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## Short reports

AN OUTBREAK OF *CLOSTRIDIUM PERFRINGENS* AND THE ENFORCEMENT OF FOOD SAFETY STANDARDS

Megan K Young, Peta Smith, Jack Holloway, Rod P Davison

## Abstract

Investigation and management of a possible foodborne outbreak notified to the Brisbane Northside Population Health Unit aimed to determine the likely source of the outbreak and prevent the same scenario from recurring. Environmental health officers inspected the implicated premises and collected legal samples prior to the 1st outbreak control team meeting. Interview evidence was carefully documented. Inspection revealed large quantities of meat dishes being allowed to cool at room temperature overnight. Microbiological results implicated the meat dishes as a source of *Clostridium perfringens*, consistent with the cause of illness in notified cases. When educational measures failed to alter food handling practices, the restaurant owner was successfully prosecuted under the *Food Act 2006*. Education and voluntary compliance with food safety standards must form the foundation of sustainable behaviour change among food handlers. When these fail, prosecution is justified to mitigate the risk to public health. Immediate inspection, sampling left over food, and attention to formal interview technique and evidence collection can assist the investigation of outbreaks of foodborne illness and help to ensure any necessary court proceedings are a cost effective use of resources. *Commun Dis Intell* 2008;32:462–465.

Keywords: Foodborne outbreak, *Clostridium perfringens*, enforcement, food safety, legal proceedings

Access to safe food and water is fundamental to maintaining public health, and expected by Australian consumers. Within public health infrastructure, the interplay of health promotion, food safety education, national food standards, state legislation, local licensing and communicable disease surveillance, investigation and control strives to achieve this expectation. Yet, with an estimated 5.4 million cases of gastroenteritis in Australia per year costing around AU\$811 million,<sup>1</sup> foodborne illness is both common and costly.

Outbreaks of foodborne illness contribute significantly to the total burden. In each year from 2002 to 2005, there were around 100 reported outbreaks of foodborne

illness.<sup>2–5</sup> While not the most common foodborne pathogen at an estimated 43,000 cases of gastroenteritis per year,<sup>6</sup> *Clostridium perfringens* was still responsible for between 3 and 8 outbreaks of foodborne illness annually between 2002 and 2005.<sup>2–5</sup>

Symptoms typical of food poisoning by *C. perfringens* include epigastric pain, nausea, and watery diarrhoea lasting 12 to 24 hours after an incubation period of 8 to 24 hours.<sup>7</sup> The elderly and hospitalised populations are at risk of more severe disease. A cytotoxin is thought to be responsible for the symptoms in most cases.<sup>7</sup>

Cooking inactivates many foodborne pathogens including the vegetative cells of *C. perfringens*, but the spores of this bacteria may survive typical cooking temperatures and germinate and multiply as the cooked product cools. The optimal growth temperature is generally between 43 and 45 degrees Celsius.<sup>8</sup> Published outbreak investigations have usually implicated meat or poultry cooked on a large scale with improper attention to temperature regulation of the cooked product.<sup>9–12</sup>

Here we report on a foodborne outbreak of *Clostridium perfringens* that resulted from allowing large quantities of meat dishes to cool for prolonged periods of time at room temperature. We then discuss the implications for public health practice in the investigation of potential outbreaks of foodborne illness.

## Outbreak summary

In mid-2006, the Brisbane Northside Population Health Unit was notified that a minimum of 7 people from a function of 25 had gastrointestinal symptoms after eating at a local restaurant. Contact details were obtained for as many of those known to be unwell as possible and specimen collection kits were delivered to their homes shortly after the outbreak was notified.

Within hours of the notification, environmental health officers from the Population Health Unit attempted to inspect the restaurant in question, finding the premises closed. They returned the following day to discover that large quantities of cooked food were being left at room temperature to

cool for more than 12 hours at a time. Food from the same batch eaten by function attendees (and that had undergone this same cooling process) was still present in the cold room. Samples were taken in accordance with the legislative requirements under the *Food Act 2006* and the owner of the restaurant was informed of the nature and possible consequences of the breach of food safety. Environmental health officers counselled the owner and staff on safe food practices at this time.

Whilst environmental health officers and communicable disease control officers were in consultation with each other from the time of the notification, the result of circumstance was that sample collection was initiated prior to the 1st outbreak control team meeting.

Further symptom and meal specific food histories were taken from symptomatic function attendees following the 1st outbreak control team meeting. As the host of the function had travelled overseas soon after its completion, no contact details were available for a number of the function attendees. A total of 11 cases were interviewed with a further 2 known cases unable to be contacted. One asymptomatic function attendee was contacted. Because of the availability of only a single control, epidemiological enquiry was based only on the food histories of the cases. The available data indicated that it was possible that one of the pre-prepared meat dishes that had been sampled was among the likely sources of infection (Table).

