Hepatitis C Outbreak in North Dakota, Update to Tuberculosis in Grand Forks County and Disease Control Highlights

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North Dakota Department of Health
Dakota Conference on Rural and Public Health
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Tuberculosis Outbreak Update North Dakota

Dee Pritschet, TB Controller
North Dakota Department of Health

NORTH DAKOTA TB CASES 2000 - 2011

Number of Cases

Reporting Year
Timeline Overview

- Late September 2012: 3 suspect TB cases were identified in Grand Forks County
- October 2012: 3 suspect cases were confirmed as cases; 3 additional cases added to the outbreak
- November 2012: Investigation identifies 7 more cases, CDC Epi-Aid requested
- December 2012: Epi Aid team arrives, 3 more cases

NORTH DAKOTA TB CASES 2000 - 2012

Incidence Rate of TB/100,000
TB Case Rates,* United States, 2012

• Cases per 100,000.

- ≤ 3.2 (2012 national average)
- >3.2

Investigative Tools

• Case Interview
• Electronic Medical Records
• Name and Photo release forms
• Facebook/Social Networks
• Pictures of transmission locations
• Genotyping

Genotyping

• Genotyping is the process of determining differences in the genetic make-up (genotype) of an individual by examining the individual’s DNA sequence using biological assays and comparing it to another individual’s sequence or a reference sequence.
GENtype G00011

• Spoligotyping
  • Identifies the M. tuberculosis genotype based on presence or absence of spacer sequences found in a direct-repeat region of the M. tuberculosis genome where 43 identical sequences and 36 base pairs are interspersed by spacer sequences.
  
  Spoligotype - 7777677760601
  Miru - 22432353323
  Miru2 - 444234423337

  • CDC Epi Aid reviewed all cases with matching spoligotype as well as requested spoligotypes be run on culture positive cases with potential epi links

Why Genotype?

• Discover unsuspected transmission relationships between TB patients
  • Identify unknown or unusual transmission settings, such as bars or clubs, instead of traditional settings like home and workplace
  • Uncover inter-jurisdictional transmission
  • Establish criteria for outbreak-related case definitions
  • Identify additional persons with TB disease involved in an outbreak
  • Determine completeness of contact investigations
  • Detect laboratory cross-contamination event
  • Distinguish recent infection (with development of disease) from activation of an old infection

*CDC TB genotyping fact sheet (www.cdc.gov)

Additional Cases Linked

• Cases from 2010 linked, index case identified

• Cases from early 2012 were linked to outbreak
  • A case from early 2012 had matching spoligotype, however greatly varied demographically and geographically
  • A case in another city when interviewed did not provide any information that would lead us to believe he was linked to the outbreak.
  • A case in 2013 has the same genotype, but no epi-link can be established
TB Outbreak Cases

<table>
<thead>
<tr>
<th>Reporting Year</th>
<th>Rest of North Dakota</th>
<th>Other Counties</th>
<th>Grand Forks County</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2011</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>2012</td>
<td>10</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>2013</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>2014</td>
<td>6</td>
<td>4</td>
<td>1</td>
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Age of TB Cases

<table>
<thead>
<tr>
<th>Age at Diagnosis</th>
<th>Number of Cases</th>
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<tr>
<td>&lt;15</td>
<td>8</td>
</tr>
<tr>
<td>15-24</td>
<td>5</td>
</tr>
<tr>
<td>25-34</td>
<td>2</td>
</tr>
<tr>
<td>35-44</td>
<td>3</td>
</tr>
<tr>
<td>45-54</td>
<td>6</td>
</tr>
<tr>
<td>55+</td>
<td>4</td>
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Challenges

- DOT
- Children
  - Stigma of taking medication at school
  - Liquid medication, compound medication
- Drug Levels
  - Food Interaction
  - Proper timing for drawing levels
  - Compliance
  - Extended treatment regimens
- Pregnancy
- Legal Action
Shortages

• PPD
  ▫ State set aside PPD for contact screening
  ▫ Hospital staff screening

• INH
  ▫ RIF prescribed due to low level INH resistance

Drug Levels

TB Screening

<table>
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<th>June 2013</th>
<th>June 2014</th>
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<tbody>
<tr>
<td>TST</td>
<td>1650</td>
<td>TST - 60</td>
</tr>
<tr>
<td>LTBI</td>
<td>69</td>
<td>LTBI - 24</td>
</tr>
</tbody>
</table>

