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Predicting completion of treatment among foreign-born adolescents treated for latent tuberculosis infection in Los Angeles

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SUMMARY

SETTING: Two health clinics in Los Angeles County, California.

OBJECTIVE: To identify factors associated with completion of care among foreign-born adolescents treated for latent tuberculosis infection (LTBI).

DESIGN: A total of 766 low-income adolescents (79% participation rate), including 610 foreign-born, were recruited. In prospective face-to-face interviews, data were obtained on socio-demographic and lifestyle characteristics, psychosocial factors and clinic-related variables. Medical chart data were abstracted regarding clinic appointment keeping and completion of treatment. Univariate and multivariate logistic regression analyses were performed to identify factors associated with completion of care.

RESULTS: Foreign-born adolescents were more likely to complete care than US-born adolescents, with 82% completion of care rate. In logistic regression analyses after controlling for age, medication taking behavior (OR 1.26, 95%CI 1.15–1.39), living with both parents (OR 1.74, 95%CI 1.02–2.97), sexual intercourse (OR 0.66, 95%CI 0.36–1.19) and speaking mostly or only English with parents (OR 0.39, 95%CI 0.15–1.03) were independently associated with completion of care.

CONCLUSION: These findings contribute to our understanding of the factors that may explain why some adolescents complete care whereas others do not. They provide supportive evidence that tailored intervention programs should be developed to support the screening and completion of treatment of foreign-born adolescents.

KEY WORDS: adolescence; emigration; immigration; tuberculosis

LACK OF ADHERENCE to therapy by patients is cited as the most important barrier to tuberculosis (TB) elimination internationally,[1] and one of the most serious remaining problems in the control of TB in the United States.[2] Its consequences are significant, resulting not only in an increase of new TB cases,[3] and the emergence of drug-resistant strains,[4] but also in higher overall treatment costs. One way to enhance completion of care among TB patients is to identify patients who are at risk of not completing care so that appropriate intervention programs can be developed and delivered to them.

In the US, although the total number of TB cases has been decreasing, an increasing proportion of cases occurs among persons born in foreign countries due to the reactivation of remotely acquired infection.[5–9] The proportion of foreign-born TB cases increased from 24% of 25 701 reported cases in 1990 to 43% of 17 531 tuberculosis cases in 1999. Of the 7553 foreign-born tuberculosis cases, 44% were Asian or Pacific Islanders and 36% were Latino or Hispanics. Mexico alone accounted for 23% of all foreign-born cases of tuberculosis.[10]

The expanded use of preventive therapy may be an appropriate strategy to reduce the incidence of TB among foreign-born persons.[7–8] Although only individuals with active TB are infectious, one in 10 persons with latent tuberculosis infection (LTBI) may develop the disease if they are not treated with isoniazid (INH) or another appropriate treatment regimen.[11] The US Centers for Disease Control and Prevention (CDC) estimate that 7 million foreign-born persons are infected with TB, and that 140 000–210 000 will develop the disease unless they complete preventive therapy.[9]

Factors that explain the increase of TB cases among foreign-born persons include the increase in the number of immigrants,[12] and the higher proportion of immigrants coming from Asian and Latin American countries, where TB rates are up to 20 times greater than in the US.[9,13] Foreign-born communities might also be hard to reach because of cultural and linguistic barriers,[14] and, as recently as 1998, the CDC declared that 'efforts to provide screening and preventive therapy for the foreign-born are limited'.[9]

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Preventive therapy for TB presents particular challenges among foreign-born persons. Many might not know how to access appropriate care in the US or might not be able to afford care because of lack of insurance or ineligibility for Medicaid. In addition, language and cultural differences can complicate the interaction between foreign-born patients and health care providers. Furthermore, difficulties in distinguishing tuberculin reactions caused by the BCG vaccine from those caused by natural infection among persons who have been previously vaccinated against TB, combined with the high rate of INH resistance in many of the foreign-born persons' countries of origin, make the treatment of TB more challenging.[9] Finally, attitudes and behaviors related to social stigma and cultural beliefs may also have a negative impact on the treatment of the disease.[15]

Few studies have focused on the adherence behaviors of foreign-born persons. One study reported that foreign-born patients tend to have slightly better completion rates than US-born patients.[16] On the other hand, Ailinger and Dear reported that Latino immigrants' adherence to appointments ranged from 81% on the first visit to 59% by the sixth visit, and only 64% of adolescents had completed care within 6 months, which is below the 69% national average completion of care level reported by the CDC the same year.[17,18]

