

Response to an E. coli O157:H7 Outbreak in a Child Care Center

Speakers

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Illinois Department of Public Health
Illinois Public Health Association

***E. coli* O157:H7 Outbreak in a Child Care Center**

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***E. coli* O157:H7 Information**

- Source: food contaminated with ruminant feces
 - Meat (especially ground beef) that is not thoroughly cooked, unpasteurized milk
 - Apple cider, raw vegetables (alfalfa sprouts, spinach)
- Transmission
 - Fecal-oral
 - Infectious dose may be as few as 10 organisms
 - Bacteria can be in the stool of an infected person 1-8 weeks after onset of symptoms
 - Surfaces can become contaminated
 - At room temperature and normal humidity can live for one day or longer

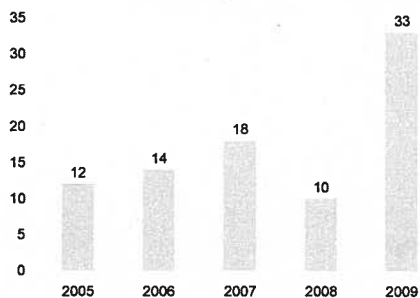
***E. coli* O157:H7 Information**

- Incubation period:
 - Usually 3-4 days after exposure
 - May be as short as 1 day or as long as 10 days
- Symptoms:
 - Watery or bloody diarrhea, abdominal cramps, and/or low-grade fever
 - Can be asymptomatic in young children

Hemolytic Uremic Syndrome

- Severe life-threatening complication
- Occurs in about 10% of those infected with *E. coli* O157:H7
- Administration of antibiotics may increase risk
- Recognized as the most common cause of acute kidney failure in infants and young children

***E. coli* O157:H7 Cases, Cook County 2005 - 2009**



***E. coli* Outbreaks in Child Care Centers**

- August 2000: Folsom, California
 - 8 individuals positive for *E. coli* O157:H7 (5 from the same classroom, 1 mother, 1 sibling and 1 toddler)
 - Caused by a sponge being used simultaneously for wiping down a changing table and a table for serving meals
 - Only symptomatic individuals were tested

***E. coli* Outbreaks in Child Care Centers**

- June 2002: Fort Worth, Texas
 - 14 individuals positive for *E. coli* O157:H7 (12 children, 1 staff and 1 parent)
 - 1 case hospitalized for HUS
 - Possible source: having portable lunches out on the child care center (CCC) grounds by a pond, which collected pasture runoff from nearby grazing cattle
 - Several water samples from this pond had a heavy concentration of *E. coli* O157:H7

***E. coli* Outbreaks in Child Care Centers**

- January 1997: Colorado
 - 24 *E. coli* O157:H7 cases identified
 - 5 hospitalized, 1 developed HUS
 - Median duration fecal shedding was 29 days (range 11-57 days)
- German study (1995) for long term shedding of *E. coli* O157:H7 in 53 children
 - Median duration was 13 days (2-62 range) in cases with diarrhea or hemorrhagic colitis
 - Median for cases who developed HUS was 21 days (5-124 range)

Duration of *E. coli* Shedding in CCC Outbreaks

1 st Author	Year of publication	Median duration of shedding (days)	N	O157??
Miliwebsky	2007	26.5	2	Yes
Miliwebsky	2007	26	2	No
Miliwebsky	2007	18.5	2	No
Shah	1996	29	12	Yes
Karch	1995	13 (no HUS) 21 (HUS)	?	Yes Yes
Belongia	1993	17	?	Yes

Risk factors evaluated: severity of illness, young age, recent antibiotic use

Red Book (2006 Edition) *E. coli* O157:H7 Recommendations

- Exclude from child care until diarrhea resolves and results of 2 stool cultures obtained at least 48 hours apart are negative
- Strict attention to hand hygiene
- CCC should be closed to new admissions
- Prevent transfer of exposed children to other centers
- Antimotility agents and antibiotics should not be administered

Cohorting

- Not recommended by the Red Book (2006 edition) for child care center outbreaks of *E. coli* O157 or *Shigella*
- No reports in the literature of use during *E. coli* O157 outbreak
- Reports of use during *Shigella* outbreaks
 - Hoffman et al, 1990
 - Mohle-Boetani et al, 1995
 - Tauxe et al, 1986
- Reduces number of days of exclusion from CCC
- Requires careful monitoring by CCC and public health staff

Screening

- Gilbert et al, 2008
- *E. coli* O157 outbreak in a CCC in Waterloo, Ontario
- Survey found that parents and teachers may not understand significance of diarrhea or comply with recommendations
- Previously unrecognized cases identified through screening

