Latent Tuberculosis and Current Health Disparities in California: Making the Invisible Visible

Tuberculosis (TB) continues to have devastating consequences for patients both globally and locally, with disease risk concentrated in specific subgroups defined by race, ethnicity, and nativity. We highlight TB disparities in California in 2016, and describe opportunities to reduce disparities by scaling up screening and treatment of latent TB infection (LTBI) in primary care settings.

Primary impediments to mainstreaming LTBI screening and treatment and reducing TB disparities include poor understanding of patient-level barriers, knowledge gaps on the part of health care providers, and insufficient promotion of effective testing and treatment strategies.

To overcome these barriers, efforts should focus on finding and engaging high-risk patients and the providers who serve them, as well as enabling health care systems to adopt recommended strategies for testing and treatment through improved dissemination of policy, tracking and measuring LTBI outcomes, and reducing financial barriers to LTBI treatment. (*Am J Public Health.* 2018;108:S242–S245. doi:10.2105/AJPH.2018.304529)

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Despite being a preventable and treatable infectious disease, tuberculosis (TB) continues to cause more than 9000 cases of disease, including 470 deaths, in the United States annually.[1] Case rates of TB have declined since the mid-20th century, attributable in part to investments in local TB control programs and supportive interventions such as directly observed therapy. However, the rate of decline has slowed in the past decade,[1] and the current pace of decline is inadequate to achieve elimination this century.[2]

TUBERCULOSIS IS A HEALTH EQUITY ISSUE

Although everyone who breathes is at risk for contracting tuberculosis, the risk of exposure and subsequent infection varies on the basis of individual risk factors. Disease risk is concentrated in specific subgroups defined by race, ethnicity, and nativity, as well as by medically and socially determined drivers. Those born in countries with high TB burden have a high risk of being infected. Children, people with chronic conditions such as diabetes and renal disease, and people with immune compromise are all at increased risk of disease progression if infected. With roughly 3% of the US adult population immune-compromised,[3] 14% with diabetes,[4] and increasing numbers receiving organ transplantation[4] and chemotherapeutic and biologic immunosuppressive agents, there is cause for concern that a growing population in the United States is at high risk of progression to TB disease if infected.

In California, a high-incidence TB state with 5.2 cases per 100 000 person-years, there were 2062 verified cases of active tuberculosis in 2016, with 1656 (80%) occurring in persons born outside the United States.[5] The high proportion of TB disease found in those born outside the United States is consistent with national trends, which show that the case rate of active TB among persons born outside the United States is approximately 13 times higher than among US-born persons.[6] The majority of TB cases, both in California and nationwide, occur not in recent arrivers to the United States but in persons who have resided in the United States for at least five years.[7] Thus, a large reservoir of TB infection exists in non–US-born persons who are longstanding residents of the United States.

Racial and ethnic minorities are disproportionately affected by TB disease. Although the risk of TB varies across the distinct groups that make up Asians and Pacific Islanders, the TB rate in California among Asians and Pacific Islanders (18.6 per 100 000) is 19 times higher than among Whites (1.0 per 100 000), while rates among Blacks (4.4 per 100 000) and Hispanics (4.6 per 100 000) are four to five times higher.[5] These trends are not restricted to persons born outside the United States, but are magnified in the non–US-born group, which tends to be older and more medically complex than their US-born counterparts.[7] Medical comorbidities are common among patients with TB from racial or ethnic minority groups. For example, diabetes is far more prevalent among Asians and Pacific Islanders and Hispanics with TB disease then in their White counterparts. Together, Asians and Pacific Islanders and Hispanics made up 93% of patients with TB and diabetes in California from 2010 to 2014 (Janice Westenhouse, California Department of Public Health, written communication, April 2, 2018).[1]

Attention to racial and ethnic disparities and the social

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determinants that drive them has been a focus of national movements for a number of diseases including heart disease and cancer, and for HIV health outcomes.[8–10] However, similar attention to TB disparities has been limited. Beyond the arguments for equity and justice, this oversight is problematic for two reasons. First, as we achieve more effective implementation of TB prevention activities and drive down case rates, we should be wary of magnifying existing inequities. Unless interventions are effectively focused on the groups with the highest TB rates, benefits may disproportionately impact lower-risk subgroups. Recognizing risk disparities is the first step to designing specific interventions that target high-risk groups. Second, in failing to target the specific communities and populations most affected by TB, we lose an opportunity to make real progress toward TB elimination.

