

Foodborne Illness Outbreak

Last updated: 1 July 2012

Public health priority:

High

PHU response time:

Respond to 2 or more probable cases

Respond on the day of notification

Complete summary form within 1 month of completion of the investigation

Case management:

Investigate cause of outbreak, in collaboration with NSW Food Authority (NSW FA)

Depending on the likely cause, advise cases who are food handlers or who care for children, the elderly or patients to stay away from such work until at least 48 hours after symptoms cease

Contact management:

Where feasible advise others at risk about symptoms and preventive actions

1. Reason for surveillance

- To identify the source of the outbreak and so control it and prevent further cases
- To monitor the epidemiology and so inform the development of better prevention strategies.

2. Case definition

Case definitions in an outbreak setting are usually determined by epidemiologists investigating the outbreak. As a guide, a foodborne disease outbreak may be defined as a situation where 2 or more people who are linked in time or place report acute onset of enteric or other symptoms caused by ingestion of infectious agents or toxins that may have been acquired by consuming contaminated food or drink.

3. Notification criteria and procedure

Foodborne illness in two or more related cases is to be notified to PHUs by telephone within 24 hours of diagnosis by:

- Hospital CEOs (or delegates) (ideal reporting by telephone)
- Medical practitioners (ideal reporting by telephone).
- The NSW FA through their consumer complaints line frequently receives food complaints from members of the public. The NSW FA will refer these complaints to the public health unit for further investigation if the ill people do not reside in the same house.
- Through routine disease surveillance

4. The disease

The agent

Many enteric pathogens such as viruses, bacteria and parasites, as well as toxins produced by bacteria (e.g. *Staphylococcus aureus*), can cause outbreaks of gastroenteritis. Foodborne illness may also be caused by other biological toxins, e.g., mushrooms, or other naturally occurring materials, e.g., cyanide.

Mode of transmission

Foodborne illness is transmitted by ingestion of contaminated food or drink (by definition). Secondary cases can occur through close contact with infected persons via the faecal oral route.

Timeline

Many different diseases with different symptoms can result from eating contaminated food. Incubation periods and clinical features of some agents of foodborne illness are presented in the table below.

Depending on the aetiology, symptoms usually last between a few hours and many days, and cases may be infectious while symptoms of diarrhoea or vomiting are present, and for at least 48 hours after symptoms cease.

Clinical manifestations

Agent	Incubation period	Clinical Features
<i>Bacillus cereus</i> toxin	1 - 6 hours (vomiting) 6 - 24 hours (diarrhoea)	Malaise, vomiting and/or diarrhoea
<i>Campylobacter</i>	1 - 10 days	Fever, nausea, abdominal cramps and diarrhoea (sometimes bloody)
<i>Clostridium perfringens</i> toxin	6 - 24 hours	Abdominal cramps, diarrhoea and nausea
Toxigenic <i>Escherichia coli</i> (STEC/VTEC)	2 - 10 days more commonly 3 - 4 days	Diarrhoea (often bloody), abdominal cramps
Hepatitis A	2 - 7 weeks	Jaundice, fatigue, anorexia, nausea
<i>Listeria monocytogenes</i>	3 days - 6 weeks	Meningitis, sepsis, fever
Norovirus	24 - 48 hours	Fever, nausea, vomiting, abdominal cramps, diarrhoea and headache
<i>Salmonella</i>	6 – 72 hours	Headache, fever, abdominal cramps, diarrhoea and nausea
<i>Staphylococcus aureus</i> toxin	0.5 – 8 hours	Abdominal cramps, vomiting and diarrhoea
<i>Vibrio parahaemolyticus</i>	4 – 30 hours	Nausea, vomiting, abdominal cramps and diarrhoea

Symptoms vary depending on the aetiology, and may include nausea, vomiting, diarrhoea, abdominal pain, myalgia, headache, malaise and fever. Some marine toxins produce neurological symptoms.

5. Managing notifications

Response time

Investigation

On the day the notification of an outbreak is received, begin the follow-up investigation. Within one working day, notify the Communicable Diseases Branch (CDB) at enteric@doh.health.nsw.gov.au and the NSW Food Authority Foodborne Outbreak Coordinator of the nature of the outbreak. When an environmental investigation is required use the *Environmental Investigation Request Form*. ([Link to Environmental Request Form](#))

Data entry

Cases should be entered onto NCIMS if they are diagnosed with a notifiable disease or if you create an outbreak in NCIMS.

Within one month of completion of the investigation, send the completed *OzFoodNet Outbreak Summary Form* to the OzFoodNet Epidemiologist, Communicable Diseases Branch.

