpiSurv.

On receiving a notification, medical officers of health should immediately notify the Director of Public Health at the Ministry of Health.

The International Health Regulations (IHR) National Focal Point in the Ministry must use the IHR Decision Instrument for any event involving cholera, pneumonic plague, yellow fever, viral haemorrhagic fevers, West Nile fever or any unusual or potentially serious public health event, and then notify WHO if required.

References and further information

Yersiniosis

Chapter reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

Epidemiology in New Zealand

Prior to 2014, the vast majority of cases of yersiniosis in New Zealand were caused by Yersinia enterocolitica biotype 4 (commonly found in pigs in New Zealand). In 2014 Y. pseudotuberculosis isolates accounted for almost half of all notifications and Y. enterocolitica biotype 2 has become the most common biotype isolated in New Zealand.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz/surveillance/annual_surveillance.php.

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

Case definition

Clinical description

In children under 5 years old, Y. enterocolitica infection typically causes diarrhoea, vomiting, fever and occasionally abdominal pain. In contrast, older children and adults are more likely to experience abdominal pain as the prominent symptom. Bacteraemia and sepsis may occur in immunocompromised individuals. Y. pseudotuberculosis is more likely to cause mesenteric adenitis and septicaemia than Y. enterocolitica.

Laboratory test for diagnosis

Laboratory definitive evidence for a confirmed case requires:

- isolation of Yersinia enterocolitica or Y. pseudotuberculosis from blood or faeces
- detection of Yersinia spp nucleic acid from faeces.

Serology does not meet the criteria for laboratory confirmation.

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

However, note that presently PCR testing may not detect Y. pseudotuberculosis and the ability of the assays to adequately detect of Y. enterocolitica biotype 1A is uncertain as of July 2017.
**Case classification**

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

- **Probable:** A clinically compatible illness that is epidemiologically linked to a confirmed case or has had contact with the same common source as a confirmed case – that is, is part of a common-source outbreak.

- **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.

**Spread of infection**

**Reservoir**

Animals. Pigs are the main reservoir for *Y. enterocolitica*; *Y. pseudotuberculosis* is widespread among many avian and mammalian hosts including deer.

**Incubation period**

From 3–7 days, generally under 10 days.\(^{52}\)

**Mode of transmission**

Mostly through ingestion of contaminated food, including pork and pork products, dairy products (especially unpasteurised milk), fruit, vegetables and tofu.

Although optimal growth is seen at 28–30°C, *Y. enterocolitica*, like *L. monocytogenes*, also grows well in a refrigerator (4°C) and survives freezing.

In New Zealand yersiniosis is also associated with ingestion of untreated water, direct contact with an infected animal, and person-to-person spread. Person-to-person transmission in a hospital has been reported. *Yersinia* spp. have rarely been transmitted from asymptomatic patients by blood transfusion.

*Y. pseudotuberculosis* is thought to be distributed less widely in the environment than *Y. enterocolitica* but both are considered to be significant foodborne pathogens. Outbreaks caused by *Y. pseudotuberculosis* are rare, but they have been noted overseas where carrots, lettuces and milk were the vectors. While implicated in the 2014 *Y. pseudotuberculosis* outbreak, produce was not confirmed as the source of the outbreak. Infections from *Y. enterocolitica* are often linked to pork products and pigs are considered to be a major reservoir of human pathogenic strains. *Y. pseudotuberculosis* is also found in the gut of many wild and domestic animals and is considered one of the most serious and common infectious disease of deer in New Zealand.

\(^{52}\) CDC range, 1–14 days [www.cdc.gov/yersinia/healthcare.html](http://www.cdc.gov/yersinia/healthcare.html)
Note that methods for detection of Yersinia spp. in foods are poor and hence attribution of human illness to specific foods is difficult.

**Period of communicability**

Faecal shedding generally persists for 2–3 weeks but can be prolonged (months) in both children and adults.

**Notification procedure**

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

**Management of case**

**Investigation**

Obtain a food history, details of ingestion of untreated water, contact with animals, possible human contacts and travel.

