Food Safety Song – Microbes Medley

http://www.youtube.com/watch?v=1EkehFkhWf4&feature=related
FOOD HYGIENE

Unit 1: Food Inspection
Topic: Food Hazards
Lecture 4
Objectives

At the end of the session, students should be able to:

• Accurately define terms related to food borne illnesses
• Classify correctly food borne illness based on diseases caused
• Identify correctly characteristics of the three types of FBI illnesses
• Identify correctly examples of food borne disease contaminants
• Identify correctly sources of food contamination
• Identify correctly common foods associated with at least eight (8) food borne disease pathogens (bacterial, viral, parasitic)
• Identify correctly toxin-producing bacteria
• Outline accurately the major factors contributing to outbreaks of FBIs
Overview

• Foods can be intentionally or unintentionally contaminated
• Estimated 250 food borne pathogens
• Microbial contamination of foods is of significant concern in relation to food safety
• Responsible for thousands of deaths annually
Food borne illness

- Illnesses caused by the consumption of foods contaminated by
  - microorganisms or their toxins
  - chemicals
  - Helminth/parasites
Classification of FBIs

- **Bacterial Food infection**
  - Illness caused by the consumption bacteria that are allowed to grow in the food
    - typhoid and salmonellosis

- **Bacterial Food intoxication**
  - Illness caused by the consumption of bacterial toxin and not the number of bacteria
    - botulism

- **Toxin-mediated infection**
  - Illness caused by eating a food with microbes that produce toxins once inside the body
    - C. perfringens
Classification of FBIs

• Non-bacterial parasitic infections
  – worm infestation

• Chemical food poisoning
  – accidental food poisoning
    • pesticides in food

• Poisonous plants
  – mushrooms, young ackees, young yam

• Poisonous animals
  – shellfish and barracuda
Biological Contaminants

• Bacteria
• Non-bacterial
  – Viruses
  – Molds/Yeasts
  – Parasites
  – Fish toxins
Physical contaminants

- Metal shavings
- Glass
- Rocks, sand, dirt, insect parts
- Hair, fingernails, eyelashes, bandages
- Jewelry
- Any other foreign material
Chemical contaminants

• From equipment and cleaning supplies
  – Oil, grease detergents, sanitizers
• From pest control
  – Insecticides and rodenticides
• From excessive amounts of food additives
  – MSG
• May occur naturally in food
SOURCES OF FOOD CONTAMINATION

RAW MATERIALS / INGREDIENTS

WATER

AIR / DUST

SOIL

GARBAGE & SEWAGE

FOOD HANDLERS / MAN

PACKAGING MATERIAL

ANIMALS & BIRDS

RODENTS

INSECTS
Transmission of FBIs

• Oral route
• Contamination varies
  – Organism, reservoir, handling/processing
• Human reservoir
  – Norwalk-like virus, *Campylobacter, Shigella*
• Animal reservoir
  – *Campylobacter, Salmonella, E. coli 0157:H7, Listeria, and Toxoplasma*
Common FBIs

**Bacillus cereus**

- **Illness caused:** intoxication, or toxin mediated infection
  spore forming
- **Incubation period:** 30 min. to 6 hours (emetic) and 6 to 15 hours (diarrheal)
- **Symptoms:** nausea, vomiting, watery diarrhea
- **Foods implicated:** rice products, starchy foods, grains, meats, vegetables, casseroles, puddings
- **Source:** soil, dust, cereal crops
Common FBIs

**Clostridium botulinum**

- **Illness caused:** intoxication
  - Neurotoxin leads to flaccid paralysis
  - Spore forming
  - Infants at greatest risk
  - Annually: 10-30 outbreaks; ~110 cases

- **Incubation period:** 18-36 hours

- **Signs/ Symptoms:** vomiting, constipation, double vision, drooping eyelids, difficulty speaking and swallowing, paralysis, death

- **Foods implicated:** improperly heat processed foods (home canning), baked potatoes, ROPs, garlic/oil mixtures, low-acid canned foods

- **Source:** present on almost all foods, soil, water
Staphylococcus aureus

- **Illness caused:** Intoxication
- **Incubation period:** 1 to 7 hours
- **Sign/Symptoms:** nausea, retching, abdominal cramps, diarrhea
- **Foods Implicated:** ready-to-eat, salads, reheated foods, dairy products, protein foods
- **Source:** skin, hair, nose, throat, infected sores, animals
Common FBIs

