Using a Tiered Approach to Employee Health Guidelines to Address the Control of Norovirus in the FDA 2005 Food Code

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Presentation Overview

- The approach
- Pathogens of concern for food workers
  - The critical factors
  - Why the concern about Norovirus?
- 4-tiered Employee Health System
The Approach
Risk-Based Employee Health

- Based on 4 Levels of Risk
- Removes infected food workers when most likely to transmit a pathogen to food items
- Balances employee’s needs with risk to the public
- Provides guidance on safely allowing infected employees to return to duties
How to translate the levels of risk into a tiered approach to protect public health

- Risk
  - How much organism is being excreted?
  - How close is the person to the food?

- The more that is excreted and the closer to food - the greater the risk
Disease Process Timeline

- **Excretion of Agent**

- **Clinical illness**

- **Incubation Period**

- **Symptomatic**

- **Asymptomatic**

- **Exposure**

- **Onset of Symptoms**

- **End of Symptoms**
Factors that determine the pathogens with highest risk of transmission

- **Pathogenicity**
  - Ability of the organism to cause disease

- **Virulence factors**
  - The factors that allow the organism to make someone sick

- **Communicability**
  - Ease of spread

- **Epidemiology**
  - The data we have to show transmission from food Outbreaks etc.

- **Other**
  - CDC List of Infectious & Communicable Diseases
THE “BIG FIVE”
GI pathogens listed in the Food Code

- Norovirus
- *Salmonella* Typhi
- Hepatitis A Virus
- *Shigella* spp.
- Enterohemorrhagic or Shiga toxin-producing *E. coli*

Source: CDC
Norovirus Virus

Reported as the single most common cause of gastroenteritis in the western world
# Recent Norovirus Outbreaks 2005

<table>
<thead>
<tr>
<th>Month</th>
<th>State</th>
<th>Facility Type</th>
<th>Number Ill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 14</td>
<td>Kent County, MI</td>
<td>Restaurant- Sub Sandwich shop</td>
<td>87</td>
</tr>
<tr>
<td>July</td>
<td>Virginia</td>
<td>Boy Scout Camping Event</td>
<td>56</td>
</tr>
<tr>
<td>September</td>
<td>Colorado</td>
<td>River Tours</td>
<td>100</td>
</tr>
<tr>
<td>Sept.-Nov.</td>
<td>Nebraska</td>
<td>Elementary Schools</td>
<td>125</td>
</tr>
<tr>
<td>October</td>
<td>Nebraska</td>
<td>Hotel</td>
<td>300</td>
</tr>
<tr>
<td>November</td>
<td>Nebraska</td>
<td>University</td>
<td>40</td>
</tr>
<tr>
<td>December</td>
<td>Cincinnati, OH</td>
<td>Hotel</td>
<td>200</td>
</tr>
<tr>
<td>December</td>
<td>Santa Cruz County, CA</td>
<td>Upscale Restaurant</td>
<td>90</td>
</tr>
</tbody>
</table>

1As Reported in 2005 News Articles
<table>
<thead>
<tr>
<th>Month</th>
<th>State</th>
<th>Facility Type</th>
<th>Number III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 14</td>
<td>Indiana</td>
<td>Middle School</td>
<td>245</td>
</tr>
<tr>
<td>Jan. 27-30</td>
<td>Michigan</td>
<td>Italian Restaurant</td>
<td>&gt; 430</td>
</tr>
<tr>
<td>February</td>
<td>Chicago, IL</td>
<td>Hotel AMA Meeting</td>
<td>&gt;150</td>
</tr>
<tr>
<td>Jan.-Feb.</td>
<td>Minnesota</td>
<td>Restaurants, hotels, nursing homes, and schools</td>
<td>&gt;29 Outbreaks</td>
</tr>
<tr>
<td>March</td>
<td>Florida &amp; California</td>
<td>Cruise Ships</td>
<td>&gt;500</td>
</tr>
<tr>
<td>April</td>
<td>Florida</td>
<td>University</td>
<td>150</td>
</tr>
<tr>
<td>April</td>
<td>Vancouver, WA</td>
<td>Assisted Living Facility</td>
<td>55 residents &amp; staff—3 deaths</td>
</tr>
</tbody>
</table>

1As Reported in 2006 News Articles
CDC’s EHSNET OUTBREAK/NONOUTBREAK STUDY
EFORS-Listed Outbreaks Evaluated by EHS-Net

