IFPTI Fellowship Cohort VI:
Research Presentation
JoAnn Xiong-Mercado, CP-FS
2016-2017
Estimating Risk by Measuring Coliform On Common Touch Surfaces

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What is different in these two photographs?

Image source: aprilbreakfastclub.splashthat.com

Image source: whatscooking.shortorder.com
• Studies have shown that common touch surfaces are vectors for infections
• Consumer spending on Food-Away-From-Home (FAFH) continues to rise
• 53% of foodborne outbreaks occur at sit-down restaurants
• When outbreaks occur, tracing back foodborne illness outbreaks can be difficult due to lack of food to sample and asymptomatic food workers

• Environmental sampling has demonstrated efficacy as an investigation tool
Commonly-handled common touch surfaces in restaurant dining areas may serve as pathogenic reservoirs but the extent of this risk is largely unknown.
Research Question

1. Can environmental sampling in restaurant dining areas help illuminate risks associated with common touch surfaces and offer value as an investigative tool for regulators?
Methodology

- Used 3M Hydrated Sponges for collection (Control testing demonstrated a 1000 fold reduction in sensitivity)

- Confirmed counts of coliform colonies with gas production on 3M Petrifilm **Coliform Count (CC)** Plate

Image source: JoAnn Xiong-Mercado
Methodology (continued)

• All sponges submerged in Single-Strength Trypticase Soy Broth (SS TSB) for coliform growth
  – Positive = Cloudiness and particulate matter; not necessarily coliforms
  – Negative = No change in SS TSB

• All sponges were Cloudy (positive) indicating bacteria
Methodology (continued)

- IDEXX Colilert Testing for Coliform presence and absence
  - Yellow indicates positive/present
  - Clear indicates negative/not present

- All samples checked for fluorescence (*E. coli* indicator)
• MacConkey agar (MAC) and Eosin Methylene Blue agar (EMB) plates used for isolating pure colonies for identification
• RapID used for identifying coliforms with a clinical database

• Only 14 samples tested this way due to cost

Image source: JoAnn Xiong-Mercado
879 restaurants in Indianapolis that met the sampling criteria

- Non-institutional/arena, sit-down restaurants with 10+ employees

44 were randomly selected

4 samples were taken per establishment

176 total
Hierarchy sampling list, non-food contact surfaces only:

1. Laminated menu
2. High chair
3. Soda gun (or touch screen)
4. Restroom door handle (inside only)
5. Salt and pepper shakers
6. Ketchup and mustard bottles
7. Underside of a chair
8. Underside of a table
Estimating Risk by Measuring Coliform on Common Touch Surfaces

Sampling Locations

- High Chairs: 23%
- Door Knobs: 21%
- Salt/Pepper: 19%
- Menus: 11%
- Ketchup/Mustard: 2%
- Under Chairs: 6%
- Under Table: 3%
### Results (continued)

<table>
<thead>
<tr>
<th>Colony Counts</th>
<th>Counts</th>
<th>% of Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 colony, Colilert Negative</td>
<td>82</td>
<td>46.59%</td>
</tr>
<tr>
<td>&lt;1 colony, Colilert Positive</td>
<td>67</td>
<td>38.07%</td>
</tr>
<tr>
<td>1-20 colonies, Colilert Positive</td>
<td>21</td>
<td>11.93%</td>
</tr>
<tr>
<td>21-100 colonies, Colilert Positive</td>
<td>4</td>
<td>2.27%</td>
</tr>
<tr>
<td>101+ colonies, Colilert Positive</td>
<td>2</td>
<td>1.14%</td>
</tr>
</tbody>
</table>
### Results (continued)

<table>
<thead>
<tr>
<th>Sample Location</th>
<th>Total Sampled</th>
<th>Total Positive</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>High chairs</td>
<td>40</td>
<td>37</td>
<td>92.50%</td>
</tr>
<tr>
<td>Condiment bottles</td>
<td>4</td>
<td>3</td>
<td>75.00%</td>
</tr>
<tr>
<td>Laminated menus</td>
<td>20</td>
<td>13</td>
<td>65.00%</td>
</tr>
<tr>
<td>Soda guns/machines</td>
<td>26</td>
<td>14</td>
<td>53.85%</td>
</tr>
<tr>
<td>Under tables</td>
<td>6</td>
<td>3</td>
<td>50.00%</td>
</tr>
<tr>
<td>Under chairs</td>
<td>10</td>
<td>4</td>
<td>40.00%</td>
</tr>
<tr>
<td>Salt and pepper shakers</td>
<td>34</td>
<td>10</td>
<td>29.41%</td>
</tr>
<tr>
<td>Restroom doorknob</td>
<td>36</td>
<td>10</td>
<td>27.78%</td>
</tr>
</tbody>
</table>

“Estimating Risk by Measuring Coliform on Common Touch Surfaces”
• **RapID test for identification on 14 samples:**
  – 4 *Klebsiella* (salt and pepper, high chair, soda gun, under chair)
  – 2 *Enterobacter* (high chair and restroom door handle)
  – 1 *Citrobacter* (soda gun)
  – 2 *E. coli* (menu, restroom door handle)
  – 5 unknowns (unknowns are likely still coliforms; RapID database only contains “clinically significant pathogens”)

• **Identified a non-Coliform:**
  – 1 confirmed *Acinetobacter* (36 other indications with the same characteristic)
Conclusions

• Consumers and regulators still use visual cues to determine cleanliness but need to develop a measurable tool for coliforms

• Colilert-18 IDEXX is an effective testing method for coliform detection although no acceptable levels standards have been developed

• However, there appears to be a link between Colilert-18 IDEXX positive detections and cleaning regimes
Restaurant

1. Restaurant operators should examine their cleaning practices regarding areas which are frequently touched but may not be frequently cleaned such as high chairs, soda guns, laminated menus, and condiment bottles.

2. Restaurant operators should consider food safety as a part of dining room design and material selection as they do kitchens.

3. Establishments should focus on cleaning high chairs with relation to high risk population.
Regulatory Agencies:

4. Regulators should consider using routine environmental sampling to uncover risk factors for outbreaks.

5. Regulatory agencies should adopt a standardized method for common surface sampling so as to better compare results and risk factor implications.

6. Increased guidance regarding common surface cleaning for retail food establishments should be offered by regulatory authorities.
Acknowledgements

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  – All other instructors and mentors: Joe Corby, Cameron Smoak, Steve Steinhoff, Dan Sowards
  – All other staff
  – Cohort VI Fellows
Planned Future Presentations

• Indiana Environmental Health Association Food Protection Committee June 29, 2017, Indianapolis, IN

• National Environmental Health Association 81st AEC July 10-13, 2017, Grand Rapids, MI

• American Culinary Federation, Indianapolis, IN

• Indiana Environmental Health Association Fall Conference, September 2018
Questions?

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• Additional Study Information
• Letter of Intent Example to Restaurant Management
• Lab Process Flow Chart
• References