TB CASE STUDIES: WHO, WHEN, HOW

Dee Pritschet, TB Controller – North Dakota Department of Health

HIV.STD.TB.Viral Hepatitis Symposium; June 6, 2019
Case Management is an important for a good outcome for patients diagnosed with TB infection and TB disease.

Review epidemiology to TB cases in North Dakota

Identify public health challenges and opportunities in a low incidence state

Discuss the importance of performing a good contact investigation
Case Study #1
Contact Investigation
TB on a College Campus
PATIENT HISTORY

- 30-40 y/o, foreign born
- Student at a ND college
- Third ER visit in 2 weeks
  - Severe headache
    - Rapid HIV positive
    - Abnormal CXR
- Transported by ambulance to Medical Center
HOSPITAL ADMISSION

- Positive for Cryptococcus
- CD4 109 count
- CD4 8%
- HIV RNA VL 307,000
- Bronchoscopy performed
  - AFB smear – 1+
  - Nucleic Acid Amplification Test – Positive
  - Culture – Positive for Mycobacteria tuberculosis
CONTACT INVESTIGATION

- 53 college students/faculty identified – all US born
- QFT – 24 tested; collected at student health
  - Positive – 10
  - Indeterminate – 1
  - Negative - 13
- TST – 12 Students; performed at local public health
  - Positive – 0
  - Negative - 12
WHAT COULD EXPLAIN THE TEST RESULTS?

- QFT more sensitive?
  - US born?
- Just the luck of the draw who had QFT and who had TST?
- Public Health did not perform TST appropriately?
- Other thoughts???
NEXT STEPS

- Expand contact investigation
- Test more students and faculty?
- Retest all students who had a positive QFT?
RESULTS

- Students retested
  - Positive – 1
    (tested positive first round)
  - Negative - 24
NOW WHAT???

Contacted Cellestis
RESOLUTION

- Cellestis, Inc., sent a "Notification of market withdrawal of QuantiFERON" letter dated September 27, 2012 to its domestic and international customers. The letter described the product, problem and actions to be taken. Customers were informed to discontinue use of these products and any product sequestered such that it cannot be used or distributed. Cellestis will provide replacement materials.
Case Study #2
The Dreaded Cavitary Lesion
Dr. John Hagan,
North Dakota State Penitentiary
- Male in 20s—African Born
- Admitted to correctional facility
- Mantoux tuberculin skin test (TST) = 14 mm
- Chest X-ray:
  - “Patchy areas of ground glass interstitial opacities within the upper lungs…
  - At least 2 cavitary nodules within the right upper lung.”
PHONE CALL TO TB PROGRAM

- Inmate placed into air-borne isolation
- Has been in the general population for two weeks
- Who should they screen as contacts?
- Start medication?
ADDITIONAL HISTORY

- Emigrated to Europe as a teen
- Played competitive sports in eastern and western Europe for 6 years
- Relocated to United States
- No fevers, chills, night sweats, weight loss, cough, sputum production, hemoptysis
- Denies history of diagnosis or treatment for latent or active TB
RECOMMENDATION

- Collect a QFT
- Collect 3 sputum specimens
  - AFB Smear and Culture; GeneXpert X 2
- Hold off on starting treatment
- Contacts aren’t going anywhere
CT SCAN

Requested CXR and CT review
Case Study #3

Friday at 4 pm
IT ALL STARTED WITH A PHONE CALL
4+ AFB SMEAR

- Call from jail nurse
- Patient is in airborne isolation cell
- Follow-up on Monday when PCR results available
WORKUP

- Previously treat for pneumonia
- Minimal symptoms
- Pleural effusion found on chest x-ray
SOUND THE ALARM

- One week later
- 3 cases; all smear positive, all have cavitary lesions
- Contact Investigation begins
7 of 8 cases in US have this Silent Mutation
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 - 777776777760601
Miru - 224325153323
Miru2 - 444234423337
### Results (7 Total Records)

<table>
<thead>
<tr>
<th>State ID</th>
<th>State Case#</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND</td>
<td>2012ND000201214</td>
</tr>
<tr>
<td>ND</td>
<td>2012ND000201204</td>
</tr>
<tr>
<td>ND</td>
<td>2012ND000201213</td>
</tr>
<tr>
<td>ND</td>
<td>2012ND000201212</td>
</tr>
<tr>
<td>ND</td>
<td>2012ND000201206</td>
</tr>
<tr>
<td>ND</td>
<td>2010ND000201012</td>
</tr>
<tr>
<td>ND</td>
<td>2010ND000201004</td>
</tr>
</tbody>
</table>

