Evaluating Tuberculosis Case Detection in Eritrea

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We used results from a national tuberculosis prevalence survey in Eritrea to calculate case detection rate (CDR) and compared it with the published CDR. The CDR obtained from the survey was ≈40%, whereas the CDR published by the World Health Organization was 3× lower (14%).

During the World Health Assembly in 1991, 2 targets were set for tuberculosis (TB) control: to detect 70% of all new sputum smear-positive cases arising each year and to successfully treat 85% of these cases (1). For assessment of the first target, case detection rate (CDR) is used; CDR is the number of cases reported divided by the number of incident cases estimated for that year. In Africa in 2004, the range of CDRs for new smear-positive TB patients was 14%–115% in different countries (2). The CDR is uncertain for many African countries because information for estimating the incidence is outdated or unavailable. The most recent national TB prevalence surveys were performed from 1955 through 1960; they covered 11 countries and a population of ≈40,000 (3). Since then, TB treatment has become widely available, and the emergence of HIV has had a substantial effect on TB incidence (4,5).

Recently, a TB prevalence survey was performed in Eritrea, a country with a population of 3 million, located in the Horn of Africa (6). The survey determined the prevalence of sputum smear–positive TB by examining sputum samples of persons ≥15 years of age. To assess the performance of Eritrea’s TB program, we calculated the CDR by using information obtained from the survey and compared this CDR to published estimates.

The Study

The national TB prevalence survey in Eritrea was conducted from February through October 2005 (6). In 40 selected villages, a census (which included information about sex and age) was taken of ≈875 persons in each village. All persons ≥15 years of age were asked to provide a morning and a spot sputum sample. Persons were informed about the survey and could refuse participation. The study protocol for the prevalence survey was approved by the Ministry of Health.

The specimens were examined by fluorescence microscopy. Samples positive by fluorescence microscopy were reexamined by light microscopy for confirmation. Persons who had 2 positive sputum samples were informed about the test results and referred for treatment. Those who had 1 positive sputum sample were referred to a nearby healthcare facility for further smear examination. If results of smear examination were negative, thoracic radiographs were taken and evaluated by 2 experienced radiologists. The case definition for a sputum smear–positive case was at least 2 sputum specimens positive for acid-fast bacilli by Ziehl-Neelsen staining and microscopy or at least 1 sputum specimen positive for acid-fast bacilli and radiographic abnormalities consistent with active pulmonary TB (classification of the National Tuberculosis Control Program in Eritrea).

Using the prevalence estimate obtained from the survey and 2 different models, we calculated the CDR for 2004. In model 1, described by Styblo, CDR = (notification rate/prevalence rate) / (0.5 + 0.83 × [notification rate/prevalence rate]) (7,8). In model 2, described by Dye et al., CDR = (notification rate/prevalence rate) / ([notification rate/ prevalence rate] + 0.5) (9,10). We then compared the calculated CDR with the CDR estimated by the World Health Organization (WHO) to evaluate whether comparable conclusions about TB case detection would be obtained.

A total of 38,047 persons were included in the prevalence survey. Of those ≥15 years of age, 18,152 (94.6%) provided at least 1 sputum sample (Figure). The prevalence of new smear-positive TB was estimated at 90/100,000 (95% confidence interval [CI] 35–145/100,000) in persons ≥15 years of age. In 2005, 44.7% of the Eritrean population was <15 years of age (11), which resulted in an overall new smear-positive TB prevalence of 50/100,000 (95% CI 19–80/100,000) under the assumption of no cases in persons <15 years of age.

In 2004, 17/100,000 new smear-positive cases were reported (2). The calculated CDR from model 1 was 43% and from model 2 was 40%. The 2004 CDR published by WHO was 14%.

Conclusions

For Eritrea, the CDR provided by WHO is considerably lower than that calculated from the results of the national TB prevalence survey. Both estimates indicate that Eritrea has not reached the 70% target for case detection. However, the WHO estimate suggests that the program needs to improve case detection by a factor of 5, whereas the survey estimate suggests that case detection needs to be improved by a factor of 1.6. Two explanations may account for the large difference: 1) the CDR derived from the TB...
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