

International outbreak of salmonellosis in a hotel in Lloret de Mar, Spain, August 2007

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International outbreak of salmonellosis in a hotel in Lloret de Mar, Spain, August 2007

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On 21 August 2007, a hospital in Barcelona, Spain, informed local health authorities in Girona of the occurrence of an outbreak of gastrointestinal illness among three families who had eaten lunch at a hotel in Lloret de Mar on 14 August 2007. Only one of these three families was staying at the hotel. The lunch on 14 August at the hotel was the only meal they had shared. Samples for stool culture were collected from six of the 12 affected individuals in this outbreak and all tested positive for *Salmonella* spp.

Local epidemiologists carried out a preliminary investigation by interviewing the 12 cases notified by the hospital in Barcelona on 21 August. Information about clients having stayed at the hotel around 14 August was obtained from the hotel manager and from the health centre that usually provides medical assistance to clients of the hotel.

Affected tourists from 12 countries were detected. Most of these guests had returned to their countries by the time of the investigation. Most of the cases came from France; therefore on 26 August, the French Institut de Veille Sanitaire (InVS) and the four Spanish autonomous regions implicated were contacted to initiate an investigation coordinated by the Centro Nacional de Epidemiología in Spain. On 27 August, a European alert was sent through the Early Warning and Response System (EWRS). On 29 August, after a teleconference organised by the European Centre for Disease Prevention and Control (ECDC), all involved countries were included in the international investigation of this outbreak. The aim of the investigation was to describe the extent of the outbreak and determine the vehicle/source of infection in order to reduce risks of future outbreaks.

Methods

We defined a case as a person presenting gastrointestinal illness within 96 hours after having eaten from the open buffet served for lunch on 14 August at the hotel. We identified people potentially exposed to the meal using administrative data from the hotel and information from consultations of the health centre providing medical assistance to clients of the hotel. We described cases identified in terms of time, place and person. We carried out a retrospective cohort study among all individuals who had lunch at the restaurant and were staying in the hotel in Lloret de Mar on 14 August.

For the retrospective cohort study, data were collected through standardised questionnaires distributed through Enter-net and the EWRS to all countries with individuals potentially exposed to the suspected lunch. Collected information included demographic characteristics, duration of stay at the hotel and exposure to the different food items served at the suspected meal, clinical and microbiological data.

Relative risks (RR) and 95% confidence intervals (CI) for the association of disease with various risk factors were estimated. The effect of potential confounding factors on associations identified in the univariate analysis was assessed with Cox regression models using SPSS 15.0.

We interviewed food handlers involved in the preparation of food for the suspected lunch and collected information on the menu served, preparation and ingredients of all food items, storage and cooling procedures. Information about tasks of each food handler, their hygiene habits, previous contacts with ill individuals and clinical symptoms was also collected. All food handlers were tested for the presence of *Salmonella* in their stools.

Results

Among 271 people potentially exposed to the suspected lunch, 270 were from 12 European countries and one was from Vietnam - the table shows the exact distribution of nationalities. Fifty additional people not staying at the hotel but who had lunch that day at the restaurant could not be reached.

TABLE

Nationalities of guests exposed to *Salmonella* infection in a hotel in Lloret de Mar, Spain, on 14 August 2007 (n=271)

Nationality	Number of guests exposed
Albania	1
Belgium	4
France	110
Hungary	3
Italy	44
Lithuania	1
Luxembourg	4
Romania	1
Russia	5
Spain	80
The Czech Republic	15
United Kingdom	2
Vietnam	1
Total	271

During preliminary investigations, 56 individuals presenting gastrointestinal symptoms were identified: 32 from France, four from Italy, 16 from Spain, one from Romania, one from the Czech Republic and one from Albania.

By 30 September, we had received 61 completed questionnaires from potentially exposed people (response rate: 23%): 21 from France, eight from the Czech Republic and 32 from Spanish Autonomous Regions. No questionnaires were received after that date.

We identified 52 exposed individuals from 61 questionnaires. Four people staying at the hotel but who had not eaten lunch there on August 14 were not included in the analysis. Another five individuals who had not eaten the open buffet for lunch on 14 August but who had eaten at the hotel were also excluded. Among the 52 exposed individuals, 28 fulfilled the case definition (54%). Twelve cases were men and 16 were women. The median age was 22 years [range 2-58]. Onset of illness ranged from 14 to 18 August (Figure 1.).

The most frequent symptoms were: diarrhoea in 100% of cases responding to this question (25 out of 25), fever in 92% (22 of 24) and vomiting in 71% (20 of 28). All symptoms were self-reported. Fifteen cases reported having requested medical assistance. One adult and two children under five years were hospitalised. Two cases mentioned having had stool samples taken. Both reported positive results for *Salmonella* Enteritidis.

Twenty-five food items were served during the incriminated lunch. The attack rate was higher among people who ate spaghetti (AR=75%) compared to those who did not eat (AR=24%) (RR 3.2, 95% CI [1.3 – 7.8]). Spaghetti was the only food item found to be associated with illness in the univariate analysis.

