

Integration of tuberculosis screening at an HIV voluntary counselling and testing centre in Haiti

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Objective: To describe the integration of tuberculosis screening into the activities of an HIV voluntary counselling and testing (VCT) centre in a country with endemic tuberculosis.

Setting: An HIV VCT centre in Port au Prince, Haiti.

Design: All patients presenting for HIV VCT who reported cough received same-day evaluation for active tuberculosis. Of the 1327 adults presenting to the centre for the first time between January and April 1997, 263 (20%) reported cough and of these 241 (92%) were evaluated.

Results: Of the 241 patients evaluated for cough, 76 (32%) were diagnosed with pulmonary tuberculosis. Of the 76 patients diagnosed with pulmonary tuberculosis, 28 (37%) had a positive smear for acid-fast bacilli (AFB), 14 (18%) had a negative AFB smear but a positive sputum culture for *Mycobacterium tuberculosis*, and 34 (45%) had culture-negative tuberculosis. Also, 31 out of 241 (13%) VCT clients evaluated for cough were diagnosed with bacterial pneumonia.

Conclusion: This report confirms that in areas with a high HIV and tuberculosis prevalence, a high proportion of VCT clients have active pulmonary tuberculosis. The integration of tuberculosis screening offers several benefits, including the diagnosis and treatment of large numbers of individuals with tuberculosis, a decreased risk of nosocomial tuberculosis transmission, and the opportunity to provide tuberculosis prophylaxis to HIV-positive patients in whom tuberculosis has been excluded. Future studies are needed to determine the cost-effectiveness of integrated tuberculosis and HIV VCT services, and whether integration should be recommended in all countries with high HIV and tuberculosis rates.

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Introduction

Voluntary counselling and testing (VCT) for HIV infection may be a cost-effective HIV prevention strategy [1–3]. Therefore, many VCT centres have been opened in countries affected by the HIV epidemic.

Because of the high rate of HIV and tuberculosis co-infection, and because of the overlap between the symptoms of HIV and tuberculosis, a large percentage of patients presenting to HIV VCT centres in developing countries may have active tuberculosis [4,5]. In the Dominican Republic and Uganda, 10 and 6% respectively, of patients presenting to VCT centres had active tuberculosis [6,7]. Therefore, in countries with high rates of tuberculosis and HIV, VCT centres may be a good place to identify large numbers of individuals with active tuberculosis. Also, at health facilities where patients with infectious tuberculosis come into close contact with immunocompromised HIV-positive patients, tuberculosis transmission is an important risk [8,9]. Therefore, nosocomial tuberculosis transmission may be an important risk at VCT centres in countries with high rates of HIV and tuberculosis.

At the HIV VCT of the Haitian Study Group of Kaposi's Sarcoma and Immunodeficiency Disorders (GHESKIO) in Haiti, tuberculosis screening has been integrated into VCT activities. On the basis of World Health Organization recommendations [7], patients presenting for HIV testing who report a cough are routinely screened for active tuberculosis. Patients with cough are targeted because cough is a good risk marker for active tuberculosis [10,11], and because cough is important in the aerosolization and transmission of *Mycobacterium tuberculosis* [12]. In the current report, we describe the results of tuberculosis screening, and make recommendations for the integration of tuberculosis screening at VCT centres in other developing countries.

Methods

GHESKIO is a national HIV VCT centre serving a poor urban population in Port au Prince, Haiti. GHESKIO's central activity is HIV VCT; other services including sexually transmitted disease (STD) management, family planning, HIV care, and tuberculosis screening have been integrated into the central VCT activities. Haiti has high rates of HIV infection with over 5% of the general adult population infected [13–15]. Haiti also has one of the highest rates of tuberculosis infection in Latin America and the Caribbean, with a tuberculosis incidence rate of over 250 per 100 000 [6–19].

All individuals who come to GHESKIO receive pre-test and post-test HIV counselling. There is a 10–14 day wait between pre-test counselling and the provision of HIV test results with post-test counselling. All patients also receive group education on HIV. The average time spent in waiting areas, counselling, and group education is 5 h. During this time, patients are in close contact with each other and the VCT staff.

At the first visit to GHESKIO, during pre-test HIV counselling, patients are systematically asked about a history of cough. Patients reporting cough are segregated from other VCT clients and referred for same-day tuberculosis evaluation. Evaluation includes a history and physical, a sputum smear for acid-fast bacilli (AFB), sputum culture for *M. tuberculosis*, and a chest radiograph. Patients are asked to provide two additional sputum samples over the ensuing 2 days.

Our case definition of tuberculosis is based upon the definition of the American Thoracic Society [20]. We require two of the following three criteria: (i) symptoms of tuberculosis, (cough, fever, night sweats, etc.); (ii) AFB visible by direct Ziehl–Neelsen staining of sputum, or *M. tuberculosis* cultured from sputum in Lowenstein–Jensen medium after sodium hydroxide digestion, decontamination, and concentration; (iii) a chest radiograph independently interpreted as highly suggestive of tuberculosis. For patients with culture-negative tuberculosis, we also require a clinical response to antituberculosis medications. Patients diagnosed with tuberculosis are treated on-site with directly observed tuberculosis therapy. For the diagnosis of pneumonia we require a history of respiratory symptoms and fever, an infiltrate on chest radiograph, and the resolution of clinical symptoms after treatment with antibiotics.

