Introduction to
IAFP’s European Symposium

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Principal, Ruth Petran Consulting LLC. and Senior Advisor, The Acheson Group
5 May 2022
Welcome

- History
  - So happy to be back in person, yet cautiously…
  - What I’m looking forward to during this meeting…
  - Student Travel Award recipient with us
    - Congratulations to Alessia Delbrueck from the ETH Zurich in Switzerland
Practical Application of Risk Assessment Outcomes Helps Ensure Food Safety

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5 May 2022
There are many food safety risks in need of management

Need to translate empirical and valid research information into practical approaches that can be reasonably implemented

Practical examples

- *Listeria monocytogenes* in manufacturing
- Norovirus in food service

Applying optimal control measures reduces overall food safety risks
Is The Food Supply Less Safe Than It Used To Be?

- No, but food safety incidents are increasingly more visible
- Improved detection & surveillance identifies broad issues
  - WGS identifies & differentiates organisms more precisely
- Good news for public health
- Must flawlessly execute food safety programs across supply chain
- Food safety facts can help direct efforts appropriately
Foodborne Illness Annual Estimates

Canada - 4 million cases
United States - 48 million cases
EU - 49.4 million cases
China - Surveillance beginning
Africa - Surveillance beginning
Australia - 4.1 million cases

Global foodborne illness estimate: 600 million cases & 420,000 deaths
Global Foodborne Illness Data

- WHO estimates of global burden of diseases from foodborne illnesses
  - 31 agents (bacteria, toxins, parasites, chemicals)
- African region has highest disease burden, then SE Asia
- Global Variability in What Causes Illness
  - Developed World - Norovirus, *Campylobacter*, *E. coli* and *Salmonella*
  - Developing World expanded to also include hazards from chemicals
- Agents responsible for most deaths
  - Typhoidal and non typhoidal *Salmonella*
  - Enteropathogenic *E. coli*
  - Norovirus
- 40% of affected people suffering were < 5 years old

Source: [http://www.who.int/foodsafety/areas_work/foodborne-diseases/ferg/en/](http://www.who.int/foodsafety/areas_work/foodborne-diseases/ferg/en/)
Approach is 3 Pronged…

- Awareness of risks – reliance on expert information
  - Many food safety and public health risks in need of management.
- Implementing risk management strategies
  - Translate scientific information into practical approaches that can be reasonably implemented.
- Verifying that risks are adequately managed
  - Role of inspection

*Applying optimal controls reduce food safety and public health risks.*
WHO Risk Analysis Framework

Risk assessment
Science-based

Risk management
Policy-based

Risk communication
Interactive exchange of information and opinions concerning risks
Risk Management

- From WHO, “The process of weighing policy alternatives in the light of results of risk assessment and, if required, selecting and implementing appropriate control options, including regulatory measures.”

- More simply… “the practice of identifying potential risks in advance, analyzing them and taking precautionary steps to reduce/curb the risk.”
What are the “Right” Food Safety Risks To Manage?

- Cause most deaths?
- Cause most illnesses?
- Most costly from an economic standpoint?
- Cause highest risks to brand?

All can be valid determinants…
Examples of Identified Risks

- **Listeria monocytogenes**
  - High mortality rate – 20-30%
  - 90% of cases are hospitalized
  - Annual cost of illness - $2.8B

- **Norovirus**
  - Top global cause of acute gastroenteritis = 685M cases
  - Causes half of all outbreaks of food-related illness
  - Annual cost of illness - $2.2B

Listeria monocytogenes  Example
L. monocytogenes in Cantaloupe, 2011

- 147 cases, 143 hospitalizations, 33 deaths
- Cases significantly more likely to have eaten cantaloupe (OR=8.5; 95% CI=1.3-∞)
- Notable findings in processing facility
  - Melons washed in non-chlorinated water
  - Equipment had brushes and felt rollers
  - Outbreak strain found in 31% of environmental samples
  - Truck for hauling culled melons to animal feed close to processing area
- Owners sentenced to 5 years probation, 6 months home detention, and $150,000 each in restitution fees to victims.

Five key factors identified as contributing strongly to the risk of listeriosis associated with ready-to-eat foods

1. Amount and frequency of consumption of a food
2. Frequency and extent of contamination of a food with *L. monocytogenes*
3. Ability of the food to support the growth of *L. monocytogenes*
4. Temperature of refrigerated/chilled food storage
5. Duration of refrigerated/chilled storage

https://www.who.int/news-room/fact-sheets/detail/listeriosis
### Applying *L. monocytogenes* Risk Assessment Findings

| Potential For Contamination | • Implement GMPs and a valid HACCP plan  
|                            | • Hygienic design of equipment & processing area  
|                            | • Hygienic zoning to separation of raw foods from processed |
| Support The Growth          | • Consider reformulation to a $w < 0.95$ and pH $< 5.5$ * |
| Are Ready To Eat            | • Reformulate so growth is retarded |
| Temperature Control         | • Store refrigerated items at $< 4.4 \degree C$  
|                            | • Ensure integrity of entire cold chain |
| Stored For An Extended Time | • Post packaging treatments to eliminate *L. monocytogenes* |

Applying this to Melons…

- Understand contamination sources:
  - Growing environment, soil
  - Poor sanitary design of equipment
  - Carryover from animal feed hauling

- Limiting growth
  - Use of valid antimicrobial in wash water
  - Refrigerated production area
Sounds *So Easy*, Yet Opportunities Exist…

