



## **Shigellosis Outbreak Associated with a Daycare Center**

**Harvey County, Kansas  
May 2006**

### **Report Date**

August 26, 2006

### **Outbreak Investigators**

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### **Background**

On July 11, 2006, the Harvey County Health Department (HCHD) notified the Epidemiology Services Section (ESS) at the Kansas Department of Health and Environment (KDHE) about an ongoing outbreak of shigellosis at Daycare Facility X in Harvey County, Kansas. As of July 11, eight children and one staff member had tested positive for *Shigella sonnei*. The daycare's total enrollment was 135; it employed 30 staff members.

The HCHD and ESS began a joint outbreak investigation on July 12, 2006. The purpose of the investigation was to determine the extent of the outbreak and to implement appropriate prevention and control measures.

### **Methods**

#### *Epidemiologic*

All laboratory-confirmed cases of shigellosis among Harvey County residents were interviewed by HCHD staff using ESS's Enteric Questionnaire. Two sibling cases that

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attended the daycare were Marion County residents; they were interviewed by the Marion County Health Department. Clinical information was collected, and exposure to Daycare Facility X was assessed. One case, not connected to the daycare, reported additional illnesses among family members that attended a gathering at a local lake. As a result, ESS investigated this gathering as a possible outbreak, and interviewed those who attended with a specifically designed questionnaire.

#### *Environmental*

The daycare was inspected by the Harvey County Health Department on July 10, 2006.

#### *Laboratory*

Children and staff with symptoms of shigellosis were required to submit a stool specimen for laboratory testing. *Shigella* isolates were forwarded to the Kansas Department of Health and Environmental Laboratories (KDHEL) for confirmatory testing and Pulsed-Field Gel Electrophoresis (PFGE).

### **Public Health Interventions**

Symptomatic children were excluded from the facility and required to submit a stool sample to their physician. Children testing negative were allowed to reenter when asymptomatic. Children testing positive were allowed to reenter after two consecutive stool samples, taken 24 hours apart, tested negative for *Shigella*. The same exclusion policy was applied to the daycare staff.

Staff of HCHD provided a letter to Daycare Facility X that was sent home with daycare enrollees on July 2. The letter provided information to parents of daycare enrollees about shigellosis and on restriction of ill enrollees.

Upon inspection of the facility, the HCHD staff provided information about proper hand washing techniques and toy disinfection to the staff of Daycare Facility X. The daycare began to monitor children to ensure proper hand washing was practiced.

The ESS prepared a form letter for daycare providers in the surrounding area, informing them of the outbreak and referencing the guidelines for the control of enteric outbreaks. A fact sheet on shigellosis was included with the letter, which was sent via email to the childcare licensing authority in Harvey, Butler, Marion, McPherson, Reno, and Sedgwick counties on July 13. Each county was asked to forward the materials to its daycare providers.

To increase detection of additional cases, an additional letter to physicians was crafted by ESS. This letter was emailed to the surrounding county health departments on July 19; the county health departments then forwarded the letter to local physicians.

This outbreak was detected at a time when additional cases of shigellosis, clustered in time but apparently unrelated, were being reported in other parts of the state.

Subsequently, all materials were also sent to the Franklin and Crawford County health departments on July 19.

