Mayo Clinic Center for Tuberculosis
TB Case Management in North Dakota

Dee Pritschet, TB Controller
North Dakota Department of Health
Disclosures

• No relevant financial relationships
• No off-label/investigative use of commercial product/device
Disclosures

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No Relationships

Course Director - Stacey Rizza, M.D

Relevant Financial Relationships

None

Off Label/Investigational Uses

None

Accreditation

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Participants can earn up to 1.0 ANCC contact hours.
Learning Objectives

1. Define strategies that are culturally appropriate for verbal and non-verbal communication with Native Americans.

2. Describe the paradigm of case management for TB in North Dakota.

3. Identify strategies that improved communication between the North Dakota Department of Health and various tribal affiliations.
Indian Health Services (IHS)

North Dakota is served by the Great Plains IHS Branch located in Aberdeen, South Dakota
Indian Health Service

- Is the health care system for federally recognized American Indian and Alaska Natives in the United States.

To utilize HIS:

- Is of Indian and/or Alaska Native descent as evidenced by one or more of the following factors:
  - Is regarded by the community in which he lives as an Indian OR Alaska Native;
  - Is a member, enrolled or otherwise, of an Indian or Alaska Native Tribe or Group under Federal supervision;
  - Resides on tax-exempt land or owns restricted property;
  - Actively participates in tribal affairs;
  - Any other reasonable factor indicative of Indian descent; or

- Is an Indian of Canadian or Mexican origin, recognized by any Indian tribe or group as a member of an Indian community served by the Indian Health program; or

- Is a non-Indian woman pregnant with an eligible Indian's child for the duration of her pregnancy through post partum (usually 6 weeks); or

- Is a non-Indian member of an eligible Indian's household and the medical officer in charge determines that services are necessary to control a public health hazard or an acute infectious disease which constitutes a public health hazard.
Great Plains Indian Health Services

Works in conjunction with 19 Indian Health Service Units and Tribal managed Service Units.

Provides health care to approximately 122,000 Native Americans located in North Dakota, South Dakota, Nebraska and Iowa.

The Area Office's service units include seven hospitals, eight health centers, and several smaller health stations and satellite clinics.

Map used with permission by the Great Plains Tribal Chairman’s Health Board
North Dakota Reservations

• Turtle Mountain - Band of Chippewa
  • 30,995 enrolled members

• Spirit Lake Nation – Mni Wakan Dakota Oyate
  • 6,748 enrolled members

• Standing Rock – Sioux
  • 16,000 enrolled members

• Three Affiliated Tribes - Mandan, Hidatsa and Arikara Nations
  • 12,204 enrolled members

On the South Dakota border is Lake Traverse - Sisseton-Wahpeton – Oyate
• 11,763 enrolled members
North Dakota Demographics

Total Population - 672,591*

- 36,591 or 5.4% - Total American Indians (one race) in ND
- 42,996 or 6.4% - Total American Indians (race alone or in combination with one or more other races) in ND

Percent of American Indians (one race) living on/off a reservation

* 2010 Census
TB Case Management in North Dakota
Field Epidemiologist Regions
North Dakota Public Health Units

28 independent local public health units working in partnership with the North Dakota Department of Health.

Local public health units are organized into single or multi-county health districts, city/county health departments or city/county health districts.

Each county has a designated nurse to facilitate TB case management.
North Dakota Case Rates 2000-2015
It all started with a phone call
Grand Forks Correctional Center

Negative Pressure Cells
September 2012

3 cases in 1 week – all adults

October 2012

3 new cases, 2 adults and a 5-month old baby
Daily Calls

• Altru

• Grand Forks Public Health

• Grand Forks Correctional Center

• North Dakota Department of Health

  • Also in communication with the Minnesota Department of Health – Thief River Falls
Urban Indian

- Urban Indians are Native American in the United States who live in urban areas.
- Have little or no ties to the reservation.
Great Plains Tribal Chairmen’s Health Board

- Established to provide the tribal nations in the Great Plains region with a formal representative Board as a means of communicating and participating with the Great Plains Area Indian Health Service and other Health and Human Services entities and organizations on health matters.

- Northern Plains Tribal Epidemiology Center
  - Jennifer Giroux, Medical Epidemiologist
  - Dayle Knutson, PHN Consultant
Jennifer Giroux

- Acted as a liaison between Indian Health Services and the North Dakota Department of Health
- Able to give a heads up to IHS healthcare providers with outbreak details
- Explained policies vary between different tribes
- Resource if legal issues occurred
Protocol when working with tribes

- Remember that American Indians may be suspicious of outsiders and outside ideas.

Do not assume one Tribe or one leader speaks for all. Take the time to find the key players.

Those you consult with might not be able to answer questions immediately. They may need to think about it and consult with others.
• Always shake hands when introduced, meeting with someone or departing. It is customary to shake hands with everyone in the room.