Response procedure

An outbreak response team should be formed once the existence of an outbreak is verified. The team should meet by teleconference at least once each working day. The team members may include the following professionals as required:

- Director of the Public Health Unit
- Public health physician/s
- Public health nurse/s or surveillance officers
- Public health laboratory staff
- Epidemiologist/s
- Environmental health officer/s (EHO)
- Communications officer
- Administration support
- NSW Food Authority and CDB if required.

The coordinator of the team will usually be the public health unit director (or delegate). When outbreaks cross more than one public health unit, the coordinator should be the public health director (or delegate) in whose jurisdiction the food was prepared or function held. Where interviews are required of cases who live outside the coordinating public health unit's area, the public health unit in which the case resides is responsible for interviewing the case, unless otherwise agreed by the directors of each public health unit. Where a statewide outbreak is identified, the coordinator will be appointed by the Director CDB.

Roles and responsibilities

Liaison between NSW Health and the NSW Food Authority during foodborne events is outlined in the *Investigation of Foodborne Illness Response Protocol-Operational Procedures Manual*.

In investigating a foodborne illness outbreak, close collaboration among investigators is essential.

The responsibility for the epidemiological investigation rests with the Public Health Unit director. This includes:

- Determining appropriate epidemiological methods for the investigation
- Interviewing cases (and non cases, if necessary)
- Advising cases on when to seek medical care
- Facilitating medical tests for cases, and obtaining the results of tests
- Advising cases on any exclusions from work
- Gathering information on exposures, including aids such as menus and lists of patrons from caterers (sometimes it may be more practical for NSW Food Authority investigators to collect this information; the PHU should negotiate with NSW Food Authority if necessary)
- Identifying a potential link to food
- Where an investigation is referred to the PHU by NSW Food Authority, providing a progress report to the NSW Food Authority Foodborne Outbreak Coordinator on the investigation within one working day of the referral using the *Environmental Investigation Request Form*. If the required response is urgent then the request should be by telephone and followed up by email.
- Reporting the results of the epidemiological investigation to CDB and NSW Food Authority Foodborne Outbreak Coordinator on the day results are known (by telephone or email) and within 1 month of completion of the investigation (in writing using the *OzFoodNet Outbreak Summary Form*)

- Alert the NSW Food Authority Foodborne Illness Investigation Unit by telephone (phone 1300 552 406) where an ongoing risk to the public has been identified and where the PHU Director believes further regulatory action is required.
- Reporting the deidentified result of an outbreak investigation to the public (when required) and determining the nature of that report after consultation with the NSW Food Authority Foodborne Outbreak Coordinator.

PHUs should not accept specimens of food samples from the public. People bearing samples should be referred directly to the NSW Food Authority.

The responsibility for the environmental food investigation rests with the NSW Food Authority. This includes:

- Assessing the safety of food handling procedures (including food handlers' hygiene and reports of illness)
- Establishing the source of specific foods, where possible
- Testing foods suspected to be a source of infection, where available
- Obtaining the results of food tests
- Investigating any food retailer or manufacturer linked to an outbreak to ensure any ongoing public health risk is minimised
- Ensuring any risk identified by these investigations are rectified
- Reporting the results of environmental food investigations to the PHU on the day of the inspection (by telephone or email) and in writing using the *Environmental Investigation Summary Report Form* once completed
- Initiate preventative action when the PHU director believes there is an ongoing risk to the public.
- Joint onsite assessment by public health and NSW Food Authority staff

Public Health and NSW Food Authority staff should conduct at least one onsite assessment together, during the course of the investigation if feasible. The joint on-site assessment should be planned and include a meeting both before and after the assessment to help ensure that all relevant critical inquiry is undertaken and all relevant information and samples are collected. Where a joint on-site assessment is not feasible during the investigation, relevant public health and NSW Food Authority staff should discuss the joint approach to the investigation to help ensure all relevant critical inquiry is undertaken and all relevant information and samples are collected.

Case management

Treatment

Treatment of individual cases is to be managed by their doctor according to diagnosis.

Investigation

The response to an outbreak of foodborne illness will vary and may be influenced by the number of cases, the aetiology, severity, extent, location (e.g., in a high-risk establishment) and further public health risk. Section 6 summarises the steps involved in an outbreak investigation.

There are three main scenarios to consider:

1. Investigation of an outbreak related to a single self-catered function with no evidence of ongoing risk to the general public

A formal investigation of these types of outbreak is generally of little value and is done at the discretion of the public health unit.