**OH, OH!**

- Time to Look Back
CASE #1
MALE IN 30s

- Fever, cough, hypoxic respiratory failure
- TST negative
- Quantiferon-Gold negative
- AFB stain, DNA probes and cultures negative
- Bronchoscopy: AFB stains, DNA probes, and cultures negative
- Open Lung biopsy: granulomas, positive AFB stains, and positive TB culture
- Diagnosed with pulmonary TB
WHAT CAN WE LEARN FROM #1

• 7 Hospital Visits from October 2009 – April 2010
• Abnormal CXR in November 2008, January 2010
• Abnormal CT – April 2010
• Diagnosed with TB in April 2010
PROBABLY NOT INFECTIONOUS

- Readmissions due to noncompliance and alcohol use
- Homeless, Medically underserved, Alcoholic
- Previous prison stays
- Multiple admissions before TB was considered
- Negative TB test does not rule out active TB
- Quinolones and aminoglycosides inhibit TB
CASE MANAGEMENT CHALLENGES

- Non-compliance with treatment
- Alcohol abuse
- Readmission
  - Court order
  - Transfer to alcohol treatment facility and discharge before treatment completed
- Drinking again, non-compliance
- Another court order
#2
MALE IN 50s

- Homeless
- Alcohol dependence
- Many detox visits
- No consideration for TB
- Minimal to no cough
- TST negative
- Quantiferon-Gold positive
- AFB stain positive
- LTBI – treated with 6 months of INH
WHAT CAN WE LEARN FROM #2

• 6 Hospital Visits from August 2009 – October 2010

• Cough with questionable infiltrate seen on Chest x-ray – June 2010

• Diagnosed with active TB – October 2010

• TB disease not considered due to treatment for TB infection
- Minimal signs and symptoms yet had significant disease
- Negative TST does not rule out TB
- #2 was NOT ill, yet was very infectious with a high burden of disease
- #2 wasn’t diagnosed with TB until multiple visits ruling out other respiratory conditions.
No cases found in Minnesota or South Dakota

No cases in Manitoba or Saskatchewan

Yes, in British Columbia

Cocaine use
Mom doesn’t bring child to office

- After several attempts:
  - History and physical unremarkable
  - Stress to Mom this is very serious
  - Chest x-ray ordered, Mom leaves without CXR
- After several attempts:
  - CXR obtained, discussed with mom importance of following doctors orders
  - 48 hours later she shows up in ER
- Noncompliance with medications
  - Inadequate drug levels
  - DOT provided by PHN
PEDiatric
Active Disease
VS TB Infection

- Clinical diagnosis
- Signs and symptoms of disease
- Abnormal chest x-ray
- Improves with treatment
Significant exposure
Pos TST
Fever, chills, cough 3 months
CXR debated
CT: cavitary lesions
Pos TST
- Fevers, cough, sweats for 3 months
- Significant exposure
- Physical is negative
- CXR and CT lung is negative
- Clinical Case
INFANT CASE - INTERJURISDICTIONAL
PEDIATRIC CHALLENGE

- Diagnosing active disease vs TB infection
- Liquid formulations available for all medication
  - Crushing tablets
  - 2 hours prior to meals?
- Contact Investigation
  - School Testing – Is it necessary?
  - Public pressure
  - Testing school bus passengers?
- Rifampin – decreases oral birth control effectiveness
ADULT WORK-UP

- Male in 20s
- High-risk exposure to outbreak strain
- Doctors advise: nurse tells patient no action needed
- How do you know this is NOT active disease if you do not do a history and exam?
- If this is LTBI, why would you not start TX for LTBI?
MALE IN 20s

- High-risk exposure
- High fevers, diaphoresis, pleuritic chest pain
- TST positive
- 3 AFB sputum smear and culture - negative
- Bronchoscopy negative
- Pleural fluid negative
- Symptoms resolved with 4 drug treatment
ADULT CHALLENGES

- Working with providers to “Think TB”
- Prescribing medication to treat contacts
- Locating contacts to test
  - Drug dependence
  - Jail warrants pending
  - Unstable housing
LABORATORY ISSUES