Within the foreign-born population, adolescents are of particular interest. Adolescents are more susceptible to the development of active TB due to hormonal changes and altered protein and calcium metabolism associated with adolescent growth.[19] Furthermore, poor adherence has been documented among adolescents with chronic and infectious diseases. A study revealed also that only 59% of a sample of tenth grade students and 74% of seventh grade students completed TB preventive therapy.[19] Psychosocial factors such as self-esteem, locus of control, and self-efficacy have been found to influence adolescent adherence to the treatment of chronic diseases.[20–23]

It is therefore crucial to identify characteristics that are associated with failure to complete care in this vulnerable population. To our knowledge, no studies have been conducted on completion of care among foreign-born adolescents treated for LTBI. The purpose of our analysis was to 1) describe the socio-demographic profile of foreign-born adolescents treated for LTBI; 2) determine their completion rate; 3) identify characteristics associated with completion of care, and 4) identify factors that independently predict completion of care in this population.

STUDY POPULATION AND METHODS

Participant recruitment and data collection

From 1995 to 1998, adolescents aged between 11 and 19 years were recruited from two public health clinics in Los Angeles County at their first clinic visit. These clinics serve a predominantly disadvantaged population, with the overwhelming majority of the patients receiving public assistance such Medicaid, medical insurance, food stamps, etc. The majority of the foreign and US-born adolescents (71%) were referred to the clinics by schools or gateway programs (educational programs directed at assisting educationally disadvantaged students to prepare for admission to the University of California) after having received a positive Mantoux skin test. All schools in Los Angeles County require that all enrolling students provide proof of a TB skin test. This test may be performed by various health care providers. Only four participants were referred by the Refugee Assistance Program (RAP) or immigration services. Active consent, which requires that parents return a signed consent form if their child is to participate, was obtained prior to the study.

The adolescents were randomly assigned to one of four groups: usual care, peer counseling group, parental contingency contracting group and combined peer counseling and parental contingency group. In the parental contingency group, with the assistance of program staff, parents and adolescents negotiated an incentive provided by the parent to be received if the adolescent adhered to the prescribed TB treatment.

All participants received treatment and medical follow-up visits according to the standard clinic protocol that included monthly supplies of medication (typically isoniazid) for at least 6 months, the planned course of treatment. At each site, trained interviewers administered face-to-face interviews at baseline, and all participants who remained in care received a follow-up assessment prior to the sixth month of care, with a follow-up rate of 75%. Interviewers were knowledgeable health professionals with a master's degree in public health (MPH). They were also extensively trained in TB control.

Questionnaires were available in English, Spanish and Khmer. Our criteria for inclusion of Khmer language were based on retrospective reviews of adolescents who were receiving care during the previous year and the observation of the clinic nurse who indicated that they needed a translator for this population. In light of this and due to limited resources, English, Spanish or Khmer fluency were considered criteria of eligibility to participate in the study. However, no adolescents in the foreign-born sample chose to be interviewed in Khmer. Interviews were only conducted in English and Spanish. All Spanish questionnaires were translated and administered by bilingual native Spanish speakers.

Adolescents were not interviewed in the presence of their parents. Culturally sensitive brochures and booklets were provided to participants to explain the importance of completion of care for patients treated for LTBI. Participants were provided with a modest monetary incentive for their time in completing the interview (US$10).

Measures

This paper will focus on participants who reported being born outside the US. Demographic variables included age, sex, self-reported racial/ethnic background, country of birth, age at arrival in the US and family status (whether or not the adolescent lived with both parents). Lifestyle factors such as drug and alcohol use, history of sexual intercourse, incarceration and membership of a gang were also included in the questionnaire. The outcome variable, completion of treatment, was measured according to the discharge summary recorded in the patient's medical chart. For a patient to complete medical treatment, a minimum of 6 months' treatment had to have been completed. All patients who did not have a measure regarding completion of care were assumed to have discontinued therapy and were coded as having not completed care (excluding those patients who discontinued treatment on the physician's advice or had informed us they were moving).

Other factors hypothesized to influence completion of care include mastery (7-item scale; alpha = 0.65),[24] Rosenberg self-esteem (10-item scale; alpha = 0.79),[25] a modified Morisky-Green medication taking behavior index (3-item scale; alpha = 0.59)[26] and self-efficacy for medication taking (12-item scale; alpha = 0.80). The self-efficacy index was drawn from Rosenberg[25] and Lorig et al.,[27] and adapted to the cultural values of the study population.