**Restriction**

In a health care facility, only standard precautions are indicated in most cases; if the case is diapered or incontinent, apply contact precautions for the duration of illness. For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric Disease.

**Counselling**

Advise the case and their caregivers of the nature of the infection and its mode of transmission. Educate about hygiene, especially hand cleaning.

**Management of contacts**

**Definition**

All those with unprotected close 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**

Test for asymptomatic infection only in an outbreak.

**Counselling**

Advise all contacts of the incubation period and typical symptoms of yersiniosis, and to seek early medical attention if symptoms develop.
Other control measures

Identification of source
Check for other cases in the community. Investigate potential food or water sources of infection only if there is a cluster of cases or an apparent epidemiological link.

If indicated, check the water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008).

Disinfection
Clean and disinfect surfaces and articles soiled with stool. For further details, refer to Appendix 1: Disinfection.

Health education
Educate the public about safe food preparation (see Appendix 3: Patient information).

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 with diarrhoea should be taken to a veterinarian 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.

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.

Reporting
Ensure complete case information is entered into EpiSurv.

Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.

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.

References and further information
Appendix 1: Disinfection

Appendix reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdupdates.

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

**Disposible 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

Appendix 2: Enteric disease

Appendix reviewed and updated in March 2018. A description of changes can be found at www.health.govt.nz/cdcupdates.

Although the terms ‘enteric’ and ‘food and waterborne’ illness are sometimes used interchangeably, not all enteric diseases are caused primarily by food or water. Conversely, some diseases that can be transmitted by food or water are not considered ‘enteric’. Most of the diseases covered in this appendix have – to a greater or lesser extent – an association with food or water, hence the terms ‘foodborne’ and ‘waterborne’ are used. Nevertheless, animal and farm environment contact should be considered important routes of infection in New Zealand.

In all cases of enteric illness, health services should refer to the specific disease chapters or the chapter on acute gastroenteritis in this manual and base the scope of their investigation on an assessment of the risk of disease spread. It is essential to obtain a clinical history of symptoms and exposure through possible food, water or animal contacts as well as through the case’s occupation. Whenever possible, arrangements should be made for appropriate specimen(s) to be sent for laboratory testing to confirm the diagnosis.

If a reported case is thought to be part of an outbreak, it is essential that health services follow the approach outlined in the Guidelines for the Investigation and Control of Disease Outbreaks (ESR 2012) to ensure the assessment of the possibility of shared risk factors in order to prevent further cases.

Food and waterborne illnesses are itemised in Section A of the list of notifiable diseases. They are therefore notifiable by the attending health practitioner and laboratories to a medical officer of health and by the attending health practitioner to the territorial authority (TA). This requirement for reporting to TAs can be fulfilled by summary reporting from the public health unit.

Roles and responsibilities

Liaison with the Ministry for Primary Industries (MPI) is required when food/food businesses are suspected of being the cause of illness. MPI is the New Zealand regulatory authority for food safety, including domestic food and imports and exports of food and food-related products. MPI is the lead agency for investigating, improving and promoting food safety and protecting consumers from risks (including nutrition and public health risks) that may arise in connection with the consumption of food.

Where food/food businesses are thought to be involved inform MPI. This includes commercially prepared food and recreationally gathered food.
Table 2.1 summarises responsibilities of public health units when investigating an outbreak of foodborne illness.

