

## Developing operational research capacity in hospital tuberculosis control officers in Malawi

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### SUMMARY

**SETTING:** The National TB Control Programme (NTP) of Malawi.

**OBJECTIVES:** To describe 1) the way in which a generic operational research project was developed and implemented by hospital TB officers (TBOs), 2) the outcome in terms of research work completed, data analysed and papers written up, and 3) the results of the research project.

**DESIGN:** A descriptive study of assessing diagnostic processes in patients labelled as TB suspects who had been admitted to general hospital wards over 4 weeks.

**RESULTS:** A total of 25 TBOs were trained in developing the research protocol: 19 performed satisfactory

work, 17 attended an analysis/paper writing workshop and 11 submitted a research paper. The data of five papers were collated. Of 900 hospital admissions, 153 (17%) were TB suspects, of whom 37% were diagnosed with TB, 38% were discharged with another diagnosis and 25% died or absconded during investigations.

**CONCLUSION:** This first attempt at developing a research capacity in hospital TB officers in Malawi was partially successful, and may, through local dissemination and feedback, help to improve the speed of TB diagnosis in hospital in-patients.

**KEY WORDS:** tuberculosis; research capacity; Malawi; diagnosis

THE NEW MILLENNIUM has seen several outspoken commentaries in medical journals about the need for more equitable funding for research in developing countries,<sup>1,2</sup> and for Africa in particular to have a more meaningful say in setting research priorities.<sup>3,4</sup> There is also a growing recognition that research in resource-poor countries, to be of benefit to the local people, should be strongly linked to disease control.<sup>5</sup> The World Health Organization's revised draft framework for effective tuberculosis (TB) control specifically addresses the need for control programmes to embrace and undertake locally relevant operational research (Meeting of the Strategic and Technical Advisory Group on Tuberculosis [STAG-TB], July 2001). Operational research in the context of TB control may be broadly defined as the search for knowledge about activities, interventions, tools or strategies that enhance programme effectiveness, with the research being planned and conducted either by or in partnership with the national programme.

The Malawi National Tuberculosis Control Programme (NTP) has for several years had a strong operational research focus.<sup>6</sup> The research programme is led and coordinated from the Central Unit. There is a dedicated budget line for research studies, training

and other activities, including dissemination of research findings. Clinical research officers working in certain districts have conducted research under the direction of the Central Unit, and the Central Unit also works with hospital TB officers in all districts of the country to carry out research projects on topics pertinent to TB control efforts.

The NTP wants to gradually build up research capacity throughout the programme, and in 1999 it started an annual operational research training workshop for all staff members. The idea behind this initiative is to educate TB officers about the principles of operational research and to build up district capacity to design, implement, analyse and write up research projects. Hospital TB officers (TBO) collect programme data and perform cohort analysis of case-finding and treatment outcome as part of their daily work. First-hand exposure to the discipline of research should improve their awareness of the importance of accurate data gathering and their ability to analyse and interpret their findings.

Nevertheless, the difficulties of building research capacity in TBOs should not be underestimated. In Malawi, the majority of such officers are health assistants, although occasionally nurses, clinical officers

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or medical assistants may be appointed as a TBO. Entry to health assistant training at one of the professional colleges requires the completion of 4 years at secondary school. At college, trainees undertake a 3-year course in environmental health and leave with a certificate. Health assistants are not medical or clinical practitioners, and have no recognised formal degrees. However, in the last 4 years, health assistants have had the opportunity to undertake a 1-year diploma course that includes a training component on research methodology. Health assistants are appointed to the position of TBO as a result of recommendations made by the NTP to the district health officer. All TBOs undergo a 2-week training on 'managing tuberculosis at district level' using World Health Organization (WHO) modules.

The aim of this report is to describe 1) the way in which a generic operational research project was developed and implemented by TBOs in Malawi, 2) the outcome in terms of research work completed, data analysed and papers written up, and 3) the results of the research project.

