

Outbreak of salmonella food poisoning amongst delegates at a medical conference

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ABSTRACT – An outbreak of *Salmonella typhimurium* DT9 food poisoning due to contaminated chicken pieces affected at least 196 delegates at a medical conference. Twelve per cent of the cases reported suffering parasthaesiae. Nine reported serious complications of infection which included rectal prolapse and perianal abscess. Antibiotic therapy did not measurably reduce the duration or severity of diarrhoea. Over 1,600 doctor-days were lost to the NHS. Most doctors sought expert infection control advice before returning to work but the advice given differed between hospitals.

Salmonella food poisoning usually causes an acute self-limiting illness with fever, abdominal pain and diarrhoea within 12–72 hours of ingestion of the contaminated food [1]. However, symptoms may be more severe in the very young, the very old and the immunosuppressed, and severity of symptoms may be related to the infective dose [2, 3]. We report an outbreak of *Salmonella typhimurium* DT9 infection affecting delegates at a medical conference which afforded the rare opportunity to obtain expert assessment of clinical features and severity of symptoms in relation to a high infective dose.

On Saturday 6 September 1986 delegates at a medical conference presented at the accident and emergency department with severe diarrhoea, fever and abdominal pains. Twenty-three were admitted to hospital in Cardiff. On Sunday 7 September, *Salmonella typhimurium* DT9 was isolated from faeces of cases and from cooked chicken pieces remaining from a buffet lunch on 5 September. A postal questionnaire survey of the 427 delegates was undertaken on 9 September

to investigate attack rates and food consumption. A follow-up questionnaire was sent to all cases to ascertain duration of illness and medical complications.

Results

Clinical features and epidemiology

Of 427 delegates attending the conference, 360 (84%) returned questionnaires. Of the 266 delegates who attended the buffet lunch on 5 September, 196 (74%) aged between 22 and 61 years (mean 37 years, median 35 years) reported gastrointestinal symptoms (Table 1) from 5 to 10 September (Fig. 1). Fifty-eight patients had positive faeces samples. Peak onset was between 4 and 8 am on 6 September, giving a modal incubation period of 16 hours and a median of 18 hours. Thirty-two (16%) were admitted to hospital, all with *S. typhimurium* DT9 infection, and their duration of stay ranged from 2 to 7 days (median 4 days). Nine

Table 1. Symptoms reported by 196 ill delegates.

Symptoms	Number	(%) (n = 196)
Diarrhoea	186	(95%)
Abdominal pain	178	(91%)
Feverishness	163	(83%)
Headache	143	(73%)
Muscle pains	132	(67%)
Rigors	116	(59%)
Vomiting	100	(51%)
Mucus in faeces	54	(28%)
Parasthaesiae	23	(12%)
Blood in faeces	10	(5%)

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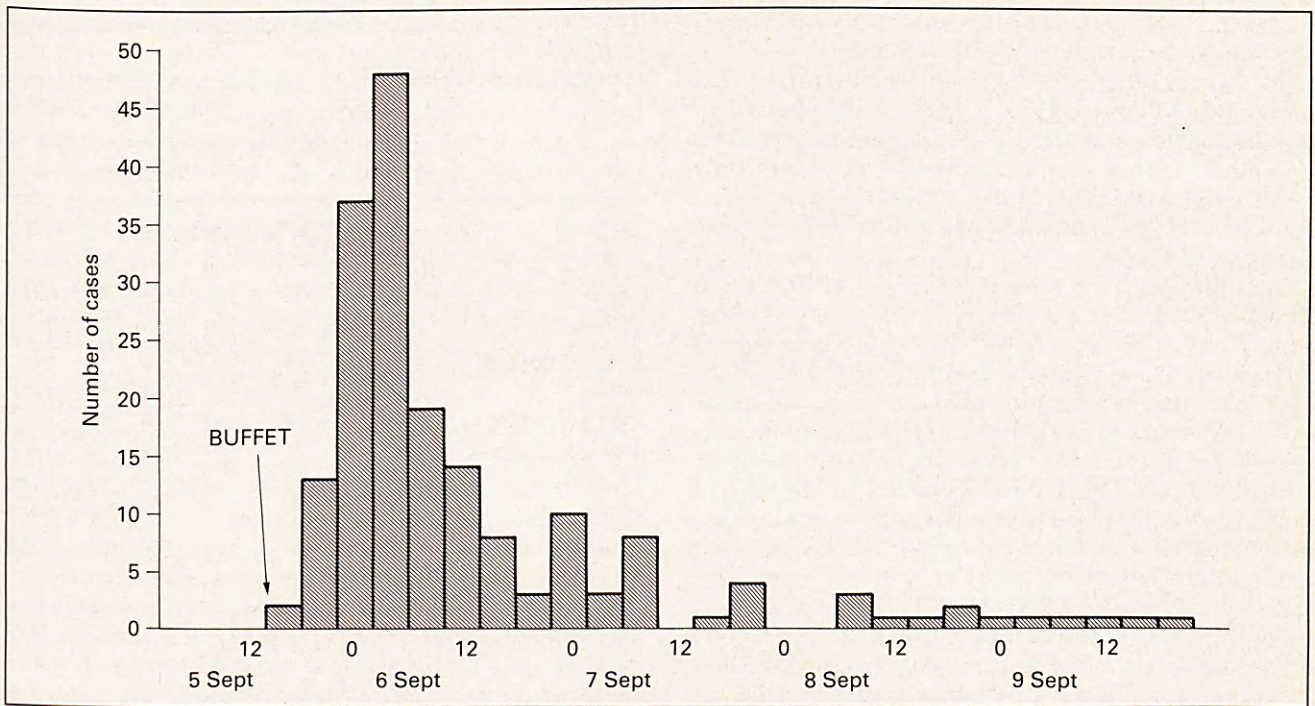


