### Version control

<table>
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<th>Chapter</th>
<th>Date updated</th>
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<tr>
<td>Poliomyelitis</td>
<td>August 2017</td>
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<tr>
<td>Invasive pneumococcal disease</td>
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<tr>
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<td>July 2016</td>
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<tr>
<td>New chapter added: Middle East Respiratory Syndrome</td>
<td>February 2015</td>
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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
General considerations for the control of communicable diseases – May 2012

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 Zealand

**Notifiable infectious diseases under the Health Act 1956 (Schedule 1 Part 1)**

**Section A: Infectious diseases notifiable to a medical officer of health and a local authority**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Notifiable Disease</th>
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<tbody>
<tr>
<td>Meningoencephalitis – primary amoebic</td>
<td>Acute gastroenteritis^2</td>
</tr>
<tr>
<td>Campylobacteriosis</td>
<td>Cholera</td>
</tr>
<tr>
<td>Cryptosporidiosis</td>
<td>Giardiasis</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>Legionellosis</td>
</tr>
<tr>
<td>Listeriosis</td>
<td>Salmonellosis</td>
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<tr>
<td>Shigellosis</td>
<td>Typhoid and paratyphoid fever</td>
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<td>Yersiniosis</td>
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**Section B: Infectious diseases notifiable to a medical officer of health**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Notifiable Disease</th>
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</thead>
<tbody>
<tr>
<td>Acquired immunodeficiency syndrome (AIDS)</td>
<td>Arboviral diseases</td>
</tr>
<tr>
<td>Creutzfeldt-Jakob disease (CJD) and other spongiform encephalopathies</td>
<td>Enterobacter sakazakii invasive disease^3</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Hepatitis (viral) – not otherwise specified</td>
</tr>
<tr>
<td>Hydatid disease</td>
<td>Leprosy</td>
</tr>
<tr>
<td>Malaria</td>
<td>Mumps</td>
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<tr>
<td>Pertussis</td>
<td>Plague</td>
</tr>
<tr>
<td>Rabies^4</td>
<td>Rickettsial disease^5</td>
</tr>
<tr>
<td>Severe acute respiratory syndrome (SARS)</td>
<td>Viral haemorrhagic fevers</td>
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<tr>
<td>Anthrax</td>
<td>Brucellosis</td>
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<tr>
<td>Diphtheria</td>
<td>Haemophilus influenzae type b</td>
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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.
### Other diseases notifiable to a medical officer of health (Schedule 2, Sections A and B)

<table>
<thead>
<tr>
<th>Disease</th>
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<tbody>
<tr>
<td>Hepatitis C (HCV)</td>
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<tr>
<td>Invasive pneumococcal disease</td>
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<tr>
<td>Measles</td>
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<tr>
<td>Non-seasonal influenza (capable of being transmitted between human beings)</td>
</tr>
<tr>
<td>Rheumatic fever</td>
</tr>
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<td>Tetanus</td>
</tr>
<tr>
<td>Highly pathogenic avian influenza (including HPAI subtype H5N1)</td>
</tr>
<tr>
<td>Leptospirosis</td>
</tr>
<tr>
<td>Neisseria meningitidis invasive disease</td>
</tr>
<tr>
<td>Poliomyelitis</td>
</tr>
<tr>
<td>Rubella (including congenital)</td>
</tr>
<tr>
<td>Yellow fever</td>
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### 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

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6 The blood lead level threshold of 15 μg/dl is for conditions arising from occupation, otherwise the notification level is 0.48 μ mol/l).
General considerations for the control of communicable diseases

- 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 disseminating 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)

Acquired immunodeficiency syndrome (AIDS) is the late stage of the spectrum of disease caused by the human immunodeficiency virus (HIV). Currently in New Zealand, AIDS is a notifiable condition while HIV is not.

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 meeting AIDS criteria have tested late for HIV and therefore have not previously been on anti-retroviral treatment.

The survival of those people who do progress to AIDS is also longer due to treatment, and the annual number of deaths is now consistently lower than the number 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 six-monthly newsletter produced by the AIDS Epidemiology Group (www.otago.ac.nz/aidsepigroup) which is also posted on the Ministry of Health website (www.health.govt.nz/aids).

Case definition of AIDS

For surveillance purposes in New Zealand, and in most other developed countries, 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.

AIDS-defining diseases (CDC 1993) are:

- candidiasis of bronchi, trachea or lungs
- candidiasis, oesophageal
- cervical cancer, invasive
- coccidioidomycosis, disseminated or extrapulmonary
- cryptococcosis, extrapulmonary
- cryptosporidiosis, chronic intestinal (> 1 month duration)
- cytomegalovirus disease (other than liver, spleen or nodes)
- cytomegalovirus retinitis (with impairment of vision)
- herpes simplex: chronic ulcer(s) (> 1 month duration), bronchitis, pneumonitis or oesophagitis
- histoplasmosis, disseminated or extrapulmonary
- HIV-related encephalopathy
- HIV-related wasting
- isosporiasis, chronic intestinal (> 1 month 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 AIDS-defining conditions 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 2-year period
- lymphoid interstitial pneumonitis (CDC 1994).

**Laboratory testing for diagnosis**

AIDS is a clinical diagnosis. Although there is laboratory testing available for HIV, there is no laboratory testing for AIDS.

**Case classification**

- **Under investigation**: Not applicable.
- **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. Appropriate anti-retroviral therapy that controls the circulating viral load reduces infectivity.

Notification procedure
AIDS is a notifiable condition. Attending medical practitioners must notify all cases to the local medical officer of health, using form H773/1A. A code, not the individual’s name, is used. The medical officer of health should forward the notification to:

- AIDS Epidemiology Group
- Department of Preventive and Social Medicine
- PO Box 913
- University of Otago Medical School
- Dunedin

Although HIV infection without AIDS is not notifiable, surveillance based on laboratory diagnoses is undertaken by the AIDS Epidemiology Group.

Regular quarterly reports are made by the AIDS Epidemiology Group to the Ministry of Health and disseminated widely every 6 months in the AIDS – New Zealand publication.

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 work, attendance at early childhood service or school 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. This should include 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 (for example, 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 adult and/or paediatric infectious diseases physician with a special interest in HIV.