We also verified the effect of spaghetti as a potential confounder for the association between the disease and other foods. In the multivariate analysis, only consumption of pork steak and zucchini modified the effect of spaghetti. The adjusted RR for the association of spaghetti with disease was 7.1 (95% CI [0.9 – 61.1]). No other food items were associated with illness after the multivariate analysis. Out of 28 cases, 19 had provided information on consumption of spaghetti, of which 15 had eaten it.

Out of the eight food handlers, six had eaten the same food as clients on 14 August, two of those six suffered from gastroenteritis; *Salmonella* Enteritidis was isolated from four of them. One food handler who also had symptoms after 14 August declared not having eaten at the hotel and had a positive test result for *Salmonella* Enteritidis.

Salmonella Enteritidis phagetype 21 was identified in stool samples from the six cases reported on 21 August in Barcelona and the four food handlers. Comparison of strains using Pulse Field Gel Electrophoresis (PFGE) showed an identical restriction profile for the 10 strains.

At the moment of the environmental inspection, no leftovers from the lunch of 14 August were available for testing. Refrigerators were found not to be functioning properly, while access to the washbasin was difficult and further away from the food preparation zone. There was no sink in the cold zone. Capacity for food storage was insufficient and containers all lacked temperature control equipment. In the restaurant, the temperature of display containers for the buffet was inappropriate.

Interviews with food handlers revealed that one of the food handlers who felt ill on 15 August and tested positive for *Salmonella* Enteritidis had mixed spaghetti with bare hands. Spaghetti was served mixed with a vegetarian tomato sauce and chopped boiled eggs. The eggs had been bought precooked and packed in plastic boxes. As part of routine quality control procedures of the producer, random batches tested around the same period did not find contamination with *Salmonella*. No further tracing back of the eggs was done by food safety authorities.

Control measures

Food handlers who tested positive for *Salmonella* Enteritidis were immediately put on leave on 27 August by the hotel and only returned to work after they had two consecutive negative test results. The kitchen was disinfected, refrigerators not functioning properly were replaced and the kitchen's infrastructure was improved following environmental inspection. A catering agency provided food until the hotel's conditions met the standards of the food safety agency. No further cases have been associated with the hotel since 18 August 2007.

Discussion

The results of epidemiological analysis strongly suggest an association between consumption of spaghetti at the hotel on 14 August 2007 and illness.

Findings from the environmental inspection support this hypothesis. It is very likely that the spaghetti was kept at a temperature lower than usually recommended, as all dishes were left to cool until lunchtime in the cooking area and without proper protection. The spaghetti dish may have been contaminated either by the precooked eggs, directly by an infected food handler or by cross-contamination. Nonetheless, we lack microbiological information to confirm these hypotheses, as there were no leftovers from the spaghetti dish to be examined.

In the analysis, we considered all exposures related to the lunch on 14 August. However, other food items available at the hotel apart from the buffet, at the snack bar or elsewhere were not accounted for in our analysis. Recall bias is an important issue in retrospective studies. In this case, the time between exposure and interviews was around 15 days. Nonetheless, interviews focused on a single meal for which a complete list of food items was provided by the hotel. There was no pre-established hypothesis as to a specific incriminated food item reducing the chances of information bias either from the interviewers or the interviewees.

Selection bias relating to the low response rate cannot be excluded. However, according to available information, 21% (56 out of 271) of potentially exposed people sought medical while in Lloret the Mar, a percentage similar to that observed in our sample, 24% (15 out of 61 interviewed people), thus ensuring similar attack rates and probably increasing representativeness of the sample.

Given the reduced sample size, we did not have the capacity to test for small associations or potential interactions between risk factors.

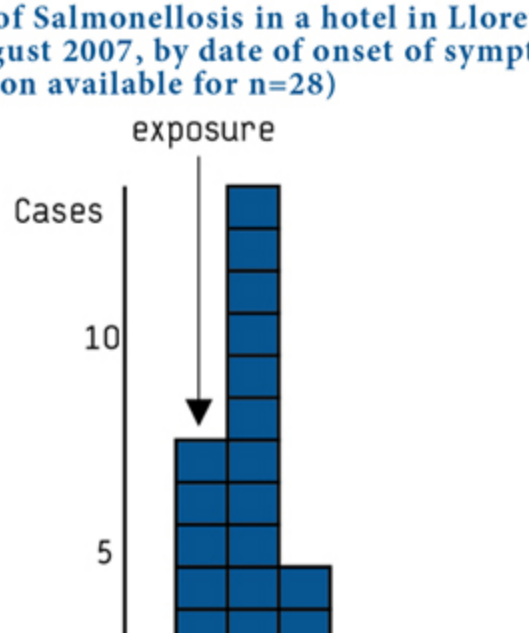
Conclusion

Although results of the investigation were not conclusive regarding the source of contamination, they strongly suggest that a spaghetti dish was the contamination vehicle.

The alert was given in a timely and efficient manner allowing for the rapid beginning of a coordinated international investigation. A high level of participation from implicated countries and Spanish Autonomous Regions contributed to a timely investigation: results were available four days after notification to the Centro Nacional de Epidemiología. The low response rate to the questionnaire could have been reduced, without generating biases in the results, by concentrating the investigation efforts in most affected countries and regions also limiting the time spent in coordination of the outbreak investigation.

FIGURE 1

Outbreak of Salmonellosis in a hotel in Lloret de Mar, Spain, August 2007, by date of onset of symptoms (information available for n=28)



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