

**Disclaimer:** The activities and data presented in this document are fictional and intended for example purposes only. The actual activities implemented as part of TB program evaluation should be identified by state or local TB program officials in collaboration with other stakeholders. The example provided here is not intended to be applied directly to any specific TB program.

**Program Evaluation Topic/Focus Area:** Tuberculosis Infection Identification Among Persons with Diabetes Mellitus in Community Health Centers

## **Background**

*The purpose of this section is to provide background, or rationale, and intended use of your evaluation results. What are the expected outcomes and impact if successful?*

Diabetes mellitus (DM) can significantly increase the risk of developing tuberculosis (TB) and adversely affect TB treatment outcomes.<sup>1,2</sup> Undiagnosed and untreated latent tuberculosis infection (LTBI) that progresses to TB disease accounts for approximately 80% of TB cases diagnosed in the US.<sup>3</sup> Both DM and LTBI disproportionately affect some population groups, including Hispanic, Asian, African American, and non-US-born persons.<sup>1,2</sup> Community Health Centers (CHCs) can play a vital role in reaching populations at higher risk for these conditions by providing health screening services as part of the critical primary care services they provide.<sup>4</sup> Strategies implemented by CHCs to test and treat LTBI can help public health programs improve TB prevention and control in the communities they serve.

### **\*Scenario:**

During October 1, 2022-June 30, 2023, one TB program partnered with 3 CHCs serving primarily non-US-born patients to pilot a TB infection screening program among patients being treated for preexisting DM. All patients with DM over the age of 15 years were screened the first time they visited the CHC for DM care and treatment during the project period to determine if they met the criteria to be tested for TB infection. The criteria to conduct TB infection testing were based on the state's standard TB risk assessment form. Individuals who answered *yes* to any of the risk assessment questions were considered eligible for TB infection testing. The TB program sought to evaluate this screening process to assess its ability to identify eligible persons. The clinic also sought to determine if the screening and testing process is more likely to identify individuals with TB infection if it prioritizes persons newly diagnosed (<2 months) with DM as compared with persons who have been living with diabetes long term (>2 months).

**Goal:** Improve TB infection identification among individuals with DM.

### **Objectives**

*Should be specific, measurable, attainable, realistic, and time-bound (SMART).*

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1. By July 31, 2023, describe the number and percentage of all persons with DM referred for TB infection testing and the numbers who were tested.
2. By July 31, 2023, the program will complete TB infection testing in 75% of the DM patients referred for TB infection testing.
3. By July 31, 2023, describe the number of patients who tested positive for TB infection stratified by newly diagnosed (<2 months) with DM or long-term (>2 months) management of DM.
4. By August 31, 2023, use findings related to objectives 1 and 3 to identify new or improved strategies that might help increase LTBI identification among persons with DM.

**Expected Outcome:** Improved or new strategies to increase the detection of LTBI among persons with DM.

### **Corresponding National Tuberculosis Indicator Project Indicator**

*Program evaluation should ideally reflect the National Tuberculosis Indicator Project ([NTIP](#)). Please specify the NTIP indicator addressed by this evaluation. If the evaluation is not linked to an NTIP indicator, please provide an explanation regarding how the evaluation relates to your scope of work.*