It is essential that all HIV tests be performed with the informed consent (verbal consent is sufficient in most cases) of the person and with pre-test counselling that includes 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 steps will be taken to maintain confidentiality, including an offer to test under code. More comprehensive pre-test counselling is indicated if the person is at high risk of being HIV-positive.
Prophylaxis
Immediate advice should be sought from the infectious diseases service of the closest tertiary care hospital. Prophylaxis must be authorised by an anti-retroviral prescriber.

Anti-retroviral prophylaxis depends on:
- the period that has elapsed between exposure and the time of availability of appropriate treatment (chemoprophylaxis has been shown to have some protective effect up to 36 hours post exposure)
- the type of exposure and source material, for example, a needle-stick injury versus sexual contact.

Counselling
The contact should be offered 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 (for example, 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 and prevention
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: www.needle.co.nz

The Ministry of Health offers a screening programme for all pregnant women. Information is available on the National Screening Unit website: www.nsu.govt.nz
References and further information


Acute gastroenteritis

Epidemiology in New Zealand

Episodes and outbreaks of acute gastroenteritis are common in New Zealand. They are usually due to micro-organisms. 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

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

Case definition

Acute gastroenteritis is the sudden onset of diarrhoea and/or vomiting, usually three or more bouts of diarrhoea or vomiting and diarrhoea. This can be caused by ingestion of:

- toxins, for example, toxins produced by Bacillus cereus, staphylococci, Clostridium botulinum, tutin
- viruses, for example, norovirus
- bacteria, for example, campylobacter, salmonella
- parasites, for example, giardia, cryptosporidium
- chemicals, for example, some metals.

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, food handler, 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).

Clinical description

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

Laboratory test for diagnosis

Laboratory confirmation requires isolation of the specific organism or toxin, or detection of 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, 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

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*, *Staphylococcus aureus*)

2. single cases in a high-risk category (for example, food handler, early childhood service worker)

3. single cases of infectious gastroenteritis of public health importance, including:
   - Shiga toxin-producing *Escherichia coli* and other *E. coli* strains causing diarrhoea, for example, enteropathogenic *E. coli* (EPEC) and enterotoxigenic *E. coli* (ETEC)
   - *Clostridium perfringens* or *C. botulinum*
   - *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 tanalised wood has been used).
Management of case

Investigation

In liaison with the attending medical practitioner, obtain a history of possible contacts, travel, food and water ingestion.

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. 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 patients with norovirus infection, especially if vomiting, under airborne precautions in addition to contact precautions.

Food handlers with gastroenteritis of unknown cause should be withdrawn from work while undergoing investigation and until symptoms resolve. There is no additional restriction on food handlers found to have non-cholera vibrio infections, botulism or shellfish or fish poisoning. 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 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

People known to have eaten *C. botulinum* toxin-contaminated food may be purged with a cathartic, given gastric lavage and high-bowel washout and kept under close medical supervision. In high-risk cases, give botulinium antitoxin within 1–2 days of ingestion.
**Counselling**

Advise 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 or water sources of infection 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**

For botulism, detoxify implicated foods by boiling before discarding or break the containers and bury them deeply in soil to prevent ingestion by animals. Sterilise utensils potentially contaminated with botulinum toxin.

**Health education**

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

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**


For suspected or known norovirus outbreaks, refer to *Guidelines for the Management of Norovirus Outbreaks in Hospitals and Elderly Care Institutions* (Ministry of Health 2009) at www.health.govt.nz/publication/guidelines-management-norovirus-outbreaks-hospitals-and-elderly-care-institutions-0
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.

Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

References and further information


Anthrax

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

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 Whataroa 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 Whataroa 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
## Case definition

<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, meningitis, 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 2: **Incubation period of arboviral diseases**

<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>
<tr>
<td>Other arboviruses</td>
<td>Unknown, possibly 3–11</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, pneumatic 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

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, meningencephalitis, 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 4–8°C 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

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

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

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

Case definition

Clinical description
An illness of variable severity with symptoms of abdominal pain, fever and diarrhoea, often with bloody stools.

Laboratory test for diagnosis

Laboratory confirmation requires isolation of Campylobacter spp. from a clinical specimen.

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 – that is, is part of a common-source outbreak.
- **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
Usually 2–5 days, range 1–10 days.
Mode of transmission
Most often by ingestion of contaminated food, typically undercooked poultry but also other meats 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 other 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 immediately 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
Obtain a food consumption history and details of water consumption and animal contact as well as details of occupation.

Investigate and obtain a more detailed history if there is an outbreak or if 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 a diapered or incontinent child, apply contact precautions for the duration of illness. For further details, refer to the exclusion and clearance criteria in Appendix 2: Enteric Disease.

Treatment
Fluid replacement is the mainstay of therapy. Antimicrobial agents have modest if any benefit on duration of symptoms and are only indicated if the infection is severe, the patient is immunocompromised or prompt termination of excretion of organisms is desired. Erythromycin is the preferred antimicrobial agent in New Zealand and generally clears the stool of Campylobacter spp. within 3 days. Other macrolides are equally effective. Ciprofloxacin or norfloxacin are alternatives but are associated with increasing resistance and are not recommended for children.
Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission. Educate about hygiene.

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.

Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

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

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

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 confirmation 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 ESR for serotyping 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 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 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 that is laboratory confirmed.

- **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

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 until a few days after recovery but occasionally persists for several months or years.

*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 a diapered or incontinent child, 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 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**
In New Zealand, 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 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.

Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

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

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

Sporad 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 | Recipients of hormone derived from human pituitary glands, for example, growth hormone, gonadotrophin. (In New Zealand, the human pituitary hormone programme ceased in 1985.) Individuals who have received a graft of dura mater. (In October 1988 the New Zealand Department of Health, now Ministry of Health, recommended that commercially produced dura mater not be used.) Cases who have been contacted as potentially at risk, including individuals considered to be:
- 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
- at risk of vCJD due to receipt of blood components or plasma derivatives
- at risk of CJD/vCJD due to receipt of tissues/organs
- 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. |

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
Cryptosporidiosis

Epidemiology in New Zealand

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

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

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

Laboratory test for diagnosis

Laboratory confirmation requires detection of C. parvum oocysts in a faecal specimen.

