Outbreak of *Salmonella* Potsdam associated with salad dressing at a restaurant

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Abstract

Between 27 January and 7 February 2002, 12 cases of *Salmonella* Potsdam infection were notified to NSW Health of which nine were residents of the Hunter Health Area. Interviews with two cases notified by two local doctors initiated the investigation and revealed exposure to foods from the same restaurant (restaurant A). All New South Wales *S*. Potsdam cases, those accompanying cases to restaurant A and people from restaurant A booking lists were interviewed. Of the 34 people interviewed, 17 met the case definition. The epidemiological investigation did not detect a food source of *S*. Potsdam infection, however, shell egg-based Caesar salad dressing and mayonnaise, and a swab of a cap from a mayonnaise bottle collected at restaurant A tested positive for *S*. Potsdam. Environmental and laying hen feed samples from the egg supplier to restaurant A and meat meal, (the major component of laying hen feed) tested positive for various *Salmonella* serotypes. The investigation identified problems of inadequate cleaning, time-temperature abuse, and ignorance of the hazardous nature of raw shell eggs at the restaurant level, poor sanitation and a lack of hygiene inspections at the egg production level, and problems with cleaning, storage and lack of bacterial monitoring of final product at the animal rendering plant. Investigation of 12 notified cases of *Salmonella* resulted in public health interventions, which likely prevented further cases of foodborne disease due to *Salmonella* and other pathogens in the Hunter Health Area and elsewhere in New South Wales. *Commun Dis Intell* 2003;27:508–512.

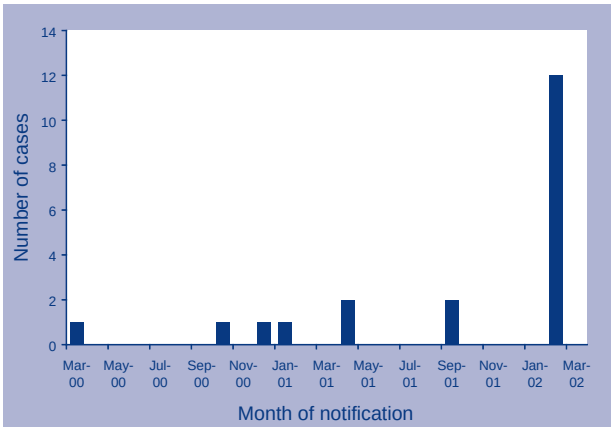
Keywords: Salmonella *Potsdam, salmonellosis, outbreak, eggs*

Introduction

Salmonella Potsdam is a relatively uncommon serotype in Australia with between 40 and 60 cases detected annually since 1991.[1] In New South Wales between 1 and 12 cases are detected annually[2] (Figure 1) and Queensland reports the greatest number of cases each year (20–40).[1] Non-clinical Australian sources of *S*. Potsdam include native animals and birds, nuts, vegetables, bottled oysters, eggs, domestic animals, farm animals, sewage effluent, spices, and meats, among samples tested between 1988 and 2002.[1]

We are not aware of published reports of outbreaks of *S*. Potsdam in Australia or elsewhere, however, an outbreak with no identified risk factors occurred in Queensland in 1988 with a total of 109 cases detected for the year.[1] During 1988, 62 of the 109 cases were detected from January to February but no investigation was reported. A further cluster of seven Queensland cases associated with foods consumed at an Asian stall at an Expo, was detected in December 1988.

Figure 1. *Salmonella* Potsdam notifications in New South Wales from March 2000 to March 2002



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On 8 February 2002 the NSW Health department received notification that *Salmonella* was detected in the stools of two patients (specimens collected on 4 and 8 February 2002) who had shared meals at restaurant A. Five of the seven people accompanying the two notified cases at restaurant A had been ill with vomiting and diarrhoea.

Methods

Epidemiological investigation

The investigating team attempted to ascertain as many cases as possible in addition to the notified *S*. Potsdam cases. This was undertaken by identification and interview of patrons from restaurant A's booking lists and interview of persons accompanying *S.*Potsdam cases to restaurant A. An ill staff member was also interviewed.

Interviews were conducted with patrons identified through the booking list who had eaten at restaurant A between 27 January and 7 February 2002, *S.* Potsdam positive cases and persons that had accompanied them to restaurant A. *S.* Potsdam positive cases were asked about their illness and asked about meals eaten outside the home in the week prior to illness and asked to describe or name the meal and beverages consumed during restaurant meals. Respondents identified through the booking list, those accompanying *S.* Potsdam cases to restaurant A and the ill staff member were asked about illness and the meal eaten at restaurant A. Those indicating that they had been ill were also asked about meals eaten outside the home in the week prior to illness, in addition to restaurant A and asked to describe or name the meal and beverages consumed. Restaurant A supplied the dinner and lunch menus. Among persons that ate at restaurant A, the menu was used as a prompt for recording meal information.

