



Foodborne Illness Causes/Agents



Causes can be wide and varied and include

- Bacteria** e.g. Salmonella, Campylobacter, Shigella, Yersinia
 - The bacteria is ingested in large enough numbers to survive the stomach acid, then it incubates in the bowel and produces toxins causing illness (i.e. longer incubation), and some species can invade the tissue to cause systemic illness e.g. *S. typhi* (typhoid fever)
 - The bacteria multiplies to large numbers in food **prior to ingestion** or even cooking thoroughly, and it has **produced a significant amount of toxin** which is not inactivated by heat/cooking. Short incubation period often 30-60 mins for the pre formed toxin to cause symptoms, and if not cooked then the pathogen in turn can also multiply in the bowel to produce more toxin
- Viruses** e.g. norovirus, rotavirus, sapovirus
- Parasites** e.g. Giardia, Cryptosporidium
- Metals** e.g. lead, copper, cadmium, mercury, arsenic, lithium
- Fish toxins** e.g. ciguatera (large ocean fish including barracuda, grouper that have eaten toxic dinoflagellates), Sx 1-48hrs recurring up to 6 months, GI & neurologic, itching, vertigo, etc
e.g. scombroid toxin from scombroid decayed/spoiled fish (tuna, mackerel, mahi-mahi, etc) produce heat stable histamines Sx 1 min-3hrs, allergic histamine reactions
- Other toxins** e.g. poisonous mushrooms, mycotoxins, plants (honey tu tu plant toxin), chemicals (LSD ryegrass staggers)

What are the signs and symptoms associated with foodborne disease?

Foodborne diseases usually cause gastrointestinal illness.

Signs and symptoms associated with gastrointestinal illness vary, depending upon several factors including the pathogenic organism/toxin, the age and health status of the patient and how much of the particular pathogen/toxin was ingested. As we age we have less acid in our stomach. Antacids also prevent inactivation of pathogens in the stomach.

Typical signs and symptoms include nausea, vomiting, diarrhoeal illness and abdominal pain.

Additional signs and symptoms may include fever, headache, malaise, a general feeling of being unwell, myalgia, loss of appetite, loss of weight, chills and dehydration.

Some signs and symptoms are usually associated with particular diseases, such as jaundice with hepatitis A.

In addition, sometimes serious illness can follow a gastrointestinal illness.

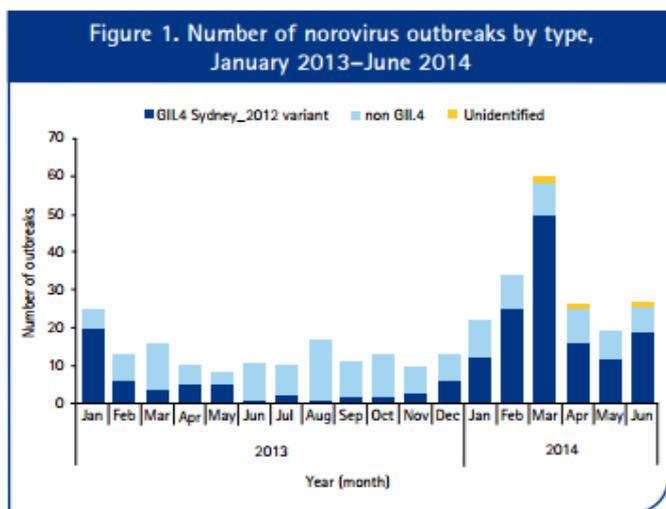
Examples of this include HUS, a severe kidney condition that can occur after illness caused by *E. coli* infections or Guillain-Barre syndrome, a neurological condition that can follow illness with campylobacteriosis (about 1:2000 cases), or reactive arthritis.

Bacterial Diseases:	Usual Incubation Period	Range of incubation period
Salmonellosis:	12- 36 hours	6-72 hours
Shigellosis:	1-3 days	12-96 hours
Campylobacteriosis:	2-5 days	1-10 days
<i>E. coli</i> infection (Shiga toxin-producing):	3-4 days	2-10 days
Listeriosis:	3 weeks	3-70 days

	Viral Diseases:	Usual Incubation Period
	Norovirus:	24-48 hours
	Hepatitis A:	28-30 days

Range of incubation period	Parasitic Diseases:	Usual Incubation Period
10-50 hours	Giardiasis:	7-10 days
15-50 days	Cryptosporidiosis:	7 days

Range of incubation period	Foodborne Intoxication:	Usual Incubation Period
3-25 days	<i>Staphylococcus aureus</i> :	2-4 hours
1-12 days	<i>Bacillus cereus</i> :	range is .5-6 hours (emetic type)
	<i>Clostridium perfringens</i> :	10-12 hours



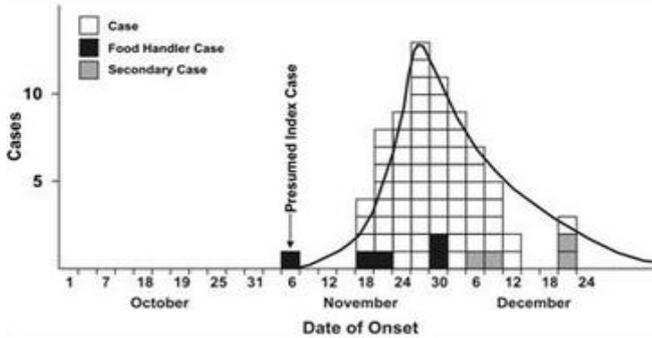
MOH NZ – each outbreak has many people affected

