What do primary care clinicians know about the management and control of Tuberculosis?

Balt, E
MB, BCh, MPraxMed (UP), DGG, DTG
Provincial Tuberculosis Co-ordinator -
Mpumalanga Department of Health, Nelspruit.

Durrheim, DN
MB, ChB, DTM & H, DCH, MPH & TM, FACTM
Consultant in Communicable Disease Control
Mpumalanga Department of Health, Nelspruit.

Ogunbanjo, GA
MB, BS, MFGP (SA), MFamMed (MEDUNSA)
Principal Family Physician & Senior Lecturer
Dept. of Family Medicine, Medical University of Southern Africa (MEDUNSA),
Pretoria.

Keywords:
Tuberculosis, primary care clinicians, knowledge, training, continuing medical education

Correspondence to:
Dr. Elsa Balt
Mpumalanga Department of Health
Private Bag X11285, Nelspruit, 1200
E-mail: eskom@mweb.co.za

Abstract

Objectives
To investigate primary care clinicians' knowledge of tuberculosis (TB) management and control.

Methods:
A cross-sectional survey of primary care clinicians in public service, attending the TB symposium organised for the 1999 World TB Day in Mpumalanga Province, South Africa. One hundred and sixty-eight primary clinicians completed the questionnaire. Respondents included 36 doctors (21%), 94 nurses (58%) and 34 (21%) allied health professionals. The response rate was 100%.

Results
The mean questionnaire score was 58% (range: 0-97%) but there was profound heterogeneity in answers to specific questions. Certain deficiencies found could seriously compromise TB management, for example the finding that only 55% of respondents knew the correct duration of continuation phase therapy for new pulmonary TB patients. Doctors performed better on the questionnaire, with 64% (23/36) scoring greater than 75% compared to 20% (20/98) of nurse practitioners, but doctors were weaker in questions relating to TB control. Nurse practitioners who had attended TB training programmes scored considerably better than their colleagues, with 47% (14/30) scoring greater than 75% compared to 8% (5/64) of their colleagues (χ^2= 19.12; p=0.000). Respondents demonstrated limited knowledge of managing childhood TB. Only 17% (28/168) could provide the rationale for BCG immunisation, 33% (55/168) provided the indication for tuberculin skin testing and 21% (35/168) named the correct prophylactic TB therapy for children under two years.

Conclusions
Nurse clinicians in Mpumalanga Province who had attended TB training programs demonstrated superior knowledge on TB management and control com-pared to their colleagues who had received no training. Primary care doctors appear to be an under-utilised resource in the TB Control Program in Mpumalanga Province and require orientation on control program priorities. In general, the knowledge of primary care clinicians on managing TB in children is inadequate and must become a focus for future training.

S A Fam Pract 2000;22(4): 16-20

Introduction

The incidence of tuberculosis (TB) world-wide is predicted to increase from 8.8 million in 1995, to 10.2 million cases by the year 2000 and 11.9 million by 2005.[1] The most important causes of this global increase include non-compliance by control programmes in implementing proven management strategies; inadequate diagnosis and treatment; migration; and the human immunodeficiency virus (HIV) pandemic. The South African TB epidemic is ranked as one of the worst, with 78 000 cases notified and 3 000 deaths reported during 1996.[2] Of these cases, 18% had interrupted their treatment and were potentially spreading the disease in the community.

Since the launch of the Directly Observed Treatment Short-course (DOTS) strategy in Mpumalanga Province, South Africa during 1996, there has been a remarkable improvement in the detection of patients through positive sputum examination, adequate treatment and follow-up to cure. However, instances

have been recorded where Provincial protocols were ignored or primary care clinicians commenced treatment without sufficient confirmation of disease. These undesirable practices are not limited to Mpumalanga Province. Hong YP et al in their study of the knowledge, attitudes and TB management practices of private general practitioners in Korea, found that more than 50% did not consider sputum examination essential for case finding/diagnosis, while 75% did not perform sputum examinations for monitoring treatment response.[3] A similar study among general practitioners in Delhi, India, found that sputum examination was utilised by only 12% of respondents for investigating suspected cases of pulmonary tuberculosis while 89.5% relied on chest x-ray, and only 29.5% used the treatment regimen recommended by the National Tuberculosis Program.[4] A study amongst nurses in India, found that a substantial number of nurses had inadequate knowledge about causative factors, importance of sputum examination, and correct dosage and duration of routinely used short-course chemotherapy.[5] Although the introduction of the DOTS strategy in Mpumalanga included a training programme for health workers on TB management and control, no study has been conducted to assess the impact of this approach or the current knowledge of primary care clinicians regarding the TB control strategy. This study was conducted to provide insight into this area and guide future training for primary care clinicians in the Province.

