Surveillance: The Public Health Version of CSI

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Outline of Surveillance Talk

♦ Basics of Surveillance
♦ Uses of Surveillance
♦ Limitations of Surveillance
♦ Future of Surveillance
♦ Examples of Surveillance in Action in Illinois
♦ Infectious Disease Quiz
Public Health Surveillance

Systematic, ongoing

♦ Collection
  “get data”

♦ Analysis & Interpretation
  turn data into information”

♦ Dissemination
  “route to those who need it”

♦ Link to public health practice
  “do something about it”
Building Block of Surveillance

♦ All surveillance starts with the single case who is brought to the attention of public health by a laboratory, HCP or other party and who’s risk factors are investigated by the LHD CD investigator.
Three Main Features of Surveillance

♦ Systematic Collection

♦ Consolidation and Evaluation of Data

♦ Prompt Dissemination of Results to Those Who Can Take Action
Public Health Approach

Problem Response

Surveillance: What is the problem?

Risk Factor Identification: What is the cause?

Intervention Evaluation: What works?

Implementation: How do you do it?
Legal Authority For Conducting Surveillance

♦ Diseases and conditions to be reported
♦ Who is responsible for reporting
♦ What information is required for each case
♦ How, to whom and how quickly must cases be reported
♦ Control measures to be taken for specific diseases
Control of Communicable Diseases Code

(77 Illinois Administrative Code 690)
Reportable Infectious Diseases, 2006

- 67 reportable infectious diseases in Illinois
- 56 diseases/conditions are nationally notifiable to CDC
- 3 are reportable to WHO
Primary Data Sources for Surveillance

- Lab reports
- Health care providers
- Death certificates
- Animals/insects
Modes of Surveillance

- **Passive Surveillance**: Wait for reports
- **Enhanced Passive surveillance**: Health alerts to encourage rapid reporting. Communication and relationship building with hospitals and clinicians
- **Active surveillance**: Actively querying or auditing clinical sites for cases; expensive and more often part of “ramping up”
The Public Health Team

- Health care providers
- Other Experts
- Epidemiologists
- Communicable Disease Investigators
- IT persons
- Support staff
Allied Surveillance Useful to Infectious Disease Surveillance

- Biowatch-environmental monitoring for BioT agents in big cities
- Biosense
Uses of Surveillance

- Identify cases for investigation and followup
- Estimate magnitude of the problem
- Determine trends in incidence and distribution
- Detect sudden increases in disease-Outbreak detection
Uses of Surveillance (cont)

♦ Generate hypotheses, stimulate research
♦ Evaluate prevention and control measures
♦ Monitor long-term changes/trends in infectious agents
♦ Detect changes in health practices
♦ Facilitate planning
Uses of Surveillance

- Identify cases for investigation and followup
- Estimate magnitude of the problem
- Determine geographic distribution of disease
- Detect sudden increases in disease-Outbreak detection
Situations Requiring Prophylaxis of Contacts
Uses of Surveillance

- Identify cases for investigation and followup
- **Estimate magnitude of the problem**
- Determine trends in incidence and distribution
- Detect sudden increases in disease-Outbreak detection
Uses of Surveillance

- Identify cases for investigation and followup
- Estimate magnitude of the problem
- **Determine trends in incidence and distribution**
- Detect sudden increases in disease-Outbreak detection
Lyme Disease Cases Reported in Illinois, 1995-2005
Lyme Disease Exposures in 3 Counties in Illinois, 1995-2005

Number of cases

Year

DuPage County
JoDaviess County
Ogle County
Known Geographic Distribution of Ixodes scapularis by county in Illinois 1991

Ixodes scapularis is also known as the "deer tick" and the "black-legged tick". Amblyomma americanum, the lone star tick, and Dermacentor variabilis, the American dog tick, should be presumed present throughout the state.

Shaded counties denote where the "deer tick" has been found repeatedly in the environment and is believed established. CDC criteria for "established" ticks are at least 3 ticks or 2 life stages (larvae, nymphs, adults) identified.

Additional tick and host surveillance activities not depicted on this map may have been conducted by other agencies/organizations in Illinois - findings reflected on this map are those reported to the Illinois Department of Public Health (IDPH).

IDPH does not perform testing for disease pathogens in ticks but identification for genus and species is performed at IDPH when the tick is intact and sent in a crush-proof container to:

Illinois Department of Public Health
Entomologist, Division of Environmental Health
625 West Jefferson - 3rd Floor
Springfield, IL 62761
(217) 782-5830

13 January 2005
Known Geographic Distribution of *Ixodes scapularis* by county in Illinois 2005

*Ixodes scapularis* is also known as the “deer tick” and the “black-legged tick.” *Amblyomma americanum*, the lone star tick, and *Dermacentor variabilis*, the American dog tick, should be presumed present throughout the state.

Shaded counties denote where the “deer tick” has been found repeatedly in the environment and is believed established. CDC criteria for “established” ticks are at least 6 ticks or 2 life stages (larvae, nymphs, adults) identified.

Cross-hatched counties denote where additional reports suggest the “deer tick” is present and may be established.

