

## Screening for tuberculosis prior to isoniazid preventive therapy among HIV-infected gold miners in South Africa

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### SUMMARY

**SETTING:** Human immunodeficiency virus (HIV) clinic for employees of a gold mine, Free State, South Africa.

**OBJECTIVE:** To evaluate the process of screening for active tuberculosis (TB) prior to commencing TB preventive therapy in HIV-infected individuals.

**DESIGN:** Cross-sectional study comparing performance of various combinations of screening tests for TB against a gold standard diagnosis of TB based on symptoms, chest radiograph (CXR), sputum microscopy and culture.

**RESULTS:** Of 899 individuals, 44 (4.9%) had TB. The most sensitive symptom combination (59.1%) was any of night sweats, new or worsening cough or reported weight loss; measured weight loss >5% or abnormal CXR increased sensitivity to 90.9%. Sputum microscopy did not increase sensitivity further, but including

World Health Organization HIV clinical staging or CD4 count did. As the specificity of all these combinations was low, many individuals required further investigation to rule out TB. TB prevalence was high (11.7%) among individuals with a CD4 count <200/mm<sup>3</sup>.

**CONCLUSION:** CXR greatly increased the sensitivity of screening for TB in this population. Sputum microscopy conferred no additional benefit among asymptomatic patients with a normal CXR. The high prevalence of TB amongst those with a low CD4 count underlines the importance of screening for active TB prior to commencing TB preventive therapy, and before antiretroviral therapy.

**KEY WORDS:** tuberculosis; HIV infection; tuberculosis preventive therapy; diagnosis; screening

CLINICAL TRIALS have demonstrated the efficacy of tuberculosis preventive therapy (TBPT) in reducing the risk of TB among human immunodeficiency virus (HIV) infected individuals,<sup>1</sup> and it is recommended as part of the package of care available to persons living with HIV or the acquired immune-deficiency syndrome (HIV/AIDS).<sup>2</sup> However, there are a number of operational challenges that need to be met if TBPT is to be widely implemented.<sup>3</sup> One of these is the process of screening for active TB disease prior to commencing TBPT to minimise the potential risk of drug resistance resulting from inadvertent monotherapy. International guidelines do not specify how this process should be carried out.<sup>2</sup> At the time of this study, guidelines in Southern Africa recommended: 1) TB symptom review, 2) chest radiography (CXR), 3) sputum microscopy and 4) mycobacterial cultures, where available.<sup>4</sup> These have since been simplified to recommend that investigations are only indicated if screening identifies cough, drenching night sweats or fever for >2 weeks or observed weight loss of >1.5 kg per month.<sup>5</sup> The cost and availability of screening in-

vestigations is an important consideration in African settings.

The incidence of TB in the workforce from which the study population was drawn, gold miners, has risen since the early 1990s to more than 4000 per 100 000 population.<sup>6</sup> The major contributory factors are silicosis and HIV, whose combined effect is multiplicative.<sup>7</sup> The TB control programme of the company includes directly observed rifampicin-based short-course chemotherapy regimens, use of combination tablets and active case detection using miniature CXRs. In 1999, primary TBPT (isoniazid [INH] 300 mg daily for 6 months for those with no prior history of TB) was introduced as part of routine care for HIV-infected employees.

The aim of the present study was to evaluate the performance of strategies to exclude active TB, to identify individuals who may safely commence TBPT. The main analysis was restricted to individuals with no history of TB, who are eligible for TBPT according to international guidelines.<sup>2</sup> A secondary analysis was conducted that included all individuals, irrespective of whether they had a prior history of TB, as second-

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ary preventive therapy (TB prophylaxis given to individuals who have experienced a previous episode of TB disease, to prevent recurrence) has been shown to be effective in this population.<sup>8</sup>

## STUDY POPULATION AND METHODS

### *Study population*

We studied HIV-infected employees first attending the preventive therapy clinic of a gold mining company in Free State Province, South Africa, between April 1999 and July 2001. Included in the study were individuals who completed all components of the TB screening procedure within 1 month of their first visit to the clinic and who had a minimum follow-up period of 3 months after screening (to ensure adequate time to identify those with TB). Those who were taking, or had completed within the previous month, anti-tuberculosis treatment were excluded. Antiretroviral therapy (ART) was not yet available to this population at the time of the study.

