Repeated Salmonella Outbreaks From a Single Restaurant Over 15 Years: Lessons Learned from a Long Term Outbreak Response

InFORM Conference
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History of Restaurant A and \textit{Salmonella Montevideo}

1997:
- GI illness outbreak after grade school event catered by Restaurant A
- 5 children ill
  - All stool culture positive for \textit{Salmonella montevideo} JIXX01.0964
  - Illness seemed associated with consuming chicken soft tacos
- One staff member (of 25) at restaurant was stool culture positive
  - Reported eating chicken soft tacos that day
- No obvious source identified
- Facility underwent environmental cleaning and reopened
- In retrospect: from May through August of 1996, 6/14 OC residents with infection due to \textit{S. montevideo} reported eating at Restaurant A
History of Restaurant A and *S. Montevideo*, continued

2000:

- 6 of 11 (54.5%) of persons infected with *Salmonella Montevideo* JIXX01.0966 or related strains reported eating at Restaurant A
- Thorough evaluation of Restaurant A conducted at that time with assistance of CDPH
- Facility closed for cleaning
- 6 of 25 (24%) restaurant staff tested stool culture positive
- Epi and EH investigation found no clear source
- Environmental sample culturing yielded no positives
- Hypothesized:
  - Prolonged carriage by one or more employees with intermittent shedding, allowing contamination of the staff, environment, and food
  - Serial and possibly repeated infections of staff at restaurant may have maintained a nidus, with occasional transmission to patrons
Restaurant A

• One site of a fast-food chain
• Several hundred restaurants in multiple states
• Many sites in Orange County
• 3.0% of all salmonella cases in Orange County in 2000 reported eating at a restaurant in this chain in 7 days prior to developing illness
• No other sites appeared associated with this event
From January-May, 2012:

- 4 of 5 (80%) OC residents infected with *Salmonella montevideo* JIXX01.0964 or related strains reported eating at Restaurant A
  - Case ages ranged from 9-84 years
  - 1 of 4 lived in city where Restaurant A located
- 2005-2011 data reviewed:
  - 8/21 OC cases of *S. montevideo* JIXX01.0964 or related strains reported eating at Restaurant A
- *S. Montevideo* JIXX01.0964 & JIXX01.0966 are very similar patterns
- From 2000-2013, PulseNet had 47 reports of infection with either of these two patterns:
  - 31 from Orange County
  - Rest from Long Beach, LA County, Las Vegas (1), and Washington (1)
- JIXX01.1139 also similar strain, seen 11 times between 2009-11, all in Orange County

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*2012 S. Montevideo isolates*
OCHCA Response to Restaurant A
Cluster: 2012

June 1, 2012:
• Testing found 8/26 (30.7%) of Restaurant A staff stool culture + for *S. montevideo*
  – No positive staff had been working there during previous outbreaks
• Restaurant voluntarily closed, environmental cleaning performed on June 1
• 30 environmental samples taken, all negative

June 2, 2012: Restaurant reopened
• All positive staff needed two negative stool specimens prior to returning to work
June 27, 2012:

- HCA team with representatives from Epi, EH, and Laboratory Divisions returned to restaurant A
- 13 environmental cultures obtained
- Positives for *S. montevideo* JIXX01.0964:
  - Grease pan under grill
  - Floor at the side base of the grill
CDPH/OCHCA Joint Evaluation of Restaurant A

July 9, 2012:

• CDPH Food and Drug Branch staff inspected Restaurant A
• 30 environmental cultures collected
• 13 positive for *S. montevideo* JIXX01.0964
• Most positives on floor sites of restaurant
Culturing from Private Environmental Consultant Group

• Private food safety consultant group performed environmental culturing on 7/3/12

• Two of 32 samples positive for *S. Montevideo*:
  – Behind hinge which holds implements next to the cutting board
  – On the cutting board used for cooked meat
Second Voluntary Restaurant Closure
Initiated on July 26, 2012

• Planned:
  – More thorough cleaning
  – Replacing multiple physical structures of the site

• Vendors hired for cleaning of facility and environmental assessment

• Initial plan was for closure to last 4 weeks
Reculturing of Staff

- 5 of 35 staff tested positive for *S. montevideo* on second closure
- One staff person was repeat positive from last closure testing
- Two of those who were positive had begun working since last closure on June 1
- No staff were seriously ill
2012 Restaurant A Timeline