Chronology of Events

- February 2, 2009
 - Cook County Department of Public Health (CCDPH) CD unit notified by Illinois Department of Public Health (IDPH) that 2 cases of Shiga toxin-producing *E. coli* (STEC) reported from children attending the same child care center (CCC)
 - A school nurse called to report a case of *Clostridium difficile* in a 3 year old from the same CCC
 - Test results showed 1 child positive for STEC, another for *C. difficile* and the third one for both.
- February 3, 2009
 - The CD and environmental unit visited the CCC

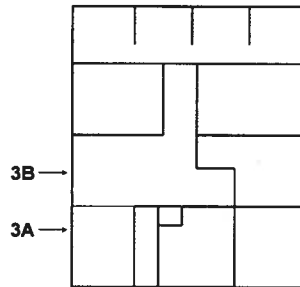
Epidemiologic Investigation

- 5 children with diarrhea (4 bloody, 1 non-bloody) from 1/25/09 to 1/29/09 at the CCC
- All were in the same 3 year old classroom, 3A
- No other children with diarrhea in the CCC during this time period
- No staff from that classroom or the rest of the CCC with diarrhea during this time period
- The cook was not sick during this period
- The center did not keep a log for absenteeism
- Children wash their hands upon entering the classroom in the morning and before eating any food
- The facility did not use hand sanitizing wipes

Environmental Investigation

- The center has a kitchen and one cook
- Food is delivered and placed in the freezer located in the kitchen
- All food is pre-cooked
- Lunch is taken to the classrooms by the cook
- Snacks are served by the teachers; they use gloved hands to dispense the food
- Employees practiced good hand washing techniques
- One of the 3 year old bathrooms did not have soap
- For outbreaks of illness, the facility uses bleach in a concentration of one cup in 32 oz. of water
- For routine cleaning they use Lysol antibacterial (2 oz. per 2 gallons of water) and Lysol non-rinse sanitizer (1/2 oz. per 2 gallons of water)
- Score was 93/100

Child Care Center A



- Children ages 6 weeks to 12 years
- Occupancy for 127 children
- 10 classrooms
- Each class has their own teachers
- 2 classes for 3 year olds, 3A and 3B, with a total of 27 children and 4 teachers

Outbreak Investigation

- After the CCC field visit, we initiated surveillance for diarrheal illness lasting for 2 STEC incubation periods (20 days) after the onset of the last case
- We recommended that any children or staff with diarrhea be tested for STEC and stay at home until the symptoms were resolved
- On 2/9/09 two more children with diarrhea tested positive for STEC

Outbreak Investigation

- On 2/10/09 IDPH recommended testing all children and teachers in both 3 year old classrooms
 - Even if they had not experienced symptoms consistent with STEC infection
- One STEC-negative stool specimen was required to continue attending the CCC
- Children and staff were not excluded from the CCC while awaiting laboratory results
- Children and staff with confirmed STEC infection were excluded from the CCC until they submitted two consecutive STEC-negative stool specimens even if symptoms had resolved

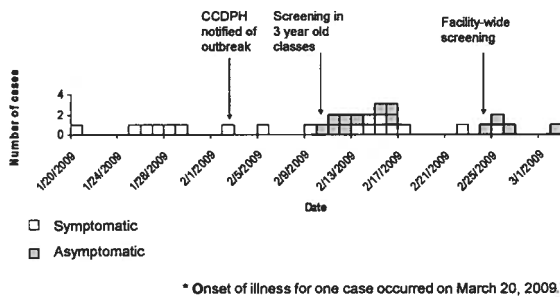
Outbreak Investigation

- Some of the symptomatic children who tested positive for STEC were siblings of identified cases from the 3 year old classrooms
- Some children who tested positive were asymptomatic, or had only one loose stool
- On 2/14/09 a questionnaire was developed to administer to parents of children in the 3 year old classrooms asking questions regarding early arrival and late dismissal
 - 4 out of 17 cases arrived early
 - 1 out 17 cases left late
 - 5 out of 17 did both
- On 2/23/09 IDPH agreed to screen the entire CCC

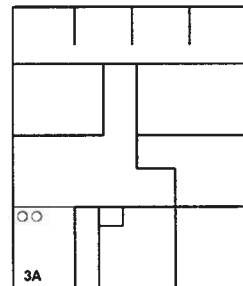
Summary of Cases

- 31 confirmed cases and 1 probable case in the CCC
- 1 secondary case – mother of CCC attendee
- 20 symptomatic; 13 asymptomatic
- 4 hospitalized, 1 developed HUS, no deaths
- Symptom onset ranged from 1/20/09 to 3/20/09
- 2 adults & 31 children ages 5 and under
 - 3 years old (17), 2 years old (3), toddler (7), infant (2), 5 year old (1), 4 year old (1)
- Cases included 8 household pairs
- Siblings of 4 previously identified cases served as index cases in previously unaffected classrooms
- Pulsed-field gel electrophoresis:
 - 32 tested
 - 32 matches or close matches
- 20 Will County residents, 11 Cook, 2 DuPage