- Discrepant AFB smear data between Public Health Lab and Altru, i.e. false negatives
  - Why?
    - Inadequate specimens
    - Technical skill issues
  - Best Practice:
    - Optimum volume is at least 5 ml
    - Expectorated sputum, if 5 ml not obtained, collect an induced sputum
    - 3 specimens
    - 3 consecutive days, at least 8 hours apart
    - First morning specimens preferable
INH RESISTANT

- Drugs levels advised when clinical failure
- ~25% of our cases have non-therapeutic levels
CONTACT TREATMENT

- Use rifampin to treat all contacts in County
- Go back and retreat contacts from 2010 and early 2012?
Epidemiologic Links Among Patients

2010

2012

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

2010

A

B

G

2012

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

- 2010
- 2012

- A
- B
- G
- F

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

**2010**

- A
- B
- C
- D
- G
- F

**2012**

- E
- S
- H
- I

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, K, L, M, N

- 2010
- 2012

Symbols:
- Adult
- Child
- Smear positive
- Smear negative
- Name-based link
- Location-based link
Patient G: Super-Spreader

*from CDC Epi Aid Exit Presentation 12/11/12
7 OF 8, IMPORTANCE OF REPEAT INTERVIEW

- Active case with same genotype
  - 1\textsuperscript{st} and 2\textsuperscript{nd} interview could not establish an epi-link
- Student at UND
- Lives in a county 100+ miles away
- 3\textsuperscript{rd} interview; identified super-spreader by photo
  - Laboratory samples were sent to Mayo and CDC had her as a Minnesota resident
A MISSED OPPORTUNITY
2 MISSED CASES = 35 CASES OF ACTIVE TB
<table>
<thead>
<tr>
<th>YEAR</th>
<th>NUMBER TESTED</th>
<th>LTBI DIAGNOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>1650</td>
<td>69</td>
</tr>
<tr>
<td>2013</td>
<td>60</td>
<td>13</td>
</tr>
<tr>
<td>2014</td>
<td>89</td>
<td>5</td>
</tr>
<tr>
<td>2015</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2016</td>
<td>79</td>
<td>3</td>
</tr>
<tr>
<td>2017</td>
<td>60</td>
<td>2</td>
</tr>
<tr>
<td>2018</td>
<td>75</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total Screened – 2000+</strong></td>
<td><strong>95 LTBI to date</strong></td>
</tr>
</tbody>
</table>
G00011 in North Dakota
Results received 1/8/2019
Analysis updated with 18RF7917

Node A
12L6537
12L7456
12L9367
12L9368
12L9369
13L0496
13L1156
13L2106
14RF1653
14RF5749
14RF6681
14RF6682
16RF7689
18RF7051

WHOLE GENOME SEQUENCING
INVESTIGATIVE TOOLS

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

Validation of ventilation at jail

Hospital isolation
- Airborne isolation capacity exceeded
- Cohorting is not ideal.
- Visitors in the hospital who had TB, too.

TB hysteria

Epidemiologic picture included Native Americans, alcoholism, prison and homelessness – “picking on Native Americans”

Data management issues (CDC)
- EPIC microbiology presentation issues
- HCW’s workers data NOT kept in EPIC

Homelessness led to long hospitalizations
- Financial issues leads to conflict
- Filter “what’s best for the patient and protect the community”

Counsel females receiving rifampin to use alternative birth control

Use of Incentives
Case Study #4
TB and One Health
PATIENT HISTORY

- 20-30 y/o
- Farm/Ranch Worker
- Work VISA (Mexico)
- Presents to local clinic
  - Cold/flu Symptoms
  - Elevated glucose
- Referred to infectious disease physician
PATIENT HISTORY

- Diabetes mellitus
- Cough x 1 month
- Fever
- Weight loss
TESTING

- QFT – positive
- CXR and CT – infiltrates with cavitation
- 1+ AFB smear
- Nucleic Acid Amplification Test – Positive
- Self-Isolate
ISOLATION OPTIONS

- Find alternative housing until no longer infectious?
- Allow him to remain in current housing as roommates already exposed?
- Children live on farm, any concern?
- Continue to work outside?
TREATMENT STARTED