Data analysis

All analyses were performed using SPSS-PC version 9.0 (SPSS Inc, Chicago, IL, USA). Completion of care was cross-tabulated with demographic, lifestyle, and clinic-related variables using Pearson's χ^2 tests to guide interpretation. *t*-tests were used to assess age and psychosocial variable differences between those who completed and those who did not complete care. Odds ratios (OR) and 95% confidence intervals (95%CI) were used to study unadjusted associations between the variables of interest and completion of care. Logistic regression analyses were performed using a conditional forward procedure to simultaneously examine variables identified as significant ($P < 0.05$) in bivariate analyses that are independent predictors of completion of care.

RESULTS

Population characteristics

The participation rate was 79%. Participants differed from non-participants only with regard to ethnic background: Latinos had a higher participation rate than other groups. A total of 629 foreign-born and 156 US-born adolescents were recruited. Of the total number of participants initially recruited, 18 moved out of Los Angeles County and nine had their medical treatment discontinued by their physician. The resulting study population included 610 foreign-born and 164 US-born adolescents.

A total of 766 US and foreign-born participants were recruited. The mean age of the overall population was 15.4 (standard deviation [SD] = 1.9), with half (51.2%) being males. Latinos comprised the largest proportion of participants (77.8%), followed by Asians (9.8%) and African Americans (7.8%). The majority of the study population (79.6%) was born outside the US. The majority of the population (80%) reported a family income of less than US$15 000; 17% between $15 000 and $30 000; and 3% above $30 000.

Table 1 gives a description of selected characteristics for US and foreign-born participants. Several significant differences ($P < 0.05$) were noted between the two populations. Foreign-born participants were more likely to be Hispanics or Asians and to keep their appointments. They also had a significantly higher completion of care rate (82.0% vs. 71.8%). On the other hand, foreign-born persons were less likely to be sexually active and to have been incarcerated. They also had significantly lower mastery, self-esteem, and

Table 1 Selected characteristics of US- and foreign-born study population at two sites

	US-born (n = 156) n (%)	Foreign-born (n = 610) n (%)
Sex		
Male	78 (50.0)	314 (51.5)
Female	78 (50.0)	296 (48.5)
Ethnicity*		
Hispanic	88 (56.4)	508 (83.3)
Asian	5 (3.2)	70 (11.5)
Black	50 (32.1)	10 (1.6)
White/other	13 (8.3)	22 (3.6)
Lives with		
Both parents	68 (43.6)	276 (45.2)
Not both	88 (56.4)	334 (54.8)
Health rating		
Good to excellent	127 (81.4)	472 (77.8)
Fair to poor	29 (18.6)	135 (22.2)
Gang member		
Yes	6 (3.8)	11 (1.8)
No	150 (96.2)	598 (98.2)
Sexually active*		
Yes	58 (37.2)	138 (22.6)
No	98 (62.8)	472 (77.4)
History of incarceration*		
Yes	35 (22.4)	51 (8.4)
No	121 (77.6)	559 (91.6)
Knows therapy prevents disease		
Yes	46 (29.5)	225 (36.9)
No	110 (70.5)	385 (63.1)
Age (mean, SD)	15.41 (1.94)	15.28 (1.91)
Medication taking behavior (mean, SD)	3.93 (2.12)	4.04 (2.30)
% of appointments kept* (mean, SD)	70.05 (24.91)	74.29 (22.34)

* $P < 0.05$.
SD = standard deviation.

self-efficacy for medication taking scores than US-born participants ($P < 0.05$). The two groups did not differ significantly regarding medication taking behavior.

The completion of care rate among foreign-born participants was 82%. The age of foreign-born participants ranged from 12 to 19 years, with a mean age of 15.3 (SD = 1.9). Males comprised 52% of the foreign-born participants. The majority of the sample were Hispanics (83.3%) followed by Asians (11.5%). Blacks and Whites/others represented 1.6% and 3.6%, respectively, of the population. The majority of Hispanics (72%) were born in Mexico. Among Asians, 35% were born in Thailand, 32% in the Philippines and 22% in Cambodia. Five of the 11 black foreign-born participants (45%) were born in Nigeria. The majority of participants who identified themselves as White/other were born in Asia or Latin America. Participants were on average, 9.5 years of age when they arrived in the US (SD = 5.1 range 1–18).