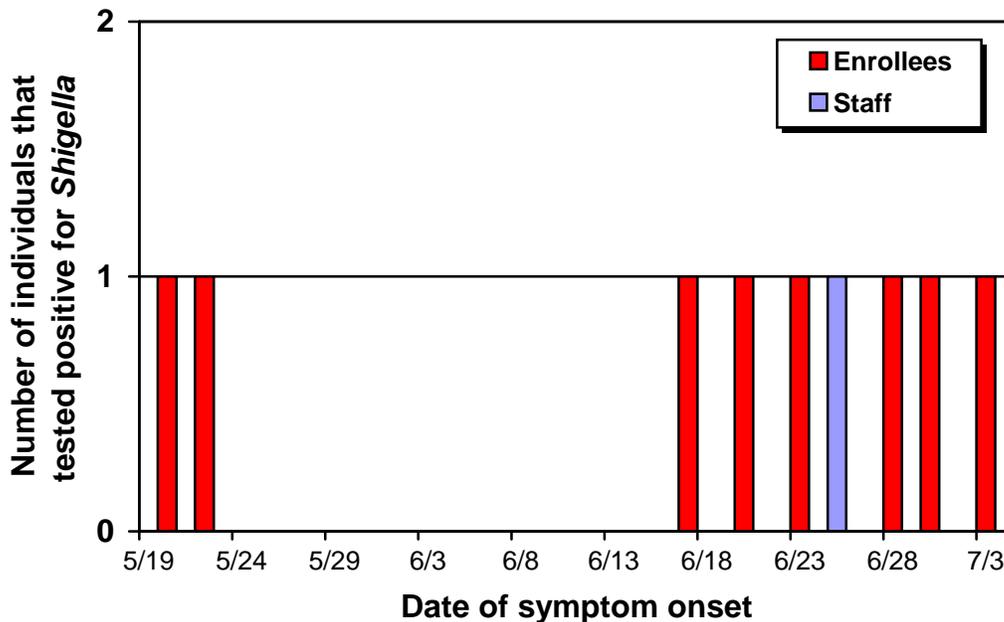
## **Results**

### *Epidemiologic*

The daycare outbreak likely began in May, when two children showed clinical signs consistent with shigellosis—the exact dates of these illnesses were not recorded, and the two children were not tested for *Shigella*. Information regarding other non-laboratory-confirmed, daycare-associated individuals that showed symptoms of shigellosis was not available.

Ultimately, *Shigella* was isolated from ten daycare-associated individuals—eight enrollees and two staff. Among these laboratory-confirmed cases, the first illness onset was May 22, and the final case became ill July 3 (Figure 1). Laboratory-confirmed enrollees ranged from three to seven years of age; the median age was four years of age. Additionally, eight enrollees had symptoms of shigellosis, but tested negative.

**Figure 1. Daycare-related, laboratory-confirmed shigellosis cases by date of symptom onset, 2006 (n=9\*)**

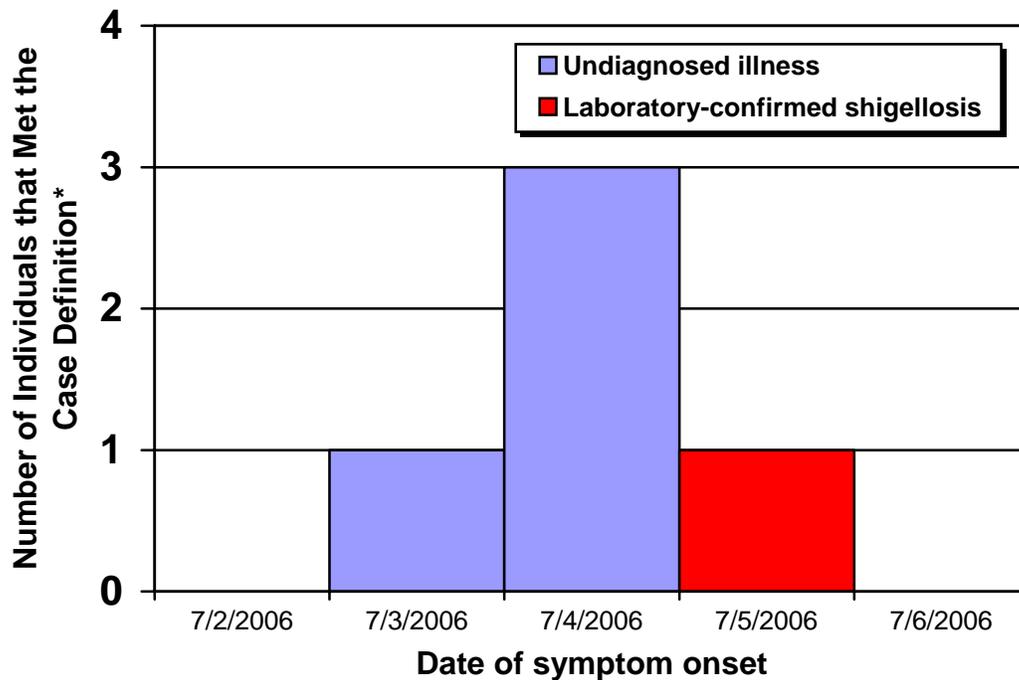


*\*The onset date for one staff member was not available.*

Outside of the daycare, *Shigella sonnei* was confirmed in two Harvey County residents during the same time period. One of these individuals reported exposure to Daycare Facility X—the case was a parent of a child enrolled at the daycare. The child was symptomatic, but not tested for *Shigella*, as the illness occurred before the daycare was aware of the outbreak. The second case did not report any interaction with Daycare Facility X, but did report attending a family gathering at a Harvey County lake on July 2. Other family members that attended were reportedly ill.

