



Missed Opportunities for Tuberculosis Screening in Primary Care

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Objective To assess how frequently pediatric practitioners perform latent tuberculosis infection (LTBI) screening according to guidelines. We hypothesized that screening occurs less frequently among children whose parents do not speak English as the primary language.

Study design We conducted a retrospective cohort study of patients attending well-child visits in an urban academic pediatric primary care clinic between April 1, 2012, and March 31, 2013. We assessed documentation of 3 LTBI screening components and tested the association between parent primary language and tuberculin skin test (TST) placement and documentation of results.

Results During the study period, 387 of 9143 children (4%) had no documentation of screening question responses. Among the other 8756 children, 831 (10%) were identified as at high risk for LTBI. Of these, 514 (62%) did not have documented TST placement in the appropriate time frame. Thirty-nine of 213 children (18%) who had a TST placed did not have documented results. Multivariable regression showed that parent language was not associated with TST placement or documentation of results, but non-Hispanic Black children were more likely to not have a documented test result (aOR, 2.12; 95% CI, 1.07-4.19; $P = .03$) when adjusting for age, sex, parent primary language, insurance status, day of the week, and study year of TST placement.

Conclusion Parent primary language was not associated with LTBI testing. However, we found substantial gaps in TST placement and documentation of TST results among high-risk children, the latter of which was associated with race/ethnicity. Targeted quality improvement efforts should focus on developing processes to ensure complete screening in high-risk children. (*J Pediatr* 2015;166:1240-5).

Tuberculosis in children remains a public health concern in the US and internationally. According to the World Health Organization, in 2012 more than 74 000 children died from tuberculosis worldwide.¹ Despite an overall decrease in annual incidence in the US, pediatric tuberculosis case rates among Hispanic, Black, and foreign-born children remain disproportionately high.^{2,3} Child or parent country of birth are among the most important risk factors for pediatric tuberculosis in the US; 31% of children diagnosed with tuberculosis between 2008 and 2010 were foreign born, and 66% of all US-born children diagnosed with tuberculosis had at least 1 foreign-born parent.³

Treatment of individuals with latent tuberculosis infection (LTBI) remains an important strategy for preventing LTBI reactivation and reducing the burden of active tuberculosis among populations in low-incidence countries.⁴⁻⁷ In 2004, the American Academy of Pediatrics (AAP) updated its recommendations for a targeted LTBI screening approach.⁷⁻⁹ To identify children at highest risk for LTBI, the AAP recommends asking 4 screening questions at well-child visits at least once annually.^{7,10} Based on the most important risk factors for LTBI, these screening questions identify children who subsequently require tuberculin skin test (TST) placement and reading for the diagnosis of LTBI.

Despite the most recent AAP recommendations, however, pediatric tuberculosis screening rates are low in many practices.¹¹⁻¹³ We sought to better characterize the frequency of adherence to the AAP recommendations at each step of the screening process among children at a large academic pediatric primary care institution in the US. We also sought to identify patient-specific factors that may contribute to any identified gaps in adherence to screening and testing recommendations. Recognizing that non-English speakers often have difficulty accessing health care, and that children of foreign-born parents are at higher risk for LTBI,^{14,15} we hypothesized that parent primary language other than English would be associated with less frequent adherence to AAP-recommended LTBI screening.

Methods

We performed a retrospective cohort study, using an electronic medical record review to test the association between parent primary language and incomplete

AAP	American Academy of Pediatrics
IFN	Interferon
LTBI	Latent tuberculosis infection
TST	Tuberculin skin test

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documentation of LTBI screening. The pediatric primary care clinic from which we sampled serves a broad range of racial and ethnic minority patients, with more than 40 languages spoken by patients and families. In addition, 72% of the patients were insured by TennCare, Tennessee's form of Medicaid. The clinic used TSTs exclusively for LTBI screening during the study period. The clinic was not affected by the US Tubersol shortage documented in April 2013.¹⁶ The Vanderbilt University Institutional Review Board approved the study and granted a waiver of informed consent.

