Tuberculosis complicated by diabetes mellitus — Maryland, 2014–2016

Richard Brooks, MD, MPH
Department of Health and Mental Hygiene
Background

• Diabetes becoming epidemic around the world
• Particularly high rates in locations with high TB rates
• Growing understanding that comorbid DM leads to worse TB outcomes\(^1\)
  – Increased risk for combined treatment failure or death (RR 1.69 [1.36–2.12])
  – Increased risk for death (RR 1.89 [1.52–2.36])
    • RR 4.95 [2.69–9.10] in adjusted studies
  – Increased risk for relapse (RR 3.89 [2.43–6.23])

Maryland Guidance

- Expert panel convened by CTBCP to discuss response

1. Screen all suspect/confirmed TB cases for DM
2. Perform TDM if A1c >7%, severe TB, evidence relapse/failure, delayed response to treatment
3. Work to link patients to care for DM
Methods

- TB cases for MMWR years 2014–2016 reviewed
- Data abstracted from LHD charts:
  - Confirm DM diagnosis
  - Blood glucose and A1c levels
  - DM complications
  - DM medications (insulin vs. oral)
  - Determine whether pt. (successfully?) referred to DM provider
  - TDM performed? Results?
  - Regimen changed as a result of TDM
TB and TB-DM cases — Maryland, 2014–2016

<table>
<thead>
<tr>
<th>MMWR Year</th>
<th>TB Cases</th>
<th>TB-DM cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>173</td>
<td>25</td>
</tr>
<tr>
<td>2015</td>
<td>148</td>
<td>28</td>
</tr>
<tr>
<td>2016</td>
<td>186</td>
<td>33</td>
</tr>
</tbody>
</table>
Caveat

Of 86 total TB-DM cases, charts have only been reviewed for 65 (75.6%) so far.

Data in following slides only describes those 65 cases.

If you haven’t heard from me yet...I will be calling you...
Hemoglobin A1c

- Describes percentage of glycated hemoglobin in RBCs
- Reflects mean blood sugar over last 8-12 weeks
- Diabetes diagnosed by value ≥6.5%

- Of 65 charts reviewed, 44 (67.7%) had A1c data available
Hemoglobin A1c, n = 44

Range: 5.3%–17%

Median: 8.45%

25th percentile: 6.6%

75th percentile: 10.95%

16 cases (24.6%) had A1c <7% (“controlled” DM)
Was the case aware of their DM diagnosis prior to presenting to the HD?

Anecdotally, DM was often diagnosed during hospitalization during which TB also diagnosed.
What types of DM medications were the TB-DM cases taking?

- Insulin only
- Orals only
- Both
- Neither
- Unknown

Number of Cases
What diabetic complications did the cases report?

- None documented: 40 cases
- Kidney: 10 cases
- Nerve: 5 cases
- Blood vessel: 3 cases
- Erectile dysfunction: 2 cases
- Foot infections/amputation: 1 case
- Gastroparesis: 1 case
- Eye: 1 case
Were cases referred to a provider for ongoing DM care?

- Yes, already linked: 35 cases
- Yes: 10 cases
- No: 5 cases
- Unknown: 0 cases
Were cases able to see a provider for their DM?

- Unknown: 37
- No: 9
- Yes: 19
Therapeutic Drug Monitoring (TDM) Results

• Of 65 cases reviewed thus far, 28 had TDM performed
• 100% of cases with low results had medication dose changed as a result
Which drug levels were abnormal on TDM?

N = 28

- INH only: 4 cases
- Rifampin only: 7 cases
- PZA*: 1 case
- Both: 6 cases
- None: 10 cases

*PZA levels rarely ordered
What was the A1c for patients who received TDM?

<table>
<thead>
<tr>
<th>Was TDM ordered?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>22</td>
<td>21</td>
</tr>
</tbody>
</table>

Mean Hemoglobin A1c level (%)

*P = 0.02 by t-test
Outcomes

More to come...
Thank you!

Questions?