Using the JIFSAN Pilot Observational Study of Food Safety Practices in Interagency *Listeria monocytogenes* at Retail Deli Risk Assessment

JIFSAN Advisory Council
Spring Symposium
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Role of Risk Analysis in Public Health Policy

A Powerful Public Health Tool

- Scientific basis for food safety policies and allocation of resources
- Allows for transparency and stakeholder involvement to ensure credibility and scientific accountability
- Facilitates the application of science to policy – “informational bridge” between data and decisions
What’s So Special About This Project?

A new paradigm!

- Collaboration (FDA, FSIS, CDC, JIFSAN, UMD, and others)
- Develop data specifically for the risk assessment model
- First retail cross-contamination model
- Stakeholder participation early in the process
The Interagency Retail *Lm* Risk Assessment

- **Objective:** Ascertain the impact on public health of current practices and potential interventions that reduce or prevent *Listeria monocytogenes* contamination in ready-to-eat food sliced, prepared and/or packaged in retail facilities.
Background … in 5 studies

- *Listeria monocytogenes* (*Lm*): 2nd cause of foodborne-disease related death in the US
  - 500 deaths amongst 2,500 invasive cases (Mead et al., 1999)

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Illnesses</th>
<th>Deaths</th>
<th>Case fatality rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Campylobacter</em></td>
<td>2,453,926</td>
<td>124</td>
<td>0.1%</td>
</tr>
<tr>
<td><em>Salmonella</em></td>
<td>1,412,498</td>
<td>582</td>
<td>0.8%</td>
</tr>
<tr>
<td><em>E. coli O157:H7</em></td>
<td>73,480</td>
<td>61</td>
<td>0.8%</td>
</tr>
<tr>
<td><em>Listeria monocytogenes</em></td>
<td>2,518</td>
<td>504</td>
<td>20.0%</td>
</tr>
</tbody>
</table>
Deli meat: 1\textsuperscript{st} ready-to-eat (RTE) food vehicle of \textit{Lm}.

\begin{itemize}
  \item \textit{ca.} 1,600 cases per year (FDA/FSIS, 2003)
\end{itemize}
Background ... in 5 studies

- *Lm* prevalence and *Lm* levels are higher for in-store packaged than for manufacturer-packaged RTE food
  - Gombas et al., 2003
  - NAFSS, 2008 [unpublished results]
83% of all listeriosis cases attributed to deli meat are from deli meat sliced and packaged at retail.

FSIS, 2009 report using NAFSS contamination data.
Why would in-store-packaged products be more contaminated than manufacturer-packaged ones?

- Major hypothesis: additional cross-contamination
  - More than one kind of products manipulated at a given time / place
    - Meat, Poultry, Vegetables, Seafood, …
  - More than one process at a given time / place:
    - Slicing, Cutting, Mixing, …
Lm at Retail Risk Assessment Model

The mathematical model will simulate the retail environment and determine how practices at retail influence exposure.
Data Needs

- Worker behavior
- Transfer coefficients
- Concentrations at retail
- Growth
- Product formulation
- Product sales
- Retail Operations
- Retail storage
- Retail sanitation
- Consumer handling
- Dose-response model
- Niches
Available Data on Food Safety Practices of Food Handlers

- Several studies have assessed food employees’ behavior in food service settings

- Methods used include:
  - Self-reports
  - Observational designs

- None provided data with the level of detail needed for the risk assessment model.
Methods

- Nine retail facilities which sell deli meat, cheese, and deli-type salads were selected for the study based on size, location, and other criteria.
  - Six chain stores \((n=25)\)
  - Three independent stores \((n=8)\)

Procedure

- Interview was conducted with store manager.
- Employee was selected at random.
- Researcher observed employee for 15 minutes during which time data collected was discarded.
- Researcher continued to observe until at least 100 actions were performed/recorded (~15-45 min).
<table>
<thead>
<tr>
<th>Action No.</th>
<th>Action Sequence</th>
<th>Notes</th>
<th>Specific Food Safety Action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Action</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Required</td>
<td>Attempted</td>
<td>Adequate</td>
</tr>
<tr>
<td>1-TIME:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10AM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>WS HDS</td>
<td>No soap</td>
<td>WS</td>
</tr>
<tr>
<td>2</td>
<td>PON GLVS</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>OPN CAS</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>PUP SAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CLS CAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>P SAL ON SLI #3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>SL SAL ONTO GLV</td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td></td>
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<td></td>
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<td>9</td>
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<td>10</td>
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</tbody>
</table>
Frequency of Events

- Wipe Slicer (8%)
- Change Gloves: Wash-N-Change (40%), Change Only (27%), None (33%)
- Touch NFCS (5%)
- Open Case (82%)
- Touch Refrigerator Handle (3%)
- Contact When Open Chub: None (35%), Sink (24%), FCS (35%), Slicer (6%)
- Touch Knob (22%)
- Slice On Gloves (99%)
- Touch Scale (100%)
- Put Chub On FCS (1%)
- Wipe Slicer (22%)

Approximately 3,300 data points!
The “Virtual” Deli is Open!

