Food Borne Illness

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Objective

- Know a brief knowledge about the food born illnesses
- Describe the key areas of focus for Infection Control Oversight of Food Services
- Why a dietitian need to know about the food born illnesses
A dietitian have many roles in an institution like,

- nutritional Assessment
- developing and analyzing nutritious menus.
- counseling
- food policy planning
- Monitoring sanitation and safety standards in a food service setting.
- It is a Registered Dietitian responsibility to ensure that infection control practices of the institution are current and meet professional requirements

- And RD is involved in the infection control policy making of the institution
Overview

- Definition
- Epidemiology
- Organisms
- Transmission
- Prevention and Control
Food borne illnesses result from consumption of food containing pathogens such as bacteria, viruses, parasites or the food contaminated by poisonous chemicals or bio-toxins (WHO, 2011c).
Epidemiology

- Food borne illnesses are responsible for substantial morbidity and mortality worldwide.
- It is difficult to determine the exact mortality associated with food borne illnesses.
- However, worldwide an estimated 2 million deaths occurred due to gastrointestinal illness, during the year 2005 (Fleury et al., 2008).
Globally, an estimated 2 million people died from diarrheal diseases in 2005. Approximately 70% of diarrheal diseases are foodborne. It is estimated that up to 30% of the population suffer from foodborne illnesses each year in some industrialized countries (WHO, 2011c).
High risk Group

- The high risk groups for food borne diseases include infants, young children, the elderly and the immuno compromised persons (Fleury et al., 2008).
- High risk groups resulting in high mortality and morbidity in this group.
The population in developing countries is more prone to suffer from foodborne illnesses because of multiple reasons, including:

- lack of access to clean water for food preparation;
- inappropriate transportation and storage of foods; and
- lack of awareness regarding safe and hygienic food practices (WHO, 2011c).
Estimated causes of death in WHO South-East Asia Region\(^1\), 2008

- Tuberculosis: 490 deaths (100,000)
- HIV/AIDS: 244 deaths (100,000)
- Diarrheal disease: 1,181 deaths (100,000)
- Childhood cluster diseases\(^2\): 243 deaths (100,000)
- Malaria: 51 deaths (100,000)
Now The Main Topic
Food can be contaminated by

- Biological
- Chemical
- Physical
Bacteria, molds, viruses and parasites
More than 250 different food borne illnesses are caused by various pathogens or by toxins (Linscott, 2011).

Pathogenic bacteria are of 3 types
- Infections
- Intoxications
- Toxin- Mediated Infection
Pathogenic bacteria

• **Food Infections**
  Ingestion of bacteria that grow in the host’s intestine, replicate and create infection

• **Food Intoxications**
  Bacteria grow on the food and release toxins

• **Toxin-Mediated Infection**
  Bacteria enter the intestinal track and then start to produce the toxins.
### Food borne infections vs intoxication

<table>
<thead>
<tr>
<th><strong>Infections</strong></th>
<th><strong>Intoxications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Bacterial / Viral / parasite</td>
<td>- toxins (natural / preformed bacterial / chemical)</td>
</tr>
<tr>
<td>- Invade and or multiply in lining of intestine</td>
<td>- No invasion or multiplication</td>
</tr>
<tr>
<td>- Incubation period- hours to days</td>
<td>- Incubation period- minutes to hours</td>
</tr>
<tr>
<td>- S/s – Diarrhoea, nausea, vomiting, abdominal cramps, fever</td>
<td>- S/s – Vomitting, nausea, diarrhea, diplopia, weakness, resp. failure, numbness, sensory/motor dysfunction</td>
</tr>
<tr>
<td>- Communicable-spreads from person to person</td>
<td>- Not communicable</td>
</tr>
<tr>
<td>- Factors-inadequate cooking, cross contamination, poor personal hygiene, bare hand contact</td>
<td>- Factors-inadequate cooking, improper handling temperatures</td>
</tr>
</tbody>
</table>
Important Organisms
Some common bacteria producing toxin

