Tuberculosis and Diabetes Mellitus

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Learning Objectives

• Understand the impact of uncontrolled diabetes mellitus (DM) on TB infection and TB disease
• Recognize the importance of partnership between TB and DM programs
• Evaluate appropriate TB screening in clinical practice based on TB epidemiology
Audience Survey

• Screened patients with diabetes for TB?
• Managed a patient that was prescribed latent TB infection medication?
• Managed a patient that had diabetes and active TB disease?
• Assisted a patient in completing latent TB infection treatment?
TB Exposure & Disease Risk \(^3, 7\)

- Approximately 30% of persons exposed to *Mycobacterium tuberculosis* will develop LTBI,
- If untreated, approximately 5% to 10% of these persons will progress to active tuberculosis disease or reactivation of tuberculosis. \(^3, 7\)
- Highest risk in the first 2 years (about 5% of exposed)
- Overall risk increases with immunosuppressive conditions
  - Uncontrolled Diabetes 30% lifetime risk
  - HIV 10% additional risk per year
Select Medical Risk Factors\textsuperscript{1,2,3} – WA Cases, 2009-2015

\textsuperscript{1} Medical risks recorded at diagnosis, as documented in medical record or otherwise reported by healthcare provider.
\textsuperscript{2} Frequencies represent medical risks as reported alone or along with other risk factors.
\textsuperscript{3} Immunosuppressing conditions include: TNF alpha-antagonist therapy, post-organ transplantation, end-stage renal disease, and other immunosuppression.
The Relationship Between TB & DM\textsuperscript{5}

- Increased Susceptibility to TB disease
  - Hyperglycemia- impairs interferon-gamma production
  - Macrophage and lymphocyte function resulting in reduction in interferon-gamma.
- Diminished ability to contain the organism in infection stage (thus developing disease)
- Poorly controlled DM might augment the severity of infections.
Impact of Uncontrolled DM on TB

• Increased difficulty to diagnose TB in DM patients
  – Atypical radiographic pattern and distribution
    • 20% of patients with DM present with lower lobe involvement
    • Less likely to have positive smear or culture
• Increase disease severity and outcomes
  – Multi-lobular involvement
  – Multiple cavities
    • Cavities lengthen treatment beyond 6 months
  – Potentially higher bacillary burden and increased length of time to sputum conversion
Pharmacological Issues

• TB medication
  – might worsen glycemic control in patients with DM
  – can change oral absorption of other medication

• Overlapping toxicities must be considered when co-managing TB and DM
  – peripheral neuropathy with INH
  – hyperglycemia with rifampin

• Rifampin concentrations can be too low
  – Can lead to treatment failure or resistance
Importance of Partnership \(^4, 6\)

- Improved patient case management
- Common public health goals, yet competing interests.
- Make collaboration a program goal
- Motivating change
- Screening efficiency: Who should be tested for TB and who should be tested for DM?
Appropriate TB Screening Strategies

• Where was my patient born?
• What are their current glucose levels? A1C>7
• What TB screening test should I use?
  – History of BCG, IGRA recommended
  – TST- ask if immune compromised
  – Discuss with local TB program
• Make screening routine:
  – All patients with DM and exposure risk factors, especially foreign born from high risk TB countries should be screened and treatment recommended.
What Can I do?

• Ask Questions
• Talking Points:
  – Increased chances of active TB disease in presence of DM
  – Protect family and friends from spread of TB
  – Treat BEFORE active TB disease
• Add screening to intake sheet
• Know your resources: http://www.doh.wa.gov/TB
Case Study A

- 52 year old female born in Mexico, in US for 11 years and travels back yearly.
- Symptoms: 2 months of cough with 2 days of blood in sputum; 40lbs of wt loss in last year; night sweats.
- RBG 252, HgbA1c 12.5
- QFT positive
- Initial AFB smears negative, poor quality specimens
- CT and Chest x-ray: consolidation and LUL cavity
- LUL resection, chest tube, etc
- 4 drug TB treatment started
- Lung tissue culture positive MTB
- In hospital for a total of 26 days
Case Study B

• 63 year old US born AI/AN female
• poorly controlled DM
• Household contact
• Mild, chronic dry cough
• Initial TST 00mm
• Second TST at 8 weeks 00mm
Case Study B Continued… 3 months

- Developed productive cough, night sweats, chills, 30lbs weight loss, tiredness
- Last year HgA1c 5.4%; RBG 200-400 currently
- Now QFT positive!
- Chest radiograph showed RLL infiltrate
- Sputum: AFB negative, but NAAT positive, culture negative.
- What happened?
References


2 Center of Disease Control and Prevention: Tuberculosis case counts are based on provisional National Tuberculosis Surveillance System data as of March 4, 2016. Updated data will be available in CDC's annual TB surveillance report later this year at http://www.cdc.gov/tb/statistics/