ADDRESSING LATENT TUBERCULOSIS INFECTION

In California, 80% of active TB arises from latent TB infection (LTBI) and could have been prevented with appropriate therapy.[7] Latent infection is common, with an estimated one in 17 Californians having LTBI. A majority of latent infections are in persons born outside the United States, with approximately one in four non–US-born Californians having LTBI. Although local public health infrastructure generally includes programs focused on targeting TB disease attributable to recent transmission or importation, few programs exist to specifically address LTBI, the largest contributor to TB cases.

Significant strides toward TB elimination in the United States are unlikely to be successful without scaling up LTBI testing and treatment.[11] Public health clinics have historically provided the majority of LTBI care; however, national funding for public health clinics has been declining since 2008,[12] and public clinics are unlikely to be able to keep up with new initiatives that would scale up LTBI care and increase patient volume. Partnerships with community clinicians, which would allow the provision of LTBI testing and treatment in primary care settings, are therefore urgently needed.

BARRIERS TO TESTING AND TREATMENT

Although the US Preventive Services Task Force recommends LTBI screening for asymptomatic adults who were born in or resided in countries with increased TB prevalence,[13] several factors conspire against widespread adoption of this practice in a primary care setting. Understanding the patient-level, provider-level, and health care system–level barriers to LTBI care is a first step in making TB prevention routine.

The data published on patient-level barriers to LTBI care are limited and have focused on demographic factors such as age and medical factors including comorbidities and adverse effects of medication.[14] Little is understood about other contributing factors that may be specific to the culture and beliefs of key patient groups, including inadequate understanding of the stigma associated with TB, reluctance to take medication for asymptomatic infection, and mistrust of the medical system. In addition, there may also be uncertainty related to risk of developing disease for individuals with a positive test.

Two additional barriers disproportionately affecting the non–US-born population may pose a threat to normalizing care for patients with LTBI. For some persons born outside the United States, perceived threat about disclosing country of birth may deter care seeking for LTBI. In addition, immigrants to the United States may be less likely to have health insurance and encounter increased challenges to accessing the medical system.[15] These obstacles may lead to reduced access to LTBI care and need attention to ensure that TB prevention can benefit all those at risk.

Knowledge gaps on the part of providers, including understanding who is at highest risk for TB, interpretation of interferon-γ–release assays, and, perhaps most critically, comfort with LTBI treatment regimens other than nine months of isoniazid, limit the widespread implementation of LTBI screening and treatment. Although completion rates for LTBI therapy are improved with short-course regimens compared with the traditional isoniazid therapy,[16] lack of familiarity with these regimens remains an obstacle to treating LTBI in a primary care setting (Jenna Feraud, California Department of Public Health, written communication, March 5, 2018).[2] Additional barriers for primary care providers may include limited time and the competing priorities of other chronic conditions, lack of perceived benefit to patients, and lack of provider compensation for LTBI care.

Insufficient funding of local TB programs means that the majority of LTBI care cannot be completed in public health clinics. However, health systems obstacles limit care for patients in primary care clinics, which suffer from a lack of strategic planning and policies related to LTBI. Furthermore, poor coordination of laboratory and radiology services lead to delays in diagnosis and treatment, and inadequate methods for documenting LTBI care in medical records means that LTBI treatment completion is often challenging to document.

A CALL TO ACTION

Elimination of TB will not be achieved without attention to the reservoir of latent infection, which in the United States occurs largely in a non–US-born population of racial and ethnic minorities. Reaching elimination targets will require specific efforts to

1. find and engage high-risk patients and tailor interventions to specific groups,
2. educate and incentivize the providers that serve high-risk patients,
3. develop measures to track LTBI care and attrition,
4. promote access to effective testing and treatment strategies including short-course LTBI regimens, and
5. remove cost barriers to treating LTBI.

Some interventions can be put in place locally, such as facilitating linkage to care and developing culturally appropriate patient materials, while others will require more time-intensive actions at state and national levels. Clear guidance on testing and treatment must be

disseminated by state and national organizations.