<table>
<thead>
<tr>
<th>Incubation period</th>
<th>Cause</th>
<th>Symptoms</th>
<th>Common foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6 hours</td>
<td>Staph aureus (enterotoxin)</td>
<td>Nausea, vomiting, diarrhea</td>
<td>Milk n milk products, ham, poultry, salads, custards</td>
</tr>
<tr>
<td></td>
<td>Bacillus cereus (enterotoxin)</td>
<td>Nausea, vomiting, (emetic form)</td>
<td>Fried rice</td>
</tr>
</tbody>
</table>
## Some common bacterial food poisons

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</thead>
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<tr>
<td>8-16 hours</td>
<td>Clostridium perfringes (spores)</td>
<td>Abd.cramps, diarrhea, Nausea and Vomitting – rare</td>
<td>Meat, poultry, legumes, gravies</td>
</tr>
<tr>
<td></td>
<td>Bacillus cereus (diarrheal form-preformed n stable toxins)</td>
<td>Diarrhea, abd.pain, nausea, vomiting/fever</td>
<td></td>
</tr>
</tbody>
</table>
### Some common bacterial food poisons

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<tr>
<td>&gt;16 hours</td>
<td>Vibrio cholera</td>
<td>Rice watery stools</td>
<td>Water and ice creams, sea food</td>
</tr>
<tr>
<td></td>
<td>Salmonella spp</td>
<td>Inflammatory diarrhea</td>
<td>Meat, milk n milk products, poultry</td>
</tr>
<tr>
<td></td>
<td>Shigella sp</td>
<td>dysentery</td>
<td>Potato/raw eggs-salad</td>
</tr>
</tbody>
</table>
Prevention and Control
Cats and Cockroaches from Premises of a Hospital as Pathogen-loaded Bullets for Nosocomial Infections*

- **Conclusion:** cats and cockroaches living in the hospital premises are key reservoirs of multiple pathogens and suggest that their immediate removal from the Pakistani hospitals could be a useful strategy to lessen the load of nosocomial infections.

International Journal of Infectious Diseases, vol 12 sup.1, Pg364, Dec 2008
To make such policies and guidelines which prevent

- Nosocomial infection due to food services
- Food contamination
- Occurrence of food borne illnesses
Prevention

- Not necessary to have ‘sterile’ food, cause–‘world is not sterile’
- Prevent, reduce or limit by, Food hygiene and food safety
- **food hygiene** – microbiological safety of food
- **food safety** – absence of chemicals/residues
Food Safety Practices

- In receiving and storage
- In Refrigeration
- In food preparation
- In the work area
- With utensils
- In transport
- Dishwashing and sanitizing
Preventing Food borne illnesses

- The HACCP system
- What is HACCP?
- Hazard Analysis and Critical Control Point
The Seven Principles of HACCP

1. Assess the hazards
2. Identify the critical control point (CCP)
3. Establish limits at each CCP
4. Monitor CCP
5. Take corrective action
6. Documentation
7. Verification
Critical Control Point

- It starts from,
- Purchasing
- Preparation
- Chilling
- Specific sanitation Procedures
- Prevention of Cross contamination
- Employee Hygiene
- Environmental Hygiene
Purchasing/ Receiving

- **Recommendation**
- Food should be purchased from reputable vendors—an essential step
- Food should be free from extreme alterations in temperature;
- Food needs to be inspected and approved when it is brought into the facility.
Proper refrigeration or freezing is must for *high risk* foods

High Risk Foods are,
- Meat - beef, mutton,
- Poultry
- Fish
- Dairy
- Eggs
Food Storage- Prevent cross contamination

- Ensure the facility refrigerators and freezers are at properly monitored with complete logs.
- Cooked foods must be stored above raw foods
- Raw animal foods should be separated from raw ready to eat foods during storage, preparation, holding, and display
- All foods should be properly wrapped or covered
Bacteria will grow and multiply every 20 minutes in protein, moisture, and in the danger zone.

The facility needs to ensure foods are not in the danger zone (>41 F/4C degree and <135 F/60C degree) for more than four hours.
Microbes can't grow above 60°C. The right combination of high temperature and time will kill most bacteria, although bacterial spores may survive.

Microbes grow rapidly when the temperature is between 5°C and 60°C. This is called the temperature danger zone.

Microbes grow very slowly between 0°C and 5°C.

