disease shall be notified, for several reasons, clinicians fail to always do so.

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An outbreak of *Salmonella* Typhimurium RDNC A045 at a wedding feast in South Australia

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Abstract

In April 1998 an outbreak of salmonellosis amongst guests at a wedding feast was investigated. Of the 58 attendees interviewed 38 (66%) subsequently developed gastrointestinal symptoms. Stool cultures from 7 cases grew *Salmonella* Typhimurium RDNC A045. Food samples were culture-negative for *Salmonella* spp. A cohort study implicated spatchcock (RR 2.5, 95% CI 1.09-5.77) and scampi (RR 2.0, 95% CI 1.05-3.89). Temperature abuse and cross-contamination within the kitchen during preparation and cooking are likely to have been the main contributing factors to this outbreak. Control measures included staff education in safe food handling and improvements in poultry processing methods to minimise carcass contamination. *Commun Dis Intell* 1999;23:101-103

Introduction

In South Australia between 300 and 600 notifications of salmonellosis are received annually. Of these the most common serovar is *Salmonella* Typhimurium (62% in 1997) with a predominance of phage types 9, 64 and 135. *Salmonella* Typhimurium designated as 'Reacts Does Not Conform' (RDNC) occur much less frequently with about 12 cases per year (South Australian Department of Human Services, unpublished data).

On 23 April 1998 the Communicable Disease Control Branch was notified of two laboratory proven cases of salmonellosis. They were from a group of 61 people who had attended a wedding. Enquiries revealed that at least 6 (10%) had a gastrointestinal illness. The only common feature amongst the 61 people was attendance at the wedding. The caterer reported that all foods were prepared and served on site.

An investigation was conducted to determine the extent and source of the outbreak.

Methods

Epidemiological investigation

A questionnaire was developed based on information from a menu and list of staff and guests. A cohort study was conducted to determine whether any food or drink consumed at the wedding was associated with illness. A case was defined as any of the attendees, including staff,

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who suffered a gastrointestinal illness between the wedding on 18 April 1998 and the time of interview. The questionnaire was conducted by telephone between 24 and 27 April. The interviewers inquired about symptoms of illness, onset time and foods and drinks consumed from the menu items. Food risks and risk ratios for illness were calculated using Epi Info 6.

Environmental investigation

Methods of food preparation were determined from the caterer, the cook and the serving staff by telephone interview. The kitchen facilities, food storage and preparation areas were inspected by the local government environmental health officer (EHO). There was no leftover food available for culture, but a sample of scampi, which was from another batch, was sampled for culture. Faecal specimens from 7 cases were sent for culture and typing.

The processing plant that supplied spatchcocks for the wedding was inspected and fresh and frozen samples were taken for culture (spatchcocks are 4 week old broiler chickens, which are processed at specialty plants).

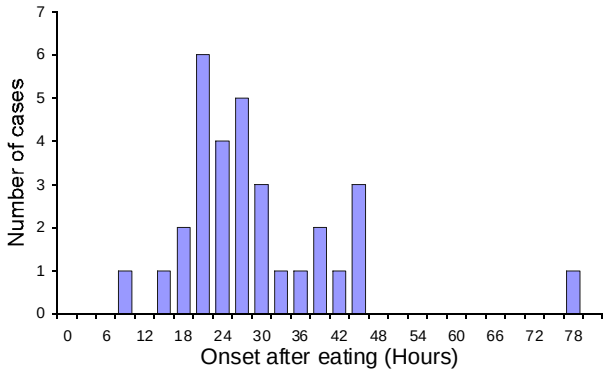
Results

Epidemiological investigation

Of the 61 guests, 58 (95%) were interviewed. The guests came from various states (SA - 48, NSW - 5, Vic - 2, WA - 2 and Qld - 1). Twenty people reported no illness after the wedding. Symptoms consistent with the case definition were reported by 38 (66%). The only common feature identified in cases was attendance at the wedding. Among the cases the male to female ratio was 1.2: 1 and the age range was 10 to 68 (median = 38). The majority, 36 (95%), had onset of illness on the 19 or 20 April 1998 with a median incubation period of 26 hours (see Figure 1). The symptoms described by the 38 cases were: diarrhoea (100%), abdominal pain (92%), fever (92%), nausea (73%), vomiting (35%) and bloody diarrhoea (3%). Stool specimens from seven cases grew *Salmonella* Typhimurium on standard enteric media and were subtyped using the Colindale method as RDNC A045.

The foods with the highest risk ratio for illness were spatchcock (RR = 2.51, 95% CI 1.09-5.77) and scampi (RR = 2.02, 95% CI 1.05- 3.89) (Table 1). Lower (although statistically significant) risk also occurred for the terrine (RR = 1.76, 95% CI: 1.13-2.75) and fetta filo parcels (RR = 1.53, CI 1.08-2.16). No statistically significant risk was found with the other foods or beverages.

Figure 1. Number of cases of gastrointestinal illness after the wedding feast, by onset time



Environmental investigation

Food preparation and handling

A large proportion of the food was prepared on the day of the wedding or the previous day. Foods were pre-cooked and reheated on the day, or cooked just prior to serving. The foods were prepared and stored overnight in the refrigerator or iced in polystyrene containers. The methods of preparation for all foods were reviewed.

