Quarterly report

OzFoodNet quarterly report, 1 April to 30 June 2015

The OzFoodNet Working Group

Introduction

The Australian Government Department of Health established the OzFoodNet network in 2000 to collaborate nationally to investigate foodborne disease. In each Australian state and territory, OzFoodNet epidemiologists investigate outbreaks of enteric infection. In addition, OzFoodNet conducts studies on the burden of illness and coordinates national investigations into outbreaks of foodborne disease. This quarterly report documents investigations of outbreaks of gastrointestinal illness and clusters of disease potentially related to food, which commenced in Australia between 1 April and 30 June 2015.

Data were received from OzFoodNet epidemiologists in all Australian states and territories. The data in this report are provisional and subject to change.

During the 2nd quarter of 2015 (1 April to 30 June), OzFoodNet sites reported 352 outbreaks of enteric illness, including those transmitted by contaminated food or water. Outbreaks of gastroenteritis are often not reported to health authorities, which results in current figures under-representing the true burden of enteric disease outbreaks within Australia. There were 5,214 people affected in these outbreaks and 192 hospitalisations. There were 11 deaths reported during these outbreaks. This represents a decrease in the number of people affected compared with the 5-year average from 2010 to 2014 for the 2nd quarter (8,191). The majority of reported outbreaks of gastrointestinal illness in Australia are due to person-to-person transmission. In this quarter, 72% (255/352) of outbreaks were transmitted via this route (see Table 1). This percentage was similar to the same quarter in 2014 (73%, 305/419) but the total number is lower than the 5-year average (2nd quarter, 2010-2014) of 360 outbreaks transmitted person-to-person. Of the person-to-person outbreaks in the 2nd quarter of 2015, 47% (119/255) occurred in child care facilities and 40% (102/255) occurred in aged care facilities.

Table 1: Outbreaks and clusters of gastrointestinal illness and number ill reported by OzFoodNet, Australia, 1 April to 30 June 2015, by mode of transmission.

Transmission mode	Number of outbreaks and clusters	Per cent of total (%)*	Number ill
Foodborne and suspected foodborne	33	10	363
Person-to-person	255	72	4,061
Suspected waterborne	4	1	14
Unknown	52	15	578
Unknown (*Salmonella* cluster)	7	2	182
Unknown (other pathogen cluster)	1	<1	16
Total	352	100	5,214

* May not add up to 100% due to rounding.

Foodborne and suspected foodborne disease outbreaks

There were 33 outbreaks during this quarter where consumption of contaminated food was suspected or confirmed as being the primary mode of transmission (Appendix 1). These outbreaks affected 363 people, of which 177 were laboratory confirmed cases, and resulted in 44 hospitalisations. There were no deaths reported during these outbreaks.

There were fewer foodborne outbreaks than were reported in the 1st quarter of 2015 (47) but similar to the 5-year average (2010-2014) for the 2nd quarter (34 outbreaks). The data within this report, provided by OzFoodNet sites, has associated limitations, including the potential variation in categorisation of features of outbreaks, depending on varied circumstances and investigator interpretation. Changes in the number of foodborne disease outbreaks should be interpreted with caution due to the small number each quarter.

Salmonella Typhimurium was identified as the aetiological agent in 52% (17/33) of foodborne or suspected foodborne outbreaks during this quarter (Appendix 1); a lower total and proportion than for the same quarter in 2014 (62%, 24/39). The aetiological agents for the remaining outbreaks included *Clostridium perfringens* (3 outbreaks), and one outbreak each due to: *Campylobacter jejuni*; ciguatoxin; *S.* Agona; *S.* Hvittingfoss; norovirus; *S.* subsp I ser 4, 5, 12: i:-, and *S.* Virchow. For 6 outbreaks the aetiological agent was unknown.

Fourteen outbreaks (42% of all foodborne or suspected foodborne outbreaks) reported in this quarter were associated with food prepared in restaurants (Table 2). This is similar to the 5 year average for the 2nd quarter (2014-2014) of 13 outbreaks.