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 – that is, is part of a common-source outbreak.
- **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

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, 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 a diapered or incontinent child, 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 for 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 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.

Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved.

Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

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

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*. 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

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 confirmation requires** microscopic identification of excised cysticerci (or from tissue biopsies).

Antibodies to *T. solium* in serum or cerebrospinal fluid can also be identified. Newer ELISA tests may be available and are two to three times as sensitive, with a sensitivity of 95 percent and specificity of 99 percent. Serology has low sensitivity when cysts are not multiple and negative serology should not exclude the diagnosis. Use should be discussed with ESR on a case-by-case basis.

Radiological investigations (plain X-rays, CT, MRI) are considered superior to antibody testing.

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 that is not laboratory confirmed but has distinctive radiological features and occurs in a person who has lived in 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**

**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). *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. 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
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. Contacts also include people potentially exposed to eggs via faecal-oral contamination.

Investigation
Advise contacts to visit their general practitioner to arrange laboratory testing, including testing for the adult worm (for example, stool testing for eggs and parasites). The laboratory needs to be informed of the history of overseas travel or other risks. 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 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.

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 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 a potential animal source can be undertaken.

**References and further information**

Diphtheria

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 (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 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.

**Reporting**

Ensure complete case information is entered into EpiSurv.

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7 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.
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**


**Enterobacter sakazakii invasive disease**

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

**Epidemiology in New Zealand**

*Enterobacter sakazakii* 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 *E. sakazakii* invasive disease notifiable is disease in premature infants, including meningitis, necrotising enterocolitis and sepsis, often resulting in death, as a consequence of low-level *E. sakazakii* contamination in powdered infant formula. In August 2004 all neonatal units were advised to cease using powdered infant formula, to be replaced by the prepared ‘ready-to-feed’ (RTF) infant formula that is recommended by the Ministry of Health and the New Zealand Food Safety Authority (now Ministry for Primary Industries).


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

**Case definition**

**Clinical description**

Severe illness, usually in neonates, 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.
Laboratory test for diagnosis

Laboratory confirmation requires isolation of *E. sakazakii* (*Cronobacter* spp.) from a normally sterile site, for example, cerebrospinal fluid, urine.

All invasive isolates of *E. sakazakii* of 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 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

Not yet determined. Symptoms normally appear a few days after birth.

Mode of transmission

*E. sakazakii* 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.
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 *E. sakazakii*. Molecular subtyping should be used to determine the association between isolates from cases and any foodstuffs that test positive for *E. sakazakii*. All invasive isolates of *E. sakazakii* of should be referred to the Enteric Reference Laboratory at ESR for confirmation.

Investigate the source of contamination of any foods found to test positive for *E. sakazakii*. Recall contaminated foodstuffs if necessary. Notify the Ministry for Primary Industries.

Restriction

Nil.

Treatment

Neonatal high-dependency unit as determined by the attending paediatrician.

Counselling

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

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 to cease using powdered infant formula, which is to be replaced by the prepared RTF infant formula that is recommended by the Ministry of Health and the Ministry for Primary Industries.

Identification of source

Liaise with the Ministry for Primary Industries.

Disinfection

Nil.

Health education

The Ministry for Primary Industries makes the following recommendations for all newborn babies.

- ‘Breast is best.’ Breast milk contains all the nutrition newborn babies need and breastfeeding benefits both the mother and the baby.

- But if infant formula is the only option then for full-term (37–42 weeks) and healthy newborns:
  - powdered infant formula is not sterile, which means it may contain bacteria; however, these bacteria almost never cause illness as long as the milk is prepared and stored properly
  - healthy term babies have an extremely low risk of infection by _E. sakazakii_ from powdered infant formula
  - if you are not breastfeeding, the next best alternative is dairy-based powdered infant formula
  - it is now recommended that, when preparing dairy-based powdered infant formula, you only prepare the amount you need for your baby’s next feed and that you prepare it as close as possible to feeding time.

The Ministry for Primary Industries makes the following recommendations for premature, low birthweight and sick babies (admitted to neonatal units).

- Breast milk is best for these babies too, but some may need formula or milk powder added to their expressed breast milk.

- If not breastfed, these babies should be fed ready-made liquid formula instead of powdered milk formula. Ready-made 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.

See also: [http://www.foodsmart.govt.nz/elibrary/infant-formula-sakazakii.htm](http://www.foodsmart.govt.nz/elibrary/infant-formula-sakazakii.htm)
**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.
Giardiasis

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.

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

Laboratory test for diagnosis
Laboratory confirmation requires at least one of the following:
- detection of giardia cysts or trophozoites in a specimen from the human intestinal tract
- detection of giardia antigen in faeces.

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 — that is, is part of a common-source outbreak.
- 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
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 a child who 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 for 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.

Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

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**

Haemophilus influenzae type b invasive disease (Hib)

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. ceftrioxone (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

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.

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

Case definition

Clinical description

Following a prodrome of fever, malaise, anorexia, nausea or abdominal discomfort, there is jaundice, elevated serum aminotransferase levels and sometimes an enlarged tender liver. 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 confirmation requires positive hepatitis A-specific IgM in serum (in the absence of recent vaccination).

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 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

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 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.

**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.

**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.
Treatment
Supportive. The disease is often asymptomatic in children but is fulminant in about 1 percent of adult cases.

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:
   a. all household and sexual contacts
   b. 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. 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 vaccine 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.

Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

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

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 1: Management of contacts of hepatitis B cases – summary

<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 6 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

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 includes cases where there has been documented seroconversion within a 12-month period, even in the absence of clinical illness. 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:**
  - documented seroconversion to HCV when the most recent negative specimen was within the last 12 months, or

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8 Also sometimes referred to as ‘incident’ cases.
9 Ministry of Health correspondence DS 20 07 0, 3 December 1999.
- 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

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.

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 confirmation requires:
• negative tests for hepatitis A and C; and
• a positive anti-HDV, positive anti-HEV or 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 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

- 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 by serology has been attempted.

#### Restriction

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

#### Treatment

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 only 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.

