

Expanding HIV surveillance to include TB patients in resource-limited settings with a generalized epidemic

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SUMMARY

Screening of antenatal clinic attendees is central to monitoring the human immunodeficiency virus (HIV) epidemic. However, recent evidence suggests that declining fertility rates are affecting the reliability of antenatal clinic surveys as the epidemic matures. Population-based HIV surveys, while ideal, are resource-intensive, necessitating newer, cost-effective approaches. Unlinked anonymous testing for HIV in sputum of tuberculosis (TB) patients serves as reliable proxy for estimating the bur-

den of symptomatic HIV disease and is a potential adjunct to current surveillance efforts. Unlinked anonymous testing for HIV surveillance in KwaZulu-Natal, South Africa, the epicentre of the global epidemic, is justified, as data from the largest urban TB referral clinic indicate that only 22% of TB patients uptake voluntary HIV testing.

KEY WORDS: HIV; surveillance; tuberculosis

DISEASE SURVEILLANCE is an important foundation of public health decision-making and the mainstay of infectious disease management. To effectively design and target health interventions, it is necessary to quantify the magnitude of a disease, monitor temporal trends and identify risk factors.¹

In regions where heterosexual human immunodeficiency virus (HIV) transmission is the primary mode of transmission, or in a generalised epidemic such as in sub-Saharan Africa, the screening of antenatal clinic attendees is central to monitoring the evolving epidemic.^{1–3} Pregnant women have served as a reliable proxy marker of HIV risk in the general population.^{1,2} However, recent evidence suggests that fertility rates are declining as the HIV epidemic matures, resulting in an underestimation and declining reliability of antenatal clinic surveys.² Tuberculosis (TB) is a common presentation of symptomatic HIV disease. Given the TB-HIV co-infection rate of 65%,⁴ and the 10% per annum risk of incident TB in HIV-infected individuals,⁴ it is reasonable to extrapolate that TB reflects the burden of symptomatic HIV disease. We therefore suggest that, in addition to HIV surveillance in antenatal clinics, we expand HIV surveillance to TB patients as well. This will serve as a marker of the burden of symptomatic HIV disease,

rather than HIV infection, in a TB-HIV endemic population. Although there has been an increase in population-based HIV prevalence and incidence rate data, this approach is prohibitively resource-intensive in most settings.⁵ Newer approaches that are less invasive or labour-intensive, with the added benefit of rapid data turnover such as HIV sputum testing, have demonstrated efficacy.³

In a maturing HIV epidemic in which morbidity and mortality will continue to increase until treatment coverage improves, there is a critical need to expand surveillance systems to monitor trends and the impact of antiretroviral (ARV) provision on HIV related comorbidities. TB is the most common opportunistic infection associated with HIV disease progression; therefore, monitoring the trends of HIV infection in TB patients provides a logical, reliable marker for estimating morbidity trends, projecting more precisely the short- to medium-term care needs and measuring the impact of ARVs on TB disease burden. The impact of ARVs on TB incidence has been modelled previously, and it is estimated that by initiating ARVs at CD4 < 200 cells/mm³ the cumulative incidence of TB would decrease by 22% over 20 years, and at CD4 < 500 cells/mm³ by 50%.⁶ This impact not only reduces the risk of TB, it also extends life expectancy,

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Table 1 Trends in HIV testing in TB patients in an urban TB clinic in KwaZulu-Natal, South Africa

Year	New smear-positive TB cases <i>n</i>	Patients agreeing to test <i>n</i> (%)
2004	8716	770 (8.8)
2005	8567	1145 (13.4)
2006	8180	1392 (17.0)
2007	7202	1564 (21.7)

$P < 0.0001$ (χ^2 for trend)

HIV = human immunodeficiency virus; TB = tuberculosis.

and individuals develop TB at a lower rate and after a longer period.⁷

The data reflected in Table 1, derived from the largest urban TB referral clinic in KwaZulu-Natal (KZN), the epicentre of the HIV epidemic, shows that approximately 22% of confirmed TB patients accepted provider-initiated testing (PIT) during 2007. While this is a three-fold increase compared with 2004, when only voluntary counselling and testing (VCT) was available, this remains significantly below data reported elsewhere. Years of fear and stigma continue to pose a major obstacle to individuals deciding whether or not to have a HIV test.