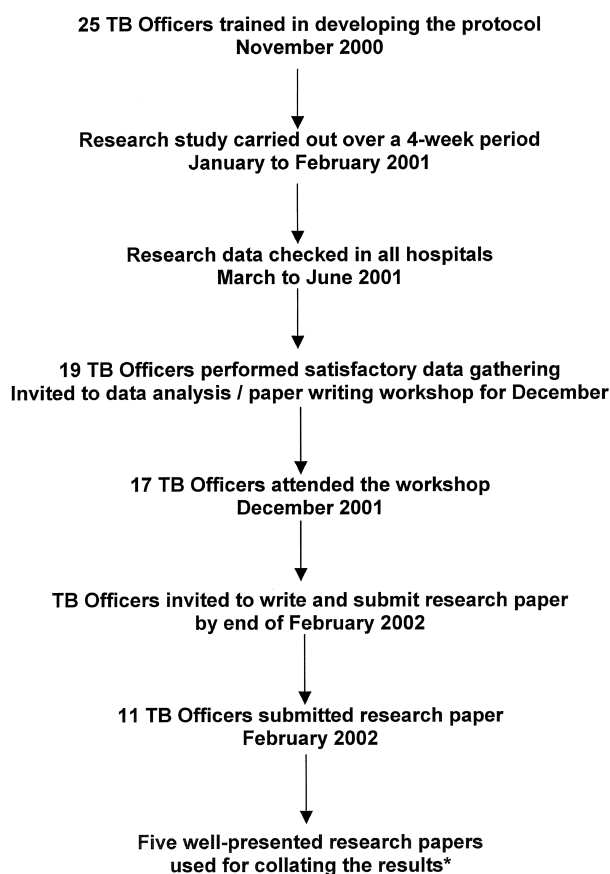
## METHODS AND RESULTS

### *Development and implementation of a research project*

In November 2000, 25 hospital TB officers (TBO) from one central, 12 district and 12 mission hospitals in the three regions of Malawi were invited to a one-and-a-half day seminar on operational research. Two half-days were devoted to discussing the principles of operational research, including gender-related research, and reviewing research studies carried out in the previous 3 years. In the other half-day, NTP facilitators from the Central Unit and Regional TB offices worked with the group to develop a protocol on 'assessing the diagnostic process of patients labelled as TB suspects who had been admitted to general hospital wards'. The topic had already been chosen by the NTP, and a template protocol had been developed. This was discussed in detail with all participants, and a revised protocol finally agreed upon. Each individual TBO was given the opportunity to make photocopies of the protocol, and they returned to their hospitals with the necessary files and extra stationery in order to conduct the study. TBOs were informed that the research would be assessed during the second quarter of 2001 by a member of the Central Unit, and those who had carried out satisfactory work would be invited to a data analysis/paper writing workshop at the end of the year.

### *Outcome*

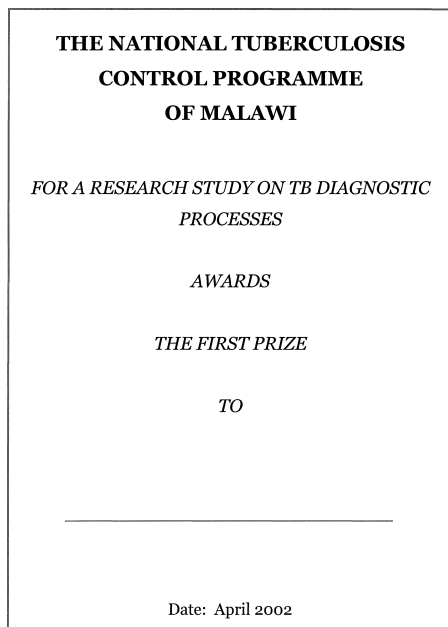
The outcome in terms of research work completed, data analysed and papers written up is shown graphically in Figure 1. The 25 TBOs returned to their hospitals, and prepared to collect information on all



