Game Planning for Infectious Diseases

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NFL Game Planning

- Scouting Reports
- Stats
- Film Study
- Opponents’ Tendencies
- Neutralize Strengths
- Exploit Weaknesses

GOAL: WIN!
NFL Game Planning
NFL Game Planning
Infectious Disease Game Planning

GOAL:

STOP THE SPREAD OF INFECTION

How? PPE, handwashing, vaccines, antibiotic treatment, disinfection, decontamination, food recall, restaurant closure, and others...
Infectious Disease Game Planning: How do we know how to stop transmission?

- Know your Opponent
  - Know the Chain of Infection
  - Understand the Natural History of a Disease
  - Understand the Epidemiology of a Disease
- Exploit Weaknesses
Game Planning
First Step: Tailgating
Infectious Disease Game Planning
Know Your Opponent: Microbes

• What is a Microbe?
  – Our unseen friends and foes
  – Friends produce wine, foes cause human (or animal) infection and illness
  – They are everywhere!
  – Types:
    • Bacteria (Salmonella, TB, E.coli, MRSA)
    • Viruses (Ebola, norovirus)
    • Yeast and Fungi (Candida, Exserohilum)
    • Protozoa (Cyclospora, Cryptosporidium)
Infectious Disease Game Planning
Know the Chain of Infection

- Infectious agent
- Reservoirs
- Portal of entry
- Means of transmission
- Portal of exit
- Susceptible host
Opponents: Infectious Agents

- Found in nature in **reservoirs** (its natural habitat)
- Reservoirs can be people (pertussis, norovirus), animals (Ebola, *Salmonella*, *E.coli* O157:H7), or inanimate matter like soil (botulism, tetanus, anthrax)
- Microbes survive and reproduce in the reservoir. Sometimes the microbe makes the reservoir sick, sometimes not.
Chain of Infection: How do microbes exit the reservoir and infect someone else?

Modes of Transmission

• Many ways! Many definitions! Many levels!
• Direct vs Indirect
• Vehicles (Food, Fomites)
• Vector (Mosquito, Tick)
• Person-to-Person
• Airborne (Measles, TB), Bloodborne (HIV, Hepatitis B)
  Fluid-borne (Ebola), Foodborne (Salmonella), Waterborne (Cryptosporidium)
• Zoonotic (Ebola, MERS, Rabies, Q fever)
HI, YOU MAY REMEMBER ME
FROM THE ALPHABET
Chain of Infection: How long does it take?

• Incubation period
  – Time from exposure to the microbe to the development of symptoms

• Examples: Flu 1-4 days, Ebola 2-21 days, TB 3-12 weeks, rabies 2 months-1 year

• Contagious or Shedding Period may precede symptoms

• Knowing both key to risk assessment and control
Patterns
(Or, the Epidemiology of our Opponents)

• It’s a Small World After All: Emerging infectious diseases are only a plane, boat, ship, or bus ride away

• In 2014, the world shared these infectious diseases: Influenza A H7N9, Chikungunya, MERS, and Ebola

• For foodborne outbreaks: widely distributed contaminated food products; many fresh produce vehicles

• Prevalence of antimicrobial resistance (MRSA, MDR-TB, CRE) and healthcare-associated infections
How Does This Help Us Break the Chain?

- Control at any link in the chain
- Some easier
- Reservoir harder
- **Transmission/entry = PPE, disinfection, handwashing**
- **Susceptible host = vaccination, isolation, quarantine**
- Also focus on epidemiology: early detection among travelers
Some Examples of ID Game Plans
Bacterial Agents: *Salmonella*

- **Reservoir:** Animals (poultry, cattle, amphibians), Humans (typhi) SEROTYPE-specific
- **Incubation period:** 1-3 days
- **Clinical symptoms:** diarrhea, fever, abdominal cramps, SEVERE, death
- **Epidemiology/patterns:**
  - Restaurants, environment, PFGE clusters
- **Associated vehicles:**
  - Eggs, chicken, fresh produce (melon, tomatoes, sprouts)
- **Spread:** Cross-Contamination from Food to Environment to Person
Viral Agents: MERS Coronavirus

- **Reservoir:** Camels?
- **Incubation period:** 2-14 days
- **Clinical symptoms:** Severe acute respiratory illness, fever, cough, death.
- **Epidemiology/patterns:**
  - Travelers to Middle East (21 countries), healthcare spread, some close contact spread
- **Spread:** Direct contact, droplet?
- **Control:** WHO says people with diabetes, kidney failure, or chronic lung disease and weakened immune systems should:
  - Avoid contact with camels
  - Do not drink raw camel milk or raw camel urine
  - Do not eat undercooked camel meat
Bacterial Agents: *E. coli* O157:H7

- **Reservoir**: Cattle
- **Incubation period**: 1-8 days
- **Clinical symptoms**: Severe/bloody diarrhea, abdominal pain, vomiting, HUS, death.
- **Epidemiology/patterns**:
  - Restaurants, events, fairs, water/recreational water
- **Associated vehicles**:
  - Undercooked ground beef, fresh produce (apples, sprouts), water
- **Spread**: Cattle feces to beef or to produce via water or manure
Bacterial Agents: *E. coli* O157:H7

Where’s The Beef?
EVD Natural History: Transmission

- Ebola is spread through **direct contact**

**How do you get the Ebola virus?**

Direct contact with:

1. **Body fluids of a person who is sick with or has died from Ebola.** (blood, vomit, pee, poop, sweat, semen, spit, other fluids)

2. **Objects contaminated with the virus** (needles, medical equipment)

3. **Infected animals** (by contact with blood or fluids or infected meat)

Is NOT Airborne
Epi Patterns: Ebola Early Case Recognition

Patient care checklist for patients under investigation for Ebola virus disease

- Isolate the patient in a separate room with a private bathroom.
- Activate the hospital preparedness plan for Ebola.
- Ensure standardized protocols are in place for PPE use and disposal.
- Wear appropriate PPE when in physical contact with the patient.
- Attend to the patient’s medical needs.
- Consider and evaluate patient for alternative diagnoses.
- Obtain detailed information about symptoms, contacts, and travel history.
- Perform only necessary tests and procedures.
- Ensure patient has the ability to communicate with family.
- Allow visitors only if they are wearing appropriate PPE.

For more information on how to care for a person under investigation for Ebola, please visit: [http://www.cdc.gov/ebola](http://www.cdc.gov/ebola)
Toxin Producers: Staphylococcus aureus/MRSA

- **Reservoir**: Humans (nose, throat, boils, piercings); Animals
- **Incubation period**: Varies
- **Clinical symptoms**: Skin infection, boils, purulent, “spider bite”
- **Epi patterns**:
  - Athletic Teams (Tampa Bay Buccaneers), healthcare settings
- **Associated vehicles**: towels, razors, shared equipment, whirlpool
- **Spread**: skin-to-skin direct contact, indirect via vehicles above
- **Control**: Keep wounds covered, handwashing, no sharing
Parting Words

• We rarely mentioned “You Know Who”--“Eboldemort” –don’t worry--more to come!

• Etiologic natural history is the foundation of our game plan to defeat our opponent microbes and the keys to their control.

• Infectious disease preparedness has multi-purpose benefits; partnerships always the key to overall improved community health.

• And if something just doesn’t seem right...
How to Contact Epidemiology (24/7)

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When it Comes to our Microbial Opponents...