# Foodworkers as a Source of Contamination

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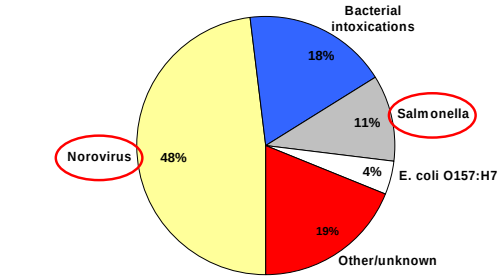
## Confirmed Foodborne Outbreaks by Etiology, Minnesota, 1981-2004




n=545

## Background *Salmonella* Outbreaks

*Salmonella* was most common outbreak etiology reported to CDC 1993-1997

357 (13%) outbreaks

137 (38%) in commercial food establishments

## Background Foodworkers Infected with *Salmonella*

Do infected foodworkers pose a significant risk in transmission?

- Buchwald and Blaser (1984)
  - Few outbreaks where foodworkers have been "clearly shown" to be the original source of the organism
- Cruickshank and Humphrey (1987)
  - "any adult having a solid formed stool after recovery from an attack of diarrhea and who has good hygienic habits does not need to be excluded form any form of work including food handling…"

## Background Significance of Shedding

- *Salmonella* is shed in the stool after recovery
- Fingertip contamination after defecation
- Handwashing is sufficient to remove contamination
- Food can be contaminated by hands inoculated with 100 organisms

## Good Hygienic Habits

- 2004 FDA report, handwashing out of compliance
  - 34% hospitals
  - 54% fast food restaurants
  - 57% delis
  - 73% full service restaurants
- MN survey (Allwood, 2004)
  - 48% foodworkers could demonstrate code-compliant handwashing

- EHS-Net 2002-2003 survey (Green, 2005)
  - 4.7% foodworkers worked while ill with vomiting or diarrhea symptoms in the last year

## Foodworkers as a Reservoir for *Salmonella*?

Even if infected foodworkers are inefficient spreaders of *Salmonella*

- Low infectious dose
- Prolonged shedding after recovery
- Less than perfect hand hygiene
- Survival and transfer from hands to food or surfaces
- Many report working while ill

## Restaurant Outbreaks of Salmonellosis in MN

A review of all *Salmonella* outbreaks in restaurants in MN, 1995-2003

- To characterize the potential role of infected foodworkers as a source of transmission to patrons during restaurant-associated outbreaks
- Shedding of *Salmonella* in the stool of infected foodworkers associated with those outbreaks

## Outbreak Characteristics

- 23 of 39 (59%) confirmed foodborne outbreaks of *Salmonella* occurred in restaurants (range, 1 to 4 per year)
- Median outbreak duration, 21 days (range, 1 to 517 days)
  - 70% duration > 10 days
  - 21% duration > 3 months

## Outbreak Characteristics
n = 23

In 9 of 23 (39%) of restaurant outbreaks a specific food vehicle was implicated or suspected

- 4 vehicle statistically implicated
- 5 vehicle suspected

vs.

14 of 16 (88%) of non-restaurant foodborne *Salmonella* outbreaks vehicle implicated

## Patron-Cases

- Median number of patron-cases, 7 (range, 1 to 36 patron-cases per outbreak)
- Median illness incubation in patrons for each outbreak ranged from 9 hrs to 6 days
  - In 10 of 23 (43%) outbreaks, median incubation >3 days

## Foodworkers

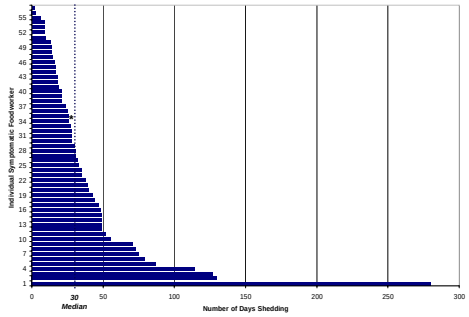
- In 22 of 23 outbreaks foodworkers were interviewed and tested
- In 19 of 22 outbreaks (83%) positive foodworkers identified (same serotype and PFGE subtype as patron-cases)
- 1,033 foodworkers tested
- 129 (12%) tested positive for *Salmonella* (range, 0% to 36%)

## Foodworker Testing Illness History

**Overall**

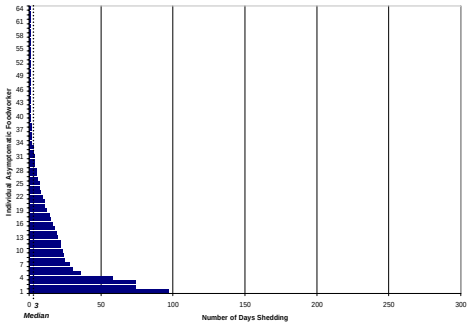
- 64 of 121 (53%) asymptomatic
- 35 of 499 (7%) reported recent history of gastrointestinal symptoms but tested negative