Bivariate relationships

Treatment group

Our data allowed examination of possible associations between three intervention programs—peer counseling, contingency contracting, and dual peer counseling/contingency contracting—and completion of care. Treatment group was not associated with completion of care ($\chi^2 = 4.29$, $P = 0.2$); we therefore analyzed the data without regard to intervention groups.

Socio-demographic variables

Completion of care was significantly associated with ethnicity ($P = 0.01$), age ($P = 0.004$), and living with both parents ($P = 0.001$). The highest completion rate was found among Asians (90%), whereas Blacks had the lowest rate, with only five of 10 (50%) completing care. Hispanics and Whites/others had completion rates of 81.7 and 72.7, respectively. Older participants were less likely to complete care (OR 0.85, 95%CI 0.76–0.95). Participants living with both parents were twice as likely to complete treatment as those who did not (OR 2.13, 95%CI 1.37–3.31). Participants speaking mostly/only English with their parents were less likely to complete care than students who spoke both their ethnic language and English (OR 0.34, 95%CI 0.16–0.74). Language spoken with friends and age at immigration were not related to completion of care (Table 2).

Clinic-related factors

The clinic waiting time to see the nurse was associated with completion of care ($P < 0.05$). Specifically, waiting an additional 30 min was associated with being 20% less likely to complete treatment (Table 2).

Lifestyle factor

Alcohol use, drug use, and use of inhalants were not associated with completion of care ($P > 0.05$). However, participants who had had sexual intercourse were less likely to complete care (OR 0.43, 95%CI 0.28–0.68) than those who had not. Furthermore, gang members were one third as likely to complete treatment as non-gang members and adolescents who had been incarcerated were half as likely to complete treatment as those who had not been incarcerated (Table 2).

Table 2 Factors associated with completion of care at two sites ($n = 610$)*

	Care completed	
	Yes ($n = 500$) *n* (%)	No ($n = 110$) *n* (%)
Age* (mean, SD)	15.17 (1.87)	15.74 (2.05)
Ethnicity†		
Hispanic	414 (81.7)	93 (18.3)
Asian	63 (90.0)	7 (10.0)
Black	5 (50.0)	5 (50.0)
White/other	16 (72.7)	6 (27.3)
Lives with both parents		
Yes	242 (87.7)	34 (12.3)
No	257 (76.9)	77 (23.1)
Knows therapy prevents disease		
No	305 (79.2)	80 (20.8)
Yes	194 (86.2)	31 (13.8)
Clinic wait time (mean, SD)	19.0 (65.5)	10.0 (34.5)
Language spoken with parents†		
Only/mostly English	18 (62.1)	11 (37.9)
Ethnic language or both	480 (82.8)	100 (17.2)
Sexually active		
Yes	98 (71.0)	40 (29.0)
No	401 (85.0)	71 (15.0)
Gang member†		
Yes	6 (54.5)	5 (45.5)
No	493 (82.4)	105 (17.6)
History of incarceration		
Yes	36 (70.6)	15 (29.4)
No	463 (82.8)	96 (17.2)
Medication taking behavior (mean/SD)	4.23 (2.18)	2.83 (2.67)

* $P < 0.05$.
† $n = 609$ due to one missing value.
SD = standard deviation.

Other measures

Not knowing that the medication was intended to prevent sickness was associated with non-completion of care (OR 0.60, 95%CI 0.39–0.96). Medication taking behavior score was associated with completion of care ($P < 0.0001$). Other baseline measures, such as self-efficacy for appointment keeping, mastery, self-efficacy for medication taking, and self-esteem, were not associated with completion of care ($P > 0.05$).

Multivariate logistic regression analysis: predictors of completion of care

Table 3 presents the results of the multivariate logistic regression. Of all the variables found to be significantly associated with completion of care at the bivariate level, four were also found to be significant in the multivariate logistic regression. The analysis confirmed the

Table 3 Logistic regression of predictors of completion of care among foreign-born adolescents treated for LTBI at two sites in Los Angeles County (n = 558)

	Adjusted OR	95%CI	P value
Medication taking behavior	1.26	1.15–1.39	<0.0001
Living with both parents	1.74	1.02–2.97	0.0411
Sexual intercourse	0.66	0.36–1.19	0.1663
Speaking mostly English with parents	0.39	0.15–1.03	0.0570
Age	0.90	0.78–1.05	0.1840