- Top violations in inspections overwhelmingly highlight basic cleanliness issues…

#### Top Major Non-Conformances – FSSC, 2022

<table>
<thead>
<tr>
<th>Rank</th>
<th>Clause number</th>
<th>Clause requirement</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>ISO 22000:2018; 8.5.4.3</td>
<td>Monitoring systems – CCPs and OPRPs</td>
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<tr>
<td>2</td>
<td>ISO 22000:2018; 8.7</td>
<td>Control of monitoring and measuring</td>
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<tr>
<td>3</td>
<td>ISO 22000:2018; 9.2.1</td>
<td>The organization shall conduct internal audits at planned intervals</td>
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<tr>
<td>4</td>
<td>ISO 22000:2018; 8.3</td>
<td>Traceability system</td>
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<tr>
<td>5</td>
<td>ISO 22000:2018; 5.1</td>
<td>Leadership and commitment</td>
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Verifying *L. monocytogenes* Risk Management Strategies is Key

A comprehensive Environmental Monitoring Program and Appropriately Directed Finished Product Testing.

- Root cause analysis
- Trend analysis
- Does not treat positive results as a failure in the system
Norovirus Example
Norovirus Outbreak at Restaurant

- At least 364 cases, among patrons, employees & their contacts
- Affected people more likely to have eaten antipasti platter (OR = 2.96; 95% CI = 1.08 - 8.14) and garlic mashed potatoes (OR = 4.05; 95% CI = 1.37 - 11.99).

Deficiencies noted:
- Employees worked when ill with active GI symptoms
- Inadequate cleanup of vomit
- Handwashing procedures not followed
- Surface cleaning improperly done

Source: https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2019.24.18.1800511?crawler=true
Norovirus Risk Analysis Findings

- Estimated to cause >50% of all foodborne illnesses
- Most cases traced to food contaminated by infected employees in retail food or restaurant settings.
- Reduced transmission linked to
  - Excluding employees ill with vomiting or diarrhea when symptoms first appear
  - Handwashing efficacy
  - No bare hand contact with RTE foods
  - Proper sanitation of surfaces

Employees working when ill

<table>
<thead>
<tr>
<th>Scenario</th>
<th>% Baseline Number of Infected Customers (starting point = 1)</th>
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</thead>
<tbody>
<tr>
<td>Employee never works while ill</td>
<td>0.13</td>
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<tr>
<td>EE works when ill</td>
<td>2.26</td>
</tr>
<tr>
<td>Sick EE excludes for 24h</td>
<td>0.75</td>
</tr>
<tr>
<td>Sick EE excludes for 48h</td>
<td>0.69</td>
</tr>
</tbody>
</table>

- Reality: > 60% of food employees have worked while ill and 20% while experiencing diarrhea or vomiting
- Why?
  - Don’t want to lose income
  - Illness is perceived as “not that severe”
  - Don’t want to leave co-workers short staffed

Sources:
Impact of hand hygiene

- Wearing gloves alone is not enough
- Needs to be combined with physical removal of virus from hands through hand washing
- Improving efficacy through training, more friction in hand wash process, a sanitizer, etc. reduces risks further

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<th>Scenario</th>
<th>% Baseline Number of Infected Customers (starting point =1)</th>
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</thead>
<tbody>
<tr>
<td>24h exclusion, No bare hand contact, 100% wear gloves</td>
<td>1.14</td>
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<tr>
<td>24h exclusion, 100% HW compliance</td>
<td>0.94</td>
</tr>
<tr>
<td>24h exclusion, 100% HW compliance and 100% wear gloves</td>
<td>0.58</td>
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<tr>
<td>Improved HW efficacy, additional 2 log reduction</td>
<td>0.53</td>
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## Applying Norovirus Risk Assessment Findings

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| **Excluding ill employees at first sign of symptoms** | • Ill employees report illness and stay away from work  
• Reported symptom resolution  
• Followed post symptomatic exclusion period of >24h |
| **Handwashing Efficacy** | • Wash after toilet usage  
• Wash hands for 20 sec with soap and warm water |
| **No bare hand contact with RTE food** | • Glove usage  
• Utensils to handle food |
| **Proper sanitation of surfaces** | • Following established protocols and product directions  
• Routine cleaning and sanitizing  
• Proper disinfection when and where needed |
Verifying Norovirus Risk Management Strategies

- Examine for presence of valid procedures for illness exclusion, hand washing, cleaning & disinfection.
- Monitor hand soap or disinfectant usage.
- Audit/inspect for proper compliance with procedures for illness exclusion, hand washing, cleaning & disinfection.
Reductions in Norovirus Positive Specimens in 2020, Australia

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<tr>
<th>Likely Contributors to Reductions</th>
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<td>■ Fewer specimens analyzed and restaurant meals</td>
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<tr>
<td>■ Physical distancing</td>
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<tr>
<td>■ International and domestic border closures in response to the COVID-19 pandemic</td>
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<tr>
<td>■ BUT...Personal hygiene awareness may have played a role as well!</td>
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Benefits of Risk Management Aimed at *L. monocytogenes* and Norovirus

- Reduced morbidity and mortality
- Reduced healthcare costs
- Enhanced brand and establishment reputation
Concluding Point:

Optimally Apply and Verify the Appropriate Risk Management Practices to Effectively Manage Many Risks
Any questions?

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