



Preventing Tuberculosis in Your Clinical Setting:

A PRACTICAL GUIDEBOOK



California Department of Public Health
Tuberculosis Control Branch



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APRIL 2022

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Preface

Staff from the TB Free California initiative, a project of the California Department of Public Health, produced this Guidebook to share information with primary care clinics and other partners who endeavor to improve tuberculosis (TB) prevention among their patients. The information presented was developed based on the experiences of the TB Free California team as they worked over several years with local health departments, community providers and community-based organizations serving populations disproportionately affected by TB. The authors' intentions in this Guidebook are to assist primary care clinics to scale-up and improve their latent TB infection (LTBI) programmatic and care activities as well as to engage with their community-based partners for support. If implemented, these efforts should result in successful TB prevention outcomes, ultimately contributing to the elimination of TB in California. Find out more about the TB Free California initiative and access our many resources for patients and providers at the [TB Free California website](#).

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The authors would also like to acknowledge all TB Free California partner clinics and organizations, and clinicians working on TB prevention in our state. Without them, this work would not be possible, and we are grateful for their continued collaboration.

Special thanks and appreciation to our partners who reviewed draft versions of this Guidebook:

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Suggested citation

TB Free California Initiative. Preventing Tuberculosis in Your Clinical Setting: A Practical Guidebook. Richmond, CA. April 2022.

Disclaimers

This document was partially supported by Cooperative Agreement Number NB01OT009395, funded by the U.S. Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the U.S. Centers for Disease Control and Prevention or the U.S. Department of Health and Human Services.

Overview

Purpose

The purpose of this Guidebook is to provide practical instructions for establishing and improving tuberculosis (TB) prevention efforts in your health care clinic. The Guidebook content was informed by a collection of experiences from working with California clinics and lessons learned from clinics across the country. This is not a comprehensive guide to clinical care for latent TB infection (LTBI), which can be found elsewhere. Instead, the Guidebook provides an overview of best practices for implementing TB prevention activities, addresses common questions that have come up over the years and puts forth methods for measuring and monitoring TB prevention across clinical settings. We believe that successful implementation of the interventions described in this Guidebook will promote health equity within California by advancing prevention of TB, a life-threatening condition that disproportionately affects California's most vulnerable populations.

The interventions presented in this Guidebook are intended to promote health equity within California.

The Guidebook's "[Background](#)" section makes a simple and clear justification for prioritizing TB prevention. It also highlights best practices and introduces the LTBI care cascade. We share processes, tools and other resources to engage and support patients, within and outside the clinic, and provide brief clinical guidance. We offer standardized steps for measuring the LTBI care cascade and examples of how clinics can use their electronic medical records (EMRs) to monitor and support TB prevention. These efforts can be quite complex; we know there are many barriers to successful prevention and therefore we offer suggestions for how to bypass the obstacles and address points of attrition in LTBI care.

As a professional working in a clinical setting that provides care to populations at higher risk for TB, you play a key role in preventing TB in California. We understand the challenges of incorporating TB prevention in busy primary care settings where many competing demands exist. Our work with clinics across California has shown, however, that success can be achieved. With the right workflow, tools and support systems in place, we have seen clinics successfully implement TB prevention and

ultimately improve care for their patients. We hope that this Guidebook serves as a resource for you as you embark on this important work.

Intended audience

This Guidebook has been created for clinic staff with a goal of improving LTBI care and outcomes for their patient population. Users may include, but are not limited, to:

- Health care providers
- Primary care clinic directors
- Health system leaders
- Electronic medical record analysts
- Public health department leaders providing guidance for primary care settings

Guidebook objectives

- 1.** Promote and increase health care providers' understanding of the importance of TB prevention and the roles they play
- 2.** Increase providers' awareness and understanding of best practices for LTBI care and increase their capacities to screen, test for and treat LTBI
- 3.** Provide easy-to-use tools and other resources for providers which can be tailored to various settings to support them as they engage communities, screen, test and treat patients with LTBI
- 4.** Increase providers' knowledge on how to measure the steps in the LTBI care cascade
- 5.** Increase providers' awareness and understanding of strategies that can be implemented to overcome barriers to each step in the LTBI care cascade

Use of this Guidebook

The implementation of TB prevention activities varies across practice settings. Some concepts presented in this Guidebook may be more practical for large health care organizations and others for smaller clinical entities. Our intention is to provide examples from various types of clinical settings throughout the document. An overview of different prevention activities based on practice settings, which are detailed in this Guidebook, is provided below.

Large health care organizations

Large health care organizations serve a high volume of patients and might require a strong evidence base and cost analysis in order to demonstrate the benefit of TB prevention across the organization. Increasing attention to and funding for antibiotic stewardship, reduction of disparities and inequalities in health care and quality improvement interventions in outpatient settings are important steps to scale up TB prevention. Potential actions include: modifying existing disease-specific screening protocols, such as for hepatitis C, to include TB screening; leveraging established community partnerships for additional engagement; modifying EMRs to identify patients who are at higher risk and monitor their treatment; and generating progress reports to share feedback with providers across the organization on their success. Patient navigation structures could also support patients through each step of the LTBI care.

Small community clinics

A number of options for smaller community clinics are also feasible. They might review their patient population and demographic data to determine which patients might experience risk for TB infection based on place of birth or immunosuppression. Board certified physicians, particularly pediatricians, can build an LTBI program under the auspice of quality improvement, which is newly required for ongoing board certification. Pediatric or family practice offices might start by focusing on the younger clinic population who has higher risk of and longer opportunity for LTBI progression to TB disease. Younger patients have fewer comorbidities, take fewer medications and tolerate LTBI medications quite well. Community partnerships might already be well developed, but if not, initial outreach to populations can begin with disseminating posters and materials available in-language for communities served by the clinic. EMRs may be more easily amended by smaller practices to identify patients with risk factors and document testing and treatment progress through to completion.

Finally, numerous resources for clinics, providers and patients are showcased in this Guidebook. The digital version of this Guidebook includes live links to resources that are available online. Resources presented that are not available online can be found in the Guidebook appendices, on pages that can be printed for easy reference and use.

Supplementary Materials

Numerous educational materials about LTBI exist. In particular, in 2022, the CDC Division of TB Elimination (DTBE) unveiled the “Think. Test. Treat TB” communications campaign. The Campaign aims to reach those at higher risk for LTBI, and their health care providers, to encourage TB testing and accelerate elimination of TB. The Campaign goal is to change attitudes about TB by raising awareness of TB as a serious and potentially fatal issue among those at higher risk.

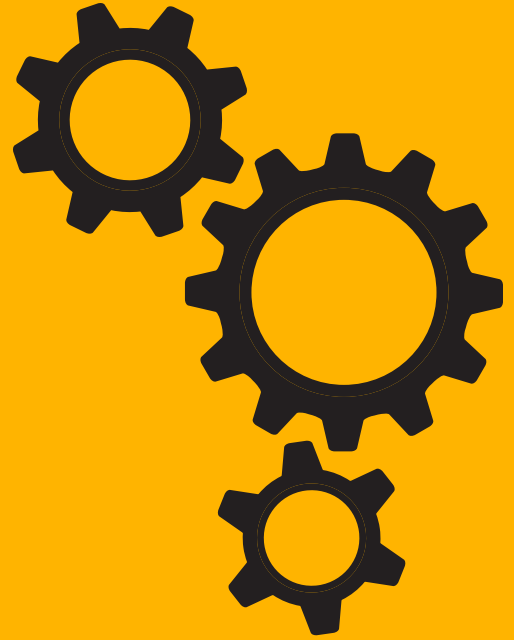
DTBE has created a website which houses numerous materials for both communities and persons at higher risk for TB and the providers who care for them. The Campaign's “Partner Toolbox” includes educational materials, videos, social media posts with images and text, sample articles and more. The patient materials are available in multiple languages.

Go to [CDC DTBE Think. Test. Treat TB website](#) to learn more about the Campaign and to access the downloadable resources.

The California TB Controllers Association (CTCA) website also houses a toolbox which includes numerous downloadable educational materials about LTBI and TB. See the [CTCA Toolbox website](#) to view the materials.

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Background

Background

Why TB prevention?

TB is a life-threatening disease that is transmitted through the air and results in profound medical consequences. Every year, close to 2,000 Californians are diagnosed with TB disease.¹ About half of these patients are hospitalized and one in six die within five years of diagnosis despite the availability of effective treatments.^{2,3} Those who do survive sometimes suffer from life-long disability, including impaired lung function, and shorter life expectancy.

Furthermore, the burden of TB is borne disproportionately by communities of color, and the disparities are startling. Asians born outside the U.S. are diagnosed with TB at 50 times the rate of U.S.-born whites, which far exceeds disparities by race and ethnicity noted in HIV, heart disease and diabetes.⁴⁻⁷ TB also adversely affects persons experiencing homelessness, persons who are incarcerated and persons in long-term care facilities.

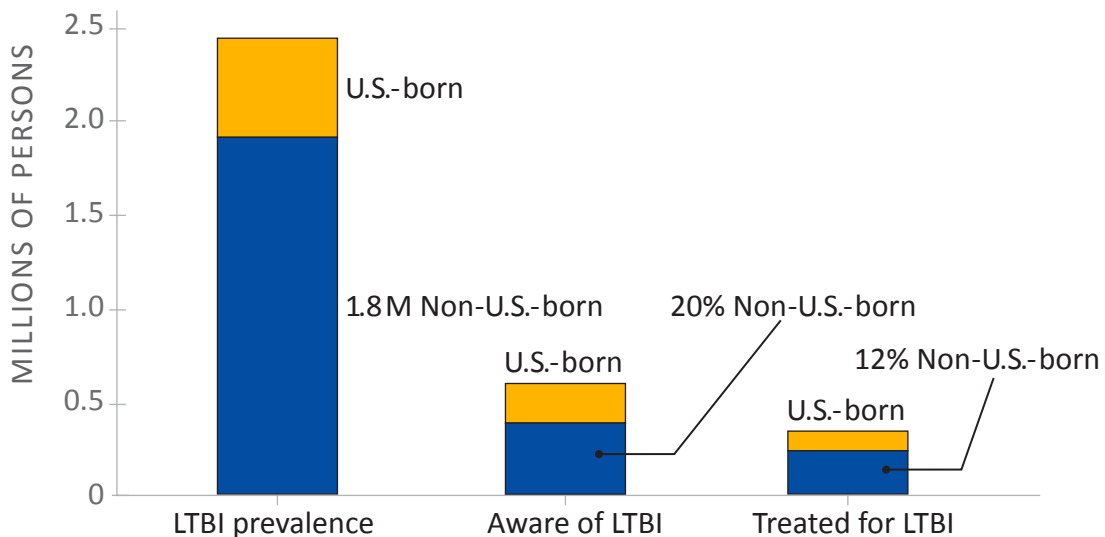
The term “TB prevention,” as used in this Guidebook, specifically refers to targeted testing and treatment of LTBI. The term can also be used to describe other activities that contribute to TB disease prevention (e.g., early detection and treatment of TB, isolation of patients with infectious TB, contact investigation, bacille Calmette-Guerin (BCG) vaccination and environmental controls for preventing transmission of *Mycobacterium TB*). “TB prevention” in this Guidebook primarily refers to preventing LTBI from reactivating and developing into infectious TB disease.

The large reservoir of untreated LTBI is the source of roughly 80% of TB disease in California.³ More than two million Californians have LTBI — they are infected with the TB bacteria, *Mycobacterium tuberculosis*, but are asymptomatic, and most are unaware of their infection and are untreated.¹ As shown in Figure 1 on the next page, in 2020 there were an estimated 1.8 million non-U.S.-born Californians with LTBI yet only 20% were aware of their infection and only 12% of those were fully treated. Often persons infected with TB do not develop disease right away but after years of harboring the infection. If current trends continue, there will be an esti-

The term “TB prevention,” as used in this Guidebook, specifically refers to targeted testing and treatment of LTBI.

mated 4,200 deaths from TB by 2040 which could have been prevented by treating someone before they progressed from LTBI to active disease.⁸

FIGURE 1: Estimated latent TB infection prevalence, awareness and treatment, California, 2020



TB disease is disruptive and costly. TB can result in significant financial repercussions for patients and their families as well as for health care, public health systems and the greater economy. Persons with TB can lose income or employment because they are too sick to work or cannot go to work. Medical expenses associated with the disease further exacerbate the financial effects.

Half of patients with TB disease are hospitalized, and these hospitalizations are twice as expensive and four times longer than those for other conditions, usually about 11 days.² In 2020, direct medical and societal costs of TB in California were over \$180 million.⁴

FIGURE 2: TB has tragic consequences^{3,9-13}



Death

- 1 in 6 die within five years of diagnosis
- 10% do not survive treatment



Disability

- After treatment, impaired lung function and shorter life expectancy
- >80% of children with central nervous system TB die or permanently disabled



Hospitalization

- 50% of TB patients are hospitalized
- 2x expensive and 4x longer than hospitalizations for other conditions



Cost

- Catastrophic costs to patients and families
- >\$180 million in direct and societal costs in California in 2020

TB is a preventable disease and thus the human suffering and individual and societal costs caused by TB are ultimately preventable. TB infection can be detected with a one-time test and can be treated with a short-course regimen which can prevent progression to infectious TB disease. In contrast, prevention for common conditions such as high blood pressure and high cholesterol require regular testing and a lifetime of treatment. The cost to prevent TB for one person is low (\$790) compared with the costs involved in diagnosing and treating one person with active TB disease (\$43,900).¹⁴ Furthermore, because TB is communicable, preventing TB also means preventing potential transmission of TB to the patient's family or friends, or within your health care facility.

Cost of TB prevention vs. TB disease

TB PREVENTION (\$790 PER PATIENT)	TB DISEASE (\$43,900 PER PATIENT)
Life-saving	Deadly (10% mortality in CA)
1-2 medications for 3-4 months	4+ medications for 6+ months
Avoids severe disease, hospitalization	Severe disease and hospitalization is common, leading to treatment which is 55x higher in cost than LTBI treatment
No isolation period, minimal disruption to patient's daily life	Isolation required while patient is infectious, leading to potential losses of income

Best practices for latent TB infection screening, testing and treatment

Preventing TB, this expensive and devastating disease, can be accomplished in primary care and other clinical settings. Three best practices for LTBI care are recommended by leading agencies in public health and primary care, detailed below and on the next page.

Screen to identify patients who are at higher risk for TB

In 2016, the United States Preventive Service Task Force (USPSTF), the leading national agency for assessing prevention, updated its TB screening recommendations and recommended screening and testing for LTBI among asymptomatic adults at increased risk in the primary care setting. The rationale included that “accurate screening tests for LTBI are available, [treatment provides] benefit in preventing progression to active disease, and the harms of screening and treatment are small.”¹⁵ Testing in persons at higher risk is cost-effective, as it helps to focus limited resources on those most likely to benefit from interventions and avoid false positive tests that are more common in lower risk groups. The USPSTF specifically called out non-U.S.-born persons from countries with higher TB incidence as an important group for testing based on their risk for infection.

In 2023, USPSTF published the recommendation again with a larger evidence base; the guidance suggested the interferon-gamma release assay (IGRA) blood test as a superior testing tool for LTBI compared to the Mantoux skin test and called out the need to complete LTBI treatment in order for patient benefit to be achieved.

The California Department of Public Health (CDPH) created TB risk assessment tools to help identify persons at higher risk for TB, specifically those with:

- Birth, travel or residence in a country with an elevated TB rate
- Immunosuppression
- Close contact to someone with infectious TB
- Homelessness or incarceration, current or past



LINKS: [USPSTF Recommendation: Screening for Latent Tuberculosis in Adults](#)

[CDPH Tuberculosis Risk Assessment](#)

Test using an IGRA

In 2017, the American Thoracic Society (ATS), Centers for Disease Control and Prevention (CDC), and Infectious Diseases Society of America (IDSA) jointly recommended that TB testing in populations disproportionately affected by TB should be obtained using IGRAs rather than tuberculin skin tests in most situations.¹⁶ IGRAs allow for more specificity in diagnosing LTBI with fewer false positives resulting from previous BCG vaccination or nontuberculous mycobacteria.

In 2020, the American Academy of Pediatrics (AAP) also recommended the use of IGRAs among children ages 2 years and older.¹⁷



LINKS: [ATS TB Testing Guidelines](#)

[AAP TB Guidelines](#)

Treat with a short-course, rifamycin-based regimen

In 2020, the National TB Controllers Association (NTCA) and the CDC preferentially recommended short-course, rifamycin-based, 3- or 4-month LTBI treatment regimens over 6- or 9-month isoniazid monotherapy because of the effectiveness, safety and high treatment completion rates.^{18,19} Preferred options for LTBI treatment include:

- 3 months of once weekly isoniazid plus rifapentine
- 4 months of daily rifampin
- 3 months of daily isoniazid plus rifampin



LINK: [NTCA and CDC LTBI Treatment Guidelines](#)

Key clinic considerations when establishing or improving TB prevention care

TB prevention is most likely to be successful when key capacities are available in your clinic setting. Two tools can be used to assess the need and readiness for scaling up LTBI testing and treatment. [The Clinic Assessment Survey](#) in Appendix C helps to identify patient demographics and risk characteristics in your clinic population to determine the percentage who may be at higher risk for TB. This survey asks specific questions that will allow you to understand the demographics and risk characteristics of your population as well as questions related to your clinic's LTBI testing and treatment policies. While we recommend screening for risk factors among all patients, and testing for those at higher risk, knowledge of the size of the population at risk helps to inform the size and scope of LTBI prevention activities for your clinic. TB prevention programs are especially impactful at clinical sites that care for a moderate or high volume of patients at higher risk for LTBI.

