TUBERCULOSIS CONTROL AND OCCUPATIONAL HEALTH SERVICES

DR J.T. METS

Senior Lecturer in Occupational Health, Department of Community Health, University of Cape Town

Die hoë voorkoms van tuberkulose in die Kaapstadgebied, soos aangegee deur die mediese gesondheidsbeamptes van die Kaapse Afdelingsraad en die Stadsraad, is rede tot kommer. In 1982 was die syfers vir Swartes in die omgewing van 1 400 tot 1 500 per 100 000 en vir Kleurlinge in die omgewing van 300 tot 340 per 100 000. Die beraamde bevolking in die Wes-Kaap gesondheidstreke is 1,6-miljoen.

Met die samewerking van die bedryfsgesondheids-verpleegkundiges in die area is 'n opname gedoen om die voorkoms van tuberkulose in industrie en die rol van hierdie verpleegkundiges in tuberkulosebeheer te ondersoek. Die opname het 'n werkersbevolking van 24 471 persone in 29 ondernemings ingesluit. Vir swart werkers was die jaarlikse voorkoms van tuberkulose 1 per 100 en vir Kleurlingwerkers 1 per 200.

Bedryfsgesondheidsverpleegkundiges was verantwoordelik vir die identifisering van 65 % van al die gevalle wat in 'n twee-jaar tydperk (1981 en 1982) opgespoor is en het 'n beslissende rol gespeel in die geslaagde behandeling van werkers.

'n Stel riglyne, wat gebaseer is op die bevindings van die opname, is vir die hantering en beheer van tuberkulose in industrie opgestel.

INTRODUCTION

The W.H.O. (1982) estimates that the annual risk of infection with tuberculosis in most developing countries is in the order of 3 to 5%. Every year 4-million to 5-million highly infectious cases of tuberculosis occur in those countries, according to the WHO Technical Report No. 671. This report also states that case finding and chemotherapy, combined as one entity, must be considered to be the most powerful weapon in tuberculosis control. Since case finding in those countries depends principally on the examination of patients presenting with relevant symptoms to a health facility, it is recommended that all staff at such facilities should be properly trained and motivated to identify potential tuberculosis patients.

It is advised that microscopy services be extended and that where chest radiography is also used in case finding, bacteriological confirmation should be sought to avoid overdiagnosis.

In South Africa there are a growing number of industrial enterprises with a healthy facility on their premises, usually headed by an occupational health nurse. With the co-operation of the Western Cape members of the Society of Professional Occupational Health Nurses a survey was undertaken to investigate the extent of the tuberculosis problem among workers and the role the occupational health nurse plays or can play in the control of tuberculosis in the work situation.

Available data for South Africa suggest that the annual case rate (per 100 000) of bacteriologically positive cases of tuberculosis in 1980 amounted to 110 in urban Blacks and 160 in Coloureds country-wide, but only to 20 in Whites and Indians (Kleeberg, 1982). Most regions of the country showed a figure of 1-2% for annual risk of infection, while the incidence of active cases varied between 100 to 150 per 100 000. Fourie (1983) stated that the remarkably high rate of tuberculosis prevalence in lowland areas, particularly in the Eastern and Western Cape regions is cause for concern. Based on notifications received by the Department of Health and Welfare in Pretoria, Küstner (1983) calculated that in 1982 the incidence rates per 100 000 amounted to 235 for Blacks (RSA only), 378 for Coloureds, 13,3 for Whites and 64,3 for Asians.

In some Western Cape health regions, with an estimated population of nearly 1,6-million (Küstner, 1983) the tuberculosis incidence figures are of great concern.

The Medical Officer of Health of the Divisional Council of the Cape reported in his Annual Report for 1982 a notification rate (per 100 000) of 1 507 for Blacks (24% considered to have been imported from elsewhere), 334 for Coloureds and 16 for Whites. The total population under his care amounts to 625 000 people.

The Medical Officer of Health of the City Council of Cape Town reported, also for 1982, notification rates for tuberculosis in the Black population as 1 393 per 100 000, for Coloureds 292 and 18 for Whites (all forms, all ages). Again, for the Blacks, 12% were considered to have been imported cases. Perhaps it should be emphasised here that the above figures must be regarded as being conservative. They are based on actual notifications and real figures may be even higher.

METHODOLOGY AND RESULTS

Method

A questionnaire was handed out to members of the Occupational Health Nurses Association. Replies were received covering a population of 24 471 workers in 29 enterprises. Industrial categories which were included were textile (6), paper (5), engineering (5), food (4), clothing, asbestos cement and power (2 each) and one foundry, one glass factory and a retail commercial firm.

