MANAGEMENT OF PULMONARY TB IN NURSE-BASED CAPE TOWN METROPOLITAN LOCAL AUTHORITY CLINICS

The reported incidence of TB in the Western Cape, particularly in the Cape metro region, continues to rank among the highest in the world.

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Exacerbated by the HIV epidemic and demographic shifts, the annual reported TB caseload in the Cape Town metro region has risen 66% over the past 7 years to a total of 23 000 in 2003. This represented a 30% increase in incidence rate over the same period with 678/100 000 population in 2003. Approximately 72% cases were notified as pulmonary tuberculosis (PTB), of which 75% were smear-positive.

In July 1996, in line with the national health departmental policy, the metro region adopted the WHO TB control strategy (DOTS)[1] which prioritises the detection and cure of infectious cases of PTB.

The five essential elements of WHO's DOTS strategy are:

- commitment at political and service level to strengthen human and financial resources to make TB control effective
- access to sputum bacteriology for case detection among persons with TB symptoms
- standardised, directly observed treatment which includes harnessing support in the community and the workplace
- uninterrupted supply of fixed-dose combination drugs, free of charge to all TB patients
- a recording and reporting system enabling assessment of the outcomes of each patient and the programme at district level.

The successful implementation of the programme in nurse-based local authority clinics in this region is evidenced by improved cure and adherence rates, which in some districts have equalled WHO DOTS strategic targets, and by the comparatively low MDR prevalence rate which has remained stable at < 1% and < 4% for new and re-treatment cases respectively over the past 10 years.

DIAGNOSIS OF SMEAR-POSITIVE TB IN NURSE-BASED CLINICS

Patients self-refer or are referred by other primary health care providers. Patients should be screened if they have had a persistent cough for longer than 2 weeks.

Microscopy remains the primary, most cost-effective tool for case detection of PTB among self-reporting, symptomatic patients, even in an HIV-prevalent setting.[2]

Table I. **Incidence (case detection) Cape Town metro district (1997 - 2003)**

Year	All TB	Case detection rate/ 100 000 population* All TB	New smear + cases	Case detection rate/ 100 000 population New smear+ TB
1997	13 870	521	-	-
1998	14 970	520	6 089	212
1999	15 769	530	6 639	223
2000	17 244	562	7 262	237
2001	18 361	581	7 761	247
2002	20 950	638	8 769	266
2003	22 999	678	8 853	261

*1996 Census data, adjusted according to Dorrington (Table I derived from: *Cape Town Metro Annual Reports on TB program* — see 'Further reading')

Table II. **Cape Town: Cure rates of new smear-positive TB cases (1997 - 2003)**

	Cure rate	Success rate	Interruption rate	Failure rate	Death rate, all causes
1997 *N* = 4 690	65	74	21	2.1	3.3
1998 *N* = 5 739	66	74	22	1.7	4.1
1999 *N* = 6 717	64	77	19	1.3	3.9
2000 *N* = 7 297	70	79	16	1.4	3.3
2001 *N* = 7 720	73	81	14	1.2	4.2
2002 *N* = 9 024	70	78	13	0.9	3.6
3 Qs 2003 *N* = 6 827	71	79	11	1.1	3.5

At least 2 sputum samples are collected from the patient — an 'on the spot' specimen, followed by an early morning specimen the next day. A quality specimen relies on careful instruction to the patient to expectorate deeply. The specimens are examined microscopically at the regional laboratory (NHLS) for acid-fast bacilli (AFB). Results may be obtained within 24 - 72 hours and patients are recalled if necessary.

A clear bacteriology-based case definition of PTB has enabled the introduction of algorithmic nurse-based diagnosis of patients with smear-positive PTB.[3] Two positive smears are sufficient for a TB-trained professional nurse to diagnose PTB and initiate treatment.

Symptom-persistent, smear-negative patients must be followed up.[4] The patient may receive empirical treatment (amoxicillin) for a possible lower respiratory tract infection and have a chest X-ray and/or a culture prior to referral to the TB medical officer.

A culture for *Mycobacterium* TB has higher specificity and sensitivity but is more costly and results may only be available after 6 weeks. It is reserved for patients who have been treated previously, who have doubtful or negative smears (as is increasingly the case in a maturing HIV epidemic) or where drug resistance is suspected.

Because of poor specificity in TB diagnosis,[2] a chest X-ray is now used in TB screening only if the smear is negative. It may be used to monitor response in smear-negative TB or in complicated cases, e.g. suspected pleural effusion, pneumothorax, haemoptysis, etc.

The TB skin test (Mantoux, Tine) plays a very limited role in TB diagnosis in patients over the age of 4 years in areas with high TB prevalence and is not used routinely in older patients.

