EPIDEMIOLOGY OF FOODBORNE ILLNESS IN MALTA

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Hazards in food

Industrialization of:
- production of food
- distribution of food

Improvement by national food standards but microbial pathogens persist
Food borne Illness

Food borne illness is caused by consuming contaminated foods or beverages

- Pathogens
- Poisonous chemicals
Food borne Illness

More than 250 different food borne illnesses

Bacteria - *Salmonella, campylobacter, E.Coli*
Viruses - *Noroviruses*
Parasites - *Giardia*
Toxins - *Staphylococcus aureus* toxin
Chemicals - Scombrototoxic food poisoning
Symptoms of Food borne Illness

Different for each type of food borne illness but commonly include:

- nausea
- vomiting
- abdominal cramps
- diarrhoea
Food borne Illness

- Difficulty in identifying mode of spread of a particular pathogen
- Important to know if it is food borne to take appropriate steps to control it
  eg E.Coli 0157:H7 can be spread by contaminated food, drinking water contaminated swimming water toddler to toddler
Campylobacter
Campylobacter

- Bacterial pathogen
- IP 1-10 days
- Causes fever, diarrhoea, abdominal cramps
- Lives in intestines of healthy birds
- Risk foods:
  - undercooked chicken
  - other food contaminated by raw chicken
Salmonella
Salmonella

- Bacterial pathogen, various serotypes
- Incubation period (IP) 6-72 hours
- Widespread in the intestines of birds, reptiles and mammals.
- Causes fever, diarrhoea and abdominal cramps.
- Risk foods: variety of different foods of animal origin
Eschericia Coli

- Enterotoxigenic (ETEC)
- Enterinvasive (EIEC)
- Enteropathogenic (EPEC)
- Enterohaemorrhagic (EHEC). eg. *E. coli* 0157: *H7*
Enterotoxigenic. (ETEC).

- “travelers diarrhoea”.
- IP 10-72 hours
- acute watery diarrhoea, dehydration, shock lasts 1-5 days
- spread via contaminated food or water, or from person to person.
Enterinvasive (EIEC)

- spread by contaminated water and food and has been associated with imported cheese
- IP 10-18 hours
- causes bloody diarrhoea which is very severe usually lasting about 2 weeks.
**Enteropathogenic (EPEC)**

- infantile gastroenteritis
- spread by faecal-oral route but can also be food borne or waterborne
- IP 9-12 hours causing vomiting and diarrhoea lasting up to 2 weeks in infants.
Eschericia coli 0157:H7
Eschericia coli 0157:H7

- Bacterial pathogen
- Reservoir in cattle and other similar animals.
- Illness typically follows consumption of food or water that has been contaminated with microscopic amounts of cow faeces.
- Risk foods:
  - poorly cooked beef especially ground beef
Eschericia coli 0157:H7

- Uncommon in Malta
- Important since the illness it causes is often a severe and bloody diarrhoea and painful abdominal cramps, without much fever.
- In 3% to 5% of cases, a complication called haemolytic uraemic syndrome can occur several weeks after the initial symptoms in children
Norovirus

Common cause of food borne illness

Laboratory test is not widely available.

Causes an acute gastrointestinal illness, usually with more vomiting than diarrhoea, that resolves within two days.
Norovirus

- It is believed that Norovirus spreads primarily from one infected person to another.
- Infected food handlers can contaminate food as they prepare it if they have the virus on their hands.
Other food borne pathogens

- Shigella
- Hepatitis A
- Giardia lambia
- Cryptosporidia
Toxin producing organisms

Food borne illnesses can be caused by the presence of a toxin in the food that was produced by a pathogenic organism in the food.

eg. Staphylococcus aureus
    Clostridium botulinum
    Bacillus cereus
Toxin producing organisms

- *Staphylococcus aureus* grow in some foods and produce a toxin that causes intense vomiting with IP of 2-6 hrs
- Botulism occurs when the bacterium *clostridium botulinum* grows and produces a powerful paralytic toxin in foods
- *Bacillus cereus* causes heat resistant spores and toxins in food or gut. IP 1-5 hrs causing nausea and cramps and IP 8-16 hrs causing abdominal pain and diarrhoea
Natural toxins in food

- Natural toxins may occur in some fish and other foods such as scombroid toxin in tuna, mackerel or blue fish that have not been kept at correct temperatures.
- Causes scombrototoxic food poisoning
Pathogenesis of Food borne Illness

- Pathogenic organisms are swallowed with food
- Delay called the incubation period before symptoms of illness occur. This period may range from hours to days depending on the organism.
- Pathogens multiply in the intestine. Pathogens produce a toxin that is absorbed into the bloodstream walls or invade deeper in the body tissues.
Diagnosis of food borne illness

- clinically from the clinical features
- confirmatory diagnosis requires specific laboratory tests that identify the causative organism
**Risk groups**

- All persons can be affected by food borne illness
- Primarily affects
  - pregnant women,
  - infants and the elderly
  - the immunocompromised.