To investigate these outbreaks, OzFoodNet sites conducted 4 cohort studies, 1 case control study and collected descriptive case series data for 19 investigations. For 9 outbreaks no individual patient data were collected. The evidence used to implicate food vehicles included analytical and microbiological evidence in 1 outbreak, analytical evidence in 3 outbreaks, microbiological evidence in 8 outbreaks, and descriptive evidence in 21 outbreaks.

The following jurisdictional summaries describe key outbreaks and public health actions that occurred during the quarter.

Australian Capital Territory

There were 2 outbreaks of foodborne or suspected foodborne illness reported in the Australian Capital Territory (ACT) in this quarter. The aetiological agents identified were *S.* Typhimurium phage type (PT) 135 and *C. perfringens*.

Table 2: Outbreaks of foodborne or suspected foodborne disease and number ill reported by OzFoodNet, Australia, 1 April to 30 June 2015, by food preparation setting.

Food preparation setting	Number of outbreaks	Per cent of foodborne outbreaks (%)*	Number ill	Number laboratory confirmed
Restaurant	14	42	136	69
Private residence	9	27	71	48
Commercial caterer	2	6	41	0
Take-away	2	6	10	4
Bakery	1	3	40	30
Institution – not otherwise specified	1	3	23	10
Other (home business)	1	3	17	2
Aged care facility	1	3	12	2
Camp	1	3	9	8
Child care facility	1	3	4	4
Total	33	100	363	177

* May not add up to 100% due to rounding.

Description of key outbreak

An outbreak was investigated in June after two people made a complaint of illness following a catered event attended by 2,600- 2,700 people. Active case finding was conducted on a subset of members of the public who had sent an RSVP for the event. Food histories were obtained for an additional 134 attendees and 11 (8%) of these reported diarrhoea. Interviews with staff members found 16/45 (36%) who reported consuming food at the event had diarrhoea. None of the cases visited a medical practitioner and no samples were collected. An analytical study conducted with catering staff found a statistically significant association with eating the butter chicken and becoming ill (adjusted risk ratio [aRR] 5.2; 95% confidence interval [95% CI] 1.1–24.9; $P<0.05$). The environmental investigation identified food handling and temperature control issues. Several food samples were taken and 170,000 colony forming units per gram (cfu/g) of *C. perfringens* was isolated from the butter chicken.

New South Wales

There were 10 outbreaks of foodborne or suspected foodborne illness reported in New South Wales (NSW) in this quarter. The aetiological agents identified were *S.* Typhimurium (for 2 outbreaks) and one outbreak each of *S.* Agona; *C. perfringens*; *Ca. jejuni;* and ciguatoxin. Four outbreaks were of unknown aetiology.

Description of key outbreak

An outbreak was investigated in June after routine surveillance identified an increase in *S.* Agona (9 cases) in Western Sydney. A total of 37 cases were notified in NSW between January and June 2015, with 13 of these cases notified in May and June 2015. The previous 5 year annual average in NSW for this serovar was 28 cases. Sixteen of the most recent cases were interviewed including all 9 located in Western Sydney. Six had consumed sushi from one of 2 sushi venues in the same shopping centre; 3 cases at sushi outlet A, 2 cases ate at sushi outlet B and 1 case ate at both outlet A and outlet B. No links were found between the other 10 cases. Both venues were inspected by the NSW Food Authority and were reported to have potential for cross contamination of ready to eat foods. It was reported no ingredients or staff were shared between shops and records were not available to confirm this. Samples were taken from both venues, with outlet A returning a positive *S.* Agona result from sushi rolls. Sushi outlet A was inspected another 2 times during the following 19 days. On all occasions the tuna mix for tuna sushi rolls was positive for *S.* Agona, even though the individual ingredients for this mix and the tools used to make this mix were all negative. The venue was prohibited from selling the tuna product until it showed evidence of *Salmonella* clearance. Whole genome sequencing showed *S.* Agona isolates from the 4 confirmed outbreak cases who reported eating at sushi outlet A, shared identical sequencing with 2 cases who reported eating just at sushi outlet B, and with isolates from 5 other cases from the same time period who either did not report eating at the sushi restaurant or were not interviewed. All of the *S.* Agona isolates from food samples at sushi outlet A were identical to the case isolates and very similar to 2 of the isolates from retail samples of chicken meat earlier in the year. This analysis suggests the source of the *S.* Agona in the cluster may have been cross contamination from raw chicken meat, with a common source of chicken for the 2 sushi venues likely at the time of the outbreak. This investigation was the first time NSW used whole genome sequencing for a *Salmonella* outbreak.