A list of individuals that attended the family gathering was obtained by HCHD and shared with ESS. These individuals—three adults and five children among four households—were interviewed by ESS. Cases were defined as individuals that attended the July 2 gathering that reported diarrhea (three or more loose stools in a 24-hour period) or vomiting. Five individuals met the case definition (Figure 2).

**Figure 2. Family-gathering-related cases by date of symptom onset, 2006 (n=5)**



*\*Cases were defined as individuals that attended the July 2 gathering that reported diarrhea (three or more loose stools in a 24-hour period) or vomiting.*

Food was present at the event; however, the majority of those interviewed were unable to recall what they (or their children) had eaten. As a result, no food item was implicated with the illness. Swimming in East Lake was also not associated with illness.

### *Environmental*

The inspection confirmed that the daycare was practicing recommended guidelines for outbreak control, including the exclusion of symptomatic children as mentioned above.

### *Laboratory*

Ten daycare-associated individuals tested positive for *Shigella sonnei*, including two staff members and eight daycare enrollees. The KDHEL performed PFGE on nine (90%) of these isolates. Five were pattern SONx139, two were pattern SONx145, one was pattern SONx144, and one was pattern SONx146.

One individual that attended the East Lake family gathering tested positive for *Shigella sonnei*. The PFGE pattern of that isolate was SONx139. No other enrollees were tested.

### **Discussion**

Shigellosis is transmitted through the fecal-oral route and is readily transmissible because the infectious dose is low. Minor lapses in hand hygiene allow widespread person-to-person transmission, particularly in a daycare setting.

This shigellosis outbreak appears to be the result of person-to-person transmission within the daycare facility. The epidemic curve of this outbreak (Figure 1) supports this conclusion, as do the PFGE patterns of the *Shigella* isolates. Although the isolates produced four separate PFGE patterns, the four patterns were very closely related. This suggests that one strain of *Shigella* gradually spread through the daycare.

No specific exposure was identified as a source of illness at the family gathering. Person-to-person or foodborne transmission may have taken place. Although these cases reported no exposure to Daycare Facility X, the laboratory-confirmed case was daycare-aged, and the case's PFGE pattern indicates infection with the daycare strain.

Shigellosis appeared in the Harvey County community after the daycare outbreak began. Two laboratory-confirmed, shigellosis cases were reported in July and August. The two cases were daycare-aged, and the PFGE patterns of the isolates also indicated infection with the daycare strain. It is likely that others were also affected, but were not seen by a physician or were not tested by their physician.

### **Limitations**

Several factors limited the outbreak investigation at Daycare Facility X. First, this outbreak investigation did not include a formal study of the relationship between exposures and shigellosis. A cohort study would have been helpful in clarifying the specific exposure, or exposures, associated with infection. Second, the facility did not have information regarding the total number of symptomatic children and staff. The scope of the outbreak presented in Figure 1 underestimates the total number of infected individuals, as data was available only on those tested for *Shigella*.

Biases related to recall and interviewer techniques might have affected the quality of data obtained during the investigation of the East Lake family gathering.

### **Recommendations**

Several prevention measures should be followed to prevent future outbreaks in daycare settings:

- Educating children attending daycare on proper hand washing technique
- Ensuring that daycare staff and enrollees practice proper hand washing technique, including hand washing after using the toilet, after changing diapers, and before preparing, serving or eating food
- Supervising hand washing of daycare enrollees, particularly younger children, after they use the toilet
- Surfaces and hard-surface toys should be regularly cleaned; daily during an outbreak
- Stressing the importance of restricting daycare enrollees and staff when ill, particularly with diarrhea

### **Acknowledgements**

The investigators for this outbreak thank the staff at Daycare Facility X, the Harvey County Health Department, the Butler County Health Department, the Crawford County Health Department, the Franklin County Health Department, the Marion County Health Department, the McPherson County Health Department, the Reno County Health Department, the Sedgwick County Health Department, and KDHE for the assistance provided during this investigation.