E. coli O157:H7 Cases by Onset Date, January 20 – March 2, 2009*



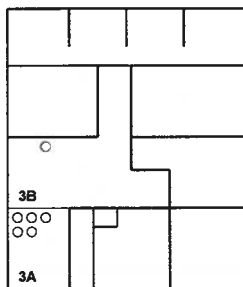
Week of Jan. 19 – 25, 2009



Prior to CCDPH notification of outbreak

○ Symptomatic case

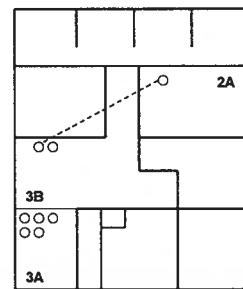
Week of Jan. 26 – Feb. 1, 2009



Prior to CCDPH notification of outbreak

○ Symptomatic case

Week of Feb. 2 – 8, 2009



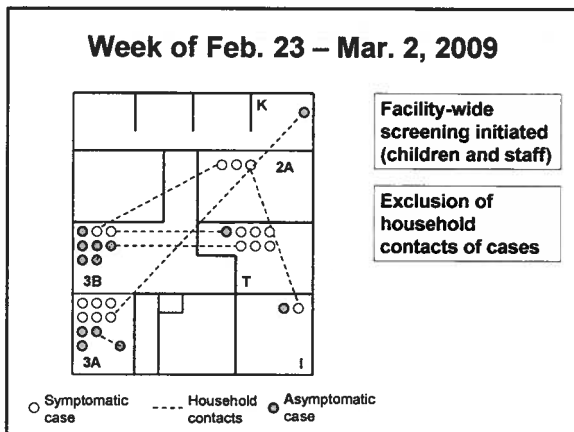
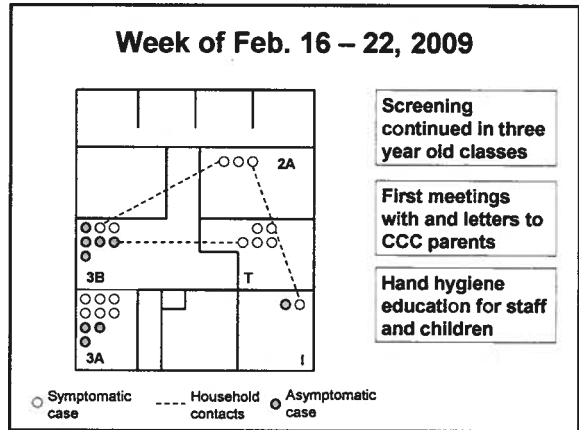
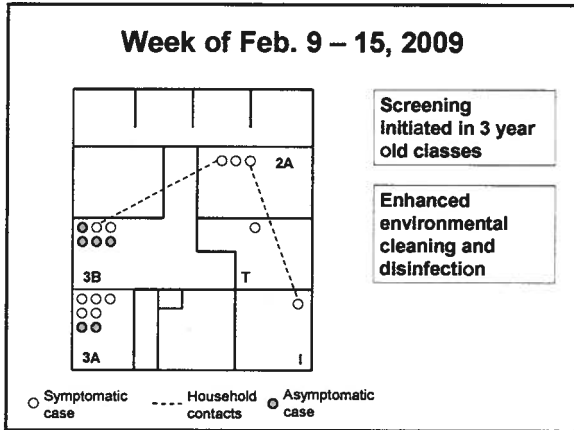
CCDPH notified of outbreak

Inspections conducted

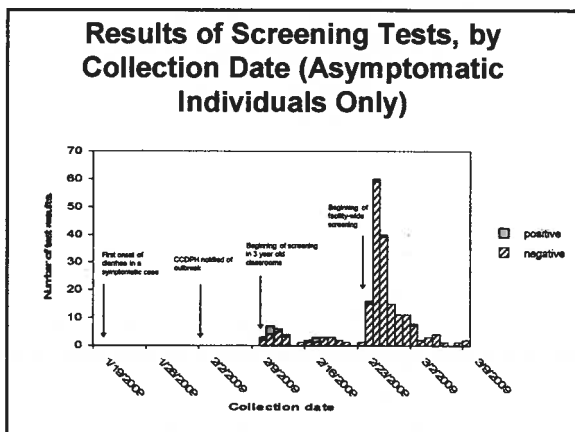
Recommendations given to CCC

- Exclusion of cases until 2 negative tests
- Hand hygiene
- Restroom supervision