Northern Territory

There was 1 outbreak of foodborne or suspected foodborne illness reported in the Northern Territory (NT) in this quarter. The aetiological agent identified was *S.* Typhimurium PT 9.

Description of key outbreak

An outbreak was investigated in June after 23 people reported becoming ill after attending the same restaurant. Eight cases were laboratory confirmed with *S.* Typhimurium PT 9. There were 4 hospitalisations as a result of the

outbreak. Analysis of a cohort study involving 76/80 patrons and 3 staff found an association between consuming duck prosciutto and illness (relative risk [RR] undefined; OR 18.6; $P<0.05$). Duck prosciutto was eaten by all cases and had a food-specific attack rate (AR) of 27%. An environmental health inspection of the restaurant identified that the duck prosciutto was likely to have been cured for an inadequate time period and in an area where cross contamination could occur. Duck prosciutto was immediately removed from the menu. Samples of raw duck meat and duck prosciutto were collected. The raw duck meat tested negative for *Salmonella* spp. and coliforms. The duck prosciutto also tested negative for *Salmonella* spp. but contained high levels of coliforms ($2x10^7$ cfu/g) with the increase in coliforns suggesting contamination of the prosciutto during the curing process.

Queensland

There were 5 outbreaks of foodborne or suspected foodborne illness reported in Queensland (Qld) in this quarter. The aetiological agents identified were *S.* Typhimurium (for 2 outbreaks), and *S.* Hvittingfoss, *S.* Virchow PT 8 and norovirus genogroup II (for 1 outbreak each).

Description of key outbreak

An outbreak was investigated in April after 9 cases of gastrointestinal illness were identified among 2 school groups that attended a camp facility. *S.* Virchow PT 8 was detected in 8/9 cases. No common food vehicle was identified; however, water samples collected from a rainwater tank, which supplied the kitchen facility, tested positive for *S.* Virchow PT 8. Whole genome sequencing indicated a close genetic relatedness between the isolates from the human specimens and the water samples. Investigations identified potential issues with regard to vermin, birds and leaf litter from trees surrounding the kitchen facility. The ultraviolet disinfection system connected to the rainwater tanks required re-calibration and sediment filters were in need of maintenance. All rainwater tanks were subsequently chlorinated.

South Australia

There were 5 outbreaks of foodborne or suspected foodborne illness reported in South Australia (SA) in this quarter. The aetiological agents identified were *S.* Typhimurium (for 4 outbreaks) and *S.* subsp 1 ser 4,5,12:i:- (for 1 outbreak).

Description of key outbreak

An outbreak was investigated in June after initial interviews identified 2 cases of *S.* Typhimurium PT 9, multi-locus variable number tandem repeat analysis (MLVA) profile 03-14-08-11-550 who had eaten at the same bakery in metropolitan Adelaide before becoming unwell. A total of 30 cases, 8 of whom were hospitalised, reported consuming Vietnamese rolls purchased from two bakeries owned by the same family. Ten additional people reported having gastroenteritis following eating at one of the two bakeries, but were not tested. The rolls were made with raw egg butter and an environmental investigation identified multiple poor practices in relation to handling the raw egg butter. An improvement notice was issued.

