VACCINE-PREVENTABLE DISEASE INVESTIGATIONS

Why and How
Bureau of Epidemiology and Public Health Informatics
Kansas Immunization Program
Kansas Department of Health and Environment

2011 Annual Conference
Objectives

- Explain the purpose of disease investigation
- Identify available resources
- Understand the importance of collecting complete information
- Conduct case interviews
Why Investigate?

- To prevent the spread of illness!
  - Trace disease source and spread
  - Identify outbreaks
  - Implement control and prevention measures
  - Gain information for policy, education
    - Used by state, CDC
    - Design disease control activities
    - Evaluate program, vaccine efficacy
The chain of infection

All links must be present in the right order for an infection to occur

Becomes source of infection

Source

Way in

Way out

Spread

Person at risk
Why Investigate?

- It’s the law
  - KAR 28-1-2
    - “Designation of infectious or contagious diseases”
    - “Cases or suspect cases shall be reported within 7 days”
Why Investigate?

- It’s the law
- KAR 28-1-2
  - Kansas Notifiable Disease List

### 2006 REPORTABLE DISEASES IN KANSAS

<table>
<thead>
<tr>
<th>Disease</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquired Immune Deficiency Syndrome (AIDS)</td>
<td></td>
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<tr>
<td>Amebiasis</td>
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<tr>
<td>Anthrax</td>
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<tr>
<td>Arboviral disease (including West Nile virus, Western Equine encephalitis (WEE) and St. Louis encephalitis (SLE))</td>
<td></td>
</tr>
<tr>
<td>Botulism</td>
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<tr>
<td>Brucellosis</td>
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<tr>
<td>Campylobacter infections</td>
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<tr>
<td>Chancroid</td>
<td></td>
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<tr>
<td>Chlamydia trachomatis genital infection</td>
<td></td>
</tr>
<tr>
<td>Cholera</td>
<td></td>
</tr>
<tr>
<td>Measles (rubella)</td>
<td></td>
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<tr>
<td>Meningitis, bacterial</td>
<td></td>
</tr>
<tr>
<td>Meningococccemia</td>
<td></td>
</tr>
<tr>
<td>Mumps</td>
<td></td>
</tr>
<tr>
<td>Pertussis (whooping cough)</td>
<td></td>
</tr>
<tr>
<td>Plague (Yersinia pestis)</td>
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<tr>
<td>Poliomyelitis</td>
<td></td>
</tr>
<tr>
<td>Psittacosis</td>
<td></td>
</tr>
<tr>
<td>Q Fever (Coxiella burnetii)</td>
<td></td>
</tr>
<tr>
<td>Rabies, human and animal</td>
<td></td>
</tr>
<tr>
<td>Rocky Mountain Spotted Fever</td>
<td></td>
</tr>
<tr>
<td>Rubella, including congenital rubella syndrome</td>
<td></td>
</tr>
</tbody>
</table>

- Indicates that a telephone report is required by law within four hours of suspect or confirmed cases to KDHE toll-free at 1-877-427-7317
- Indicates that an isolates must be sent to: Division of Health and Environmental Laboratories
  Forbes Field, Building #740, Topeka, KS 66620-0001
  Phone: (785) 296-1633

K - Department of Health and Environment Division of Health
But really, Why do we investigate?
Steps to Prevent the Spread

1. Confirm the diagnosis
Case Study #1

- Varicella positive 36 year old male
- LHD assumes shingles → no follow up done with the physician or individual
Case Study #1 – Outcome

- Patient did have chickenpox
- Individual worked as a guard at a juvenile justice facility in the county
- Inmates continually being transferred to and from this facility
- Potentially hundreds of inmates exposed to patient that are now all over the state
Steps to Prevent the Spread

1. Confirm the diagnosis
2. Conduct case interview
   - Implement control measures
Case Study #2

- Hepatitis A positive male
- Physician contacted, diagnosis confirmed
- LHD informed that patient is a known drug user
- Investigator is not comfortable associating with drug users and therefore does not conduct case interview
Case Study #2 - Outcome