**Clostridium Perfringens**

- **Illness caused:** Toxin-mediated infection
  - Forms spores in adverse conditions
- **Incubation period:** 10-12 hours
- **Sign/Symptom:** severe abdominal pain, nausea, diarrhea, headache, vomiting usually absent
- **Foods Implicated:** Stews, gravies, beans
- **Source:** soil, animal and human intestinal tracts
Common FBIs

- **Listeria monocytogenes**

- **Illness caused**: infection
- **Incubation period**: 3 to 70 days
- **Sign/Symptom**: flu-like, meningitis, encephalitis, spontaneous abortion
- **Foods Implicated**: raw meats, dairy products, hot dogs, unpasteurized milk, ice cream, ready-to-eat lunchmeats vegetables and sea foods
- **Source**: soil, water, damp environments, domestic/wild animals (esp. fowl)
Common FBIs

**Shigella spp.** *(sonnei, dysenteriae, flexneri, boydii)*

- **Illness caused:** Infection
- **Incubation period:** 5-7 days
- **Sign/Symptom:** Watery or bloody diarrhea, nausea, vomiting, cramps, fever
- **Foods Implicated:** salads, dairy products, raw vegetables
- **Source:** Human fecal contamination of food (asymptomatic workers), beverages, vegetables, water
Common FBIs

E. coli O157:H7 (Shiga toxin-producing E.coli)

- **Illness caused:** infection or toxin mediated infection
- **Incubation period:** 5-10 days
- **Sign/Symptoms:** Watery or bloody diarrhea, nausea, cramps, mild fever
- **Foods Implicated:** undercooked beef, raw milk and raw fish, Undercooked or raw hamburger, salami, alfalfa sprouts, lettuce, apple juice or cider, well water,
- **Source:** Intestinal tract of cattle, other mammals
Common FBIs

**Vibrio spp.**

- **Illness caused:** infection
- **Incubation period:** 2–3 days
- **Signs/Symptoms:** profuse watery diarrhea, sometimes described as “rice-water stool,” vomiting, rapid heart rate, loss of skin elasticity, dry mucous membranes, thirst, muscle cramps
- **Foods Implicated:** fish or shellfish, raw fruits/vegetables, water
- **Source:** water
Salmonella spp.

- **Illness caused**: infection
- **Incubation period**: 12-36 hours (~72 hrs)
- **Sign/Symptom**: abdominal cramps, headache, fever, nausea, diarrhea
- **Foods Implicated**: eggs & egg products, poultry, dairy products, chocolate and cream filled desserts, sliced melons, sliced tomatoes, unwashed fruits, alfalfa sprouts
- **Sources**: Reptile pets: Snakes, turtles, lizards; eggs, poultry
Common FBIs

**Campylobacter jejuni**

- **Illness caused:** Infection
- **Incubation period:** 2-5 days
- **Sign/Symptoms:** diarrhea, vomiting, headache, fever, muscle pain, nausea, abdominal cramps
- **Foods Implicated:** poultry, dairy products, raw/undercooked meat, water
- **Source:** intestinal tracts of wild/domestic animals, raw milk, unchlorinated water
What am I?

• Many farm animals carry me
• I have been found in produce that has come in contact with animal waste
• I am associated with poultry and eggs
• I can produce vomiting and diarrhea in those who consume me

**Salmonella spp**

• I am found in the waters of the Gulf of Mexico
• I have been associated with raw oysters
• I can produce rice water stool
• I am present in the Caribbean

**Vibro cholerae**
What am I?

- I have been found in the soil
- I have been associated with rice
- I can produce two different types of toxins that cause illness
- I am spore forming

**Bacillus cereus**
- I form spores
- The toxins I produce cause illness
- I have been associated with meat stews
- I am carried in the intestines of animals and humans
- I produce diarrhea and severe abdominal pain

**Clostridium perfringens**
What am I?

- I do not need oxygen to grow
- I can cause double vision and difficulty swallowing
- I am commonly associated with produce from the soil
- I produce a deadly toxin when food is temperature abused

**Clostridium botulinum**

- My habitat is in the throat and nose of humans
- I produce a toxin that is not destroyed by heat
- I cause severe abdominal cramps
- I am associated with ready to eat food items

**Staphylococcus aureus**
Common FBIs

Viruses: Basic characteristics

– Need living cell to propagate
– Do not reproduce in food
– Do not need PHF
– Spread usually result of poor hygiene
Common FBIs

Hepatitis A

- **Illness caused:** Infection
- **Incubation period:** 10-50 days
- **Sign/Symptom:** sudden mild fever, vomiting, jaundice, nausea, abdominal cramps, weakness
- **Foods Implicated:** contaminated water - ice, raw sea foods – shellfish, ready-to-eat, fruit juices, vegetables
- **Source:** human intestinal/ urinary tracts
Common FBIs

Rotavirus

• Illness: Infection
• Incubation: 1-3 days
• Sign/Symptom: vomiting, diarrhea, mild fever
• Foods: ready-to-eat, water and ice
• Sources: human intestinal tract, water
Common FBIs

Norwalk virus

- Illness caused: Infection
- Incubation: 10-50 hours
- Symptoms: nausea, diarrhea, headache, mild fever, headache
- Foods: water, shellfish, raw vegetables and fruits
- Source: human intestinal tract, water
What am I?