These risk groups are at greatest risk of serious illness and death.
Complications of Foodborne Illness

- septicaemia
- abortion
- localised infections
- arthritis
- haemolytic uraemic syndrome
- Guillian Barre’ syndrome
- death.
Surveillance represents only a proportion of Food borne Illness
Reported Incidence rate of Food Borne Illness 1992-2006

![Graph showing reported incidence rate of foodborne illnesses from 1992 to 2006 for different bacteria such as Campylobacter, E. Coli, Salmonella, and unspecified cases.](image-url)
Validity of Notifications

- Doctors reluctant to notify cases
- Patients do not like being notified
- Doctors too ‘busy’ to notify
- Patients may not seek doctor’s advise
- Doctors do not always ask for stool culture
- Reluctant to submit stools for culture
Changing spectrum of Food borne Illness

Changing spectrum of food borne illness by:

- disinfection of drinking water
- sewage treatment
- milk sanitation and pasteurisation
- shellfish sanitation.
Typhoid Cases in Malta 1900 - 2000
Emerging foodborne pathogens

Foodborne Zoonoses

- Salmonella - chicken ovaries
- E.Coli 0157:H7 - calf
- Norwalk virus - oyster
- Campylobacter jejuni - poultry
Antimicrobial Resistance

- widespread use of antibiotics in the animal reservoir
- *Campylobacter* increasingly resistant to florourquinoles (antibiotics were introduced for use in animals)
- *Salmonella* have become increasingly resistant to a variety of antimicrobial agents.
Contamination of food

- Meat and poultry during slaughter by intestinal contents
- Fresh fruit/ Veg washed with contaminated water
- Infected food handlers
- Cross contamination
- Hazard in bulk foods-various sources
Temperature

- Temperature affects pathogenic organisms.
- Refrigeration or freezing prevents bacteria from multiplying except for *Listeria monocytogenes* and *Yersinia enterocolitica* can actually grow at refrigerator temperatures.
- An internal temperature of 78°C for a few seconds is sufficient to kill parasites, viruses or bacteria except for the *Clostridium* bacteria.
Sources of Outbreaks in 2005
Dr. Gro Harlem Brundtland

“More needs to be done globally to reverse the upward curve which represents escalating sickness and death from consumption of unsafe food”.

Control of Foodborne Illness

- The microbiological quality of food needs to be improved by concerted action at all stages in the chain from the point of production to the point of consumption.
- Healthy behaviour needs to be fostered through education to both food handlers and the consumer.
- Further standardisation of surveillance would make trends easier to identify, expediting the implementation of effective control measures.
Control of Foodborne Illness

- Inspection of food premises by enforcement officers
- Hazard analysis critical control point (HACCP) - an analytical tool for the systematic assessment of the many steps in the production, processing, packaging and kitchen preparation of food and the identification of the steps critical to the safety of the product.
Control of Foodborne Illness

- The Pennington report in 1997 described the need to raise the level of awareness of and the expertise in coping with the hazards associated with food production and handling.
WHO Rules for safe food preparation

- Choose food processed for safety
- Cook food thoroughly
- Eat cooked food immediately
- Store cooked food carefully
- Reheat cooked foods thoroughly
- Avoid contact between raw foods and cooked foods
- Wash hands repeatedly
- Keep all kitchen surfaces meticulously clean
- Protect foods from insects, rodents, and other animals
- Use pure water.
**Consumer Awareness**

- A study was performed in 1999 to assess the level of consumer knowledge and attitudes toward safe food handling in home in order to design a local health promotion campaign.
- Three focus groups and a small case control study were carried out to gather information about local consumer knowledge and attitudes towards safe food handling in the home.
Consumer Awareness

- These studies showed that persons who themselves or a dependent were exposed to Salmonellosis had a higher level of awareness to certain elements of food safety awareness.
- Persons have to be convinced that food safety measures do have an effect before they will act upon messages. These results were then used to plan a local health promotion strategy.
Control of Foodborne Illness

- Surveillance programmes are important for identifying disease trends
- Periodic enhancement of surveillance and detailed epidemiological studies are needed to answer specific questions
Conclusions

- Globalization of the risks associated with food borne illness has resulted in greater interdependence in terms of food safety.
- Food safety standards and other types of agreements are becoming important in addressing transnational challenge of food borne disease control.
**Conclusions**

- Epidemiological data provide a common ground for reaching international consensus on food safety issues.
- If one recognises that ensuring food safety is inherently uncertain, food borne illnesses become opportunities for learning rather than failures to predict.
The risk that food borne disease will occur is ever present, and so we must be prepared to react quickly to reduce the risk of new food borne hazards.