Microbes can't grow below freezing point because there is no water. They are dormant (sleeping) until food is thawed.
Cooling Foods - Time and Temperature Control (TTC)

- Recommendation
- Two-step method:
  - Within 2 hours from 135° - 70°F**
  - Within an additional 4 hours from 70° - 41°F
    - **Can reheat to 165°F & restart
- One-step method:
  - Cooled within 4 hours to 41°F or less
What is the best way to thaw frozen foods?

Safe Thawing

- Refrigerator – 1-3 days depending on the size of the product defrosting being thawed.
- Microwave **
- Cold water, changing the water every 30 minutes**.

**If you use the microwave or cold water, use the meat immediately.**
Recommendations
Ensure staff know appropriate steps for food preparation:

- Thoroughly wash all raw unprocessed fruits and vegetables under running water before use

- Discard any food that comes out of broken packages or swollen cans.

- Discard any food that has an abnormal appearance or odor.

- Single service articles are discarded after one use.
Serving Food

- **Recommendations**
- Prepared food is transported to other areas in closed food carts or covered containers (use separate carts for serving clean trays and collecting dirty trays).

- Food is served with clean tongs, scoops, forks, spoons, spatulas, or gloves to avoid direct contact with food.

- All HACCP Guidelines are observed for heating, cooling, and handling foods that are cooked, cooled and reheated for service.
Ensure that foods prepared to be served at a later time are cooked, chilled, and reheated at appropriate temperatures to prevent contamination or microbial growth.
Good personal hygiene practices are a must and cannot be overemphasized for food service workers

- Cleanliness
- Clothing
- Hand washing
- Finger nails
- All food grinders, choppers, and mixers should be cleaned, sanitized, completely dried, and reassembled after each use.

- All serving carts must be clean. Ensure carts that collect soiled trays are free from leftovers.
Five keys to safer food

Keep clean
- Wash your hands before handling food and often during food preparation
- Wash your hands after going to the toilet
- Wash and sanitize all surfaces and equipment used for food preparation
- Protect kitchen areas and food from insects, pests and other animals

Why?
- While most microorganisms do not cause disease, dangerous microorganisms are widely found in soil, water, animals and people. These microorganisms are carried on hands, wiping cloths and utensils, especially cutting boards and the slightest contact can transfer them to food and cause foodborne diseases.

Separate raw and cooked
- Separate raw meat, poultry and seafood from other foods
- Use separate equipment and utensils such as knives and cutting boards for handling raw foods
- Store food in containers to avoid contact between raw and prepared foods

Why?
- Raw food, especially meat, poultry and seafood, and their juices, can contain dangerous microorganisms which may be transferred onto other foods during food preparation and storage.

Cook thoroughly
- Cook food thoroughly, especially meat, poultry, eggs and seafood
- Bring foods like soups and stews to boiling to make sure that they have reached 70°C. For meat and poultry, make sure that juices are clear, not pink. Ideally, use a thermometer
- Reheat cooked food thoroughly

Why?
- Proper cooking kills almost all dangerous microorganisms. Studies have shown that cooking food to a temperature of 70°C can help ensure it is safe for consumption.

Keep food at safe temperatures
- Do not leave cooked food at room temperature for more than 2 hours
- Refrigerate promptly all cooked and perishable food (preferably below 5°C)
- Keep cooked food piping hot (more than 60°C) prior to serving
- Do not store food too long even in the refrigerator
- Do not thaw frozen food at room temperature

Why?
- Microorganisms can multiply very quickly if food is stored at room temperature. By holding at temperatures below 5°C or above 60°C, the growth of microorganisms is slowed down or stopped. Some dangerous microorganisms still grow below 5°C.

Use safe water and raw materials
- Use safe water or treat it to make it safe
- Select fresh and wholesome foods
- Choose foods processed for safety, such as pasteurized milk
- Wash fruits and vegetables, especially if eaten raw
- Do not use food beyond its expiry date

Why?
- Raw materials, including water and ice, may be contaminated with dangerous microorganisms and chemicals. Toxic microorganisms and chemicals may be formed in damaged and mouldy foods. Care in selection of raw materials and simple measures such as washing and peeling may reduce the risk.

Knowledge = Prevention