- I can produce a mild fever and general weakness
- I am primarily found in feces of infected persons
- I am commonly associated with ready to eat food items
- I allow an asymptomatic person to remain infectious for several weeks

Hepatitis A

- I am primarily found in the feces of the people I infect
- People become contagious within a few hours of eating me
- I am characterized by projectile vomiting
- I am commonly associated with outbreaks in institutions

Norovirus
Common FBIs

**Parasites - Basic characteristics**

- Living organisms
- Require a host
- Usually killed by freezing (and cooking)
- Normal fauna in many animals
  - Hogs, cats, rodents, fish, etc.
Common FBIs

Anisakis simplex - Anisakiasis

- **Roundworm**
- **Incubation**: hours to 2 weeks
- **Symptoms**: tickle in throat, coughing up worms
- **Foods**: undercooked, improperly frozen seafood
- **Source**: marine fish- bottom feeders
Common FBIs

Cryptosporidium parvum – Cryptosporidiosis

- Protozoan
- Incubation: 1-12 days
- Symptoms: severe diarrhea, nauses, may have no symptoms
- Foods: water, raw foods, unpasteurized cider, ready-to-eat fruits/vegetables
- Source: humans, cattle, barn-wash
- Direct spread in day care/medical facilities
Cyclospora cayetanensis

- **Protozoan**
- **Incubation:** days to weeks
- **Symptoms:** watery diarrhea, weight loss, bloating, cramps, vomiting, muscle aches
- **Foods:** water, marine fish, raw milk, raw produce
- **Source:** humans, water
Common FBIs

Giardia lamblia - Giardiasis

- Protozoan
- **Incubation:** 3-25 days
- **Symptoms:** fatigue, nausea, gas, weight loss, abdominal cramps
- **Foods:** water, ice, raw vegetables
- **Source:** beavers, bears, dogs, cats, humans
Common FBIs

**Trichinella spiralis**

- **Roundworm**
- **Incubation:** 2-28 days
- **Symptoms:** flu-like, swelling around eyes, extreme sweating, hemorrhaging
- **Foods:** undercooked pork, game
- **Source:** domestic pigs, bear, walrus
Common FBIs

Toxoplasma gondii

- Oocyst shed in cat feces
- **Incubation period:** 1 week - 1 month
- **Signs/Symptoms:** flu like symptoms, fever, headache, swollen lymph nodes
- **Foods Implicated:** raw/undercooked meat, water
- **Source:** Infected cats, soil, undercooked meat, water (mother to fetus)
What am I?

• I can produce fever and loose stool
• I can be spread easily in daycare settings
• I am a parasite that can be found in irrigation water

Cryptosporidium

• Cooking sea food can destroy me
• I have been found in herring
• Sometimes I produce a tingling in the throat

Anisakis simplex
FBIs

**Chemicals**
- Naturally occurring
  - Allergens, ciguatoxin, mycotoxin, scombroidotoxin, shellfish toxins
- Man made
  - Cleaning compounds, food additives, pesticides, heavy metals
Other food safety problems

- Prions
- POPs
- Mycotoxins
- Heavy Metals
Factors contributing to FBIs

• Purchasing foods from unsafe sources
  – Contaminated raw materials
• Time Temperature abuse
  – Inadequate cooking temperature
  – Preparation of foods too far in advance
    • Inadequate cooling
• Inadequate reheating temperature
  • Inadequate holding temperature
• Poor person hygiene practices
  – Poor hand washing practices
• Cross contamination
• Poor cleaning and sanitization practices
Food safety song

- [http://www.youtube.com/watch?v=wA-f7ART_xI&feature=relmfu](http://www.youtube.com/watch?v=wA-f7ART_xI&feature=relmfu)
Summary

- Food borne illnesses occur due to food contamination before, during or after processing
- More than 250 FBIs
- Most common – salmonella spp., campylobacter spp. E. Coli 0157:H7
- Potentially hazardous foods often implicated
- An understanding of FB pathogens is important for prevention