Liaise with the environmental health officer of the local territorial authority if food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

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

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
  - 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**
The health sector response to the New Zealand emergence of any cases of HPAI is guided by the New Zealand Influenza Pandemic Action Plan (Ministry of Health 2010):

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**

Hydatid disease

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

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 confirmation requires at least one of the following:

- identification of live *E. granulosus* in cyst fluid or, rarely, sputum
- positive serological tests for *E. granulosus*.

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable:** Radiological or other organ imaging evidence of characteristic cystic disease with positive serological tests.
- **Confirmed:** Histopathological or other demonstration of live *E. granulosus* cysts.
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.
Spread of infection

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.

Treatment
The case should be under the care of an infectious diseases physician. Albendazole is given, together with, in some cases, surgical resection or percutaneous aspiration-injection-re-aspiration.

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

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 asymptptomatically 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.\(^\text{10}\) \(^\text{11}\)

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.

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\(^{10}\) Occasionally, antigen test results are positive when culture results are negative.

\(^{11}\) Isolation of pneumococcus is preferred as this allows for serological identification and so informs the vaccination programme.
**Reporting**

Ensure complete case information is entered into EpiSurv.

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

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 (e.g. 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 ≥ 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 ≥ 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
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

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

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.

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 confirmation 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 $\geq 400$ in the MAT.
It is recommended that both nucleic acid testing (NAT) and MAT testing be undertaken to improve diagnostic accuracy.

**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 diagnostic test because of cross-reactivity with other diseases.

Acute and convalescent samples need to be tested in parallel by MAT. A four-fold or greater rise in titre or a demonstrated seroconversion is indicative of current or very recent infection. There should be a minimum of 2 weeks between sampling for acute and convalescent sera.

ESR-NCBID is the national reference laboratory for MAT testing.

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

NAT has the highest sensitivity of all available diagnostic tests and can be used for diagnosis in the acute septicaemic phase of the disease before an antibody response is mounted. The timing of the appropriate specimen is essential for a correct diagnosis. 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 a single raised agglutination titre by MAT of < 400 (that is, less than the level required for a confirmed diagnosis).
- **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**

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 the local branch of the Department of Labour under the Notifiable Occupational Disease System (NODS), 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 (formerly the Ministry of Agriculture and Forestry) under the Biosecurity Act 1993. The Ministry for Primary Industries can assist with the investigation of animal sources.

**Restriction**

Nil.

**Treatment**

In consultation with the primary care or secondary care service.

**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 the local branch of the Department of Labour under NODS, for occupational investigation. See ‘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).

Disinfection
Articles soiled with urine should be cleaned and disinfected.

Health education
Educate the public to avoid swimming or wading in potentially contaminated waters supplies.

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

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.

Further information on foodborne illness is available at www.foodsafety.govt.nz and 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 confirmation requires isolation of Listeria monocytogenes from a normally sterile site, including the fetal gastrointestinal tract.

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.

Cases can be further classified, if appropriate, as follows:

- **Perinatal case**: A case occurring in an infant from 7 days before birth until 7 days after birth.
Spread of infection

Incubation period
Variable. Outbreak cases have occurred 3–70 days following an exposure to a contaminated food product. Median incubation period is estimated to be 3 weeks.

Mode of transmission
*L. monocytogenes* can survive at normal refrigeration temperatures and ingestion of contaminated foods such as unpasteurised milk or cheese, contaminated vegetables or meat products such as pâté, or shellfish have been the 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*. 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
If a contaminated commercial food source is suspected or identified, liaise with the Ministry for Primary Industries. Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved.

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.

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.

The Ministry for Primary Industries should be involved where a commercial food
source is suspected. Liaise with the environmental health officer of the local territorial
authority where food premises are thought to be involved.
Malaria

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

Epidemiology in New Zealand

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). The use of laboratory tests may change in an established outbreak. 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.

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. 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 virus can persist in the environment for up to 2 hours.

**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 2 hours after it has been vacated by the case must be treated as a contact.

Susceptible contact

- Anyone born from 1 January 1969\textsuperscript{12} 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.

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 \textit{Immunisation Handbook 2011}. 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.

\textsuperscript{12} Measles vaccine was introduced into New Zealand in 1969.
**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 last exposure to the infectious case. The medical officer of health should consider whether it is necessary to use exclusion provisions in the Health (Infectious and Notifiable Diseases) Regulations 1966, and 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).

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 2 hours 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

Epidemiology in New Zealand

Primary meningo-encephalitis 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)

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.
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?ua=1

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)\(^{13}\) and either:

- has a history of residence in, or travel to, the Arabian Peninsula\(^{14}\) 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\(^ {15}\) 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
- 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.

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\(^{13}\) Immune-compromised patients may not present with typical or severe symptoms.

\(^{14}\) 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.

\(^{15}\) 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 ill person.
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: www.who.int/csr/disease/coronavirus_infections/MERS_CoV_investigation_guideline_Jul13.pdf

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?ua=1

**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.\(^\text{16}\)

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 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.

\(^{16}\) Please refer also to guidance from the US Centers for Disease Control and Prevention at: www.cdc.gov/coronavirus/ncv/case-def.html#infection
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.\(^7\)

Prophylaxis
Nil.

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.

\(^7\) Refer to the WHO website at:
www.who.int/csr/disease/coronavirus_infections/MERS_home_care.pdf
**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.
Mumps

Epidemiology in New Zealand

The incidence of mumps in New Zealand has been stable in recent years. The last mumps epidemics in New Zealand occurred in 1989 and 1994. Before the introduction of the measles–mumps–rubella (MMR) vaccine in 1990, mumps epidemics occurred every 3–5 years.

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 acute onset of fever and unilateral or bilateral tenderness and swelling of the parotid or other salivary gland/s, lasting more than 2 days, and without other apparent cause.

Laboratory tests for diagnosis

If the case received a vaccine containing the mumps 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.\(^\text{18}\)

If the case did not receive a vaccine containing the mumps 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 mumps virus by culture
- detection of mumps virus nucleic acid.

Consult a reference laboratory if testing is unavailable locally.

\(^\text{18}\) In New Zealand, genetic characterisation is generally only performed for measles virus.
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**
From 7 days before the onset of parotitis until 9 days after the onset of illness. However, the level of infectivity significantly drops off from day 4 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**
Ascertain whether there is a history of vaccination and travel and identify any possible contacts, including travellers from overseas.