Fig. 1. Number of cases according to time of onset.

patients reported serious complications of infection including rectal prolapse and perianal abscess requiring surgical drainage (Table 2).

Duration of symptoms reported by 148 (75%) of 196 ill delegates who returned the follow-up questionnaire ranged from 1 to 42 days (mean 10 days, median 8 days). There was no association between duration of symptoms and age. The maximum stool frequency in a 24 hour period reported by 177 cases ranged from 1 to 96/day (mean 15 per day, median 12 per day). Those under 35 years of age had a daily mean of 19 motions compared with 12 for 35–44 years old, 12 for 45–54 years old and 8 for those over 55 years ($p = 0.02$).

Twenty-three cases (12%) reported parasthaesiae as a major symptom. They were slightly older on average (39 years v 37 years) and had a higher maximum daily stool frequency (16 v 15) but these differences were

not statistically significant. However, more of them had rigors (83% v 56%, $p < 0.0001$), and the symptoms of their illness lasted for a mean of 12 days compared with 9 days for those without parasthaesiae ($p = 0.08$).

Thirty-seven patients (19%) reported receiving antibiotic therapy. Antibiotics used were amoxycillin (13 cases), ampicillin (10 cases), septrin (8 cases), erythromycin (4 cases) and trimethoprim (1 case). Twenty-seven (73%) of these patients had had rigors compared with 56% of other cases ($p = 0.09$). Their mean maximum daily stool frequency was 20 compared with 13 ($p = 0.001$) and their symptoms lasted on average 12 days compared with 9 days ($p = 0.16$) for the others. Antibiotic therapy did not measurably lessen the severity or duration of diarrhoea since of the 116 cases with rigors there was no significant difference in the mean maximum frequency of stools or in the mean duration of symptoms in those receiving antibiotics and those who did not receive them.

The presence of gastrointestinal illness was specifically associated with consumption of only one food item, chicken pieces (Table 3). For those who reported eating chicken the attack rate declined with increasing age. It was 89% (79/89) in those aged under 35 years, 86% (65/76) for 35–44 years old, 78% (25/32) for 45–54 years old and 71% (5/7) in those 55 years and older. Of the 32 cases who ate more than one portion of chicken, 28 were under 45 years old and their attack rate was 89% (25/28) compared with 87% (119/137) of those under 45 years old who only ate one portion. There was no difference in the mean maximum stool frequency or in the duration of illness of cases under 45 years old who ate one or more chick-

Table 2. Complications reported by 196 ill delegates.

Complications	Number of cases
Perianal abscess	1
Rectal prolapse	1
Angio-oedema	1
Arthralgia	1
Disruption of diabetic control	1
Lactose intolerance	1
Tremor	1
Pericarditis at ⁶ / ₅₂	1
Renal colic	1

en pieces. Parasthaesiae was present in only one of 29 cases who ate two or more pieces of chicken.

The 147 replying to the follow-up questionnaire had 353 household contacts and 6 (2%) were reported to have had gastrointestinal illness between 9 and 29 September. Faeces samples were cultured from only one of them and found to be negative for salmonella. Only one (3%) of 37 household contacts under 5 years old reported illness.