Methods

A cross-sectional survey design was used, with a questionnaire provided to primary care clinicians in the public service, who attended the TB symposium organised for the 1999 World TB Day in Mpumalanga Province, South Africa. Prior permission was obtained from the Research and Ethics Committee of the Department of Health, Mpumalanga Province and all participants provided consent. Respondents completed a pre-tested, self-administered questionnaire designed to assess their knowledge on the management and control of TB. The completion of the questionnaire preceded the symposium aimed at enriching the knowledge of health staff on the management and control of Tuberculosis.

The objectives of the study were to investigate the knowledge of primary care clinicians on the management and control of Tuberculosis, and identify any areas requiring remedial action. Data was analysed using SPSS for Windows 95 software. Univariate analysis was used to explore responses while simple multivariate analysis allowed broad description of questionnaire responses in relation to broad characteristics of respondents. Confidentiality was maintained through questionnaire coding and grouped analysis.

Results

There were one hundred and sixty-eight respondents, 36 doctors (21%), 98 nurses (58%) and 34 (21%) allied health professionals, with no refusals. The age of respondents ranged from 21 to 64 years, with a median age of 37 years. Nurses were generally older than doctors with only 12% being less than 30 years of age compared to 26% of doctors. Of 158 respondents who indicated their gender, 125 were females and 33 were males, while of 153 study participants who provided information on their training, 80 (52%) had a university degree and 73 (48%) had a college diploma. Only 34 (20%) health workers indicated that they had received any training on TB subsequent to their initial diploma/degree.

The mean questionnaire score was 58% (range: 0-97%) and scores were not associated with respondents' ages or time since qualification. Although 73% (n=123) of respondents could provide the correct definition of DOTS, only 19% (n=31) could correctly provide the main aim of the South Africa national TB control programme i.e. to cure at least 85% of all new sputum positive pulmonary TB cases. Less than one-quarter of health workers (n=41) correctly indicated that the reason for the six month treatment period for new pulmonary TB was the importance of eradicating dormant *Mycobacteria*. Two-thirds of respondents (n=112) correctly stated that interrupted or incorrect therapy were the underlying causes of multi-drug resistant tuberculosis (MDR-TB).

When asked to list five factors known to increase the risk for progression of TB infection to active disease, 85% (n=142) mentioned malnutrition, 63% (n=106) HIV co-infection, 33% (n=55) other medical conditions, including diabetes, malignancy, pneumoconiosis, and 8% (n=13) immuno-suppressive medication. Only 14% (n=19) of health workers provided the correct answer to the question, "What percentage of HIV negative people infected with TB develop TB disease in their lifetime?" i.e. 10%, and 19% (n=25) of respondents indicated that 70% or more would develop tuberculosis. Only 8% (n=14) of respondents could provide four risk factors for developing active TB and 69% (n=116) provided less than two risk factors.

When asked to list the common respiratory symptoms of pulmonary TB, the most frequent answers provided by the 168 respondents were, chronic cough (92%), dyspnoea (61%), productive cough (58%), and chest pain (49%). The most common systemic symptoms mentioned were, weight loss (94%), night sweating (82%) and malaise (37%). Fever was only mentioned by 24% of respondents.