- Isoniazid – 300 mg
- Rifampin – 600 mg
- Ethambutol – 1200 mg
- Pyrazinamide – 1500 mg
- B6 – 50 mg
- Ask PHN to travel 100+ miles each day?
- Consider vDOT?
- Look for other options?
Local pharmacy agrees to provide DOT
PATIENT INTERVIEW

- Patient Interview
  - Farm hand acted as interpreter
    - Worked with close contact to cattle for 5 years
    - Each year travels back to Mexico for 2 months
    - Shares a mobile home with 3 other workers
    - Milks 150 cows twice a day
  - Signed release to share information with employer and North Dakota Department of Agriculture
WHAT COULD HAVE BEEN DONE DIFFERENTLY?

- Ideas?
Tested 13 named contacts
• 11 QFT, 2 positive
• 2 TST, no reactors

July

Tested 11 negative contacts
• No conversions

October
LATE 2013

- *Mycobacterium bovis* identified
  - Pyrazinamide resistant
  - Isoniazid resistant
- Changed treatment regimen
  - Rifampin – 600 mg
  - Ethambutol – 1200 mg
  - Moxifloxacin – 400 mg
  - B6 – 50 mg
- Treatment to extend until Fall 2014
4 MONTH DELAY IN IDENTIFICATION

What could have been done to improve diagnosis turnaround time?
CURE TB – SAN DIEGO COUNTY

- Medications provided to patient

- Letter written from health department
SNP Table detailing the SNP differences between the most closely related isolates. An in depth analysis of the 3 ND isolates show no evidence the 14 SNPs that are divergent (in positions 1264009 through 517735) exist in any of the isolates at low levels as a mixed population, consequently direction of transmission cannot be resolved by these data,
SNP Table detailing the SNP differences between the most closely related isolates. An in depth analysis of the 3 ND isolates show no evidence the 14 SNPs that are divergent (in positions 1264009 through 517735) exist in any of the isolates at low levels as a mixed population, consequently direction of transmission cannot be resolved by these data,
HOW DO WE EXPLAIN SECOND STRAIN?

- Patient infected with two strains of *Movies*?
- Unknown/undiagnosed TB case on farm?
- Will we ever know?
Case Study #4

Travel History
PATIENT HISTORY

Male, US born
- Poorly controlled diabetic
  - Diagnosed in 2000
  - Smoker

Symptoms
- Difficulty swallowing
- Weight loss
  - 15 pounds in last couple of weeks
- Shortness of Breath
- Night Sweats

Testing
- QFT – negative
- HIV - Negative
- CXR with left apical and right midlung infiltrates
- CT Large cavitation in LUL, cavitary infiltrate in RUL
- AFB smear 4+
- Bronch Culture positive for *Mycobacterium tuberculosis*
TRAVEL HISTORY

- No recent travel within the US
- Lived in a TB high incidence country for 1 year, 10 years ago
MDDR – no mutations

Phenotypic susceptibility – Pan Sensitive

Genotype – PCR00385
# National Distribution of PCR00385

**Spoligotype:** 677777477413771  
**MIRU:** 2443262223422

**Number of cases with this genotype in U.S. (Z):** 11  
**Percent of all genotyped cases in the U.S. with this genotype:** 0.04

**Number of States reporting this genotype:** 6  
**Family Name:** IndoOceanic (L1)

**Date Range:** 05/28/2010 - 05/28/2014  
**Date Type:** Count Date

<table>
<thead>
<tr>
<th>State</th>
<th>No. of cases with this genotype in state (X)</th>
<th>All cases with any genotype in state (Y)</th>
<th>% of all cases in state with this genotype (X/Y)</th>
<th>% of U.S. cases with this genotype in the state (X/Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALABAMA</td>
<td>1</td>
<td>410</td>
<td>0.24</td>
<td>9.09</td>
</tr>
<tr>
<td>NEW YORK CITY</td>
<td>1</td>
<td>1847</td>
<td>0.05</td>
<td>9.09</td>
</tr>
<tr>
<td>SOUTH CAROLINA</td>
<td>1</td>
<td>322</td>
<td>0.31</td>
<td>9.09</td>
</tr>
<tr>
<td>TEXAS</td>
<td>2</td>
<td>3647</td>
<td>0.05</td>
<td>18.18</td>
</tr>
<tr>
<td>WASHINGTON</td>
<td>2</td>
<td>652</td>
<td>0.31</td>
<td>18.18</td>
</tr>
<tr>
<td>CALIFORNIA</td>
<td>4</td>
<td>6673</td>
<td>0.06</td>
<td>36.36</td>
</tr>
</tbody>
</table>
CONTACT INVESTIGATION