A forward logistic regression model was performed including the following variables: age, ethnicity, family status, knows therapy prevents disease, clinic waiting time, language spoken with parents, sexual activity, gang membership, history of incarceration, and medication taking behavior score. Although the model did not select age, we chose to force it in the model.
LTBI = latent tuberculosis infection; OR = odds ratio; CI = confidence interval.

importance of medication taking behavior (OR 1.26, 95%CI 1.15–1.39), speaking mostly English with parents (OR 0.39, 95%CI 0.15–1.03), living with both parents (OR 1.74, 95%CI 1.02–2.97) and being sexually active (OR 0.66, 95%CI 0.36–1.19) after controlling for age. Of note, controlling for intervention groups did not affect the results of the multivariate logistic regression model.

DISCUSSION

Very limited data are available on rates of completion of preventive tuberculosis therapy among foreign-born populations. In our sample, foreign-born adolescents were more likely to complete care than US-born adolescents. A previous report found that overall completion rates for foreign-born patients with TB disease are equal to or greater than those of US-born patients.[17] Levels of completion of TB treatment among foreign-born persons were also found to vary by country of origin.[16] Cultural factors such as level of understanding of the appropriate treatment methods and linguistic factors have been cited as potential barriers to patient adherence.[15] However, it is possible that these factors might have enhanced completion of care in our study population. As they often originate from countries with high rates of TB, foreign-born persons might be more aware of the seriousness of TB. They are likely to have known somebody who has had TB or died from TB, which increases their perceived susceptibility. The importance of perceived susceptibility in health seeking behavior and treatment adherence has been previously documented. For instance, 8 months after seeing films on tuberculosis, healthy people were significantly more likely to have obtained a preventive examination from their physician than a control group that had not seen the films.[28] Perceived susceptibility might also explain why, in spite of many economic and financial obstacles, developing countries such as Malawi, Mozambique and Nicaragua have adherence rates for active TB of around 80%, which is higher than in the US.[29]

Another explanation for the higher completion rate among foreign-born adolescents is that immigrant populations may have a greater respect for various forms of authority, including physicians' orders, than US-born persons. As immigrants are trying to make their transition to a new country as smooth as possible, they may want to do their best to comply with any form of authority, including doctor's orders. In addition, foreign-born adolescents might be more likely to comply with their parents' requests than US-born persons.

It is also possible that this finding reflects the fact that compared to US-born adolescents, the foreign-born adolescents in our study sample represent an overall lower risk group in terms of engaging in problem behaviors. For instance, we found that foreign-born adolescents were significantly less likely to have engaged in sexual intercourse and to have been incarcerated than US-born adolescents. It has been reported previously that US-born adolescents were significantly more likely to report use of alcohol, cigarettes and marijuana in their lifetime,[30] and that foreign-born Latinos were significantly less likely to engage in problem behaviors than US-born Latinos.[31] In this study, we were not able to detect a significant effect of the interventions on completion of care rate, which may indicate a potential Hawthorne effect as a result of pretesting study participants.

We also found that Asian adolescents had the highest completion of care rate (90%). Previous studies have documented several positive behavioral outcomes among Asians compared to other ethnic groups. This might be explained by the fact that younger Asians show deference to older persons, particularly parents. Parents are obeyed 'to an extent which baffles many American children'. The parents' involvement in this study may have constituted a motivation for Asian adolescents to comply with their doctor's orders. Furthermore, in most Asian cultures, the family's needs come before the individual.[32] As TB is a contagious disease, it is possible that these adolescents complete their medical treatment to prevent the disease for the well being of their family.

Another major finding of this study is that completion of care among foreign-born adolescents was independently predicted by medication taking behavior, sexual intercourse, language spoken with parents and whether or not the adolescent lived with both parents. These results suggest that parents of foreign-born adolescents may play an important role in their children's completion of care. This finding agrees with previous studies reporting that among adolescents, coming from a single-parent family was a risk factor for problem behaviors.[33]

We also found that speaking mostly English with parents, a proxy for acculturation, was associated with non-completion of care. This result confirms previous findings that among Latino adolescents, higher levels

of acculturation are associated with an increased likelihood of exhibiting problem behaviors and a decreased likelihood of exhibiting certain health-promoting behaviors.[26,34] There may be a connection between acculturation and family structure. Foreign-born adolescents who are acculturated might be less close to their families than those who are not. They may therefore not benefit from the positive support system that facilitates treatment adherence, and may resemble US-born adolescents in many regards, including adherence behavior.