- Turned into the largest documented outbreak of hepatitis A that Kansas has seen
- Number of Cases: 90
- Number of Contacts: 548
- Doses of IG
  - Contacts: 401
  - Patron recall: 2800
- Doses of vaccine
  - General public: 1550
  - High Risk: 187
  - Children: 392
Steps to Prevent the Spread

1. Confirm the diagnosis
2. Conduct case interview
3. Identify contacts
   - Implement control measures
Case Study #3

Patient presents to ED with fever and respiratory sx

Feb 12

1 4 6 8 2 0 2 4 2 6 2 8 Mar 2

IgM from patient is negative

Patient 2 develops fever

IgM from patient is positive

Patient 2 develops respiratory sx and fever, presents to ED; admitted with dx of asthma exacerbation

Patient 2 discharged from the hospital

Patient 2 diagnosed with measles

And it continued...

Patient presents to ED with fever and respiratory sx

Measles suspected, pt isolated, LHD notified

Patient develops rash, is admitted to hospital with viral infection dx

Patient 2 presents to ED with cough and rash; admitted with dx of pneumonia and allergic reaction; pt isolated

Patient 2 diagnosed with measles
Case Study #3 - Outcome

- Suspected Cases: 363
- Probable Cases: 8
- Confirmed Cases: 14
- ~15K h lost in furlough
- ~$800K spent by the two hospitals
Case Investigations
Passive Surveillance

Single Reportable Disease Event

Medical Provider | Case | Laboratory

Public Health Agency

Analysis and Dissemination | Recommendation and Control
Who Provides What Information?

Reporting Sources

- Laboratories
  - Lab Result
  - Ordering Provider Contact Info
- Medical Providers
  - Demographics
  - Clinical Info / Diagnosis
  - Lab Result
  - Risk Factors
What information to collect

- Resources –
  - Disease Investigation Guidelines (DIGs)
  - Disease specific information
- Demographics
- Clinical History
- Lab test type and results
- Risk factors
  - Where infected
  - Where spread
## Varicella (Chickenpox) Investigation Guideline

<table>
<thead>
<tr>
<th>CONTENT:</th>
<th>VERSION DATE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation Protocol:</td>
<td></td>
</tr>
<tr>
<td>• Investigation Guideline</td>
<td>06/2010</td>
</tr>
<tr>
<td>Investigation Forms / Documentation Worksheets:</td>
<td></td>
</tr>
<tr>
<td>• General Investigation Form(s)</td>
<td>06/2008</td>
</tr>
<tr>
<td>• Varicella Supplemental Form</td>
<td>04/2009</td>
</tr>
<tr>
<td>• KS Varicella Reporting Form</td>
<td>06/2004</td>
</tr>
<tr>
<td>Supporting Materials found in attachments:</td>
<td></td>
</tr>
<tr>
<td>• Sample Letter, Parent Notification</td>
<td>07/2010</td>
</tr>
<tr>
<td>• Fact Sheet</td>
<td>07/2010</td>
</tr>
</tbody>
</table>

http://www.kdheks.gov/epi/disease_investigation_guidelines.htm
DIGs – What is inside

- Case Classification – Confirmed, Probable, Suspect
- Lab analysis – what specimens to collect and when
- Overview of the disease
- Investigator responsibilities
- Isolation and other control measures
- Investigation Forms
  - Rapid assessment & contact investigation forms (VPDs)
  - General investigation form
  - Supplemental form – disease specific
Demographics

- Who they are
- Where they live, work

![Patient Information Form](image)

**Name Type:** [ ] Default/Common [ ] Legal [ ] Maiden [ ] Nickname

**Last:** __________________________  **First:** __________________________  **Middle:** __________________________

**Street:** __________________________  **City/State:** __________________________  **Zip:** __________________________

**Evening Phone #:** __________________________  **Daytime Phone #:** __________________________

**Sex:** [ ] Failure to Report [ ] Female [ ] Male [ ] Other [ ] Transsexual [ ] Unknown

**Race:** [ ] American Indian or Alaska Native [ ] Asian [ ] Black or African American [ ] Native Hawaiian or Other Pacific Islander [ ] White [ ] Unknown