A case was defined as a person with a stool sample positive for *S*. Potsdam collected between 12 and 27 February 2002, or a person eating at restaurant A between 27 January and 7 February 2002 that developed symptoms of diarrhoea within 72 hours of consuming food from restaurant A.

Environmental health investigation

Restaurant investigations

An inspection of restaurant A was undertaken on 12 February 2002 to obtain a booking list (for the period 27 January to 7 February 2002), menus, information on staff illness, and a log of customer complaints. An environmental and regulatory investigation of the kitchen area was performed. The following day food and environmental samples were obtained. A further visit occurred on 21 February 2002 to assess compliance with previous directions and to obtain samples of all ingredients of all dressings. Information on recipes, preparation of dishes and a list of suppliers of ingredients and sources of shell eggs were also obtained. Three cases identified a second restaurant (Restaurant B) which was investigated on 7 March 2002.

Egg producer

A shell egg traceback was conducted. Between 27 January and 7 February 2002 there was a single supplier of shell eggs to restaurant A. Environmental samples were obtained from egg producer A on 18 February 2002 and submitted for microbiological examination. Each swab was taken from multiple sites to reflect the environment of the operation and not just isolated areas. Egg producer A was supplementing stocks between 27 January and 7 February 2002 with eggs from egg producer B, located in Sydney. This premises was also inspected.

Animal rendering plant

The dried feed given to laying hens by egg producer A was predominantly made up of meat meal produced by a single supplier. The plant was investigated on 5 March 2002 when samples of meat meal from the animal rendering plant were obtained and submitted for microbiological examination.

Laboratory investigations

Clinical samples were cultured for *Salmonella*, *Shigella* and *Campylobacter* species and examined for parasites by microscopy at local laboratories and *Salmonella* isolates were forwarded to the Institute of Clinical Pathology and Medical Research, Westmead, New South Wales for serotyping. Environmental samples were tested for *Salmonella* species at the Division of Analytical Laboratories, Lidcombe, New South Wales, and *Salmonella* isolates were forwarded to the Institute for Medical and Veterinary Sciences, South Australia, for serotyping.

Results

Epidemiological investigation

A total of 34 people were interviewed, 12 were identified through notifications, 14 identified using restaurant A's booking list, seven were identified by notified cases as accompanying them to restaurant A and one was a staff member from restaurant A. Of those interviewed 32 (94%) consumed food and/or beverages at restaurant A. Seventeen persons (50%) met the case definition, 12 (71%) had *S.* Potsdam detected in stool samples, the remaining

five cases were identified through interview but did not have a stool sample collected. Of the 17 cases, 10 had eaten lunch, two had eaten dinner, two had consumed coffee, two had not eaten at restaurant A and one staff member ate an item from the lunch menu (Table). Of the four *S*. Potsdam cases that did not eat a meal at restaurant A, two consumed coffee at restaurant A and ate dinner at restaurant B, one worked in the kitchen at restaurant B and one was a baby with no apparent connection to restaurant A or B. Thus 15/17 cases ate or consumed a beverage at restaurant A. The epidemic curve is shown in Figure 2.

Table. Summary of meals consumed at restaurant A among persons interviewed

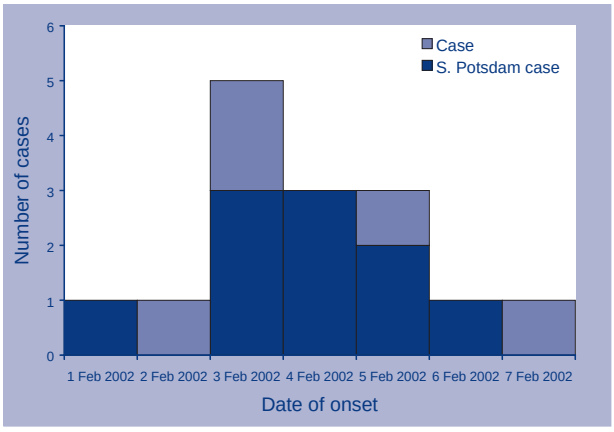
Restaurant meal	Interviewed	Number ill	*S.* Potsdam positive
Dinner	14	2	2
Lunch*	14	11	7
Coffee	4	2†	1
No food or beverage	2	2	2
Total	34	17	12‡

* Includes one staff member that ate an item from the lunch menu.

† 2/2 ate dinner at restaurant B.

‡ All ill.