• If possible, arrange meetings with refreshments and/or a meal. This is a cultural characteristic that is still strong in Indian country.

Source: North Dakota Indian Affairs Commission
Dayle Knutson

Used IHS electronic record system to search for contacts not yet located.
• Phone call from Bev Metchuk
CDC Lab
Molecular Detection of Drug Resistance

### Results for Molecular Detection of Drug Resistance (Pyrosequencing, INH and RMP only); Conventional Drug Susceptibility Test in progress.

<table>
<thead>
<tr>
<th>Locus (region) examined*</th>
<th>Result</th>
<th>Interpretation (based on in-house evaluation of 550 clinical isolates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>rpoB (Rv0221c)</td>
<td>Silent mutation: CGC&gt;CGT; Arg828Arg</td>
<td>Probably Rifampin susceptible. (97% of RMP-R isolates in our in-house evaluation of 550 clinical isolates have a mutation at this locus.) The mutation detected is a synonymous (silent) single-nucleotide polymorphism (SNP) and does not result in an amino acid change and is not considered clinically significant.</td>
</tr>
<tr>
<td>inhA (promoter)</td>
<td>No mutation</td>
<td>Cannot rule out INH resistance. (90% of INH-R isolates in our in-house evaluation of 550 clinical isolates have a mutation at one or both of these loci.)</td>
</tr>
<tr>
<td>katG (ser16)</td>
<td>No mutation</td>
<td></td>
</tr>
</tbody>
</table>

*A negative result (e.g., no mutation) does not rule out contributory mutations present elsewhere in the genome.

MDDR assays were developed and the performance characteristics determined by the DTBE Reference Laboratory. They have not been cleared or approved by the Food and Drug Administration.

**NOTE:** MDDR testing (Sanger sequencing, complete panel) will not be performed because mutations associated with RMP resistance were not detected. Contact laboratory if this testing is required for clinical reasons.

Reviewed by: Beverly Medlock

Phone: 404-639-2455  Fax: 404-639-5491  TBLab@cdc.gov

Address: 1600 Clifton Road, MS F08, Atlanta, GA 30333

Confidentiality, security, and integrity of patient data should be maintained in accordance with CLIA and HIPAA.
### Results for Molecular Detection of Drug Resistance (Pyrosequencing, INH and RMP only); Conventional Drug Susceptibility Test in progress.

<table>
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<th>Result</th>
<th>Interpretation (based on in-house evaluation of 550 clinical isolates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>rpoB (RRDR)</td>
<td>Silent mutation: CGC&gt;C GT; Arg528Arg</td>
<td>Probably Rifampin susceptible. (97% of RMP-R isolates in our in-house evaluation of 550 clinical isolates have a mutation at this locus.) The mutation detected is a synonymous (silent) single-nucleotide polymorphism (SNP) and does not result in an amino acid change and is not considered clinically significant.</td>
</tr>
<tr>
<td>inhA (promoter)</td>
<td>No mutation</td>
<td>Cannot rule out INH resistance. (86% of INH-R isolates in our in-house evaluation of 550 clinical isolates have a mutation at one or both of these loci.)</td>
</tr>
<tr>
<td>katG (ser315 codon)</td>
<td>No mutation</td>
<td></td>
</tr>
</tbody>
</table>

*Positive results (e.g., no mutation) do not rule out contributing mutations present elsewhere in the genome.
November 2012

7 more cases – 4 of them children
Susceptibility Report

**Centers for Disease Control and Prevention**  
**National Center for HIV, STD and TB Prevention (NCHSTP)**  
**Division of Tuberculosis Elimination (DTBE)**  
**Mycobacteriology Laboratory Branch**  
**Diagnostic Mycobacteriology Section**

**CLIA ID #**

**Original Submitter:**

**Submitter to CDC:**

North Dakota Department of Health  
Laboratory Services - Mycobacteriology  
2635 East Main Avenue  
P.O. Box 5520  
Bismarck, North Dakota 58505-5520  
United States

**Specimen ID:**

**Label:**

**Sample:**

**Type:**

**Received:**

**Date Collected:** 09/27/2012  
**Date Received:** 10/03/2012  
**Date Reported:** 11/13/2012

**Patient:**

**Submitter Specimen Identifiers:**

**Susceptibility Testing Method:** Indirect agar proportion, P310 medium. Susceptibility is defined as < 1% resistance compared to the drug-free media.