We included all children aged 1 year to 18 years who had a well-child visit in the clinic between April 1, 2012, and March 31, 2013. We limited the cohort to well-child visits because our primary objective was to study screening practices of asymptomatic individuals.

Documented Components of LTBI Screening

We evaluated 3 components of targeted LTBI screening by determining whether the following were documented in the electronic medical record (Figure; available at www.jpeds.com).

Identification of High-Risk Children through Screening Questions. Since March 2011, the pediatric practitioners in the clinic have used an electronic template for well-child checks that includes a specifically designed feature to facilitate provider documentation of LTBI screening question responses. The template includes a slightly modified version of the AAP-recommended tuberculosis screening questions (Table I) with “yes,” “no,” and “unsure” response options, and a free text field following the statement “date of child’s most recent purified protein derivative and results.”

We considered a child to have been screened appropriately if well-child visit documentation noted 1 of the following 3 conditions: (1) a “no” response to all 4 screening questions; (2) a “yes” response to any of the 4 questions; or (3) any associated comment in the free text field indicating completed screening, even if none of the questions was answered. Children who had multiple well-child visits during the study year needed to have documentation of LTBI screening questions at least once to be considered appropriately screened in accordance with annual screening recommendations. Every child who had a “yes” response to at least 1 of the 4 screening questions was designated high-risk for LTBI.

Placement of a TST within 30 Days for Those at High Risk (or Documentation of a Previous TST). We subsequently assessed whether children identified as high risk had a TST placed within 30 days after the well-child visit at which they were screened. High-risk children who did not have a TST placed within 30 days were considered to have care consistent with AAP recommendations if: (1) they had a TST result recorded within the 365 days preceding the date of the well-child visit at which they were identified as high-risk; or (2) their only positive screening question was

Table I. Responses to recommended screening questions for pediatric LTBI in the US*

Question	Yes, n (% of 831)
Has a family member or contact had tuberculosis disease?	128 (15)
Has a family member had a positive TST result?	293 (35)
Was your child born in a high-risk country [†] ?	279 (34)
Has your child traveled (had contact with resident populations) to a high-risk country [†] for more than 1 week?	425 (51)

*These questions are listed in the template of the provider well-child visit note at the study clinic. They have been adapted from AAP⁷ and RedBook¹⁰ guidelines.

†The clinic template does not specifically list high-risk countries. The AAP recommendations consider countries in Africa, Asia, Latin America, or Eastern Europe to be high-risk countries.⁷

birth in a high-risk country, and they had documentation of a TST result at any time in the past. The results and follow-up of children with previous TST results were beyond the scope of the present study.

Results of TSTs That Were Placed. Care consistent with AAP recommendations was defined as documentation of a TST result recorded between 2 and 3 days after the TST was placed. For those patients who had multiple TSTs placed during the study period, only the first TST was included, to preserve the independence of observations. We did not evaluate the size of induration reported for TST results. As a pre-specified secondary analysis, to expand the sample size of children who had a TST placed, we identified all children (aged 1-18 years) who had a TST placed between April 1, 2010, and March 31, 2013, in association with a primary care clinic visit, regardless of the purpose of the clinic visit (ie, not limited to well-child clinic visits). We did not use this extended study period for the first 2 components, because implementation of the screening questions in the electronic templates did not occur until March 2011. Finally, we reviewed the charts of all children who had a positive TST result to check whether a health care provider noted the positive result, a referral to the health department was made, and chest radiography was performed.

Parent Primary Language

Parent primary language was self-reported by parents at registration for pediatric visits and was categorized as English, Spanish, Arabic, or other. Parent primary language was selected as the primary predictor variable because it approximates foreign-born status and was readily available in the electronic medical record. In 2010, approximately 85% of the foreign-born population in the US spoke a non-English language at home, and approximately 10% of the US-born population spoke a non-English language at home.¹⁷

Covariates

For the primary analysis, we selected a limited set of covariates, including patient age, sex, and race/ethnicity (Hispanic; non-Hispanic Black; non-Hispanic White; and other non-Hispanic). We assessed race/ethnicity because tuberculosis

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