<table>
<thead>
<tr>
<th><strong>MPI foodborne illness responsibilities</strong></th>
<th><strong>Ministry of Health-contracted areas under notification of foodborne illness</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducting surveillance of risk factors relating to foods or food businesses</td>
<td>Conducting surveillance of cases, all activities including trends and distribution of illness</td>
</tr>
<tr>
<td>Receiving reports of foodborne illness incidents or outbreaks</td>
<td>Recording notifications of foodborne illness (in EpiSurv) Reporting any outbreaks/incidents to MPI</td>
</tr>
<tr>
<td>Investigating issues and risk factors related to food or food businesses following reports of foodborne illness outbreaks</td>
<td>Conducting epidemiological investigations</td>
</tr>
<tr>
<td>Infection control, hazard control, risk minimisation and management related to food or food businesses including food handler identification during investigation, eg, product recall</td>
<td>Tracing contacts Controlling infectious cases – exclusion and clearance of cases from food businesses</td>
</tr>
<tr>
<td>Promoting risk prevention and safe food handling to the food business and/or the sector and consumers as appropriate</td>
<td>Advising the public about disease and protection measures</td>
</tr>
<tr>
<td>Taking food samples at the food business</td>
<td>Taking specimens from case or contacts. Taking samples of any leftover food not at the food business</td>
</tr>
<tr>
<td>Recording all actions on the appropriate MPI database</td>
<td></td>
</tr>
<tr>
<td>Reporting issues, findings and action taken to Ministry of Health</td>
<td>Providing recommendations or reporting to MPI</td>
</tr>
</tbody>
</table>
Incubation periods

Common incubation periods for enteric disease are summarised in Table 2.2.53

<table>
<thead>
<tr>
<th>Cause</th>
<th>Incubation period (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bacillus cereus</em> (diarrhoea)</td>
<td>6–24 hours</td>
</tr>
<tr>
<td><em>Bacillus cereus</em> (vomiting)</td>
<td>0.5–6 hours</td>
</tr>
<tr>
<td>Campylobacteriosis</td>
<td>2–5 days (1–10 days)</td>
</tr>
<tr>
<td>Ciguatera fish poisoning</td>
<td>1–24 hours</td>
</tr>
<tr>
<td><em>Clostridium botulinum</em></td>
<td>12–36 hours</td>
</tr>
<tr>
<td><em>Clostridium perfringens</em></td>
<td>10–12 hours (6–24 hours)</td>
</tr>
<tr>
<td>Cryptosporidiosis</td>
<td>7 days (1–12 days)</td>
</tr>
<tr>
<td>Diarrhetic shellfish poisoning</td>
<td>Hours</td>
</tr>
<tr>
<td><em>Entamoeba histolytica</em></td>
<td>Days to months</td>
</tr>
<tr>
<td>Enteric adenoviruses</td>
<td>3–10 days</td>
</tr>
<tr>
<td>Enteropathogenic <em>E. coli</em> (EPEC)</td>
<td>10–12 hours</td>
</tr>
<tr>
<td>Enterotoxigenic <em>E. coli</em> (ETEC)</td>
<td>24–72 hours</td>
</tr>
<tr>
<td>Giardiasis</td>
<td>7–10 days (3–25 days)</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>28 – 30 days (15 – 50 days)</td>
</tr>
<tr>
<td>Norovirus</td>
<td>10–50 hours</td>
</tr>
<tr>
<td>Rotavirus</td>
<td>24–72 hours</td>
</tr>
<tr>
<td>Salmonellosis</td>
<td>12–36 hours (6–72 hours)</td>
</tr>
<tr>
<td><em>Salmonella</em> Paratyphi</td>
<td>1–10 days (up to about 30 days)</td>
</tr>
<tr>
<td><em>Salmonella</em> Typhi</td>
<td>1–3 weeks (3 days – 90 days)</td>
</tr>
<tr>
<td>Shigellosis</td>
<td>1–3 days (12 hours – 1 week)</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>0.5–8 hours</td>
</tr>
<tr>
<td><em>Vibrio cholerae</em> O1 or O139</td>
<td>2–3 days (2 hours – 5 days)</td>
</tr>
<tr>
<td><em>Vibrio parahaemolyticus</em></td>
<td>4–30 hours</td>
</tr>
<tr>
<td>Yersiniosis (not <em>Y. pestis</em>)</td>
<td>3–7 days (&lt; 10 days)</td>
</tr>
</tbody>
</table>

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53 Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.
**Mode of transmission**

Most notifiable enteric diseases are transmitted to a greater or lesser extent by ingestion of contaminated food or water.