Outbreak Steps

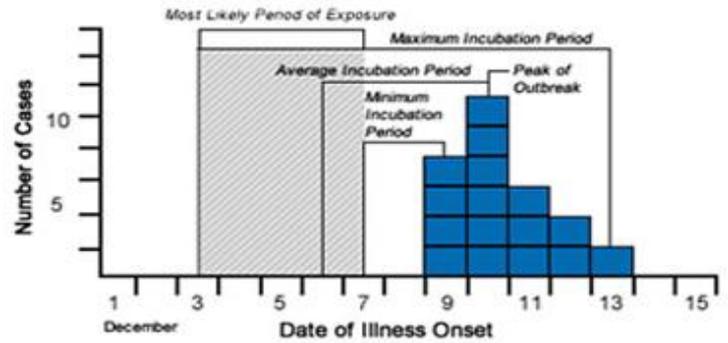
1. Confirm Outbreak exists and its type
2. Implement Control & Prevention Measures
3. Notify key people (internal/external)
4. Develop Case Definition
5. Confirm the agent/diagnosis if possible
6. Case line listing details
7. Formulate hypothesis, epidemiology
8. Communicate ongoing
9. Summary report
10. Continue Surveillance!

Epidemic Data

- Data analysis e.g. Histograms
- Visual display of cases by dates of onset



Most Likely Exposure Time Range



NZ MOH Dec 2014 notified data - NB it is generally believed only 1 in 8 - 10 people seek medical advice for ? food poisoning related symptoms)

https://surv.esr.cri.nz/PDF_surveillance/NZPHSR/2014/NZPHSRDec2014.pdf :

Campylobacteriosis 6719 notifications over the last 12 months), giving a rate of 150.3 cases per 100,000 population

Salmonellosis 1018 notifications over the last 12 months giving a rate of 22.8 cases per 100,000 population

VTEC Infections 178 notifications over the last 12 months giving a rate of 4.0 cases per 100,000

Yersiniosis 589 notifications over the last 12 months giving a rate of 13.2 cases per 100,000 population

Cryptosporidiosis 630 notifications over the last 12 months giving a rate of 14.1 cases per 100,000 population

Toxic Shellfish Poisoning 4 notifications over the last 12 months

Hepatitis A 73 notifications over the last 12 months giving a rate of 1.6 cases per 100,000 population

In addition to acute food poisoning, 'we are what we eat' – 'our microbiome', i.e. the 90 trillion bacteria that we each carry on/in us, plus our 'own' 10 trillion tissue cells work in continual harmony and communication of some kind to help keep us usually healthy, we are interdependent, actually comparable to a multispecies organism. There is also increasing good evidence that when this microbiome changes its balance/proportions in us (e.g. diet, genetics, birth method, antibiotics) the end result can have a significant longterm effect on our body system, good and bad. The bad is at the acute end of the spectrum infections are caused including food poisonings, and at the longer term perspective are other effects such as obesity, eczema/dermatitis, autoimmune illnesses, moods – none of which have previously been known or thought of in the context of 'food poisoning', but they are food ingested and microbially effect related

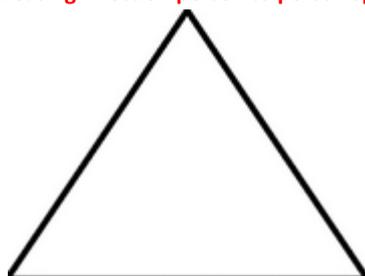


Infectious Gastroenteritis Testing Guide

Clinical History	Routine Faecal Culture	<u>Giardia & Cryptosporidium</u> antigen	Full Extended Parasite examination (2 samples)	<u>Clostridium difficile</u> toxin testing	Viral testing for gastro	Other points
Acute diarrhoea only	No testing					Fluid electrolyte replacement only, dependent on age, other factors
Bloody diarrhoea or febrile	✓					One sample 85% sensitive when bacterial cause
Chronic diarrhoea	✓	✓	✓			Note if overseas travel and where if one main location
Children ≤ 5 years	✓				??	Consider rotavirus also especially if outbreak and/or childcare attendance
Post antibiotic &/or hospital &/or LTCF				✓		If positive toxin, do not retest
> 65 years	✓			?		Consider <u>C difficile</u> also if ABs or debilitation or been in healthcare
Overseas travel or immigration	✓	✓	✓			
<u>Immunocompromised</u>	✓	✓	✓	✓		
Rural or animal exposure	✓	✓				
Child care attendance	✓	✓			?	? viral testing especially if > one case
Healthcare worker	✓			✓	✓	Extent of testing guided by patient contact type
Food handler	✓				?	Plus ? viral if > 1 case
Outbreak	✓			?	?	? extra testing dependent on point source (food poisoning), healthcare association (C diff), or institutional (viral)

Infection cases

? increasing infection person to person spread



? single event point source infection (e.g food)