### *Screening procedures*

A symptom questionnaire was administered by trained nurses; as cough and sputum production are common symptoms in this population, a history of new or worsening cough and sputum production was specifically enquired after. Data on previous medical history were gathered by patient interview and review of their medical record card. Measured weight loss was defined as a clinic weight at least 5% less than the weight at the time of first employment. A doctor performed a physical examination and read the CXR, comparing with previous films if necessary (CXR are taken annually to screen for TB). Tuberculin skin testing (TST) was not performed, as a previous survey among miners with silicosis found 99% were tuberculin-positive.<sup>9</sup> Two sputum specimens were collected on the day of attendance. Blood was taken for a CD4 count to determine when to commence cotrimoxazole prophylaxis.

### *World Health Organization staging*

Patients were classified according to World Health Organization (WHO) HIV stage<sup>10</sup> at the first clinic visit. Briefly, WHO stage 1 represents asymptomatic HIV infection, stage 2 mild HIV-related disease, stage 3 moderate disease and stage 4 severe disease. Stage 4 is broadly equivalent to AIDS, except that pulmonary TB (PTB) in the past year is classified as stage 3 and extra-pulmonary TB (EPTB) as stage 4. For this analysis, a new diagnosis of TB made at the screening visit was ignored when assigning the WHO stage.

### *Laboratory methods*

Sputum specimens were examined by auramine staining and fluorochrome microscopy, and cultured on Löwenstein-Jensen (LJ) media. Identification of *Mycobacterium tuberculosis*

was carried out on LJ slopes with more than five colonies using a colorimetric ribosomal RNA hybridisation test (Accuprobe® *M. tuberculosis* complex probe kit, Gen-Probe, San Diego, CA, USA). CD4+ T lymphocyte measurements were made using a flow cytometry method (FACSCount, BD Diagnostics, Franklin Lakes, NJ, USA).

### *Case definitions*

For study purposes, patients were classified as having PTB if they had compatible clinical or radiological features and were either: 1) sputum culture-positive (five or more colonies) for *M. tuberculosis*, or 2) had clinical and radiological improvement after 2 months of TB treatment and were either sputum smear-positive for acid-fast bacilli (AFB), or had new radiological changes suggestive of TB, but no response to 5 days of treatment with antibiotics. Individuals were classified as having EPTB if they had compatible clinical features and either: 1) *M. tuberculosis* isolated from a relevant site, or 2) improved after 2 months of TB treatment and had other diagnostic evidence such as typical radiological or histological features (AFB, caseation or granulomata), or characteristic cerebrospinal fluid changes. Subjects were classified as having been detected by the clinic screening process if TB was diagnosed on the basis of investigations initiated at the screening visit and the case definitions were fulfilled.

Decisions about TB treatment were made by the attending clinician; individuals who started TB treatment but did not meet study case definitions were excluded from the study because we could not confidently exclude active TB at the time of screening in this group. It was not possible to be sure whether patients who were not suspected of having TB at the time of screening, but started TB treatment between 6 weeks and 3 months later, had active TB at the time of screening. We therefore performed two analyses: first, assuming that these individuals had TB at the time of screening and were 'missed' by the screening procedure, and second, excluding these individuals from the analysis.

### *Data collection*

Clinic and hospital admission data were routinely collected and double-entered into a Microsoft Access database (Microsoft Corporation, Seattle, WA, USA). Additional data, such as clinic patients commenced on TB treatment between routine clinic visits, were gathered from the health service's paper and electronic records.

### *Data analysis*

Sensitivity, specificity and negative predictive values (NPV) of screening criteria were determined using STATA software version 6.0 (STATA Corp, College Station, TX, USA). To minimise the number of people

with active TB who are inappropriately given TBPT, the most relevant measure is the NPV (the probability that a person with a negative test result genuinely does not have TB). However, a screening test with low specificity will generate a high proportion of false-positives, requiring unnecessary further investigation. Screening combinations were created using the most sensitive symptoms, signs and investigations, while attempting to minimise the use of expensive tests. Criteria were linked to form combinations using ‘or’ operators to maximise sensitivity; use of ‘and’ operators would have increased specificity at the expense of sensitivity.

*Ethical considerations*

This study was a retrospective programme evaluation for which ethical approval was not specifically requested.