**Shedding in symptomatic (n=57) foodworkers tested during restaurant-associated outbreaks of salmonellosis, Minnesota, 1995-2003**




* did not recall the date of onset

**Shedding in asymptomatic (n=64) foodworkers tested during restaurant-associated outbreaks of salmonellosis, Minnesota, 1995-2003**




## Outbreaks Characteristics by Results of Environmental Sampling

| | POSITIVE | NEGATIVE |
|---|---|---|
| NUMBER OF OUTBREAKS | 4 | 8 |
| NUMBER AND PERCENT OF OUTBREAKS WITH IDENTIFIED VEHICLE | 0 (0%) | 4 (50%) |
| NUMBER AND PERCENT OF POSITIVE FOODWORKERS OF TOTAL TESTED | 40/183 (22%) | 35/464 (8%) |
| MEDIAN OUTBREAK DURATION | 186 days | 26 days* |

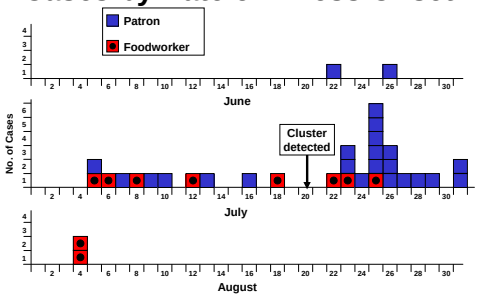
* p=0.03

## Environmental Sampling

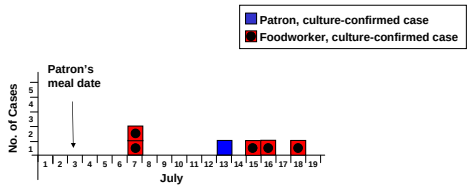
*Salmonella* was recovered from

- cold holding area behind cook's line
- cutting boards
- grill stands
- dishwasher area
- employee break room
- grill grease trap
- water cooler surface

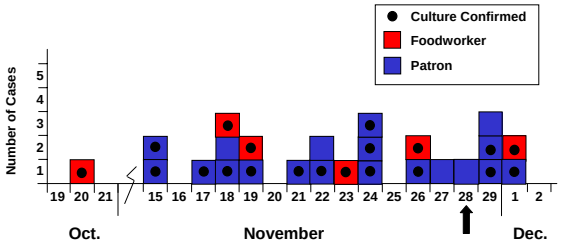
## *S.* Heidelberg, June-August 1999 Cases by Date of Illness Onset



## *S.* Montevideo Outbreak, 1999
## Cases by Date of Illness Onset




## *S.* Typhimurium Outbreak, Thanksgiving 2002
## Cases By Date of Onset




## *S.* Typhimurium Outbreak, 2002

## Foodworkers as a Source of Contamination

**Reservoir of contamination:**

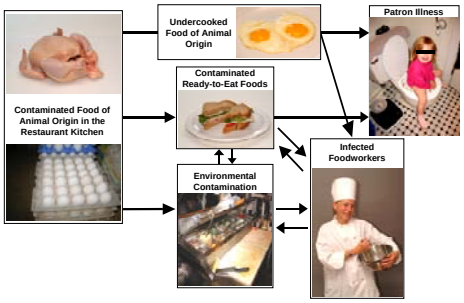
- **Prolonged outbreak duration**
- **Illness incubation in patrons was longer than the "typical" 12 hr to 3 days (low infective dose)**
- **no specific food vehicle identified in 83% of outbreaks**

## Foodworkers as a Source of Contamination

**Foodworkers vs. environment**

- ***Salmonella* recovered from food contact surfaces**
- ***Salmonella* recovered from areas that don't come in contact with food**
- **High proportion (83%) of outbreaks with positive foodworkers**
- **Low proportion (33%) of outbreaks with identified environmental contamination**

## Complexity of *Salmonella* in Restaurants



## Foodworkers as a Source of Contamination Intervention

- Interview all foodworkers about recent history of gastrointestinal illness
- Test all foodworkers regardless of job duties until 2 consecutive stool specimens test negative for *Salmonella*
- Exclude or restrict positive employees

## Foodworkers as a Source of Contamination Prevention

- Identify sporadic cases of salmonellosis who work in food service establishement
- Restrict or exclude until 2 consecutive negative specimens