**Table. Proportion of interviewed cases (n=11) who ate specific food types from the restaurant on the night previous to the complaint**

Food type	Proportion of cases who ate the food type (%)
Beef/lamb kebab	91
Bread and dips	91
Lamb curry (pre-prepared)	91
Water	91
Chicken kebab	82
Rice	73
Salad	64
Chicken curry (pre-prepared)	46
Turkish delight	36
Vegetarian dish	9

Laboratory results confirmed this hypothesis, with counts of *C. perfringens* greater than  $2.5 \times 10^7$  per gram in the pre-prepared meat dish samples ( $>10^5$  per

gram is considered a public health risk<sup>13</sup>) and spore counts between  $2.1 \times 10^5$  and  $8.7 \times 10^6$  per gram in the faecal samples obtained from the function attendees (a median of  $>10^6$  per gram is considered consistent with *C. perfringens* induced diarrhoea<sup>13</sup>).

Environmental health officers returned to the restaurant upon receipt of the laboratory results for the food samples, to find that large quantities of cooked meat dishes were still being allowed to cool for hours at room temperature. In light of the public health risk incurred by this practice, the relevant food was seized and destroyed after further samples were taken. The result of laboratory testing showed that the seized food had indeed been a risk to public health with *C. perfringens* counts of at least  $1.6 \times 10^5$  per gram.

The owner of the restaurant was successfully prosecuted under section 35(2) of the *Food Act 2006* for selling food that was unsafe, and was fined in the order of \$20,000.

## Discussion

In Australia and elsewhere, foodborne outbreaks still occur as the result of poor food handling.<sup>14</sup> Therefore, the key to decreasing the incidence of outbreaks lies, at least in part, in changing the behaviour of food handlers. As with any behaviour change at either the population or individual level, this is not an easy task.

Safe food handling is supported in Queensland in a number of ways. These include education and training, food safety guidelines and standards, and the enforcement of legislation at both a local and state level. There are a number of providers of food handling training. These include TAFE (Technical and Further Education) colleges, registered training organisations, industry associations and private tutors. A number of local councils also run training courses. The Australian Institute of Environmental Health has developed an in-house training program for food handlers.<sup>15</sup>

Under the Foods Standards Code, it is now a requirement that all food handlers have the appropriate skills and knowledge to handle food safely.<sup>16</sup> These skills and knowledge may be gleaned from a formal food handling course, or by in-house processes such as information provision or operating rules.

In Queensland, the *Food Act 2006* authorises local governments to licence food premises and conduct regular inspections to ensure compliance with licensing requirements. The Act also requires that all food sold should meet safety standards and that food premises operators comply with safety standards.

In the case reported here, previous local government inspections had not discovered the inappropriate food handling practice that is believed to have led to the outbreak. When failure of preventive measures like this occur, local investigation and management, possibly including enforcement of state legislation, is the appropriate recourse. As in this case, specific advice on the changes required to meet food safety standards, support as necessary to implement the changes, and follow up to ensure compliance with these should precede legislative action.

As a result of this case, 2 points of procedure from the investigation have been adopted into local policy:

1. If preliminary enquires are suggestive of a foodborne source for the illness (rather than person to person transmission), environmental health officers now routinely conduct an inspection of the suspected premises and collect left-over food samples as soon as possible after the complaint is taken (this will often be prior to the 1st outbreak control team meeting); and
2. Both samples and interviews are undertaken formally, so as to be admissible in a court proceeding if required.

Outbreak management protocols have been altered to support these procedures.

The reasoning behind this change is not punitive. Education and voluntary compliance with food safety standards will remain the foundation of sustainable behaviour change among food handlers. Indeed, most food businesses readily comply with advice after a foodborne illness outbreak.

However, in instances of significant public health risk, where educational measures fail to alter behaviour, prosecution is justified to mitigate the risk. To be successful and a cost effective use of resources, a prosecution's case must be built on evidence admissible in court.

For the charge of selling unsafe food, the evidence must show that:

1. the food was potentially unsafe
2. the food was sold by the vendor to the victim/s
3. the food caused harm when consumed.

To prove this offence, it is necessary to demonstrate the bacteria in the food was the same as that in biological samples, and that the person or persons affected bought and consumed the contaminated food from the vendor. To fulfil the first of these requirements, samples of left-over food and biological samples from the victims of the food poisoning are a prerequisite; hence the purpose of sampling

as a priority over the 1st outbreak control meeting. To fulfil the second of these requirements, in the absence of detailed receipts held by the victims from the vendor, witnessed statements from the victims and vendor are necessary; hence the change to the interview procedure.

Since the successful prosecution of the offending restaurant as outlined above, no further cases of gastrointestinal illness linked to the restaurant have been notified. It is our recommendation that other public health authorities adopt similar procedures for the investigation of potential foodborne illness.

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