SALMONELLA HIDUDDIFY GASTROENTERITIS IN A NEWBORN NURSERY

BACKGROUND

There are over 2400 known serotypes of *Salmonella* [1] *Salmonella Hiduddify*, also known as *Salmonella I 6, 8:1z28:1, 5*, is an uncommon serotype in the United States. The PulseNet national data base does not contain any patterns for this serotype, other than those recently submitted by Los Angeles County (LAC). No PulseNet patterns were even a close match. This serotype was last identified in LAC twenty years ago in an infant case. One study reported finding this serotype in dogs in Nigeria and suggested these animals as a source for transmission of salmonellosis to humans and domestic animals [2].

On October 24, 2006, LAC Department of Public Health (DPH) Acute Communicable Disease Control (ACDC) Program was notified by the infection control professional (ICP) of two infant cases diagnosed with salmonellosis who were both cared for in the Level II nursery in an acute care hospital (Hospital A). On the same day ACDC initiated an investigation and worked together with the ICP to determine the extent of the outbreak, risk factors for disease, and any steps needed to prevent further infections.

METHODS

The hospital ICP reviewed the medical charts and provided clinical information to ACDC. District public health nurses (DPHNs) visited the cases and their families in the home and gathered data related to possible exposures and risk factors. Stool specimens were collected from caregivers and other family members for culture. A segment of reptile animal skin was also cultured from one case patient house. ACDC staff visited Hospital A to assess the physical layout of the nursery and gather additional information from staff. The LAC Public Health Laboratory (PHL) performed serotyping and molecular epidemiology using pulsed field gel electrophoresis (PFGE) on three isolates.

Case Definition: An outbreak-associated case was defined as an infant with culture-confirmed *Salmonella Hiduddify* (*S. Hiduddify*) infection who was cared for in the Level II nursery at Hospital A in October 2006.

RESULTS

A total of three confirmed cases of *S. Hiduddify* were identified, the two hospitalized newborns at Hospital A and a sibling of Infant #1. The two newborns met the case definition.

Infant #1: The infant was born at Hospital A by scheduled cesarean section on October 10, 2006. She was coupled in-room with her mother. The infant's father and two siblings were observed by hospital staff to visit frequently. The infant had a blood-streaked stool on October 12, 2006 and was subsequently moved to the Level II nursery and placed in contact isolation. The child was breast fed but also received premixed formula in individual-use bottles. The infant was treated and discharged home on October 20, 2006.

The home of Infant #1 was assessed and investigated by the DPHN. The father made drums in an adjoining workshop using animal skins, including reptile skins, imported from Africa. The skins were soaked and then stretched to construct the drums.

Stool cultures of the parents and siblings of Infant #1 detected the infant's one year-old sibling as positive for *S. Hiduddify*; the sibling had not been symptomatic. The infant's mother was positive for *S. I 9,12:a:__* (incomplete serotype); she reported having had symptoms of diarrhea and fever for two days in August 2006. The infant's father and a seven year-old sibling were negative on stool culture and asymptomatic. DPHNs educated the family regarding salmonellosis, stressing transmission prevention with emphasis on hygiene and possibility of contaminated clothing related to the handling of reptile skins in the home. A small sample of cleaned and dried skin, identified by the father as iguana skin, was provided by the father. The type of processing done on the skin before collection was unknown. This skin was cultured in the PHL for *Salmonella*; the result was negative.

Infant #2: The infant was born normal spontaneous vaginal delivery (NSVD) at Hospital B on October 14, 2006 and transferred to Hospital A on the same day due to respiratory problems. After spending three days in the neonatal intensive care unit (ICU), the infant was moved to the Level II nursery on October 17, 2006. She was breast fed but also had formula in 4 oz. bottles. This infant was discharged to home on October 19, 2006 but returned with fever and diarrhea the next day to the Hospital A emergency room.

The home of Infant #2 was also assessed and investigated by the DPHN. No other family members had been ill. There had been no travel or exposure to reptiles. Stool culture results for the infant's mother and father were negative. DPHNs educated the family regarding salmonellosis, stressing transmission prevention.

The two infants were together in the same nursery between October 17 and October 19, 2006. The ICP provided information on Level II nursery staffing. One medical team—four interns and one resident—cared for both babies during that time period. Five nurses cared for the infants; two nurses floated from the labor and delivery unit and one from the pediatric ICU.

No other infants were symptomatic in the Level II nursery. No hospital staff was symptomatic. The hospital infection control committee chair decided to test all infants who were in the Level II nursery between October 17 and October 19, 2006 and associated staff for *Salmonella*. Six infants and twenty-nine hospital staff members were tested; all results were negative. Not all staff members were tested due to intern rotations.

ACDC conducted a site visit on October 27, 2006 to review the layout of the Level II nursery. The actual room was being remodeled and was not in use at the time of the visit. Originally the room was set up in a horseshoe formation, with basinets being evenly spaced around a central room. Two or three nurses would be assigned to care for up to four infants. Two reclining sleeper chairs were placed in one section, away from the basinets; an electric breast pump was situated between the chairs. Parents were encouraged to stay with their infants and mothers to use the reclining chairs while holding and nursing their infants. When parents visit, they must wash hands for three minutes; they do not gown. Each mother has her own breast pump kit. The reclining chairs were not routinely cleaned after each use. Contact isolation does not require a one-to-one nursing ratio. Only premixed, portioned, ready-to-use formula is used at Hospital A. Per hospital staff, the families of the two infants were not observed to commingle. Both mothers did use the reclining chairs.

Three isolates were available for PFGE, including the isolates from the two cases, plus the isolate from the one year-old sibling of Infant #1. PFGE patterns for the three isolates were similar if not indistinguishable to each other using both Xba 1 and Bln 1 enzymes. PFGE differentiation could not be assessed because there were no patterns for comparison in the PulseNet national data base.

CONCLUSIONS

An outbreak of salmonellosis associated with Hospital A Level II nursery occurred during October 2006. This outbreak was identified by the hospital ICP.

S. Hiduddify is rare in California, but it is seen in Africa [2]; the origin of the animal skins used by the father of Infant #1 was West Africa. The negative culture of the skin sample did not rule out the possibility of other skins being the source of the infection. Based on the onset date and other available information, Infant #1 was infected during a family visit to the nursery and not at the time of birth. The father and siblings were asymptomatic, and only the one year-old sibling was positive for *S. Hiduddify*. It is possible that the one year-old infected Infant #1, while being held in the same bed or parent's lap or during manipulation of her diaper. Another possibility is that the father or mother was shedding the bacteria at the time of their visits. Although the mother had a different serotype she may have been carrying two serotypes of S*almonella*. She may have infected the infant during care or feeding and then cleared this serotype by the time public health screening was conducted.

Infant #1 was the likely source for Infant #2 with transmission occurring during care or via an item shared by the infants or the mothers. Outbreaks with transmission via contaminated equipment have been documented [3]. Person-to-person transmission via hospital staff and parents has also been documented [4] [5]. The parents may have had a role in transmission; however, they were not observed to commingle. Although infant formula has been the source of large *Salmonella* outbreaks in the past [6], it is unlikely that formula was the source of this outbreak based on the small number of cases and the type of formula used at this hospital.

ACDC provided Hospital A with recommendations to improve infection control practices among mothers and visiting families, as well as environmental cleaning of shared equipment and furniture.

LIMITATIONS

Limitations for this investigation include small number of cases, lack of information on PFGE differentiation, and incomplete histories on the culture-positive family members.

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