Brain warm-up
The cloth ripped, the haystack was important
Brain Warm-up #2
The bottle broke, the ship sailed on time

Christening

What is epidemiology?
What is epidemiology?

- *Epi* = Upon
- *Demos* = man = humans = population
- *Ology* = study of

Definition: The study of that which affects population

- Not epizootiology
A question to ponder...from a letter to a newspaper several years ago

• In the nearly 100 years since insulin was discovered in 1922, millions of animals have been sacrificed to study and treat type 1 diabetes in humans.
• Nevertheless, NOW there are MORE people with type 1 diabetes than there were THEN.
• Your response to the letter is.....

Principles of Epidemiology

Numerator beg denominators

Cases beg controls

May not be a Disease

Deaths by guns in 1998:
NZ 2
Japan 19
UK 113
USA 36,000
Deaths by guns in 1998:

- Japan 19 / 150,000,000 = 0.013 / 100,000
- NZ 2 / 3,000,000 = 0.066 / 100,000
- UK 113 / 70,000,000 = 0.160 / 100,000
- USA 36,000 / 300,000,000 = 12.00 / 100,000

Pathologic Epidemiology

- Similar to clinical practice, pathology tends to deal with one case at a time
- However, events do not occur randomly
- The proficient pathologist looks for patterns
  - Person (or animal)
  - Place (spatial relationships/clusters)
  - Time (frequency)

Disease outbreaks

- Increase in the number of cases over past experience for a given population, time, and place
- Synonymous with epidemic
- Relative to the usual frequency of the disease
- Usually for a specific space and time
Case study #1

- 1980-1981: U.S. physicians diagnose increasing number of opportunistic infections and rare cancer
- Pneumocystis carinii pneumonia
- Kaposi’s sarcoma
- Other infections
  - Candidiasis
  - Tuberculosis
  - GI disease

Syndrome

The association of several clinically recognizable features
- Clinical signs (recognized by the clinician)
- Symptoms (reported by the patient)

Epidemiologic investigation

- CDC task force formed by epidemiologist Dr. James Curran
  - Evaluated patterns of disease to characterize syndromes
- June 5, 1981 – described unexplained immune deficiency
  - Opportunistic infections, neck lymphadenopathy, physical weakness
  - Named syndrome Acquired Immune Deficiency Syndrome (AIDS)
Outbreak investigation

1. Verify the diagnosis
2. Define a case
3. Determine the magnitude of the problem
4. Demographics (age, sex, susceptibility, etc.)
5. Spatial factors

Outbreak investigation cont’d

6. Temporal factors
7. Analyze the data
8. Working hypothesis
9. Intensive follow-up
10. Publish and disseminate results

Case study #2

- September to October, 2010 – many cases of canine distemper seen at WSVL
- After 5 cases occurred in the two-month period, WSVL pathologists contacted the WY state veterinarian
1. Verify diagnosis

- Pathology helpful to this step:
  - Good clinical characterization also effective
- There may not be an official causative agent identified (AIDS)
  - = syndrome definition
- Diagnostics may be routine (canine distemper due to CDV)

2. Define a Case

2. Define a Case cont’d

- Clinical canine distemper virus
  - Ante-mortem: FA or PCR
  - Post-mortem: Histology, IHC, FA, PCR, VI
  - Clinical signs may be respiratory, gastrointestinal, central nervous system
3. Determine the Magnitude

\[ \text{Attack Proportion (AP)} = \frac{\# \text{ affected}}{\text{Population at-risk}} \]

Consider the background level of disease
24 dogs presented with CDV at WSVL
CDV background at WSVL – 5.4 cases/year (range 0-11)

4. Demographics

- Race/breed, age, sex, susceptibility
- Gay men and IV drug users (AIDS)
- For the CDV outbreak: puppies (8-14 weeks old) of multiple breeds
  - Clinical signs reported for 11 animals
    - Respiratory – 8
    - GI – 6
    - CNS - 8

5. Spatial patterns

Cases presented in 6 veterinary clinics in Cheyenne, Laramie, Casper, and Douglas

All originated from 2 pet stores (Casper and Cheyenne) – 180 miles apart

A single owner
6. Temporal Factors

6. Pattern in Time (epidemic curve # affected vs. time)

7. Analyze the Data

- Outbreak traced back to a single large canine breeding facility in Kansas
- Biosecurity failures at the facility
  - No records of vaccination, breeding, veterinary care
  - Wildlife on property

8. Working hypothesis

- Kind of epidemic (point-source vs. propagated)
- Source of the epidemic (common source, multiple exposure)
- Mode of spread
9. Intensive follow-up

• Sequencing of virus – strains identical from two stores and different from a ranch dog from Riverton

• Interviews with pet store owner, veterinarians for the breeding facility, and regulatory agencies

• Review of USDA inspection records

10. Publish and Disseminate Results

• Many stakeholders; diverse audience
• Potential legal issues
• Manuscript submitted to JAVMA