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## Enrollment in English-as-a-Second-Language Class as a Predictor of Tuberculosis Infection in Schoolchildren

### SYNOPSIS

**Objective.** To assess the rate of tuberculosis infection among Hispanic students enrolled in English-as-a-Second-Language classes compared with Hispanic and non-Hispanic students not enrolled in such classes.

**Methods.** Using Mantoux tuberculin skin tests, the authors screened 720 students—out of 844 eligible—in two schools with predominantly Hispanic populations. Ethnicity and enrollment in the English-as-a-Second Language classes were recorded for each student. The rate of skin test positivity was compared for students enrolled and not enrolled in these classes.

**Results.** The incidence of positive tests among Hispanic students enrolled in an English-as-a-Second-Language class was 10.6%, compared with 1.3% for Hispanic students not enrolled (relative risk 8.3, 95% confidence interval 2.92, 23.8). There was no statistically significant difference in incidence rates for non-Hispanic students (0.5%) and Hispanic students (1.3%) who were not enrolled in English-as-a-Second-Language class (relative risk 2.4, 95% confidence interval 0.27, 20.9).

**Conclusion.** School-based tuberculin screening programs targeted at students enrolled in English-as-a-Second-Language classes can be effective and are not racially discriminatory.

**M**ass screening of schoolchildren, once a major component of tuberculosis (TB) control programs, is no longer considered a cost-effective strategy by public health officials.<sup>1-4</sup> School-based screening of targeted populations of high-risk children has been suggested as a cost-effective public health alternative.<sup>5,6</sup> A program of focused school screening in Amarillo has been effective in detecting TB infection in children. It has also demonstrated that screening targeted at children enrolled in English-as-a-Second-Language (ESL) classes is not racially discriminatory.

### Methods

In 1988, we implemented a school-based TB screening program in our community of 160,000 located in the Texas Panhandle. Hispanics, predominantly Mexican Americans, are the leading racial minority, composing 15% of

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the population. The annual screening was initiated with two purposes. The primary purpose was to identify and treat children with TB infection. By identifying these children and testing their immediate families, we hoped to increase our case finding of adults with undiagnosed active TB. The second purpose for screening was to identify epidemiologic trends that would serve as a basis for public health policy within our community.

For the first two years of this program, we screened with Mantoux tuberculin skin tests (TST) all first and seventh grade students enrolled all 41 schools of the local school district. We defined a new positive test as a 10mm induration in a student who had never been tested previously or who had tested negative in the past. We also standardized administration and reading of tests.<sup>7</sup>

The majority of positive reactors were concentrated in four schools. From 1991 through 1993, only students in these schools were tested. Three of these schools had mostly Hispanic students, and the fourth school had predominantly Asian students. We determined ethnicity of individual students on the basis of their surnames. The school district administration supplied statistics on the ethnic makeup of school populations based on parent's responses to a standardized enrollment form.

Because of increased incidence of positive TSTs in ESL students in 1994, we expanded our screening to include all ESL classes in the school district. Students with new positive TSTs were screened for active TB and offered preventive therapy with isoniazid. Analysis of our 1994 data revealed that the incidence of new positive TSTs among children enrolled in ESL classes in the four targeted schools was

7.5%. This was 12 times the rate of the non-ESL children attending the four schools. Seventy-one percent of the 42 children with new positive TSTs who were identified in 1994 were enrolled in ESL classes, while ESL students comprised only 17% of the children screened.

This prompted us to narrow the focus of our 1995 screening. Children enrolled in all ESL classes in the district were screened (15 schools). The majority of students enrolled in ESL classes were foreign-born. This paper focuses on the two schools where the entire student body was screened, thus allowing comparison of ESL and non-ESL populations. Standard statistical methods were used to calculate relative risks and confidence intervals.<sup>8</sup>

## Results

In 1995, we screened 1527 students from 15 schools with ESL programs; 66.6% of these students were enrolled

**Table 1. Comparison of Hispanic students' new positive tuberculin skin tests by ESL status at two Amarillo, TX, schools where the entire student body was screened; combined data, 1995**

Status	Total	Number positive	Percent positive
Enrolled in ESL . . . . .	218	23	10.6
Not enrolled in ESL . . . . .	316	4	1.3

ESL = English-as-a-Second-Language program.