Data analysis

Analysis was carried out using Epi Info 6 software (Centers for Disease Control and Prevention, Atlanta, GA, USA) and SAS (SAS Institute, Cary, NC, USA). To determine a difference in two proportions, chi-square with Yates correction was used. For expected cell values of less than 5, Fisher's exact test was used. Means and medians were compared with Student's *t*-test for normally distributed data and the Wilcoxon rank sum test for non-parametric data.

Results

From January to April 1997, 1327 adults (age > 18 years) presented to the GHESKIO Centre for HIV VCT, and 474 (36%) were HIV positive. Of the 1327 patients presenting for VCT, 263 patients (20%) reported cough. Of the 263 patients with cough, 241

individuals (92%) had a diagnostic tuberculosis evaluation and 22 (8%) were lost to follow-up.

Of the 241 individuals with cough who received diagnostic evaluation, the median age was 34 years, 130 (54%) were women, 59 (24%) reported a previous history of tuberculosis, and 139 (58%) were self-referred. Of the 241 individuals evaluated for cough, 193 (80%) reported weight loss, 127 (53%) reported fever, 144 (60%) reported a cough of over 1 month's duration, and 128 (53%) were HIV positive.

The diagnoses established in the 241 patients evaluated for cough, stratified by HIV status, are given in Table 1. Of the 241 patients evaluated for cough, 76 (32%) were diagnosed with active tuberculosis. The 76 individuals with active tuberculosis represented 6% of the 1327 patients presenting to the clinic during the study period. Among patients evaluated for cough, risk factors for active tuberculosis were weight loss [odds ratio (OR) 4.0; 95% confidence interval (CI) 1.5–11.1; $P = 0.002$], male sex (OR 2.0; 95% CI 1.1–3.6; $P = 0.018$), and a positive HIV test (OR 2.1; 95% CI 1.1–4.0; $P = 0.011$). In addition, of the 241 patients evaluated for cough, 31 (13%) were diagnosed with bacterial pneumonia. The 31 individuals with pneumonia represented 2.3% of the 1327 clients coming for VCT during the study period.

Of the 241 patients evaluated for cough, 28 (12%) were AFB smear positive. The sensitivity of AFB smear when compared with *M. tuberculosis* culture was 28 out of 42 (66%). In HIV-negative individuals, the sensitivity of AFB smear was 17 out of 17 (100%). In HIV-positive individuals, the sensitivity of AFB smear was 11 out of 25 (44%) ($P < 0.001$). Among the 213 patients evaluated for cough who had a negative AFB smear, 14 out of 213 (7%) had a positive *M. tuberculosis* sputum culture and 34 (16%) had culture-negative tuberculosis. In total, 48 out of 213 smear-negative patients (23%) were diagnosed with tuberculosis. Among the 213 smear-negative patients, 97 patients

both tested HIV positive and reported weight loss, and 37 (38%) of these patients were diagnosed with active tuberculosis, whereas among the other 116 smear-negative patients, 11 (9%) were diagnosed with tuberculosis. Of note is the fact that all 14 of the AFB smear-negative patients with a positive *M. tuberculosis* sputum culture were among the 97 HIV-positive patients with weight loss.

Of the 241 patients with cough, 92 (37%) had a normal chest radiograph, 73 (30%) had an interstitial infiltrate, 26 (11%) had apical fibrosis, eight (3%) had a pleural effusion, eight (3%) had mediastinal adenopathy, seven (3%) had cavitory disease, three (1%) had cardiac enlargement, and 24 (10%) did not have a chest radiograph. Among the 92 patients with a normal chest radiograph, none were diagnosed with tuberculosis; among the 125 with an abnormal examination, 72 (58%) were diagnosed with tuberculosis ($P < 0.001$).

Discussion

This report confirms that in areas with high HIV and tuberculosis prevalence, a high proportion of VCT clients have active pulmonary disease, mainly tuberculosis and bacterial pneumonia. At least 6% of the patients presenting to an HIV testing centre in Haiti had active tuberculosis, and approximately 2% had bacterial pneumonia. This is comparable with the results found in the Dominican Republic and Uganda [6,7].

The benefits of tuberculosis screening in HIV VCT centres are: (i) the centres provide an opportunity to diagnose and to treat a large number of individuals with active tuberculosis; (ii) patients with infectious tuberculosis can be segregated from other VCT clients, many of whom are HIV positive and immunocompromised; (iii) HIV-positive patients in whom tuberculosis has been excluded may benefit from isoniazid prophylaxis;

Table 1. Pulmonary diagnoses of 241 patients presenting with cough to a voluntary HIV counselling and testing centre.