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Uses of Surveillance

- Identify cases for investigation and followup
- Estimate magnitude of the problem
- Determine trends in incidence and distribution
- Detect sudden increases in disease-Outbreak detection
Surveillance-Outbreak Identification

- S. enteritidis, Kankakee, 2002
- Histoplasmosis, Iroquois County, 2003
- Rabies, 2004 & 2005
Uses of Surveillance

♦ Generate hypotheses, stimulate research
♦ Evaluate control and prevention measures
♦ Monitor long-term changes/trends in infectious agents
♦ Detect changes in health practices
♦ Facilitate planning
TOXIC SHOCK SYNDROME (TSS)
United States, 1983-1998

*Includes cases meeting the CDC definition for confirmed and probable cases for staphylococcal TSS.

National Center for Infectious Diseases (NCID) data*
National Electronic Telecommunications System for Surveillance (NETSS) data

*Includes cases meeting the CDC definition for confirmed and probable cases for staphylococcal TSS.
Reported Toxic Shock Syndrome in Illinois, 1980-2004
Investigation leads to prevention
Uses of Surveillance

- Generate hypotheses, stimulate research
- **Evaluate control and prevention measures**
- Monitor long-term changes/trends in infectious agents
- Detect changes in health practices
- Facilitate planning
Poliomyelitis (Paralytic)

United States, 1968-1998

NOTE: Inactivated vaccine was licensed in 1955. Oral vaccine was licensed in 1961.

Reported Cases


NOTE: Inactivated vaccine was licensed in 1955. Oral vaccine was licensed in 1961.

Rabies, potential human exposure

- 15% of rabies PEP unnecessary
- Improper timing of rabies PEP in 1/3 of cases
- Improper location for injections in 1/3 of cases
- Given properly in 43% of cases
Uses of Surveillance

- Generate hypotheses, stimulate research
- Evaluate control and prevention measures
- Monitor long-term changes/trends in infectious agents
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Brucellosis in Humans and Cattle in Illinois, 1951-2004

[Graph showing the number of human and cattle cases over years, with a decrease trend for both categories.]
Uses of Surveillance

- Generate hypotheses, stimulate research
- Evaluate control and prevention measures
- Monitor long-term changes/trends in infectious agents
- **Detect changes in health practices**
- Facilitate planning
Examples of Changes in Health Practices
Uses of Surveillance

- Generate hypotheses, stimulate research
- Evaluate control and prevention measures
- Monitor long-term changes/trends in infectious agents
- Detect changes in health practices
- Facilitate planning
What Diseases Should be Under Surveillance?

- Cause serious morbidity and/or mortality
- Have the potential to affect additional people beyond the initial case
- Can be controlled or prevented with an intervention
- Any outbreak or unusual increase in a disease
- Any unusual case/cluster
Competing Interests

- CDC
- State Health Department
- Local Health Departments
- Citizens and action groups
- Health Care providers
- Politicians
Types of Infectious Diseases Under Surveillance

♦ Diseases transmitted from food/drinking water
♦ Diseases requiring contact tracing for prophylaxis
♦ Vaccine preventables
♦ Diseases requiring environmental control measures
♦ New/emerging/unusual infections
Diseases transmitted from food/drinking water

♦ Enterics—Salmonella, *E. coli* O157:H7
♦ Other—botulism, *Listeria* etc
♦ PH responses
  – Restrict foodhandlers
  – Remove contaminated foods from commerce
  – Find problem in manufacturing process
Examples of diseases requiring contact prophylaxis

- Hepatitis A
- *N. meningitidis*
- Rabies Exposures
Vaccine Preventables

- Examples: *H. influenzae*, Hepatitis A and B, *pertussis*, chickenpox, influenza
- PH Response
  - Increasing vaccination rates in risk groups
Diseases Requiring Environmental Control Measures

♦ Examples: outbreaks of legionellosis, leptospirosis, histoplasmosis, cryptosporidiosis, arboviruses

♦ PH Response
  – Recommendations on how to decrease exposure to organism and prevent further cases
New/Emerging/Unusual

♦ Examples: monkeypox, bioterrorism agents
Limitations of Surveillance System

♦ Underreporting
Limitations (continued)

♦ Representativeness
♦ Timeliness
♦ Inconsistency of case definitions
Characteristics of Good Public Health Surveillance

- Qualified and dedicated personnel
- Teamwork approach to investigations
- Strong relationships with reporters
- Strong relationships with partners-other LHDs, state and federal partners
Characteristics of Good Public Health Surveillance (cont)

- Templates and database resources available on hand
- 24/7/365 availability
- Always stay alert/open minded
Ways to Improve Surveillance

♦ Improve awareness of reporters
♦ Simplify reporting
♦ Frequent feedback
♦ Active surveillance
What’s Up in the Future for Infectious Disease Surveillance in Illinois???

♦ INEDSS
  – Faster reporting
  – LHDs have access to their own data
♦ Electronic Reporting from labs
♦ Electronic death certificate data?
♦ IDPH-Intranet resources for each reportable disease, A-Z
Surveillance/Epi Response overview

♦ “Signal”
- Call from clinician/hospital
- Syndrome threshold/trigger
- Environmental trigger

♦ Early Epi Investigation
- Targeted questions for MD, Patient
- Laboratory work up
- Environmental investigation
- Cross-Evaluation data from all systems
- Enhance surveillance/ Actively look for more case

♦ Outbreak investigation
Examples of Surveillance in Action in Illinois