- Products in display case
- Food workers
- Sites/equipment
- Products sold

Tracking changes in contamination levels
Wipe Slicer

Removes some bacteria from the slicer
Example: Serve Customer Event

Wipe Slicer

Wash hands & change gloves

Removes some bacteria from hands
Example: Serve Customer Event

- Wipe Slicer
- Wash hands & change gloves
- Open case, remove chub, close case

Cross contamination between gloves and case
Example: Serve Customer Event

- Wipe Slicer
- Wash hands & change gloves
- Open case, remove chub, close case
- Slice on gloves

Cross contamination among gloves, slicer, chub
Example: Serve Customer Event

Wipe Slicer

Wash hands & change gloves

Open case, remove chub, close case

Slice on gloves

Touch scale

Cross contamination between gloves and scale
Example: Serve Customer Event

- Wipe Slicer
- Wash hands & change gloves
- Open case, remove chub, close case
- Slice on gloves
- Rewrap chub

Cross contamination between the chub and the food contact surface
Example: Serve Customer Event

- Wipe Slicer
- Wash hands & change gloves
- Open case, remove chub, close case
- Slice on gloves
- Touch scale
- Rewrap chub
- Open case, remove chub, close case

Cross contamination between the gloves and the case
Timeline

- Commission RA (Charge from risk managers)
- FR notice; June 2009 public meeting
- Collect data and information (an ongoing process)
  - Literature search
  - Expert opinion
  - Input from stakeholders
  - Pilot observational retail study
- Develop conceptual model
- Develop and test Beta model
- Prepare draft RA report
- External peer review
- Issue draft RA report for public comment
- Revise RA model and report, as appropriate
Timeline of Events

Draft FDA-FSIS quantitative risk-ranking of ready-to-eat foods; identify deli meats as highest risk

FSIS develops risk-based Lm sampling algorithm with parameters informed by QMRAs; establishments producing RTE products are selected for monthly sampling based on this risk-ranking

Final FDA-FSIS quantitative risk-ranking of ready-to-eat foods; deli meats remain the highest risk

FSIS comparative Lm risk assessment completed; 83% of listeriosis cases attributed to deli meat are associated with those sliced at retail

FSIS and FDA initiate joint interagency retail Lm risk assessment to evaluate the transmission of Lm at retail and effectiveness of controls

FSIS and FDA brief the Association of Food and Drug Officials (AFDO) Retail & Food Committee

FSIS comparative Lm risk assessment evaluating the effectiveness of various Lm processing controls; used to guide FSIS’ RTE Rule for Lm

FDA reviews ORISE fellow for interagency retail Lm risk assessment

FDA presents at ISOPOL XVII (International Symposium on Problems of Listeriosis)

FSIS and FDA joint public meeting on the interagency risk assessment

FSIS presentation at ISOPOL XVII (International Symposium on Problems of Listeriosis)

FSIS contracts VA Tech to support the development of an interagency retail Lm risk assessment model

FDA call for data for interagency risk assessment

FDA/JIFSAN pilot food worker retail observation study completed (started Summer 2009)

FSIS contracts Cornell University to develop data for the interagency retail Lm risk assessment

FSIS presentation at the 2009 Society for Risk Analysis

FDA/JIFSAN/AFDO brief the Retail & Food Safety Committee

FSIS briefs CDC FoodNet Attributions Workgroup

FSIS presentation at the 2010 FSIS-ARS Annual Conference

FSIS briefs the Joint Institute for Food Safety and Applied Nutrition and Food Marketing Institute (JIFSAN/FMI)

President’s Food Safety Working Group Report identifies Interagency Retail Lm Risk Assessment as a priority

CDC, FSIS, and FDA briefing on interagency retail Lm risk assessment

FSIS presentation at AMIF Meat Industry Research Conference

FDA/JIFSAN pilot food worker retail observation study completed (started Summer 2009)

FSIS and FDA brief the Joint Institute for Food Safety and Applied Nutrition and Food Marketing Institute (JIFSAN/FMI)

Joint FSIS-FDA docket for public comments closes

CPDH to participate on interagency retail Lm risk assessment work group

FSIS has VA Tech conduct laboratory studies and provide transmission data

FSIS and FDA brief the Association of Food and Drug Officials (AFDO) Retail & Food Committee

President’s Food Safety Working Group Report identifies Interagency Retail Lm Risk Assessment as a priority

FSIS and FDA follow-up briefing with the Joint Institute for Food Safety and Applied Nutrition and Food Marketing Institute (JIFSAN/FMI)
Acknowledgements

Interagency Retail Lm Risk Assessment Workgroup

- Federal Partners
  - USDA, Food Safety and Inspection Service
  - FDA, Center for Food Safety and Applied Nutrition
  - CDC

- Academia
  - VA Tech
  - Cornell University
  - University of Maryland/Joint Institute for Food Safety and Applied Nutrition

Food Marketing Institute (FMI)