53.7% of Named Contacts are LTBI
Ongoing work

- Continue to locate, refer, and follow cases, LTBI, and contacts
- Administer directly observed therapy (DOT) to active cases
- Manage social barriers to treatment compliance
  - Isolation for infectious cases
  - Housing
  - Food
  - Medication and evaluation compliance
- Continue investigative work
  - Full genotyping
  - New case identification
  - Reinterviews

Electronic Medical Records

- Allowed for further verification and identification of named contacts
- Able to “flag” charts of patients
- Streamlined gathering and sharing of clinical information and patient status

Whole Genome Sequencing
In the News

Public Health Challenges
• Housing
• Provide Food
• DOT
• Transportation
• Arrange Appointments
• Arrange for health care coverage
• Case Management
• Incentives

Cohort Review
• Attended by Altru Staff, GFPHU Staff and NDDoH staff
• Review each case
  • Lessons learned
Hepatitis C Outbreak in North Dakota

Sarah Weninger, MPH
Viral Hepatitis Prevention Coordinator

Presentation Outline

• Introduction
• Investigation Timeline
• Activities Completed
• Methods and Preliminary Findings
• Recommendations
Hepatitis C Virus (HCV): Background

- Most common bloodborne infection in the United States
- Transmission is primarily through percutaneous blood exposure
  - Most infections are asymptomatic
  - Long incubation period: 2 weeks to 6 months
- Healthcare-associated exposure due to infection control lapses is an emerging route of transmission

Hepatitis C Outbreaks
United States, 2008-2012

- 16 outbreaks with 160 associated cases
  - 8 outpatient settings (42 cases; >68,000 notified)
  - 6 hemodialysis settings (50 cases; 1,353 notified)
  - 2 owing to drug diversion (67 cases; >19,000 notified)

Centers for Disease Control and Prevention.
http://www.cdc.gov/hepatitis/Outbreaks/PDFs/HealthcareInvestigationTable.pdf

Hepatitis C Outbreaks: Cited Infection Control Lapses Associated with Transmission

- Syringe reuse/contaminated medication vials
- Suspected syringe reuse
- Failure to maintain separate clean and contaminated work spaces
- Breaches in environmental cleaning/disinfection
- Breaches in medication preparation
- Failure to consistently change gloves and perform hand hygiene
- Mode of transmission unknown or only suspected
  - 5 of 16 HCV investigations (31%)
HCV Transmission: Challenges

- HCV capable of surviving at room temperature for at least 16 hours
- Blood contaminated surfaces may act as reservoir for the virus
- Blood contamination may not be visible to the naked eye
- There is no vaccine or prophylactic treatment for HCV

Activities Completed

- Case-finding by serologic screening of past or present residents
- Laboratory confirmation of cases
- Chart abstraction
- Interviews
- Observations

Initial NDDoH Timeline

- March 2013
  - Three HCV cases among elderly individuals reported to NDDoH; Two cases were acute

- April – May 2013
  - NDDoH notified CDC and molecular laboratory testing coordinated across facilities
  - An additional HCV acute case reported to NDDoH
Initial NDDoH Timeline

• June – August 2013
  ▫ NDDoH launched review of medical charts and surveillance data, in addition to preliminary patient interviews
  ▫ Initial investigation revealed that each case had exposure to LTCF A and the local hospital within 6 months prior to HCV diagnosis
  ▫ Quasispecies (QS) molecular analyses confirmed relatedness of 3 cases
  ▫ Standardized abstraction forms and case questionnaires applied
  ▫ Two additional HCV cases identified with confirmed QS relatedness to first 3 cases

• September 2013
  ▫ Expanded case-finding:
    ▪ Additional persons with current or past history of residence at LTCF A were screened
    ▪ For comparison, a random sample of residents (n=96) at LTCF B were screened

• October - November 2013
  ▫ Infection control assessment
  ▫ Due to concern for potential ongoing transmission, NDDoH requested CDC assistance
    ▪ 10/15/2013 - 11/14/2013
Investigation Objectives

- Evaluation and review of
  - Medical charts for inpatient and outpatient encounters, skilled nursing care, and EMS encounters
  - Infection control procedures
  - Controlled injectable drug administration records
- Assess potential modes of transmission and risk factors for HCV infection in this outbreak
- Extend recommendations to prevent HCV transmission in this healthcare setting

Characteristics of Cases (n = 44)

- Age range: 38-100 years
- Median age: 84
- Males: 18 (40.9%)
- Females: 26 (59.1%)