In addition to the survey, the Resources and Capacity Checklist shown on the next page provides you the opportunity to assess whether your clinic is meeting TB prevention readiness factors. It describes eight clinic capacities that can support and optimize TB prevention efforts. We encourage you to think through what protocols and staffing currently exist in your clinic and what processes may need to be changed to make the workflow run smoothly. This list can serve as a prompt to secure the resources that will create an environment that most effectively supports patients and providers through the LTBI care cascade.

TB prevention programs are especially impactful at clinical sites that care for a moderate or high volume of patients at higher risk for LTBI.

Resource and Capacity Checklist

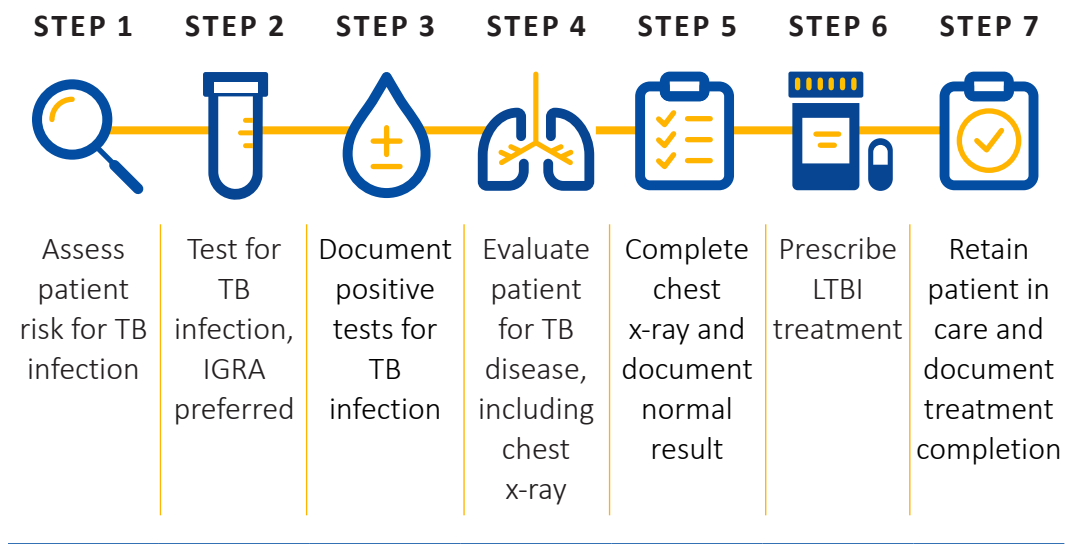
- A champion within your clinic who can propel TB prevention activities forward and work to ensure that quality improvement efforts are incorporated
- Clinic leadership committed to the scale-up of LTBI testing and treatment to facilitate TB prevention successes
- Access to an operational EMR that captures the majority of LTBI patient care charting and test results. EMRs can be used to monitor LTBI testing and treatment practices and can be modified to support providers as they work to increase improve LTBI care
- Capacity for accessible TB testing with IGRA testing onsite or ordered through an EMR with electronic results
- Capacity for accessible chest x-ray onsite or a chest x-ray referral process with results that appear in the EMR
- Capacity to order short-course, rifamycin-based treatment regimens (either four months of daily rifampin, three months [12 doses] of once-weekly isoniazid and rifapentine or three months of daily isoniazid and rifampin)
- Ability to follow-up with patients to support treatment completion
- Ability to measure each step in a care cascade to assess testing and treatment completion and points of attrition

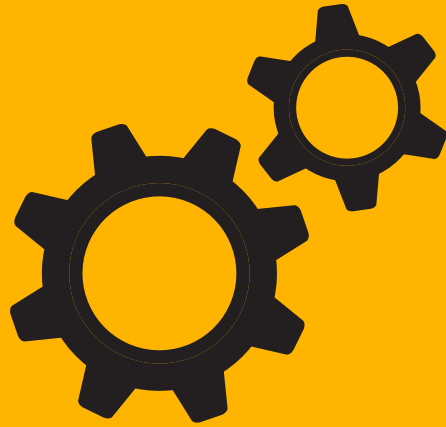
Introduction to the latent TB infection care cascade

An LTBI care cascade describes the discrete steps needed to identify persons with LTBI and ensure that they complete treatment to prevent progression to TB disease.²⁰ Measuring an LTBI care cascade can help clinic staff understand their clinic’s current LTBI testing and treatment practices, identify points of attrition and highlight opportunities for improvement. See the [“Measurement of the latent TB infection care cascade \(definition and rationale for latent TB infection care cascade\)” section](#) for detailed definitions and rationales for using the cascade in your clinic.

For most clinics, the easiest way to measure the steps of a care cascade is by using data extracted from an EMR, which helps track both individual patient and clinic progress. Figure 3 below is a snapshot of the steps in the [LTBI care cascade](#), also available in Appendix C as a full page print-out. The [“Measurement of the latent TB infection care cascade \(electronic medical record\)” section](#) of this Guidebook provides more information on how to use the EMR to measure each step of the care cascade; this section provides case examples demonstrating common barriers faced by clinics integrating care cascade measurement into their TB prevention activities. Ensuring that patients make it through the entire LTBI cascade is key to preventing TB.

FIGURE 3: Steps in the LTBI care cascade





Engaging
and supporting
patients
through latent
TB infection
screening,
testing and
treatment

Engaging and supporting patients through latent TB infection screening, testing and treatment

A critical initial step in decreasing TB-related disparities is to ensure the engagement of persons considered to be at higher risk for TB. Clinics can optimize LTBI testing and treatment using strategies to identify persons at higher risk for TB in the community and implementing efforts to engage them in screening, testing and treatment. While some patients might be initially hesitant to engage in LTBI care, clinics can integrate effective approaches to develop trusting relationships that will ultimately engage and sustain communities in care. Expanding TB prevention networks to support patients and communities at large can lead to improved

While some patients might be initially hesitant to engage in LTBI care, clinics can integrate effective approaches to develop trusting relationships.

health outcomes. Collaboration with organizations serving TB-impacted communities and use of culturally relevant and linguistically appropriate educational resources help TB prevention clinical efforts.

The following sections provide suggestions for how clinics can engage and support patients through LTBI screening, testing and treatment.

Creating community partnerships to reach populations disproportionately affected by TB

For many clinics and providers serving large and diverse patient populations with varying needs, it is essential to secure partnerships with organizations which have aligned goals for improving health in the population. Fostering diverse partnerships that include multidisciplinary collaborators allows clinics to effectively engage individuals at higher risk for developing TB. These partnerships can include, but are not limited to:

- TB coalitions
- Community-based organizations (CBOs)
- Federally Qualified Health Centers (FQHCs)
- Faith-based organizations
- Diabetes Control, Tobacco Prevention, and Hepatitis B programs that often serve populations who are also at higher risk for TB
- State and local TB programs

Collectively, these partners can develop tailored interventions and identify ways to address barriers to LTBI care and facilitate continuity of care. These diverse collaborators can exercise their unique skills and leverage their resources to engage communities in ways that a single agency cannot. For instance, community clinics, CBOs and faith-based organizations often have trusted relationships with community members and TB education and outreach might be better received from these organizations instead of from public health departments or health care entities. Co-leading community outreach events with these types of organizations provides a great opportunity to educate persons at higher risk for TB.

It is also key to engage leaders of both community clinics and other organizations even more deeply embedded in the community (e.g., CBOs, faith-based organizations) as TB champions to facilitate and support TB outreach efforts. When leadership from a variety of CBOs and clinics is part of the planning process for TB prevention activities, efforts are less likely to be interrupted when competing priorities arise. Nurturing a collaborative model that allows leaders, staff and community members to be part of the decision-making process encourages continued participation and can lead to greater impact.

What steps can you take to prepare for potential partnerships?

- 1. Research.** Gather information to understand populations and the subset at highest risk in your community
 - Size of populations
 - Where populations are located
 - How to reach each population
 - Risk characteristics
- 2. Build relationships.** Reach community organizations or programs serving populations of interest
 - Identify key members and decision makers
 - Be prepared to present TB data and identified needs to the community
 - Share current LTBI scale-up recommendations
 - Offer technical support and resources
 - Respond to questions
- 3. Communicate.** Contact the local public health department TB program to discuss potential collaboration and identify existing support/resources
- 4. Follow up.** If programs are unable to partner due to staff or funding constraints, follow up again at a later time or ask for referrals to other organizations that serve the same population(s)
- 5. Be flexible.** Forming partnerships requires strategy and willingness to pivot as needed

Examples of successful partnership projects that engage community members at higher risk in LTBI care

There is no one single recipe for building and maintaining effective partnerships. Partnerships allow clinics to engage patients and communities in TB education and prevention with fewer clinic resources. Below are a few examples of collaborative TB prevention projects and approaches that have been implemented in California.

- **Posters.** Clinics have partnered with various programs and organizations to display TB and LTBI education posters with LTBI messages in community clinic waiting rooms and at community centers, CBOs and shopping centers where individuals at higher risk might frequently visit
- **Outreach at vaccine sites.** Sites administering flu and/or COVID-19 vaccinations have included TB outreach in their process. The vaccination sites conduct TB risk assessments while collecting the necessary patient information prior to vaccination. People found to be at higher risk for TB based on their assessments are then referred to a local clinic or health department for LTBI testing
- **Community engaged health promotion.** Partners have conducted short TB 101 health information sessions at community centers serving populations disproportionately affected by TB (instead of at a health department-sponsored event). These events have successfully engaged individuals not previously reached by the health department in an environment where the community members felt welcome and safe

Partnership example²¹

The TB Free California project staff partnered with a local TB program and an FQHC primarily serving patients from Vietnam. Several interventions to promote TB prevention were implemented, including:

- Culturally relevant and in-language educational resources were displayed throughout the clinic
- Clinic staff were trained on how to use a TB risk assessment, prompting patients to be tested and linked to care, when appropriate
- TB education was provided in patients' native languages
- TB training for health care providers was provided and included best practices for counseling patients on accepting LTBI testing and treatment
- Clinic negotiated with a private laboratory to lower the cost of IGRAs and obtain the tests for in-clinic use

As a result of these interventions, the clinic achieved the following LTBI screening, testing and treatment outcomes:

- Patients were routinely screened for LTBI
- More patients were tested using an IGRA (3% → 95%)
- More patients were treated for LTBI (7% → 72%) using short-course regimens
- EMR modifications were made to document testing results and treatment outcomes
- LTBI care cascade was measured to determine success and places where improvement was needed

TB prevention efforts in California are strengthened by the networks of organizations that support communities at higher risk for TB. Working in partnership with existing organizations and programs to implement prevention initiatives is critical to overcoming the barriers and stigma that can arise in the testing and treatment of LTBI. Examples of CBOs and other organizations that your clinic can partner with exist at the local, regional, and state levels. Examples of organizations we have had successful partnerships with include Hep B Free LA (local), Breathe California of the Bay Area (regional) and the California TB Controllers Association (state). Furthermore, developing tools and resources that are accessible to communities, that are culturally and linguistically appropriate, is also crucial. In the next section of this Guidebook, we share sample tools to facilitate patient LTBI care engagement.

Resources to engage and support patients in care

Many challenges can arise when trying to engage patients, and both patient and provider factors contribute to limited patient engagement in LTBI care.^{20,22-25} Lack of TB awareness continues to be one of the primary reasons that a relatively small number of patients are screened and tested for TB.²² Even when patients learn about LTBI, they might not sense any urgency to test for or treat LTBI when they feel well and know that there might not be an immediate threat to their health or the health of their families and communities. Developing TB education activities that resonate with patients and are available through various delivery channels (e.g., social media) can help prevent TB.

Listed on the next page are barriers which were commonly identified by our clinic partners in California. The Guidebook sections that follow detail challenges that clinics may encounter in engaging patients and offer a number of approaches to meaningfully support patients in LTBI care. In addition to the barriers to patient engagement listed on the next page, see the [“Attrition in the latent TB infection care cascade”](#) section for a broader list of barriers identified both in practice and in the literature that result in attrition in the LTBI care cascade.

Barriers to engagement

Patient factors:

- Many barriers can lead to patient hesitancy to test and/or treat. These barriers include lack of awareness about TB or LTBI; lack of awareness of risk factors that can lead to TB disease progression; and false perceptions of BCG vaccine protection
- Lack of sufficient culturally and linguistically appropriate TB/LTBI messaging and educational materials to support patient understanding of TB and encourage testing and treatment can also impede testing and treatment acceptance
- Concerns over privacy may arise. Asking immigrants to disclose their ethnicity or country of birth without assuring confidentiality might invoke fear of deportation or other immigration concerns which can create barriers to LTBI testing and treatment
- Cost for health care, childcare and transportation, and limited availability of appointments, may challenge many, especially in underserved communities at higher risk for TB

Provider factors:

- Lack of awareness about TB or LTBI risk to identify populations at higher risk may result in undertesting
- Lack of adequate training to engage with patients
- Separation of TB prevention efforts from CBOs or programs that serve populations at higher risk for TB
- Competing demands to engage patients due to a busy clinic schedule

Key considerations for TB outreach and education

When planning for outreach and education geared towards communities disproportionately affected by TB, it is essential to ensure that both staff and the educational methods used, e.g., trainings, print and social media materials, are culturally appropriate. Listed below are important perspectives to consider for your planning efforts.

- Keep the text simple and clear
- Co-create LTBI messaging and resources with impacted communities to ensure cultural appropriateness
- Translate resources into key languages to improve access
- Identify how patients and communities want to receive these messages, and create these opportunities
- Produce strategic dissemination plans together with partners

Concerns to consider when engaging non-U.S.-born populations:

- **Individuals who have received the BCG vaccine might express hesitancy toward testing and treatment of LTBI** because of their false sense of protection. In these instances, clarify that BCG does not offer lifetime protection against TB while acknowledging that this is a common misunderstanding
- **Patients might be hesitant to disclose their ethnicity or country of birth.** Asking for this information might invoke fear of deportation or other immigration concerns which can create barriers to LTBI testing and treatment. It is important to assure patients that the personal information they share will not be disclosed to anyone outside of the care team. To create a trusting environment for the patient, include on this care team staff from the same cultural or ethnic background as the patient whenever possible, as this person can offer sincere support (and can also potentially provide language interpretation, if needed)
- **Many patients fear the stigma of a TB diagnosis.** Discussing a TB diagnosis with patients requires a sensitive approach, as it might bring up feelings of fear, shame, and/or guilt. It is important to discuss with patients that everyone is at risk for TB since the bacteria that causes the disease is spread through the air

Integration of Community Health Workers in latent TB infection care coordination

Clinics can improve patient engagement and create patient-centered care through the inclusion of Community Health Workers (CHWs) in LTBI care. CHWs are trusted members of a specific community with shared experiences and have linguistic and cultural ties to their respective communities. They bring their own perspectives and understandings of community life and health issues that help to engage patients and ultimately improve community health. Staff in these roles have the cultural understanding to bridge gaps in care and mitigate issues that may impede patient care. Depending on the clinic settings, CHWs are sometimes referred to as patient navigators, health advocates, or promotoras.

Opportunities for CHWs to enhance patient experiences in clinical settings include:

- Providing LTBI outreach and education to individuals and communities
- Facilitating communication and interaction among health care providers and patients
- Encouraging communities to accept LTBI testing and treatment
- Empowering patients to take an active role in managing their treatment (e.g., reporting side effects)
- Serving as a liaison with community organizations to expand education, training and advocacy

COVID-19 and TB education

COVID-19 has increased the general public's understanding of airborne illness. This new awareness offers an opportunity to highlight TB as a threat to communities at higher risk and to showcase the importance of LTBI testing and treatment to prevent illness from TB. TB prevention partners can leverage lessons learned from the COVID-19 pandemic to strengthen TB awareness and communication strategies at clinic visits, supported by the use of engaging educational materials which

are culturally appropriate and available in multiple languages. Similarly, using social media platforms for health communication messaging created collaboratively with CBOs can help reach a wider audience.

Education resources

The California Department of Public Health TB Control Branch has developed a multitude of education resources for both providers and communities. Many can be adopted for your clinic's use to support patients and providers. The types of resources include:

- Posters
- Self-administered risk assessment
- Handouts and brochures
- Videos

Posters

Posters can be an effective visual tool to foster awareness and engagement around the value and need for TB prevention. Large (12"x18") TB awareness posters for clinics and other settings are available in several languages, including Traditional Chinese, Vietnamese, Spanish, and Tagalog. The messages of these posters include:

- “Loving your family starts with caring for yourself. Ask your doctor about getting tested for latent tuberculosis if you were born in Asia or traveled there for a month or more”
- “I thought the BCG vaccine gave me lifelong protection from tuberculosis. I was wrong. Talk to your doctor about getting tested for latent tuberculosis”
- “If you have lived in Mexico, Central or South America, or with someone sick with tuberculosis, you are at risk for having tuberculosis infection. Talk to your doctor about getting tested today”

Posters promoting LTBI awareness can be found on the TB Free California website at the link below.

 **LINK:** [LTBI educational posters](#)

Self-administered risk assessment


A TB self-risk assessment is an effective tool to help patients understand their risk for TB and the potential need to be referred for TB testing. The risk assessment tool can be completed by patients on their own and returned to a provider who can assess their risk. The full-size risk assessment can be found at the link below. This

assessment can be modified for individual clinics and populations based on local risk factors. This tool is also available in simplified Chinese, Spanish and Vietnamese.