NOTE: Relative risk 8.3; 95% confidence interval 2.92, 23.8

in ESL classes. Participation in the screening was voluntary and required parental permission. Students with a previous positive TST were ineligible for screening. The incidence rate for ESL students was 5.51% and for non-ESL students, 0.98% (relative risk = 5.62, 95% confidence intervals [CI] 2.26, 13.93). Of the positive reactions, 53 (87%) occurred in Hispanic children, six (10%) in Vietnamese children, and one each in a Laotian and a black child.

In the two schools where we tested the entire student body, ethnic minorities comprised the majority (68% and 88%) of the student population. Of the 844 students eligible for testing (students who had previously tested positive were ineligible), 720 (85.3%) completed the screening. In these two schools, the incidence of positive TSTs among Hispanic students enrolled in ESL classes was 10.6%, compared with 1.3% for Hispanic students not enrolled in an ESL class (Table 1). For non-Hispanic students not enrolled in ESL the rate was 0.5% (Table 2). Thus, enroll-

ment in an ESL class, not ethnicity, predicted risk for a positive TST. The populations tested in this screening study were convenience samples. Results reflect the incidence of tuberculin positivity for the students tested but do not represent the total prevalence of TB infection within these populations.

**Table 2. Comparison of non-ESL students' new positive tuberculin skin tests by ethnicity at two Amarillo, TX, schools, 1995**

Ethnicity	Total	Number positive	Percent positive
Hispanic . . . . .	316	4	1.3
Non-Hispanic . . . . .	186	1	0.5

ESL = English-as-a-Second-Language program.

NOTE: Relative risk 2.4; 95% confidence interval 0.267, 20.9.

School-based screening programs targeted at students enrolled in ESL classes can be effective and not racially discriminatory.

## Discussion

Tuberculin testing is not a requirement for school enrollment in this school district, and each year the population screened changed as the focus of screening shifted to eliminate low risk students from the next year's screening. The population tested varied also as students entered and left the school district or transferred from school to school within the district. As a result, some students had no baseline negative tuberculin test for determination of conversion statistics. Bacillus Calmette-Guerin (BCG) vaccination was another confounding factor in determining rates of conversion, because many children had received immunizations in Mexico. No attempt was made to differentiate boosted BCG reactions from true positives. All children with positive TSTs were considered to be infected with *Mycobacterium tuberculosis*, as recommended by the Centers for Disease Control. Participation in TB screening was voluntary, with 67% to 69% of eligible students being screened from 1993 through 1995.

Conclusions must be drawn cautiously from the data presented by these screenings due to the changing populations. Control data are lacking, because research was not the original intent of doing this tuberculin testing. We feel, however, that there are some significant findings that may be of interest to those working in the field of TB control.

Targeting of high risk populations is perceived by some as racially discriminatory. During the 1994 screening, some ESL class teachers voiced concerns that the testing was racially biased. Education of the staff members and review of the 1994 data helped to allay these concerns and ensure more complete testing of students in ESL classes in 1995.

As a result of the 1995 screening, a total of 61 positive TST reactors were identified. Fifty-seven (93%) of these children received chest X-rays for evaluation of active disease, and 55 (90%) were started on isoniazid preventive therapy. Despite an extensive investigation, a source case for infection of these children was not found. Compliance is difficult to establish for this group because some are still pending completion of therapy. TB program statistics for 1995, however, show a completion rate of 65% for children younger than age 15. The majority of these are children identified in the 1994 school screening. One of the recom-

mendations we have made to the school board is for increased use of twice-weekly, directly-observed preventive therapy to be given by the school nurses.

## Conclusions

Our experience demonstrates the usefulness of a targeted school-based screening program given that 5.6% of the students in ESL classes were identified as having positive TSTs and were evaluated for isoniazid preventive therapy. Our experience also shows that enrollment in an ESL class, not ethnicity, predicts the risk for tuberculous infection. Students enrolled in ESL classes come from families in which a language other than English is predominant in the home. ESL class enrollment is, therefore, a useful marker of recent immigration or frequency of contact with family members from other countries where the incidence of TB is higher than in the United States. School-based screening programs targeted at students enrolled in ESL classes can be effective and not racially discriminatory.

ESL class enrollment is a useful marker of recent immigration or frequency of contact with family members from other countries where the incidence of TB is higher than in the United States.

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