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IFPTI Fellowship Cohort VI: Research Presentation

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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

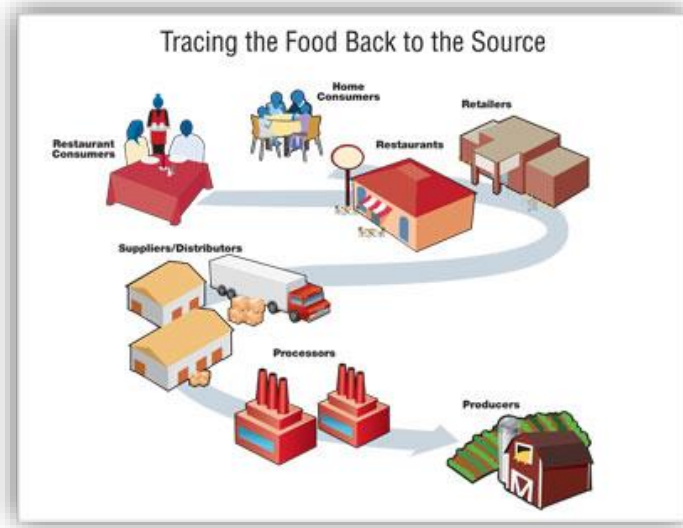


Image source: CDC.gov



Image source: JoAnn Xiong-Mercado (sampling bag)

"Estimating Risk by Measuring Coliform on Common Touch Surfaces"

Commonly-handled common touch surfaces in restaurant dining areas may serve as pathogenic reservoirs but the extent of this risk is largely unknown.

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?

- 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

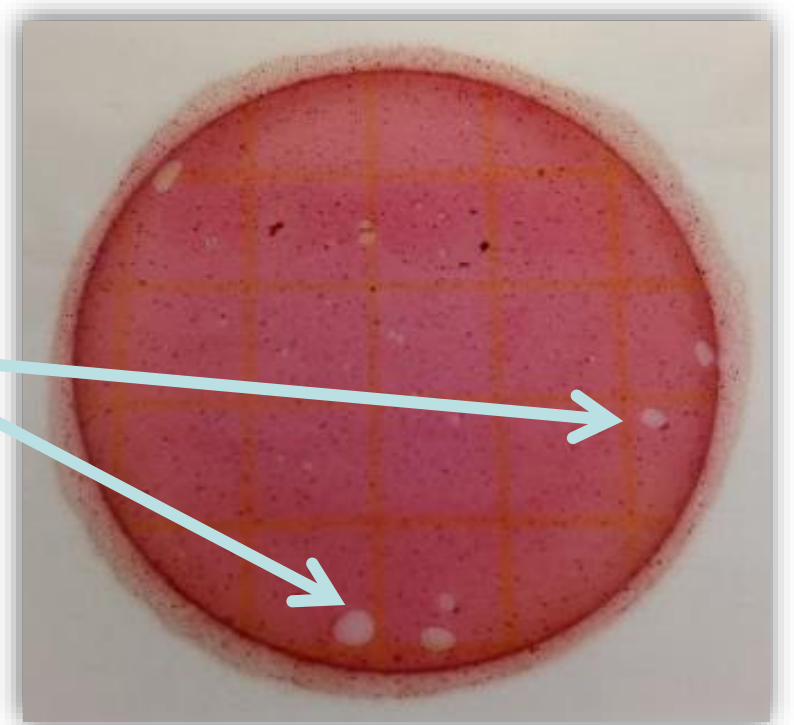


Image source: JoAnn Xiong-Mercado

- 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



- 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)