 **LINK:** [Self-administered risk assessment](#)

Latent TB infection vs. TB disease explained

The tool linked below distinguishes the differences between LTBI and TB disease. This tool can be used to support patient and/or community education about TB. It is available in full-size at the link below.

 **LINK:** [Differences between LTBI and TB disease](#)

Tool is also available in other languages in the [CTCA Toolbox](#) (click on “LTBI education materials”)

Latent TB infection video resources

Several short videos have been developed to teach primary care providers (PCPs) how to talk with patients about LTBI testing and treatment, as these conversations can be challenging. In these videos, we model how to discuss testing for LTBI with patients, including those who have received the BCG vaccine. The videos are publicly available on YouTube at the links below.

 **LINKS:** [Why should I get tested for LTBI?](#)

[Why do I need treatment for LTBI?](#)

[I received a BCG vaccine, do I still need LTBI testing and treatment?](#)

Below are highlights of the short and simple messages used in the video clips linked above.²⁶⁻²⁸

- Why should I get tested for latent TB infection?
"We can diagnose tuberculosis infection with a simple blood test and there is treatment available. When latent TB is treated, we prevent TB disease from developing."
- Why do I need treatment for latent TB infection?
"In the United States, actually most of our TB disease comes from people who have had progression of a latent infection; so latent TB infection medicines can prevent TB disease from developing and from spreading to other people."
- I received a BCG vaccine, do I still need latent TB testing and treatment?
"The BCG vaccine is not completely effective, and it doesn't protect you for life. BCG [vaccine] is most effective in protecting young children against the more severe forms of TB disease."

HELPFUL RESOURCES: TB patient survivor stories can also be helpful to promote TB prevention among populations at higher risk. Through sharing their lived experiences, survivors can inform communities about the importance of TB testing and treatment, mitigate impacts of stigma across different cultures and serve as peer support.



LINKS: [Former TB & LTBI patient stories](#)

[We are TB peer support](#)



TIP: Fact sheets on LTBI testing and treatment in the languages used in a clinic can be integrated into an EMR. When the patient is in the office, the desired LTBI information sheet, in a specific language, can be selected and printed along with the After Visit Summary document. These materials are useful for augmenting discussions between the patient and the provider.



Providing care for patients with latent TB infection

Providing care for patients with latent TB infection

The clinical algorithm for approaching LTBI testing and treatment shown below outlines the basic steps in identifying individuals at risk and testing and treating patients with LTBI in a clinic setting. Each of the four prevention actions are reviewed in more detail on the following pages. A supplemental page that further covers information in the algorithm is also available at the link below.

The figure on the next page displays a risk assessment tool that patients can complete on their own and return to a provider who can assess their risk. The footnotes for the graphic can be found at the link below.

FIGURE 4: LTBI clinical algorithm for providers



LINK: [LTBI clinical algorithm](#)

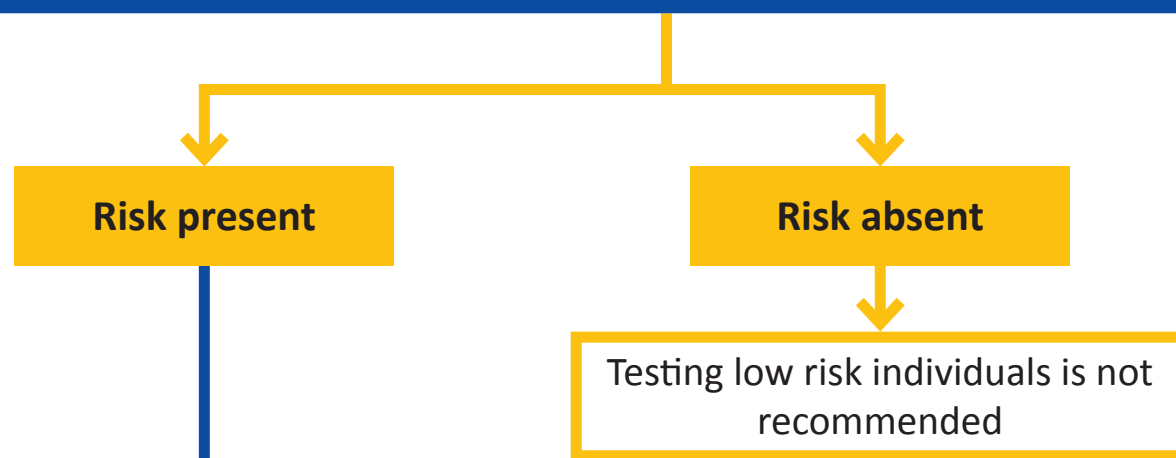
Prevent Tuberculosis (TB) in 4 Steps: A Guide for Medical Providers

TB 101

1

Identify patients at risk for TB infection

- Use California TB Risk Assessment¹



TB disease: TB is transmitted through the air and infects the lungs, but can spread to other organs. People with TB disease usually have symptoms such as cough, fever, or weight loss, and are often highly infectious.

TB disease is deadly: more than 1 in 10 patients die.

Latent TB infection (LTBI): asymptomatic infection with TB bacteria. Although persons with LTBI feel well and are not infectious, they can develop TB disease months or years after being infected.

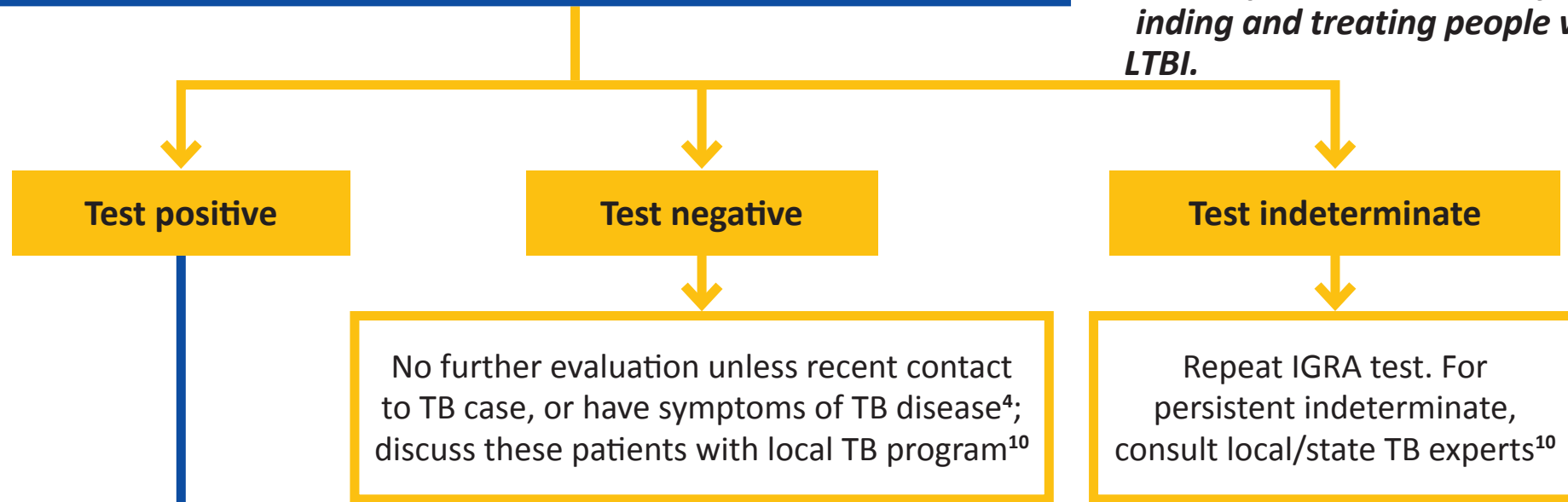
80% of TB disease in California comes from progression of untreated LTBI.

We can prevent TB cases by finding and treating people with LTBI.

2

Test patients for TB infection

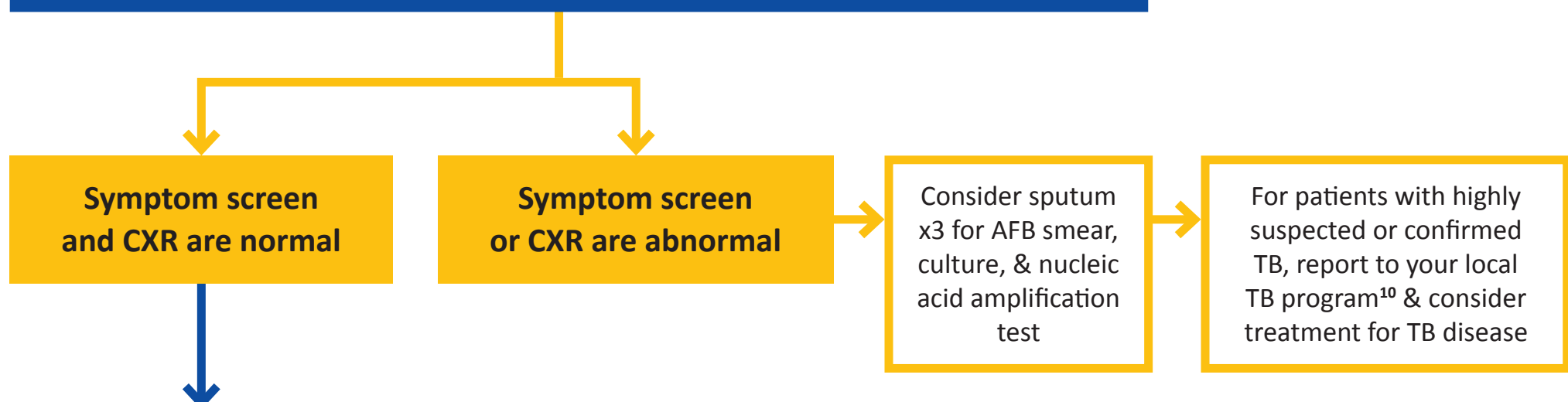
- Use interferon gamma release assay (IGRA) if possible, especially for non-U.S.-born patients^{2,3}



3

Evaluate for TB disease

- Use TB symptom screen⁴, physical exam, and chest x-ray (CXR)⁵
- Do not treat for latent TB infection (LTBI) until TB disease is excluded



4

Treat LTBI to prevent TB disease

- Evaluate for pregnancy⁶ and relevant medical conditions⁷
- Check baseline liver function tests (LFT) for select populations⁸
- Use 3 or 4 month LTBI treatment regimens whenever possible⁹



1: Identify patients at higher risk of TB infection

As mentioned earlier, in 2016 the USPSTF updated its screening recommendations and recommended screening and testing for LTBI for adults at higher risk for TB. The Task Force specifically mentioned non-U.S.-born persons from countries with higher TB incidence as an important risk group to be assessed. Non-U.S.-born populations have the highest rate of TB in California — 14 times higher than the rate among U.S.-born persons and half of TB cases in non-U.S.-born persons occurred

Non-U.S.-born populations have the highest rate of TB in California — 14 times higher than the rate among U.S.-born persons

more than 20 years after arrival in the U.S.⁴ Increasing screening, testing and, when appropriate, treatment of these persons would contribute to decreasing the substantial TB disparities found between non-U.S.-born Californians from high prevalence countries and U.S.-born Californians.

The large reservoir of the more than two million people in California with LTBI — again, largely among residents from high TB prevalence countries — represents possible future cases of TB. However, TB is a disease that can be averted with effective prevention steps for LTBI testing and treatment. Approximately 80% of TB cases in California occur as a result of untreated LTBI that progresses to TB disease. Identifying patients with a risk factor for LTBI demands the need for TB testing, and for those who are positive, the critical next step is to provide linkage to care to ensure treatment initiation (and, ultimately, completion) occurs so TB disease can be prevented.

Following engagement in care, the first step in the clinical care of LTBI is to assess patients for risk factors. We suggest using the California TB risk assessments as a guide for adult or pediatric patients. Although there are many factors that can increase a patient's risk of TB exposure or progression to TB disease, the California TB risk assessment takes into account both TB epidemiology and the risks presented by an individual's co-morbidities. This risk assessment tool lists the four most important risks and prompts testing patients for LTBI if they have one or more of the risk factors listed on the following page.

- **Birth, travel, or residence in a country with an elevated TB rate** for at least one month (this includes any country other than the United States, Canada, Australia, New Zealand or a country in western or northern Europe)
- **Immunosuppression**, current or planned, including HIV infection, organ transplant recipient, treated with TNF-alpha antagonist (e.g., infliximab, etanercept, others), steroids (equivalent of prednisone ≥ 15 mg/day for ≥ 1 month) or other immunosuppressive medication
- **Close contact** to someone with infectious TB disease during lifetime
- **Homelessness or incarceration**, current or past

Local epidemiology and/or mandates may support testing for other groups (e.g., residents of homeless shelters). Your local TB program can inform you about specific risk factors in your local jurisdiction. In general, it is not recommended to test patients without a clear risk factor.

A note about the BCG vaccine: BCG is a live, attenuated vaccine against TB that is given during childhood in many countries with moderate or high TB incidence. Vaccination with BCG is most effective at preventing severe forms of TB disease in childhood. However, due to waning immunity in the 15-20 years following vaccination, a history of BCG vaccine is not considered protective against TB disease in adults. If a patient reports a history of BCG vaccination as well as a risk factor for LTBI, they should be tested for LTBI using an IGRA test.

2: Test patients for latent TB infection

As shown in the algorithm, the second step in providing clinical care is to test for LTBI using an IGRA.

There are two types of tests available to detect TB infection: (1) IGRA, which include QuantiFERON-TB Gold (QFT) and T-SPOT.TB (T-SPOT) tests and (2) tuberculin skin tests (TST). Both IGRA and TST tests are immunologic tests, rather than direct testing for mycobacterial organisms. Neither type of test can distinguish between LTBI and TB disease.

IGRAs are preferred tests for TB infection in individuals ≥ 2 years old.

- In contrast to TST, IGRAs do not cross-react with non-tuberculous mycobacteria, and prior vaccination with BCG does not cause a false-positive IGRA result
- Additionally, IGRAs can be obtained during a single patient visit, and the results include both a quantitative value and interpretation, and therefore are not based on subjective interpretation/misinterpretation of results as are TST results

However, neither TSTs nor IGRAs are not 100% sensitive or specific, and either test can produce false-negatives. If TB disease is suspected based on history, symptom screen or physical exam, obtaining sputum (or alternate clinical specimen if extra-pulmonary TB is suspected) for nucleic acid amplification test (NAAT), smear and culture, is the process to definitively diagnose TB disease.

IGRA tests explained

IGRA tests involve a blood draw (anti-coagulated whole blood) and laboratory processing. In both IGRA tests, a patient's blood is mixed with antigens that trigger sensitized T cells to release interferon-gamma. IGRA antigens are designed to be specific to *Mycobacterium tuberculosis-complex spp* and do not include antigens found in the BCG vaccine.

Each test includes a mitogen (positive) control and a nil (negative) control. The IGRA report will include a quantitative results section, as well as a results interpretation stating that the test is positive, negative or indeterminate. Each test also requires careful laboratory processing, thus multiple indeterminate (QFT) or invalid (T-SPOT) tests should prompt review of laboratory procedures. Limited data exist on the use of IGRAs in young children, so TST is the preferred test among children younger than two years old.

QFT and T-SPOT have similar sensitivity and specificity in most published studies; we do not recommend one test above the other.

An additional resource from the National TB Controllers Association (NTCA) on testing¹⁸ is linked below.



LINK: [NTCA Companion Document on Recommendations for Testing and Treatment of LTBI in the US — Clinical Recommendations](#)

3: Evaluate for TB disease

Neither IGRA nor TST testing can distinguish LTBI from active TB disease. If the IGRA or TST test is positive, symptom screening, physical exam and chest x-ray are necessary to rule out TB disease. LTBI should not be treated until an evaluation for TB disease is complete and TB disease is reasonably excluded.

In 2020, NTCA released a comprehensive clinical guide to LTBI testing and treatment that is a useful document to augment this Guidebook. The document is entitled “Testing and Treatment of Latent Tuberculosis Infection in the United States: Clinical Recommendations” and can be downloaded from the NTCA website.¹⁸

TB symptom screen and physical exam

All patients with a positive IGRA or TST should be asked about the presence of any of the following symptoms to evaluate for TB disease: cough for more than two weeks, hemoptysis, fever, night sweats and unexplained weight loss. Note that although pulmonary TB is the most common form of TB disease, TB can disseminate to almost any extra-pulmonary site. If there is a high clinical suspicion of TB (e.g., for a household contact of a TB case who reports a new cough), perform a full review of symptoms and a careful physical exam, especially paying attention to vital signs, weight, pulmonary and lymph node exam. If the patient is an infant or child, be sure to review all previous and current growth curves.

Chest x-ray

All patients with a positive IGRA or TST and with no prior TB treatment should receive a chest x-ray (CXR) to be evaluated for TB disease. A posteroanterior (PA) view is sufficient for patients ≥ 10 years. For patients < 10 years, obtain both a PA and lateral view. CXR abnormalities in TB disease may include infiltrates, nodules, cavitations, effusions and/or hilar lymphadenopathy. If there are abnormalities on the chest imaging of a patient with a positive IGRA or TST test, it is recommended that you discuss the findings with an experienced chest radiologist and/or a clinician at your local TB control program.