Eighty-two percent (n=138) of primary care clinicians indicated that they requested sputum microscopy as their initial diagnostic test when they suspected pulmonary tuberculosis in a patient without a prior history of TB, while the remaining 30 health workers requested chest-X rays as their initial investigation. When asked to name the four drugs recommended for the initial treatment of new pulmonary TB disease in South Africa, 80% (n=135) mentioned ethambutol, 74% (n=124) pyrazinamide (PZA), 70% (n=117) isoniazide (INH) and 65% (n=109) rifampicin. Only 36% (n=61) correctly answered that the reason for at least two anti-TB drugs during the continuation phase of therapy, is to limit the development of resistance and only 55% (n=93) correctly indicated that the continuation phase of treatment for new pulmonary TB patients is four months. The proportion of correct responses by study participants to the question, "Name the anti-TB drugs which most commonly causes each of the following symptoms or adverse reactions", are reflected in Table I.

Participants were also questioned on a number of aspects of childhood TB management. Only 17% knew that BCG immunisation prevented TB meningitis in children, while 57% correctly indicated that children 0-2 years of age who have been in contact with a sputum positive TB patient should receive prophylactic anti-TB therapy for 3 months. Only 21% knew that the correct prophylactic therapy for children under two years was rifampicin and isoniazid (INH).

Thirty-two percent (30/94) of nurses had undergone training on TB since qualification. These nurses fared better than their peers on the vast majority of questions. For example, 97% (29/30) would request sputum microscopy as initial test for suspected pulmonary TB compared to 77% (49/64) of nurses who had received no training (χ^2= 5.845, P = 0.016). Other areas where they outperformed their colleagues included the definition of DOTS (100% vs. 70%; χ^2= 11.163, P = 0.001), length of continuation phase therapy (87% vs. 42%; χ^2= 16.432, P = 0.000), and correct indications for tuberculin use (60% vs. 25%; χ^2= 10.838, P= 0.001). Forty-seven percent (14/30) of nurses who had attended TB training scored more than 75% on the questionnaire compared to 8% (5/64) of their colleagues (χ^2= 19.120, P = 0.000). In certain areas, despite their knowledge being superior to their colleagues, it was still inadequate e.g. treatment of childhood TB (40% vs. 11%; χ^2= 10.697, P = 0.001).

Doctors generally performed better on the questionnaire, with 64% scoring greater than 75% compared to 20% of the nurse practitioners. Areas where doctors were particularly strong included being able to provide three or more risk factors (67% vs. 24%; z = 4.64, P = 0.000), the cause of MDR-TB (97% vs. 62%; z = 3.98, P = 0.000), and indications for prophylactic treatment in children (86% vs. 56%; z = 12.34, P = 0.001) (see Table II).

Table I: Knowledge of common adverse events associated with anti-TB drugs

Symptom/ Adverse Event	Anti-TB Drug	Number (%) correct
Sensorineural deafness	Streptomycin	89 (53%)
Peripheral neuropathy	INH	80 (48%)
Retrobulbar neuritis	Ethambutol	60 (36%)
Orange discoloration of urine	Rifampicin	106 (63%)

Table II: Performance of primary care doctors and nurses on TB management questionnaire.

Questions	Doctors	Nurses	P-Value**
Risk Factors (3 or more)	24/36 (67%)	23/98 (24%)	0.000
Aim of TB Control Programme	6/36 (17%)	24/98 (25%)	0.483
Initial diagnostic test	30/36 (83%)	82/98 (84%)	1.000
Cause of MDR-TB	35/36 (97%)	61/98 (62%)	0.000
DOTS definition	29/36 (81%)	79/98 (81%)	1.000
Reason for 6 months therapy	7/36 (19%)	29/98 (30%)	0.278
Indications for prophylactic treatment in childhood	31/36 (86%)	55/98 (56%)	0.001
Prophylactic treatment regimen for children	15/36 (42%)	20/98 (20%)	0.025
Rationale for BCG immunisation	12/36 (33%)	14/98 (14%)	0.024
Indication for tuberculin use	16/34 (44%)	35/98 (36%)	0.423

**Fisher's Exact Test

Discussion

A critical strategy for successful TB control is the prompt, appropriate, and complete treatment of all patients diagnosed with active disease. This cannot be achieved if health care workers' knowledge of the disease is deficient or national treatment protocols are not followed. The aims of the South African National Tuberculosis Control Program are: [2]

a. To cure 85% of all new sputum smear positive TB cases
b. To achieve a smear conversion rate of 85% of new smear positive cases and 80% of retreatment cases at the end of the intensive phase of treatment
c. To contain, then reduce, the rising incidence of tuberculosis expected as a result of the HIV epidemic
d. To prevent TB drug resistance

It has been recognised that to achieve these aims, appropriate training and support of health care workers on management and control of TB is essential. Mpumalanga Province introduced the Directly Observed Treatment Short-course (DOTS) strategy during 1996, and concurrently launched a systematic training programme for primary care clinicians on TB management and control but predominantly focused on clinic nurses.