**RESULTS**

Between April 1999 and July 2001, 1310 HIV-infected individuals were screened for TB. A total of 411 individuals were excluded from the main analysis (Figure), leaving 899 participants. Table 1 shows the characteristics of the study population. Forty-four had active TB disease at the time of screening; 35 of the 39 pulmonary cases (89.7%) were sputum culture-positive.

Table 2 shows the frequency of positive findings for symptoms, signs and investigations at screening and their sensitivity, specificity and NPV for active TB. The commonest symptoms were night sweats, new

**Table 1** Characteristics of study population

	n (%)
Study participants	899 (100)
Male	897 (99.8)
Age, years, median (IQR)	37.7 (34.1–43.6)
WHO clinical stage	
1	413 (45.9)
2	290 (32.3)
3	188 (20.9)
4	8 (0.9)
CD4 count, cells/mm <sup>3</sup> , median (IQR)*	365 (245–520)
TB cases	44 (4.9)
Culture-positive cases	35 (3.9)
PTB	35 (3.9)
EPTB	5 (0.6)
Both PTB and EPTB	4 (0.4)

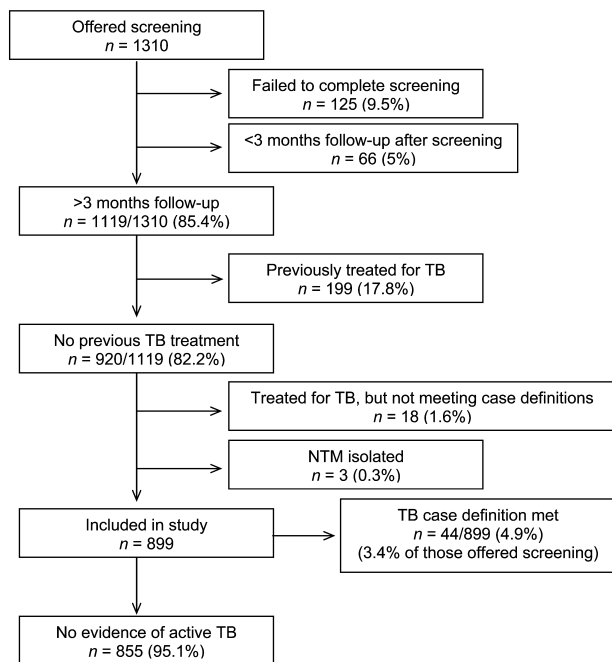
\* CD4 counts within 1 month of first (screening) clinic visit available for 816 (90.8%) of individuals. IQR = interquartile range; WHO = World Health Organization; TB = tuberculosis; PTB = pulmonary tuberculosis; EPTB = extra-pulmonary tuberculosis.

or worsening cough and new or worsening sputum production. Measured weight loss was the most frequent positive sign, and any abnormality on CXR the most frequent positive investigation finding. The symptoms, sign and investigation with greatest sensitivity and NPV were, respectively: night sweats and reported weight loss, measured weight loss and any CXR abnormality.

Active TB at screening was more common among individuals with a lower CD4 count; among individuals with a CD4 <200, 200–349 and ≥350/mm<sup>3</sup>, the prevalence of active TB was respectively 11.7%, 4.1% and 3.3% ( $\chi^2$  test for trend 11.9,  $P < 0.001$ ).

Table 3 shows various potential screening combinations and their effectiveness in distinguishing between those with and without active TB. The most sensitive combination of symptoms (combination A in the Table) was any of night sweats, new or worsening cough and reported weight loss. Use of measured instead of reported weight loss improved the sensitivity and NPV (B), as did addition of CXR (C, D) or sputum smear (E). Adding sputum smear to combinations including CXR (F, G) provided no additional benefit. Inclusion of WHO Stage 3 or 4 (H, I) or CD4 count <200 cells/mm<sup>3</sup> (J, K) to the screening combination improved sensitivity and NPV further.