**Figure 1** Outcome of developing an operational research project in the Malawi TB control programme. \* see Table.

patients admitted to the adult male and female general wards over a 4-week period between 8 January and 2 February 2001. Admissions in male wards included medical and surgical cases, and in female wards included medical, surgical and gynaecological cases. TBOs kept all the case files of admitted patients. In the case files they searched for any written statement in the admission notes which indicated that the patient was a TB suspect. Key words looked for included 'rule out TB', 'TB', 'AFB', 'sputum smear examination', 'chronic cough' and 'Koch's disease'. A record was made of TB suspects, and the following information was obtained and transferred onto a structured proforma: patient's sex, request for sputum examination, results of sputum smear examination, requests for and results of chest X-ray examination, diagnosis and registration of TB, death during investigations with either another diagnosis or no diagnosis of TB being made, absconded or transferred to another hospital during investigations, and a diagnosis other than TB with the patient discharged from hospital.

Between March and June 2001, the Central Unit visited all hospitals as part of its country-wide supervisory and operational research agenda, and assessed



**Figure 2** Certificates for the prize-winning TB officers.

whether the research had been satisfactorily carried out. These country-wide visits are conducted once or twice yearly by the central unit staff, and are budgeted for in the annual work plans. The research assessment was done by 1) interviewing the TBOs about whether the research had been done and how it had been done, 2) inspecting the collection of case files to determine whether all patients admitted to the wards had been included and 3) checking completed proforma for completeness and accuracy of data in comparison with the case files. Nineteen (76%) TBOs had undertaken satisfactory research, and were invited to a data analysis/paper writing workshop for the end of the year.

Seventeen TBOs attended the one-day workshop in December 2001. At the workshop half the day was spent explaining and discussing issues such as: 1) simple data analysis including the calculation of parameters such as 'mean, median and mode', 2) how to group together the data in terms of male, female and total subjects, 3) how to perform simple frequency

calculations, and 4) how to check that the calculated data made sense, i.e., that the number of patients diagnosed with TB plus the number who died/absconded/transferred and had another non-TB diagnosis equalled the number of TB suspects. The TBOs worked on their own data sets. The other part of the day was spent describing in the context of the research project how to write up a research paper using the classical approach of introduction, aim, methods, results, discussion and conclusion. Advice was given about writing and presenting tables.

The TBOs were invited to return to their hospitals and write a research paper on the project, one copy of which was to be sent to the NTP and one copy to the District Health Officer. They were given 2 months in which to complete the task. They were told that papers submitted to the NTP would be assessed, and cash prizes given to the best three papers (US\$40 for first prize, \$25 for second and \$15 for third). Eleven TBOs submitted papers to the NTP. These were assessed by two independent members of the Central Unit and the top three papers were selected. The three TBOs have been given cash prizes and certificates of achievement (Figure 2), while the other eight TBOs have received certificates indicating their participation in the research study.

#### *Results of the research project*

Of the 11 papers submitted, five were well written and included all the data, which had been well analysed and made sense. In the other six papers, data were either incomplete or clearly inaccurate, as numbers did not add up (e.g., the number of male and female TB suspects did not add up to the total number of TB suspects). Data from the five well-written papers were collated, and results examined for male, female and all patients combined. Categorical variables between males and females were compared using the  $\chi^2$  test, with differences at the 5% level being regarded as significant.

The combined results of these studies (two from district and three from mission hospitals) are shown in the Table. In summary, 153 patients (17% of all admissions) were TB suspects. Sputum examination

**Table** TB diagnostic process in patients admitted to five hospitals in Malawi between 8 January and 2 February 2001

	Men <i>n</i> (%)	Women <i>n</i> (%)	All patients <i>n</i> (%)
A. Case files of admissions	355	545	900
B. TB suspect (% of A)	72 (20)	81 (15)	153 (17)
C. Sputum requested (% of B)	67 (93)	75 (93)	142 (93)
D. Sputum smear result obtained (% of C)	50 (75)	55 (73)	105 (74)
E. Smear +ve	13 (26)	10 (18)	23 (22)
Smear -ve (% of D)	37 (74)	45 (82)	82 (78)
F. Diagnosis of TB with registration (% of B)	31 (43)	26 (32)	57 (37)
G. Death while being investigated (% of B)	12 (17)	17 (21)	29 (19)
H. Absconded/transferred while being investigated (% of B)	4 (6)	5 (6)	9 (6)
I. Diagnosis NOT TB and discharged (% of B)	25 (35)	33 (41)	58 (38)