Pregnant persons with a positive IGRA or TST should receive prompt evaluation for TB disease, including CXR with abdominal shielding. Although preventive treatment can generally be deferred following the post-partum period due to risk of hepatotoxicity of LTBI medications in pregnancy and early postpartum period, it is important to complete a medical evaluation for TB disease to protect both mother

CXR findings to prompt further TB evaluation:

- Infiltrate/consolidation
(often upper lobe or apical location in adults)
- Cavitory lesion(s)
- Fibroparenchymal/reticular opacities/nodules
(a very small solitary calcified nodule is not typically associated with active TB)
- Lymph node enlargement or hilar prominence
(mainly in children)
- Pleural effusion/pleural thickening
- Linear scarring/fibrosis
- Bronchiectasis
- Atelectasis/collapse/lung retraction
- Multiple scattered tiny bilateral nodules
(e.g., miliary TB)

and infant. A frequently asked questions (FAQ) resource for pregnant patients can be found at the link below.



LINK: [FAQ for pregnant persons and new mothers](#)

4: Treat latent TB infection to prevent TB disease

Offering treatment and counseling patients

Most patients with a positive IGRA or TST, a completed medical evaluation with no evidence of TB disease and no history of LTBI treatment should be offered LTBI treatment.

Patients might have misconceptions or feel stigma associated with their diagnosis of LTBI. It is important to explain to patients that although their infection is not currently making them feel sick, inactive bacteria can become active at any point later in their life, and that LTBI treatment is the best way to protect themselves and their families from future TB disease. For guidance on how to counsel patients, including a script and frequently asked questions, see: [How to Talk to Patients about LTBI — Adult](#) and the [Pediatric](#) versions. Starting the conversation with what the patient already knows and what concerns the patient has about both TB and LTBI, offers the opportunity for the provider to provide more accurate information while building on the patient’s prior knowledge and experience. This process allows the provider to tailor the conversation to each individual patient.

Choice of LTBI regimen

NTCA’s clinical recommendations for testing and treatment of LTBI discuss the general principles concerning whether or not to treat a given patient identified to have LTBI.¹⁸

An LTBI treatment regimen should be selected based on the patient’s medical history, drug interactions and patient preference. Three- or four-month regimens containing rifamycins (e.g., rifampin or rifapentine) are preferred over six to nine months of isoniazid.¹⁹ Because the rifamycin-based regimens are shorter, there is a higher likelihood that patients will complete treatment. Additionally, rifamycin-based regimens are less hepatotoxic and better tolerated. [LTBI treatment regimen drug dosages](#) can be found in Appendix B. A resource on drug-drug interactions for isoniazid and rifamycins can be found at the link below. See also Appendix B for a [full-size LTBI treatment option reference card](#).



LINK: [Common drug interactions related to isoniazid and rifamycins](#)

Clinical monitoring of the patient during LTBI treatment

Baseline liver function tests (LFTs) are needed prior to starting LTBI treatment for all pregnant patients and for patients with certain medical conditions, such as HIV infection; liver disease (including cirrhosis, non-alcoholic fatty liver disease, chronic

hepatitis B and C); heavy alcohol use; use of hepatotoxic medication; or age >50. Consider screening patients at higher risk for hepatitis B and C, including patients who inject drugs and patients immigrating from high incidence regions. Patients with these conditions can still be treated but require baseline lab testing and clinical follow-up during treatment. Younger healthy adult and pediatric patients not meeting the above criteria do not require laboratory screening prior to LTBI treatment. Repeating monthly laboratory testing is prudent for patients with baseline abnormalities and those at increased risk of hepatotoxicity.

All patients on LTBI treatment can benefit from clinical follow-up during their treatment to support adherence and monitor for side effects. This clinical follow-up need not be in-person visits with a medical provider. Many clinics choose to use other staff to monitor LTBI treatment — some options are described below.

- Nursing staff can serve as an “LTBI care coordinator” and can monitor patients on treatment and provide follow-up phone calls
- Pharmacy staff can provide education and adherence check-ins at the time of prescription pick-up
- Medical assistant staff can support with data entry, faxing orders, flagging patients for monitoring and coordinating follow-up calls
- Community health workers can also serve as liaisons to encourage and empower patients to complete treatment
- Another model is to establish an LTBI treatment unit overseen by a mid-level practitioner

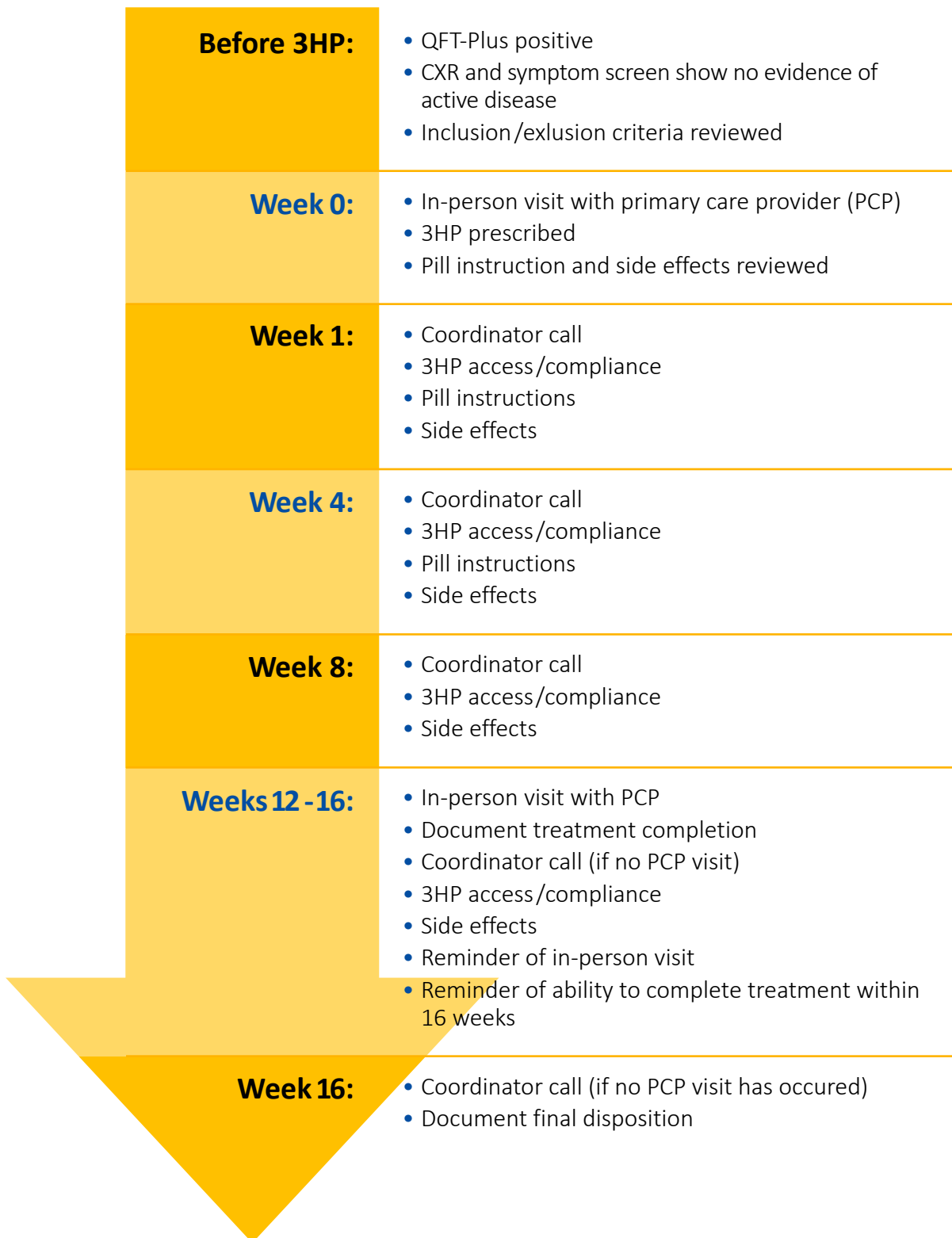
A sample schedule of patient encounters to monitor 3HP adherence is presented in Figure 5, and additional treatment monitoring details in an [LTBI Monitoring Tool for 3HP](#) can be found in Appendix C. Although the schedule presented in Figure 5 is specific to the 3HP regimen, it can be tailored to other LTBI regimens and the resources available in your clinic.

For additional resources on treatment, including specific considerations for patients who are children, or are pregnant, breastfeeding, or persons living with HIV, immune suppression, liver or kidney disease,^{18,19} see the links below.



LINKS: [NTCA Companion document: Testing and Treatment of LTBI in the US – Clinical Recommendations](#)
[CDC MMWR 2020 LTBI treatment guidelines](#)

FIGURE 5: Sample LTBI Monitoring Tool for 3HP



Before 3HP:	<ul style="list-style-type: none">• QFT-Plus positive• CXR and symptom screen show no evidence of active disease• Inclusion/exclusion criteria reviewed
Week 0:	<ul style="list-style-type: none">• In-person visit with primary care provider (PCP)• 3HP prescribed• Pill instruction and side effects reviewed
Week 1:	<ul style="list-style-type: none">• Coordinator call• 3HP access/compliance• Pill instructions• Side effects
Week 4:	<ul style="list-style-type: none">• Coordinator call• 3HP access/compliance• Pill instructions• Side effects
Week 8:	<ul style="list-style-type: none">• Coordinator call• 3HP access/compliance• Side effects
Weeks 12 -16:	<ul style="list-style-type: none">• In-person visit with PCP• Document treatment completion• Coordinator call (if no PCP visit)• 3HP access/compliance• Side effects• Reminder of in-person visit• Reminder of ability to complete treatment within 16 weeks
Week 16:	<ul style="list-style-type: none">• Coordinator call (if no PCP visit has occurred)• Document final disposition

Billing for latent TB infection care

Depending on the clinic, the patient population may be publicly or privately insured, uninsured or represent a combination of these insurance statuses. Under the U.S. Affordable Care Act (ACA), health plans are required to cover preventive services recommended by the USPSTF, including the recommendation to screen adults for LTBI. The ACA also includes a provision that preventive services be provided without patient cost-sharing (e.g., copay, deductible). Below are tips for billing for LTBI services, with a focus on Medi-Cal, California's Medicaid health care program.

Screening and testing

The USPSTF recommends screening for LTBI in adult populations at increased risk.¹⁵

- Preventive services recommended by USPSTF are required to be covered by both public and private insurance plans without patient cost-sharing.^{29,30} Services may need to be provided by in-network providers. Note some older health insurance plans (i.e., “grandfathered plans”) may exclude this benefit.
- For children, Bright Futures is a national initiative that recommends screening for LTBI in pediatric patients at higher risk for TB.³¹ Similarly, this service is covered by most plans with no patient cost-sharing

When billing Medi-Cal Fee for Service or documenting a service for a Medi-Cal Managed Care insurance plan, the provider must include one of the Current Procedural Terminology (CPT) codes for TB testing: 86580 (IGRA-QuantIFERON), 86481 (IGRA-T-SPOT), 86480 (TST).³²

- Any ICD-10 diagnostic code can be used with these CPT codes. See Appendix C for a [comprehensive list of ICD-10 codes related to TB](#)
- CPT codes can be billed with “modifiers” to provide further detail on the procedure performed or service rendered. Modifier 33 can be used when billing the TB testing CPT codes, indicating the service was provided in accordance with USPSTF recommendations and is not subject to ICD-10 inclusion or exclusion criteria³³
- Medi-Cal reimbursement rates can be found online³⁴
- If an insurance plan rejects payment for the test, the provider or patient can request a review of the denial and submit an appeal if the denial is upheld
- Providers can also submit a request for prior approval to use an IGRA, if needed



TIP: Local public health laboratories might be able to offer reasonable pricing ranges for IGRA tests. Clinics should communicate with their local laboratories to discuss competitive pricing based on anticipated test volume. This may be particularly helpful for clinics that have traditionally not ordered many IGRAs but are planning to scale-up and order a higher volume of IGRA testing in the future. Large laboratories may offer health equity or other types of grants to address disparities in health conditions, including TB.

As previously mentioned, IGRAs are a more specific test and are recommended for anyone with a risk factor for TB, including BCG-vaccinated individuals. If resources do not allow for IGRA testing for all patients at higher risk, clinics may choose to prioritize BCG-vaccinated individuals for IGRAs and order TSTs for non-BCG-vaccinated or U.S.-born individuals.

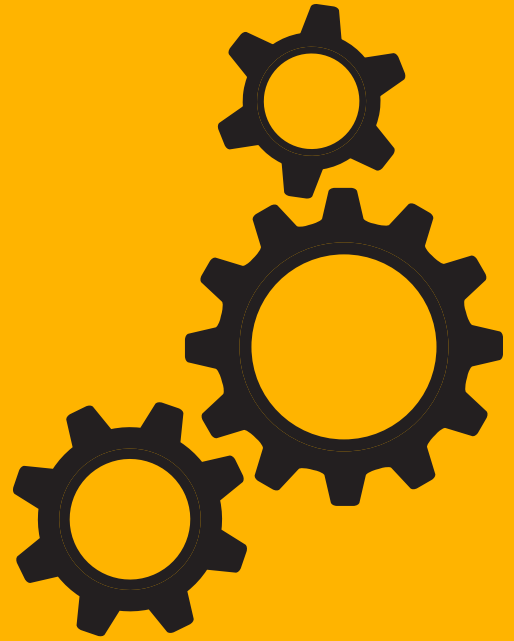
Chest x-ray

In Medi-Cal Managed Care Plans, ordering a chest x-ray to rule-out TB disease may be considered a preventive service or a medically necessary service following a positive test result and be covered under the plan's medical benefit policy. It should be billed with the ICD-10 code for a positive TST (R76.11) or positive IGRA (R76.12), depending on which is applicable to the patient. Some plans may also accept a TB screening code, such as Z11.1.

Treatment

Typically, billing for isoniazid and rifampin treatment does not present significant challenges. Of note, prescriptions may need to be written for one-month of medication at a time. While rifapentine is on the formulary for Medi-Cal plans (and therefore incurs no share of cost for Medi-Cal members), on other plans, its tier status might differ, resulting in varying levels of patient cost-sharing or prior approval required. Similarly, prescriptions for three months of once-weekly isoniazid and rifapentine (3HP) might need to be written in one-month intervals for coverage. Four months of rifampin can be an alternative to 3HP in situations in which cost is prohibitive.

For additional information on coding and billing for LTBI, see the Heartland National TB Center's resource, "[Screening, Diagnosis and Treatment of LTBI in Primary Care Settings](#)," pages 3, 4 and 6.



Measurement of the latent TB infection care cascade

Measurement of the latent TB infection care cascade

Definition and rationale for the latent TB infection care cascade

A care cascade is a public health model that outlines the discrete steps needed to diagnose and treat individuals with a particular disease condition. An LTBI care cascade describes the discrete steps needed to identify persons with LTBI and ensure that they complete treatment to prevent progression to TB disease.²⁰ Measuring an LTBI care cascade can help clinics to analyze their current LTBI practices, identify points of attrition and highlight opportunities for improvement. The LTBI care cascade also reveals TB prevention testing and treatment outcomes for your patient population. Steps in the care cascade can serve as key LTBI care indicators to monitor and improve over time.

For example, two key LTBI care indicators that a clinic could monitor are:

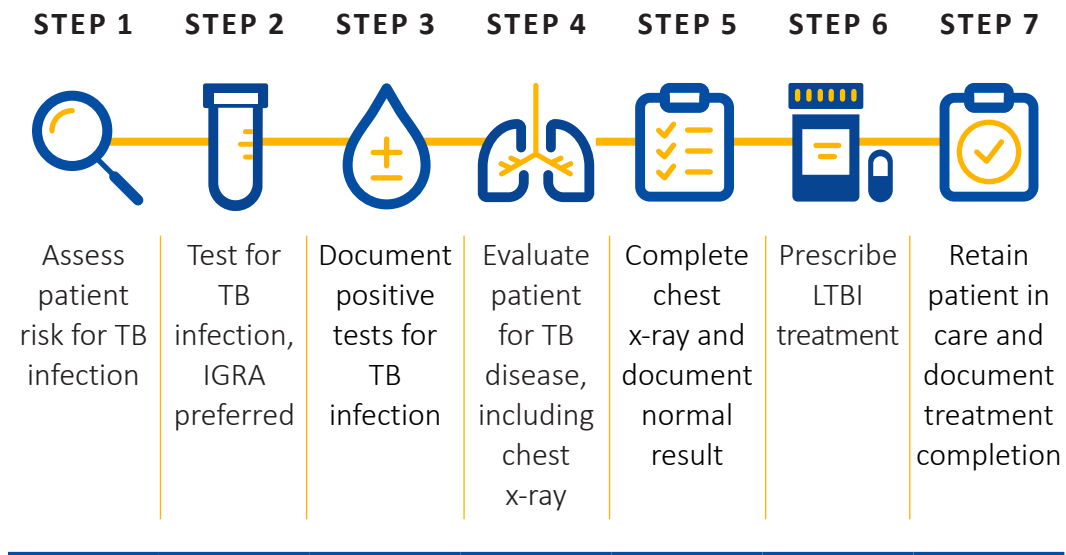
1. Proportion of the population at higher risk that received an LTBI test
2. Proportion of the population with a positive test that has completed LTBI treatment

For most clinics, the easiest way to measure the steps of a care cascade is by using an EMR to extract or report out data on outcomes, which helps track both individual patients and clinic progress. Ensuring that patients make it through the cascade is key to preventing TB.

