

Current Issues in Foodborne Disease Epidemiology

Multi-State Food Safety and Quality Update 2007
Presenter: Roberta M. Hammond, Ph.D., R.S.

Thursday, April 5, 2007
1:30pm – 4:00pm



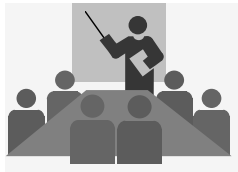
Regional Environmental Epidemiologists

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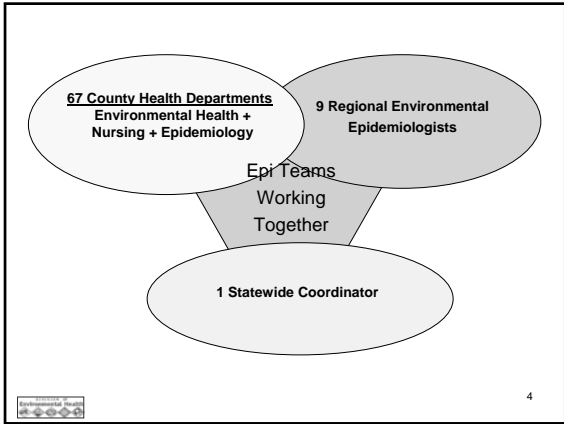


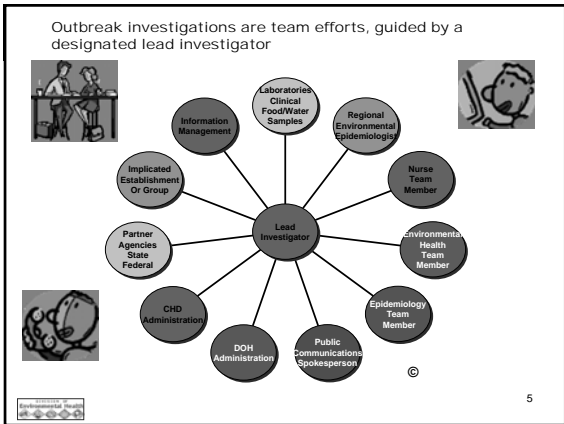
Regional Food and Waterborne Disease Functions



- ✓ Provide investigation assistance on request of county health departments
- ✓ Training: develop and provide training to county health departments as needed
- ✓ Surveillance







Florida Background Data

- ❖ **Florida population: est. 17,516,732 M**
- ❖ **Florida tourist visitors: est. 85.8 M**
- ❖ **Licensed restaurants and caterers: approx. 43,053**
- ❖ **Licensed grocery stores, food processors and delis: approx. 33,564**
- ❖ **Licensed institutions with food service: approx. 16,322**

6

- Multi-state Outbreaks
 - Spinach and *E. coli* O157:H7
 - Lettuce and *E. coli* O157:H7
 - Salmonella Tennessee and Peanut Butter
- Botulism and Flash Pasteurized Carrot Juice
- Marine Toxins and Vibrios
 - NSP outbreak
 - Ciguatera campaign



E. coli O157 H:7 Outbreaks Reported by CDC 1982-2002

- 49 states reported 350 outbreaks
- 8,598 cases
- 1,493 (17%) hospitalizations
- 354 (4%) HUS cases
- 40 (.05%) deaths



E. coli O157:H7

- Causes ~ 73,000 illnesses annually
- Over 2,100 hospitalizations
- 61 deaths
- An important cause of acute renal failure in children



Spinach and E. coli O157:H7, 2006



10

As of October 6, 2006

- 199 confirmed cases from 29 states
- 102 hospitalized
- 31 HUS
- 141 (71%) female/58 male (29%)
- 22 (11%) children < 5 yrs. Old
- 3 deaths



11

Spinach

- 13 packages of spinach tested
- 11 had lot codes from a single manufacturing facility on a particular day
- 2 did not have lot codes available, but were the same brand
- All matched the PFGE of the outbreak strain



12

Bins Containing Spinach Harvested By Seco Packing Company



13

Valley Fabrication Harvesting Machine Pictured With Empty Totes Prior to Harvesting and Packing



14

San Benito River on the Paicines Ranch: Cattle Crossing



15

Pig Rooting and Tracks, in Field Belonging to Neighboring Grower to Mission Organics