Data from a specialist TB referral hospital in the same area indicate that in-patients are more likely to test for HIV (Table 2) compared to out-patients from the TB clinic. This is likely related to a trust relationship established during the protracted period of time spent in hospital, as opposed to in an out-patient setting.

International guidelines recommend PIT for HIV in high-risk patients such as TB suspects.^{*1,2} The addition of the TB clinic population to HIV surveillance systems would enable two endeavours key to responding effectively to TB and HIV: the estimation of the HIV prevalence in TB patients, the group most easily identifiable to benefit from highly active antiretroviral treatment initiation (HAART), and the attributable fraction of the increasing TB caseload due to HIV infection. It would also be a marker of HIV disease in the population that will require ARVs. This is especially important in resource-constrained settings. While one may argue that the prevalence of TB in HIV-infected individuals is a better marker of those developing morbidity, it is more difficult to exclude TB in HIV-infected individuals due to paucibacillary TB, as well as the human and financial resources associated with sputum culture to exclude TB.

Unlinked anonymous HIV testing¹ has been previously performed on blood specimens, but it can also be performed less invasively on 'leftover' sputum samples collected for microscopy. The comparable specificity and sensitivity between serum and sputum

*TB suspects refer to anyone that attends the clinic because of signs and symptoms suggestive of TB

Table 2 Trends in HIV testing in TB patients in a specialist urban TB referral Hospital in KwaZulu-Natal, South Africa

Year	Patients admitted <i>n</i>	Patients agreeing to test <i>n</i> (%)
2004	609	367 (60.3)
2005	893	527 (59.0)
2006	935	681 (72.8)
2007	1509	1296 (85.9)
2008	1489	1321 (88.7)

$P < 0.0001$ (χ^2 for trend)

HIV = human immunodeficiency virus; TB = tuberculosis.

secretions has been demonstrated in Botswana.³ This expansion allows enhancement of current antenatal clinic-based HIV surveillance in the setting of a generalised epidemic, enables comparison of data from linked to unlinked HIV testing and offers an understanding of who is volunteering to test vs. who needs to test. This comparison may provide evidence for justifying PIT in TB services as well as more accurately assessing the impact of HAART on AIDS-related comorbidity. Unlinked anonymous testing does have limitations, which include an inability to distinguish incident from prevalent TB, difficulty in distinguishing sputum taken for diagnosis vs. monitoring of treatment outcomes and the need to include clinical details on the sputum requisition form.

Statistics for KZN indicate an HIV prevalence of 37.4% compared to 28% nationally, and an incidence of TB of 1094 per 100 000 population as compared to 740 nationally.⁸ Current World Health Organization (WHO) guidelines recommend a target rate of 80% for routine HIV surveillance of TB patients to provide a robust estimate of the TB-HIV burden. However, the availability of policy does not equate to coverage or utilisation. Data from other developing countries, Uganda and Kenya, indicate that they are meeting WHO recommendations for HIV surveillance in TB populations through voluntary testing.^{9,10} This is in contrast to KZN, South Africa, the epicentre of the HIV pandemic and the nation with the fifth highest TB burden. In KZN, with high dual infection rates and a low uptake of VCT, the use of unlinked anonymous testing in TB patients is justified for obtaining HIV surveillance data and epidemiological analysis. HIV testing of leftover sputum samples could serve as a useful and reliable tool for obtaining such data. Ultimately, effective surveillance is a fundamental means of working towards and ensuring full access to comprehensive HIV services.