While not a truly representative sample of industry in the Western Cape it is a reasonable cross-section covering approximately 7% of the workforce in the particular area in and around Cape Town, selected on the basis of an existing health service and of data being made available.

Number of cases

A breakdown of the worker population and of the numbers of active pulmonary tuberculosis cases occurring in each is presented in table 1 which covers a two-year period (1981 and 1982). Only hourly rated workers, not management and staff, are included in the figures.

Diagnosis

The diagnosis of pulmonary tuberculosis had been made as a result of pre-employment medical examinations in 5 Black and in 12 Coloured applicants which leaves a total of 169 diagnosed while employed. One factory employing 800 workers of whom more than 500 are Black found only 1 case of tuberculosis in a 5-year period notwithstanding their higher than average quality of health services, which includes routine chest X-rays of workers regarded to be *at risk* due to exposure to adverse working conditions.

Specific information about how active tuberculosis cases had been detected is evident from table 2, in which the number of people diagnosed on pre-employment examination is included.

All workers who had been referred to clinics by occupational health nurses had been suspected, on the grounds of symptoms or signs, to be suffering from tuberculosis. Among the group of workers diagnosed independently at clinics (65) 9 were contacts called up via the nurse at work. The term *routine X-ray* used above denotes a periodical X-ray performed without any reference to contact, clinical suspicion, signs or symptoms.

Table 1 Workforce and Tuberculosis incidence (1981/82)

Population Group	Workers	T.B. cases
Black	2 847 (12%)	62 (33%)
Coloured (Female 7 282)	18 476 (75%)	123 (66%)
White	3 148 (13%)	1
Total	24 471	186

Table 2 Means of detection of Tuberculosis cases

Method of detection	No.	Proportion
Pre-employment X-ray	17	9%
Routine periodical X-ray	32	17%
Referred by OH nurse:		39%
diagnosed on X-ray	70	
diagnosed on sputum test	2	
Through OH services: Subtotal	121	(65%)
Diagnosed at clinics without OH nurse involvement	65	35%
Total	186	100%

Incidence

On the basis of the above figures, the annual incidence of active pulmonary tuberculosis among these workers for the years 1981 and 1982 was calculated to be 10 per 1 000 Black workers (1 001 per 100 000) and 5 per 1 000 Coloured workers (496 per 100 000). These rates are very similar to those found by the author over a period of eight years (1972 to 1980) among hourly rated Black and Coloured workers in the motor industry in the Eastern Cape, which was 1% per annum (or 10 per 1 000 workers). One would expect that these rates, as a result of the well-known *healthy worker effect* on epidemiological data, would be lower than those in the general adult population which also contains the unemployed and old, and therefore socio-economically less privileged people.

Treatment and compliance

During the two survey years, 25 workers had been admitted to hospital of whom only seven had been kept there as in-patients for longer than two months. Another 76 were treated, as ambulatory patients only, for six months or longer, and then regarded as cured, while 16 worker-patients were lost to treatment at work before their six months had expired. Of the hospitalised patients, four did not return to their place of work, four were dismissed while still in hospital and another five were also dismissed mainly or solely because they had contracted tuberculosis! At the end of 1982 there were still 64 workers under treatment at work.

In total, therefore, 140 out of 169 worker-patients who had contracted active tuberculosis while at work had been treated or were still under treatment while satisfactorily at work. The other 29 patients (17%) had lost their work-occupational health nurse contact. Compliance with treatment for all except the ones lost through dismissal had been exceptionally good compared with compliance at clinics. On average no more than 6% of work-treatment days had been lost by the worker-patient group.

Compliance, defined as submitting to and acceptance of an ade-

GUIDELINE FOR THE MANAGEMENT AND CONTROL OF TUBERCULOSIS IN INDUSTRY FOR OCCUPATIONAL HEALTH NURSES

•EDUCATION

Educate management at all levels with regard to the value and importance of **early diagnosis** of tuberculosis in the worker so as to
treat him adequately
while at work (perhaps temporarily adapted or restricted)
maintaining him as valued employee and able to
support his family.

In case a worker needs to be admitted for a month or so Management should be motivated to
support him by adequate sick pay and to
assure him of employment continuation.

Most often lung tuberculosis is not a disabilitating disease and workers can remain on the job.

Educate foremen, supervisors, and workers including the *unions* in respect of the importance of making an early diagnosis by awareness of the early symptoms and signs of tuberculosis, to come and consult you and to take special notice of risk factors.

