

Letter to the Editor

Nosocomial Outbreak of *Salmonella enteritidis* in a University Hospital

To the Editor:

Following the rising importance of *Salmonella enteritidis* infections in Belgium and other countries,^{1,2} we report briefly a nosocomial outbreak of *S enteritidis* in a 355-bed hospital.

On October 17, 1997, the outbreak was revealed by the finding of *S enteritidis* on stool culture of several patients with diarrhea, located on different wards. The patients themselves immediately suspected the ground beef served for dinner the previous day as the source of contamination. An outbreak investigation was promptly started, and all patients, staff members, and visitors who had eaten hospital food and who subsequently developed gastrointestinal symptoms including diarrhea (more than three loose stools per day) with or without vomiting, abdominal pain, and fever were screened for the presence of *S enteritidis* in stools. Stool samples, as well as suspected food items and alimentary residues served on October 16, were cultivated following standard methods. Antibiograms, lysotypes, and pulsed-field gel electrophoresis (PFGE) of *S enteritidis* isolates were performed using standard techniques. The hospital kitchen was inspected, and food-handling procedures were reviewed.

In total, 88 persons who had eaten the ground beef and subsequently developed gastrointestinal symptoms were identified, 41 (47%) of whom met the case definition (persons with a stool culture yielding *S enteritidis* after October 17). Thirty-four were patients, 2 were staff members, and 5 were visitors. Forty-seven additional symptomatic persons (26 patients, 7 visitors, and 4 staff members) who lacked microbiological confirmation were considered as probable cases of salmonellosis. The shape of the epidemic curve confirmed the point-source outbreak (Figure). The overall attack rate for patients was 10.9% (34/310 consumers) but varied between 3% and 100% on different wards (patients

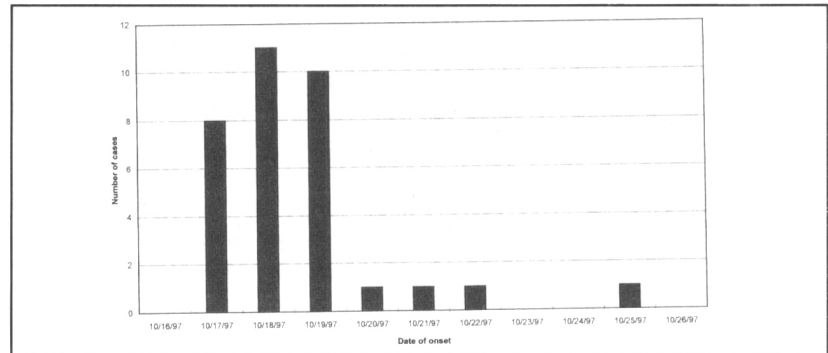


FIGURE. Epidemic curve.

located on all 14 wards were affected). A hygiene inspection in the kitchen revealed that the ground beef preparation differed according to the diet. First, the low-fat diet was prepared by mixing raw meat with raw eggs; after that, the regular ground beef dish was made with commercially prepared mayonnaise. The same bowl was used to prepare both types of ground beef and was not cleaned between uses. The ground beef was not cooked but was stored in a refrigerator until served. Cultures confirmed the initial suspicion: *S enteritidis* was grown from the ready-to-eat ground beef samples, whereas cultures of two remaining raw eggs were negative for *S enteritidis*. All *S enteritidis* isolates tested had the same antibiogram pattern, were lysotyped as phage-type 4 (PT4), and had the same PFGE pattern. The clinical course was rapidly favorable for all but 1 person, who became symptomatic 9 weeks later. Infection control measures were implemented on the wards and in the kitchen, including enteric isolation of affected patients, removal of the contaminated food, and exclusion of raw ground beef and raw eggs from all food preparations. Neither new cases nor secondary transmission of infection among patients or the staff were identified following the implementation of these measures.