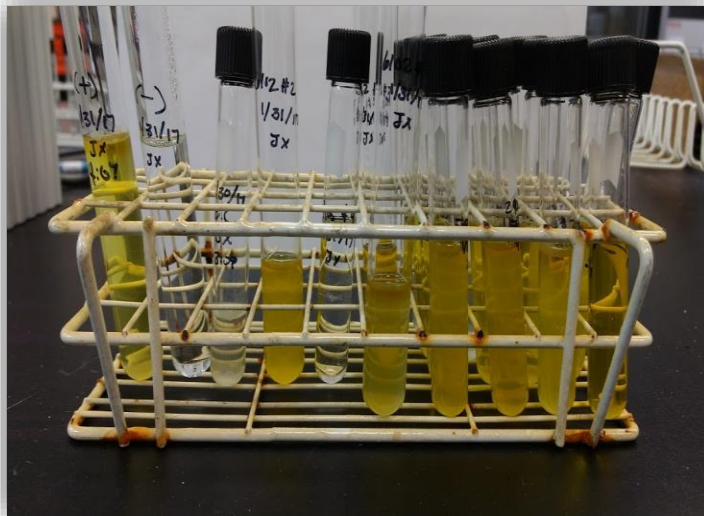


Image source: JoAnn Xiong-Mercado

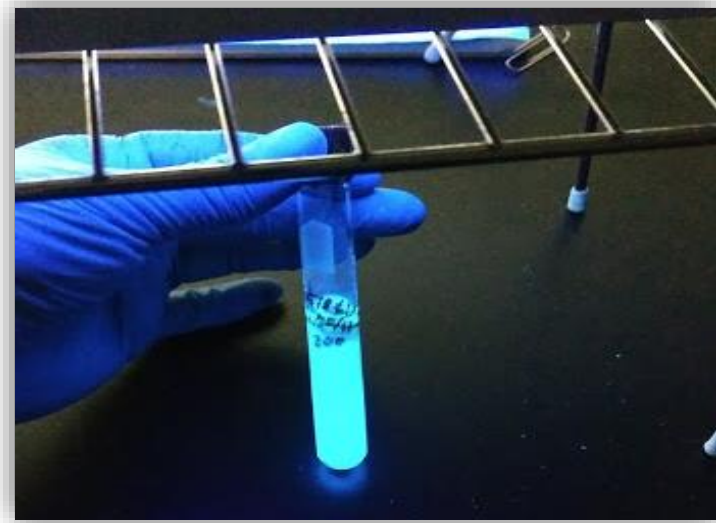


Image source: JoAnn Xiong-Mercado

- MacConkey agar (MAC) and Eosin Methylene Blue agar (EMB) plates used for isolating pure colonies for identification