The screening combination that would have missed the smallest proportion of active TB cases (5.1%) was any one of night sweats; new or worsening cough; measured weight loss of >5%; any CXR abnormality; or CD4 count <200 cells/mm<sup>3</sup>. Confining CXR abnormalities to those compatible with TB improved the specificity of the combination. As the proportion of TB cases who would have been missed by this series of screening combinations declined from 40.9% to 5.1%, the proportion of individuals without TB



**Figure** Study inclusions and exclusions. TB = tuberculosis; NTM = non-tuberculous mycobacteria.

**Table 2** Number and percentage of positive screening findings for symptoms, signs, investigations and WHO staging

Screening criteria	Criterion present overall (n = 899) n (%)	Criterion present in TB cases (n = 44), i.e., sensitivity n (%)	Criterion absent in non-cases (n = 855), i.e., specificity n (%)	Negative predictive value %
<b>Symptoms</b>				
New or worsening cough	115 (12.8)	14 (31.8)	754 (88.2)	96.2
Cough for ≥3 weeks	40 (4.4)	6 (13.6)	821 (96.0)	95.6
New or worsening sputum production	90 (10.0)	12 (27.3)	777 (90.9)	96.0
Haemoptysis	10 (1.1)	2 (4.5)	847 (99.1)	95.3
Night sweats	123 (13.7)	15 (34.1)	747 (87.4)	96.3
Fever	70 (7.8)	8 (18.2)	793 (92.7)	95.7
Reported weight loss	84 (9.3)	15 (34.1)	786 (91.9)	96.4
<b>Signs</b>				
Measured weight loss >5%	176 (19.6)	22 (50.0)	701 (82.0)	97.0
Temperature >37.4°C	17 (1.9)	6 (13.6)	844 (98.7)	95.7
<b>Investigations</b>				
Sputum microscopy AFB-positive	27 (3.0)	14 (31.8)	842 (98.5)	96.6
Sputum culture mycobacteria positive	32 (3.8)	24 (54.6)	846 (99.0)	97.5
<i>M. tuberculosis</i> identified	25 (3.0)	24 (54.6)	854 (99.9)	97.5
CD4 count <200/mm <sup>3</sup>	128 (15.7)*	15 (38.5) <sup>†</sup>	664 (85.5) <sup>‡</sup>	96.5
CXR features compatible with TB	146 (16.2)	29 (65.9)	738 (86.3)	98.0
Any CXR abnormality	213 (23.7)	32 (72.7)	674 (78.8)	98.2
<b>Clinical classification</b>				
WHO HIV stage 3 or 4	196 (21.8)	23 (52.3)	682 (79.8)	97.0

\* n = 816.

† n = 39.

‡ n = 777.

WHO = World Health Organization; TB = tuberculosis; AFB = acid-fast bacilli; CXR = chest X-ray; HIV = human immunodeficiency virus.

**Table 3** Effectiveness of combinations of TB screening criteria

Combination of TB screening criteria: at least one of	Sensitivity (n = 44) %	Specificity (n = 855) %	NPV %	Unnecessarily investigated further (n = 855)* n (%)	TB cases missed (n = 44) <sup>†</sup> n (%)
<b>Symptoms</b>					
A. Night sweats, cough or reported weight loss	59.1	75.6	97.3	209 (24.4)	18 (40.9)
<b>Symptoms/sign</b>					
B. Night sweats, cough or measured weight loss	75.0	67.0	98.1	282 (33.0)	11 (25.0)
<b>Symptoms/sign/CXR</b>					
C. Night sweats, cough, measured weight loss or CXR features compatible with TB	90.9	59.2	99.2	349 (40.8)	4 (9.1) <sup>‡</sup>
D. Night sweats, cough, measured weight loss or any CXR abnormality	90.9	54.8	99.1	386 (45.1)	4 (9.1)
<b>Symptoms/sign/sputum smear</b>					
E. Night sweats, cough, measured weight loss or smear-positive	84.1	65.9	98.8	292 (34.1)	7 (15.9)
<b>Symptoms/sign/CXR/sputum smear</b>					
F. Night sweats, cough, measured weight loss, CXR features compatible with TB or smear-positive	90.9	58.1	99.2	358 (41.9)	4 (9.1)
G. Night sweats, cough, measured weight loss, any CXR abnormality or smear-positive	90.9	53.8	99.1	395 (46.2)	4 (9.1)
<b>Symptoms/sign/CXR/WHO stage</b>					
H. Night sweats, cough, measured weight loss, CXR features compatible with TB or WHO stage 3/4	93.2	51.8	99.3	412 (48.2)	3 (6.8) <sup>§</sup>
I. Night sweats, cough, measured weight loss, any CXR abnormality or WHO stage 3/4	93.2	48.0	99.3	445 (52.0)	3 (6.8)
<b>Symptoms/sign/CXR/CD4</b>					
J. Night sweats, cough, measured weight loss, CXR compatible with TB or CD4 <200	94.9 <sup>¶</sup>	51.0 <sup>#</sup>	99.5	381 (49.0) <sup>#</sup>	2 (5.1) <sup>¶**</sup>
K. Night sweats, cough, measured weight loss, any CXR abnormality or CD4 <200	94.9 <sup>¶</sup>	47.4 <sup>#</sup>	99.5	409 (52.6) <sup>#</sup>	2 (5.1) <sup>¶</sup>
<b>Excluding CXR</b>					
L. Night sweats, cough, measured weight loss, WHO stage 3/4	79.5	57.9	98.2	327 (42.1)	8 (20.5)
M. Night sweats, cough, measured weight loss, CD4 <200	82.1 <sup>¶</sup>	58.2 <sup>#</sup>	98.5	325 (41.8) <sup>#</sup>	7 (18.0) <sup>¶</sup>

