Hand Hygiene: A Cornerstone for Food Safety
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Awareness Exercise

- What are the two most important things that can keep you healthy or make you very sick?
Outline

- Statistics
- Hand Hygiene Evolution
- Common Practices / Issues
- Science of Handwashing
- Best Practices
- Hand Hygiene Program Requirements
- Summary

Fast Facts

- There are 229,000 germs per square inch on frequently used faucet handles
- A working adult touches 30 objects in 1 minute on average
- The majority of colds transmission comes from hand-to-hand contact and transfer of germs, not coughing and sneezing
- There are 21,000 germs per square inch on work desks – about 400 times more than the average toilet seat
- Researchers in London estimate that if everyone routinely washed their hands, a million deaths a year could be prevented
Foodborne Illness Statistics

- The Centers for Disease Control (CDC) estimates that annually:
  - 1 in 6 Americans (48 million people) get sick from foodborne diseases
  - 128,000 of these people are hospitalized and 3,000 die
- The World Health Organization (WHO) estimates up to *35% of foodborne illnesses could be prevented with proper handwashing procedures*
- Increase in ready-to-eat foods has compounded the need for proper hand hygiene

Did You Know?

- *The human body sheds 1,000 – 10,000 CFU per minute of viable microorganisms*
- *An estimated 1 in every 50 asymptomatic food worker sheds pathogens at 1,000,000,000 CFU per gram of feces*
Hand Hygiene Evolution

- Hand hygiene has been central to societies since ancient civilizations
- Nearly early one of the world’s religions has a link between cleanliness and spiritual purity in their writings

1546, Italian physician Girolamo Fracastoro put forth the idea that infection could be passed on via hands and clothes – but was mostly ignored until the 1800s

19th Century – Germ Theory and Handwashing Connected
- ‘Germ Theory’ developed by Koch and Pasteur – identified microorganisms as cause of many diseases
- In 1846, Dr. Semmelweis observed a much higher mortality rate in maternity wards staffed by doctors vs. those staffed by midwives
- Semmelweis studies determined the doctors were going directly from autopsy suites to maternity wards
Hand Hygiene Evolution

• Semmelweis studies continued
  – Doctors hands had a malodor despite washing with soap and water
  – They were transferring *Strep pyogenes* via their hands and clothing
• Semmelweis introduced first antiseptic wash in 1847

Maternal Mortality (%) from Postpartum Infection
General Hospital, Vienna, Austria, 1841-1850

Hand Hygiene Evolution

• 20th Century – Identification of “Infection Carriers”
  – In the summer of 1906, a wealthy banker, rented a home in Oyster Bay, NY
  – Over the course of one week, 6 of the 11 people present in the rental home had developed typhoid fever
    • Typhoid fever is caused by *Salmonella typhimurium*
  – George Sober was a sanitary engineer hired to determine what caused the typhoid fever
    • Initially believed freshwater clams has caused it, but not everyone that was sick had eaten them
    • He then looked at the cook that had been hired, Mary Mallon, who also had a moderate form of typhoid fever
Hand Hygiene Evolution

• The Advent of “Typhoid Mary”
  – Sober learned that of eight other families she had cooked for, 7 of them had developed typhoid
  – As she continued to cook at various places throughout the NYC area, people continued to get sick
  – George Sober was able, with police, to get her medically quarantined for two years where samples were taken and confirmed she was a carrier of the organism
  • 120 of her 163 stool samples tested positive

Hand Hygiene Evolution

– Even when her symptoms resolved, she remained a carrier and passed the organism on to others through her preparation of their food
The Fecal-Oral Route

The F – Diagram

- Fluids
- Fields/Floors
- Flies
- Fingers
- Feces
- Food
- Future Victim

Source: Wagner and Lanois, 1958

Carriers & The Fecal-Oral Route

- Carriers are especially problematic for organisms that are spread via the fecal-oral route
  - *Salmonella*
  - *E. coli*
  - Norovirus (Norwalk virus)
- People that come into contact with fecal matter and don’t wash their hands can spread disease when they prepare food or touch baby bottles, pacifiers, etc.
  - Changing diapers
  - Using the restroom
  - Caring for pets
Common Practices and Issues

The Link: Hand Hygiene and Foodborne Illness

- Approximately 50% of food workers go to work when they are sick
- Studies estimate that up to 75% of food processing individuals do not wash their hands correctly
- Issues:
  - People don't always wash hands
  - Even when people wash their hands, they do so incorrectly
  - People miss a lot of critical areas on their hands when they wash
  - People don’t use gloves properly – becomes just like having dirty hands
We Don't Wash Long Enough

- People take far less time to wash their hands than the CDC recommends
  
  **25% – 50% less time**

- 20 seconds is about how long it takes to slowly sing the ABCs

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We Miss A LOT

- People tend to miss their finger tips the most
  - The areas that also tend to come into the most contact with food

- Nails and cuticles – Significant harbors for bacteria

*Image of hands after washing and application of Glo Germ™ to illuminate areas where germs remained – note all the glowing areas around the fingernails*
The Science of Handwashing