In addition, adolescents who had had sexual intercourse were less likely to complete care. Sexual intercourse can be a proxy for lifestyle factors not accounted for in our assessments. In other words, it is possible that engaging in sexual activity per se might not hinder completion of care, but that those adolescents who do engage in sexual activitity share certain characteristics that may hinder adherence.

Some limitations of this study should be noted. Although the self-reported medication taking behavior measure used to assess adherence has been found to be a reliable and valid indicator,[28] no evidence was obtained that participants took their medication. Future studies should use more reliable measures of adherence, such as urine tests, or tablet dispensers. The completion rate reported in this study might be higher than expected, as the interviews may have influenced the participants' behavior towards completing care. In addition, the accuracy of self reports might be limited for sensitive behaviour in adolescents such as drugs, alcohol use and sexual activity. It is also possible that the use of translation may have contributed to inaccuracy in reporting.

The findings of this study have implications for the development of intervention programs to support the screening of foreign-born adolescents and their completion of care. Screening of immigrants and non-immigrants should be improved both abroad and after their arrival in the US. The majority of the LTBI cases were detected as a prerequisite to school entry. Only four of 629 foreign-born adolescents were referred to the clinics by immigration or by the RAP. This implies that these programs miss a significant number of foreign-born LTBI cases, specifically those aged under 15 years who are not included in the abroad screening mechanism, those who are undocumented, and those who entered the country on non-immigrant visas. Efforts to detect TB in this group should be encouraged.

Early detection of foreign-born TB cases is particularly important, as the risk of TB disease appears to be highest during the first year after arrival in the US and decreases with length of stay in the US among some groups, whereas in other groups the risk remains high for as long as 20 years after arrival. Foreign-born persons who arrived in the US after their fifth birthday have incidence rates of TB two to six times higher than those of similar age who arrived before they were 5 years of age.[7]

Characteristics of the typical immigrant adolescent vary from one part of the country to another.[35] Even within the foreign-born populations, intervention programs should therefore be tailored to the specific needs of particular adolescent populations based on their country of origin so as to incorporate relevant cultural and language issues and on their area of residence in the US. Future research should try to focus on foreign-born adolescent populations in various regions of the US.

Based on the findings of this study, it is possible that short questionnaires administered to adolescents seeking care for LTBI may help identify those adolescents at risk of not completing care. For instance, clinics may identify those adolescents who are sexually active, do not live with both parents and who speak mostly English with their parents during the intake interview so that they can be given particular attention. Further studies should investigate the use of this screening tool in various racial and ethnic cultures. Involving the adolescent's family in education and treatment might help improve adherence rates, which might be especially beneficial in the Latino and Asian communities given the importance of the family in these cultures.[18,35] Efforts to control TB among foreign-born populations in the US are an important step towards TB elimination. However, ultimately, efforts should be made to attack the problem at its roots. No country can seal its boundaries to infectious diseases. It is therefore in Western countries' best interests to help strengthen TB control programs in developing countries to eliminate TB internationally.

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References

1 World Health Organization. The World Health Report 1998. Geneva, Switzerland: WHO, 1998.
2 Ziv E, Daley C J., Blower S. Early therapy for latent infection. Am J Epidemiol 2001; 4: 381–385.
3 Snider D E Jr, Roper W L. The new tuberculosis. N Engl J Med 1992; 326: 703–705.
4 Iseman M D. Management of multidrug-resistant tuberculosis. Chemotherapy 1999; 45 (2 Suppl): 3–11.
5 Institute of Medicine. Ending neglect. The elimination of tuberculosis in the United States. Geiter L, ed. Committee on the Elimination of Tuberculosis in the United States, Division of Health Promotion and Disease Prevention. Washington, DC: National Academy Press, 2000.
6 McKenna M T, McCray E, Onorato I. The epidemiology of tuberculosis among foreign-born persons in the United States, 1986 to 1993. N Engl J Med 1995; 332: 1071–1076.
7 Zuber P L F, McKenna M T, Binkin N J, Onarato I M, Castro