High risk groups and factors

— The new Black worker coming from the Transkei, Ciskei or other areas, urban or rural
— The previously unemployed applicant
— Unmarried men without a family
— People working or living under excessive stress, such as excessively long working hours
alternating shifts or long night shifts
work exposed to the elements
heat exposure, cold exposure, especially if alternating exposure to excessive dusts (especially if dust contains silica), fumes and irritant gases and vapours
— People drinking more alcohol than is good for them, whether or not smoking as well (dagga!). Malnutrition is the common underlying factor reducing resistance of the body
— The older worker, especially if underweight and on manual work
— Diabetics and others with chronic diseases
— Contacts of open tuberculosis cases (although re-infection may play a lesser role than endogenous relapse, it does occur)
— Ex-tuberculosis patients who may *break down* under excessive stresses after viral infections (such as influenza) or when drinking to much
— Groups of workers who are working under adverse environmental conditions (dusty, hot, cold, and so on) are high risk groups, especially if they hail from environments with high prevalence of tuberculosis.

• Prevention of tuberculosis at work

Preventive measures in the work situation should be aimed at reducing the chance of infection (contacts) but more importantly at diminishing the **disease risk**, that is,of becoming a tuberculosis patient. Factors leading to breakdown, reactivation, endogenous re-infection and so forth, are not usually under the control of the occupational health nurse but should be monitored by her.

Medical control and intervention is aimed at:
— early diagnosis (passive case finding)
— adequate supervised treatment (ambulatory)
— maintenance of people at work if this is not contraindicated
— follow up of patients and contacts.

Control measures are

— Pre-employment medical examinations including a chest X-ray
— **Screening** by X-ray methods (active case finding) of **selected worker groups** regarded to be at special risk. This would include close contacts of an open tuberculosis case in a small work area
— **Passive case finding**. This is the term used to indicate investigation of persons **suspected** of possibly suffering from tuberculosis on the grounds of symptoms and signs

- **presenting themselves** with complaints (persistent cough, loss of weight, loss of appetite, lassitude, night sweats, dyspnoea, chest pains, low grade fever, hemoptysis)
- **presented by foremen**, supervisors or friends as not well
- **suspected by medical personnel. A high level of awareness of the possibility of tuberculosis** in all persons she has contact with should be maintained by the OH nurse.
- Routine annual or other periodic medical examination results:
  Loss of weight is an important sign often related to tuberculosis. Regular weighing of groups at risk is a cheap and fairly effective method of early case finding.
  When suspicion is aroused sputum examination (Clinic) and chest X-ray (Clinic) are indicated to confirm the diagnosis. A high ESR may assist in diagnosis of possible *activity* but a low ESR does not rule this out.
- **Contacts** should be X-rayed with or without a sputum test, both **repeated** after 2-3 months
- **Follow-up** routine checks by X-ray and weighing are advocated for ex-tuberculosis patients for the period of 3-5 years depending on the severity of the case.
  Alcoholism is an important risk-factor for breakdown in ex-tuberculosis patients.

• Treatment and notification

Supervised ambulatory treatment at work is the most effective control measure for tuberculosis.

Close liaison with clinics, who should inform the occupational health nurse of all relevant data and delegate treatment to her, is essential.

Tuberculosis patients should be taught why they should take treatment for so long and what to avoid in their daily lives and also be appraised for possible side-effects (which should be monitored by the nurse).

Contacts outside the factory will be followed up by the clinics.

The investigation of sputum is nowadays regarded as an effective and relative cheap method of detecting **active** tuberculosis cases in an urban setting. Where X-ray facilities are readily available, the sputum test can play a useful role for confirmation of activity and effectiveness of treatment, as well as avoiding overdiagnosis.

Treatment schedules for tuberculosis are available from the Department of Health and Welfare, Private Bag X63, Pretoria 0001. (Publication ISBN-0-621-0617-0) and from local authorities. They also indicate side-effects of drugs.

quate number of doses of prescribed treatment, depends on many factors. Among these, motivation of the patients, of the persons administering treatment and of the people in the social environment, but also daily supervision of treatment, are paramount.

In general, non-compliance with tuberculosis treatment is considered to occur if patients receive less than 75% of doses planned, which implies that the treatment regime is regarded as still effective at 75% attendance.