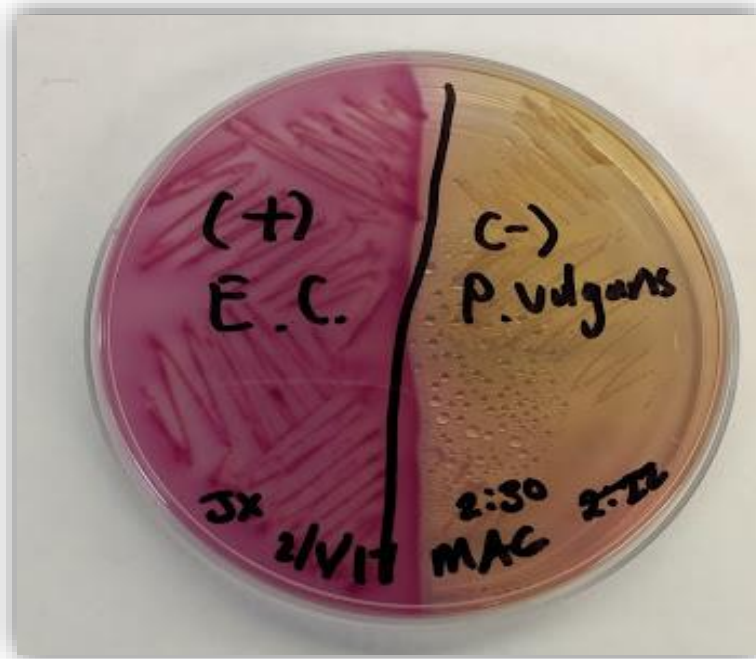


Image source: JoAnn Xiong-Mercado

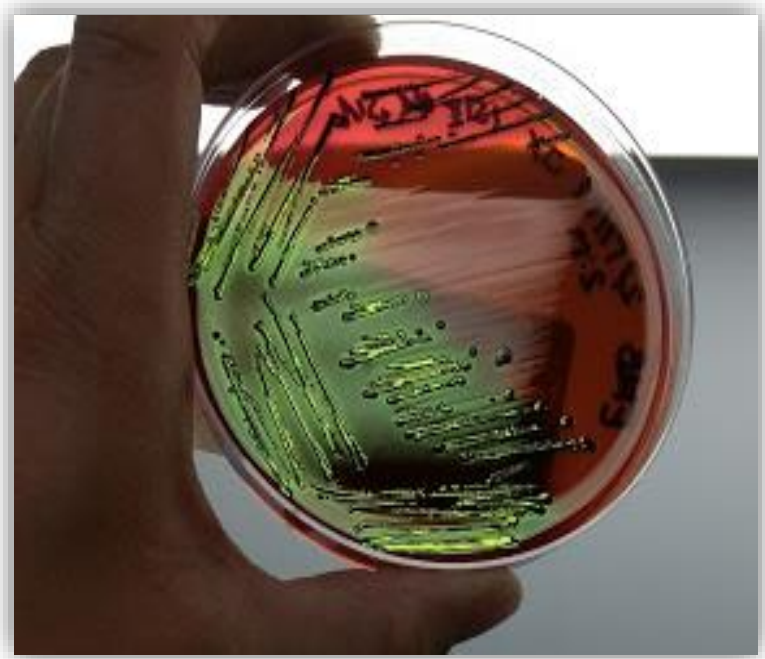


Image source: JoAnn Xiong-Mercado

- 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

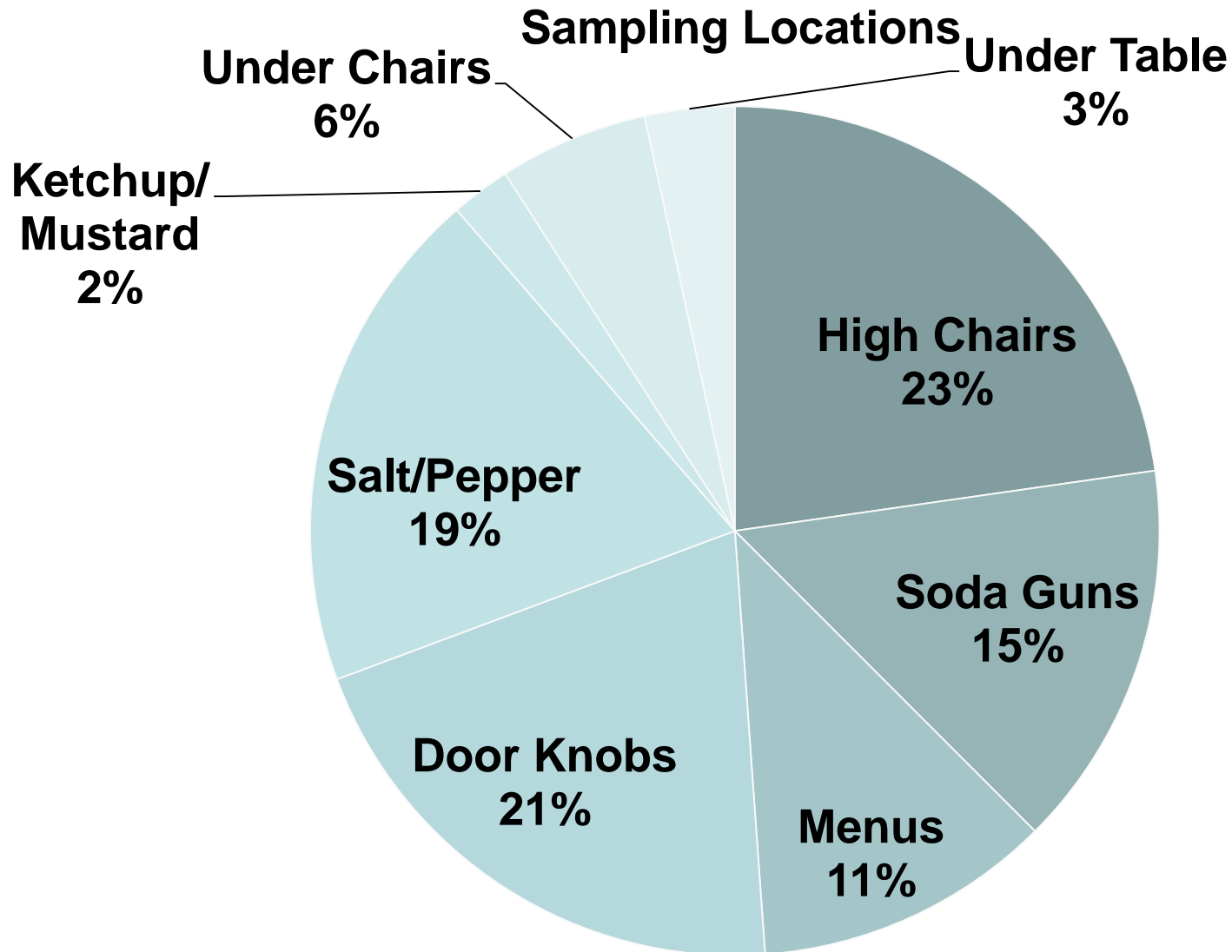
- Non-institutional/arena, sit-down restaurants with 10+ employees

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



Colony Counts	Counts	% of Samples
<1 colony, Colilert Negative	82	46.59%
<1 colony, Colilert Positive	67	38.07%
1-20 colonies, Colilert Positive	21	11.93%
21-100 colonies, Colilert Positive	4	2.27%
101+ colonies, Colilert Positive	2	1.14%

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

- 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)

- 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.

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- 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](#)