Tasmania

There were no outbreaks of foodborne or suspected foodborne illness reported in Tasmania in this quarter.

Victoria

There were 8 outbreaks of foodborne or suspected foodborne illness reported in Victoria (Vic.) in this quarter. The aetiological agents identified were *S.* Typhimurium (for 5 outbreaks) and *C. perfringens* for 1 outbreak. Two outbreaks were of unknown aetiology.

Description of key outbreak

An outbreak associated with the consumption of food from a restaurant was investigated in June after a complaint was made to a local council. Seventy-five people attended a birthday dinner that comprised an Asian buffet style meal with

a range of desserts made at different premises. Sixteen of 28 attendees interviewed reported being ill with diarrhoea; the majority of whom also experienced abdominal pain and fever. One case was considered to have been a secondary case due to a delayed onset of symptoms. Twelve cases presented to a doctor and 2 were hospitalised. *S.* Typhimurium PT 135 MLVA 03-11-11/12-14-523 was isolated from 8 of 9 faecal specimens. One restaurant staff member had an onset of diarrhoea 48 hours after this group dined at the restaurant and submitted a faecal specimen which was polymerase chain reaction (PCR) positive for *Salmonella* but culture negative. A case-control study showed that cases were more likely to have eaten desserts when compared to those who were not ill (odds ratio [OR] 12; 95%CI 1.0-590.2; $P<0.05$). The desserts included tiramisu, cheesecake, custard cream cake and fruit. No leftover food from this function was available for testing, however samples of fish and raw eggs collected from the premises during the investigation tested negative for *Salmonella*.

Western Australia

There were 2 outbreaks of foodborne or suspected foodborne illness reported in Western Australia (WA) in this quarter. The aetiological agent identified was *S.* Typhimurium (for both outbreaks).

Description of key outbreak

An outbreak was investigated in April after cases of *S.* Typhimurium pulsed-field gel electrophoresis (PFGE) type 0001 reported independently eating at the same café. In total there were 9 confirmed cases and 1 suspected case. Most cases (8/10) had eaten breakfast meals containing eggs, while the remaining 2 cases had consumed fruit smoothies. Cases reported that the eggs were undercooked. One sample from the implicated egg brand tested positive for *S.* Typhimurium PFGE 0001. Environmental samples (eggs and faecal material) from the implicated egg farm were negative for *Salmonella*.

Multi-jurisdictional investigations

In the first half of 2015, OzFoodNet investigated a multi-jurisdictional outbreak of hepatitis A associated with the consumption of a particular imported frozen mixed berry product. Consumer level recalls of the implicated product and related products were conducted in February 2015. Case finding was conducted in every jurisdiction which included all cases of hepatitis A notified from 1 October 2014 to take into account the long incubation period of the virus and the time period that the implicated frozen berries were in the marketplace. A total of 35 laboratory-confirmed cases of hepatitis A with genotype IA and an identical genetic sequence were associated with this outbreak; 15 in Qld, 13 in NSW, 4 in Vic., and 1 each in WA, the ACT, and SA. Of the 35 confirmed cases, 28 recalled consumption of the implicated brand of imported frozen mixed berries during their acquisition period. Three cases were secondary infections (of confirmed outbreak cases), 2 cases had consumed frozen berries during their acquisition period but couldn't recall the brands, and 2 cases could not recall eating any frozen berries and had no other risk factors.

Hepatitis A RNA was detected in 1/3 opened packets of the implicated berry product that were obtained from cases' homes and from 1/15 sealed packets obtained from retail premises that were removed from sale during the recall. The RNA in the sample from the open packet was amplified and confirmed to be genotype IA with the outbreak genetic sequence, however, the RNA in the sealed packet was present at very low levels and unable to be amplified to enable genotyping and sequencing to be conducted.

This outbreak involved a multi-jurisdictional response involving state and territory health departments and food safety agencies, OzFoodNet, public health reference laboratories, the Australian Department of Agriculture and Food Standards Australia New Zealand. The Chief Medical Officer of Australia also activated the National Incident Room at the Australian Department of Health in the initial stages of the investigation to assist in the coor-

dination of communication between the various national, state and territory agencies involved in the response.