The Medical Officer of Health in Cape Town (1982) reported that one-third of 609 patients on ambulatory treatment had attendance records of less than 75%. Non-compliance is ascribed to lack of motivation and knowledge about the disease and to transport problems, side effects, dissatisfaction and financial problems. MacKenzie and Kling (1983) reported an average of 18% non-compliance per month, studying a one-year period. Figures ranged from 58% in December 1982 to nought in November 1982 and March 1983 (n = 384 on average). However in a clinic in a Black township they found an average monthly non-compliance rate of 32% (n = 1 097) over five months. Gordon Smith (1983) reported that out of 440 patients admitted to the Ga-Rankuwa Hospital with confirmed active tuberculosis who could be followed up after discharge, only 259 (59%) completed subsequent ambulatory treatment at clinics until discharged as cured. The failure rate in this group, due to defaulting and non-compliance, was as high as 41%.

These studies demonstrate the seriousness of the problem of non-compliance in tuberculosis control. In a working environment where involvement of the worker community as well as supervised treatment is possible, especially when on site health services are provided, ambulatory treatment of tuberculosis offers an effective solution to this problem. Obviously close co-operation with the local authority clinics, which provide diagnostic services and drugs, is necessary, but the occupational health nurse is the principal actor.

Such disturbing factors as lack of understanding of the disease and of the need for long-term (6 months) treatment, interference with social and work life, difficulties in attending clinics in terms of access and time of day, are solved on the spot while side effects of drugs can be handled early and effectively and health education can be a continual process. The patient, being known to the nurse, will be treated in a contact situation allowing reaching out, to some extent at least, to his social environment.

Case finding

The other main aspect of tuberculosis control, case finding, has already been touched upon, but will not be discussed further as the occupational health nurse and her assistants can play a decisive role in this as well.

The present policy advocated by the health authorities is not to attempt case finding by indiscriminate routine mass X-ray screening campaigns. Local recommendations are to arrange chest X-rays for all new employees (free-of-charge for Black prospective workers and low cost for others) and further only for contacts, tuberculosis *suspects* and *high risk groups*. A definition of the latter, not only applicable to the local situation, is offered in the guidelines for the management of and control of tuberculosis in industry for occupational health nurses.

The yield in active cases out of 10 717 contacts investigated by the City Council of Cape Town in 1982 was 3,4% while a case finding yield of all X-rays taken amounted to only 0,30%. However 12% of all active tuberculosis cases were found as a result of pre-employment and routine mass X-rays (M.O.H. Report, 1982). This is a lower proportion than shown in the survey (26%) which, of course, only concerned adults and prospective workers.

The yield of case finding by early referral of suspects, based on a high level of awareness among the medical staff of the occupational health service at Volkswagen of S.A. between 1972 and 1980 was 15 per annum (143 in total) compared with 52 new cases found by general and selective routine mass X-ray campaigns over these eight years (n = 16 861 X-rays taken) (Mets, 1980).

The provision of bacteriological services to suspects and contacts is, generally speaking, not adequate as yet, at least not for screening purposes. Chest X-rays are still used extensively and remain the most useful initial tool to be complemented by sputum tests as an aid to diagnosing active cases.

Conclusion

Only five of the 29 occupational health nurses who took part in the survey were not supported by a medical practitioner, 21 indicated that they performed routine annual medical examinations and 13 that they arranged annual chest X-rays for at least a part of their workers regarded as *high risk groups*. A proportion of these nurses (8 out of 29) expressed dissatisfaction with the communication received from clinics about their worker-patients which was regarded as detrimental to proper management of these cases.

Based on the results of the survey and the suggestions made by the occupational health nurses themselves, most of whom emphasised the important role of health education, a set of guidelines was drawn up for the nurse in industry. Supervised ambulatory treatment of tuberculosis at work is the most effective control method for pulmonary tuberculosis of adult workers, especially in the hands of an occupational health nurse, to the benefit of worker-patients, their colleagues, their families, the enterprise and the community as a whole.

REFERENCES

Fourie, P B (1983). The prevalence and annual rate of tuberculosis infection in South Africa. *Tubercle* Vol. 64, 181-192, 1983.

Gordon Smith, D J (1983). The fate of TB referrals. *Proceedings of the MEDUNSA Conference on Tuberculosis in the Eighties*, 14-16 April 1983.

Kleeberg, H H (1982). The dynamics of tuberculosis in South Africa and the impact of the control programme. *S Afr Med J* Special Issue, 17 November 1982.

Küstner, V O (1983). *Empidemiological Comments* Vol. 10, 4, 1983. Department of Health and Welfare.

MacKenzie, J M; Kling, N K (1983). Unpublished student report. Department of Community Health, University of Cape Town.

Mets, J T (1980) *S Afr Med J* Vol. 57, 669, 1980. WHO. 1982 *Tuberculosis Control.* Technical Report Series 671. Geneva. WHO.