Targeted Teacher Testing Unwarranted in Arkansas: Utility of Advanced Genotyping in a Case Study of a Tuberculosis Cluster Involving a School Teacher


Arkansas Department of Health, Little Rock, AR
Background:

- Arkansas has had a law (A.C.A.§ 6-17-101 (2011) that requires tuberculosis (TB) screening of all elementary school teachers

- Elementary school children born outside the US are not covered by this law

- The TB Control Program desired to revise this regulation;
  - Exempt the teachers in elementary schools from TB screening (37,162 teachers)
  - Require TB screening of foreign-born students in elementary school; approximately 72,000 of 478,965 (15%) students are born outside the US
Objectives:

• Describe TB trends in elementary school teachers and school students grades K through 12 from 2000-2012

• Conduct a cluster investigation on a TB cluster involving a school teacher to determine epidemiologic links

• Revise recommendation on TB screening of teachers and foreign-born school students
Methods:

• Analyzed surveillance data on TB cases in school students grades K-12

• Searched the TB Registry for TB cases reported among school teachers

• Reviewed the TB Genotyping Information Management System (TB GIMS) for a 10-member genotyping cluster that involved a school teacher

• Conducted a cluster investigation on a 10-member cluster, AR_0006
Results:

• In the 13-year period 2000-2012, 154 TB cases were reported in school students grades K through 12.

• 89 of 154 (57.8%) TB cases in elementary school were born outside the US

• The majority of 65 native born students had foreign-born parents

• A 10-member genotype cluster, AR-0006, covering the period 2004-2012, was found
Tuberculosis Cases in Children
Grades Kindergarten – 12, Arkansas, 2000-2012, (N=154)
Cluster AR-0006:

- A 10-member genotype cluster, AR-0006, covering the period 2004-2012, was found.
- 3 of 10 cases were born in the Philippines.
- 4 of 10 (40.0%) cases were US-born, including the teacher; but one lived in Philippines for 2 yrs.
- Of the remaining 3 cases, 2 were from Mexico and 1 from Puerto Rico (Asian origin).
- The US-born teacher had a TST of 0mm in 2000, in 2004 as part of a contact investigation and in 2007.
- She subsequently developed TB in 2010, TST done = 11mm.
- Her TB genotype did not match the index case for the contact investigation in 2004.
- In 2006, a foreign-born TB case with a genotype matching the teacher’s was reported from the same community, but there were no definite epidemiologic links with the teacher.
Spatial Distribution of Cluster AR-0006, Arkansas Counties, 2004-2012 (n=10)

Teacher US-born
Lived Philippines 1984-86

US-born
Lived Philippines 1971-73

Mexico Arrived 2001

Philippines Arrived 2001

Mexico Arrived 1995

Philippines Arrived 1962
TB elbow

Philippines Arrived 7/1997
TST 1999 = 61mm

Puerto Rico, Asian
Arrived 2004

US-born

Sebastian Faulkner Sevier Benton Craighead Washington Pulaski Baxter

Represents probable epidemiologic link
Cluster AR-0006 (2):

- Each dot represents a TB case by County

- There are no epidemiologic links in the US among 8 of 10 cases in the cluster

- Of the 4 US-born cases:
  - 1 lived in the same town (population 6,629) as an infectious TB case born in Mexico; also, her strain matches a case from the Philippines, but no epidemiologic links found
  - 2 served in the military in the Philippines
  - 1 case was not forthcoming regarding travel history
Tuberculosis Genotype Cluster AR-0006, Involving a Teacher, Arkansas, 2004-2012 (n=10)

<table>
<thead>
<tr>
<th>CaseNo</th>
<th>Country-Birth</th>
<th>County</th>
<th>SpoligoType</th>
<th>MIRU</th>
<th>MIRU2</th>
<th>Cluster1</th>
<th>Cluster2</th>
<th>GENType</th>
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</table>

No Epidemiologic link between the 2 GENType G00016 cases

Genotyping Lineage: IndoOceanic
Genotyping Sublineage: Manila
Time from Arrival in Arkansas to Development of TB, Foreign-born Elementary School Students, 2000-2012 (N=89)

### Quartile Estimates

<table>
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<th>Quartile Estimates</th>
<th>Time to TB Diagnosis (Yrs)</th>
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<tr>
<td>75</td>
<td>5.7 (4.0---7.9)</td>
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<tr>
<td>50</td>
<td>2.6 (1.3 -- 3.4)</td>
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<tr>
<td>25</td>
<td>0.5 (0.3—1.1)</td>
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Discussion

1. There has not been evidence of transmission of TB from teachers to students in Arkansas in the last 13 years

2. Instead, there was possible transmission of TB from a school age child to a US-born teacher

3. MIRU2 further differentiates cluster AR_0006 to support the conclusion that there is no evidence of ongoing transmission of this strain in the US

4. A dedicated genotype cluster investigations approach to allow for the identification of epidemiologic links that could not be found by traditional contact investigations

5. 50% of the children develop TB within 2.6 yrs of arrival

6. However, 25% develop disease within 0.5 yrs of arrival

Recommendations

1. Stop targeted TB testing in grade K-12 school teachers in Arkansas

2. Develop regulation to screen all foreign-born children from TB endemic countries that may have missed baseline screening on arrival in the United States