K G. Long-term risk of tuberculosis among foreign-born persons in the United States. JAMA 1997; 278: 304–307.
8 Chin D P, DeRiemer K, Small P M, et al. Differences in contributing factors to tuberculosis incidence in US-born and foreign-born persons. Am J Respir Crit Care Med 1998; 158: 1797–1803.
9 Centers for Disease Control and Prevention. Recommendations for prevention and control of tuberculosis among foreign-born persons. Report of the working Group on tuberculosis among foreign-born persons. MMWR 1998; 47 (RR16): 1–26.
10 Centers for Disease Control and Prevention. Reported tuberculosis in the United States, 1999. Atlanta, GA: US Department of Health and Human Services, CDC, National Center for HIV, TB, and STD Prevention, 2000.
11 Centers for Disease Control and Prevention. TB elimination: now is the time. Atlanta, GA: CDC, 2002. http://www.cdc.gov/nchstp/tb/pubs/nowisthetime/pdfs/nowisthetime.pdf Accessed March 2004.
12 US Census Bureau. The foreign-born population: 1996; P20-494 and PPL-59. Washington, DC: US Census Bureau, 1998.
13 Raviglione M C, Snider D E Jr, Kochi A. Global epidemiology of tuberculosis: morbidity and mortality of a worldwide epidemic. JAMA 1995; 273: 220–226.
14 Binkin N J, Zuber P L F, Wells C D, Tipple M A, Castro K G. Overseas screening for tuberculosis in immigrants and refugees to the United States: current status. Clin Infect Dis 1996; 23: 1126–1132.
15 Matteelli A, Casalini C, Raviglione M C, et al. Supervised preventive therapy for latent tuberculosis infection in illegal immigrants in Italy. Am J Respir Care Med 2000; 162: 1653–1655.
16 Bloch A B, Simone P M, Castro K G. Comparisons of completion of tuberculosis (TB) therapy rates in foreign-born patients reported in US in 1993. Chicago, IL: International Union Against Tuberculosis and Lung Disease North American Region Second Mid-Year Conference, February 1997 (abstract 22).
17 Centers for Disease Control and Prevention. Core curriculum on tuberculosis. 3rd ed. Atlanta, GA: CDC, 1994.
18 Barry M A, Shirley L, Grady M T, et al. Tuberculosis infection in urban adolescents: results of a school-based testing program. Am J Public Health 1990; 80: 439–441.
19 Smith M H D. Tuberculosis in adolescents. Clin Pediatr 1967; 6: 9–15.
20 Korsch B, Fine R, Negrete V. Noncompliance in children with renal transplants. Pediatrics 1978; 61: 872–876.
21 Litt I, Cuskey W, Rosenberg A. Role of self-esteem and autonomy in determining medication compliance among adolescents with juvenile rheumatoid arthritis. Pediatrics 1982; 69: 15–17.
22 Jacobson A M, Hauser S T, Wolfsdorf J I, et al. Psychological predictors of compliance in children with recent onset of diabetes mellitus. J Pediatr 1987; 110: 805–811.
23 Littlefield C H, Craven J L, Roden G M, et al. Relationship of self-efficacy and binging to adherence to diabetes regimen among adolescents. Diabetes Care 1992; 15: 90–94.
24 Pearlin L I, Schooler C. The structure of coping. J Health Soc Behav 1978; 19: 2–21.
25 Rosenberg M. The measurement of self-esteem. Society of the Adolescent Self-Image. Princeton, NJ: Princeton University Press, 1965.
26 Morisky D E, Malotte K, Choi P, et al. A patient education program to improve adherence rates with antituberculosis drug regimens. Health Educ Q 1990; 17: 253–267.
27 Lorig K, Chastain R L, Ung E, Shoor S, Nolman H R. Development and evaluation of a scale to measure perceived self-efficacy in people with arthritis. Arthritis Rheum 1989; 32: 37–44.
28 Haefner, D, Kirscht J P. Motivational and behavioral effects of modifying health beliefs. Public Health Rep 1970; 85: 478–484.
29 Landesman S H. Commentary: tuberculosis in New York City—the consequences and lessons of failure. Am J Public Health 1993; 83: 766–768.
30 Sneed C D, Morisky D E, Rotheram-Borus M J, Ebin V J, Malotte C K. Patterns of adolescent alcohol, cigarette and marijuana use over a 6-month period. Addict Behav 2001; 26: 415–423.
31 Ebin V J, Sneed C D, Morisky D E, Rotheram-Borus M J, Magnusson A M, Malotte C K. Acculturation and interrelationships between problem and health-promoting behaviors among Latino adolescents. J Adolesc Health 2001; 28: 62–72.
32 Ratliff S S. Understanding southeast Asian cultures. In: Community Health Advocates Training Guidebook. Cleveland, OH: Ohio Commission on Minority Health, 1994.
33 Sokol-Katz, J S,Ulbrich, P M. Family structure and adolescent risk-taking behavior: a comparaison of Mexican, Cuban and Puerto Rican Americans. Int J Addict 1992; 27: 1197–1209.
34 Balcazar H, Peterson G, Coba, J A. Acculturation and health-related risk behaviors among Mexican-American pregnant youth. Am J Health Behavior 1996; 20: 425–433.
35 De La Rosa J M, Escobedo M. Tuberculosis and other infectious diseases in the adolescent immigrant. Adolesc Med 2000; 1: 453–467.

