An Untypeable Shigella flexneri Strain Associated with an Outbreak in California

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Eleven Shigella flexneri (group B) isolates were recovered from epidemiologically linked patrons and food handlers from a restaurant-associated outbreak of shigellosis. Six isolates available for pulsed-field gel electrophoresis were identical. All strains agglutinated in group B and subgroup factor 6 sera but not in group 1 through group 6 sera.

In January 1998, the Sonoma County Department of Health Services (SCDHS) received multiple reports of gastrointestinal illness among patrons of a single restaurant, most of whom had dined at the restaurant on 9 January 1998. Shigella spp. were isolated from the stool specimens of three hospitalized case patients. SCDHS conducted an investigation to determine the extent of the outbreak.

Symptomatic patrons who dined at the restaurant on 9 January were classified as confirmed case patients if Shigella spp. were isolated from a stool specimen or probable case patients if diarrhea developed within 4 days of the meal. Patrons who ate food prepared at the restaurant in the week following 9 January and who developed diarrhea within 4 days of the meal were classified as suspected case patients. Restaurant employees who reported any gastrointestinal symptoms in the previous month or who prepared food on 9 January were classified as high risk and were required to submit two consecutive stool specimens, collected no less than 24 h apart, that were culture negative for Shigella spp. prior to returning to work.

Of 36 patrons with reported illness, 25 met the study definitions for case patients (8 confirmed, 14 probable, and 3 suspect); the median age was 39 years (age range, 6 to 73 years), and 14 (56%) were female. Most case patients reported illness onset on 11 or 12 January (Fig. 1). Three case patients were hospitalized. Symptoms reported included diarrhea (n = 25), nausea (n = 21), abdominal cramping (n = 14), vomiting (n = 13), and bloody stools (n = 11). In addition, three case patients reported symptoms compatible with reactive arthritis.

Inspections of the restaurant noted several hygiene violations, including a lack of hand washing between tasks and inadequate hand-washing facilities. Eighty-two (98%) of 84 restaurant employees were interviewed. Nineteen were classified as high-risk employees; 13 who prepared food on 9 January but who were asymptomatic, 5 who did not prepare food on 9 January but who reported a history of gastrointestinal symptoms during the previous month, and 1 who prepared food on 9 January and who reported a history of gastrointestinal symptoms during the previous month. The restaurant was ordered closed, and all other employees were required to submit one stool specimen that was culture negative for Shigella spp. prior to returning to work.

Three employees had stool specimens that were culture positive for Shigella spp. Two had prepared food on 9 January but were asymptomatic, and one had prepared food on 9 January and reported a history of gastrointestinal symptoms with onset on 11 January. Shigella flexneri isolates available from three case patients and three employees were forwarded to the Microbial Diseases Laboratory (MDL), California Department of Health Services, for confirmatory serogrouping and pulsed-field gel electrophoresis (PFGE).

Serogrouping was performed by the standard slide agglutination technique, and antisera were prepared in-house (at MDL). Although the six strains were confirmed to be S. flexneri, there was no agglutination in S. flexneri type 1 through type 6 sera. All strains did, however, possess subgroup factor 6 antigen. PFGE, performed with a CHEF Mapper (Bio-Rad Laboratories, Hercules, Calif.) and by the method recommended by the manufacturer, showed that all six isolates were identical (Fig. 2).

This report describes a restaurant-associated outbreak involving an unusual strain of S. flexneri that is being seen with increasing frequency in California (7). Similar strains were first reported in Japan (6). The Centers for Disease Control and Prevention (CDC), which confirmed the serotyping results for some California isolates, including one from the current study, refers to strains with this serogrouping pattern as S. flexneri Provisional serogroup 89-141 (CDC 3007-94) (9).

Shigellosis is transmitted either through the feces of an infected person or through food or water contaminated by an infected person, with as few as 10 to 100 organisms capable of causing infection (1). Accordingly, control efforts in this outbreak were focused on the identification and exclusion of potentially infected employees. The culture-positive employee who reported gastrointestinal symptoms with the same date of onset as most of the ill restaurant patrons, 11 January, was likely an outbreak victim. Asymptomatic carriers have been incriminated in the maintenance and transmission of shigellosis, suggesting that one or both of the two reportedly asymptomatic culture-positive employees may have been the source of the epidemic (4). It is also possible that these employees were symptomatic but were reluctant to admit this during the interview.

Prior to the reopening of the restaurant, SCDHS staff assisted the management in providing training on personal hy-
Among restaurant patrons. Onset dates are in January 1998.

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The restaurant reopened 3 days after closure with staff who had been determined to be culture negative for Shigella spp. No further reports of gastrointestinal illness were received by SCDS following reopening of the restaurant. No additional cases of shigellosis in the community were detected by laboratories in Sonoma County from 24 January through 24 February 1998.

The severity of the illness in this outbreak was notable. A previously healthy 21-year-old male and two women, ages 45 and 73 years, respectively, were hospitalized at a cost of more than $61,000. Reactive arthritis was a likely symptom among three nonhospitalized case patients who reported subsequent joint symptoms; this is a high frequency compared with those in previous reports (3, 8).

There are currently six established serotypes of S. flexneri (types 1 to 6) and two variants (5). In addition, other serotypes have been identified in the literature. Carlin et al. (2) serotyped 13 (5%) of 240 isolates from Bangladesh, and 2 of these (strains Y394 and Y400) were found to be of a provisional new serotype and 11 were rough and therefore nontypeable. Matsushita et al. (6) identified two new strains (strains 89-141 and 89-11) from the stools of travelers returning from India. The former strain appears to be identical to those identified in the current study.

Antisera to provisional serotypes are available only in reference laboratories; thus, limited information about the true incidence of such serotypes is available. Currently, in California, there are no statutory requirements that Shigella isolates be submitted to the Department of Health Services for confirmation and serotyping. This precludes an accurate estimation of the incidence of provisional serotypes in California. The first recognized isolates of Provisional serogroup 89-141 in California were detected in 1997. In that year, 9 of 13 untypeable S. flexneri strains submitted to MDL were determined to belong to this serotype. In 1998, 22 untypeable S. flexneri strains, including those from the outbreak reported on here, were found to belong to S. flexneri Provisional serogroup 89-141.

The epidemiology of S. flexneri Provisional serogroup 89-141 (CDC 3007-94) strains in California remains unknown. Further studies are required to determine if infection with this serotype is associated with a greater severity of illness or an increased frequency of reactive arthritis.

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