Modeling the Impact of USPSTF Screening Guidelines for LTBI in California

A Parriott (1,2), PB Shete (1,2,3), A Readhead (5), PM Barry (5), J Flood (5), JG Kahn (1,2,4)

(1) Consortium for the Assessment of Prevention Economics (CAPE) UCSF & CDPH (2) Philip R Lee Institute for Health Policy Studies, UCSF, San Francisco, CA (3) University of California San Francisco (UCSF), Zuckerberg San Francisco General Hospital Division of Pulmonary and Critical Care Medicine, San Francisco, CA (4) Department of Epidemiology and Biostatistics, UCSF, San Francisco, CA, USA (5) Tuberculosis Control Branch, California Department of Public Health, Richmond, CA

Background

Despite dramatic declines in the burden of tuberculosis (TB) disease in the last two decades, about 2,000 new cases of TB were diagnosed in California last year. A disproportionate number of cases occur in persons born outside the United States, and in residents of high risk congregate settings (HRCSs) including correctional facilities, homeless shelters, and long-term care (LTC) facilities. In 2016, the United States Preventive Services Task Force (USPSTF) issued recommendations that persons born in countries with increased TB prevalence and current and former residents of high risk congregate settings be tested for latent tuberculosis infection (LTBI) in primary care settings.

Aim

We sought to estimate how many cases of TB disease in California are potentially preventable via adherence to USPSTF guidelines.

Methods

We used a stochastic Markov model representing the population of California to compare the predicted number of cases of TB disease expected if current standard of care for LTBI (the baseline) continued versus a scale up of targeted testing and treatment in adherence with the USPSTF guidelines. Persons tested under the baseline and USPSTF scenarios are shown in Table 1. Risk of LTBI by age, sex, race, and country of origin were assigned based on available data. We also assigned individuals probabilities of residing in and monthly probabilities of transitioning into or out of HRCSs, and a monthly probability of presenting for a primary care visit. We assumed testing via IGRA and treatment with 12 weeks of rifapentine and isoniazid. Using one-month cycles, we evaluated the trajectory of TB cases in these two scenarios through 2026.

Table 1: Groups targeted for testing under baseline and United States Preventive Services Task force (USPSTF) guidelines (adults only).

Baseline	USPSTF
• Healthcare workers tested annually • Correctional inmates tested at admission • Long term care (LTC) facility patients tested at admission • Contacts to infected patients tested once. • Immunosuppressed persons: ▪ 100% of transplant recipients and HIV+ at transplant/diagnosis.* ▪ 85% of TNFAA users at treatment initiation • 2% annual probability of testing in the general population	All persons tested in baseline scenario, plus: • Annual testing: ▪ Current HRCS residents • One-time testing: ▪ Former residents of high risk congregate facilities listed above ▪ Non-US born

*ART therapy initiation used as a proxy of HIV diagnosis

Figure 1: Total Predicted TB Disease Cases, California 2016-2026

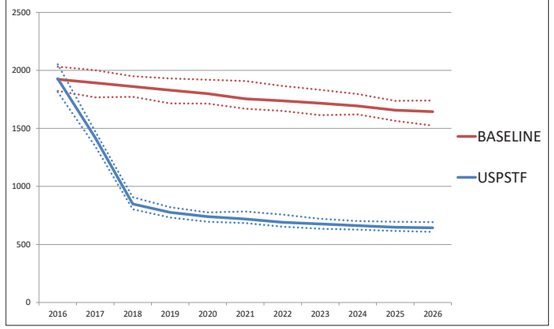
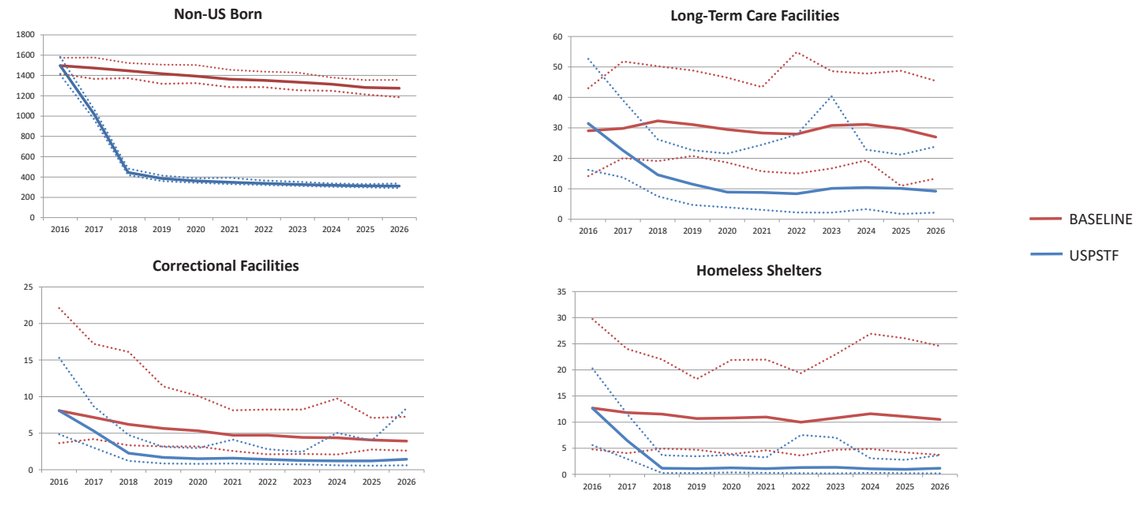


Figure 2: Predicted TB Disease Cases in Targeted Populations, California 2016-2026



Results

- In the first decade post implementation, we estimate that the USPSTF guidelines will prevent 9,756 (95% simulation interval 8,908 to 10,322) cases of TB disease, or 50% (95% SI 47 to 52%) of total cases (Figure 1).
- 94% of the prevented cases are projected to occur in persons born outside the United States (Figure 2).
- The number needed to test to prevent one case of TB disease is estimated to be 663 (95% SI 607-739).

Conclusions

- Perfect adherence to USPSTF LTBI screening guidelines could potentially prevent about half of new TB disease cases in the first decade post-implementation.
- Targeted testing and treatment of non-US born persons has the greatest impact on reductions in case counts at the population level.
- Because relatively few cases of TB disease occur in HRCS residents relative to cases in non-US born, the potential impact of testing in these populations is limited. However, targeted testing and treatment of current and former HRCS residents may be justified by benefit to the individual patient.
- Increased testing in HRCSs may also help prevent the need for large and costly contact investigations.

Acknowledgements

This project was funded by the U.S. Centers for Disease Control and Prevention, National Center for HIV, Viral Hepatitis, STD, and TB Prevention Epidemiologic and Economic Modeling Agreement (# 5U38PS004649).