The time lost from work reported by 113 of the ill delegates ranged from 1 to 52 days (mean 10 days, mode 7 days, median 8 days). Of the 147 ill delegates who replied to the follow-up questionnaire, 111 (76%) reported that they sought advice from a colleague before returning to work. Forty (27%) consulted their hospital control of infection officer, 36 (24%) another hospital microbiologist, 28 (19%) with the MOEH, of whom 19 also discussed with a hospital microbiologist, and 52 (35%) with other colleagues, which included their general practitioner (11), infectious disease physician (5), gastroenterologist (3) and occupational health service (3). Few delegates took the opportunity to report advice they were given, but there was a divergence of opinion about when doctors should be allowed to return to work. One doctor was advised by his consultant and the control of infection officer to return to work despite persistence of diarrhoea, whilst five doctors were told not to return to work until three negative faeces samples had been obtained. The usual advice, however, was to observe careful hygiene and return to work when symptoms had ceased. There was no agreement on the need for faeces sampling of the patients or their families.

Food preparation and microbiology

Salmonella typhimurium DT9 was cultured from cooked chicken pieces taken from the kitchen refrigerator on 6 September at a count of 2.8×10^6 organisms/g and from samples on 7 September at counts of 8.4×10^4 organisms/g. The same organism was cultured from chicken liver pate and cooked beef taken on 6 September at counts of less than 20 organisms/g and from wholemeal breadcrumbs used to coat the chicken pieces at counts of 9×10^2 organisms/g. The chicken pieces available for culture were from the same batch as those served at the buffet. They had been defrosted at the same time, steam-cooked but had been deep-fried after coating in breadcrumbs whereas the chicken pieces served at the buffet had been roasted.

The chicken for the buffet comprised 50 3–4 lb frozen chickens imported from France. They were taken from the deep-freeze on 3 September and laid out in a single layer on tables to thaw at room temperature. On the morning of 4 September carcasses were cut into pieces and placed in 6 perforated steamer oven trays in stacks in one oven for about 45 minutes. After cooking, the trays were left *in situ* with the door of the steamer open. They were then taken to a side room for 2 hours before refrigeration for 2 hours. The pieces were then passed through containers of flour,

Table 3. Attack rates for delegates eating and not eating specific foods.

Food	Eaten			Not eaten			Relative risk
	Ill	Total	%	Ill	Total	%	
Tuna	70	98	72	127	169	76	0.9
Ham	48	63	77	149	204	73	1.1
Beef	29	46	64	168	221	76	0.8
Salmon	38	46	84	159	221	72	1.2
Egg mayonnaise	67	89	76	130	178	73	1.0
Pate	50	66	76	147	201	74	1.0
Beef sandwiches	10	13	79	187	254	75	1.1
Ham sandwiches	15	20	75	182	247	74	1.0
Chicken	182	213	86	15	54	29	3.0*
Quiche (cheese)	80	108	50	117	159	74	0.7
Quiche (ham)	18	21	86	179	246	73	1.2
Ham & turkey pie	103	137	76	94	130	73	1.0

* $\chi^2 = 70.7$; $p \lll 0.01$

egg-wash and breadcrumbs and packed into roasting trays over a period of 1½ hours. The trays were kept in a refrigerated larder until 10 am on 5 September. One batch of chicken pieces was placed in the deep-fat frier but since they were too dark in appearance it was decided to place the remainder of the chicken in roasting trays in a gas oven for 30–40 minutes at full temperature. The chicken was then put in the cold larder until served at the buffet.

Discussion

This outbreak was unusual in that it affected mainly doctors, who might be expected to provide the most accurate recall of symptoms of any patient group. This may explain the finding that 12% of those affected reported parasthaesiae as a major symptom. To our knowledge, this is a new observation. One account described the development of symptoms as follows: 'The pace, however, hotted up with rigors and then most severe pains in both thighs accompanied by parasthaesiae in the legs' [4]. Cases reporting parasthaesiae were on average older and had more severe diarrhoea and systemic symptoms. They were also ill for longer than other cases. Possibly this symptom reflected a higher infectious dose which may also explain the greater frequency of rigors in this group. Those who had parasthaesiae were not more likely to have eaten more of the implicated chicken, but the chicken pieces may not have been evenly contaminated.

The 'typical' illness began suddenly 18 hours after the buffet, with fever, abdominal cramps, muscle pains, rigors and diarrhoea, the latter persisting for about 9 days. At its worst the diarrhoea caused on average 15 bowel motions in a day. Severity of diarrhoea

but not duration was inversely related to age. Antibiotics given because of systemic symptoms did not measurably reduce the severity or duration of diarrhoea.