16

Investigation Conclusions

- E. coli O157:H7 found in environmental samples near fields that provided implicated spinach
- Isolates from only one field matched the outbreak strain
- Outbreak PGFE pattern identified in river water, cattle feces, and wild pig feces just under one mile from the spinach field
- Land used primarily for cattle grazing
- Risk factors identified:
 - Wild pig activity around spinach fields and irrigation wells
 - Irrigation wells exposed to feces from cattle and wildlife
- No definitive determination regarding how spinach was contaminated

From: Investigation of an Escherichia coli O157:H7 Outbreak Associated with Dole Pre-Packaged Spinach, Final Report, March 21, 2007



17

Lettuce and E. coli O157:H7, 2006



18

Lettuce and E. coli O157:H7, 2006

- 71 ill from 5 states
- People with outbreak strain ate at Taco Bell in NJ, NY, PA and DE
- 53 hospitalized
- 8 HUS
- Onsets: Nov. 20-Dec. 6
 - peak last week of Nov.
- Lettuce likely contaminated before restaurants



19

Epidemiology

- 1.4 M cases est. each year in US
- > 500 cases fatal
- 2% cases complicated by chronic arthritis
- Half of all Salmonella cases caused by 2 serotypes
 - S. Enteritidis (SE)
 - S. Typhimurium (ST)
- 3rd most frequent serotype: S. Newport₂₀



20

Salmonella Tennessee and Peanut Butter, 2007



21

Salmonella Tennessee and Peanut Butter, 2007

- 425 cases from 44 states
- 71/351 hospitalized
- No deaths
- Onsets: Aug. 1, 2006 – Feb. 16, 2007
- 67% illnesses after Dec. 1, 2006
- 15 jars of peanut butter serotyped S. Tennessee and confirmed outbreak strain



22



Figure 1. Outbreaks of foodborne botulism by state, 1950-1996*

* Multiple outbreaks are added to each outbreak count.



Overview of Foodborne Botulism

- US: 110 cases/year
 - 25% foodborne
 - 72% infant botulism
 - 3% wound botulism
- FL: 0.5 cases/year (10 year ave.)
- Primarily from home-canned foods, but also unviscerated fish, baked potatoes, improperly handled commercial pot pies, sautéed onions, garlic in oil.



24

7 Carrot Juice-associated Botulism Cases (2006)

- September 8, 3 cases reported to Georgia health authorities
 - All had shared meals on 9/7, including a bottle of carrot juice
- September 25, Florida Health authorities notified of a suspect case of botulism
 - Partially consumed bottle of carrot juice found in hotel room where the woman had been living
- In Canada, 3 additional cases of botulism linked to carrot juice
 - a husband and wife in Toronto and another person in Montreal



25

Implicated Carrot Juice

- Distributed in all 50 states, Mexico, Canada and Hong Kong
- Flash pasteurized
 - *C. botulinum* spores can survive this process
- Low acidity, low salt, low sugar and temperatures $>39^{\circ}\text{F}$ ($>4^{\circ}\text{C}$) promote germination of spores
- Lack of refrigeration suspected during distribution or storage



26

Produce Outbreak Investigations

- **Rapid response and good communications**
 - Within and between local and state agencies
 - Between state and federal agencies
 - With the public
- **Good disease surveillance systems – active and passive**
 - PulseNet - PFGE
 - Local communications networks
- **Public information – where appropriate**
- **Difficulties of investigating outbreaks of widely distributed products**
- **Importance of cultural knowledge of food consumption patterns of various populations**



27

Consequences

- **Economic – produce industry**
- **Political-economic**
 - Exporters of produce from other countries
 - Trade agreements
- **Public hysteria regarding produce**
- **Media sensationalism**



28

Prevention Activities

- **Working papers:**
 - FDA Produce Action Plan 2004
 - FDA Lettuce Safety Initiative
 - FDA Survey of Imported Fresh Produce 2005
 - Industry and FDA Good Agricultural Practices (GAPS) and Good Management Practices (GMPS)
- **Workgroups:**
 - North American Tomato Trade Workgroup
 - Florida Tomato Food Safety Forum
- **Advisories and regulations:**
 - Advisories on fresh produce safety
 - HACCP for fresh squeezed juice
 - FDA embargoes and import alerts



29

NSP Incidents from Self-Harvested Shellfish



30

Neurotoxic Shellfish Poisoning

- ☠ NSP is a notifiable disease in Florida
- ☠ Associated with harmful algal blooms (red tide) from the multiplication of single celled algae called *Karenia brevis* which produces brevetoxins (shellfish accumulates this toxin). Red tide is a natural phenomenon and is not caused by man made pollution.
- ☠ Recreational and commercial harvest areas must be closed when there are >5,000 cells/liter in the waters and must remain closed until both: 1) the cell counts drop <5,000 cells/liter and 2) the shellfish tests negative for toxin.