STANDARDISED SHORT-COURSE CHEMOTHERAPY/ DIRECTLY OBSERVED THERAPY (SSC/DOT)

Standardisation of chemotherapy regimens has facilitated nurse-based treatment of confirmed cases. The TB nurse may prescribe and initiate treatment, apply routine adjustments to the medication and terminate treatment when bacteriological criteria for cure are fulfilled. Patients receive SSC chemotherapy for 6 - 8 months using regimens of fixed combination of 4 - 5 antimycobacterial drugs. Each clinic maintains an uninterrupted supply of essential TB drugs.

The training of the TB nurse includes recognition and management of the rather frequent minor side-effects of TB treatment, and the early referral of sus-

pected major side-effects. The nurse monitors response to treatment by smear conversion at 2 - 3 months and confirms cure by negative smears at the end of a course of treatment.

COMMUNITY-BASED DOT PROGRAMME

To encourage treatment adherence the drugs are administered during weekdays through a supportive DOT system. The programme harnesses NGO-managed community DOT supporters, work supervisors or the clinic. The taking of each dose has to be witnessed and is recorded on a patient card by the treatment supporter or supervisor.

RECORDING, REPORTING AND QUALITY ASSURANCE

The programme is monitored using WHO and International Union Against Lung Disease (IUTLD) accepted definitions. A standardised and automated system of recording and reporting enables an outcome assessment of each patient and evaluation of overall programme performance at facility, district and regional level. The TB nurse substantially drives the data collection by keeping a register for all TB patients in the clinic.

District management and TB staff get quarterly feedback on case finding and outcome indicators and measure these against pre-set target indicators. The latter includes smear conversion, interruption and cure rates. The system also facilitates auditing of aspects of clinical and resource management.

Meticulous management of TB information has played a major part in the success of the programme in this region.

TECHNICAL SUPPORT TO THE TB NURSES

The TB nurses are monitored and supported by a network of TB co-ordinators who are professional nurses who receive specialised training in relevant aspects of TB, sexually transmitted infections (STIs) and HIV management and information systems. The TB nurses and TB co-ordinators receive medical and technical support from clinical medical officers who rotate through the clinics.

Referrals from the TB nurse to the doctor include:

- diagnostic dilemmas where inconclusive/negative bacteriology requires a more sophisticated clinical approach and radiological assessment — e.g. smear-negative PTB, almost all paediatric TB and all forms of extra-pulmonary TB are generally managed in consultation with a doctor
- therapeutic dilemmas where standardised regimens may be contraindicated due to severe drug side-effects or drug interactions
- patients who fail to respond satisfactorily to treatment, who develop complications or where drug resistance is suspected or confirmed
- assessments for sick leave, disability grant applications, UIF applications and other medical reports.

CONTACTS

Symptomatic contacts of smear-positive patients are screened. Child contacts under the age of 5 years routinely receive prophylaxis after exclusion of active TB. There is targeted provision of prophylaxis to some patients with HIV who are exposed to TB.

RELATED SERVICES

- With the increasing HIV-TB co-infection rate and the epidemiological links between HIV transmission and STIs, the clinical staff who are active in the TB programme screen and/or manage these patients as well.
- The TB programme is a major entry point into the health care system for newly diagnosed HIV patients. Voluntary counselling and testing (VCT) is therefore offered routinely to all TB patients (see Fig. 1). Patients found to be co-infected with HIV routinely receive pyridoxine and co-trimoxazole. They are referred to the antiretroviral programme if the CD4 count is < 200 after 2 months of TB treatment. Staff are encouraged to do screening for other opportunistic infections at every opportunity as indicated.
- The clinics provide syndromic management of STIs. This includes routine syphilis serological testing, VCT, advice on safer sex, voluntary recall of contacts and a regular condom supply.
- The patient has access to a reproductive health service, which offers a choice of contraceptive methods, referral for termination of pregnancy if required and cervical screening.
- The clinics do the postnatal follow up of the MTCT programme babies.

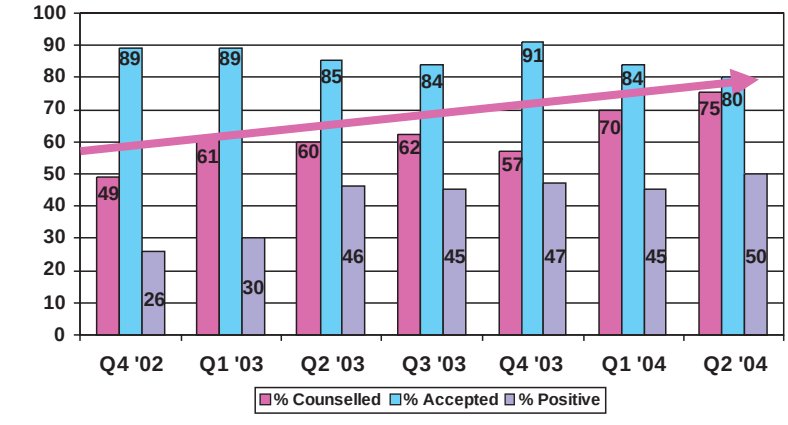

Fig. 1. TB/VCT coverage — Cape Town clinics: quarterly figures for 2003 and 2004.