The vehicle of infection was the chicken drumsticks. Chicken has been the main identified cause of salmonella outbreaks in the United Kingdom in recent years [5]. Most chicken carcasses purchased in shops are contaminated with salmonellae [5], and inadequate thawing, cooking and prolonged and inadequate storage of cooked chicken before consumption are the main factors leading to food poisoning [6]. Cross-contamination of cooked from raw meat is also an important factor. The precise explanation for this outbreak was not determined but probably undercooking, cross-contamination and storage at ambient temperature contributed to the large number of salmonellae found on chicken pieces from the same batch. The original source of the salmonella infection is likely to have been the raw chicken carcasses.

An important consequence of such an outbreak can be seen from the disruption to the NHS when over 200 doctors in a single specialty from all over the United Kingdom are affected simultaneously. Sixteen per cent were admitted to hospital for an average of 4 days, and we estimate that more than 1,600 doctor-days were lost over a period of 3 weeks, mainly from the care of diabetic patients. The restaurant implicated in this outbreak was on hospital premises but did not serve patients. A recent review of salmonella outbreaks in hospitals in England and Wales showed that 16% of outbreaks between 1978 and 1987 involved only hospital staff. Staff restaurants and canteens 'should be included in any hygiene inspection and guidelines laid down by environmental health officers' [7] for hospitals.

The decision concerning return to work was clearly taken responsibly by most doctors who sought expert advice about infectiousness and preventive precautions. In most cases return to work was recommended once diarrhoea had ceased, although several doctors were kept off work until three consecutive negative faeces samples had been obtained. The current recommendation of the PHLS for health care workers who have direct contact with highly susceptible patients is that they should be excluded from work until symptom-free. In normal circumstances they should be allowed to return to work if they have well formed stools even if they are excreting salmonellae [7]. Salmonella excretion persists on average for 5 weeks [8] after illness, so exclusion until faeces become negative may cause considerable logistic problems for patient care. Anyway the risk to patients from staff who are symptomless excretors is very small [9]. In one study the risk to patients from infected nurses with diarrhoea was less than 1 in 1,000 staff-patient contacts [10]. Our advice to infected doctors was that with careful hygiene they were safe to return to work once symptoms had ceased.

References

1. Beneson, A. S. (ed.) (1985) *Control of communicable diseases in man*, 14th edn. American Public Health Association.
2. Taylor, D. N., Bopp, C., Birkness, K. and Cohen, M. L. (1984) An outbreak of salmonellosis associated with a fatality in a healthy child: a large dose and severe illness. *American Journal of Epidemiology*, **119**, 907-12.
3. Blaser, M. J. and Newman, L. S. (1982) A review of human salmonellosis. I. Infective dose. *Reviews of Infectious Diseases*, **4**, 1096-106.
4. Slater, S. D. (1986) Personal view. *British Medical Journal*, **293**, 1096.
5. Humphrey, T. J., Mead, G. C. and Rowe, B. (1988) Poultry meat as a source of human salmonellosis in England and Wales. *Epidemiology and Infection*, **100**, 175-84.
6. Roberts, D. (1982) Factors contributing to outbreaks of food poisoning in England and Wales 1970-1979. *Journal of Hygiene (Cambridge)*, **89**, 491-8.
7. Joseph, C. A. and Palmer, S. R. (1984) Outbreak of salmonella infection in hospitals in England and Wales 1978-87. *British Medical Journal*, **298**, 1161-4.
8. Buchwald, D. S. and Blaser, M. J. (1984) A review of human salmonellosis. II. Duration of excretion following infection with nontyphi salmonella. *Reviews of Infectious Diseases*, **6**, 345-56.
9. White, P. M. B. (1986) Food poisoning in a hospital staff canteen. *Journal of Infection*, **13**, 195-8.
10. Tauxe, R. V., Hassan, L. F., Findeisen, K. O. et al. (1988) Salmonellosis in nurses: lack of transmission to patients. *Journal of Infectious Diseases*, **157**, 370-3.

Royal Colleges of Physicians MRCP (UK)

Part 1

The next MRCP (UK) Part 1 Examination will take place on Thursday, 28th June 1990.

Application forms accompanied by the necessary certificates and fee of £135.00 must reach the College of entry by Friday, 11th May 1990.

Prospective candidates should have been qualified for at least 18 months and may enter through any one of the Colleges listed below.

Part 2

The next MRCP (UK) Part 2 Examination will begin on Tuesday, 8th May 1990.

Application forms accompanied by the necessary documentation and fees must reach the College of entry by Friday, 30th March 1990.

Prospective candidates should have been qualified for 2½ years and must comply with the regulations concerning training in acute medicine.

The Examination fees: *Written Section* £130.00 *Oral and Clinical Section* £145.00. The London College will require separate cheques. The Scottish Colleges will require a single cheque for £275.00.

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