○ Symptomatic case --- Household contacts



- ### Screening results
- **Asymptomatic** individuals tested in the first round of screening
 - 74% (26/35) were negative and 26% (9/35) were positive
 - **Asymptomatic** individuals tested in the second round of screening
 - 98% (171/175) negative and only 2% (4/175) were positive



- ### Duration of Shedding
- The median duration of shedding was 22 days (range: 2-48 days)
 - Duration of shedding was the number of days between the collection date of the 1st positive test and of the 1st of 2 negative tests
 - Symptomatic individuals were more likely to experience prolonged shedding than asymptomatic individuals ($p < 0.05$)
 - Prolonged shedding was defined as shedding for more than 21 days
 - Young age and recent antibiotic use were not significantly associated with prolonged shedding

Public Health Recommendations to CCC

- Exclude children and staff not submitting samples by screening deadline
- Continue to test and exclude all children and staff with any diarrhea
- Continue to provide testing to symptomatic and asymptomatic cases; readmit to CCC after 2 negative tests in a row collected at least 24 hours apart

Public Health Recommendations to CCC

- Conduct hand hygiene training for children and staff (provided by public health 2/20, 2/23, and 3/12)
- Increase frequency of environmental cleaning
 - Daily cleaning of toys
- Create and maintain daily absenteeism log
- Hire hand-washing aides for all classrooms and LPN for duration of outbreak

Additional Steps Taken by Child Care Center

- Consultation with certified environmental hygienist
- Exclusion of household members of cases
- Financial compensation to families for in-home nanny care, time off from work, and non-reimbursed medical expenses

Communication with Parents

- Letters for the parents were sent on 2/4, 2/10, 2/12, 2/18, 2/23 and 3/6
- Meetings with parents:
 - 3 with parents of children ages 3 and younger on 2/17, 2/24 and 3/3
 - 1 with parents of children ages 4 and older on 3/4

Recommendations for Parents

- Monitor household members daily for new onset of diarrheal disease with or without blood
- Schedule a visit to your primary care provider for all persons with diarrheal disease and request a test for *E. coli* O157:H7
- Report all new cases of diarrheal illness to the CCC
- Keep all children with diarrhea away from the facility until they have two negative stool cultures for *E. coli* O157:H7

Recommendations for Parents

- Keep all *E. coli* O157:H7-positive children from returning to the CCC until they have had two negative stools collected 24 hours apart
- Encourage thorough and frequent hand washing for all household members before eating, after toileting/diapering, and throughout the day when hands become soiled
- Avoid sharing personal items such as towels and bar soap with positive individuals until the infection has cleared, i.e., when two negative stool cultures have been obtained
- Perform routine cleaning using a household disinfectant.

Communication

- Memo to hospitals and labs regarding testing for and reporting of *E. coli* O157:H7
- Letters of notification to child care centers in Cook, Will and DuPage Counties
- Letters of notification to local school district in Lemont
- Media

Conclusions

- The index case was not identified
 - 30 of 31 cases tested had the same PFGE pattern
- The facility was not closed down to prevent the spread of the disease to other child care centers
- It is important to test children with diarrheal disease who attend child care centers for enteric pathogens
- Screening of asymptomatic individuals in the same group or classroom as cases should be implemented to prevent transmission in an outbreak situation
- Surveillance of diarrheal illness should be in place for 2 incubation periods (20 days) from the last day in school of the last case
- Hand hygiene should be monitored and children/staff at the center should be trained

Conclusions

- Household transmission probably contributed to the spread of the outbreak at the CCC
- Asymptomatic shedding was common and may have contributed to transmission at the CCC
- Prolonged shedding can occur with *E. coli* O157:H7 diarrhea
- Screening to identify asymptomatic cases was resource-intensive
 - 200 person-days of exclusion from the CCC
 - 415 samples tested by IDPH lab
- Exclusion policies based on stool culture results posed a considerable burden on parents

Recommendations

- Evaluation of cohorting as an *E. coli* O157 outbreak management strategy is warranted
- If feasible, perform additional evaluation of screening strategies, e.g.
 - Screening vs. no screening of asymptomatic individuals
 - Exclusion of all individuals until screened negative

Recommendations

- Incorporation of findings and lessons learned into guidance (toolbox) for child care center *E. coli* O157 management
 - Epidemiologic/scientific information (e.g., duration of shedding, asymptomatic carriage)
 - Practical information
 - Communication with parents
 - Screening considerations
 - Recommended CCC policies
 - Hand hygiene training for young children



Spread the word, not the germs!!

4 Principles of Hand Awareness

1. Wash your hands when they are dirty and before eating.
2. Do not cough into your hands.
3. Do not sneeze into your hands.
4. Above all, do not put your fingers in your eyes, nose or mouth.

www.henrythehand.com/

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