

OREGON PUBLIC HEALTH DIVISION • OREGON HEALTH AUTHORITY

MYCOBACTERIUM TUBERCULOSIS, VAR. XENOPHILUM

W e jest of course, so don't scurry for your copy of 'Mandel's,' but have a look at the graph. Nationally and in Oregon, cases of tuberculosis disease (TB) among the U.S.-born have declined significantly over the past few years. In 2008, only 17 cases of TB occurred among Oregonians born in the U.S. — the remainder, 58 cases (77% of all cases) occurred among the foreign-born. We interviewed foreign-born cases reported during 2008 and reviewed their case notes to identify unique risk factors and missed opportunities for prevention. Overall, 21 of the 58 people born abroad and diagnosed with TB in Oregon in 2008 were interviewed in-person.

REFRESHER

Most people exposed to *Mycobacterium tuberculosis* develop an asymptomatic latent TB infection (LTBI for short). Of these, 5%–10% develop TB disease during their lifetimes. The World Health Organization estimates that an astonishing one third of the world's population is infected with LTBI.¹ The prevalence in the United States is much lower, closer to 5%.¹

Treatment with prophylactic antibiotics, often a 9-month process, is about 85% effective in preventing progression to active disease if completed as prescribed.²

DEMOGRAPHICS

Foreign-born TB cases reported in Oregon during 2008 averaged 46 years of age; 57% were male. They came from 17 different countries of origin, the largest single contributor being Mexico (17 cases). Interviewed cases were disadvantaged compared to most Oregonians. Fewer than half graduated from high school and a third did not reach that level. More than a third had median annual household incomes less than \$20,000, and 70% rated their own English level as "poor" or "none" (N.B. these interviews were conducted in Spanish and a variety of other languages). Average household size was five. In short, obstacles to successful treatment of TB disease or LTBI abound.

OPPORTUNITIES FOR PREVENTION

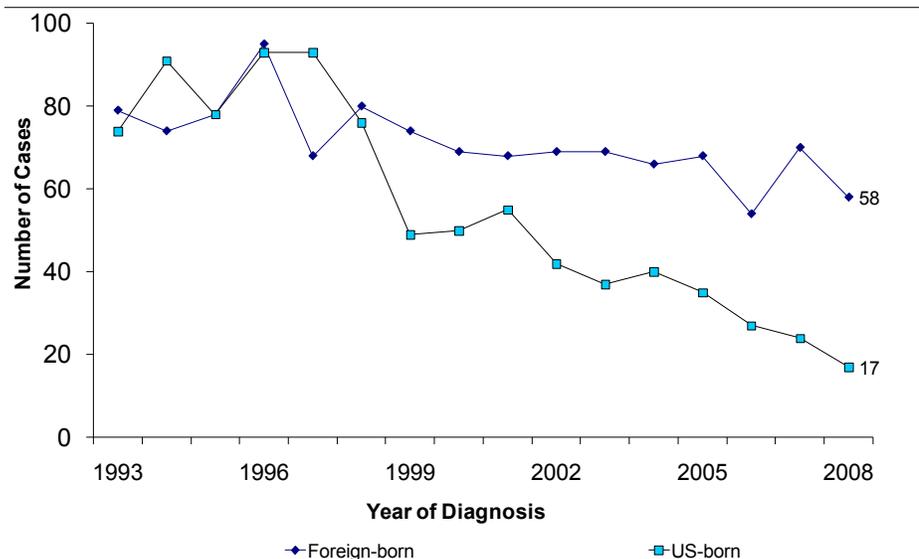
Our forebearers would have rejoiced at the day when 75 cases comprised a year's worth of TB in Oregon. Nevertheless, protracted treatment regimens, steeply declining budgets,

communication difficulties, requirements for directly observed therapy, and occasional drug resistance burden state and local public health agencies. We can't offer a definitive solution to the challenge of reducing future cases among foreign born. But, we did learn a few things. Unfortunately, one is how difficult it might be to try to drive this case rate even lower.