- 18 identified
  - 13 screened – TST
    - 10 adults – all negative
    - 3 children
      - 1 negative
      - 1 positive, placed on treatment with INH
      - 1 placed on window prophylaxis
  - 5 not tested
HOSPITALIZED

- Electrolytes – below normal values
- Total Protein and Albumin – below normal values
- Glucose – above normal value
HOSPITAL ADMISSION – WEEK 2

- Failure to thrive
- Refuses food
- Depression
- Developing Skin breakdown
- 17 pound weight loss since admission
- Consider feeding tube
- Not ambulating in room

- Hepatitic function tests are worsening
  - Bilirubin 6.0 (0.7-4.7)
  - ALT 169 (20-142)
  - AST 192 (31-97)
  - Alk Phos 359 (126-225)

- Stopped treatment
CONSIDER CHANGING TREATMENT REGIMEN?

- Reintroduce Ethambutol?
- Reintroduce Rifampin and Isoniazid?
- Add an Aminoglycoside? (Amikacin)
- Add a Quinolone/Fluoroquinolone? (Levofloxacin, Moxifloxacin)
Less than 2 months after TB diagnosis

The patient passed away.
Sometimes our best efforts are just not enough.
Case Study #5

Multi-Drug Resistance
PATIENT HISTORY

- 20-30 y/o foreign born male
- Moved to the United States in late 1990s
- 2007
  - Diagnosed as LTBI, completed one month of INH in another state
- 2008 through 2014
  - Returned to his home country and attended university
- Early 2014
  - Diagnosed with active pulmonary TB in foreign country
  - Started on a single tablet, once daily 3-drug coformulation treatment (presumed to be ‘Rifater’ = INH/RIF/PZA)
PATIENT HISTORY

▪ Summer 2014
  ▪ Concerned his treatment was not working and decided to move back to US and be with his family, stopped taking medication.
  ▪ Flew from to the United States with layovers in 3 different airports
  ▪ Arrived in North Dakota
PATIENT HISTORY

- Sought medical care at Local Public Health Unit
- CXR revealed extensive upper lung infiltrates present
- Sputum specimens collected
- AFB smears
  - Day 1: 1+
  - Day 2: 1+
  - Day 3: Few
- Home isolation
  - Living with mother and 3 siblings
CONSULT WITH INFECTIOUS DISEASE PHYSICIAN

Summer 2014

- Physician has concerns of drug resistance due to incomplete prior LTBI treatment and incomplete treatment of active TB disease.
- Patient denies SOB, night sweats, fever or weight loss – has an infrequent cough
- HIV negative
- INH/RIF/PZA/EMB prescribed with B6 therapy
- Physician wonders if the state can provide Moxifloxacin, if needed
LABORATORY RESULTS

- Positive for MTB complex
- MDDR results received

<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 (RRDR)</td>
<td>Mutation:</td>
<td>Rifampin resistant. (100% of isolates in our in-house evaluation of 550 clinical isolates with this mutation are RMP-R.)</td>
</tr>
<tr>
<td></td>
<td>TCG&gt;TTG; Ser531Leu</td>
<td></td>
</tr>
<tr>
<td>inhA (promoter)</td>
<td>No mutation</td>
<td>Isoniazid resistant. (100% of isolates in our in-house evaluation of 550 clinical isolates with this mutation are INH-R.)</td>
</tr>
<tr>
<td>katG (ser315 codon)</td>
<td>Mutation:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AGC&gt;ACC; Ser315Thr</td>
<td></td>
</tr>
</tbody>
</table>
WHAT'S NEXT

- Ask lab to repeat test?
- Panic???
- Immediately call for consult?
- Notify CDC project officer?
- Breath Deep
PATIENT HISTORY

- Consult with Mayo Physicians
- Pre-Treatment CXR

Patient was hospitalized
PATIENT HISTORY

- CT completed with signs of dense consolidation with some volume loss in the RUL with multiple cavitations.
PATIENT HISTORY

