Surveillance

“Ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health” - Centers for Disease Control & Prevention

“The continued watchfulness over the distribution and trends of incidence through the systematic collection, consolidation, and evaluation of morbidity & mortality reports & other relevant data for the purposes of disease and injury prevention.” - Alexander Langmuir

Surveillance – Key Elements

1. Population & data elements defined
2. Data collected using systematic methods
3. Data consolidated/tabulated to facilitate evaluation
4. Data analyzed & interpreted
5. Data reported → change
Surveillance in Public Health

1. Recognition of problem
2. Definition in scope of the problem
3. Determine the cause*
4. Design of intervention
5. Targeting of intervention
6. Effectiveness of intervention

* Epi, not surveillance

Types of Surveillance - Active

- Driven by public health officials
- Cases sought
- Aims to capture 100% of data
- Most accurate & timely
- Most expensive

Types of Surveillance - Passive

- Reporting by providers
- Usually covers a large geographic area
- Less expensive
- Issues with data quality
Role of the IP in Surveillance

- Reporting notifiable diseases
- Conducting surveillance
- Analyzing surveillance data
- Making recommendations
- Designing practices, policies, & procedures

Epidemiology

Study of the distribution and determinants of health problems in specified populations

- Distribution = frequency of the problem among groups
- Determinants = any factors or events that may alter health

Epidemiology - Aims

1. Describe - the health status of a population
2. Explain - discover causal factors & modes of transmission
3. Predict - the occurrence of disease by total cases and within subsets
4. Control - the distribution of disease
Importance of Epidemiology
- Identify cause of disease & risk factors.
- Determine extent of disease in the community
- Study the natural history & prognosis of the disease
- Evaluate preventive & therapeutic measures & modes of healthcare delivery
- Foundation for developing public policy & making regulatory decisions.

Historical Highlights of Epidemiology and Infection Control

Thucydides
- Ancient Greek historian
- Wrote on the plague epidemic in Athens
- Descriptive detail

Hippocrates
- 400 B.C.
- Disease & physical environment
- Movement from supernatural → rational
History

**John Graunt**
- 1662 – published book
- Details of birth & death data
- Seasonal variations, infant mortality, gender differences
- Quantitative methods
- **Development of statistical methods to identify trends**

History

**Dr. John Snow**
- Cholera epidemic – London, 19th century
- Outbreak linked to contaminated water supply
- Spot map and tables of fatal attacks
- "Natural experiment" – 2 sources of water
  - More cases from company with contaminated water
  - Fewer cases from company with cleaner water
**History**

**Dr. Ignaz Semmelweis**

- OB – Austria, 1840s
- ↑ death rates in maternity wards due to puerperal fever
- ↑ rates on physician teaching wards than on midwife teaching wards
- ? medical students with contaminated hands from autopsies
- Handwashing with chlorinated solutions

**Patterns of Disease**

*Disease does not occur randomly, but in patterns that reflect underlying factors*

1. **Person**
   - Age, gender, socioeconomic status, nutrition, education
2. **Place**
   - Where?, urban vs. rural, states, cities, altitude, rainfall
3. **Time**
   - Rapid vs. slow increase, seasonal, trends over time

**Rates of Disease**

- **Endemic**
  - Habitual presence of disease within specified area
- **Epidemic** (outbreak)
  - Excess # of cases compared to baseline
- **Pandemic**
  - Worldwide epidemic
Outbreak Investigations

Determine the source of the outbreak:
- Control the existing outbreak
- Prevent future outbreaks
- Provide further information on the disease etiology

Steps of an Outbreak Investigation

1. Prepare for field work
2. Confirm the existence of an outbreak
3. Determine the diagnosis
Steps of an Outbreak Investigation

4. Define and identify cases
5. Describe and orient the data in terms of time, place, and person
6. Create hypotheses

7. Evaluate hypotheses
8. Refine the hypotheses and then carry out additional studies
9. Implement control and prevention measures
10. Communicate findings