Steps in the latent TB infection care cascade

On the next page is a schematic of the seven steps in the LTBI care cascade. Although there may be other steps you choose to capture, this care cascade can be used as a starting point or model for your work to understand LTBI practices in your clinic. The next section includes further detail on each step and how patient data can be captured in an EMR.

FIGURE 6: Steps in the LTBI care cascade



The [LTBI care cascade graphic](#) above and provided in Appendix C, was developed to assist clinics and health systems to generate their own LTBI care cascades, using information contained in their EMR. This graphic was developed by CDPH after working with clinics throughout the state, extracting data from EMRs, building LTBI reports and analyzing data for quality improvement projects. In this Guidebook, we address challenges that are commonly encountered when clinics first start to track LTBI testing and treatment and suggest data elements from an EMR that can be used to populate an LTBI care cascade. The ultimate goal is to develop a standardized approach to measuring LTBI care indicators and to enable comparison of these metrics over time and across different clinical settings.

A Three-Page Guide to Measuring the LTBI Care Cascade

STEP 1: Assess risk for TB infection



Use the California TB risk assessments to identify those at risk for TB infection. The risk assessments can be built into an EMR's standard wellness chart note or as part of the health maintenance section. Ensure that the chosen method allows for extraction of discrete fields for monitoring. Persons born outside the United States represent the largest group at higher risk for TB in California. Country of birth might be available in an EMR's "Registration" or "Demographic" section but may not be visible to all medical providers or completed routinely. Clinics can consider using primary language as a proxy to identify the non-U.S.-born. The "Problem list", common in most EMRs, may include some risk factors based on the International Classification of Diseases (ICD) codes, e.g., the ICD-10 code "Z20.1 Contact to TB", and can be helpful for identifying patient risk factors. Immunosuppression status can sometimes be found in the "Medications" section of the EMR.

STEP 2: Test for TB infection



For patients with an identified risk factor for LTBI, the next cascade step is to test for TB infection using an IGRA test. IGRAs are recommended over tuberculin skin tests (TSTs) for patients aged ≥ 2 years, as these results are not affected by a patient's prior BCG vaccination. For patients age < 2 , use a TST. If an IGRA is used, typically there is a lab order in the "Orders", "Laboratory" or "Results" section of an EMR; TST might be documented in the EMR's "Immunization" section. Prior TB testing might be documented in the "Medical history" section or the "Problem list".

STEP 3: Document positive tests for TB infection



TB test results should be documented in the EMR. IGRA results are usually captured by the presence of a lab report in "Laboratory" or "Results", while TST results may be documented in the "Immunization" section or "Notes" section. Positive results cannot distinguish between an LTBI or TB disease diagnosis, so further evaluation is needed for patients with positive test results. ICD-10 codes indicating a nonspecific reaction to TST and IGRA exist and can be used to document a positive TB test.

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STEP 4: Evaluate patients for TB disease



If either the IGRA or TST is positive, symptom screening, physical exam and CXR are necessary to rule out TB disease. For the purposes of the care cascade, this step may be captured by a CXR order, which is usually found in the “Orders” section of the EMR. Creating a CXR order is critical to avoid attrition. Patients sometimes encounter barriers to obtaining and completing a CXR after it is ordered, which is why this cascade step is listed separately from CXR completion (step 5).

STEP 5: Complete CXR and document normal result



Performing a CXR is a crucial step to rule out TB disease. When someone has TB disease of the lungs, CXR abnormalities are typically present. In contrast, when TB infection is latent (LTBI), the CXR is usually normal. CXR results are usually available in the “Imaging”, “Results” or “Radiology” sections of an EMR. To ensure results are captured in a systematic way, standardized documentation prompts (e.g., dot phrase or predictive text in the EMR) could be developed to capture normal vs. abnormal during provider review. Once the CXR has been reviewed and documented as normal, a diagnosis of LTBI should be determined and documented. The ICD-10 code “Z22.7” indicates an LTBI diagnosis and can be incorporated into a “Problem List” or other EMR location.*

STEP 6: Prescribe LTBI treatment



Individuals with a normal CXR should be offered and treated with the recommended 3- or 4-month LTBI treatment regimens, selected based on their medical history, possible drug interactions and personal preference. This step indicates a prescription has been issued for LTBI treatment and is commonly documented in the EMR’s “Orders” or “Medications” sections. ICD-10 codes and drug combinations can be helpful to distinguish drugs prescribed for LTBI vs. TB disease. Refer to the National TB Controllers Association’s guidance titled “Testing and Treatment of LTBI in the United States: Clinical Recommendations” to support your discussion and offer of treatment to your patient.¹² Additional data fields that indicate why treatment was not prescribed can be added to an EMR to help assess barriers to performance and to take into account previous treatment, if applicable.

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STEP 7: Retain patient in care and document LTBI treatment completion



TB disease can be prevented by ensuring patients are retained in care and complete treatment. Clinics can consider appointing an “LTBI Care Coordinator” (e.g., nurse, pharmacist) to check in with patients regarding adherence and medication side effects. It is critically important to document treatment completion in an EMR, ideally in a discrete field with the completion date. Definitions of treatment completion for purposes of the cascade can also include prescription data or pharmacy dispensing data that documents an adequate number of months of treatment or “completion” as the reason for medication stop. Treatment completion can also be documented in the EMR following capture by the treating provider or health care team member who interviews that patient at the end of therapy.

* If the CXR is abnormal, but the *Mycobacterium tuberculosis* cultures are negative and the patient is asymptomatic, LTBI (not TB disease) is likely to be diagnosed.

EMR interventions to capture and improve the latent TB infection care cascade: case examples

EMRs can be powerful tools in TB prevention efforts. With existing data elements and/or minor modifications, they can be used to measure LTBI care practices and support medical providers who are trying to increase LTBI testing and treatment.

In this section, we present three case examples that illustrate how clinics have utilized their EMRs to improve LTBI diagnosis and treatment. EMR interventions often require involvement of an EMR analyst to build and implement the intervention. The case examples shared below and on the next pages are ordered by level of complexity of the EMR intervention and the level of analyst involvement required — the first example illustrating the least complexity and the subsequent ones more complexity. As you will see, there are simple modifications that you can make to an EMR that can make a substantial impact on measuring and improving LTBI care in your clinic.



Three case examples of EMR interventions

1. A family medicine clinic affiliated with an academic center created a real-time report of patients at higher risk for TB infection and added TB testing to existing order sets
2. A FQHC successfully improved treatment rates for LTBI by implementing a package of EMR interventions, including the integration of:
 - annual TB risk assessment;
 - standing reminders for TB testing;
 - automated positive result letter;
 - LTBI treatment form; and
 - provider progress reports
3. A TB clinic with a network of primary care clinics custom built a TB module in their EMR which allowed them to evaluate their LTBI care cascade



CASE EXAMPLE 1

Incorporate EMR reminders and reports to remove provider barriers to LTBI care

OVERVIEW: A family medicine clinic affiliated with an academic center created a real-time report of patients at higher risk for TB infection and added TB testing to existing order sets.

BACKGROUND: This clinic learned that a large proportion of TB cases in the county also had diabetes. The clinic knew they saw mostly non-U.S.-born patients and already had a well-established diabetes management program. Therefore, they narrowed their focus to work on improving testing and treatment for the non-U.S.-born diabetic patients within their clinic population. A baseline assessment demonstrated a need for better follow-up and monitoring of patients on LTBI treatment. The clinic champion presented the need for and importance of TB prevention to clinic leadership; the clinic leadership agreed to support simple EMR modifications to improve LTBI care.

Interventions:

1. EMR order set modifications

- Added IGRA to a standardized order set for diabetic patients, which prompts clinical providers to order QFT testing as part of their routine evaluation for adult diabetic patients

2. Auto-generated report of non-U.S.-born patients with diabetes

- Created a report of adult non-U.S.-born patients with diabetes to facilitate monitoring (Figure 7)
- Variables include: name, date of birth, age, sex, medical record number, phone number, primary care visit in last 18 months, QFT test date, QFT result, last HbA1c value, diabetes, last visit date, next appointment date, current PCP

3. LTBI care coordinator

- Assigned a dedicated part-time LTBI care coordinator to monitor the report and remind patients about upcoming appointments and ensure patients complete CXRs
- For patients placed on treatment, LTBI care coordinator ensures patients adhere to treatment by following up monthly (by telephone)

FIGURE 7: Sample EMR report of non-U.S.-born patients with diabetes

MRN	Phone	Last visit date	Next appt date	PCP
123	999-999-9999	1/1/2020	1/10/2020	Physician

QFT date	QFT result	Last HbA1c	Place of birth
1/2/2020	POSITIVE	7	Mexico

Advantages to this intervention:

- Streamlined testing orders for a population at higher risk for TB, using existing EMR functionality
- Did not require extensive modifications by an Epic analyst
- Created an electronic patient report for LTBI care coordinators to easily identify patients needing follow-up for LTBI care

Challenges to this intervention:

- Modification of the EMR order sets, while not extensive, still involved working with an EMR analyst. Creation of patient reports and maintenance may also require continued EMR analyst support to troubleshoot issues
- Recruitment and support for a dedicated LTBI care coordinator can be a challenge
- Successful coordination of follow-up relies on the LTBI care coordinator to build relationships with patients to address potential barriers to treatment, including transportation and linkage to social services



TIP: Consider partnering with a local nursing school or other medical professional training program to develop an LTBI care coordinator program. With the appropriate training and sufficient resources, such a program could be an effective and productive opportunity for both clinics and students.

Takeaway messages:

- Relatively simple EMR interventions can improve LTBI testing and treatment outcomes
- A baseline assessment of current practices and data will help to identify which steps of the cascade need the most improvement and can drive the type of EMR intervention needed



CASE EXAMPLE 2

Enhance existing EMR structure to monitor key steps related to LTBI care

OVERVIEW: An FQHC successfully improved treatment rates for LTBI by implementing a package of EMR interventions, including the integration of: 1) annual TB risk assessment; 2) standing reminders for TB testing; 3) automated positive result letter; 4) LTBI treatment form; and 5) provider progress reports.

BACKGROUND: This clinic identified that a large proportion of their patients were at elevated risk for TB, notably non-U.S.-born patients. Clinic staff stepped up to serve as champions for TB prevention. Over several years, they identified multiple points at which an EMR intervention would be helpful. Provider progress reports allowed the clinic to measure performance across clinics and providers.

Interventions:

1. Annual TB risk assessment

- Incorporated the California TB risk assessment tool into the EMR, with modifications based on local epidemiology
- Added a provider alert to complete the annual risk assessment



TIP: Risk assessment could be incorporated into the EMR as part of a well visit template or a health maintenance flag, similar to a reminder about an annual flu shot or other immunization. See Figure 12 for different types of EMR provider enablers.

2. Standing reminders and orders for testing and CXRs

- Patients were asked at registration about their country of birth; if the country is outside the U.S., Canada, Australia, New Zealand, or northern or western Europe, a prompt notifies the provider that the patient is at higher risk of TB, and reminds them to complete the risk assessment and order LTBI testing
- A positive TST or IGRA will prompt the order of a chest x-ray, ensuring this important step to rule out TB is not missed

- 1. Automated letter sent to patients with a positive test result**
 - Patient letters prompt patients to initiate follow-up with a provider regarding a positive TB test
- 2. LTBI treatment form included in provider plan documentation in the EMR (Figure 8)**
 - LTBI treatment form provided consistent documentation in the EMR regarding whether treatment was prescribed that day, if the patient refused treatment or if there was another reason treatment would not be prescribed
 - A date field was added to capture when LTBI treatment was last discussed with the patient — to identify when follow-up may be needed
- 3. Provider progress report (Figure 9)**
 - Allows providers and staff to monitor progress in testing and treatment for patients at higher risk
 - Provides summary metrics by provider (e.g., proportion of patients at higher risk tested, proportion of positive TST/IGRA with CXR completed) to monitor LTBI care and compare across clinics and providers
 - Includes line list options to identify patients who might need further follow-up (e.g., positive TST/IGRA but no CXR date) so action can be taken

FIGURE 8: Sample LTBI treatment form

My Plan

- ICD-10 diagnostic code: Z22.7, R76.12

Details: LTBI discussed [3/1/2021]. [Will rx today].

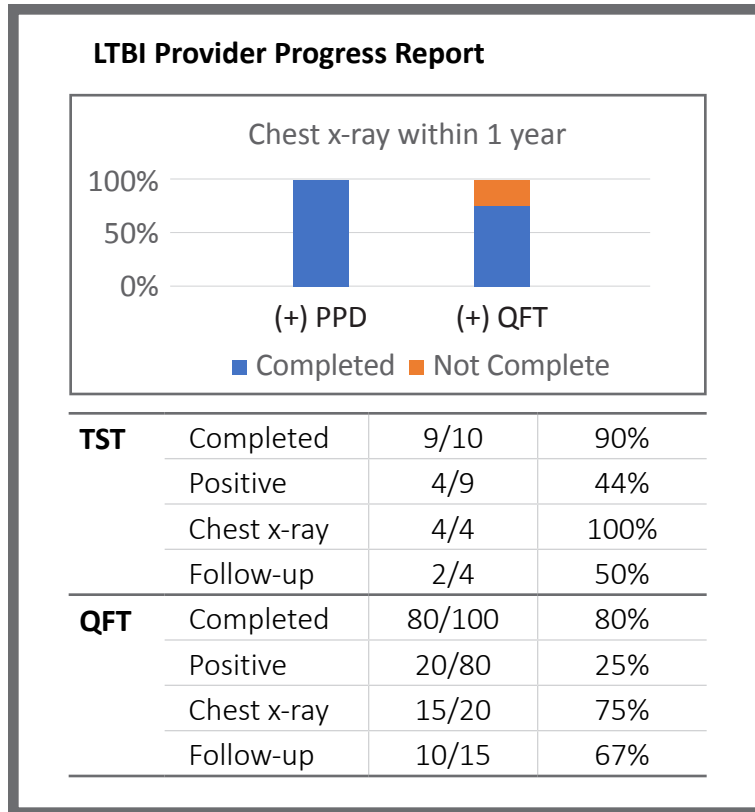
LTBI Treatment

Last Date Discussed: _____

- Will prescribe today
- Patient refused, risks and benefits discussed
- Already treated
- Treatment not indicated
- Other

FIGURE 9: Sample provider progress report

Report can be integrated into an EMR for providers to monitor their progress in testing and evaluating patients at higher risk for LTBI.

**Advantages to this intervention:**

- Several LTBI specific modifications are built upon existing EMR infrastructure
- Reminders and standing orders are incorporated into the EMR for saving time
- Patients are empowered to talk to their provider by ensuring those with a positive TB test result are provided a formal letter with recommendations for next steps

Challenges to this intervention:

- Requires modification to an EMR, likely requiring some EMR analyst time. Ongoing support for reports and other needs might require additional EMR support
- Needs an onsite clinic TB champion and provider buy-in for successful implementation and continued progress

Takeaway messages:

- Any single step or intervention, even on its own, can help to improve LTBI testing and treatment within a clinic setting. The five interventions described in this case were implemented over time, not simultaneously
- A baseline assessment of current practices and data helps to identify which steps of the cascade need the most improvement and helps to identify the type or types of EMR interventions needed. For example, getting patients at higher risk to get tested has been a point of attrition at some clinical sites, so adding data collection forms or fields to collect risk factors and incorporating standing orders is frequently a high-impact first step



CASE EXAMPLE 3

Build an EMR module to comprehensively capture LTBI care

OVERVIEW: A TB clinic within a network of primary care clinics custom built a TB module into their EMR that allowed them to evaluate their LTBI care cascade with a high level of detail.

BACKGROUND: The TB clinic was very familiar with diagnosing and treating patients for TB disease and LTBI. They identified a need for standardized documentation of LTBI care through treatment completion. Their EMR modification plan would allow them to generate detailed LTBI care cascades routinely and observe gaps and opportunities for improvement in the cascade.