- Neonates receive BCG vaccination shortly after birth at the midwife obstetric units before they are referred to the clinics.

PRIVATE SECTOR COLLABORATION WITH TB CLINICS

High smear positivity rates (only 5.6 smears to find 1 positive patient or 17.7% in 2003 with wide variability across the metropole) indicate poor case finding activities. High bacillary loads and severe morbidity upon presentation in many cases suggest a delay in presentation and/or referral to the TB clinic and a need for a higher index of suspicion.

Primary health care providers should consider TB in all patients with a productive cough lasting more than 2 - 3 weeks and offer early bacteriological screening for AFBs rather than the customary preliminary chest X-ray.[5] The latter may still be done if the smears are negative and there is no response to empiric amoxicillin. Referral of the symptomatic patient to the TB clinic for screening is strongly encouraged especially when the patient cannot afford private laboratory investigations (see Table III).

Table III. **Approximate private sector costs of bacteriology, chest X-ray: Dec 2004**

Smear microscopy for AFB	R42
Culture — excludes differential and sensitivities	R92
Chest X-ray one view only, radiologist's report included	R167

Where TB is confirmed by the private practitioner, the local authority must be notified. The patient is then registered at the local clinic and bacteriological results and outcomes are captured in the register. TB patients diagnosed and managed in the private sector may access free TB drugs from the clinics provided the National TB Programme guidelines are followed with regard to treatment regimen, monitoring and supervision of TB drug taking.

GLOSSARY

Case definitions

Pulmonary TB — TB disease of the lung parenchyma.
New case — A patient who has never been treated previously for TB, or who had less than 4 weeks' treatment previously.
Re-treatment case — A patient who had more than 4 weeks' treatment for TB previously.
Smear-positive TB — TB confirmed by at least 2 sputum smears positive for AFB, or 1 smear positive for AFB with X-ray abnormalities consistent with active TB, or 1 smear positive for AFB and patient clinically ill, or has a culture positive for TB.
Smear-negative TB — TB diagnosed in a patient who has negative smears, but a chest X-ray suggestive of active TB and failure to respond to broad-spectrum antibiotic.

Outcome definitions

Cure — A patient, originally smear-positive, who is smear-negative at, or 1 month prior to, the completion of treatment and on at least one other occasion.
Treatment completed — When a full course of treatment has been taken but there is no bacteriological proof of cure, i.e. the patient has smear-negative TB or follow-up smears were not done in a smear-positive patient.
Successfully treated — Includes cases who are cured as well as cases who have completed treatment (see above).
Interruption of treatment — A patient whose treatment was interrupted for 2 or more months.
Treatment failure — A patient who remains or becomes smear positive again after 5 months or longer of treatment.

Other

Smear conversion —When AFB are no longer detected on the smear. Smears are usually done after 2 - 3 months on treatment.

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References available on request.

Further reading

Arora VK, Sarin R, Lonnroth K. Feasability and effectiveness of a public-private mix project for improved TB control. *Int J Tuberc Lung Dis* 2003; **7** (12): 1131-1138.

Siddiqi K, Lambert M, Walley J. Clinical diagnosis of smear-negative pulmonary TB in low-income countries. *Lancet* 2003; **3:** 288-296.

Lonnroth K, Thuong LM, Lambrechts K, Quy HT, Divran V. Private TB care provision associated with poor treatment outcomes. *Int J Tuberc Lung Dis* 2003; **7** (2): 165-171.

Provincial Administration of the Western Cape — Metro Region. *Cape Town Metro Annual Reports on TB program 2002, 2003*. Cape Town: City of Cape Town Health Department, 2003 2004, respectively.

IN A NUTSHELL

The South African TB epidemic, enhanced by HIV, poses an increasing challenge.

Delayed diagnosis of smear-positive PTB is a major contributor to the spread of TB.

Constitutional symptoms and a productive cough exceeding 2 weeks is indication for TB screening.

Sputum microscopy remains the main and most cost-effective tool to identify infectious TB.

Nurse-based clinics offer free bacteriological screening and treatment of smear-positive PTB.

Directly observed treatment (DOT) is a key element in adherence and should apply to every patient on TB treatment.

VCT should be offered to all TB patients. Co-infected cases are WHO HIV stage 3 at least, require co-trimoxazole, screening for opportunistic infections, CD4 count and appropriate referral for ARVs.