## Foodworker Illness and the MN Food Code

**2-201.12 Exclusions and Restrictions**

The person in charge shall:

A. exclude a food employee from a food establishment if the food employee is ill with vomiting and diarrhea;

B. Restrict a food employee from working with exposed food, clean equipment, and clean utensils in a food establishment if the food employee has an enteric bacterial pathogen capable of being transmitted by food, including *Salmonella* spp., …until the Department of Health and licensing regulatory authority have evaluated the potential for foodborne disease transmission

## Foodworker Illness and the MN Rules and Statutes

MN Rules, Section 4605.7500, Disease Investigations:

MDH must determine "necessary control measures"

Minn. Stat., Section 144.05 subdivision 1:

MDH has the authority to "establish health standards for the protection and promotion of the public's health"

## Foodworkers in Surveillance

From 1997 through 2004

- 4, 976 *Salmonella* cases reported to MDH
  - 110 (2.2%) were foodworkers
  - Range, 9 to 21 per year

## Outbreak-Associated Cases (n=20)

- 12 of 20 (60%) part of 9 unrelated outbreaks at their workplace
- 6 of 20 (30%) outbreaks at a restaurant other than their workplace
- 1 of 20 (5%) private party outbreak
- 1 of 20 (5%) animal contact outbreak

## Outbreak-Associated Cases

| Year | In surveillance | Serotype | Total patrons | Total infected foodworkers |
|---|---|---|---|---|
| 1998 | 1 hostess<br>1 patron | Braenderup | 7 | 10 |
| 1998 | 1 server<br>1 patron | Heidelberg | 1 | 2 |
| 1999 | 1 server<br>1 patron | Montevideo | 1 | 9 |
| 1999 | 1 server<br>2 patrons | Heidelberg | 25 | 26 |
| 2002 | 1 bartender<br>2 patron | Newport | 5 | 5 |
| 2003 | 1 server<br>1 patron | Enteritidis | 20 | 7 |

## Foodworkers in Surveillance

- Infected foodworkers in surveillance should raise a high index of suspicion of a possible outbreak at their place of work
- Hostesses, servers, bartenders, serve as sentinels for transmission at their place of work

## Estimated Norovirus Infections Among Restaurant Employees

| | |
|---|---|
| • Employees | 12 million |
| • Diarrheal illness rate | (0.79 per person/year) |
| • Illnesses among restaurant employees | 9.5 million |
| • % of GI illnesses due to norovirus | (11%) |
| • Norovirus among restaurant employees | 1 million |
| • Foodworkers who work while ill | (5%) |
| • Norovirus infected restaurant employees who work while ill | ~50,000 |

NRA 2004, Mead 1999, Green 2005

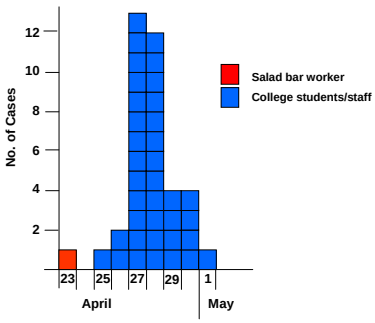
## Minnesota Foodborne Illness Hotline

Call to report foodborne illness

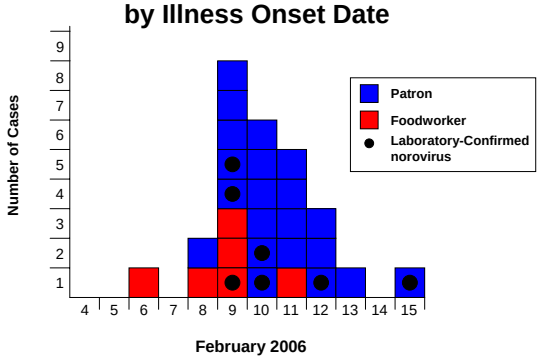
Toll free statewide:
1- 877- 366-3455
1- 877- FOOD ILL

MDH
717 Delaware Street
Minneapolis MN 55404
www.health.state.mn.us

## Outbreak of Norovirus Gastroenteritis at a College Food Service by Illness Onset Date, 2000




## Outbreak of Norovirus at a Sandwich Restaurant, 2006 by Illness Onset Date



## Foodworkers as a Source of Contamination Intervention

- Interview all foodworkers regardless of shift worked or duties
  - Manager often unaware of employee illness
  - May reveal transmission among employees
- Exclude or restrict ill foodworkers for 72 hours after recovery of symptoms

## Foodworkers as a source of contamination Prevention

- Exclude while ill with vomiting or diarrhea
- HAND WASHING
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- HAND WASHING