Ensure laboratory confirmation by serology or viral detection in saliva, cerebrospinal fluid or urine has been attempted.

**Restriction**
In a health care facility, take droplet precautions for 5 days after the onset of glandular swelling.
Exclude cases from school, early childhood services or health care work and from close contact with other susceptible people for 5 days from onset of glandular swelling.

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

**Management of contacts**

**Definition**
Any person with close contact (for example, through household, early childhood service, school, workplace, camp, 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.\(^{19}\)

**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 impractical and unnecessary.

**Restriction**
Consider advising exclusion of susceptible contacts from school, early childhood services or work for 25 days after last exposure to the infectious case, if there are other susceptible people present.

Immunised contacts are not excluded.

**Prophylaxis**
Passive immunisation is not effective. Active immunisation with MMR vaccine is not considered effective against incubating infection, but a single dose of MMR should be offered to susceptible contacts for protection against future exposure.

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

\(^{19}\) Mumps vaccine was first offered in the 1992 schedule as MMR at 15 months and 11 years.
Other control measures

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 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.

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.
Neisseria meningitidis invasive disease

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 septicaemia 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:
Neisseria meningitidis invasive disease (septicaemia and meningitis) – May 2012

- 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 2011), 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 2011).

**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
Neisseria meningitidis invasive disease (septicaemia and meningitis) – May 2012

- 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 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.

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, due to possible adverse events related to joints and surrounding tissues. It may be useful in children when no other acceptable alternative therapy is available (Ministry of Health 2011) and it has now been recommended in all age groups (and pregnant women) in the UK guidelines (Health Protection Agency 2011).

**Immunisation**

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 is the preferred type of vaccine for contacts of meningococcal C disease (conjugate vaccine is currently only available for group C in New Zealand), or if the contact is younger than 2 years old. Conjugate vaccine has been shown to reduce nasopharyngeal carriage.

Polysaccharide quadrivalent vaccine is available against group A, C, W135 or Y disease, and can be given to contacts who are more than 2 years old.

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20 Both 500 mg and 750 mg tablets are available, and evidence does not clearly favour either dose.
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.

**Revaccination**

Information on revaccination is limited, but it may be appropriate for individuals with ongoing higher risk. See the *Immunisation Handbook* (Ministry of Health 2011) 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 2011) 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

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

Epidemiology in New Zealand

New Zealand has continued to experience outbreaks of pertussis in recent decades. This is in part due to historically low immunisation rates and in part 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.

Case definition

Clinical description

A disease characterised by a cough lasting longer than 2 weeks and including one or more of:

- paroxysms of cough
- cough ending in vomiting or apnoea
- inspiratory whoop.

Laboratory test for diagnosis

Laboratory confirmation requires isolation of *Bordetella pertussis* or detection of *B. pertussis* nucleic acid, preferably from a nasopharyngeal swab.

Discuss appropriate specimens with the testing laboratory or ESR.

While serology is sometimes used it is not a confirmatory test.

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 with a high *B. pertussis* IgA test or a significant increase in antibody levels between paired sera at the same laboratory21

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21 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.
OR a cough lasting longer than 2 weeks and with one or more of the following, for which there is no other known cause:

- paroxysmal cough
- cough ending in vomiting or apnoea
- inspiratory whoop.

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

#### Period of communicability

Highly communicable in the catarrhal stage before the paroxysmal cough stage.

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 (for example, erythromycin), infectivity lasts until 5 days of antibiotics have been taken.

### 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

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 service, other institutions or work until they have received at least 5 days of a 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.

Treatment
Antimicrobial treatment does not alter the clinical course of the illness unless administered during the catarrhal stage or the early paroxysmal stage (usually the first 2 weeks) but may reduce infectivity.

Recommended antibiotics include erythromycin, azithromycin, clarithromycin and co-trimoxazole. Oral erythromycin should be used with caution in infants less than 2 weeks of age due to the risk of pyloric stenosis. Azithromycin is the preferred drug for infants less than 1 month old. There is no clinical evidence to support the effectiveness of roxithromycin for pertussis.

The standard length of treatment with erythromycin is 14 days. Most other antibiotics for pertussis are a 7 day course.

Infants must be kept under close observation while on treatment with any of these drugs.

See the Immunisation Handbook (Ministry of Health 2011) and medicine data sheets for more details, including use of antibiotics during pregnancy, or consult an infectious diseases physician or obstetrician.

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

Management of contacts
Identify contacts for restriction, immunisation and chemoprophylaxis as appropriate.

Definition
A contact can be defined as someone who has been in close proximity (within 1 metre) 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.

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22 There is evidence that for the Erythromycin estolate formulation (which has superior tissue and serum concentrations compared with the other salts), 7 days of treatment is as effective as 14 days. However Erythromycin estolate is not currently available in New Zealand.
However, 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:

- 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 healthcare and education settings
- pregnant women (particularly in the last month of pregnancy)
- individuals that are at high risk of severe illness or complications (for example 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 or recent boosters
- 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 contact has been terminated.

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.

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.

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23 The Immunisation Handbook 2011 currently recommends boosters (not funded) at 10-yearly intervals for certain groups (p142). 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). CDC advice also notes that “shorter intervals between Tdap and last Td may increase the risk of mild local reactogenicity but may be appropriate if your patient is at high risk for contracting pertussis, such as during an outbreak, or has close contact with infants” (CDC pertussis webpages).
For example healthcare workers who work with children under 12 months old (such as paediatric and maternity wards).

The Medical Officer of Health should also consider whether it is necessary to use exclusion provisions in the Health (Infectious and Notifiable Disease) Regulations 1966, and from early childhood centres using the Education (Early Childhood Centres) Regulations 1998.

**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.

See the *Immunisation Handbook* (Ministry of Health 2011) and medicine data sheets for more details, including use of antibiotics during pregnancy, or consult an infectious diseases physician or obstetrician.

**Immunisation**

Unless current immunity is likely, high priority contacts should be offered a dose of a pertussis containing vaccine\(^24\) (note that only doses on the national schedule are funded, including the 11 year old booster).

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.