First Closure: 8 staff +
All HCA Env samples -

Second Closure: 5 staff +

1st Outside vendor testing:
2 Env samples positive, including cooked meat cutting board

CDPH FDB Visit And Testing:
13 samples + for Salmonella

Community Cases
• Built in 1989
• Guest area remodeled in November, 2011
• Much of equipment purchased in 1999 remodel
• Set up and volume of raw chicken offered many opportunities for cross-contamination
Equipment Replaced

• Facility replaced all:
  – Grills
  – Sinks
  – Food preparation areas
  – Cutting board stations
  – All floor tiles

• Stainless steel all-in-one surface installed
While Replacing Center Island:

- Area under cutting board revealed a cavity which contained food debris
- Culture of this debris was positive for *Salmonella montevideo* JIXX01.0964
Reopening Criteria:

• Environmental cultures after the final cleaning
  – All had to be negative prior to reopening
• Repeat environmental cultures to occur at two and four weeks after reopening
• Staff to be recultured at 4 weeks after reopening
• SOPs revised
Restaurant Staff and Reopening

• All staff from Restaurant A were sent by the facility to other sites to work after two stool cultures negative.

• They may have been reintroduced to working at the site at a later date.

• New staff were educated about the facility’s history but not mandated by restaurant or OCHCA to be tested as condition of work.
  – Only one staff person agreed to be tested.
Reculturing of Site

• 27 repeat environmental cultures from restaurant A obtained on October 17, 2012
• Zero tolerance for positive cultures
• All negative
Restaurant A Reopening

• Site reopened on November 6, 2012
• 37 repeat environmental cultures performed on November 26, 2012
  – All negative
  – However, weekly cleaning crew was noted to be leaving from the restaurant at the time that CDPH and HCA staff arrived to begin testing
• Environmental testing was repeated on December 17, 2012
  – All negative
Where We Are Now...

No new cases associated with
Salmonella montevideo JIXX01.0964
or related strain in Orange County since
Restaurant A reopened in 2012
Take Home Points:

• *S. montevideo* survives very well in the environment
• Chronic low-level outbreaks can be difficult to identify at the local level
• Long-term response to individual restaurant outbreaks is time-intensive for local public health
• Private environmental assessment groups can play a significant role in responding to these events
Acknowledgments

• OCHCA
  – Michele Cheung
  – Steve Klish
  – Liz Gonzalez
  – Hildy Meyers

• CDPH
  – Duc Vugia
  – Michael Hernandez
• Patterns S. montevideo outbreak are JIXX01.0964, JIXX01.0966, JIXX01.1139, and JIXX01.0097
• JIXX01.1139 seen 11 times between 2009-11, all in Orange County
• JIXX01.0097 seen 7 times since 2005.
  – Four of the seven isolates came from Orange County
  – Other three came from Long Beach, LA County, and Illinois.
Private Vendor Conducted Additional Testing

- 1 culture of register above cutting board of a vent that blows air out was positive for salmonella Montevideo
- Follow up of 36 cultures of inside of multiple air vents all negative
- Positive culture from rock garden behind restaurant for *S. montevideo* 72
- Rock garden subsequently paved over
Notes on *S. montevideo* MON00074

- 448 cases of salmonella seen in Orange County in 2012
- *S. montevideo* represents 8% of our salmonella isolates
- *S. montevideo* MON00074 and related strains are relatively rarely seen isolate
- Few cases identified nationally aside from those identified in OC
Kitchen Renovation

• Some of the changes:
  – Original 3-compartment sink replaced
  – 2-compartment prep sink replaced with a single compartment sink, to be used for preparing dry food only
  – All floor tiles and base wall covings replaced
  – Floor sloped to eliminate creation of puddles.
  – Plumbing for the floor sink located under the three compartment sink repaired. Slow draining and back flow at this floor sink caused excessive liquid waste in the floor area
  – Walk-in cooler is being replaced with a larger unit to provide additional storage area
Follow Up Response

• Discussed with CDPH and other partners nationally

• Planned follow up:
  – Repeat environmental testing in 1 month
  – Repeat staff testing in 1 month
SOPs Revised:

- Floor cleaning and sanitation
- Washing and sanitizing of large equipment
- Employee work assignment and cross training
- Cleaning of exhaust hood
- Washing of multi-use dishes
Remodeling and Renovating

• Entire back kitchen, cooking and prep and service areas remodeled

• What remained:
  – Ice machine
  – Big cooking kettles
  – Tumbler
  – Upright freezer