**Corresponding NTIP indicator:** Decrease incidence of TB disease

### **Evaluation Plan Questions, Measures, Analysis, and Timeline**

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<b>Evaluation Question (Objectives 1-3)</b>	<b>Measure</b>	<b>Data Source</b>	<b>Method of Analysis</b>	<b>Target</b>	<b>Timeline of Activities and Person Responsible</b>
<p>A. How well did the program perform in identifying DM patients eligible for TB infection testing?</p> <p>B. How well did the program perform in testing referred DM patients?</p> <p>C. What proportion of those tested, received a positive TB infection result?</p> <p>D. Were patients newly diagnosed with DM (&lt;2 months) more likely to be diagnosed with LTBI than</p>	<p>A. Number of persons with DM eligible for TB infection testing and number of persons referred for testing.</p> <p>B. Proportion of eligible persons with DM referred for TB infection testing who received testing.</p> <p>C. Proportion of persons testing positive for TB infection among those who were tested.</p> <p>D. Stratify measures above (A, B, and C) by newly diagnosed (&lt;2 months) and longer-term DM patients (&gt;2 months).</p>	<p>Clinic logs, medical records</p>	<p>A. Number of persons with DM eligible for TB infection testing October 1, 2022–June 30, 2023, and the number referred for testing.</p> <p>B. Number of persons with DM referred for TB infection testing who received testing divided by the number of persons with DM who were referred for testing.</p> <p>C. Number of patients testing positive for TB infection divided by the number of patients who were tested for TB infection.</p> <p>D. Stratify analyses above (A, B, and C) by newly diagnosed with DM (&lt;2 months) and longer-term DM patients (&gt;2months).</p>	<p>A. All eligible DM patients will be referred for testing and grouped as newly diagnosed (&lt;2 months) or longer-term (&gt;2 months) DM for this evaluation.</p> <p>B. 75% of DM patients referred for TB infection testing will have testing completed.</p>	<p>TB program evaluation staff will review charts for all patients seen between October 1, 2022, and June 30, 2023, grouping patients with DM as newly diagnosed (&lt;2 months) or longer-term (&gt;2 months) DM; recording whether each patient was referred for TB infection testing, evaluated for LTBI or TB and documenting testing results. The medical record review will be completed by July 15, 2023, and data analysis will be completed by August 15, 2023.</p>

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patients who have been managing DM for >2 months?					
<b>(Objective 4)</b> A. What changes to the current strategy or what new strategies might increase LTBI identification among persons with DM?	A 1. Facilitators to screening service implementation.  A 2. Recommendations for improved or new strategies.	Meeting with health department program evaluation staff, TB control program staff, and clinical and management representatives from each CHC to discuss findings and next steps.	Identify at least 3 activities that worked well with the current strategy and at least 3 recommendations for strategy modifications or ideas for new strategies.	Meeting agenda: <ul style="list-style-type: none"> <li>• review results of analysis</li> <li>• identify facilitators for increasing screening services at CHC</li> <li>• develop recommendations for improved and new strategies</li> </ul>	Meeting agenda and discussion summary completed by TB PEN Focal Point. The meeting will take place by August 25, 2023, and a follow-up plan will be drafted by August 31, 2023.

**Evaluation Findings and Conclusions** *Updates to this section should be included in the annual progress report.*

Evaluation Question and Related Findings	Target Met or Not Met
<b>A. How well did the program perform in identifying and referring eligible patients?</b> By June 2023, a total of 500 patients with DM were seen by the 3 CHCs, 200 of whom met the TB infection testing criteria and were referred for testing. 60 were newly diagnosed with DM (<2 months), and 140 were longer-term DM patients (>2 months)	Met (Target 100%)
<b>B. How well did the program perform in testing referred DM patients?</b> 200 patients met the screening criteria and were referred for testing; 100 (50%) completed TB infection testing [30 were newly diagnosed with DM (<2 months), 70 were longer-term DM patients (>2 months)].	Not Met (Target 75%)
<b>C. What proportion of those receiving testing were positive for TB infection?</b> Of the 100 patients tested 4 (4%) were identified as having TB infection. [All 4 that tested positive were newly diagnosed with DM (<2 months), none of the longer-term DM patients (>2 months) tested positive]	N/A