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\(^24\) As noted in the Immunisation Handbook 2011 (p24), pertussis vaccination as Tdap (recommended but not funded), can be offered in pregnancy or post-partum to reduce the risk of a mother infecting her baby. This is particularly recommended when there are high rates of circulating pertussis in the community. In pregnancy, this is best given after 20 weeks gestation. It is likely to result in increased immunity in the newborn infant, as well as in the mother. (also see Updated Recommendations from the Advisory Committee on Immunization Practices (ACIP). MMWR Morbidity and Mortality Weekly Report. Vol. 60, No. 41, October 21, 2011).
Health education
Encourage on-time immunisation, particularly for infants at 6 weeks, 3 months and 5 months.
Promote behaviours that protect infants, such as people with a cough keeping their distance from babies.

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

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
Advis[e 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

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.\(^{26}\)

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.

**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:

• 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)

• cerebrospinal fluid

• a nasopharyngeal swab or throat swab

• EDTA blood

• Serum.

Contact ESR for specific advice on specimens required and on packing and transporting the specimens.

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

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.27
- **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.

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.

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27 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 http://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.
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 http://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 (https://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 (e.g., fever, malaise, headache, nausea, or vomiting) or an influenza-like illness, the medical practitioner is advised to:
• test the contact for poliovirus (see ‘Laboratory testing 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 bleach\(^{28}\) (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.

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

\(^{28}\) Use household bleach (sodium hypochlorite) with a concentration of at least 5% hypochlorous acid/sodium hypochlorite.
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:

- no history of polio vaccination
- an uncertain history of polio vaccination
- 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

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.29

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).

These tests may not be available in New Zealand.

29 Unless otherwise specified, the term ‘rabies’ in this chapter can be read as ‘rabies and other lyssaviruses’.

30 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.
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 asymptptomatically.

**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.31

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.

31 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

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>Manifestation</td>
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<tr>
<td>---------------</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>
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<tr>
<td>Minor manifestations</td>
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<tr>
<td></td>
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<tr>
<td></td>
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<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, eg, septic arthritis (including disseminated gonococcal infection), infective or reactive arthritis and autoimmune arthropathy (eg, 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>Or</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 infection 1</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>Or</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 EpiSurv.

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

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.32

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 on the organism involved, but continuing fever, cough and signs of bronchitis or

32 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.
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

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.\(^{33}\)

**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.

\(^{33}\) 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

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.\(^{34}\)

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
- 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

\(^{34}\) In New Zealand, genetic characterisation is generally only performed for measles virus.
• 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**
Advising 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

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

Epidemiology in New Zealand

Note: There are separate chapters for typhoid and paratyphoid fevers.

Salmonellosis is a common foodborne and water disease in New Zealand, 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

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

Laboratory test for diagnosis

Laboratory confirmation requires isolation of *Salmonella* species from a clinical specimen.

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 – that is, is part of a common-source outbreak.

- **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

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 occurs, often 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.

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 a diapered or incontinent child, 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
Household contacts who are food handlers should supply one negative stool.

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.

Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

**References and further information**

Severe acute respiratory syndrome (SARS)

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

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.

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

Further information on foodborne illness is available at www.foodsafety.govt.nz and 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 confirmation requires isolation of any *Shigella* spp. from a stool sample or rectal swab and confirmation of genus.

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 – that is, is part of a common-source outbreak.

- **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
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 $10^1$ to $10^2$ 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, including a food history and 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.

Restriction
Nil, unless symptomatic.

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.

Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

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

Taeniasis

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

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 *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

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
Ascertain 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

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.\(^{35}\) 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).

\(^{35}\) 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

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.

Further information on foodborne illness is available at www.foodsafety.govt.nz and 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). Less commonly, there may be rose spots on the trunk (30 percent of Caucasians), abdominal pain (20–40 percent), constipation (38 percent), diarrhoea (10 percent) 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.

Laboratory test for diagnosis

Laboratory confirmation requires isolation of *Salmonella typhi* or *Salmonella paratyphi* from a clinical specimen.

All isolates should be referred to 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 – that is, is part of a common-source outbreak.
• **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
- **Typhoid fever**: From 3 days to over 60 days (usual range 8–14 days).
- **Paratyphoid fever**: 1–10 days.

### Mode of transmission
Ingestion of food and water contaminated by faeces and urine of patients or carriers. In New Zealand, food vehicles have included shellfish taken from sewage-contaminated beds. In other countries, shellfish, raw fruits and vegetables, contaminated milk and milk products have been vehicles. 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 a diapered or incontinent child, apply contact precautions for the duration of illness.

Exclude chronic carriers from work if in a high-risk occupational group.

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 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
All close contacts require one negative faecal specimen.

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.

Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

**References and further information**

Verotoxin- or Shiga toxin-producing *Escherichia coli* (VTEC/STEC)

**Epidemiology in New Zealand**

Since the first New Zealand case was detected in 1993, the incidence of verotoxin- or Shiga toxin-producing *Escherichia coli* (VTEC/STEC) has gradually increased.

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

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

**Case definition**

**Clinical description**

Diarrhoea resulting from infection with VTEC/STEC may range from mild, watery and non-bloody to almost pure bloody diarrhoea with abdominal cramping. The disease is distinguishable from other causes of gastroenteritis by its high incidence of bloody diarrhoea (profuse rectal bleeding without fever sometimes clouds the diagnosis), severity (approximately 40 percent of cases are hospitalised) and frequency of complications.

Haemolytic uraemic syndrome (HUS) complicates 8–10 percent of VTEC/STEC infections in children; this syndrome includes haemolytic anaemia, thrombocytopenia and acute renal failure. Of children with HUS, 12–30 percent will have severe sequelae, including renal and cerebral impairment. Elderly patients with VTEC infections may suffer thrombotic thrombocytopenic purpura (TTP), which is similar to HUS but with greater neurological involvement.

**Laboratory tests for diagnosis**

**Laboratory confirmation requires** evidence of Shiga toxin, which comprises either:

- isolation of Shiga toxin-producing (verotoxin) *Escherichia coli*, OR
- detection of the genes associated with the production of Shiga toxin in *E. coli*.

All isolates should be referred to the Enteric Reference Laboratory at ESR for further characterisation.
Isolates producing Shiga toxin 2 (Stx2) are more likely to cause serious human disease than isolates producing Shiga toxin 1 (Stx1) or both toxins together. Any positive toxin test should be reported as a confirmed case of VTEC/STEC.

