Eat, Drink and Be Wary

Robert Lannigan

The University of Western Ontario, Robert.Lannigan@lhsc.on.ca

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Eat, Drink and be Wary!

Rob Lannigan. MD. FRCPC
Schulich School of Medicine and Dentistry.
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• Impact of food associated illness.
  – USA 76m per year. 5,000 deaths.
  – Australia 5m per year. 80 deaths.
  – UK 17m per year. 700 deaths.
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• In high income countries
  – Catering facilities (restaurants, cafeterias, receptions etc) 20-60%
  – Hospitals and Long term care, 5-60%
  – Domiciles, 5-30%
  – Schools and Camps, 3-9%
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- When tracking the source, need to look at all points in the food chain.
  - Production (“Field and feed”)
  - Processing (“Slaughter and slice”)
  - Serving (“Cook and kitchen”)

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• Emerging hazards
  – Industrial production
  – Long distance transportation
  – International distribution (complex backtracking)
  – Consumer preference for “raw” foods
  – Antibiotic resistance
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• In low income countries benefits of small scale production and distribution offset by the lack of hygiene and enforced regulations.
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• Despite what you are about to hear our food is amazingly safe.

• For those of you who are already worried about the food we eat...leave now or forever hold your peace!
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• Types of Microbes
  – Bacteria
  – Fungi
  – Parasites
  – Viruses
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• “Food Poisoning” is a poor term
  – **True poisoning** is from consuming something, which may be food, contaminated by **toxins** which could be chemical or microbial in origin.
  – **Food associated infections** occur when food is the vehicle for the ingestion of a microbial organism, which may then establish itself in the host and cause disease, either by a toxin or by invasion.
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- Importance of the previous concepts
  - Ingestion of food contaminated with a pre-formed toxin = rapid onset of symptoms (hours).
  - Food associated infections = later onset of symptoms (usually day/s to weeks).
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- Classical examples of pre-formed toxins
- Bacterial
  - Clostridial
  - Staphylococcal
  - Bacillary
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- Classical examples of pre-formed toxins
- Fungal
  - Ergot poisoning (St Anthony’s Fire).
  - Aflatoxin
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• Food Types
  – Meats and fish (including shellfish)
  – Eggs and Dairy
  – Grains
  – Fruits and vegetables

• Water is important in many aspects of production, preparation etc.
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• Shellfish “poisoning”
  – Paralytic (Saxitoxin)
  – Neurotoxic (Brevetoxin)
  – Amnesic (Demoic acid)
  – Diarrheal (Okadaic acid)
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- Production.
- Harvest.
- Sorting.
- Washing.
- Transport.
- Storage.
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- Production and harvest. Growing, picking, bundling.
- Initial processing. Washing, sorting etc.
- Final processing.
- Irrigation water, manure, lack of field sanitation.
- Wash water, handling.
- Wash water, cross-contamination.
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- Transportation
- Distribution
- Storage.
- Preparation.
- Cooking.
- Storage.
- Re-heating.
E. Coli O157 H7

- ~1985 Hamburger
- 1993 Apple cider.
- 1995 Leaf lettuce.
- 1996 Leaf lettuce.
- 1996 Apple juice.
- 2000 Waterborne.
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- *Listeria monocytogenes.*
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• High risk groups:
  – Pregnant women (flu like illness).
  – Their neonates (septicemia/meningitis).
  – Adult Immunocompromised inc. diabetes and alcoholism. (sepsis/meningitis).
  – Any age: focal infection/gastroenteritis.
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- Found in many food types
  - Meats.
  - Unpasteurized cheeses.
  - Vegetables.
  - Seafoods.
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- **Listeria**
  - Likes the cold.
  - Asymptomatic carriers 1-5%, higher in abattoir workers 5-30%.
  - 0.7/10E5 in North America.
  - Case fatality 35% (worse in older ages).
How Safe is Our Food?

Why Might it be a Target for Bioterrorism?
How Safe is our Food?

• What is the purpose of terrorism?
• Deliberate poisonings in the past.
• Techniques to avoid poisoning.
• Why did it become less popular?
How Safe is our Food?

- What Goals Might an Attack on Agriculture serve?
  - Attack the enemy’s food supply.
  - Destabilize government by creating food shortages or unemployment.
  - Alter supply and demand for a commodity.
How Safe is our Food?

- Food from local sources.
- Food from sources further away.
- Food from distant sources.
- Exotic foods.
How Safe is our Food?

- Production and storage standards.
- Inspections.
- Surveillance.
- Education.
- Monitoring based on Epidemiology.
How Safe is our Food?

• What has changed in:
  – Production?
  – Epidemiology?
  – Inspections?
  – Surveillance?
  – Education?
How Safe is our Food?

• Production.
  – Food produced in many different countries.
  – Biodiversity of crops reduced.
  – Different standards.
  – Storage, transport and distribution.
How Safe is our Food?

• Epidemiology.
  – Many more types of outbreaks.
  – Many different types of organisms.

• Inspections and Surveillance more complex.
How Safe is our Food?

• How might our food be vulnerable?
  – At production
    • Monocultures.
    • Soil contamination.
    • Crop spraying.
    • Additives (eg the melamine story)
  – During storage or Transportation.
    • Preservatives.
    • Water.
How Safe is our Food?

- Distribution.
  - Widespread.
  - Source hard to determine.
  - Outbreaks may be sustained.
How Safe is our Food?

• What organisms?
  – Need to make it look like a natural event.
  – Organism needs to be hardy and easily handled.

• Need a food that is eaten raw, or an organism/toxin that resists cooking.

• Why bother at all?
How Safe is our Food?

• Special Features of Agricultural attack.
  – Agents are not hazardous to perpetrators.
  – Few technical obstacles to “weaponization”.
  – Low security of vulnerable targets.
  – Low moral barrier to cross.
  – Maximum effect does not require many cases.
  – Point source can mimic “natural causes”
  – Can be carried out far from effect.
How Safe is our Food?

• What groups might be involved?
  – Countries
  – Corporations
  – Organized Crime
  – Terrorist groups
  – Individuals
How Safe is our Food?

• Probably quite safe from bioterrorist actions.

• Ecological disturbances are another matter!