Hospital outbreaks of salmonella infections are not uncommon not only in Europe but also in the United States.^{3,4} In Belgium, the number of human isolates referred to the

National Reference Laboratory for Salmonella has more than doubled over the past 10 years (from 6,092 in 1986 to 14,155 in 1997), and approximately 60% of those sent in the most recent years (1996 and 1997) were *S enteritidis*.¹ Most cases of *S enteritidis* infections occur sporadically,⁵ and up to now, no salmonella hospital outbreak has been reported in Belgium, but the true incidence of salmonellosis in our country is likely to be largely underestimated, because the majority of salmonella infections probably are not reported.

Salmonella foodborne infections are often related to the ingestion of raw, undercooked eggs or contaminated egg-containing food.³ In this outbreak, ground beef was rapidly suspected as the vehicle of infection. This was confirmed by microbiological investigation: *S enteritidis* was grown from the ground beef and had the same biotype, serotype, lysotype, and PFGE pattern as the isolates from patients. Although *S enteritidis* could not be isolated from cultures of the few remaining raw eggs, the raw eggs used in the preparation of the diet ground beef nevertheless appeared as the most likely source of this outbreak. However, the fact that persons were contaminated after ingestion of the regular ground beef prepared with commercial mayonnaise could be explained either by the use of the same bowl for the two preparations and cross-contamination between the two meals or by the contamination of the raw meat itself. Despite prompt identification of the source of the

infection, the impact of this outbreak was substantial. Overall, it affected more than 10% of all hospitalized patients from all wards and units; if probable cases are included, the attack rate rises from 10.9% to 22.5%. In Belgium, like in other European countries, legal dispositions to reduce the risk of salmonellosis throughout the poultry production chain have now been instituted according to the European Union zoonoses order. Moreover, the Public Health Ministry has made recommendations on food hygiene in the general population. Despite attempts to reduce infections in animals and to apply good hygienic practices, it seems inevitable that some raw meats and eggs will be contaminated, as proved in this case. New methods are needed to improve food safety, and in the future, irradiation or other treatment may greatly reduce contamination of food.⁶ Given these concerns, it is important to emphasize prevention by education in food hygiene and to inform staff that raw foods will continue to be a source of salmonella. In conclusion, our experience adds to the evidence that no raw food-based meal should be served in hospitals.

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Catherine Sion, MD

Maria-Grazia Garrino, MD

Youri Glupczynski, MD, PhD

University Hospital Mont-Godinne

Catholic University of Louvain

Yvoir, Belgium

Véronique Avesani

Michel Delmée, MD, PhD

Catholic University of Louvain

Brussels, Belgium

Books Received

Infection Control and Hospital acknowledges receipt of the following books. Selected books are reviewed as space allows.

Fundamental Immunology, William E. Paul, MD, ed. Lippincott-Raven, Philadelphia, PA. 4th ed. Cloth, 1,616 pps, index, references, tables, figures.

1999 Guidelines for Infectious Diseases in Primary Care, Sherwood L. Gorbach, MD; John G.

Bartlett, MD; Matthew Falagas, MD, MSc; Davidson H. Hamer, MD, authors. Williams & Wilkins, Baltimore, MD, 1999. 315 pps.

Viral Infections of the Nervous System, Richard T. Johnson, author. Lippincott-Raven, Philadelphia, PA. 2nd ed. Cloth, 528 pp, references, subject index, tables, figures, photographs.

A Clinician's Guide to Tuberculosis, Michael D. Iseman, author. Lippincott Williams &

Wilkins, Philadelphia, PA. Paper, 460 pp, subject index, figures, tables.

Tuberculosis, William Rom, Stuart Garay. Little, Brown and Co, Boston, MA, 1996. 1,002 pp.

Epidemiological Research Methods, Don McNeil. John Wiley & Sons, New York City, New York, 1996. Paper, 295 pp.

Advanced Precautions for Today's O.R., Mark S. Davis. Sweinbinder Publications LLC, Atlanta, Georgia.