- Results for MDDR received
- Treatment regimen changed based on MDDR.
- Patient started on:
  - Amikacin IV
  - Moxifloxacin
  - Linezolid
  - Cycloserine & Vit. B6
  - Ethionamide
  - Pyrazinamide included, pending phenotypic susceptibility results
### PHENOTYPIC SUSCEPTIBILITY RESULTS

**Results Table:**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Concentration</th>
<th>Percent Resistance</th>
<th>Interpretation</th>
<th>Percent Resistance</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoniazid 0.2 ug/ml</td>
<td>100</td>
<td>R</td>
<td>Kanamycin 5.0 ug/ml</td>
<td>0</td>
<td>S</td>
</tr>
<tr>
<td>Isoniazid 1.0 ug/ml</td>
<td>100</td>
<td>R</td>
<td>Ethionamide 10.0 ug/ml</td>
<td>0</td>
<td>S</td>
</tr>
<tr>
<td>Isoniazid 5.0 ug/ml</td>
<td>50</td>
<td>R</td>
<td>Capreomycin 10.0 ug/ml</td>
<td>0</td>
<td>S</td>
</tr>
<tr>
<td>Rifampin 1.0 ug/ml</td>
<td>100</td>
<td>R</td>
<td>PAS 2.0 ug/ml</td>
<td>0</td>
<td>S</td>
</tr>
<tr>
<td>Ethambutol 5.0 ug/ml</td>
<td>0</td>
<td>S</td>
<td>Ofloxacin 2.0 ug/ml</td>
<td>0</td>
<td>S</td>
</tr>
<tr>
<td>Streptomycin 2.0 ug/ml</td>
<td>100</td>
<td>R</td>
<td>Amikacin 4.0 ug/ml</td>
<td>0</td>
<td>S</td>
</tr>
<tr>
<td>Streptomycin 10.0 ug/ml</td>
<td>100</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rifabutin 2.0 ug/ml</td>
<td>see comments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin 2.0 ug/ml</td>
<td>0</td>
<td>S</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Susceptibility Testing Method:** MGIT 960

**Pyrazinamide 100 ug/ml:** Resistant

**Comments:**

- Molecular Detection of Drug Resistance (MDR) report was issued 02/23/2014.
- All conventional agar proportion results agree with the MDR results.
- EXCEPTION: Based on the Ser531Leu mutation detected in rpoB in the MDR analysis, this isolate is probably resistant to rifabutin. This conflicts with the result obtained by agar proportion testing (rifabutin-S).
- EXCEPTION: rmbB→Ac235→A mutation; AP DST→EMB-S. 12% of isolates in our in-house evaluation of 550 clinical isolates with this mutation are EMB-S by agar proportion testing.

- Phenotypic Susceptibility Testing performed at National Jewish
- Cycloserine, Clofazimine and Linezolid - Susceptible
PLANNING MEETING WITH LPHU

Medical Officer,
Director of Nursing,
TB Nursing Staff,
EPR Staff

- Housing
- DOT
- Food
- Transportation
- Insurance
- Contact Investigation Progress
CASE MANAGEMENT

Mayo Nurse Consultant
- Weekly calls
- Resource
FOLLOW UP CT CHEST –8 MONTHS LATER

Significant radiologic improvement
Microbiologic culture conversion
Clinically improved (significant)

No surgery planned
CASE MANAGEMENT

- Insurance
  - Pt had no health insurance
- Medicaid Expansion in ND
  - Coverage obtained
  - NDDOH covers co-pay and co-insurance costs
    - Prescription medications have a $3.00 co-pay.
TB NURSE CASE MANAGEMENT

- Lack of Social Worker
- TB Case Nurse Manager played a dual role
  - Arrange transportation
  - Food
  - Appointments
  - Coordination with other agencies
  - Worked with ER and EMS to develop a plan if transport needed
  - Work with the family
CONTACT INVESTIGATION

- 14 Contacts
  - Mother and Aunt
  - Father in another state
  - Uncle – works in the oil fields
  - 10 children
- Division of Global Migration and Quarantine – 33 contacts
- Home Country – 7 contacts
LESSONS LEARNED

- You don’t know what you don’t know
- Being able to go outdoors while infectious
- Use of different antibiotics
- Survivor resources, someone to talk to
- Use of Skype
THANK YOU

Dee Pritschet | TB Controller | djpritschet@nd.gov | 701-328-2377