**Hispanic / Latino Ethnicity:** [ ] Yes [ ] No

**Date of Birth:** __________________________  **Age:** __________________________  **Age Unit:** [ ] Days [ ] Weeks [ ] Months [ ] Years
Demographics

Varicella Cases Reported in 2010 by Age Group

- Sex
- Date of birth
- Race
- Ethnicity
- Address
Clinical History

- Obtain clinical information from physician, nurse
- Symptoms collected varies by disease

<table>
<thead>
<tr>
<th>Clinical Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Rash?</td>
<td>Yes</td>
</tr>
<tr>
<td>Rash Onset Date</td>
<td>mm/dd/yyyy</td>
</tr>
<tr>
<td>Rash Duration</td>
<td>0-30 Days; 99-Unknown</td>
</tr>
<tr>
<td>Rash Type</td>
<td>Generalized</td>
</tr>
<tr>
<td>Immunocompromised?</td>
<td>Yes</td>
</tr>
<tr>
<td>Lesion Severity</td>
<td>Mild (few scattered lesions on the body)</td>
</tr>
<tr>
<td>Fever?</td>
<td>Yes</td>
</tr>
<tr>
<td>If Recorded, Highest Measured Temperature</td>
<td></td>
</tr>
<tr>
<td>Fever Duration</td>
<td>0-30 Days; 99-Unknown</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia?</td>
<td>Yes</td>
</tr>
<tr>
<td>Encephalitis?</td>
<td>Yes</td>
</tr>
<tr>
<td>Cerebellar Ataxia?</td>
<td>Yes</td>
</tr>
<tr>
<td>Skin Infection?</td>
<td>Yes</td>
</tr>
<tr>
<td>Other Secondary Infection?</td>
<td>Yes</td>
</tr>
<tr>
<td>Thrombocytopenia?</td>
<td>Yes</td>
</tr>
<tr>
<td>Other Complications?</td>
<td>Yes</td>
</tr>
<tr>
<td>Death</td>
<td>Yes</td>
</tr>
<tr>
<td>If Death, Date</td>
<td>mm/dd/yyyy</td>
</tr>
</tbody>
</table>
Clinical History

- More than just symptoms!

![Hospital Information Form]

- Hospitalized: □ Yes  □ No
- Patient Status Date: ______________________

- Hospital Name: ____________________________  Hospital City: ____________________________

- Date Hospitalized: ________________________  Number of Days Hospitalized: _______________
Laboratory Testing

- Obtain from physician if lab report unclear
- If no symptoms, why was testing performed?
- Was testing performed at the appropriate time?

![Lab Reports](image)
Risk Factors

- Vaccine history

### Vaccine History

<table>
<thead>
<tr>
<th>Vaccinated? (Received varicella-containing vaccine?)</th>
<th>Number of doses received ON or AFTER 1st birthday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vaccination Date</th>
<th>Vaccine Type</th>
<th>Vaccine Manufacturer</th>
<th>Lot Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm/dd/yyyy</td>
<td>Select One</td>
<td>Select One</td>
<td></td>
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</tbody>
</table>

If Not Vaccinated, What was The Reason?

- Religious Exemption
- Lab Evidence of Previous Disease
- Parental Refusal
- Medical Contraindication
- MD Diagnosis of Previous Disease
- Other, Specify
- Philosophical Objection
- Under Age For Vaccination
- Unknown
## Risk Factors

- **Travel history**

<table>
<thead>
<tr>
<th>Destination</th>
<th>Depart Date</th>
<th>Return Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Transmission Settings

### Work / Occupation or School / Grade

<table>
<thead>
<tr>
<th>Worksites / School:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupations / Grade:</td>
</tr>
</tbody>
</table>

### Epidemiologic Information

<table>
<thead>
<tr>
<th>Epi-linked to Another Confirmed or Probable Case?</th>
<th>Case ID of epi-linked case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
## Varicella Rapid Assessment Form for the Local Investigator

(Please refer to the Disease investigation Guideline for additional guidance.)