A prospective case-control study was conducted with 23 cases of confirmed hepatitis A (genotype IA with the outbreak genetic sequence) and 47 *Salmonella* cases which were used as controls and enrolled from the respective jurisdictional notifiable disease databases where the cases were notified. Univariate analyses revealed statistically significant results for consuming the implicated frozen mixed berry product (odds ratio [OR] 440; 95% confidence interval [CI] 32-18,531; $P<0.05$), consuming any frozen mixed berries (OR 88; 95% CI 10.5-3727; $P<0.05$) and consuming any frozen berries (OR 49; 95% CI 6.2-2073; $P<0.05$).

Cluster investigations

During this quarter, OzFoodNet sites conducted investigations into 15 clusters of infection for which no common food vehicle or source of infection could be identified. Aetiological agents for these clusters included *S.* Typhimurium (3 clusters), *S.* Virchow (3 clusters), and one cluster each of: *S.* Mississipi (ampicillin resistant); *S.* Victoria; *S.* Zanzibar; *S.* Mbandaka; *S.* Newport; *S.* Chester; *Yersinia enterocolitica*, *Campylobacter spp.*; and *Cryptosporidium spp.*

Comments

This quarter marks OzFoodNet's first use of whole genome sequencing (WGS) during foodborne disease outbreak investigations (1 NSW and 1 Qld). WGS provides unparalleled resolution of communicable disease pathogens. Clusters can be more accurately defined through this process offering a more targeted response to outbreaks of foodborne disease. The genomics of communicable disease pathogens can be analysed, interpreted and stored and then shared across national and international borders. This allows for rapid identification of multinational outbreaks, a process which without whole genome sequencing, can take months to years. WGS has already been applied to match an Australian human *Listeria monocytogenes* isolate to an outbreak in stone fruit in the United States of America. It was subsequently identified that some implicated stone fruit had been imported to Australia and the case had reported consuming some, leading to a recall in Australia.

The hepatitis A multi-jurisdictional outbreak investigation (MJOI) was a complex investigation involving unprecedented levels of inter-agency communication and media interest. The investigation ultimately led to a review of national communication protocols for foodborne incidents, and also to proposed legislative changes to the imported food scheme.

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Appendix 1: Outbreaks of foodborne or suspected foodborne disease reported by OzFoodNet sites*, 1 April to 30 June 2015 (n=33)

State or Territory	Month †	Setting Prepared	Agent responsible	Number affected ^	Number lab confirmed	Number hospitalised ^	Evidence	Responsible vehicles
ACT	Jun	Private residence	*S.* Typhimurium PT 135, MLVA 03-17-08-12-525	2	2	2	D	Smoothie containing raw egg
ACT	Jun	Commercial caterer	*Clostridium perfringens*	29	0	0	AM	Butter chicken
NSW	Apr	Private residence	Ciguatera fish poisoning	4	0	1	D	Spanish mackerel
NSW	Apr	Restaurant	*Clostridium perfringens*	4	2	0	D	Unknown
NSW	Apr	Restaurant	*S.* Typhimurium MLVA 03-12-12-09-523	11	8	0	D	Undercooked egg dishes
NSW	May	Restaurant	Unknown	7	0	0	D	Unknown
NSW	May	Restaurant	*Campylobacter jejuni*	2	2	1	D	Chicken liver pâté
NSW	May	Commercial caterer	Unknown	12	0	1	D	Unknown
NSW	Jun	Restaurant	Unknown	9	0	1	D	Unknown
NSW	Jun	Child care centre	*S.* Typhimurium MLVA 03-14-09-13-523	4	4	1	D	Unknown
NSW	Jun	Take-away	*S.* Agona	4	4	0	M	Tuna mix for sushi
NSW	Jun	Take-away	Unknown	6	0	0	D	Kebabs
NT	Jun	Restaurant	*S.* Typhimurium PT 9	23	8	4	A	Duck prosciutto
QLD	Apr	Other	Norovirus genogroup II	17	2	0	D	Birthday cake
QLD	Apr	Camp	*S.* Virchow PT 8	9	8	0	M	Water
QLD	May	Private residence	*S.* Hvittingfoss	23	21	Unknown	M	Unknown (mixed food)
QLD	May	Restaurant	*S.* Typhimurium MLVA 05-21-08-14-456	14	14	6	D	Unknown
QLD	May	Restaurant	*S.* Typhimurium MLVA 03-17-09-11-523	8	6	2	D	Unknown
SA	Apr	Restaurant	*S.* Typhimurium PT 9, MLVA 03-24-11-10-523	9	8	3	M	Eggs