- Viral: 47%
- Bacterial: 32%
- Parasitic: 5%
- Toxin: 3%
- Unknown/Missing: 13%
CDC’s EHS NET OUTBREAK/NONOUTBREAK STUDY
Contributing Factors Identified in Outbreaks, EHSNET, 2002-2003

C- Contamination Factors
P- Proliferation Factors
S- Survival Factors

- Infected Person Handling Food
  - Bare Hand Contact
  - Cross Contamination from Raw Animal Food
  - Raw Food Contaminated at Source
- Holding Food at Room Temperature
  - Insufficient Time/Temp. During Initial Cooking

Bar chart showing percentage of factors: C12, C10, C9, C6, C13, C14, C11, C7, P1, P4, P3, P2, P9, S1, S2, S4.
Potential Transmission Level
Norovirus

- Shed in the feces at levels up to 10,000,000 viral particles per gram of feces.
- One projectile vomiting incident can potentially contaminate the environment with 30,000,000 viral particles.
- Infectious dose of NoV is estimated from 10-100 viral particles.
Transfer from Contaminated Fingers

- Barker (2004) found that NV can transfer from contaminated fingers, sequentially to 7 different environmental surfaces

- Secondary Transfer of NV (from contaminated surfaces to clean fingers, to other surfaces)
  - can transfer sequentially to 4 different surfaces

- Detergent cleaning, followed by rinsing was not effective in cleaning contaminated surfaces, unless followed with a disinfectant.
All Food Code Listed Pathogens Have an Extremely Low Infectious Dose

- Hepatitis A virus ~ 10 or less viral particles
- Norovirus ~ 10 to 100 viral particles
- EHEC is as low as 10 bacterial cells
- *Shigella* spp. can be as low as 10 bacterial cells
- *S. Typhi* is considered low for bacteria ~ 1000 bacterial cells
Potential Contamination Level per Gram of Feces:

- **Hepatitis A (HAV):** $10^8$ viral particles
- **Noroviruses (NoV):** $10^7$ viral particles
- **Bacterial infections:** $10^6$
The tiered approach

- Risk
  - How much organism is being excreted?
  - How close is the person to the food?

The more that is excreted and the closer to food the greater the risk
Gastrointestinal Symptoms of Concern:
- Vomiting
- Diarrhea
- Jaundice

Other symptoms of concern
- Sore throat with fever
- Infected wound, pustule or boil

Note: Fever is Deleted as a Symptom of Concern
Risk-Based Employee Health

Level I:
- Active Gastrointestinal Symptoms: or diagnosis with S. Typhi or hepatitis A virus

Level II:
- Diagnosis and symptom resolution

Level III:
- Diagnosis and never developed symptoms.

Level IV:
- Exposure to Listed Pathogen
Level I: Most Hazardous or Most Likely to Cause Foodborne Illness

- Symptomatic-- with active vomiting, diarrhea, or jaundice – no diagnosis
- Diagnosed with S. Typhi
- Diagnosed with hepatitis A within 14 days of symptoms
- Active symptoms of diarrhea or vomiting, and Diagnosed with Norovirus, EHEC, or Shigella spp. infection.
- Exclusion (Highly susceptible and general population)
Level II: Less Likely to be Carrying Pathogen in Intestinal Tract, but Still a Hazard

- Diagnosed with Listed Pathogen, but gastrointestinal symptoms have resolved

- Periods of Exclusion (in an HSP Facility), or Restriction (in a general population facility) are recommended, based on the pathogen.
Level III: Even Less Likely to be Shedding Pathogen, but Identified as a Potential Hazard

- Diagnosed & asymptomatic food workers who never developed symptoms
- Typically identified during a foodborne illness outbreak
- Periods of Exclusion (in an HSP Facility), or Restriction (in a general population facility) are recommended, based on the pathogen.
Level IV: Least likely to be shedding a listed pathogen, but still a potential hazard

- Food Worker who reports an exposure to a listed pathogen, but has not developed symptoms
- The potential hazard is enough to recommend restriction for food workers in a HSP
- The period of restriction is linked to the upper end of the average incubation period for each listed pathogen
Conclusions

- Multiple ways used to protect public health
  - Employee health
  - Handwashing
  - No bare hand contact with ready-to-eat foods

- New focus is based on new science regarding the agents that are most likely to be transmitted from a sick food worker via food.
  - Norovirus
  - Hepatitis A virus
  - S. typhi
  - Shigella
  - E.coli O157:H7 or other EHEC

- Success will be dependent on raising awareness and education
Mario Seminara, R.S.
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Questions?