An epidemic of gastro-enteritis in West Lothian

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SUMMARY. This article describes an epidemic of gastro-enteritis due to *Salmonella typhimurium* in a semi-rural practice. Methods of investigation and control of the outbreak are outlined, clinical features are described, and management of 97 patients discussed. Attention is drawn to the prolonged carrier state which may occur, and to the possible hazards of antibiotic therapy.

Introduction

THE practice has three full-time partners, providing a 24-hour service for a list of approximately 7,600 patients. This is virtually the entire population of five small villages situated along a five-mile stretch of trunk road, and the immediate hinterland. The compact and self-contained nature of the practice aids the investigation and control of such an epidemic.

Outbreak

On Sunday, 24 September 1978, calls were received from five patients suffering from colicky mid-abdominal pains, vomiting, and diarrhoea. Later in the week it became clear that there was an explosive outbreak of gastro-enteritis in the practice, judging from the number of calls and enquiries received from patients with enteric symptoms. Stools from the five initial patients were sent to the laboratory at Bangour Hospital, and by 28 September *Salmonella typhimurium* had been isolated from all five.

Cases were notified to the Community Medicine Specialist, by the practice and the laboratory. Investigative and control measures were instituted by the Community Medicine Specialist in collaboration with environmental health officers of the West Lothian District Council. Through their courtesy the full data on the epidemic were obtained.

Figure 1 shows the course of the epidemic by dates of notification. The largest number of cases (21) was recorded on 9 October 1978. The last new case detected was on 6 November.

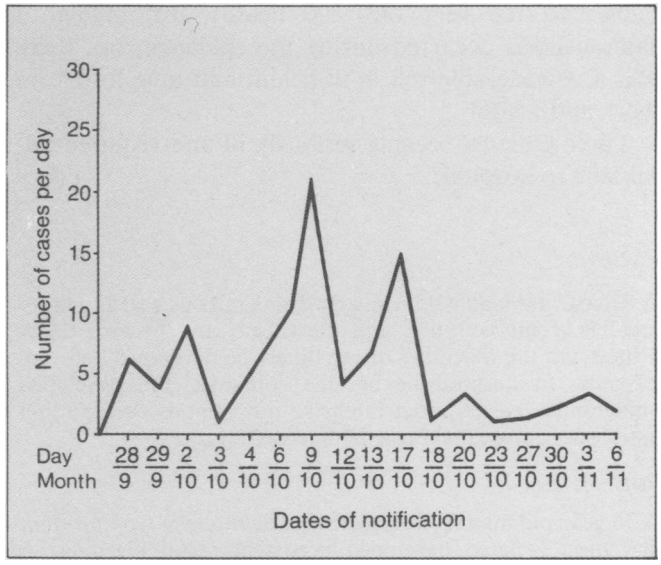
Figure 2 shows the cumulative total of cases, 97 in all.

Early in the epidemic, guidelines were issued by the Community Medicine Specialist on "Procedures to be adopted in the control of salmonellosis". A high-risk group of bacteriologically positive patients was identified. This included food handlers, nurses, dentists, teachers, and play-group supervisors. These people stayed away from work until six negative stools at intervals of not less than two days had been obtained. Absence from work or school was less stringently imposed on other workers, children, and contacts, one to three negative stools being required before return.

It was valuable to have a uniform policy from the outset, because we found that patients requested information not only from ourselves and our staff, but from the environmental health officers, district nurses, and the Community Medicine Specialist's office.

Each household with a bacteriologically proven case of salmonellosis was visited by the environmental health officers, who compiled a list of where each family obtained food and milk, and had meals away from home. From the enquiries the one common factor that emerged was that 53 out of 56 households obtained their milk from one particular dairy farm.