State or Territory	Month †	Setting Prepared	Agent responsible	Number affected ^	Number lab confirmed	Number hospitalised ^	Evidence	Responsible vehicles
SA	May	Private residence	*S.* Typhimurium PT 170/108, MLVA 03-09-07-12-523	9	5	2	M	Veal and chicken schnitzel in egg batter
SA	Apr	Private residence	*S.* Typhimurium PT 135a, MLVA 03-11-12-14-523	4	4	2	D	Unknown
SA	Apr	Private residence	*Salmonella* subsp 1 ser 4, 5, 12: i:-, MLVA 04-15-11-00-490	6	3	1	D	Unknown
SA	Jun	Bakery	*S.* Typhimurium PT 9, MLVA 03-14-08-11-550	40	30	8	D	Vietnamese rolls with raw egg butter
VIC	Apr	Private residence	*S.* Typhimurium PT 44, MLVA 03-10-09-08-523	6	2	2	D	Temperature abuse of pasta made with raw egg
VIC	Apr	Private residence	*S.* Typhimurium PT 135a, MLVA 03-11-09-11-523	6	4	1	M	Chocolate mousse
VIC	Apr	Private residence	*S.* Typhimurium PT 9, MLVA 03-23-23-10-523	11	7	0	A	Pasta carbonara containing raw egg
VIC	Apr	Restaurant	Unknown (one confirmed case of *S.* Virchow PT8)	4	1	0	D	Unknown
VIC	May	Institution not otherwise specified	*S.* Typhimurium PT 135, MLVA 03-14-10-08-523	23	10	1	M	Chicken
VIC	Jun	Restaurant	*S.* Typhimurium PT 135, MLVA 03-11-11/12-14-523	16	8	2	A	Desserts including tiramisu, cheesecake & custard cream cake
VIC	Jun	Aged care facility	*Clostridium perfringens*	12	2	0	D	Temperature abuse of food served from a bain-marie
VIC	Jun	Restaurant	Unknown	14	0	0	D	Unknown
WA	Apr	Restaurant	*S.* Typhimurium PT 9, PFGE 0001	5	3	2	D	Semifreddo containing raw egg
WA	Apr	Restaurant	*S.* Typhimurium PT 9, PFGE 0001	10	9	1	M	Egg dishes
Total				363	177	44		

[*] *No foodborne outbreaks were reported in Tasmania during the quarter*
[†] *Month of outbreak is the month of onset of the first case or month of notification of the first case or month the investigation of the outbreak commenced.*
[^] *The number of people affected and hospitalised relate to the findings of the outbreak investigation at the time of writing and not necessarily in the month specified or in this quarter. The number of people affected does not necessarily equal the number of laboratory-confirmed cases.*
[A] *Analytical epidemiological association between illness and one or more foods*
[D] *Descriptive evidence implicating the suspected vehicle or suggesting foodborne transmission*
[M] *Microbiological confirmation of aetiological agent in the suspected vehicle and cases*
[MLVA] *Multi-locus variable number tandem repeat analysis*
[PFGE] *Pulsed-field gel electrophoresis*
[PT] *Phage type*

References

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