Intervention:

Episode of care

- This clinic utilized a feature in the EMR called an episode of care. An episode of care is a tool in Epic, a software application for EMRs, to group discrete data elements from all the services patients receive during treatment for a specific illness or condition (e.g., cancer, pregnancy, TB disease)
- Although an LTBI episode of care is not a standard feature in most EMRs, current Epic users have two options:
 - OPTION 1:** Custom-build own LTBI episode of care, work with the clinic's Epic analyst and provide a list of patient variables to include
 - OPTION 2:** Download a template for an LTBI episode of care created by another Epic user from the Epic UserWeb
- This clinic pursued Option 1 and built their own episode of care which can be accessed by other Epic users
- Clinics that use the episode of care feature can open a new episode whenever a patient at higher risk (as defined by the California TB risk assessment) presents to the clinic for a diagnostic visit or work-up for LTBI
- An episode of care must be subsequently updated with future follow-up visits to fully document a patient's LTBI care

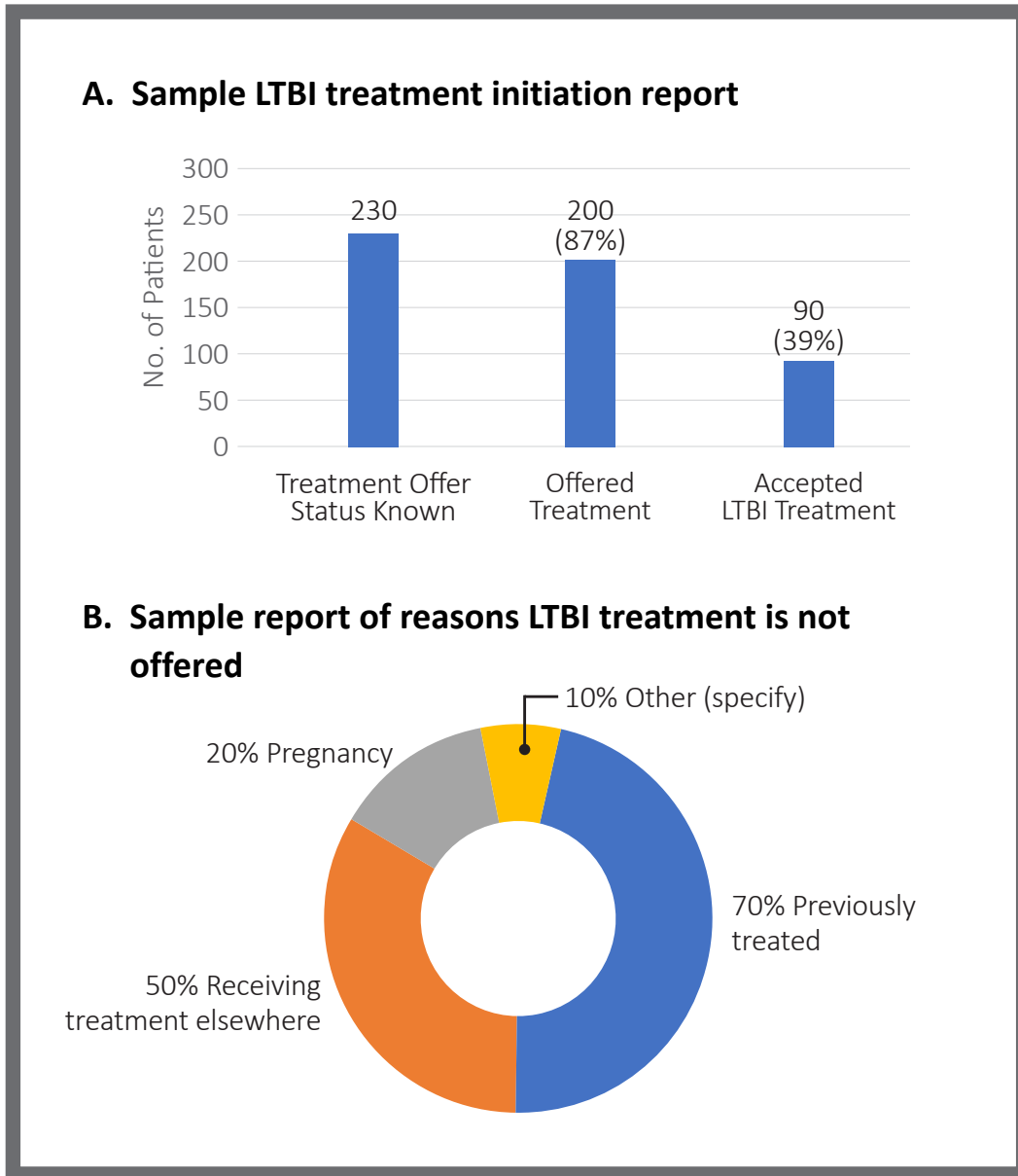
- Information specific to LTBI can be collected during patient visits and later used to build and understand a clinic’s LTBI care cascade. In this case example, variables were pulled from the existing areas of the EMR (e.g., lab results and pharmacy records), while other variables were created specifically for the episode of care (see Figure 10)
- Building an episode of care allows clinics to generate detailed LTBI care cascades routinely and observe gaps and opportunities for improvement in the cascade (see Figure 11)

FIGURE 10: List of variables and response options created specifically for the LTBI episode of care

VARIABLES*	RESPONSE OPTIONS		
LTBI treatment offered	<ul style="list-style-type: none"> • Yes • No 		
Reason treatment not offered	<ul style="list-style-type: none"> • No show • Previously treated • Pregnancy • Age • Risk of toxicity (short term) • Risk of toxicity (long term) • Medication interaction (short term) 	<ul style="list-style-type: none"> • Medication interaction (long term) • Receiving treatment elsewhere • Concern for medication non-adherence • Relocating • Death • Other 	
LTBI treatment accepted	<ul style="list-style-type: none"> • Yes • No 		
Reason for declining treatment	<ul style="list-style-type: none"> • Concern for side effects • Breastfeeding • Pregnancy 	<ul style="list-style-type: none"> • Transportation difficulty • Relocating • Perceived low risk 	<ul style="list-style-type: none"> • Need for regular follow up • Cost of care • Other
Treatment initiated date	mm/dd/yyyy		
Treatment stop date	mm/dd/yyyy		
Reason treatment stopped	<ul style="list-style-type: none"> • Treatment completed • Lost to care • Moved 	<ul style="list-style-type: none"> • Developed TB • Patient choice • Adverse event • Pregnancy 	<ul style="list-style-type: none"> • Transferred care • Not LTBI • Death • Other

* These variables facilitate a better understanding of the treatment offer, patient acceptance and treatment completion.

FIGURE 11: Sample reports generated from episode of care data



TIP: Generate a list of patients not prescribed treatment due to pregnancy for follow-up in 9-12 months.

Advantages to this intervention:

- An episode of care provides clinics with a comprehensive capture of data and bundles all services used to diagnose and treat a patient’s total health episode (i.e., LTBI diagnosis) into one
- The episode of care data can be used to provide comparative feedback for quality improvement or performance reporting
- Reports can be useful for case management and billing purposes

Challenges to this intervention:

- Creating an LTBI episode of care requires extensive support from an EMR analyst
- Some variables can be pulled from the existing EMR (e.g., labs and pharmacy records), but other variables might need to be created (e.g., treatment offered, reasons treatment not offered, treatment start date, treatment completed)
- Data, such as country of birth, need to be accessible and might need to be validated to ensure data quality
- An episode of care must be updated with each follow-up visit, and this can be time-consuming



TIP: Clinics may need to prioritize which variables they are able to collect for monitoring the LTBI care cascade. A baseline assessment involving chart abstraction can help to identify points of attrition; then, the clinic can prioritize variables at that step. For example, if patients complete a chest x-ray but are not prescribed treatment, this gap can be easily detected if the EMR contains the fields: “LTBI treatment offered Y/N”; “LTBI treatment accepted Y/N”; and “reason for declining treatment” (see Figure 10).

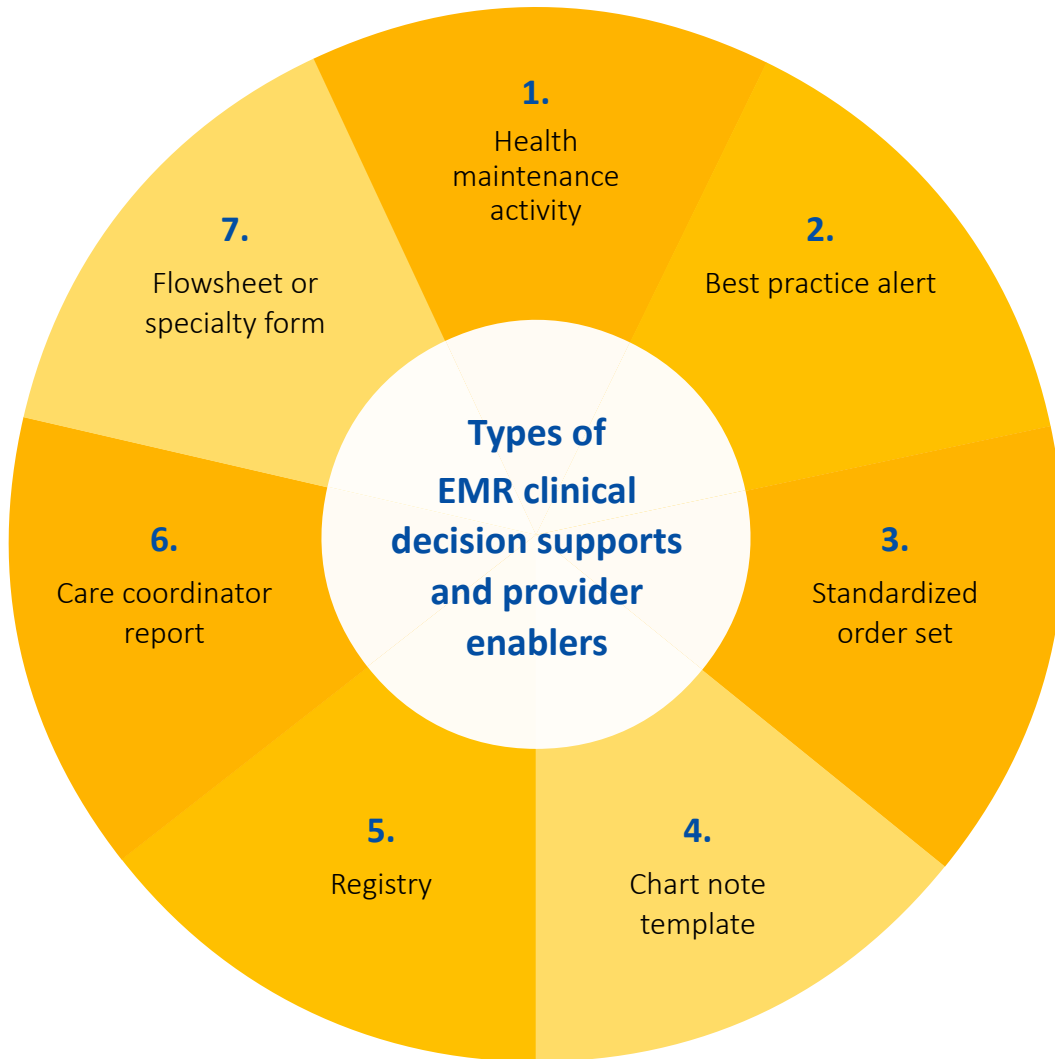
Takeaway messages:

- For clinics with regular access to an EMR analyst and clinic buy-in, building an LTBI episode of care from scratch can be an effective option to monitor the clinic’s cascade of care
- Downloading another EMR user’s LTBI episode of care is a good alternative. Training will be required for either scenario

Clinical decision supports and provider enablers

As illustrated by the case examples, there are a variety of EMR interventions that can be implemented to track and improve LTBI care. Many of these interventions include the addition of one or more types of clinical decision supports or provider enablers, also referred to as “reminders” or “prompts”. These can be added to an EMR to facilitate LTBI care. Figure 12 on the next page shows different types of supports specifically aimed at enabling providers to order testing, evaluation and/or treatment. The text that follows provides examples of how each can be used to support LTBI care.

FIGURE 12: Types of EMR clinical decision supports and provider enablers



Types of EMR clinical decision supports and provider enablers


- 1. Health maintenance activity:** Begin by assessing TB risk (consider using the TB risk assessment tool) as a standard prevention activity for routine completion; skipping this step is commonly referred to as a “care gap” (i.e., when a standard prevention activity has not been completed). The risk assessment is often conducted annually for pediatrics and at least once for adults
- 2. Best practice alert:** Add a reminder for TB risk assessment or testing; add a prompt to providers that indicates a reason when the action is not completed (e.g., already tested, patient refused and will discuss next visit)
- 3. Standardized order set:** Add TB testing to order sets for routine lab testing; create a TB/LTBI tool set that groups diagnoses and orders, including CXR and medications; consider using standing orders
- 4. Chart note template:** Build TB risk assessment into well visit chart note; create a dot phrase to pull in data elements relevant to TB evaluation (e.g., testing, CXR); create templates for TB-related visits and monitoring while on treatment
- 5. Registry:** Create an LTBI registry based on test or evaluation results; use existing disease registries to identify risk groups
- 6. Care coordinator report:** Create an LTBI report with a routinely updated list of patients to prompt follow-up; criteria can include positive test result
- 7. Flowsheet or specialty form:** Combine EMR fields related to LTBI in one location so a provider can view prior testing and CXR results



TIP FOR CLINICS: Understanding your clinic providers’ practices and preferences is important for ensuring interventions are effective and useful. There are several considerations involved in determining the type of provider enabler to implement.³⁵ Consider sharing different options and seeking input before implementation. Early staff buy-in will help to ensure success when interventions are implemented.

Examples of EMR enablers

1. Health maintenance activity reminder

 **TB risk assessment past due!**

Flu vaccination done 11/1/2021
Hepatitis screening done 12/1/2020
Diabetic screening done 4/1/2019

2. Best practice alert

Best Practice Alert: TB testing is recommended

Order QFT
Do not order QFT

3. Standardized order set

Lab order:
Date:

CBC
 QFT
 Hb A1c

LTBI tool set:

- Note template
- Test orders
- Imaging
- Diagnosis
- Treatment

4. Chart note template

Diagnosis: LTBI Z22.7
CXR [date] [NORMAL]

[Select]
Normal
Abnormal, consistent w/ TB
Abnormal, not consistent w/ TB



Attrition in the latent TB infection care cascade: barriers and interventions

Attrition in the latent TB infection care cascade: barriers and interventions

The goal of creating an LTBI care cascade is ultimately to follow patients at higher risk for TB, ensure TB testing and ensure treatment completion for those with LTBI to prevent TB disease. However, at each of the discrete cascade steps, there can be attrition because of barriers experienced by the patient, by the provider and/or at the systems level.

A published systematic review in the U.S. found that the steps in the LTBI care cascade with the lowest completion included: 1) testing of individuals at risk; 2) completion of a medical evaluation; 3) treatment recommendation; and 4) treatment completion.²⁰ Some of the most common reasons for attrition in the care cascade cited in the literature include: demographic and patient-related factors (lack of family support, limited economic resources, barriers to transportation, work schedule issues); clinical and systems-related factors (knowledge gaps, lack of provider/clinician training, prescription of older and longer treatment regimens, inadequate clinician follow-up and communication with patient), and sociodemographic and cultural factors (fear of stigma associated with TB, fear of deportation, language barriers).^{20,21,23-25,36}

There can be attrition at each cascade step because of barriers experienced by the patient, by the provider and/or at the systems level.

Barriers to advancing TB prevention

- Limited awareness in affected communities about TB and how to prevent it
- Lack of health care access for those not already in care or who lack insurance
- Cost and logistic barriers for patients (e.g., cost of transportation and childcare, work schedule issues)
- Patient mistrust of health care system and fear of consequences of seeking treatment (e.g., stigma associated with TB, concerns about privacy and/or immigration status)
- Insufficient LTBI knowledge among health care providers
- Insufficient training and limited time for clinicians to engage patients
- Competing priorities for clinicians to address during patient visits
- Few streamlined paths in primary care to support patients through testing and treatment
- Absence of clinic flow and simple EMR systems to automate care steps
- No required measure for LTBI testing/treatment in primary health care settings
- Cost barriers and lack of incentives for health systems, resulting in lack of access/availability of IGRAs and onsite CXRs

Examples of successful interventions identified by TB Free California partner clinics to overcome barriers for each step of the LTBI care cascade are outlined on the next page. For information on overcoming barriers specific to patient engagement, see the [“Engaging and supporting patients through latent TB infection screening, testing and treatment”](#) resources section.

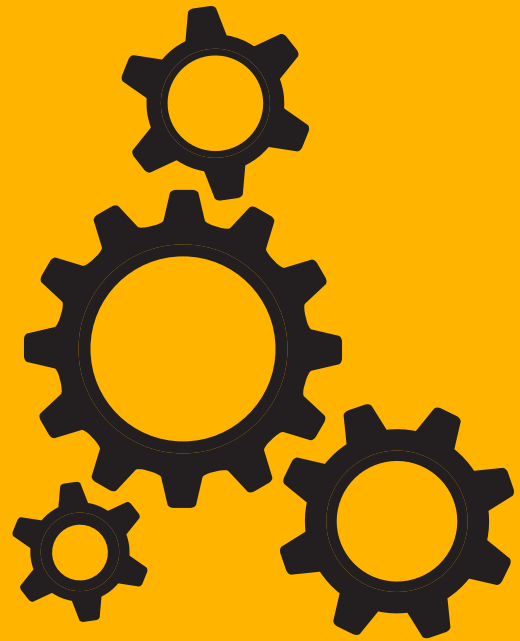
Tips for addressing common barriers in the LTBI care cascade

STEP	BARRIER	POTENTIAL INTERVENTIONS
STEP 1: Assess risk for TB infection	Providers may be unaware of who is at higher risk and who should be tested for TB infection.	Clinics can incorporate the California TB risk assessment tools into their EMRs or workflow protocols so providers can easily identify patients at higher risk for TB infection. The assessment can be added to a routine health maintenance screen or a well visit chart note template.
STEP 2: Test for TB infection	Providers are busy addressing many primary care concerns; TB testing might not be a priority.	Clinics can incorporate an IGRA test as a standing order based on risk or add the test to routine lab order sets. Clinics can also display posters that encourage patients to talk to their provider about LTBI testing. A preview of these posters is available in Appendix D.
STEP 3: Document positive tests for TB infection	Clinics do not have access to IGRAs. Patients receive a TST but do not return for the test to be read.	Clinics can work with a local lab to negotiate pricing and bring blood draw on-site, with electronic laboratory reporting. Providers should offer IGRA tests to patients aged ≥ 2 years because IGRAs do not give false positive results from BCG and do not require a follow-up visit. ¹⁷
STEP 4: Evaluate patient for TB disease	Patient with a positive LTBI test doesn't show up for evaluation; provider doesn't create a CXR order.	Patient education can be provided at the time of the LTBI test, so that if positive, the patient understands the next steps and why it is important to rule out TB disease. An EMR-generated report can identify patients without a CXR order and help patients make appointments, if needed.
STEP 5: Complete CXR and document normal result	Clinics may not have CXRs available on site and/or patient doesn't show up to have the CXR performed. If CXR facility is offsite, providers may receive a fax with CXR results, but the results are not entered into the patient's EMR.	Patient education can be provided at the time of the LTBI test so that, if positive, the patient understands the next steps and why it is important to have a CXR done. Clinics can work to bring CXR on-site (e.g., mobile CXR site) or create a protocol to ensure the results are added to the patient's EMR. Clinics can also develop a standardized method to document results, using predictive phrases or templates and the ICD-10 code for LTBI (Z22.7).