Figure 2. Number of cases of gastrointestinal illness at restaurant A in New South Wales, 1 to 7 February 2002, by date of onset*



* (N=15, no onset date was recorded for 2 cases)

Of the 17 respondents that met the case definition, 18 per cent were males, 82 per cent were females, and the median age of cases was 28.8 years (range 1–77 years), not significantly different from the median age of those without illness (44.3 years, range 3–71 years). Symptoms included diarrhoea (94%), cramps (88%), nausea (65%), fever (59%), headache (53%), joint pain (35%), vomiting (29%) and lethargy (24%). Of cases with diarrhoea (N=16), none had blood in their faeces. One case reported faecal incontinence, one case reported metallic taste, one case reported loss of sensation in hands, and one case reported light-headedness. The median incubation period was 21 hours (range 3.5 to 95 hours) and the median duration of illness was five days (range 2 to 8 days). Eleven cases (65%) consulted a general practitioner, one person went to an emergency department and two were hospitalised.

An analysis of foods consumed at restaurant A revealed that cases ate a variety of foods with no particular menu item commonly eaten. Of the 15 cases that ate or consumed a beverage at restaurant A, 4 (27%) ate menu items that included egg-based dressing. Three cases implicated restaurant B but had eaten different meals at restaurant B. Furthermore, two of the three consumed coffee and biscuits at restaurant A.

Environmental investigation

Restaurant investigations

During the inspection of restaurant A undertaken on 13 February 2002 it was indicated that the majority of meals were served at lunchtime with approximately 300 lunches served on a typical day. Of food and environmental samples collected, Caesar dressing, dill mayonnaise, and the cap of the dill mayonnaise bottle tested positive for *S*. Potsdam. *Salmonella* species was not detected in samples of sweet chilli dressing, pesto dressing, olive dressing, whole shell eggs, and caps from other dressing bottles. No *Salmonella* species was detected in dressing ingredient samples collected on 21 February 2002. During an inspection it was noted that the procedure for preparing dressings involved making a single batch of mayonnaise (using raw, whole, shell eggs), which was divided to make the Caesar dressing and the four other types of mayonnaise. The laboratory recorded pHs of the mayonnaises ranging from pH 3.4 to 5.4.

Kitchen staff reported that dressings were stored in multiple dispenser bottles and that several partly used dressing stocks could be in use at a given time. The base-mix was not made fresh each day and topping-up of bottles occurred, often in anticipation of peak sales periods. This suggested that some stocks of raw egg containing mayonnaise were prepared several days prior to serving. On inspection the dispenser bottles used to store dressings were observed to be non-re-useable, stained and perished and contained food residues and odour. Thus restaurant A was not able to effectively clean the bottles. Several plastic bottles had become soft and tacky further hampering cleaning. Staff reported that the ready-to-use dressings in dispenser bottles were often kept out of the refrigerator for extended periods of time at warm room temperature.

The kitchen was observed to be very small (2 m x 7 m with approximately one-third of that space for food preparation) given the number of meals prepared on a typical day. The intensive use of food preparation areas provided many opportunities for cross-contamination between raw and prepared foods. Numerous breaches of food regulations were detected which resulted in the entire restaurant being disinfected under the supervision of food inspectors on 21 February 2002 to prevent a recurrence.

Egg producer investigation

Egg producer A produced approximately 300,000 shell eggs per week, mostly for the Hunter region in New South Wales and mostly for restaurants and cafes. Of the 16 environmental swabs obtained, 12 were positive for *Salmonella*. No *S*. Potsdam was detected, however, *S.* Agona was found in swabs obtained from egg collection trolley wheels, egg racks of the tier egg laying frame, and feed troughs of the tier egg laying frame. *S.* Infantis was detected in swabs from the egg cleaning cloth, egg racks of the tier egg laying frame, egg collection trolley wheels, and feed troughs of the A-frame laying cages. *S.* Broughton was detected in swabs from egg racks of the tier egg laying frame. Significant food safety deficiencies were identified through the entire production chain. Investigation of egg producer B failed to detect any likely source of *Salmonella* contamination. During the investigation egg producer A reported that there had been no inspection undertaken in over 10 years. It was determined that routine food hygiene inspections of egg producers in New South Wales had not been undertaken since the Egg Board disbanded in 1990.

Animal rendering plant investigation

Meat meal was the major component of laying hen feed at egg producer A and was found positive for *S*. Agona. The capacity of the producer was approximately 100 tonne per week, 97 per cent of which was supplied for broilers to a poultry producer other than egg producer A. The multiple-part, combined sample that was obtained was positive for *S.* Johannesburg. At the animal rendering plant, no documentation of the validation of the rendering process was found, no bacterial monitoring of the product was undertaken and storage bins were never cleaned. Furthermore, the Australian Standard for Hygienic Rendering of Animal Products permits the presence of *Salmonella* in three of the most recent 10 samples of the final product.[3] Transport of the meat meal by egg producer A was reported to be undertaken in a dirty truck indicating an ignorance of the need to keep the product under hygienic conditions.