Cognisance needs to be taken of at least four important findings from this survey if future success of the DOTS strategy in Mpumalanga Province is to be assured. These are: deficient knowledge of the duration of TB therapy, under-utilisation of primary care doctors in TB management and control, the positive influence of training on TB management and control on nurse practitioner knowledge and limited knowledge of childhood TB.

Deficient knowledge of the length of TB therapy

Short-course chemotherapy is currently the most effective control program treatment strategy available for patients with TB, with direct observation assisting patients to complete the 6-8 month treatment regimen.[6,7] Of concern was the finding that the majority of primary care clinicians did not know the rationale for 6-month therapy in new pulmonary TB cases. If clinicians are not themselves conversant with the reasons for inconvenient and prolonged therapy, they may prove poor advocates of this measure to their patients, resulting in patients abandoning treatment before completion. The reason for the six-month treatment duration for new pulmonary TB patients is based on evidence from experimental studies that have demonstrated eradication of dormant *mycobacteria* following a minimum period of six months sustained therapy, provided isoniazid, rifampicin and pyrazinamide are constituents of the regimen.[8-10] This deficiency is not unique to Mpumalanga clinicians, as the studies from Korea [3] and India [4,5] also reported a low proportion of primary care clinicians equipped with the rationale for 6-month therapy in new TB patients. Hence, training programmes should effectively convey this information to primary care clinicians.

Under-utilisation of primary care doctors in TB management and control

Traditionally, the management and control of TB has been delegated to primary care nurses, with doctors more commonly seeing patients referred for therapy-associated adverse events or non-response to standard regimens. From 1996, the TB training program in Mpumalanga has focused on primary care nurses at clinics with limited involvement of primary care doctors. Reasons that may have contributed to the limited involvement of primary care doctors at training sessions include heavy clinical work load, non-protected time for continuing professional development and perceived adequate self-knowledge of TB management and control. Study findings show that doctors' knowledge of TB risk factors, initial diagnostic testing, causes of multi-drug resistant TB (MDR-TB) and definition of DOTS were good. However doctors appeared poorly informed about the aims of the TB control program and reasons for 6-months of therapy for new pulmonary TB patients. This should be addressed by incorporating TB management and control training in the Provincial Continuing Professional Development (CPD) accreditation program, insisting that all public service doctors follow the approved TB treatment protocols.

Positive outcome of TB training

The most encouraging finding unveiled by this study was that training or continuing professional development (CPD) and education had positively influenced the knowledge of nurses who had undergone TB training since qualification. These nurse clinicians outperformed their peers on the vast majority of questions posed. This is a reassuring local finding that supports systematic reviews of educational literature that have found that continuing medical education could improve clinical performance and patient outcomes.[11-13] The multi-faceted approach to TB training employed with Mpumalanga primary care nurses, which included formal clinical instruction and demonstration, training on organisational elements including surveillance and facilitatory contacts with other health care professionals, such as laboratory personnel responsible for sputum microscopy, appears to be effective. This finding provides a mandate for an extension of this training program to formerly unreached health workers involved in managing TB patients.

Limited knowledge of childhood TB

The diagnosis of TB in childhood is difficult and characterised by a plethora of suggestive symptoms including persistent cough or wheezing, weight loss, failure to thrive, lassitude, fever, failure to recover from a recent