Methods

- Comparison study
  - Study population: Patient census population targeted for screening at LTCF A
  - Compared all exposures of all residents who were cases versus those who were non-cases
    - Exposures: procedures involving percutaneous contact with blood or body fluids
    - Hospital encounters and procedures
    - LTCF procedures
    - Outpatient setting encounters and procedures
  - Investigated differences in exposures between cases and non-cases
Preliminary Results

Exposures* preliminarily not statistically associated with HCV case status in this comparison study:

- Fingerstick Monitoring (DM)
- PPD
- Injectable medications (narcotics, pain relief, anesthetics) clinic
- Vaccinations
- Transfusion
- Post-anesthesia Care
- Hemodialysis
- Interventional Radiology Endoscopy
- Orthopedic and Non-orthopedic surgery
- Chemotherapy
- Same Day Surgery
- Dental Care
- Orofacial surgery
- Eye Clinic
- Orthopedics
- Family Medicine clinic
- Surgery clinic
- Internal Medicine clinic
- Neurosurgery clinic
- GI clinic
- Cardiac Cath. clinic

*Exposure list highlights salient procedures and locations for purposes of this presentation; not exhaustive

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Preliminary Results

Exposures preliminarily statistically associated with HCV case status in this comparison study (excess of HCV cases exposed compared to non-cases):

- Patients receiving nail care at LTCF A
- LTCF A home visits:
  - Podiatry
  - Outreach lab phlebotomy

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Recommendations

- Meticulous adherence to Standard Precautions for all healthcare delivery
  - In-service training reinforcing basic infection control practices surrounding percutaneous exposures and procedures
    - e.g., injection safety, shared patient equipment
  - Audits to ensure ongoing compliance
  - Make use of consultation with a certified infection preventionist to:
    - review policies and procedures
    - assist with assuring infection control program practices are followed
Acknowledgements

**Partner Facilities**
- Administrators and directors
- Directors of nursing and infection control nursing staff
- Laboratory managers
- Clinical and outreach staff
- Pharmacy directors and staff

**NDDoH**
- Division of Disease Control epidemiologists
- DOC
- ICS Team

**CDC**
- Melissa Collier, DVH
- Joseph Perz, DHQP
- Melissa Schaefer, DHQP
- Anil Suryaprasad, DVH
- Fujie Xu, DVH
- Epi-Aid Team

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**Increase of Syphilis In North Dakota**

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North Dakota Department of Health

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**Syphilis: Treponema pallidum**

**Primary**
- Occurs after incubation
- Occurs in every case
- Usually one or more chancres at the site of exposure
- Most infectious stage of syphilis

**Secondary**
- Occurs any time after the eruption of the primary chancre (usually 4 – 6 weeks up to one year)
- The "great imitator" – rashes of different varieties, often on palms and soles
Syphilis: *Treponema pallidum*

<table>
<thead>
<tr>
<th>Tertiary</th>
<th>Other characteristics</th>
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<tbody>
<tr>
<td>• Late manifestations of syphilis</td>
<td>• Latency – periods between stages in which the person has no symptoms or signs of syphilis</td>
</tr>
<tr>
<td>• Can involve any part of the body</td>
<td>• Neurosyphilis</td>
</tr>
<tr>
<td>• Can occur during primary or secondary syphilis</td>
<td>• Congenital syphilis</td>
</tr>
<tr>
<td>• Gummatous lesions</td>
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Syphilis Screening Recommendations

- Pregnant females
- Partner(s) exposed to a positive syphilis case
- Blood donors
- MSM
  - Screen CT, GC and syphilis at 3 – 6 mo intervals if reporting multiple and anonymous sex partners
- HIV+ individuals should be tested once a year

Syphilis Treatment Guidelines

- P&S:
  - Benzathine penicillin G 2.4 million units IM in a single dose
- Early Latent:
  - Benzathine penicillin G 2.4 million units IM in a single dose
- Late Latent or Unknown:
  - Benzathine penicillin G 7.2 million units total (3 doses of 2.4 million units IM at 1-week intervals)
Multi-State Outbreak Syphilis
January 1, 2013 – May 7, 2014

Cases by Month & Stage

Number of Cases

Primary  Secondary  Early Latent  Unknown Duration  Late Latent  Congenital  Unknown Stage

Cases by Stage

Primary 48%  Secondary 17%  Early Latent 19%  Late Latent 12%  Congenital 1%  Unknown Stage 3%

Cases by Gender

Male 47%  Female 53%
Multi-State Outbreak Syphilis
January 1, 2013 – May 7, 2014
Cases by Age Group

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  - TB Controller and HIV Surveillance Coordinator