Discussion

S. Potsdam is a relatively uncommon serotype with between 1 and 12 cases detected annually in New South Wales between 1991 and 2001. NSW Health detected a cluster of 12 notified cases between 12 and 27 February 2002 who predominantly (9 of 12) resided in the Hunter Health Area of New South Wales. During this investigation the investigation team found a link between illness due to *S*. Potsdam and eating at a restaurant with 10 of 12 *S*. Potsdam cases having consumed food or beverage at restaurant A in the 72 hours prior to onset.

S. Potsdam was detected in shell egg-based dressings collected at restaurant A up to 12 days after the first case had eaten there but in no ingredients of the dressings**.** There was a practice of not completely emptying the dressing in dispenser bottles and topping them up with fresh dressing. The dispenser bottles filled with dressing were known by staff to be kept on the bench during busy periods. The high ambient temperatures that occur during February likely created an environment for *Salmonella* to flourish. Attempts to determine the origin of the pathogen in food ingredients were made by sampling all ingredients of the various dressings (all negative for *Salmonella*) and inspecting and sampling at the egg producer and animal rendering plant. *S*. Potsdam was not found in any of these samples, however, there was gross environmental

contamination and a high occurrence of *Salmonella* contamination detected at the egg producer. There was evidence of contamination of the surface of shell eggs since the wet cloth used to wipe dirty eggs at the egg producer was positive for *S*. Infantis. These findings coupled with the fact that egg was an ingredient common to all *S*. Potsdam positive dressings suggest that shell eggs were the most plausible source of *S*. Potsdam. While information obtained at interview could only attribute 27 per cent of cases to dressing consumption, kitchen practices were conducive to cross-contamination which likely explained further cases.

Egg-associated outbreaks of salmonellosis and other foodborne illnesses have been reported in Australia and elsewhere.[4,5] During 2001 and 2002, 13 egg-associated outbreaks not including this outbreak, were reported in Australia, all of which were due to salmonellosis (OzFoodNet Outbreak Register, M. Kirk, personal communication, January 2003). *S*. Potsdam has been detected in egg samples from Victoria in 1982, egg samples from Western Australia in 1985 and 1990,[1] and *Salmonella* species has been detected on the surface of eggs,[7] and in this investigation, on the cloth used to wipe eggs. Furthermore, an outbreak of salmonellosis in South Australia has been linked to raw egg used in Caesar salad dressing (OzFoodNet Outbreak Register, M Kirk, personal communication, January 2003).

This outbreak highlighted a number of important issues. The storage at room temperature of raw shell egg-based dressing and dishes or condiments that are not further cooked should be discouraged. Dressings should be made fresh daily and the temperature of contents be maintained at ≤5° C. Plastic dispenser bottles, which were not intended for re-use, should not be used for storing food. SafeFood Production, New South Wales is in the process of developing a food safety scheme for egg producers, in consultation with the egg industry in response to issues raised during this investigation.

As this investigation has shown, a comprehensive through-food-chain approach of investigating small clusters of *Salmonella* can have an impact on the food industry. On-going monitoring and inspection within the context of accredited Hazard Analysis and Critical Control Point programs will be an important public health intervention.

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References

1. National Enteric Pathogen Surveillance Scheme (NEPSS) data. Microbiological Diagnostic Unit, Department of Microbiology and Immunology, the University of Melbourne, March 2002.

2. Communicable Disease Control Branch, NSW Health, Notifiable Diseases Database, 2002.

3. Australian Standard of Hygienic Rendering of Animal Products. AS 5008:2001. SCARM Report No. 76.

4. Sarna M, Dowse G, Evans G, Guest C. An outbreak of *Salmonella* Typhimurium PT135 gastroenteritis associated with a minimally cooked dessert containing raw eggs. *Commun Dis Intell* 2002;26:32–37.

5. Hall R. Outbreak of gastroenteritis due to *Salmonella* Typhimurium PT135a following consumption of raw egg. *Commun Dis Intell* 2002;26:285–287

6. Outbreaks of *Salmonella* serotype Enteriditis infection associated with consumption of raw shell eggs — United States, 1994–1995. *MMWR* 1996;45:737–742.

7. International Commission on Microbiological Specifications for Foods (ICMSF). Microbial ecology of foods. Food commodities. Vol. 2. New York: Academic Press, 1980.