Salmonellosis: no longer just a chicken and egg story

Salmonella organisms occur worldwide and are responsible for a broad spectrum of clinical syndromes, including self-limited gastroenteritis, bacteremia and vascular infection, enteric fever, metastatic focal infections (specifically abdominal infections such as pseudoappendicitis and cholecystitis, pneumonia and empyema, central nervous system infections, osteomyelitis, and septic and reactive arthritis), although infection may be asymptomatic.[1–4] Gastroenteritis is the most common clinical manifestation of *Salmonella* infection. The symptoms include nausea, vomiting, diarrhea, headache, myalgia, fever and other systemic symptoms.[1,2] More severe or invasive infections and death occur more frequently in elderly people, in infants and in those with pre-existing medical conditions such as hemoglobinopathies, malignant neoplasms, AIDS and other immunosuppressive conditions.[4]

All salmonellae are now recognized as belonging to 1 of 2 species: *Salmonella enterica* or *S. bongori*. *S. enterica* is further divided into 6 subspecies, within which more than 2000 serotypes have been identified. Nearly all of the salmonellae isolated from humans belong to *S. enterica* subsp. *enterica*.[5] The serotypes Typhi and Paratyphi colonize only humans and may cause enteric fever or a chronic carrier state.[2,6] The main reservoir hosts of nontyphoidal *Salmonella* are animals, including poultry, other fowl, livestock, reptiles and pets.[1,4] Infection in humans frequently occurs through consumption of poultry, eggs, red meat, unpasteurized milk and dairy products.[1,2,4] More recently, infection has been associated with consumption of contaminated alfalfa sprouts, unpasteurized orange juice, cantaloup, tomatoes and other fresh produce.[3,4,7] Globalization, the shift toward centralized processing and wide distribution networks of food products are increasingly important in the epidemiology of salmonellosis.[8] Salmonellosis may also result after contact with infected animals, which may occur on farms, at petting zoos or in the care of household and exotic pets.[4]

In Canada *Salmonella* infection is a notifiable disease. During 1997 approximately 5500 *Salmonella* isolates were reported to the National Enteric Surveillance Program by the provincial public health laboratories. The serotypes Typhimurium, Enteritidis and Heidelberg accounted for 52% of the disease burden in that year. It is estimated that for every case reported, between 20 and 100 cases remain unreported.[3] This year, as of Apr. 30, 2474 cases had been reported. At least 805 of them were investigated in connection with a national outbreak of salmonellosis caused by serotype Enteritidis that was linked to contaminated cheddar cheese (Dr. Andrea G. Ellis, Division of Foodborne and Enteric Diseases, Bureau of Infectious Diseases, Laboratory Centre for Disease Control, Health Canada, Ottawa: personal communication, 1998).

Antimicrobial treatment is usually not indicated for uncomplicated noninvasive salmonellosis. Therapy does not shorten the duration of the disease and can in fact prolong the shedding of *Salmonella* organisms. Treatment is appropriate for invasive disease and is recommended for gastroenteritis in those with increased risk of invasive disease and other complications.[4] Increasingly, antibiotic susceptibility must be considered for both domestically and internationally acquired infection. Multidrug-resistant serotype Typhimurium DT104 resistant to ampicillin, chloramphenicol, sulfonamides, streptomycin and tetracycline was among the most common *Salmonella* isolates identified in Canada, the United States, the United Kingdom and several other European countries in 1996.[9]

The prevention of foodborne salmonellosis depends primarily on the careful handling of raw products and finished foods. Contamination of foods may occur at any point from the farm to the table.[3] Each stage in the production, storage, processing, distribution and preparation of food may serve as a hazard or as an opportunity for prevention.[3] In the past, foodborne outbreaks were often local occurrences, affecting people who attended the same social event or who ate at the same restaurant.[10] Today, evidence suggests that outbreaks increasingly cross provincial, territorial and national borders.[10] Prevention and control of salmonellosis will require enhanced public health surveillance, which includes diagnosis and prompt reporting of cases, characterization of the isolates and investigation of the sources of infection.[3,10] To this end, efforts are under way at the local, national and international levels to improve the capacity, coordination and cooperation of public and private laboratories, physicians, hospitals and public health officials.

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