Diagnosis	HIV-positive patients (n = 128)		HIV-negative patients (n = 113)		All patients (n = 241)	
	Patients	(% of HIV+)	Patients	(% of HIV-)	Total	(% of all)
Culture-positive tuberculosis	25	(19)	17	(15)	42	(17)
Culture-negative tuberculosis	25	(19)	9	(8)	34	(14)
Bacterial pneumonia	23	(18)	8	(7)	31	(13)
Bronchiectasis	2	(2)	0	(0)	2	(1)
Congestive heart failure	2	(2)	1	(1)	3	(1)
Cryptococcal pneumomonia	1	(1)	0	(0)	1	(< 1)
No diagnosis	50	(39)	78	(69)	128	(53)

(iv) in the process of screening for tuberculosis, many individuals with bacterial pneumonia can be diagnosed and treated.

On the basis of the results of the current study, we have implemented the tuberculosis screening strategy outlined in Fig. 1. Since implementation in 2000, 1223 VCT clients with cough have been screened and 334 (27%) have been diagnosed with active tuberculosis. We are also trying to modify services by limiting the time in waiting areas, creating outdoor waiting areas, and improving ventilation in the VCT centre.

We send all patients presenting with cough for same-day sputum AFB smear. In the current study population, 12% of individuals with cough were AFB smear positive. With a technically simple and inexpensive test, the AFB smear, contagious individuals can be identified, segregated from other VCT clients, and started on tuberculosis treatment. We believe that VCT centres in countries with endemic tuberculosis should consider integrating tuberculosis screening into routine VCT activities. Performing AFB smears on patients with cough should be feasible in most VCT centres, and could be a first step in the integration process.

However, one should be aware of the limitations of the AFB smear in an HIV VCT centre. In this study,

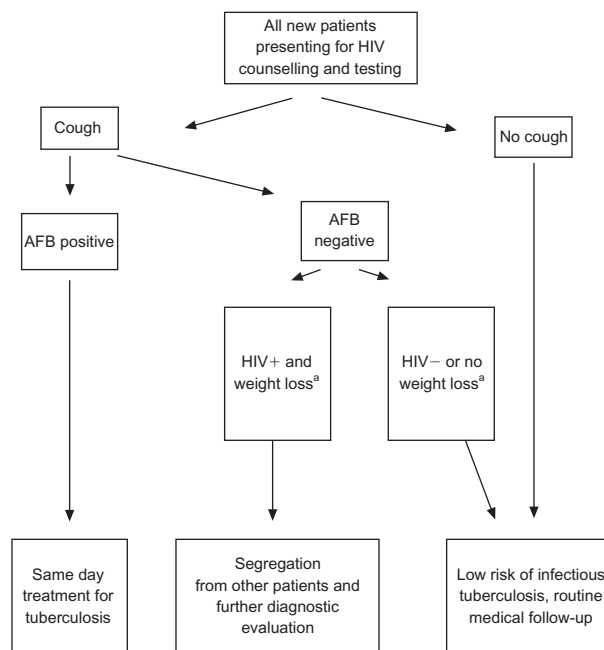


Fig. 1. Screening strategy for identification of patients with infectious tuberculosis at an HIV counselling and testing centre in Haiti.

AFB, Acid-fast bacillus.

^aIf radiography is available, then stratification of AFB smear negative patients can be performed by chest radiograph.

the sensitivity of AFB smear when compared with culture was only 44% in HIV-positive patients. Studies have shown that AFB smear-negative/culture-positive patients can be the source of nosocomial tuberculosis transmission [21]. Unfortunately, tuberculosis diagnostic tests other than the AFB smear are technically difficult and expensive, and are not available in VCT centres in developing countries. Therefore, we suggest risk-stratifying patients with cough and a negative smear by chest radiograph or by symptoms and the results of HIV testing. At our centre, by the time a patient has provided three negative smears, usually 4–5 days after initial presentation, clinicians can request expedited HIV test results. Clinicians can inform patients of their HIV status and use the results of the HIV test in evaluating the risk of tuberculosis.

In the Dominican Republic, the purified protein derivative (PPD) diameter was predictive of active tuberculosis infection in patients coming for HIV testing [6]. We chose not to include the PPD in our screening because of the delay in obtaining PPD results and because many patients do not return for PPD reading. We do use the PPD to determine if HIV-positive patients, in whom tuberculosis has been excluded, will benefit from isoniazid prophylaxis.

The current study was limited because we did not perform a cost-effective analysis of integrated tuberculosis services at HIV VCT centres. However, the current study demonstrates that integration of tuberculosis and VCT services may offer benefits, including the diagnosis and treatment of a large number of individuals with active tuberculosis, a decreased risk of nosocomial tuberculosis transmission, and the possibility of providing tuberculosis prophylaxis to HIV-positive individuals in whom active tuberculosis has been excluded. Future studies are needed to determine the cost-effectiveness of these benefits and whether the integration of tuberculosis and VCT services should be routinely recommended.

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