\* Patients without TB who would have been subjected unnecessarily to further investigation had the screening combination been used (% = 1-specificity).

† Patients with TB who would have been missed had the screening combination been used (% = 1-sensitivity).

‡ Two cases smear-negative culture-positive, 2 cases EPTB.

§ Two cases smear-negative culture-positive, 1 case EPTB.

¶ n = 39.

# n = 777.

\*\* Two cases EPTB.

TB = tuberculosis; NPV = negative predictive value; CXR = chest X-ray; WHO = World Health Organization; EPTB = extra-pulmonary tuberculosis.

undergoing further investigations unnecessarily increased from 24.4% to 49%.

In an analysis restricted to individuals with CD4 <200 cells/mm<sup>3</sup> ( $n = 128$ ) the results were similar, but the NPVs were lower for all criteria and combinations appearing in Tables 2 and 3 (excluding those incorporating CD4 count). The symptom and sign with the highest NPV were reported weight loss (92%) and measured weight loss of >5% (95.6%). The NPV for any CXR abnormality was 92.6%. Using the best screening combination (any one of night sweats, new or worsening cough, measured weight loss of >5%, any CXR abnormality), the proportion of patients with TB missed would have been 13.3% and the proportion investigated further unnecessarily would have been 46%. Addition of WHO staging to the combination did not improve sensitivity and reduced the NPV from 96.9% to 95.8%.

Six patients who did not have TB detected by the screening process, but were found to have TB between 6 and 13 weeks after screening, were included as TB cases. Excluding them from the analysis did not change the findings (data not shown). Inclusion of patients with a prior history of TB in the analysis did not significantly alter the performance of the screening strategies (data not shown).

## DISCUSSION

The process of providing TBPT must fulfil the requirements for affordable, accessible services for persons with HIV infection, while being sufficiently robust to avoid individuals with active TB being missed and inadvertently receiving INH monotherapy, jeopardising the important role of INH in treating TB.

Ideally, a screening test with a NPV close to 100% is required to provide maximum confidence that a negative result means a person truly does not have TB. We found the test combination (not including CD4 count, which may not be easily available) that best fulfilled this objective to be any of night sweats; new or worsening cough; measured weight loss of >5%; or abnormal CXR. Where any of these are present we recommend that TBPT be withheld and further investigations for TB carried out.

The resources and time spent on unnecessary further investigations are also important. Using this screening combination, four of the 44 (9.1%) active TB cases would have been commenced inappropriately on TBPT, but unnecessary sputum investigations would have been avoided in 59.2% of those who did not have TB. Nevertheless, 40.8% of those screened would have required further investigation unnecessarily, highlighting the urgent need for better diagnostic tests for TB.

The comprehensive health care facilities available for investigation and treatment of our study popula-

tion provided an opportunity to fully evaluate TB screening strategies in a large group of HIV-infected individuals. Use of TB sputum culture as part of our diagnostic gold standard and a high follow-up rate enabled us to diagnose and exclude TB with greater confidence than in other, similar studies.