**RESULTS:**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Percent Resistance</th>
<th>Interpretation</th>
<th>Percent Resistance</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoniazid 0.2 μg/ml</td>
<td>100</td>
<td>R</td>
<td>Karanimycin 5.0 μg/ml</td>
<td>0</td>
</tr>
<tr>
<td>Isoniazid 1.0 μg/ml</td>
<td>0</td>
<td>S</td>
<td>Ethionamide 10.0 μg/ml</td>
<td>0</td>
</tr>
<tr>
<td>Isoniazid 5.0 μg/ml</td>
<td>0</td>
<td>S</td>
<td>Capreomycin 10.0 μg/ml</td>
<td>0</td>
</tr>
<tr>
<td>Isoniazid 10.0 μg/ml</td>
<td>0</td>
<td>S</td>
<td>PAS 2.0 μg/ml</td>
<td>0</td>
</tr>
<tr>
<td>Isoniazid 10.0 μg/ml</td>
<td>0</td>
<td>S</td>
<td>Ofloxacin 2.0 μg/ml</td>
<td>0</td>
</tr>
<tr>
<td>Isoniazid 10.0 μg/ml</td>
<td>0</td>
<td>S</td>
<td>Amikacin 4.0 μg/ml</td>
<td>0</td>
</tr>
</tbody>
</table>

**Susceptibility Testing Method:** MGIT 960

**Notes:**

Molecular Detection of Drug Resistance (MDDR) report (INH and RMP only) was issued 10/4/2012.

Thus conventional agar proportion results agree with the MDDR result.

**Exception:** INH and KAN=K resistance; AP DST---INH=R. The absence of a mutation in INH and KAN does not rule out resistance to INH; ~14% of INH-R isolates do not have a mutation at either of these loci.

Reviewed by: Beverly Metcalf  
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Confidentiality, security, and integrity of patient data should be maintained in accordance with CLIA and HIPAA.
Genotype result received

- 3 cases identified in March and April 2012 matched the genotype of September case.

- More importantly 2 additional cases from 2010 had the same genotype
Genotype Search

- Minnesota Department of Health
- South Dakota Department of Health
- Manitoba Health
Additional contacts

• Contacted Dayle with an updated list of contacts
• Visited with Turtle Mountain PHN, one case had ties to the area
Request for CDC Outbreak Response Team Made

- 2 – March 2012
- 1 – April 2012
- 1 – July 2012
- 3 – September 2012
- 3 – October 2012
- 7 – November 2012

- 2 – 2010 cases
- 17 – 2012 cases
December 2012

3 Additional Cases – 1 Adult living in Fargo
• CDC Epi Aid Team Arrives

• Aberdeen Indian Health Services Support
Dayle Re-Interviewed Contacts

• Hope was by having a Native American interview the active cases more contacts would be identified
  • No additional contacts identified
  • Dayle was able to establish a rapport with the cases and explained the importance of sharing information with the NDDoH
Contact Investigation Interview Techniques

- To be respectful, limit direct eye contact
- Introduce yourself and explain why you are there
- Ask Permission
- Talk to them to find out what their values are
- Focus on being supportive of the cases needs
- Ask open-ended questions
- Use reflective listening
- Respond with affirmation statements
Epidemiologic Links Among Patients

2010

A

B

2012

- Adult
- Child
- Smear positive
- Smear negative
- Name-based link
- Location-based link
Epidemiologic Links Among Patients

2010

A

B

2012

G

Adult
Child
Smear positive
Smear negative
Name-based link
Location-based link
Epidemiologic Links Among Patients

- **A** (2010)
- **B**
- **F**
- **G**

Legend:
- Adult
- Child
- Smear positive
- Smear negative
- Name-based link
- Location-based link

Year Indicators:
- 2010
- 2012
Epidemiologic Links Among Patients

- **A** (2010)
- **B**
- **C**
- **D**
- **G**
- **F**

Legend:
- □ Adult
- ○ Child
- ▄ Smear positive
- ▄ Smear negative
- ➔ Name-based link
- ➔ Location-based link

Year:
- 2010
- 2012
Epidemiologic Links Among Patients

- **2010**
  - A
  - B

- **2012**
  - C
  - D
  - E

- G

Legend:
- Adult
- Child
- Smear positive
- Smear negative
- Name-based link
- Location-based link
Epidemiologic Links Among Patients

- A, B, C, D, E, F, G, H, I, J, S
- 2010 and 2012
- Adult and Child
- Smear positive
- Smear negative
- Name-based link
- Location-based link
Epidemiologic Links Among Patients

- A
- B
- C
- D
- E
- F
- G
- H
- I
- J
- S
- R
- P

Legend:
- Adult
- Child
- Smear positive
- Smear negative
- Name-based link
- Location-based link
Epidemiologic Links Among Patients
Epidemiologic Links Among Patients

- **A** (Adult)
- **B** (Child)
- **C** (Smear positive)
- **D** (Smear negative)
- **E** (Smear positive)
- **F** (Smear negative)
- **G** (Smear positive)
- **H** (Smear positive)
- **I** (Smear negative)
- **J** (Smear negative)
- **K** (Smear positive)
- **L** (Smear negative)
- **M** (Smear positive)
- **N** (Smear negative)
- **O** (Smear positive)
- **P** (Smear negative)
- **Q** (Smear positive)