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STEP	BARRIER	POTENTIAL INTERVENTIONS
<p>STEP 6: Prescribe treatment for LTBI</p>	<p>Providers are unfamiliar with newer and shorter LTBI treatments or contraindications to treatment. There may not be a process to follow-up with patients that delay treatment (e.g., pregnant persons).</p>	<p>Providers can be trained routinely on the efficacy of newer, shorter regimens and drug interactions. Standard order sets can support providers in ordering rifamycin-based regimens with correct dosages.¹⁹ Clinic staff can create an EMR-generated report to identify patients who did not start treatment. Anecdotal evidence from clinicians has shown that pregnant persons are sometimes hesitant to be treated for LTBI during pregnancy; following up with patients post-partum is helpful to ensure they start and complete treatment. See Appendix D for a resource for pregnant persons to address their potential treatment concerns.</p>
<p>STEP 7: Retain patient in care and document completion of treatment for LTBI</p>	<p>Patients might discontinue treatment due to adverse reactions or other personal reasons (e.g., transportation) and providers may be unaware of these barriers. Providers are unaware of whether patients complete LTBI treatment, and treatment completion is not documented on the patient chart.</p>	<p>Telehealth can support patients throughout care. Clinics can assign an LTBI care coordinator to follow-up with patients throughout treatment, monitor adverse events and document treatment completion. The LTBI care coordinator can use a discrete field to document treatment completion (YES/NO) and the completion date. If treatment was initiated but not completed, the LTBI care coordinator should document the reason and the date treatment stopped.</p>



Conclusion

Conclusion

TB is a preventable disease. The availability of relatively new LTBI diagnostics and short-course treatment regimens make diagnosis and treatment more feasible in clinics and provide the opportunity for positive TB prevention outcomes.

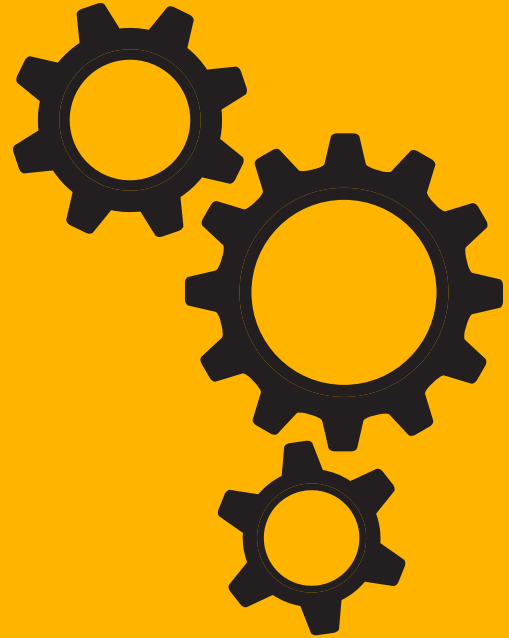
Establishing clinic procedures to create and measure the LTBI cascade of care enables a provider to systematically identify risk, test for TB infection and treat patients to prevent them from developing active disease in the future. Patient engagement and education are key to the success of these efforts. The many resources presented in this Guidebook can help patients understand the importance of TB prevention and subsequently complete treatment. Clinic investment in medical record system updates can make TB prevention more routine and easier to track over time. The examples provided in this Guidebook can guide clinics to develop interventions that will support LTBI care and provide opportunities for monitoring LTBI care cascades.

Best practices for TB prevention will continue to evolve. New resources are being developed for both providers and patients. Clinics are developing new interventions and removing system barriers as they track LTBI care cascade performance outcomes and evaluate successes. Finally, new evidence from implementation science research will likely contribute to new and effective prevention resources in the future.

The TB Free California team looks forward to hearing about your successes in implementing and evaluating TB prevention activities in your clinic. Please share your experiences with us by staying in touch. You can contact our team by emailing us at [TB Free California](#). We hope to share the lessons learned from Guidebook users with TB elimination partners throughout California and the entire nation. We look forward to learning about your progress!

For questions regarding this Guidebook, please email: [TB Free California](#).

Thank you for your contributions to end TB!



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Appendices

Appendices

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- Latent TB Infection Treatment Options
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Glossary of terms

Glossary of terms

American Thoracic Society (ATS): A national medical society, founded in 1905, dedicated to accelerating the advancement of global respiratory health through multi-disciplinary collaboration, education, and advocacy.

Bacille Calmette-Guérin (BCG) vaccine: A vaccine used to prevent disseminated TB disease in children. Use of interferon-gamma release assays (IGRA) to test for TB infection are preferable for use with BCG-vaccinated individuals to avoid the false positive results that can occur with the TB skin test.

California Department of Public Health (CDPH): The state department responsible for public health in California. CDPH is a subdivision of the California Health and Human Services Agency.

Centers for Disease Control and Prevention (CDC): The national public health agency of the United States. The CDC is a federal agency, under the auspices of the Department of Health and Human Services.

Food and Drug Administration (FDA): An agency within the U.S. Department of Health and Human Services; it protects public health by assuring the safety, effectiveness, and security of human and veterinary drugs, vaccines and other biological products for human use, and medical devices.

Federally-qualified health centers (FQHCs): Community-based health care clinics that receive federal funds to provide primary care services in underserved areas.

Infectious Diseases Society of America (IDSA): A medical association representing physicians, scientists, and other health care professionals who specialize in infectious diseases.

Interferon-gamma release assay (IGRA): A whole-blood test that can aid in diagnosing *M. tuberculosis* infection. The test does not differentiate LTBI from TB disease. Unlike the tuberculin skin test, a single patient visit is required to conduct the test and prior BCG vaccination does not cause a false-positive IGRA test result.

Latent tuberculosis infection (LTBI): Individuals with LTBI carry *M. tuberculosis*, the organism that causes TB, but do not have TB disease; they are asymptomatic and non-infectious. Individuals with LTBI usually have a positive interferon-gamma release assay blood test and positive reaction to the tuberculin skin test.

LTBI care cascade: A care cascade that outlines the discrete steps needed to diagnose and treat individuals with LTBI. At each step, prevention opportunities can be lost, so “measuring” a clinic’s care cascade allows effective interventions to be implemented to decrease patient attrition.

Medi-Cal: The Medicaid program in California, administered by the California Department of Health Care Services. Medi-Cal is a public health insurance program which provides needed health care services for low-income individuals.

Morbidity and Mortality Weekly Report (MMWR): CDC’s weekly journal highlighting public health investigation, along with providing reports and recommendations derived from science-based research.

National TB Controllers Association (NTCA): A national organization whose mission is to protect the public’s health by advancing the elimination of TB in the U.S. through the concerted actions of state, local and territorial TB programs.

Nucleic Acid Amplification Test (NAAT): A type of molecular test used to detect *M. tuberculosis*.

QuantIFERON-TB Gold (QFT): An interferon-gamma release assay blood test approved by the FDA that aids in the detection of *M. tuberculosis*. QFT-GIT measures the concentration of interferon-gamma (IFN- γ) via an enzyme-linked immunosorbent assay (ELISA).

Tuberculin skin test (TST): A skin test to determine whether a person has TB infection. The test is administered by injection of a small amount of tuberculin fluid under the skin of the forearm. The individual must return within 48 to 72 hours after the test is placed to have a trained health care worker look for and measure a reaction on the arm.

Tuberculosis (TB): An infectious disease caused by *M. tuberculosis*. The bacteria usually attack the lungs, but TB bacteria can attack any part of the body such as the kidney, spine, and brain. TB disease can be fatal.

T-SPOT.TB: An interferon-gamma release assay blood test approved by the FDA that aids in the detection of *M. tuberculosis*. T-SPOT.TB measures the number of IFN- γ -secreting T cells via an enzyme-linked immunospot (ELISPOT) assay.

United States Preventive Services Task Force (USPSTF) TB screening recommendation: In 2016, the USPSTF published a recommendation to screen populations at increased risk for LTBI (B recommendation).

Latent TB Infection Treatment Options

Most patients with a positive IGRA or TST, a completed medical evaluation with no evidence of TB disease and no history of LTBI treatment should be offered LTBI treatment. An LTBI treatment regimen should be selected based on the patient’s medical history, potential drug interactions and patient preferences. A full page, print-out LTBI treatment option reference card is available on page 75.

Latent TB Infection Treatment Regimens

An LTBI treatment regimen should be selected based on the patient’s medical history, potential drug interactions and patient preference. A full page LTBI treatment regimen drug dosages fact sheet is available on page 76.

Overview of Provider Resources Available on the TB Free California Website

Provider resources on the website include short videos on LTBI topics; TB survivor stories; TB risk assessments and associated guides; and a 3HP drug interactions guide. All materials can be downloaded from the link at the bottom of page 77.

LTBI Treatment Options



STRONGLY PREFERRED

3
Months

Isoniazid (INH) &
Rifapentine (RPT)
"3HP"

Treatment taken *once a week* for 3 months
(12 doses)

Recommended for adults and children >2 years old, and can be used by people living with HIV.

4
Months

Rifampin (RIF)
"4R"

Treatment taken *every day* for 4 months

Recommended for adults, children of all ages. Not recommended for people living with HIV.

3
Months

Isoniazid (INH) &
Rifampin (RIF)
"3HR"

Treatment taken *every day* for 3 months

Recommended for adults, children of all ages, and can be used by people living with HIV.

6
Months

OR

9
Months

Isoniazid (INH)
"6H" / "9H"

Treatment taken *every day* for 6 or 9 months

Recommended for adults and children of all ages. Sometimes recommended for people living with HIV.

Latent Tuberculosis Infection Treatment Regimens

Treatment regimens for latent TB infection (LTBI) use isoniazid (INH), rifapentine (RPT), or rifampin (RIF). **CDC and the National Tuberculosis Controllers Association preferentially recommend short-course, rifamycin-based, 3- or 4-month latent TB infection treatment regimens over 6- or 9-month isoniazid monotherapy.**

Clinicians should choose the appropriate treatment regimen based on drug susceptibility results of the presumed source case (if known), coexisting medical conditions (e.g., HIV*), and potential for drug–drug interactions.

https://www.cdc.gov/mmwr/volumes/69/rr/rr6901a1.htm?s_cid=rr6901a1_w

Original graphic can be viewed here: <https://www.cdc.gov/tb/topic/treatment/pdf/LTBITreatmentRegimens.pdf>



	DRUG	DURATION	FREQUENCY	TOTAL DOSES	DOSE AND AGE GROUP
Preferred	ISONIAZID [†] AND RIFAPENTINE ^{**} (3HP)	3 months	Once weekly	12	Adults and children aged ≥12 yrs INH: 15 mg/kg rounded up to the nearest 50 or 100 mg; 900 mg maximum RPT: 10–14.0 kg; 300 mg 14.1–25.0 kg; 450 mg 25.1–32.0 kg; 600 mg 32.1–49.9 kg; 750 mg ≥50.0 kg; 900 mg maximum
					Children aged 2–11 yrs INH [†] : 25 mg/kg; 900 mg maximum RPT ^{**} : See above
	RIFAMPIN [§] (4R)	4 months	Daily	120	Adults: 10 mg/kg; 600 mg maximum Children: 15–20 mg/kg; 600 mg maximum
Alternative	ISONIAZID [†] AND RIFAMPIN [§] (3HR)	3 months	Daily	90	Adults INH [†] : 5 mg/kg; 300 mg maximum RIF [§] : 10 mg/kg; 600 mg maximum
					Children INH [†] : 10–20 mg/kg [#] ; 300 mg maximum RIF [§] : 15–20 mg/kg; 600 mg maximum
	ISONIAZID [†] (6H/9H)	6 months	Daily	180	Adults Daily: 5 mg/kg; 300 mg maximum Twice weekly: 15 mg/kg; 900 mg maximum
			Twice weekly [¶]	52	
ISONIAZID [†] (6H/9H)	9 months	Daily	270	Children Daily: 10–20 mg/kg [#] ; 300 mg maximum Twice weekly: 20–40 mg/kg [#] ; 900 mg maximum	
		Twice weekly [¶]	76		

*For persons with HIV/AIDS, see Guidelines for the Use of Antiretroviral Agents in Adults and Adolescents Living with HIV available at: <https://aidsinfo.nih.gov/guidelines/html/1/adult-and-adolescent-arv/367/overview>.

[†]Isoniazid is formulated as 100-mg and 300-mg tablets. ^{**}Rifapentine is formulated as 150-mg tablets in blister packs that should be kept sealed until use. [¶]Intermittent regimens must be provided via directly observed therapy (i.e., a health care worker observes the ingestion of medication). [§]Rifampin (rifampicin) is formulated as 150-mg and 300-mg capsules. ||The American Academy of Pediatrics acknowledges that some experts use rifampin at 20–30 mg/kg for the daily regimen when prescribing for infants and toddlers (Source: American Academy of Pediatrics. Tuberculosis. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. Red Book: 2018 Report of the Committee on Infectious Diseases. 31st ed. Itasca, IL: American Academy of Pediatrics; 2018:829–53).

[#]The American Academy of Pediatrics recommends an INH dosage of 10–15 mg/kg for the daily regimen and 20–30 mg/kg for the twice weekly regimen.

Overview of Provider Resources Available on the TB Free California Website

VIDEOS

Short videos on how to talk to your patients about these specific LTBI topics	<ul style="list-style-type: none"> Why should I get tested for LTBI? Why do I need treatment for LTBI? I received a BCG vaccine, do I still need LTBI testing and treatment?
TB survivors tell their stories	Short videos (2) narrated by a TB survivor provides an opportunity for providers to hear from a patient’s perspective about the hardships and successes of TB treatment.

DIGITAL AND PRINT TOOLS

Prevent TB in 4 Steps: A Guide for Medical Providers	Clinical algorithm outlines the basic steps in identifying individuals at risk and testing and treating patients with LTBI in a clinic setting.
TB risk assessments	A screening tool to identify individuals at higher risk for TB and who should be testing for LTBI. Two versions: adult and pediatric. Each includes a User’s Guide.
Talking to your patients about LTBI	Includes two sections: 1) a guide for counseling your patients about TB, LTBI and LTBI testing and treatment; 2) provides common patient questions and suggestions about how to respond. Two versions: adult and pediatric
3HP Drug Interactions Guide	Common drug interactions related to the 12-dose 3HP regimen for LTBI treatment.
TB update letter to primary care providers	These forms are completed by the local health department to provide an update to a patient’s primary care provider on the clinical evaluation and other services (e.g., treatment) provided by the health department. Two versions: TB disease and LTBI
LTBI Test & Treatment Completion Card	A wallet-sized card that providers can give their patients to keep to share with future providers who need to know about their TB and LTBI testing and treatment history.
Provider Reference Card	An easy-to-post reference card reminding providers who to test for LTBI and how to treat.



LINK: [TB Provider Resources](#)

Resource and Capacity Checklist

The print-out Resources and Capacity Checklist on page 80 provides the opportunity to assess whether a clinic is meeting TB prevention readiness factors. It describes seven clinic capacities that can support and optimize TB prevention efforts. This list can serve as a prompt to secure the resources needed to create an environment that most effectively supports patients and providers through the LTBI care cascade.

Clinic Assessment Survey

The print-out survey on pages 81-83 can be used to conduct an internal assessment of the need and capacity for TB prevention in a clinic setting. It promotes a greater understanding of a clinic's population at higher risk for TB and identifies which clinic processes are working well and which ones may need to be modified.

The Latent TB Infection Care Cascade

The print-out LTBI care cascade graphic on page 84 can be a useful resource for training providers and other clinic staff on the seven steps of the cascade.

Sample LTBI Monitoring Tool for 3HP

A sample schedule and checklist for monitoring patients on LTBI treatment with 3HP is on pages 85-86. This monitoring tool proposes that an LTBI care coordinator or other staff person contacts patients who have been prescribed 3HP to monitor treatment.

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ICD-10 Latent TB Infection Treatment Codes and Select Procedure Codes

A full page resource for ICD-10 LTBI treatment codes and select procedure codes related to TB, which can be printed out for clinic use, is available on pages 87-88.

Latent TB Infection Care Cascade Excel Template

The LTBI Care Cascade Excel document is a template that clinics can use to monitor the LTBI care cascade in their own settings. It allows clinics to identify gaps in patient care and opportunities for improvement. The template provides sample definitions for each step. To obtain a copy of the template, e-mail [TB Free California](#).