We also had the advantage of previous CXRs and weights available for comparison. If these had not been available, symptoms alone would have detected only 59.1% of the TB cases. The generalisability of the study to other populations may be limited by the relatively high prevalence of silicosis, associated with both abnormal radiographic appearances and an increased risk of TB,<sup>11</sup> and the policy of regular radiographic screening as active case finding for TB. In addition, as our population is predominantly male, we cannot be confident that the findings apply equally to women.

Including CD4 count <200/mm<sup>3</sup> in our screening combination halved the proportion of cases that would have been missed, for only a small increase in the proportion of those without TB requiring sputum testing. Measurement of CD4 count is currently not widely available (although may become so with expanding access to ART) and, in its absence, WHO staging may be a useful alternative. We found that patients who are eligible to commence ART due to advanced immunosuppression are also at greatest risk of having undiagnosed TB. Initiation of ART may be complicated by an immune reconstitution syndrome in patients with previously undetected TB.<sup>12</sup> Screening for TB and offering TBPT should therefore be an integral part of the initial assessment carried out by ART programmes.

Sputum smears performed poorly as a TB screening criterion. Similar results were found among HIV-negative employees in the same setting,<sup>13</sup> suggesting that this is not a consequence of the increased frequency of smear-negative TB among persons with HIV infection.<sup>14,15</sup> Although sputum culture was highly sensitive, its usefulness is restricted by cost (for liquid culture media) and delays of up to 6 weeks before results become available (for LJ culture). In our setting, where CXR was part of the initial screen, there was no advantage in performing sputum microscopy routinely; this should be reserved for those with symptoms or an abnormal CXR. Reducing the microscopy workload of TB laboratory staff may also improve diagnostic accuracy.

Other data on the value of CXR as a screening tool are conflicting. Data from a trial in Kenya was used to recommend that CXR be performed prior to TBPT.<sup>16</sup> By contrast, only one (0.2%) of 560 asymptomatic patients screened in the Botswana programme had TB diagnosed solely on the basis of a CXR.<sup>17</sup> However, another 23 (4%) had abnormal CXRs attributed to non-specific pneumonitis, but no mycobacterial cultures were performed. This may have resulted in an

**Table 4** Comparison of three Southern African studies evaluating methods for screening for TB in HIV-infected individuals prior to TB preventive therapy

	<i>n</i>	Population	Prior screening	TB prevalence	Conclusion on best TB screening process
Botswana <sup>17</sup>	560	HIV-infected out-patients, WHO stage 1	Patients with symptoms and signs suggestive of TB excluded	1/560 (0.2%) Cultures not used	Signs and symptoms
Cape Town <sup>18</sup>	129	HIV-infected out-patients, WHO stage 3–4	Patients with symptoms and signs suggestive of TB not referred for TBPT	11/129 (8.5%) 10 culture-positive	Symptoms and weight loss
Free State (current study)	899	Mineworkers, WHO stage 1–4 (46% stage 1)	Routine annual radiological screening	44/899 (4.9%) 35 culture-positive	Chest radiograph, symptoms and weight loss

TB = tuberculosis; HIV = human immunodeficiency virus; WHO = World Health Organization; TBPT = tuberculosis preventive therapy.

underestimate of both the prevalence of TB and the usefulness of CXR. Mohammed et al. found that symptoms were adequate to effectively exclude TB in 129 Cape Town patients, all in WHO stage 3 or 4;<sup>18</sup> in this study, relatively minor symptoms such as weight loss of >2.5% were included, which may explain the high sensitivity, although specificity was also high. Table 4 compares data from the Botswana and Cape Town studies with our study. Among 93 HIV-infected subjects with CD4 count  $\geq 200/\text{mm}^3$  enrolled in a TB vaccine trial in Tanzania, 14 (15%) were found to have active TB, of whom five were asymptomatic and smear-negative but had an abnormal CXR.<sup>19</sup> When developing a screening policy, it should be noted that, if a CXR is required in the screening process and is not available on site, this may become the principal obstacle to starting TBPT.<sup>17,20</sup>

In conclusion, our data emphasise the value of CXR in screening for active TB prior to commencing TBPT in a population with high TB and HIV prevalence. We have found that it is possible to safely simplify the initial screening combination to: no night sweats, cough or weight loss of >5% and a normal CXR. This identifies those who are unlikely to have TB, for whom sputum examination is unnecessary. A CD4 count could increase the efficiency of screening, if available; if not, WHO staging could be a useful alternative. The prevalence of active TB increases as HIV disease progresses, suggesting an ever greater need to find, treat and prevent TB in people with low CD4 counts. In settings with high TB prevalence, clinics providing ART should include screening for TB as an essential part of the work-up prior to starting ART, bearing in mind that those who are eligible for ART are, by virtue of their advanced disease stage, also those most likely to have undiagnosed active TB.