Figure 1. *Number of cases notified during the epidemic.*



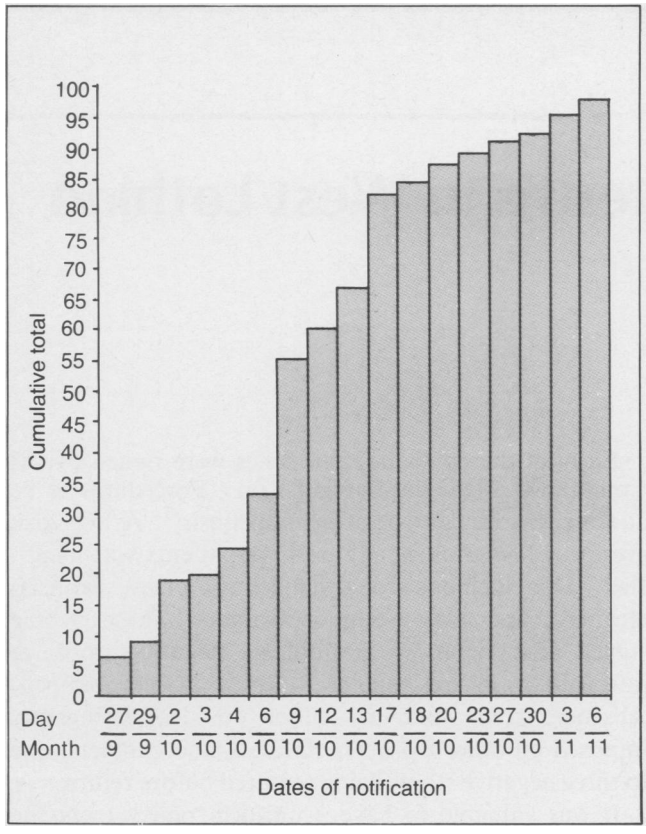


Figure 2. *Cumulative total of cases.*

Clinical features

The more severely affected patients were seen in the early stages of the epidemic. Of the five patients seen on the first day, all were febrile: one youth had high fever with rigors. All had colicky abdominal pain and profuse diarrhoea, three with fresh blood in the stool. Four had vomited several times. Three adults reported headache, dizziness, and generalized aches and pains. This pattern of symptoms continued in varying degrees throughout the epidemic. Symptomless carriers were also detected. All age groups in the community were affected, from babies to the very old. No deaths attributable to salmonellosis occurred during the epidemic, but there was a considerable toll in ill health and time lost from work and school.

Three patients became seriously ill and required admission to hospital:

Patient 1

A 62-year-old man who regularly drank milk as well as whisky had persistent vomiting and diarrhoea, and became dehydrated. On the third day of the illness he developed delirium tremens. In hospital he became comatose and developed pneumonia. He required intensive intravenous therapy and antibiotics before making a complete recovery.

Patient 2

A 36-year-old man from whose stool *Salmonella typhimurium* had been isolated developed persistent rectal bleeding. A diagnosis of ulcerative proctitis was made after sigmoidoscopy.

Patient 3

Two weeks after a mild attack of diarrhoea and vomiting lasting for two or three days, a 38-year-old woman developed joint pains affecting both knees, left ankle, and right hip. *Salmonella typhimurium* was isolated from her stool for the first time when the joint pains occurred. A large effusion developed in the left knee, and she became constitutionally ill. The effusion was aspirated later in hospital, but no pathogen was isolated. The patient was incapacitated by joint pains for six weeks but had fully recovered by 12 weeks.

A further case of joint effusion affecting the left knee occurred in a bacteriologically positive boy of 15 years, three weeks after the onset of diarrhoea and vomiting. The effusion persisted for three weeks after which complete recovery took place. Hospital admission was not required. The boy continued to complain of pain and occasional swelling of the knee during the subsequent year.

Management

Three severely ill patients were admitted to hospital. The remaining 94 were treated at home on a régime of bed-rest, 'fluids only' for 24 to 48 hours until the vomiting ceased, and symptomatic remedies such as chalk and opium mixture BP and diphenoxylate hydrochloride with atropine sulphate (Lomotil). Symptoms usually subsided in two to three days although in four patients moderate diarrhoea persisted for 10 to 14 days. In these patients dehydration was not a problem.

Stool cultures were repeated at intervals of two to three days until negative cultures were obtained. Within four weeks the majority of stool cultures were reported negative. Five patients continued to excrete *Salmonella typhimurium* at eight weeks—two adults and three infants. At 13 weeks, one adult and three infants continued to excrete the organism, and two infants and one adult were still doing so at 26 weeks (Table 1).

Of the five patients remaining at home who continued to excrete *Salmonella typhimurium* for eight weeks or longer, four had been treated with antibiotics, without apparent effect on the carrier state. Patients 1 and 3, who were admitted to hospital, were treated intensively with ampicillin and chloramphenicol respectively, in a dosage of 1-2 g daily for two to four weeks after which their stools became negative on six occasions. The remaining 90 patients were not treated initially with antibiotics for their salmonella infection.

Discussion

In the majority of patients, the illness was confined to symptoms of gastro-enteritis, but in two patients out of 97, joint symptoms occurred, an incidence of just over two per cent. After dysenteric infections of all types—salmonella, shigella, *Yersinia enterocolitica,* and possibly enterovirus, typical Reiter's syndrome with con-

Table 1. Treatment of five patients continuing to excrete *Salmonella typhimurium* up to 26 weeks.

Patient	Sex	Date of birth	First positive stool culture	8/52	13/52	26/52	Antibiotic therapy
1.	M	3.2.78	24.9.78	+	+	+	Neomycin for 7 days from 24.9.78 'Ceporex' for 7 days from 20.12.78
2.	F	24.2.78	29.9.78	+	+	+	Pivmecillinam for 10 days from 18.11.78 Neomycin for 7 days from 21.12.78
3.	M	4.1.78	29.9.78	+	+	—	Ampicillin for 7 days from 27.12.78
4.	F	23.11.40	6.10.78	+	+	+	Pivmecillinam 1.2 g daily for 10 days from 15.11.78
5.	M	28.6.43	27.9.78	+	—	—	No antibiotic

junctivitis, urethritis, and arthritis, with or without fever, can occur. At times arthritis only occurs, often tending to flit initially and then settling in a few joints. This is described as 'reactive' or 'incomplete' Reiter's syndrome. Other inflammatory bowel disease, such as ulcerative colitis and regional enteritis may be preceded or accompanied by recurrent transient synovitis (Ansell, 1978; *British Medical Journal,* 1979).