References

- 1 Joint United Nations Programme on HIV/AIDS/World Health Organization. Guidelines for conducting HIV sentinel serosurveys among pregnant women and other groups. Geneva, Switzerland: WHO, 2003.
- 2 Gray R H, Wawer M J, Serwadda D, et al. Population-based

- study of fertility in women with HIV-1 infection in Uganda. *Lancet* 1998; 351: 98–103.
- 3 Egwaga S M, Chonde T M, Matee M I, et al. Low specificity of HIV-testing on sputum specimens kept at ambient temperatures for 4 to 7 days: a blinded comparison. *BMC Clin Pathol* 2007; 7: 8.
 - 4 Medical Research Council South Africa. Extensively drug-resistant tuberculosis (XDR-TB). Cape Town, South Africa: MRC, 2007. <http://www.mrc.ac.za/public/fact7.htm> Accessed July 2009.
 - 5 Rehle T, Shisana O, Pillay V, Zuma K, Puren A, Parker W. National HIV incidence measures—new insights into the South African epidemic. *S Afr Med J* 2007; 97: 194–199.
 - 6 Williams B G, Dye C. Antiretroviral drugs for tuberculosis control in the era of HIV/AIDS. *Science* 2003; 301: 1535–1537.
 - 7 Lawn S D, Bekker L G, Wood R. How effectively does HAART restore immune responses to *Mycobacterium tuberculosis*? Implications for tuberculosis control. *AIDS* 2005; 19: 1113–1124.
 - 8 Health Systems Trust. Health statistics. Durban, South Africa: Health Systems Trust, 2007. <http://www.hst.org.za/healthstats/16/data> and <http://www.hst.org.za/healthstats/13/data> Accessed October 2009.
 - 9 Odhiambo J, Kizito W, Njoroge A, et al. Provider-initiated HIV testing and counselling for TB patients and suspects in Nairobi, Kenya. *Int J Tuberc Lung Dis* 2008; 12 (Suppl 1): S63–S68.
 - 10 Srikantiah P, Lin R, Walusimbi M, et al. Elevated HIV seroprevalence and risk behavior among Ugandan TB suspects: implications for HIV testing and prevention. *Int J Tuberc Lung Dis* 2007; 11: 168–174.

R É S U M É

Dans les régions, comme l'Afrique subsaharienne, où l'épidémie de l'infection par le virus de l'immunodéficience humaine (VIH) est généralisée, le dépistage des clientes fréquentant les cliniques prénatales est essentiel pour le suivi de l'évolution de l'épidémie. Toutefois, des données récentes suggèrent qu'avec la maturation de l'épidémie, la décroissance des taux de fertilité affecte la fiabilité des enquêtes des cliniques prénatales. Les enquêtes VIH basées sur la population, bien qu'étant idéales, exigent des ressources considérables et prohibitives, d'où la nécessité d'approches nouvelles moins invasives et requérant

moins de travail. La recherche anonyme et dissociée du VIH dans les crachats des patients tuberculeux peut constituer un substitut fiable concernant le fardeau de la maladie VIH symptomatique et un adjuvant potentiel aux efforts actuels de surveillance. La recherche anonyme et dissociée pour la surveillance du VIH au KwaZulu-Natal, l'épicentre de l'épidémie mondiale, se justifie car les données de la plus grande clinique urbaine de référence TB indiquent que 22% seulement des patients tuberculeux recourent à un test volontaire du VIH.

R E S U M E N

La detección sistemática de la infección por el virus de la inmunodeficiencia humana (VIH) en las mujeres que acuden a las consultas de control del embarazo es esencial en la supervisión de la epidemia de esta enfermedad. Sin embargo, datos recientes indican que a medida que la epidemia progresa, las tasas decrecientes de fertilidad afectan la fiabilidad de las encuestas en las consultas de control del embarazo. Las encuestas poblacionales sobre el VIH constituyen un instrumento ideal, pero al mismo tiempo exigen gran cantidad de recursos; por esta razón se precisan nuevos enfoques más rentables. La realización anónima y desligada de una prueba para el VIH

en el esputo de pacientes con tuberculosis (TB) sirve como un indicador sustitutivo fiable de la carga de morbilidad por infección sintomática causada por el VIH y constituyen un complemento posible a las campañas vigentes de vigilancia. La prueba desligada y anónima en la vigilancia de la infección por el VIH en KwaZulu-Natal, el epicentro de la epidemia mundial, está justificada pues los datos de los principales consultorios de referencia de tuberculosis indican que solo el 22% de los pacientes con TB realiza la prueba voluntaria de diagnóstico de la infección por VIH.