The spatchcocks were purchased and delivered frozen. On Friday 17 April they were thawed in cold water for 3 hours and then stuffed with a mixture of herbs and spices, cooked rice, pine nuts and sultanas. They were then baked for one hour then transferred to iced polystyrene containers. On the day of the wedding the spatchcock were split in half and then reheated. They were served on

Table 1. Foods consumed at the wedding feast by reported illness

Food	Illnesss:Food Specific Risk[1]	RR	95% CI
Bacon	19/25	1.32	0.91-1.90
Filo parcels	17/20	1.53	1.08-2.16
Kangaroo	19/23	1.48	1.04-2.10
Chicken wings	19/28	1.07	0.74-1.56
Devilled eggs	14/17	1.43	1.01-2.02
Olives	22/28	1.52	1.02-2.27
Dolmades	22/28	1.52	1.02-2.27
Salami	11/15	1.20	0.81-1.78
Crackers with pesto	25/34	1.30	0.86-1.96
Vegetable terrine	26/32	1.76	1.13-2.75
Trout	32/47	1.25	0.70-2.22
Scampi	31/41	2.02	1.05-3.89
Spatchcock	34/44	2.51	1.09-5.77
Lamb shanks	19/26	1.23	0.85-1.78
Snapper	26/36	1.31	0.84-2.05
Salad	26/36	1.32	0.86-2.04
Bread roll	12/20	0.89	0.58-1.36
Bread roll/butter	18/22	1.46	1.02-2.09
Red wine	34/50	1.36	0.66-2.79
White wine	12/20	0.90	0.58-1.38
Champagne	21/35	0.82	0.57-1.20

1. Food Specific Risk in those ill

CI = Confidence Interval

RR = Risk ratio

a clean earthenware platter with a bed of triple washed mixed lettuces.

The scampi were purchased frozen and delivered on Friday and left at room temperature for approximately 2-3 hours before being placed in the refrigerator overnight. A lime mayonnaise, to be served with the scampi, was prepared on the Friday using raw eggs, garlic, olive oil and spices and stored overnight in the refrigerator. On removal from the fridge on the evening of the wedding the scampi were still frozen and were thawed at room temperature for approximately 4 hours. They were then cooked for about 2 minutes per side on a BBQ hot plate and served with the lime mayonnaise. A Caesar salad dressing was also prepared using raw eggs.

Function site investigation

The cook and the serving staff had consumed some of the food at the function and a number of them subsequently developed gastroenteritis. None were ill before the wedding.

The food preparation area and refrigerator space in the kitchen was limited. On inspection the temperature of the fridge was found to be adequate for food storage. Advice on food preparation and storage was given on each of three visits by the local EHO.

No *Salmonella* spp. were identified in the scampi.

Spatchcock processing investigation

The inspection revealed faecal contamination of carcasses in the initial processing stages. Advice on how to avoid this was provided. Six specimens were taken from 3 different batches of spatchcocks. The actual batch of spatchcock that was served at the wedding was not known. Of the six specimens two grew *Salmonella* Senftenburg and one of these further grew *Salmonella* Typhimurium untypable (C. Murray, Med Vet IMVS Laboratory Adelaide, personal communication).

Discussion

This report describes the investigation of a well-defined *Salmonella* Typhimurium outbreak of a previously unrecognised phage type (RDNC A045) with a high attack rate (66%) suggestive of a high level of contamination.[1] It also illustrates some of the difficulties in identifying a source of contamination and indicates that small-scale catering operations continue to be a source of foodborne disease.

Numerous foods were implicated including; spatchcock, scampi, terrine and fetta filo parcels, suggesting cross contamination. On the basis of biological plausibility, food specific risk (34/44) and risk ratio, spatchcock was further investigated as a source of contamination. Spatchcock was found to be subject to inadequate temperature control and was identified as a high risk food (RR = 2.51).

Spatchcock could be expected to carry *Salmonella* spp. at the same rate (25-35%) as other poultry,[2] and this was confirmed (2/6 positive for *Salmonella* spp.) in this local investigation.

Inadequate thawing, storage and possibly cooking of the foods in the kitchen may have allowed the organisms to multiply and spread to other foods. Limited food preparation and refrigeration spaces are likely to have increased the possibility of cross contamination.

Salmonella food poisoning, related to small catered functions, continues to be a public health concern. Timely investigation of potentially related notified cases can assist with outbreak detection. Rapid typing of *Salmonella* spp. isolates assists in the identification of clusters of infection and in the tracing their source. This study reconfirms the need to educate those involved in food handling at all levels with regard to safe thawing, handling, storage and cooking of foodstuffs.

Limitations of the investigation

Selection bias may have occurred as a result of the inability to contact 3 attendees despite numerous attempts, though this would be unlikely to effect any outcomes. Measurement bias may have occurred as part of the 'loose' definition of the illness, although all 'cases' had had a diarrhoeal illness. Recall bias may be a contributor. A number of attendees had difficulty recalling exactly what they ate, or the amount, due to the nature of the function; a progressive feast served sequentially on trays, resulting in people tending to try many of the 17 or more foods. Unfortunately no samples of food from the wedding feast were available for culture, so microbiological confirmation of contamination was not possible.

Recommendations

Effective catering operations require an adequate clean preparation area with appropriate staffing and equipment. Staff should be trained in safe food handling practices to allow for appropriate preparation, cooking and serving of food. This study emphasises the need for food safety plans, as well as education and review of small-scale catering practice.[3,4]

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