Immigrants to the United States are a large and heterogeneous population; the obstacles and drivers of care for one group are not universal. Understanding what motivates particular populations and targeting LTBI programs accordingly is critical to making progress. Culturally specific programs that address stigma, health care access, and language barriers are used in HIV and hepatitis C prevention[17,18] and may be helpful models in considering a path forward for TB control. Tailoring TB intervention content and modes of delivery to specific cultures, as well as selecting interventions that are least resource-intensive, may increase the success and feasibility of these programs.[18] Although poorly studied, there is limited evidence to suggest that interventions such as adherence coaching, peer-based interventions, and targeted cultural programs can improve LTBI treatment completion rates.[16] Implementation science frameworks incorporating behavioral theory, which are being used to increase coverage of key interventions and close gaps in the HIV care cascade[19] and have been used in low-resource settings to identify barriers and facilitators to TB care,[20] may be helpful in developing targeted LTBI interventions.

Health care providers serve a critical role in ensuring that each person at risk for TB has an opportunity for testing and, if positive for infection, treatment. However, health care providers lack streamlined systems and incentives, and must juggle competing priorities. In addition, clear, simple instructions regarding which individuals are at risk, as well as how to test and treat those individuals, are critical. Supporting research to develop the shortest, most acceptable regimens is clearly needed, but equally important is thoughtful dissemination of policy related to these regimens.

To address current barriers faced by California residents and their health care providers, a TB elimination plan was published in California in 2016 that outlines actions for successful scale-up of LTBI testing and treatment statewide for high-risk populations.[21] In partnership with local health departments, the California Department of Public Health is increasing its efforts to identify and educate providers who care for high-risk populations.

Measuring LTBI outcomes and creating more-effective mechanisms for reimbursement can also incentivize providers. Tracking LTBI care and attrition will not be possible without increased attention to surveillance. Currently, LTBI is not a reportable condition in a majority of states, and LTBI codes of the *International Classification of Diseases, Tenth Revision, Clinical Modification* (*ICD-10-CM*) Official Guidelines for Coding and Reporting 2018 are insufficient to capture information about initiation or completion of therapy.[22] Revision of *ICD-10-CM* and Current Procedural Terminology codes and development of national performance measures for LTBI, such as a Healthcare Effectiveness Data and Information Set measure, would greatly enhance providers' ability to track progress in the LTBI care cascade. Revising Current Procedural Terminology codes could also facilitate reimbursement.

Health care systems will not support adoption of testing and treatment unless a cost benefit is evident. In terms of LTBI testing and treatment, recent modeling data suggest it is cost-effective to test and treat non–US-born US residents for LTBI, using 12-dose isoniazid plus rifapentine (3HP), the shortest-course therapy currently available.[23] It is likely that testing strategies employing an interferon-γ–release assay are cost-effective for non–US-born patients, other than those with end-stage renal disease.[23] In addition, the use of interferon-γ–release assays in a non–US-born population avoids the pitfalls of false-positive tests that can occur with TB skin testing because of Bacillus Calmette–Guérin vaccination. Although the original efficacy and completion data for 3HP was established with directly observed therapy,[24] which may not be feasible in many primary care settings, more recent data indicate that treatment completion for self-administered therapy is noninferior to directly observed therapy.[25] If a 12-dose self-administered LTBI regimen can be used safely in a primary care setting, promotion of this regimen may remove a significant barrier to LTBI treatment.

Finally, in light of disparities in TB incidence, uneven access to health care among those who are disproportionately affected, and high costs to society of TB disease, it may be prudent to reduce the financial barriers to LTBI treatment. Although screening of non–US-born individuals for LTBI is a Grade B US Preventive Services Task Force recommendation, coverage of LTBI treatment without cost sharing is not mandated for health plans. Currently, health plans are required to cover only the testing of at-risk individuals, not the treatment that may ultimately reduce disease transmission. This may leave patients with LTBI with disincentives to pursue treatment of a condition that does not immediately cause symptoms or illness.

In this country, TB disproportionately affects racial and ethnic minorities. Effective implementation of LTBI testing and treatment is an essential component of TB control and elimination strategies and requires careful consideration of how to find and engage high-risk groups. As in other infectious disease elimination efforts, sustained and targeted efforts as disease incidence falls will be critical. While isolated interventions alone will not be adequate to solve this daunting public health problem, focused interventions tailored to subgroups are critical.

Tuberculosis is a disease spread through air. It respects neither boundaries nor citizenship. While sharing air with those who are ill with TB is the major risk for contracting infection, the uneven pattern of TB we see in California and the United States reflects ongoing disparities in TB risk and missed opportunities for TB prevention. Attention to LTBI in our non–US-born and non-White population has the potential to improve health for everyone, if we can make it a priority. AJPH

CONTRIBUTORS

Both authors conceptualized, researched, drafted, and edited the article, and approved the final article.

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