2. Investigation of other point source outbreaks

These investigations require joint involvement from public health unit and NSW Food Authority staff. The extent of the investigation will depend on the likelihood of ongoing risk to the public. Further expertise may be required from epidemiologists, microbiologists, virologists, food industry, and CDB.

- Where a commercial food establishment is linked to an outbreak, the PHU should telephone the NSW Food Authority Foodborne Outbreak Coordinator without delay for an investigation of that establishment. The PHU should provide details of the symptoms, onset dates, times that any suspected foods were eaten, and name and address of the establishment

- Where it can be established that the only event that links most cases is a common meal, then the exposure investigation can usually be limited to foods and other exposures that occurred associated with that meal
- For outbreaks of viral gastroenteritis, if it can be established that a person who handled or otherwise contaminated other cases' food had symptoms of viral gastroenteritis at the time of a common meal, then it may not be necessary to continue with a formal epidemiological investigation to identify the food vehicles.

3. Investigation of community-wide outbreaks

Community-wide outbreaks are often the most difficult to investigate. In multi-jurisdictional outbreaks central coordination is useful and regular communication vital. Cooperation is required from food, communicable diseases and laboratory experts. Frequent evaluation of the progress of the investigation through teleconference is usually required.

Education

The case or relevant caregiver should be informed about the nature of the infection and the mode of transmission. Emphasise the importance of hand washing, particularly after going to the toilet, changing nappies, before eating and preparing food.

The NSW Food Authority should provide education regarding food safety and hygiene standards in commercial settings.

Isolation and restriction

The PHU should instruct cases who are health care workers, food handlers or who care for children or the elderly not to attend work until at least 48 hours after symptoms cease.

Cases who reside in an institution should be cohorted (separated from non-infected residents) if possible. This should include separate hand washing, toilet and bathroom facilities.

Infants and children attending childcare or school should be excluded from attending for 24 hours after resolution of symptoms.

Environmental evaluation

Where a food manufacturer or retailer is a possible source of foodborne illness, contact the NSW Food Authority Foodborne Outbreak Coordinator to:

- Assess food handling procedures
- Sample foods that have been epidemiologically linked to illness
- Advise on control measures.

Where contaminated water sources are suspected, PHU environmental health officers will need to investigate and control possible risks, in liaison with the Water Unit, NSW Health.

Assessment of ongoing risk to the public

The public health unit and NSW Food Authority staff have joint responsibility for determining whether there is likely to be an ongoing risk to the public from a foodborne illness outbreak stemming from a commercial food premises, and, if so, ensuring that the risk is minimised. The risk may be minimised in a number of ways, depending on the likely cause of the outbreak. These include but are not limited to:

- removal from sale or supply of the suspected contaminated food (by seizure, destruction, or recall)
- correction of inadequate food handling procedures
- restricting a suspected infectious food handler from work/duties
- development of urgent information/fact sheets for industry contacts/other businesses.

Where an ongoing risk is suspected but the likely vehicle cannot be ascertained following a preliminary epidemiological and environmental investigation, then it may be necessary to suspend the sale of all products that are susceptible to contamination from the likely agent. The NSW Food Authority assesses the evidence in support of a prohibition order under section 60 of the Food Act 2003.

If the Food Authority believes, on reasonable grounds any premises used by a food business in connection with the handling of food intended for sale or any equipment or food transport vehicle is:

- in an unclean or insanitary condition or
- is otherwise unfit for the purpose for which it is designed or intended to be used, or
- does not comply with a provision of the Food Safety Standards with which the food business is required to comply, or
- any relevant food safety program prepared in accordance with the regulations is not being implemented adequately by a food business, or
- any provision of the Food Standards Code with which a food business is required to comply is being contravened and that the issue of a prohibition order is necessary to prevent or mitigate a serious danger to public health, then
- the Food Authority may serve a prohibition order on the proprietor of the food business.

The NSW Food Authority is responsible for ensuring a food business' compliance with orders to suspend sale of foods or cease operations. Any enforcement action that the NSW Food Authority considers appropriate will be conducted in accordance with its Compliance and Enforcement Policy. This policy outlines the enforcement tool options that can be utilised by authorised officers.

In the absence of sufficient evidence for an enforcement tool (such as a prohibition order) or where there may be a delay between the date of inspection and issue of a formal Improvement Notice, it may be necessary to provide urgent written direction or advice to a food business to cease production of a food or practice where this is suspected to have contributed to an outbreak. Examples may include advice to cease the use of a raw egg product where microbiological evidence is yet to be determined.