Science of Soap

- Although ingredients of soaps may be different, the science is essentially the same
  - Soap decreases the surface tension of water – basically makes it spread better across the hands
  - Soap binds to oil, dirt and bacteria
- Soap is generally a chain of hydrogen, carbon and oxygen atoms

Representation of a soap molecule

Long hydrocarbon chain (Lipophilic = oil-loving)  Short ionic part (Hydrophilic = water-loving)

Adapted from The Soap Company
Science of Washing with Soap

- The lipophilic ends of the molecules are attracted to oil, dirt and bacteria and pull them into the center of a soap micelle
- When we rinse, the hydrophilic ends of the molecules follow the water so the oil, dirt and bacteria washes off of our hands

Mechanical Action

- When we rub our hands together with soap on them, the mechanical action helps the loosen the soil and bacteria to make it easier for the soap to “pick up”

Don’t just rinse – scrub!
Best Practices

Elements of FSMA Preventive Controls for Human Food

- Written Safety Plan Elements
- Hazard Analysis
- Risk-Based Preventive Controls*
- Monitoring Procedures
- Corrective Actions
- Verification
- Recordkeeping
Proper Glove Usage

• Gloves are an important barrier against contamination
• Fingernails should be kept short and artificial nails should not be worn
• Glove changing:
  – All operators should change their gloves at least every shift or break and any time the gloves rip, develop holes, etc.
  – Operators in Zone 1 should change their gloves at least every 2 hours
  – Any time moving from raw to cooked or RTE product

Proper Glove Usage (2)

• Hands need to be washed and dried, both before AND after wearing gloves
  – A perforation in the glove will allow microbes onto your skin, in addition to the sweaty environment that was in the gloves
• Beware of washing / sanitizing disposable gloves
  – Many glove types are adversely affected by hand soaps and/or sanitizers and may reduce glove integrity

Gloves are an adjunct to and not a replacement for proper hand washing
When to Wash Your Hands

- Wash **before** the following activities:
  - Putting on gloves for working with food
  - Immediately before working in food preparation where exposed food, clean equipment and/or utensils are present
  - Eating food
  - Before and after caring for someone who is sick

- Wash your hands when switching from working with raw food products to ready-to-eat food
When to Wash Your Hands (2)

• Wash your hands after:
  – Touching bare human body parts other than clean hands or arms
  – Using the toilet
  – Coughing, sneezing, using a tissue, smoking, eating or drinking
  – Any activity that contaminates the hands
    • Especially after handling raw meat, poultry or fish
  – Removing gloves

What to Wash With

• Previous USDA Standards stipulated food processing environments use:
  – E2 rated Handwashing Products
  – E3 rated Hand Sanitizing Products
• The rating, certification and registration is now done by National Sanitation Foundation (NSF)
• Use products specifically formulated for food production/processing environments
Foam vs. Liquid Hand Soap

- Foaming hand soaps have become very popular and economical.
- Published research studies show that a greater quantity (weight) of soap yields statistically greater bacterial reductions.
- A liquid hand soap will provide superior coverage of the skin compared to a foaming hand soap that is highly aerated as it is dispensed.

The Effect of Soap Volume

<table>
<thead>
<tr>
<th>Soap Volume</th>
<th>Treatment</th>
<th>Log$_{10}$ Count/Hand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (g)</td>
<td></td>
<td>Baseline bacterial count</td>
</tr>
<tr>
<td>1.5g</td>
<td>Antimicrobial Soap</td>
<td>6.32</td>
</tr>
<tr>
<td>3.0g</td>
<td>Antimicrobial Soap</td>
<td>6.24</td>
</tr>
</tbody>
</table>

Hand Sanitizers – Complete the Cycle

- Implement dedicated hand washing stations and alcohol-based hand sanitizers
  - Soap and water to remove gross soil
  - Hand sanitizer saturates the nails and cuticles
- Hand sanitizers, when used in conjunction with a good hand washing program, complete the cycle in a thorough hand hygiene program

Consider Your Dispensing Options

- There are many hands-free dispensing options to help minimize the possibility of cross-contamination and recontamination
  - Wrist-activated pumps
  - Foot-activated pumps
  - Motion-activated dryers
Hand Hygiene Program Requirements

- It is imperative to have a hand hygiene program in your written safety plan
- Support for the program needs to come from management down through the organization
  – And from the processing lines
- Employees must have hand wash stations readily available and adequate time to wash their hands

Hand Hygiene Program Requirements

- On-going and plant-wide education is essential for continued compliance
- Consider a hand sampling program to routinely check the effectiveness of handwashing procedures

The importance of learning to adopt good hand hygiene practices is a critical activity for any organisation

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Summary

- Over 48 million cases of foodborne illness occur each year in the United States
- Hand hygiene is a critical element in the prevention of food contamination
- Choose hand hygiene products based on the products being manufactured and site needs
- Proper handwashing technique is essential
- Gloves are an important barrier against contamination but must be used in conjunction with proper handwashing