Studies have shown that when tuberculosis disease develops in a foreign-born person living in the United States, the usual scenario is that the affected person was exposed to tuberculosis in their home country, developed a latent infection, and then progressed to active disease after immigrating to the U.S.³ In fact, immigrants are at the most risk of developing active tuberculosis within the first 5 years of their arrival to the U.S.⁴ Thus, the Centers for Disease Control and Prevention (CDC) recommend immigrants who arrived within the previous five years should be screened for LTBI. However, more than 37 million foreign-born people reside in the U.S. This group comprises a very large and often inaccessible pool of people to screen and treat to prevent the emergence of TB disease in about 5%–10%. Prophylactic antibiotics reduce that number by 85% but only for those patients who are compliant with the full course of treatment. In short, screening for and treating LTBI is an inefficient tool with which to prevent cases of TB. However, this is what we have.

Participants in our study developed tuberculosis disease over a wide range of elapsed time in relation to their arrival in the United States: 36% developed disease within the aforementioned 5-year window, and the remainder developed disease after longer periods, up to decades after their arrival in the U.S. One question that comes up is whether those who develop disease after such a long period of U.S. residency might have been exposed more recently via a recent return visit to their motherland or by a visit from a relative or friend from abroad. Indeed, we did find a higher

Figure. Tuberculosis cases in Oregon, 1993–2008



* www.who.int/mediacentre/factsheets/fs104/en/



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percentage of those with late onset disease had traveled abroad within the last two years, compared to those who developed TB within five years of their initial arrival in the U.S. (5/16 [31%] and 1/5 [20%], respectively). However with the small sample size, this did not reach statistical significance.

SCREENING OPPORTUNITIES

We also looked at whether participants had any formal indications for screening by skin test or interferon gamma release assay (such as QuantiFERON®) per CDC guidelines⁵ prior to their diagnosis. This includes things like a history of diabetes or immunosuppression, working in healthcare, staying in a homeless shelter, etc. Twelve of the 21 had at least one formal indication to be screened, but only 5 of 21 had actually been screened.

When a foreign national applies for asylum or seeks to permanently immigrate to the U.S., he or she is required to have a chest x-ray and a health exam to screen for tuberculosis disease, but (with the exception of children) testing for latent disease is not required.[†] The prevalence of LTBI abroad is simply too high to be addressed in this manner. Applicants for temporary or student visas and undocumented immigrants receive no TB screening at all. Eight of 20 of the foreign-born cases interviewed for this project who disclosed their immigration status were undocumented. Those who became permanent U.S. residents through official channels did report getting a chest x-ray as required. Seven of the study participants had become

U.S. citizens since their arrival in the U.S. and reported no medical testing as part of this process. There is no formal requirement for any type of medical screening as part of attaining citizenship. **PREVENTION, ARE THERE COST-EFFECTIVE OPTIONS?**

One might notice, as we did, the frequency of missed screening opportunities among foreign-born people with TB disease and conclude that stricter adherence to screening guidelines would be an easy way to lower the number of cases in Oregon. Unfortunately, these cases of active disease are drawn from a large at-risk population. The economic reality is stark when it comes to the screening and treating large numbers of people with LTBI when only a minority of them would go on to develop disease. A study published in the *New England Journal of Medicine* examined different cost-effectiveness scenarios to reduce the incidence of TB in the U.S. looking at immigrants from Mexico specifically.⁶ One strategy entailed screening for LTBI in all arrivals from Mexico. The authors estimated that this approach would cost \$329 million dollars and prevent an estimated 400 cases of TB in the U.S. Another strategy analyzed providing Mexico with \$35 million in foreign aid to be used for antibiotic therapy among cases of active TB in Mexico. The investigators concluded this strategy would prevent 2,600 cases of TB in the U.S, a much more cost-effective option.

CONCLUSION

Reducing TB disease further in Oregon will require a reduction in disease

among persons born abroad, who are at highest risk for the disease. Creative, population-based and perhaps 'out-of-the-box' thinking are necessary; no simple answers emerge to the question of the best use of public health resources to reduce TB below its current level. Some ideas might be to target screenings to those with multiple indications, and to increase education and outreach among foreign-born populations. A soon-to-be released study is rumored to demonstrate effectiveness of a 3-month, once-a-week regimen for treatment of LTBI. Cheap and effective shorter course LTBI treatment would likely help a lot. There are probably other good ideas out there. Thoughts, anyone?

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[†] www.cdc.gov/immigrantrefugeehealth/pdf/tuberculosis-ti-2009.pdf

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