31

Neurotoxic Shellfish Poisoning

- ❖ **Symptoms:** tingling and numbness of lips, mouth, fingers, toes; GI symptoms, sensory hot-cold reversal, dizziness, pupil dilation
- ❖ **Onset:** few minutes to several hours
- ❖ **Duration:** mild symptoms resolve quickly and completely
- ❖ **Source:** shellfish contamination by brevetoxins (clams, scallops, mussels, oysters)
- ❖ **National occurrence:** Unknown, thought to be frequently misdiagnosed and unreported
- ❖ **Florida:** 1.4 cases per year



32

Other Shellfish Poisoning Types

Type of illness	Area of Occurrence	Incubation period	Symptoms	Toxin
Paralytic shellfish poisoning	Mostly in California, Oregon, Washington, Alaska, Maine, Massachusetts	Within 30 minutes to several hours	Tingling/numbness of lips, mouth, face, fingers, toes; muscle weakness, GI symptoms, paralysis, death.	Saxitoxins, gonyautoxins, others.
Diarrhetic shellfish poisoning	Mostly Europe, Japan, South America. Okadaic acid also found in Gulf of Mexico shellfish and causative species occur Gulf-wide	30 minutes – few hours	Vomiting, diarrhea, nausea, abdominal pain.	Okadaic acid, dinophysis - toxins, other.
Amnesic shellfish poisoning	California, Oregon, Washington, Canada. Domoic acid found in Gulf of Mexico shellfish and the causative species occur Gulf-wide	A few hours to 24 hours.	GI symptoms, muscle cramps, disorientation, short-term memory loss.	Domoic acid.



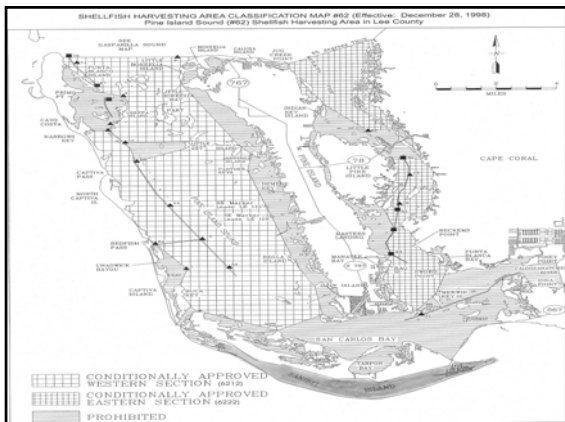
33

Lee County, NSP Outbreak, July 5 – 18, 2006



- * **5 clusters** - 13 ill from recreationally harvested clams from an unapproved area on Sanibel and Ft. Myers Beach.
- * Leftover clams from 2 clusters tested positive for brevetoxins
- * Cooked in various ways (cooking does not denature the toxin)
- * Prior similar outbreaks in
 - * Charlotte County, 2005
 - * Sarasota County, 2001
 - * Sarasota County, 1996
 - * Lee County, 1995







Information to the Public



- On July 18, 2006, LCHD issued a 2nd notice of public health concern declaring a local epidemic.
- Press release was also issued regarding the dangers of eating shellfish from local waters.
- The city manager of Sanibel sent police officers door to door delivering the message about not harvesting and consuming shellfish.
- They also activated their reverse 911 system with the same message and posted signs at beach access points.
- Flyers were passed out at the toll booths. An alert message on EMSsystem was posted on July 18, 2006 for emergency departments in the region.
- An interview with Bob South (Lee CHD Epidemiologist) was broadcasted on the local evening news (7/18/06) and the morning and evening news (7/19/06).





Recommendations

- Educational efforts should include the fact that cooking these shellfish does not eliminate the toxin.
- Under no circumstances should shellfish be harvested from these unapproved areas.
- To promote community educational efforts and for future red tide events DOH is working on some educational materials and PSAs.
- One suggestion may be to post signs in all rental units, warning the public about the risks and legality of self harvesting shellfish including contact information for the public to obtain additional information.



37

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38