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<p><b>D. Were patients newly diagnosed with DM more likely to be diagnosed with LTBI than patients who have been managing DM for a long time?</b>          All 4 DM patients that tested positive for TB infection were diagnosed with LTBI. These 4 patients were newly diagnosed with DM and had their initial visit to the clinic within the last 2 months.</p>	<p>N/A</p>
<p><b>Additional Findings:</b>          During October 1, 2022-June 30, 2023, 28 persons in the communities served by these CHCs were admitted to a local hospital with uncontrolled DM, 3 of whom tested positive for TB infection. This leads the program to believe that some persons in the community are not seeking care at local CHCs, and further efforts are needed to identify and ensure these individuals are screened for TB infection.</p>	
<p><b>Outcome from meeting between health department and CHC staff</b></p> <p><b>A 1. Facilitators to TB infection screening and testing of patients with DM</b></p> <ul style="list-style-type: none"> <li>• Written guidelines on the staff bulletin board regarding TB infection screening and testing.</li> <li>• Reminders from the nursing supervisor at weekly staff meetings to implement TB infection screening strategy</li> <li>• Use of IGRA testing, which requires a single visit to complete the test</li> <li>• TB infection testing available in the same location and on the same day as the patient visit for DM</li> <li>• Frequent information sharing between DM staff and TB staff</li> </ul> <p><b>A 2. Meeting participants' recommendations for new strategies</b></p> <ul style="list-style-type: none"> <li>• <b>Increase focus on screening for LTBI among individuals with uncontrolled diabetes</b>, including both those seen at CHCs and those not seeking health care until their illness is critical. CHC staff noted that all patients testing positive for TB infection were newly diagnosed DM patients. Individuals who were newly diagnosed with DM tended to have fewer, if any, prior visits to the CHC and therefore did not have the opportunity for TB infection screening. Individuals who were newly diagnosed were also less likely to return for future appointments, so screening for TB infection should occur during their first visit or as quickly as possible.</li> <li>• <b>Implement adequate staff training</b> for TB infection screening and testing. CHC staff should be able to identify TB symptoms and risk factors, extract relevant patient information, accurately record information in patient charts, and accurately answer patient questions.</li> <li>• <b>Develop educational messages for private providers</b> regarding the increased risk of TB infection among DM patients.</li> </ul>	

**Deliverables, Products, and Dissemination Plan** (For further information on sharing your program evaluation findings, please refer to [Sharing Your TB Program Evaluation Findings](#) on our DTBE Program Evaluation Tools website) Please provide a list of final

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deliverables and describe how you plan to disseminate to stakeholders.

- A one-pager highlighting the evaluation results will be distributed to stakeholders and CHC staff by email.
- A brief presentation will be provided at a clinic staff meeting, followed by an open discussion to get feedback on the next steps for reaching and testing the newly diagnosed DM population for TB infection.

### **Remediation Plan based on Findings**

(For further information on developing and implementing a remediation plan, please refer to [Program Evaluation: Developing and Implementing a Remediation Plan](#) for detailed steps)

*All remediation plan results and progress will be shared periodically with relevant CHC and State TB Program leadership through presentations. They will also be shared with the CDC Division of TB Elimination in the Annual Progress Report.*

- Findings indicated some newly diagnosed DM patients did not seek care from CHCs; rather, new diagnoses for DM were often received during emergency room and hospital visits among people in this community. To promote testing for TB infection among this population, the health department's TB control program staff will work with area hospitals to develop a program to flag patients newly diagnosed with DM for TB infection screening.
- To increase reach within the community and ensure there is an event for screening eligible individuals, the health department's TB control program will organize an annual community health fair. The health fair will provide DM and TB infection screening and testing services. The health department will follow up with individuals regarding their testing results to encourage and coordinate treatment efforts.
- One of the outcomes from the meeting with the health department and CHC staff indicated that CHC staff would benefit from additional training regarding TB infection screening and testing. CHCs will develop an additional section in their new employee orientation course regarding screening and testing.

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### **Resources**

1. Haddad MB, Lash TL, Castro KG, et al. Tuberculosis infection among people with diabetes: United States population differences by race/ethnicity. *Am J Prev Med* 2020;58(6):858–63.
2. Armstrong LR, Kammerer JS, Haddad MB. Diabetes mellitus among adults with tuberculosis in the USA, 2010–2017. *BMJ Open Diabetes Res Care* 2020;8(1):e001275.
3. Shea KM, Kammerer JS, Winston CA, Navin TR, Horsburgh CR Jr. Estimated rate of reactivation of latent tuberculosis infection in the United States, overall and by population subgroup. *Am J Epidemiol.* 2014;179(2):216-25.
4. Centers for Disease Control and Prevention. Community tuberculosis control. In: *Core Curriculum on Tuberculosis: What the Clinician Should Know*. 6<sup>th</sup> ed. Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Division of Tuberculosis Elimination; 2013:227–248.  
<https://www.cdc.gov/tb/education/corecurr/pdf/chapter8.pdf>

\*We would like to acknowledge Palau for providing the idea and inspiration behind the development of this program evaluation and improvement plan.