Detecting and treating tuberculosis infection in immigrants from developing countries were cost-effective

Khan K, Muennig P, Behta M, Zivin JG. **Global drug-resistance patterns and the management of latent tuberculosis infection in immigrants to the United States.** N Engl J Med. 2002;347:1850-9.

QUESTIONS

In new immigrants to the United States, is screening and treatment for latent tuberculosis (TB) cost-effective? What is the optimal treatment for persons with no history of active disease?

DESIGN

Cost-effectiveness and cost–utility analysis using a decision analytic model from the perspective of U.S. society.

SETTING

United States.

PATIENTS

A hypothetical cohort of all documented immigrants ≥ 18 years of age who entered the United States from developing countries (13 geographically independent regions) during the year 2000.

INTERVENTION

The tested strategies were no intervention or a tuberculin skin test followed by 1 of 3 treatment regimens for positive test results. Treatment regimens were 1) isoniazid, 300 mg/d, plus pyridoxine, 25 mg/d for 9 months; 2) rifampin, 600 mg/d for 4 months; and 3) rifampin, 600 mg/d, plus pyrazinamide, 15 to 20 mg/d per kg of body weight for 2 months.

MAIN COST AND OUTCOME MEASURES

Effectiveness estimates for each treatment regimen were obtained from randomized controlled trials and adjusted for the estimated prevalence of drug resistance. A panel of 3 infectious disease specialists provided values for the Health Utilities Index, and mortality estimates were obtained from the National Center for Health Statistics. U.S. costs for transportation, ambulatory care, interpreter services, laboratory tests, medications, adverse drug reactions, hospitalization, and patients' time were assessed in U.S. dollars for the year 2000. Future costs and benefits were discounted at 3% and were half-cycle adjusted.

MAIN RESULTS

Rifampin plus pyrazinamide was the most effective and least expensive treatment strategy for immigrants from Vietnam, the Philippines, and Haiti. For immigrants from China, South Korea, eastern and southern Asia, developing nations in the Pacific, India, Mexico, and sub-Saharan Africa, isoniazid led to health benefits and financial savings. Isoniazid had the lowest cost per quality-adjusted life-year gained for immigrants from Latin America and the Caribbean ($2034), eastern Europe and central Asia ($5952), and the Middle East and northern Africa ($914). Adopting a tailored approach to treatment based on geographic region of origin was more effective and less expensive than a strategy of using isoniazid for all immigrants (Table).

CONCLUSIONS

In immigrants to the United States, detecting and treating latent tuberculosis infection was cost-effective. For immigrants from Vietnam, the Philippines, and Haiti, a rifampin-containing regimen was best.

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Detecting and treating latent tuberculosis (TB) infection in immigrants from developing countries*

Strategy	Net cost (millions of dollars)	Number of future cases of active TB	Number of QALYs gained
No intervention	338.1	13 933	0
Isoniazid	258.3	4342	26 763
Best strategy for each region†	256.0	3697	28 562

*QALY = quality-adjusted life-year.
†The most effective strategy for each region up to an incremental cost-effectiveness ratio of $10 000 per QALY.

COMMENTARY

The analysis by Khan and colleagues shows the benefits of screening and treating new immigrants to the United States for latent TB as a strategy to control TB in the era of global variation in resistance patterns. It also provides unique data-driven recommendations on the treatment regimens to use based on the region or country-of-origin–specific resistance patterns. The most important variables in the analysis were drug-resistance patterns, effectiveness of regimens (based in part on drug resistance), incidence of active tuberculosis after entry to the United States, and costs of treating either latent or active TB. The methodology is sound, and the conclusions and recommendations are relevant to clinical practice today as shown by the fact that regional patterns of drug-resistant TB remained stable between 1993 and 1997 (1).

These recommendations will continue to be relevant to clinical practice, assuming that drug resistance and immigration patterns are relatively stable in the United States. From 1993 to 1998, two thirds of all foreign-born persons with TB in the United States originated from Mexico, the Philippines, Vietnam, India, China, Haiti, and South Korea (2). Based on the results of this study, physicians should screen and treat latent TB in new immigrants to the United States because it could result in substantial public health and economic benefits to the country. For persons from Vietnam, the Philippines, and Haiti, a rifampin-containing regimen is preferred. However, given the reports of serious hepatotoxicity with rifampin plus pyrazinamide, health care providers should use this regimen with caution as now recommended by the Centers for Disease Control and Prevention (3).

The benefits of screening for and treatment of latent TB and the choice of regimens may differ for industrialized countries outside the United States, depending on their immigration screening processes, immigration patterns, and health care systems.

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