- **2010**
- **2012**

- **Name-based link**
- **Location-based link**
Epidemiologic Links Among Patients

- Adult
- Child
- Smear positive
- Smear negative
- Name-based link
- Location-based link
Epidemiologic Links Among Patients

[Diagram showing connections between patients labeled A to P with different colors and symbols for adult/child, smear positive/negative, and type of link (name-based/location-based)].
Patient G: Super-Spreader

*from CDC Epi Aid Exit Presentation 12/11/12
Challenges

• Lack of Negative Pressure Rooms – Cohort Patients

• Housing

• Sub-therapeutic drug levels; extended treatment

• 7 day DOT, Incentives given for medication compliance

• Compliance orders issued
January 2013

1 new case

February 2013

0 new cases

March 2013

1 case – Fargo Cass County Jail

April 2013

2 new cases
Electronic Medical Records

Identified 40 high risk contacts

- Allowed for further verification and identification of named contacts

- Able to “flag” charts of patients
  - Altru
  - Indian Health Services

- Streamlined gathering and sharing of clinical information and patient status
Map of North Dakota
Genotyping – The Rest of the Story

• A case from early 2012 had matching spoligotype, however greatly varied demographically and geographically

  • Original contact investigation for either case was unable to identify name or location epi link
  • New focus guided by genotyping established an epi link to the super spreader
  • Photo release was critical in making the link
  • Established a time frame for the transmission event
  • Extended IP of super spreader from previous estimates by 6 months
  • Expanded investigation

CDC had this as a Minnesota case
Social Services

- Child removed from parent
- Grandmother guardian and caregiver for 3 active cases and 1 LTBI

- 1 case – 5 year old in foster care
- Request made to have child placed with a Native family
- Unable to find family
- Hotel moms
Whole-Genome Sequencing and Social-Network Analysis of a Tuberculosis Outbreak

Jennifer L. Gardy, Ph.D., James C. Johnston, M.D., Shannan J. Ho Sui, Ph.D.,
Victoria J. Cook, M.D., Lena Shah, M.Sc., Elizabeth Brodkin, M.D.,
Shirley Rempel, R.N., Richard Moore, Ph.D., Yongjun Zhao, D.V.M.,
Robert Holt, Ph.D., Richard Varhol, M.Sc., Inanc Birol, Ph.D., Marcus Lem, M.D.,
Meenu K. Sharma, Ph.D., Kevin Elwood, M.D., Steven J.M. Jones, Ph.D.,
Fiona S.L. Brinkman, Ph.D., Robert C. Brunham, M.D.,
and Patrick Tang, M.D., Ph.D.
Sequenced 11 isolates
7 genome types
Five additional clustered isolates in GiMS
March 2014
1 new case, 2010 index case

August 2014
3 new cases
Outbreak Summary

2012 - Present
TB Screening – Grand Forks

Sept 2012 - June 2013

TST – 1650
LTBI – 69
53.7% of Named Contacts are LTBI

June 2013 - June 2014

TST – 60
LTBI – 13

To Date:
Lost of Follow-Up – 20?
1710 people tested
82 identified as LTBI
TB Screening – Fargo Cass

• Tested - 360

• 3 Cases linked to Outbreak
  1 TB Case due to jail exposure

• LTBI – 27
  20/21 Fargo Cass Jail Inmates had a positive TST/IGRA
  4 Healthcare Workers
  1 Law Enforcement
Case #2, Standing Rock Reservation

• Serviced by the Fort Yates Hospital
• Case Management – Custer Health, Mandan ND
• DOT would require travel of 120 miles each day
• George Walker, Infection Control Officer
  Standing Rock Hospital
Case #3, Three Affiliated Tribes

- Serviced by Elbowoods Memorial Health Center
  - Elbowoods is a Tribal Contract Center
  - Public Law 93-638
- Outpatient health care facility that specialize in caring for American Indians and Alaska Natives
- Operated under the Indian Self-Determination Act
Case #3, Three Affiliated Tribes

- Case attended high school
- Closest public health unit 30 miles
- Oil Country – shortage of public health nurses
- Case is not a tribal member
- Contract with local clinic to provide DOT unsuccessful
- Elbowoods PHN volunteered to assist with DOT
Contact Investigation

• Upper Missouri Health Unit and Elbowoods Memorial Health Center Public Health Nurses
• Tested over 400 students, staff and daycare children
LTBI

- Reportable condition in North Dakota
- Under-reported
  - An area of opportunity to work with reservations
  - 8/440 reported cases in 2014 identify as Native American
Opportunities to Develop Relationships

• Community Planning Group
• Attend Local Trainings/Meetings
• Don’t be afraid to pick up the phone
Thank You!
TB Case Management in North Dakota