Note: The eae and enterohaemolysin (hlyA) genes are accessory virulence factors strongly associated with enterohaemorrhagic E. coli (EHEC); however, finding these genes 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**: 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: Asymptomatic people with positive laboratory results should be recorded under this category.)

**Spread of infection**

**Incubation period**

2–10 days; median 2–3 days.

**Mode of transmission**

In the majority of cases, by ingestion of food contaminated by ruminant faeces; outbreaks have been linked to contaminated hamburger and other meat products, unpasteurised milk, and produce (including melons, lettuce, 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 up to 3 weeks in children.

**Notification procedure**

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

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

Investigation
In consultation with the attending medical practitioner, obtain a history of ingestion of meat products, exposure to recreational water or untreated water, contact with ruminant animals or their faeces, possible human contacts and travel. Ensure laboratory confirmation by stool culture or rectal swab has been attempted. Inform the laboratory that VTEC 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. 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 (for example, household) contact with a case during the period of communicability or who have been exposed to the same contaminated food, water or other source in a common-source outbreak.

Investigation
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 VTEC/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 (for example, ground beef consumption).

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
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.

Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

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

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>
<tr>
<td>Marburg, Ebola</td>
<td>Africa</td>
<td>Unknown</td>
<td>Infected non-human primates sometimes provide link to humans. Outbreaks have included hundreds of cases.</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 VHF{s}.
### Table 2: 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>Crimea-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). Needlestick 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:

- **Crimea-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>
<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 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 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

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

Epidemiology in New Zealand

The vast majority of cases of yersiniosis in New Zealand are caused by *Yersinia enterocolitica* biotype 4 (commonly found in pigs in New Zealand). *Y. enterocolitica* biotype 3 (commonly found in cattle in New Zealand) and *Y. pseudotuberculosis* account for most of the remaining cases.

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

Further information on foodborne illness is available at [www.foodsafety.govt.nz](http://www.foodsafety.govt.nz) and [www.mpi.govt.nz](http://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 confirmation requires** at least one of the following:

- isolation of *Yersinia enterocolitica* or *Y. pseudotuberculosis* from blood or faeces
- detection of circulating antigen by ELISA or agglutination test.

All isolates should be sent 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 epidemiologically linked to a confirmed case or has had contact with the same common source – that is, is part of a common-source outbreak.
• **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 3–7 days, generally under 10 days.

#### 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 28–29°C, *Y. enterocolitica* also grows well in a refrigerator (4°C) and survives freezing.

Yersiniosis is also associated in New Zealand 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. paratuberculosis* is not transmitted through contaminated food. It is found in deer in New Zealand.

#### 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 a diapered or incontinent child, 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.

Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved.

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

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 appropriate for contamination with multiply 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 should be used during environmental disinfection.

Procedures

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

**Solid surfaces and/or equipment (including children’s toys):** Before disinfection, solid surfaces and/or equipment should be cleaned with detergent and water and then dried. The appropriate disinfection processes and methods depend on the particular item and its use(s), and include:

1. heat: boiling at 100°C for 20 minutes
2. sodium hypochlorite solution: a 5.25 percent sodium hypochlorite household bleach can be used as directed by the manufacturer. Note: This will corrode metal
3. 70–90 percent ethanol or propanol
4. processing laundry using a hot wash and/or hot drying cycle and/or ironing items.

Appendix 2: Enteric disease

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 extent of their investigation on the 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 an appropriate specimen 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.

Note that although sometimes ‘enteric’ and ‘food and waterborne’ illness are used interchangeably, not all enteric diseases are primarily caused by food or water. Conversely, some diseases that can be transmitted by food or water are not necessarily 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 commonly used.

Food- and waterborne illnesses are listed in Section A of the list of notifiable diseases. They are therefore notifiable by the attending medical practitioner to a medical officer of health and the local territorial authority.

Roles and responsibilities

Liaison with the Ministry of Primary Industries (MPI) is indicated when particular food products are suspected of being the cause of disease. MPI is the New Zealand controlling authority for food safety, including domestic food and imports and exports of food and food-related products. MPI protects consumers from risks (including nutrition and public health risks) that may arise in connection with the consumption of food.

Where food premises are thought to be involved in foodborne illness, the environmental health officer of the local territorial authority should be contacted. Food premises can be licensed by the local territorial authority under the Food Hygiene Regulations, or they can be regulated by MPI if a food safety plan has been adopted.

Table 2.1 summarises responsibilities of public health units when investigating an outbreak of foodborne illness.
Table 2.1: Responsibilities of public health units when investigating an outbreak of a foodborne illness

<table>
<thead>
<tr>
<th>MPI-contracted areas under foodborne illness (Note: MOUs apply in the Auckland and Canterbury regions) (Action taken under the Food Act 1981)</th>
<th>Ministry of Health-contracted areas from public health units under notification of foodborne illness (Action taken under Health Act 1956)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducting a surveillance of risk factors relating to foods or premises</td>
<td>Recording notifications of foodborne illness (in EpiSurv)</td>
</tr>
<tr>
<td>Investigating foodborne illness outbreaks or notifications at the food premises; assessing protocols in place at food premises around high-risk foods, hand hygiene, sickness policy, etc</td>
<td>Conducting a surveillance of cases, all activities including trends and distribution of illness</td>
</tr>
<tr>
<td>Promoting safe food handling to the food premises</td>
<td>Conducting epidemiological investigations</td>
</tr>
<tr>
<td>Enforcing compliance resulting from investigation at the food premises under the relevant food legislation, including: warning, seizure, closure, prosecution, exclusion of workers in contact with a person with a communicable disease, Director-General of MPI statement, Minister’s recall</td>
<td>Visiting premises to investigate illness cases or control actions</td>
</tr>
<tr>
<td>Taking food samples/exhibits at the food premises</td>
<td>Taking specimens from case or contacts</td>
</tr>
<tr>
<td>Advising consumers about food safety, eg, Director-General of MPI statement, Minister’s recall</td>
<td>Advising the public about disease and protection measures</td>
</tr>
<tr>
<td>Recording all premises-related actions as a food complaint on the appropriate MPI database</td>
<td>Tracing contacts</td>
</tr>
<tr>
<td>Reporting any outbreaks/incidents to MPI</td>
<td>Controlling infectious cases – exclusion and clearance of cases from food premises</td>
</tr>
<tr>
<td>Liaising with appointed officers under other food related legislation, eg, Animal Products Act and Wine Act and with MPI for non-regulated foods, eg, non-commercial shellfish</td>
<td>Providing recommendations or reporting to MPI</td>
</tr>
</tbody>
</table>

---

36 For Auckland Regional Public Health Service, and Community and Public Health.
## Incubation periods

Common incubation periods for enteric disease are summarised in Table 2.2.