In the absence of the likely vehicle for transmission being identified, factors that should be considered in determining whether or not there is an ongoing risk to the public include:

1. Results of the environmental investigation identify obvious failure in food handling that could account for the outbreak, and
2. The onset of illness in cases who consumed product from the outbreak-associated premises that indicates the source is ongoing. For example, onset of illness is spread over a period of time that is greater than the likely maximum incubation period of the suspected agent. PHU staff will take into account reporting delays inherent in a patient seeking medical care and a test result becoming positive. To assess this, it may be necessary for the PHU to:
 - where a pathogen has been identified] contact labs serving the community of concern to determine whether additional cases may be occurring, and if so, interview them
 - for large outbreaks, contact the local Emergency Departments and medical practitioners to determine whether they are seeing an increase in reports of possible foodborne illness and if so organise lab tests and interview suspected cases
 - where contacts of patrons of the establishment can be reasonably ascertained from restaurant booking lists, calling a sample of patrons who ate on recent days (accounting for the likely incubation period) to determine whether they were ill.

Where the PHU director considers that there is likely to be an ongoing risk to the public based on the above and supporting epidemiological information, then the PHU director (or delegate) should communicate this to the NSW Food Authority by phone, followed by email or fax. The NSW Food Authority would normally act on the advice of the PHU director, in their lead role, to minimise any ongoing risk to the public, subject to the powers of the NSW Food Act 2003.

Contact management

Identification of contacts

Secondary cases may occur in persons exposed to the faeces or vomitus of cases.

Treatment

No specific treatment is usually recommended to contacts, except for hepatitis A (see protocol).

Education

Provide information to others at risk of illness about the condition, and actions they should take if symptoms develop.

Isolation and restriction

None.

6 Epidemiological investigation

The following are ten steps that provide a systematic approach to investigations. Note that many of these steps will be done concurrently.

1 Determine the existence of an outbreak

Determine whether the number of cases is higher than expected. Information on the background rate of illness in the group can be sought from a range of sources, e.g., surveillance data, hospital records, in patient statistics.

2 Verify the diagnosis

Try to determine likely aetiological agent based on the epidemiological features. Foodborne illness will usually require laboratory investigation to help determine the diagnosis. Alert the laboratory of the outbreak and its suspected aetiology to guide testing procedures. Ask about any specific requirements for the collection of certain specimens and the estimated time frame for results. Stool samples from as many patients as possible should be collected as early as possible after onset of illness.

Each sample should undergo standard bacterial testing and testing for viral pathogens depending on the symptom profile and epidemiology. If needed, further testing (e.g., for toxins) should be determined by the investigation coordinator in consultation with microbiological experts.

3 Define and identify cases

A case definition should be developed specifying time, person and place. Cases may be sought from a range of sources, e.g., function organisers, laboratories or hospitals.

4 Perform descriptive epidemiology

Cases (and possibly people who were not ill) will need to be interviewed about risk factors for illness. Development of the questionnaire is often a painstaking process that involves:

- A search of the literature for risk factors for the illness
- Hypothesis generating interviews with several cases, including questions about all their exposures, including food and water, and other environmental contacts (such as animals, and other ill people) in the likely incubation period
- A review of questionnaires used in similar outbreak investigations.

Develop a line-listing of cases, including:

- Case identifiers
- Age, sex, place of residence
- Other relevant demographic factors
- Whether ill, date of onset
- Symptoms
- Foods eaten, other relevant exposures.

Describe the case data in terms of time, place and person:

- Create an epicurve (number of cases by day of onset)
- Plot cases on a map (using relevant parameters, e.g., place of residence, place of work)
- Construct a table of demographic characteristics and common exposures.

5 Determine who is at risk

Identify the group of people who may have been exposed to the aetiological agent.

6 Develop hypothesis

Consider the source of the illness and the usual mode of transmission based on analysis of the data gathered on the place, time and person characteristics of the cases, and exposure histories.

7 Evaluate hypothesis

Perform an analytical study, usually a cohort or a case-control study. In a case-control study, controls must be representative of the population from which the cases arose.

8 Perform additional studies

This may include further laboratory testing of human, environmental or food isolates, special epidemiological studies to further determine the risk, e.g., dose response relationships.

9 Implement control measures

This may include recall of product, public warnings, clean up orders, education and training.

10 Communicate findings

Documentation of findings is important to convey science-based recommendations about the immediate control of the outbreak to key personnel, and to provide evidence for policies designed to prevent future outbreaks.