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## R É S U M É

**CONTEXTE :** Polyclinique VIH pour les travailleurs d'une mine d'or, Free State, Afrique du Sud.

**OBJECTIF :** Evaluer le processus de dépistage d'une tuberculose (TB) active avant l'initiation d'un traitement préventif de la TB chez les individus infectés par le VIH.

**SCHEMA :** Etude transversale comparant les performances de diverses combinaisons de tests de dépistage de la TB avec celles d'un diagnostic standard de référence de la TB basé sur les symptômes, le cliché thoracique (CXR), l'examen microscopique et la culture de l'expectoration.

**RÉSULTATS :** On a décelé une TB chez 44 des 899 ouvriers (4,9%). La combinaison la plus sensible de symptômes (59,1%) était l'existence de sueurs nocturnes, d'une toux récente ou s'accroissant ou d'une perte de poids signalée ; une perte de poids mesurée de >5% ou un CXR anormal augmentait la sensibilité jusqu'à 90,9%. L'examen microscopique de l'expectoration n'a pas augmenté da-

vantage la sensibilité mais, par contre, l'inclusion de la stadification clinique VIH de l'OMS ou celle du décompte de CD4 le faisait. La spécificité de toutes ces combinaisons a été faible, en sorte que beaucoup d'individus ont dû bénéficier d'investigations complémentaires pour exclure la TB. La prévalence de la TB a été élevée (11,7%) chez les individus dont les décomptes de CD4 étaient <200/mm<sup>3</sup>.

**CONCLUSION :** Le CXR a augmenté considérablement la sensibilité du dépistage de la TB dans cette population. La bacilloscopie des expectorations n'a pas ajouté d'avantages supplémentaires chez les patients asymptomatiques dont le CXR était normal. La prévalence élevée de la TB en présence d'un décompte bas de cellules CD4 souligne l'importance du dépistage de la TB active avant l'initiation d'un traitement préventif de la TB et avant la mise en route d'un traitement antirétroviral.

## R E S U M E N

**MARCO DE REFERENCIA :** La consulta de infección por el VIH para los empleados de una mina de oro en Free State, Sudáfrica.

**OBJETIVO :** Evaluar la detección sistemática de tuberculosis (TB) activa, previa a la instauración del tratamiento preventivo de la TB, en pacientes infectados por el VIH.

**MÉTODOS :** Fue este un estudio transversal en el cual se comparó el rendimiento diagnóstico de varias combinaciones de pruebas de detección de la TB, con el criterio diagnóstico de referencia basado en los síntomas, la radiografía de tórax (CXR) y la baciloscopia y el cultivo del esputo.

**RESULTADOS :** Se estableció el diagnóstico de TB en 44 de los 899 individuos (4,9%). La combinación de síntomas que ofreció la mayor sensibilidad (59,1%) incluyó sudores nocturnos, aparición o acentuación de la tos y pérdida de peso ; una pérdida de peso >5% o una CXR

anormal aumentó la sensibilidad al 90,9%. La sensibilidad no mejoró con la inclusión de la baciloscopia del esputo, pero sí con la estadificación clínica de la infección por el VIH (según la OMS) o con el recuento de células CD4. La especificidad de todas estas combinaciones fue baja y por ello, muchos individuos precisaron estudios complementarios para eliminar el diagnóstico de TB. La prevalencia de TB fue alta (11,7%) en los individuos con un recuento de células CD4 <200/mm<sup>3</sup>.

**CONCLUSIÓN :** La CXR aumentó en forma considerable la sensibilidad de la detección sistemática de la TB en esta población ; la baciloscopia del esputo no confirió ninguna ventaja adicional a los pacientes asintomáticos con una CXR normal. La alta prevalencia de TB en los pacientes con un recuento bajo de células CD4 destaca la importancia de la detección sistemática de TB activa previa a la instauración del tratamiento preventivo de la TB y antes de comenzar un tratamiento antirretrovírico.