



# Impact of HIV on admissions and deaths in a tuberculosis hospital — recommendations for admission and discharge criteria

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Mortality and HIV prevalence rose concordantly at Brooklyn Chest Hospital from 1998 to 2001. Death and unconfirmed tuberculosis (TB) (15% of adult admissions in a sample from 2000) were associated with HIV seropositivity. Excluding

unconfirmed TB and shortening length of stay would increase the number of patients able to benefit from hospitalisation.

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Tuberculosis (TB) case fatality rates in sub-Saharan Africa have been rising due to the burgeoning HIV epidemic.<sup>1</sup> Most of the deaths in HIV-infected patients on TB therapy are due to other HIV-related diseases.<sup>1</sup> The proportion of patients with HIV-associated TB is higher in hospitals than in TB clinics,<sup>2</sup> presumably because they are more ill due to immune suppression or co-morbidity from other opportunistic infections. The Western Cape has a high incidence rate of TB (581/100 000 in 1999), and a rapidly increasing prevalence of HIV infection. This has resulted in a greater demand for inpatient TB treatment, with lengthening waiting lists for beds in TB hospitals.

As a result of the reduced diagnostic yield from sputum smears in HIV-infected patients, especially inpatients,<sup>3</sup> many are commenced on empirical antituberculosis treatment. A proportion of these bacteriologically unconfirmed cases are managed in the TB hospitals because of a poor general state of health. Co-morbidity from other opportunistic infections is frequent in these patients, resulting in increased mortality and a disease burden on TB hospitals, for which they are ill equipped. This study assesses the impact of HIV on the 305-bed TB hospital, Brooklyn Chest Hospital (BCH), Cape Town. We attempt to come up with recommendations to ease the pressure on the limited number of beds available for inpatient TB treatment.

## Methods

Admissions, deaths and HIV status were obtained from the BCH register from 1998 to 2001 to assess trends over time. A detailed retrospective review of records of all adult admissions (individuals aged 13 years and above) from February through July 2000 was undertaken in order to establish the number of patients with known HIV serostatus, type of TB, diagnosis of TB and predictors of death. We defined TB as culture of *Mycobacterium tuberculosis* or smear-positive for acid-fast bacilli or typical cerebrospinal fluid findings of TB meningitis (in this latter category we excluded HIV-seropositive individuals in view of the large number of potential causes of cerebrospinal fluid pleocytosis in these patients). Patients with TB not fulfilling these definitions were categorised as unconfirmed.

## Results

The number of admissions, deaths and patients known to have HIV infection is shown in Table I. There was a significant increase in the proportion of deaths (15% in 1998 to 25% in 2001, <sup>2</sup> for trend  $p = 0.008$ ) and the proportion known to be HIV-infected (18% in 1998 to 35% in 2001,  $p < 0.001$ ) from 1998 to 2001. The proportion of deaths in the sub-group known to be HIV-infected did not change over time ( $p = 0.14$ ). In the

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**Table I. Admissions, HIV status (passive surveillance) and deaths at Brooklyn Chest Hospital 1998 - 2001 (numbers in parentheses are % of total admissions).**

	1998	1999	2000	2001
Admissions	1 178	1 286	1 143	1 117
Deaths	180 (15)	212 (16)	199 (17)	280 (25)
HIV-positive admissions	210 (18)	320 (25)	278 (24)	393 (35)
HIV-positive deaths	77	92	89	141



detailed record review from February to July 2000, 434 adults were admitted (mean age 37 years, range 13 - 86 years, 60% males). HIV serostatus was recorded in 58%, of whom 71% were seropositive.

TB was pulmonary (presumed drug-sensitive) in 66%, pulmonary confirmed multidrug-resistant in 16%, extrapulmonary in 3% and unconfirmed in 15%. In patients with known HIV serostatus unconfirmed TB occurred in 5% of HIV-seronegative compared with 24% of HIV-seropositive patients ( $p < 0.001$ ). Treatment of patients with unconfirmed TB accounted for 2 888 hospital-bed days. HIV-infected patients had an increased mortality compared with those who were HIV-seronegative (relative risk 2.2, 95% confidence intervals (CI): 1.2 - 4.1,  $p = 0.014$ ). HIV infection accounted for 55 excess deaths (34% of all deaths). The mean length of stay was 94 days (range 2 - 314 days); this was shorter for HIV- seropositive than HIV-seronegative patients (89 versus 110 days,  $p < 0.01$ ). The shorter stay of HIV-seropositive patients was not explained by increased mortality. Length of stay was not significantly different for patients with confirmed or unconfirmed TB (96 versus 83 days,  $p = 0.18$ ). Sixty-three per cent of patients stayed more than 2 months and 13% were hospitalised for more than 6 months.

## Discussion

This study is limited as it is retrospective and HIV serostatus was only determined in 58% of adult admissions. Nevertheless it is clear that there has been an increased death rate, which is almost certainly due to an increase in HIV-seropositive admissions. A substantial proportion of HIV-infected patients had no bacteriological confirmation of their TB. Arguably,

unconfirmed cases should not be admitted to a TB hospital. As these patients are not highly infectious, and some may not have TB at all, it does not seem appropriate to admit them to a TB hospital where they run the risk of acquiring multidrug-resistant TB.<sup>4</sup> Patients with unconfirmed TB who are too ill for ambulatory treatment could be cared for by home-based care organisations. Restricting adult admissions to patients with a diagnosis of confirmed pulmonary TB or TB meningitis would allow the treatment of an extra 110 cases per annum.

The mean length of stay was shorter for HIV-infected patients. Patients with multidrug resistance and meningitis generally have prolonged admissions. It is our view that by adopting a more aggressive discharge policy it should be possible to reduce the mean length of stay to 2 months. If this could be achieved our data indicate that a further 263 patients a year could have received inpatient treatment.

In conclusion, restricting adult admissions to patients with confirmed TB and reducing mean length of stay to 2 months would considerably ease the pressure on TB hospital beds and shorten waiting lists.

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