### Symptoms (s)

<table>
<thead>
<tr>
<th>Rash</th>
<th>Unk.</th>
<th>No</th>
<th>Yes</th>
<th>Onset Date</th>
<th>Duration (days)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Rash Type: Generalized</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Rash Type Localized/ Dermatomal</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fever</th>
<th>Unk.</th>
<th>No</th>
<th>Yes</th>
<th>Onset Date</th>
<th>Duration (days)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

#### Rash Severity:

- 1. Mild (Few scattered: < 50)
- 2. Moderate (50-300 lesions)
- 3. Severe (> 300 lesions)

### Complications

<table>
<thead>
<tr>
<th>Unk.</th>
<th>No</th>
<th>Yes</th>
<th>Date(s)</th>
<th>Location(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

- Hospitalized
- Died
- Pneumonia
- Encephalitis
- Cerebellar Ataxia
- Skin Infection
- Other Secondary Infection
- Thrombocytopenia
- Other Complications (Specify)

### Medical History

<table>
<thead>
<tr>
<th>Unk.</th>
<th>No</th>
<th>Yes</th>
<th>Date Arrive</th>
<th>Date Depart</th>
<th>Location (To / From)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

- Immunocompromised
- History of Varicella

### Varicella Vaccination History

<table>
<thead>
<tr>
<th>Unk.</th>
<th>No</th>
<th>Yes</th>
<th>Date(s)</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Lot</th>
</tr>
</thead>
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</tr>
</tbody>
</table>

- Dose 1
- Dose 2

If NO to either dose, reason:

### Initial EPI Information

<table>
<thead>
<tr>
<th>Unk.</th>
<th>No</th>
<th>Yes</th>
<th>Date(s)</th>
<th>Location(s) or Case Information</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

- School Daycare Camp association
- Contact w/ Varicella case

### Laboratory Testing

<table>
<thead>
<tr>
<th>Unk.</th>
<th>No</th>
<th>Yes</th>
<th>Collection Date</th>
<th>Results</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

- Virus Isolation
- DFA
- PCR
- Serum IgG (Convalescent)
Contact Investigation and Control Measures

- Isolation
- Work, school, daycare restrictions
- Follow-up of cases
- Protection of contacts
- Environmental measures
- Education
Why Isolate?

- It’s the law
  - KAR 28-1-6
    - “Requirements for isolation & quarantine of specific…diseases”
Why Quarantine

- It’s the law
  - KAR 28-1-6
  - VPDs
    - Chickenpox (varicella)
    - Diphtheria
    - Hepatitis A and Hepatitis B
    - Mumps
    - Pertussis
    - Polio
    - Rubella
    - Measles
    - Hib and meningococcal meningitis
Purpose of Case Interviews

- Identify infection source, spread
- Activities during infectious period
- Travel during infectious period
  - Measles transmission among air passengers has been documented
- Contact tracing
  - Home, daycare, school, work
Preparation – Know the Disease

- Epidemiology
- Reservoirs
- Modes of transmission
- Incubation period
- Period of communicability
- Susceptibility and resistance
- Treatment
Resources

- Disease Investigation Guidelines
  Available at
  http://www.kdheks.gov/epi/disease_protocols.htm

- Epidemiology and Prevention of Vaccine-Preventable Diseases
  Available at
  http://www.cdc.gov/vaccines/pubs/pinkbook

- Kansas Health and Environmental Laboratories
  Available at
  http://www.kdheks.gov/labs/lab_ref_guide.htm
Contact information

- Epidemiology
  - 1.877.427.7317
  - epihotline@kdheks.gov