infectious disease or malnutrition. While non-specific symptoms such as adenopathy, erythema nodosum or hepatosplenomegaly may lead the primary care clinician to consider the possibility of TB, a thorough knowledge of tuberculosis in childhood is essential, so that a correct diagnosis of TB can be made. The present study confirmed that in addition there is a poor understanding of the indications for prophylactic TB treatment in childhood, rationale for BCG immunisation, indication for tuberculin use and actual prophylactic TB medication regimen for children, even among clinicians who have undergone TB management and control training. Delay in diagnosing TB in a child can have disastrous consequences both from a personal and community perspective. Future training must incorporate the approach recommended by the World Health Organisation [8,9] and modified by Cundall, [14] so that pulmonary TB is promptly diagnosed and classified as *suspect, probable* or *confirmed* tuberculosis. This approach can only be successfully applied if knowledgeable health workers are able to combine evidence from history, tuberculin testing (one of the cornerstones of diagnosis), chest radiography and microscopy/culture results from any body tissue, fluid or secretion. The details of this approach are beyond the scope of this article's discussion but there are outstanding texts available on this topic.[8,9,14,15] Suffice is to say, that to avoid late diagnosis and poor management of TB in children, all efforts should be made to adequately train primary care clinicians on all aspects of TB in childhood.

Conclusions

It is already more than 50 years since the first antituberculous drugs were discovered. Effective treatment capable of curing patients within six months has been available for the past 25 years but we see an increasing proportion of treatment failures and an escalating mortality curve at the dawn of the twenty-first century. To reverse this trend, we need trained primary care clinicians with adequate clinical knowledge on the management and control of the disease; true support throughout the treatment period (DOTS) and fixed-dose combination drugs. Primary care nurse clinicians in Mpumalanga Province who attended TB training programs demonstrated superior knowledge on TB management and control compared to their colleagues. Primary care doctors appear to be an under-utilised resource in the Mpumalanga TB Control Program and require orientation on control programme priorities. In general, primary care clinicians in Mpumalanga Province have limited knowledge of managing TB in children and this must become a focus for future training.

References

1. Pilhue JA. Tuberculosis 2000: problems and solutions. *Int J Tuberc Lung Dis* 1998;2:696-703.
2. Department of Health. *Tuberculosis: A Training Manual for Health Workers. First edition.* Pretoria; 1998;2-9.
3. Hong YP, Kwon DW, Kim SJ, Chang SC, Kang MK, Lee EP, Moon HD, Lew WJ. Survey of knowledge, attitudes and practices for tuberculosis among general practitioners. *Tuber Lung Dis* 1995;76:431-35.
4. Singla N, Sharma PP, Singla R, Jain RC. Survey of knowledge, attitudes and practices for tuberculosis among general practitioners in Delhi, India. *Int J Tuberc Lung Dis* 1998;2:384-89.
5. Singla N, Sharma PP, Jain RC. Awareness about tuberculosis among nurses working in a tuberculosis hospital and in a general hospital in Delhi, India. *Int J Tuberc Lung Dis* 1998;2:1005-10.
6. Iseman MD, Cohen DL, Sbarbaro JA. Directly observed treatment of tuberculosis. We can't afford not to do it. *N Engl J Med* 1993;328:576-8.
7. Bayer R, Wilkinson D. Directly observed therapy for tuberculosis: history of an idea. *Lancet* 1995;345:1545-8.
8. World Health Organization. *Treatment of tuberculosis: guidelines for national programmes* Geneva: WHO; 1993.
9. World Health Organization. *Treatment of tuberculosis: guidelines for national programmes* 2nd ed. Geneva: WHO; 1997.
10. Styblo K. The epidemiological situation of tuberculosis and the impact of control measures. *Bulletin of the International Union against Tuberculosis* 1983;58:179-86.
11. Davis DA, Thomson MA, Oxman AD, Haynes RB. Evidence for the effectiveness of CME. A review of fifty randomised controlled trials. *JAMA* 1992;268:1111-7.
12. Davis D. Does CME work? An analysis of the effect of educational activities on physician performance or health care outcomes. *Int J Psychiatry Med* 1998;28:21-39.
13. Oxman AD, Thomson MA, Davis DA, Haynes RB. No magic bullets: a systematic review of 102 trials of interventions. *Can Med Assoc J* 1995:153:1423-7.
14. Cundall DB. The diagnosis of pulmonary tuberculosis in malnourished Kenyan children. *Annals of Tropical Paediatrics* 1986;6:249-55.
15. Donald PR, Fourie PB, Grange JM. Tuberculosis in Childhood. 1st ed. Pretoria: van Schaik; 1999: 154-7.