Nevertheless, person-to-person spread via the faecal-oral route is a particularly important route of transmission for norovirus, rotavirus, enteric adenovirus and *Shigella. E. histolytica* may also be transmitted person to person by the faecal-oral route. Norovirus may be transmitted by aerosol around infected vomit or faeces.

**Period of communicability**

For those diseases that have a significant degree of person-to-person transmission, periods of communicability are summarised in Table 2.3.

<table>
<thead>
<tr>
<th>Infection</th>
<th>Period of communicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteric adenoviruses</td>
<td>Highest risk in the first few days of symptoms; up to months</td>
</tr>
<tr>
<td><em>E. histolytica</em></td>
<td>Up to months</td>
</tr>
<tr>
<td>Giardiasis</td>
<td>Up to months</td>
</tr>
<tr>
<td>Norovirus</td>
<td>During symptoms and until 48 hours after diarrhoea ceases</td>
</tr>
<tr>
<td>Rotavirus</td>
<td>During symptoms and until approximately 8 days after onset of symptoms. Up to 30 days after onset of symptoms in immunocompromised patients</td>
</tr>
<tr>
<td>Shigellosis</td>
<td>Up to 4 weeks after infection. Asymptomatic carriage may also occur. Rarely, faecal shedding may persist for months</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Table 2.4: Pathogen or disease-specific exclusion and clearance criteria for people at increased risk of transmitting an infection to others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups at increased risk of transmitting infection to others:</td>
</tr>
<tr>
<td>- 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)</td>
</tr>
<tr>
<td>- 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</td>
</tr>
<tr>
<td>- children under the age of 5 attending early childhood services/groups</td>
</tr>
<tr>
<td>- other adults or children at higher risk of spreading the infection due to illness or disability.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pathogen or disease name</th>
<th>Control</th>
<th>Cases</th>
<th>Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute gastroenteritis, including due to Bacillus species, Clostridium</td>
<td>Enteric precautions</td>
<td>Until symptom free for 48 hours</td>
<td>None required</td>
</tr>
<tr>
<td>Pathogen or disease name</td>
<td>Control</td>
<td>Cases</td>
<td>Contacts</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------</td>
<td>-------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exclusions</td>
<td>Microbiological clearance</td>
</tr>
<tr>
<td><em>Clostridium perfringens</em>, <em>Cyclospora</em>, <em>norovirus</em> and <em>rotavirus</em>, <em>Staph. Aureus</em></td>
<td>Enteric precautions until treatment complete</td>
<td>Until symptom free for 48 hours.</td>
<td>None required</td>
</tr>
<tr>
<td><em>Entamoeba histolytica</em> (amoebic dysentery)</td>
<td>Enteric precautions</td>
<td>Until symptom free for 48 hours.</td>
<td>None required</td>
</tr>
<tr>
<td>Campylobacter</td>
<td>Enteric precautions</td>
<td>Until symptom free for 48 hours.</td>
<td>None required</td>
</tr>
<tr>
<td>Cryptosporidium</td>
<td>Enteric precautions</td>
<td>Until symptom free for 48 hours.</td>
<td>None required</td>
</tr>
<tr>
<td><em>E.coli</em> VTEC/STEC</td>
<td>Enteric precautions</td>
<td>Until symptom free for 48 hours.</td>
<td>None required</td>
</tr>
<tr>
<td><em>Giardia lamblia</em></td>
<td>Enteric precautions</td>
<td>Until symptom free for 48 hours.</td>
<td>None required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>Enteric precautions ≤1 wk after onset of symptoms</td>
<td>1,2,3,4: seven days after onset of jaundice and/or other symptoms.</td>
<td>None required</td>
</tr>
<tr>
<td>Pathogen or disease name</td>
<td>Control</td>
<td>Cases</td>
<td>Contacts</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------------------------</td>
<td>-------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exclusions</td>
<td>Microbiological clearance</td>
</tr>
<tr>
<td><strong>Salmonella</strong></td>
<td>Enteric precautions</td>
<td>Until symptom free for 48 hours.</td>
<td>None required</td>
</tr>
<tr>
<td><strong>S. typhi and paratyphi</strong></td>
<td>Enteric precautions</td>
<td>Until symptom free for 48 hours.</td>
<td>None required</td>
</tr>
<tr>
<td><strong>Shigella sonnei</strong></td>
<td>Enteric precautions</td>
<td>Until symptom free for 48 hours.</td>
<td>None required</td>
</tr>
<tr>
<td><strong>Shigella Boydii, Dysenteriae, and Flexneri</strong></td>
<td>Enteric precautions</td>
<td>Until symptom free for 48 hours.</td>
<td>None required</td>
</tr>
</tbody>
</table>
### Pathogen or disease name