<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>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 paratyphi</em></td>
<td>1–10 days</td>
</tr>
<tr>
<td><em>Salmonella typhi</em></td>
<td>1–3 weeks (3 days – 3 months)</td>
</tr>
<tr>
<td><em>Shigella</em></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>Yersinia</em> (not <em>Y. pestis</em>)</td>
<td>3–7 days (&gt; 10 days)</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>
</tbody>
</table>
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 and clearance criteria for people at high risk of transmitting an infection to others

Criteria for excluding (restricting) people from work, school or an early childhood service, and for subsequent clearance are summarised in Table 2.4 for the following groups:

1. food or product handlers (including visitors or contractors who could potentially affect food safety)
2. staff of health care or early childhood facilities
3. children under the age of 5 attending early childhood services
4. other adults or children at higher risk due to illness or disability.

Each reported case in these groups needs to be assessed as to their current and ongoing risk of transmission to others. While Table 2.4 below is based on standard criteria at the time of writing, public health assessment and action should be based on the most up-to-date evidence and best practice. Therefore, there may be instances where the criteria are varied on a case-by-case basis according to the professional judgement of the local medical officer of health.

The medical officer of health should also consider whether it is necessary to use exclusion provisions in the Health (Infectious and Notifiable Diseases) Regulations 1966, and from early childhood centres using the Education (Early Childhood Centres) Regulations 1998. 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 under the Health and Safety in Employment Act 1992.

Table 2.4: Exclusion and clearance criteria

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Risk group of case</th>
<th>Close contacts (usually household)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campylobacter</td>
<td>1, 2, 3, 4</td>
<td>Not required</td>
</tr>
<tr>
<td></td>
<td>Exclude until symptom free for 48 hours</td>
<td></td>
</tr>
<tr>
<td>Cryptosporidium</td>
<td>1, 2, 3, 4</td>
<td>Not required</td>
</tr>
<tr>
<td></td>
<td>Exclude until symptom free for 48 hours</td>
<td></td>
</tr>
<tr>
<td>Giardia</td>
<td>1, 2, 3, 4</td>
<td>Not required</td>
</tr>
<tr>
<td></td>
<td>Exclude until symptom free for 48 hours</td>
<td></td>
</tr>
<tr>
<td>Yersinia</td>
<td>1, 2, 3, 4</td>
<td>Not required</td>
</tr>
<tr>
<td></td>
<td>Exclude until symptom free for 48 hours</td>
<td></td>
</tr>
<tr>
<td>Norovirus and rotavirus</td>
<td>1, 2, 3, 4</td>
<td>Not required</td>
</tr>
<tr>
<td></td>
<td>Exclude until symptom free for 48 hours</td>
<td></td>
</tr>
<tr>
<td>Salmonella</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Exclude until symptom free for 48 hours and two</td>
<td>Exclude until one negative faecal specimen has been</td>
</tr>
<tr>
<td></td>
<td>consective negative stools have been provided at</td>
<td>provided</td>
</tr>
<tr>
<td></td>
<td>least 48 hours apart</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2, 3, 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exclude until symptom free for 48 hours</td>
<td></td>
</tr>
</tbody>
</table>
### References and further information


<table>
<thead>
<tr>
<th>Disease</th>
<th>Instructions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shigella</strong></td>
<td>1, 2, 3, 4 Exclude until symptom free for 48 hours and two consecutive negative stools have been provided at least 48 hours apart</td>
<td>1, 2, 3, 4 Exclude until one negative faecal specimen has been provided</td>
</tr>
<tr>
<td><strong>Typhi and paratyphi</strong></td>
<td>1, 2, 3, 4 and school children* Exclude until symptom free for 48 hours and two consecutive negative stools have been provided at least 48 hours apart after completing treatment with effective antibiotics. If not treated with effective antibiotics, no earlier than 1 month after onset of symptoms. *Schoolchildren: Until clearance criteria are satisfied or as discussed with the medical officer of health.</td>
<td>1, 2, 3, 4 and all household, close and travel contacts required to provide one negative faecal sample</td>
</tr>
<tr>
<td><strong>VTEC/STEC</strong></td>
<td>1, 2, 3, 4 Exclude until symptom free for 48 hours and two consecutive negative stools have been provided at least 48 hours apart</td>
<td>1, 2, 3, 4 Exclude until one negative faecal specimen has been provided</td>
</tr>
</tbody>
</table>
Appendix 3: Patient information

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) administers 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 controlling authority for imports and exports of food and food-related products.

MPI contact information:
www.mpi.govt.nz/about-mpi/contact-us
www.foodsafety.govt.nz/contact-us

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

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

- Avoid working with food when you have a boil, abscess or other purulent lesion on your hands, face or nose.
- Clean your hands carefully after defecation or changing nappies and before preparing food.
- Wash raw vegetables and fruits thoroughly before juicing them or eating them fresh.
- Cook animal meat (for example, beef, pork or poultry) thoroughly before eating.
- Cook eggs and egg products properly. Avoid eating raw, incompletely cooked eggs or using dirty or cracked eggs.
- Keep hot food hot between cooking and eating it.
- Wash hands, utensils and chopping boards in hot, soapy water after handling uncooked food.
• Keep raw meat, poultry and fish separate from and below other foodstuffs so that dripping does not contaminate ready-to-eat foods.
• Cover all stored food.
• Place uneaten, cooked food in the refrigerator within 1 hour of cooking.
• Defrost food by placing it on the lower shelves of a refrigerator or using a microwave oven, rather than defrosting it 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.

**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**
  

  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**
  

  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.