Joint symptoms are becoming increasingly recognized as a complication of salmonellosis: commonly the effusion is sterile suggesting a hypersensitivity reaction, but septic arthritis following bacteraemia may also occur.

Proctitis is another well known complication of salmonellosis. It is thought that an acute enteric infection such as salmonellosis may 'unmask' an ulcerative colitis (Dickinson *et al.,* 1979).

Of the five prolonged excretors of salmonella, three were infants aged seven to eight months at the onset of symptoms. One infant had been breast fed for six and a half months, and the other two had been bottle fed, but all were receiving cows' milk when they became infected. Two infants continued to excrete salmonella after seven months. One adult remained positive after six months. This woman had a course of pivmecillinam 1·2 g daily for 10 days in November 1978. It therefore seems that antibiotics are of little value in treatment of the disease, and eradication of the carrier state requires intensive and prolonged antibiotic therapy.

Infants appear particularly liable to become prolonged carriers, perhaps owing to their immature immune system.

The *Salmonella typhimurium* RDNC I isolated in this epidemic was originally sensitive to all commonly used antibiotics: tetracycline, co-trimoxazole, ampicillin, nalidixic acid, cephaloridine, nitrofurantoin and neomycin. Sensitivity patterns were not performed routinely during the epidemic, but the sensitivity pattern in the two persistent excretors of salmonellae has remained unchanged. One of the dangers of indiscriminate use of antibiotics in enteric infections is the development of resistant strains of organisms. Salmonella and *E. Coli* in particular can develop multiple antibiotic resistance via transmissible R-factors. The hazards of spread of such organisms are obvious. Should severe disease occur, the choice of antibiotic available to the clinician would be very limited (Threlfall *et al.,* 1978).

Salmonellae were not cultured from the specimens of milk submitted for examination. The evidence incriminating the milk was therefore circumstantial but very convincing:

1. In the week before the epidemic in our practice, an outbreak of salmonellosis had been reported amongst cattle at the dairy farm. The salmonella isolated from the cows was of the same phage type RDNC I as that isolated from our patients. The farmer himself and two of the milk delivery boys were found to be carrying the same organism in their stools.

2. Of the 97 patients with salmonellosis, 94 got their milk supply from the farm.

3. The initial patients with severe gastro-enteritis all habitually drank raw milk.

4. The explosive nature of the outbreak was compatible with a milk-borne epidemic. The milk in this outbreak was unpasteurized, although the cattle were tuberculin tested and brucellosis accredited.

Possible sources of infection for the cattle came under investigation by the health authorities. Enquiry revealed that in April/May 1978 slurry from the local sewage works, mixed with washings from a poultry processing plant, had been spread on fields in the area, including those belonging to the dairy farm concerned. The slurry had not been ploughed in, and cattle had been allowed to graze on the fields seven to eight weeks later. *Salmonella typhimurium* may remain viable in water, faeces, and pasture for as long as 28 weeks (Cruickshank and Gillies, 1975). Swabs from the local sewage works grew pathogenic salmonellae for example, *Salmonella Newport, Salmonella Virchow.* Washings from the poultry plant contained *Salmonella typhimurium* RDNC I. Methods in common use for treating sewage greatly reduce the content of pathogenic organisms such as salmonellae, tuberculosis, brucellae, and viruses, but should there be short-circuiting, for example, for reasons of expense, hazards could arise for human and animal health, where sewage is spread on agricultural land.

Animal feeding stuffs are a potential source of salmonella infection. It is modern practice in the poultry industry to recycle waste products such as excreta and bones, after sterilization, into feeding stuffs. Few would deny the value of recycling waste products, which provide valuable fertilizer and nutrients, but safeguards must be comprehensive and rigidly enforced to prevent hazards from infection.

Pasteurization of milk for human consumption constitutes a second line of defence against epidemics of similar origin. The fact that the farmer concerned promptly agreed to pasteurize the milk and the early control measures instituted by the health authorities undoubtedly helped to cut short this epidemic of salmonellosis in West Lothian.

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Health insurance in the USA

If the creation of a private health insurance plan shifts the emphasis from comprehensive family care towards an item-by-item, high technology, entrepreneurially oriented health care system, it will also not be worth the price to the country. The present system is remarkable in its devotion to people as people, not as interesting scientific problems to be tackled organ by organ; it is remarkable among health care systems of the world in its devotion to family practice and to the values inherent in that devotion. Anything that would move the value system away from that more humane, more personal approach would remove much of what is best in the British system today.

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