Resource and Capacity Checklist

- A champion within your clinic who can propel TB prevention activities forward and work to ensure that quality improvement efforts are incorporated
- Clinic leadership committed to the scale-up of LTBI testing and treatment to facilitate TB prevention successes
- Access to an operational EMR that captures the majority of LTBI patient care charting and test results. EMRs can be used to monitor LTBI testing and treatment practices and can be modified to support providers as they work to increase improve LTBI care
- Capacity for accessible TB testing with IGRA testing onsite or ordered through an EMR with electronic results
- Capacity for accessible chest x-ray onsite or a chest x-ray referral process with results that appear in the EMR
- Capacity to order short-course, rifamycin-based treatment regimens (either four months of daily rifampin, three months [12 doses] of once-weekly isoniazid and rifapentine or three months of daily isoniazid and rifampin)
- Ability to follow-up with patients to support treatment completion
- Ability to measure each step in a care cascade to assess testing and treatment completion and points of attrition

Clinic Assessment Survey

Clinic demographics

1. Approximately how many patients are seen in the clinic daily?

- <25
- 25-49
- 50-99
- 100-500
- >500

- 1a. Approximately what proportion of these patients are returning patients (i.e., have been engaged in care for at least six months) as opposed to new patients to your clinic?

- <25%
- 25-50%
- >50%
- Unknown

2. Please indicate the approximate proportion of your clinic patients who were born outside the United States, in a country with a moderate or high TB incidence (this includes any country except the United States, Canada, Australia, New Zealand, or countries in Western Europe):

- 10-<20%
- 20-<30%
- 30-<50%
- > 50%
- Unknown

3. Approximately what proportion of your patients are immune-compromised (includes patients with HIV infection, organ transplant recipients, patients treated with TNF-alpha antagonists, or patients treated with steroids using equivalent of prednisone \geq 15 mg/day for \geq 1 month)?

- <25%
- 25-50%
- >50%
- Unknown

LTBI testing policies and practices

4. What tests for TB infection does your organization use?

Check all that apply

- Tuberculin skin test
- QuantiFERON TB Gold In-tube or QuantiFERON Plus (i.e., QFT, a type of IGRA)
- T-SPOT-TB (i.e., T-SPOT, a type of IGRA)

- 4a. If you use an IGRA, is the blood draw performed at your clinic?

- Yes
- No

- 4b. If you use an IGRA, approximately how long does it take for results to return?

- <2 days
- 2-5 days
- >5 days

CONTINUES >

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5. When patients need a chest x-ray (CXR), can it be done onsite at your clinic?

- Yes (skip to question 6)
- No

5a. If referred off-site, do the majority of patients complete CXR?

- Yes
- No
- Unknown

5b. If referred off-site, are radiology reports available through your electronic medical record system?

- Yes
- No

LTBI treatment practices

6. How is LTBI treatment provided at your clinic?

- Patients are treated for LTBI at our clinic
- Patients are referred elsewhere for LTBI treatment
- Patients are not offered LTBI treatment

6a. If referred elsewhere, where are patients referred?

6b. If referred elsewhere, what are the barriers to providing treatment at your facility? Please describe

6c. If treated in your clinic, which of the following treatment regimens are offered to patients who test positive for LTBI at your clinic? Check all that apply

- 3 months of once-weekly rifapentine plus isoniazid
- 4 months of daily rifampin
- 3 months of daily isoniazid plus rifampin
- 9 months of daily isoniazid
- 6 months of daily isoniazid

Medical record

7. What kind of medical record system does your clinic use?

Check all that apply

- Paper
- Electronic medical record (home-grown product, unique to our clinic)
- Electronic medical record (commercial product, used by other clinics and/or adapted for our clinic)

CONTINUES >

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8. Please check all relevant information below that is available in your medical record:

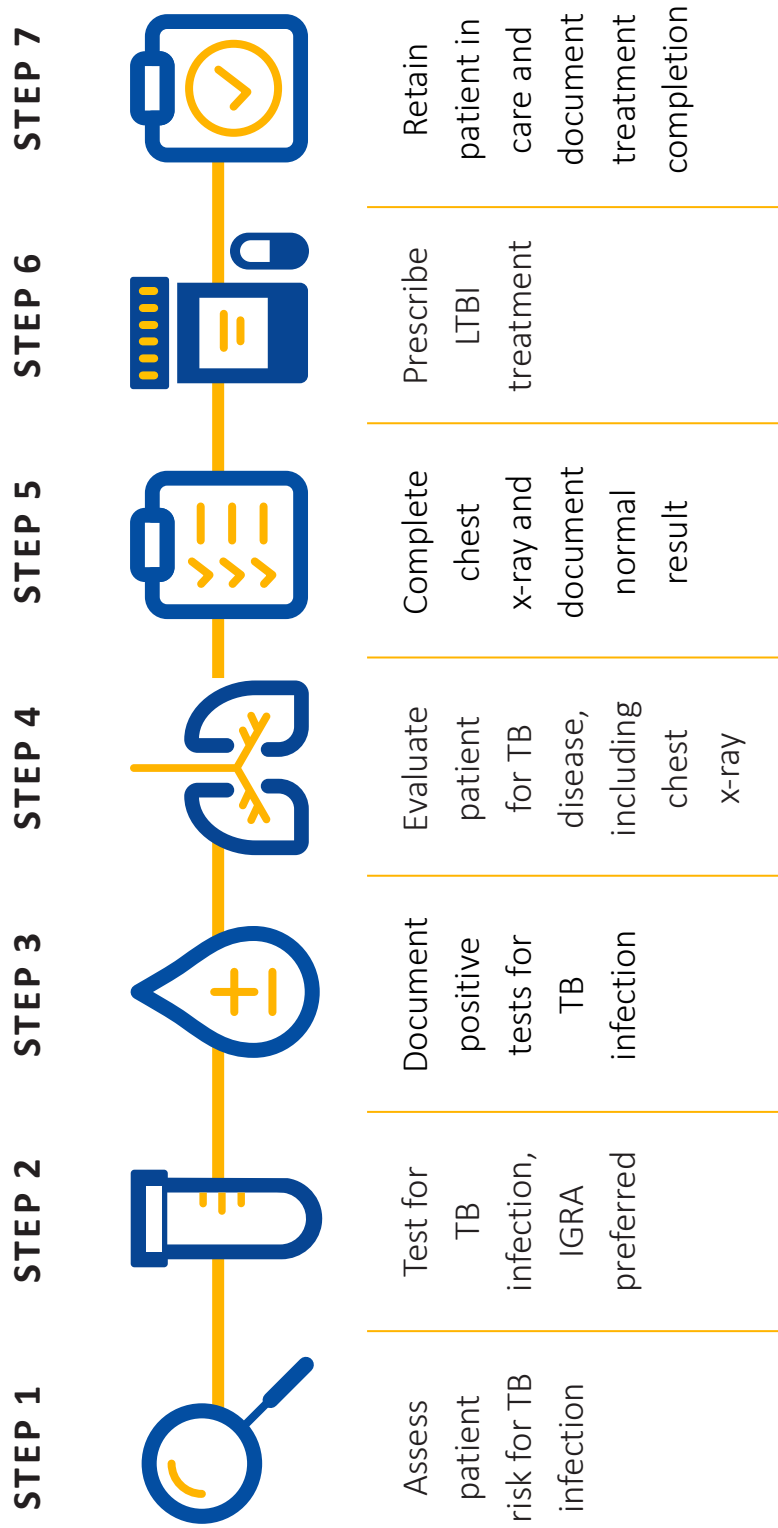
- Patient country of birth
- TB signs or symptoms
- TST placement date
- TST reading date
- TST result
- IGRA draw date
- IGRA result
- Sputum AFB smear date
- Sputum AFB smear result
- Sputum mycobacterial culture date
- Sputum mycobacterial culture result
- HIV test date
- HIV test result
- Chest X-ray date
- Chest X-ray report
- CT chest date
- CT chest report
- History of TB or LTBI treatment
- LTBI treatment start date
- LTBI treatment stop date
- Reason for LTBI treatment stop (i.e., completion, drug side effect, patient refusal, loss to follow up)
- LTBI treatment drugs (drug name and dosage)
- LTBI treatment delivery (self-administered vs. directly-observed therapy)

Leadership commitment to TB prevention

9. Are clinic leaders committed to increasing LTBI testing and treatment, in order to prevent cases of TB disease in their patient population?

- Yes
- No

The Latent TB Infection Care Cascade



Sample LTBI Monitoring Tool for 3HP

#1 Schedule

WEEK 1

- Assess 3HP access/adherence (see #2 below)
- Review [3HP Patient Brochure](#) and instructions for taking pills
- Perform symptom review and side effects of 3HP therapy (see #3)

WEEK 4

- Assess 3HP access/adherence (see #2)
- Review Patient Handout and instructions for taking pills
- Perform symptom review and side effects of 3HP therapy (see #3)

WEEK 8

- Assess 3HP access/adherence (see #2)
- Perform symptom review and side effects of 3HP therapy (see #3)

WEEKS 12 – 16

[Call if no PCP in-person visit]

- Assess 3HP access/adherence (see #2)
- Perform symptom review and side effects of 3HP therapy (see #3)
- Remind patient about upcoming in-person visit, OR
- Remind patient that 3HP can be completed by taking 11 doses within 16 weeks, and ask patient to make an in-person visit

#2 3HP access/adherence

1. Did you take your pills?
 - A. If yes: Reinforce good job!
 - B. If no: document reason
 - a. Unable to access/fill Rx
 - b. Too many pills
 - c. Experienced adverse side effect
 - d. Forgot
 - e. Decided against therapy for another reason
2. How many pills taken per dose?
3. Number of doses taken
4. Dates of doses

#3 Symptom screen and review of side effects

For each call during which the LTBI care coordinator performs a symptom screen, the coordinator will specifically ask about the following symptoms in order to screen for medication side effects.

- Abdominal pain
- Anorexia (loss of appetite)
- Chills
- Diarrhea
- Dizziness/fainting
- Dyspnea (shortness of breath)
- Fatigue
- Fever
- Flu-like syndrome
- Jaundice (yellowing of skin or eyes)
- Myalgia (muscle aches)
- Nausea
- Parasthesia (sensation of numbness or tingling)
- Rash maculo-papular (rash with both raised and flat areas)
- Vomiting
- Other symptom

If patient reports symptoms which are **Grade 2 or above**, or **vomiting, difficulty breathing, or yellowing of skin/eyes of ANY grade**, they should be asked to **stop the medications and contact their medical provider for immediate evaluation**.

If patient reports Grade 1 symptoms (for anything other than vomiting, difficulty breathing, or yellowing of skin/eyes), LTBI care coordinator should encourage patient to continue medications, and contact medical provider if symptoms worsen or they have further questions. For more detail, refer to [National Institute of Health Common Terminology Criteria for Adverse Events](#).

CONTINUES >

Sample LTBI Monitoring Tool for 3HP

Before 3HP:	<ul style="list-style-type: none">• QFT-Plus positive• CXR and symptom screen show no evidence of active disease• Inclusion/exclusion criteria reviewed
Week 0:	<ul style="list-style-type: none">• In-person visit with primary care provider (PCP)• 3HP prescribed• Pill instruction and side effects reviewed
Week 1:	<ul style="list-style-type: none">• Coordinator call• 3HP access/compliance• Pill instructions• Side effects
Week 4:	<ul style="list-style-type: none">• Coordinator call• 3HP access/compliance• Pill instructions• Side effects
Week 8:	<ul style="list-style-type: none">• Coordinator call• 3HP access/compliance• Side effects
Weeks 12 -16:	<ul style="list-style-type: none">• In-person visit with PCP• Document treatment completion• Coordinator call (if no PCP visit)• 3HP access/compliance• Side effects• Reminder of in-person visit• Reminder of ability to complete treatment within 16 weeks
Week 16:	<ul style="list-style-type: none">• Coordinator call (if no PCP visit has occurred)• Document final disposition

ICD-10 Latent TB Infection Treatment Codes and Select Procedure Codes

CATEGORY	CODE DESCRIPTION	ICD-10 DIAGNOSTIC CODE	CPT PROCEDURE CODE
Previous history of TB	Personal history of tuberculosis	Z86.11	
	Personal history of latent tuberculosis infection	Z86.15	
Testing for TB	Encounter for screening for respiratory tuberculosis	Z11.1	
	Encounter for testing for latent tuberculosis infection	Z11.7	
	Tuberculin skin test <i>Skin test, tuberculosis, intradermal</i>	For Medi-Cal, any diagnostic code is accepted	86580
	Interferon-gamma release assay (QuantiFERON-TB Gold Plus) <i>Tuberculosis test, cell mediated immunity antigen response measurement; gamma interferon</i>	For Medi-Cal, any diagnostic code is accepted	86480
	Interferon-gamma release assay (T-SPOT.TB) <i>Tuberculosis test, cell mediated immunity antigen response measurement; enumeration of gamma interferon-producing T-cells in cell suspension</i>	For Medi-Cal, any diagnostic code is accepted	86481
	Positive result (TST) <i>Nonspecific reaction to tuberculin skin test without active tuberculosis</i>	R76.11	
	Positive result (IGRA) <i>Nonspecific reaction to cell mediated immunity measurement of gamma interferon antigen response</i>	R76.12	
Ruling out TB disease	Chest x-ray <i>Radiologic examination, chest</i>	R76.11	71045 (1 view)
		R76.12	71046 (2 views) 71047 (3 views) 71048 (4+ views)

CONTINUES >

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CATEGORY	CODE DESCRIPTION	ICD-10 DIAGNOSTIC CODE	CPT PROCEDURE CODE
Diagnosis - LTBI	Latent tuberculosis infection	Z22.7	
Diagnosis - Active TB	Respiratory tuberculosis	A15.0-A15.9	
	Tuberculosis of nervous system	A17.0-A17.9	
	Tuberculosis of other organs	A18.0-A18.89	
	Miliary tuberculosis	A19.0-A19.9	
Risk Factors	TB Contact <i>Contact with and (suspected) exposure to tuberculosis</i>	Z20.1	
	HIV disease	B20; Z21 (asymptomatic)	
	Long term (current) use of systemic steroids	Z79.52	
	Other long term (current) drug therapy	Z79.899	
	End stage renal disease	N18.6	
	Transplanted organ and tissue status	Z94.0-Z94.9	
	Type 2 diabetes mellitus	E11.0-E11.9	
	Homelessness	Z59.0	
Imprisonment and other incarceration	Z65.1		
Other	Abnormal chest x-ray <i>Abnormal findings on diagnostic imaging of lung</i>	R91.1-R91.8	
	Refuse treatment (general) <i>Procedure and treatment not carried out because of patient's decision for unspecified reasons</i>	Z53.20	

*Coding systems also exist for individual medications and adverse reactions to medication.

Latent TB Infection Care Cascade Excel Template

To obtain a copy of the LTBI cascade of care Excel document, a template that clinics can use to monitor the LTBI care cascade, e-mail [TB Free California](#).

APPENDIX D PATIENT EDUCATION MATERIALS – OVERVIEW

Posters with TB Prevention Messaging

TB posters with prevention messaging, which are available in multiple languages, can be downloaded from the link on page 91.

Handouts and Brochures

TB handouts and brochures, which are available in multiple languages, can be downloaded from page 92.

Overview of Community and Patient Resources Available on the TB Free California Website

Patient and community resources on the website include short videos on TB topics; multiple posters with TB prevention messaging; a factsheet for pregnant persons and new mothers; a graphic explaining the differences between TB and LTBI; and a self-administered TB risk assessment. All materials can be downloaded from the link at the bottom of page 93.

Posters with TB Prevention Messaging

 **LINK:** [Loving your family starts with caring for yourself poster](#)

 **LINK:** [Stop TB before it stops you! poster](#)

 **LINK:** [BCG vaccine poster](#)


These posters and others can be downloaded from the link below.

 **LINK:** [TB Community Resources](#)

Handouts and Brochures

 **LINK:** [Factsheet about TB and LTBI for pregnant persons and new mothers](#)

 **LINK:** [Be TB free: LTBI educational handout](#)

 **LINK:** [LTBI treatment brochure for patients](#)

All handouts and brochures can be downloaded from the link below.

 **LINK:** [TB Community Resources](#)

Overview of Community and Patient Resources Available on the TB Free California Website

VIDEOS

What is TB?	Simple and short videos for patients and communities about TB and how to prevent it if you have LTBI. Available in English, Chinese, Spanish, Tagalog and Vietnamese.
I Have TB – What Now?	Simple and short videos that describe the difference between TB and LTBI. Describes next steps after being diagnosed with LTBI and TB. Available in Cantonese, English, Mandarin and Spanish.
Former TB patient voices	Short videos narrated by a TB survivor provide current patients and communities to hear firsthand about the hardships and successes of TB and LTBI treatment.

POSTERS

Multiple posters	All posters include messaging to increase awareness of LTBI risk. Promotes talking with one’s doctor to find out if they are at risk. Available in English, Chinese, Spanish and Vietnamese.
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HANDOUTS AND BROCHURES

Factsheet for pregnant persons and new mothers	Provides basic LTBI and TB information about concerns that pregnant persons and new mothers may have about being evaluated and/or treated for either condition.
Factsheet for college and high school students	Provides basic LTBI information and promotes getting screened for LTBI, and tested and treated, if necessary.
Be TB Free handout	Provides basic LTBI information and promotes getting screened for LTBI, and tested and treated, if necessary. Available in English, Spanish and Vietnamese.
LTBI vs. TB	Simple graphic that describes the differences between LTBI and TB.
LTBI Treatment (3HP) Brochure	Describes why to take LTBI treatment, how and when to take it, and what to expect (e.g., possible side effects). Available in English, Chinese, Spanish and Vietnamese.
Self-administered TB risk assessment	TB risk assessment form re-designed for individuals to assess their risk for TB. Available in English, Chinese, Spanish and Vietnamese.

All materials can be downloaded from this link.  **LINK:** [TB Community Resources](#)