<table>
<thead>
<tr>
<th>Control</th>
<th>Cases</th>
<th>Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exclusions</td>
<td>Microbiological clearance</td>
</tr>
<tr>
<td></td>
<td>1,2,3,4 also require clearance.</td>
<td></td>
</tr>
<tr>
<td>Vibrio cholerae O1 or O139</td>
<td>Enteric precautions</td>
<td>None required</td>
</tr>
<tr>
<td></td>
<td>Until symptom free for 48 hours.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,2,3,4 also require clearance.</td>
<td></td>
</tr>
<tr>
<td>Yersinia</td>
<td>Enteric precautions</td>
<td>1,2,3,4: until symptom free for 48 hours.</td>
</tr>
<tr>
<td></td>
<td>None required</td>
<td></td>
</tr>
</tbody>
</table>

In exceptional circumstances, eg, where workplace hygiene or sanitation is uncertain, a case may need to be excluded until they have submitted appropriate negative stool(s), taken at a suitable interval.

**References and further information**


Appendix 3: Patient information

Appendix reviewed and updated in December 2017. A description of changes can be found at www.health.govt.nz/cdcupdates.

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: http://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.
Appendix 3: Patient information – December 2017

- Keep raw meat, poultry and fish separate from and below other foodstuffs so that any raw meat juice does not contaminate other foodstuffs 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.

Medicines

Patient information is especially important where medicines are recommended for people who are not ill but who have been exposed to an infectious agent.

Sources of information include the following.

- **Medsafe – Information for consumers**  
  www.medsafe.govt.nz/Consumers/cki/CMIForm.asp  
  Consumer Medicine Information (CMI) provides useful information about medicines and contains information and advice on matters such as what the medicine is used for, how it should be taken, what side effects can result from taking the medicine, whether a person can drive or drink alcohol while taking the medicine, and what to do if a person misses a dose. However, a CMI does not contain all the available information about the medicine. Patients should ask their doctor or pharmacist if they have any questions or concerns about taking the medicine. Although pharmaceutical companies are responsible for producing CMIs, in New Zealand there are no legal requirements for them to provide consumer information. The CMIs offered on the Medsafe website have been written by pharmaceutical companies, using guidelines set by Medsafe.

- **MedlinePlus**  
  www.nlm.nih.gov/medlineplus/aboutmedlineplus.html  
  MedlinePlus brings together authoritative information from the National Library of Medicine, the National Institutes of Health and other United States government agencies and health-related organisations. Pre-formulated MEDLINE searches are included in MedlinePlus and provide easy access to medical journal articles. MedlinePlus also offers extensive information about drugs, an illustrated medical encyclopaedia, interactive patient tutorials and latest health news.
Appendix 4: Direct laboratory notification diagram for human immunodeficiency virus
Appendix 4: Direct laboratory notification diagram for HIV – March 2019

* Any first positive NAAT/viral load result on an individual should be notified, as well as any first negative NAAT/viral load performed on an individual for a purpose other than excluding infection.

The aim of the first NAAT/viral load notification is to capture individuals previously diagnosed with HIV overseas who are now under care in New Zealand.

- If the negative viral load was performed to exclude infection, eg, as work-up of low-level reactive serology in pregnancy, do not notify.

Otherwise:
- The result of the first NAAT/viral load test performed must be notified, whether positive or negative.

Any known cases previously diagnosed in New Zealand and having a viral load test, will be filtered by the AEG.