RÉSUMÉ

CONTEXTE : Deux centres de santé dans le Comté de Los Angeles, Californie.

OBJECTIF : Identifier les facteurs associés à l'achèvement des soins parmi les adolescents nés à l'étranger et traités pour une infection tuberculeuse latente (LTBI).

SCHÉMA : On a recruté un total de 766 adolescents de faibles revenus (taux de participation 79%), incluant 610 sujets nés à l'étranger. On a obtenu, au cours d'interviews prospectives en face à face, les données concernant les caractéristiques socio-démographiques et le style de vie, les facteurs psychosociaux et les variables en relation avec le dispensaire. Les données provenant des dossiers médicaux ont été prélevées concernant l'observance à l'égard des rendez-vous au dispensaire et l'achèvement du traitement. Les analyses de régression logistique univariées et multivariées ont été menées pour identifier les facteurs associés à l'achèvement des soins.

RÉSULTATS : Les adolescents nés à l'étranger ont été plus susceptibles d'achever leurs soins que les adolescents nés aux Etats-Unis : leur taux d'achèvement des soins atteint 82%. Dans les analyses de régression logistique, après contrôle du facteur d'âge, le comportement de prise des médicaments (OR 1,26 ; IC95% 1,15–1,39), le fait de vivre avec les deux parents (OR 1,74 ; IC95% 1,02–2,97), les relations sexuelles (OR 0,66 ; IC95% 0,36–1,19) et le fait de parler principalement ou exclusivement l'anglais avec ses parents (OR 0,39 ; IC95% 0,15–1,03) sont associés de manière indépendante à l'achèvement des soins.

CONCLUSION : Ces observations nous permettent de mieux comprendre les facteurs qui peuvent expliquer pourquoi certains adolescents achèvent leurs soins et d'autres non. Elles fournissent une preuve venant à l'appui du fait que des programmes d'intervention sur mesure devraient être développés pour aider au dépistage et à l'achèvement du traitement chez les adolescents nés à l'étranger.

RESUMEN

CONTEXTO : Dos dispensarios de salud en la provincia de Los Ángeles, California.

OBJETIVO : Identificar los factores asociados con el cumplimiento de la atención en adolescentes nacidos en el extranjero tratados por infección tuberculosa latente (LTBI).

DISEÑO : Se reclutaron 766 adolescentes de escasos recursos económicos (tasa de participación de 79%), de los cuales 610 habían nacido en el extranjero. En entrevistas frente a frente, se obtuvieron datos sobre las características sociodemográficas, estilo de vida, factores psicosociales y variables relativas al dispensario. Se extrajeron datos de las fichas médicas con respecto al respeto de las citas en el dispensario y al cumplimiento del tratamiento. Se realizaron análisis de regresión logística univariados y multivariados para identificar los factores asociados al cumplimiento de la atención.

RESULTADOS : Los adolescentes nacidos en el extranjero tenían más probabilidades de completar su atención que los nacidos en los Estados Unidos : su tasa de cumplimiento de la atención era de 82%. En los análisis de regresión logística, despues de controlar para la edad, el comportamiento de toma de medicamentos (OR 1,26 ; IC95% 1,15–1,39), el hecho de vivir con los dos padres (OR 1,74 ; IC95% 1,02–2,97), las relaciones sexuales (OR 0,66 ; IC95% 0,36–1,19) y el hecho de hablar principalmente o exclusivamente en inglés con los padres (OR 0,39 ; IC95% 0,15–1,03), estaban independientemente asociados con el cumplimiento de la atención.

CONCLUSIÓN : Estos hallazgos contribuyen a la comprensión de los factores que pueden explicar las razones por las cuales algunos adolescentes completan la atención y otros no. Además dan pruebas que sostienen el hecho que debieran desarrollarse programas de intervención sobre medida para ayudar a la detección y al cumplimiento del tratamiento en los adolescentes nacidos en el extranjero.