was requested in over 90% of TB suspects, and nearly 75% of those asked to submit sputum had their results in the case notes. Fifty-seven (37%) TB suspects were diagnosed and registered with TB: this included 23 patients with smear-positive pulmonary TB (PTB), 16 with smear-negative PTB and 18 with extra-pulmonary TB (predominantly pleural effusion); 38 (25%) TB suspects either died or absconded or transferred to another hospital while being investigated. In the remaining 38% the diagnosis was thought not to be TB, and the patient was discharged from hospital after treatment for another condition. A higher proportion of male than female admissions were TB suspects ( $P < 0.05$ ), but there were no significant differences in the other categorical variables between men and women.

## DISCUSSION

Over 40% of hospital TB officers completed the course from data collection design to writing up a research paper. The submitted research papers were of variable quality, but nearly half were good enough for a compilation of data. These data are of use to the NTP and to the hospital management, and can be summarised as follows. Nearly one in five hospital admissions were TB suspects. Due attention was paid in hospital wards to requesting sputum specimens, and in many cases sputum results were returned to the case files. Over one-third of the TB suspects were diagnosed with TB, and over one-third were discharged with a diagnosis which was not TB. Most of the patients who did not fit into these two categories died in hospital, with a small percentage absconding or transferring to another health facility. Time frames, especially the time between admission and death in TB suspects being investigated, were not rigorously assessed. This is clearly important because some of these patients may have had undiagnosed TB, and a more rapid diagnostic process may have resulted in earlier treatment with potentially beneficial outcomes.

There are obviously limitations to what can be inferred from data collated from only five hospitals. Furthermore, the drop-out of TBOs at all stages, from the data collection design to the satisfactory writing of a research paper, might shed doubt on this approach to research capacity strengthening. We agree that the outcome was less successful than envisaged. Nevertheless, it should be remembered that this was a first attempt, and the limitations under which this endeavour was undertaken need to be recognised. Many of the TBOs with whom we worked do not have a medical or university degree; for the majority it was their first attempt ever at carrying out, analysing and writing up a research project. The failure of two TBOs to attend the final workshop was not explored, but attending funerals, illness or transport problems are common reasons for such absences. There was no

reliable means of communication (i.e., telephone, e-mail or fax access) between NTP supervisors and TBOs during the process of writing, so they were in effect on their own during this period. Some of the TBOs who did not submit papers may have found it just too difficult without such support. Research capacity strengthening also takes time and effort. We believe that it is important to continue with this initiative, and would hope for a more successful outcome next time around. In addition, it is important to build on other issues of protocol development such as ethical considerations, piloting and budgeting.

There are many barriers to getting such locally driven research initiatives published in international journals,<sup>7</sup> and this may be disappointing for young research enthusiasts. However, there are often opportunities to publish such papers in local journals or to present the findings at local meetings. Furthermore, the relevance to the local situation and the potential for translating the research findings into meaningful practice are more likely than some of the high impact, academic research studies carried out in Africa by North-South collaborative efforts.<sup>8</sup> The other advantage of this type of approach is that one or two TBOs who demonstrate a flare for this kind of activity may be identified and selected for further training. They could, for example, attend one of the excellent regional research training courses run by the International Union against Tuberculosis and Lung Disease (IUATLD). Building up research skills in people who know, understand and work within a TB control programme should help to foster a relevant and appropriate research agenda which is of benefit to those who fall ill with TB.

## Acknowledgements

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## RÉSUMÉ

**CADRE :** Programme National de Lutte contre la Tuberculose du Malawi.

**OBJECTIFS :** Décrire 1) la façon selon laquelle un projet de recherche opérationnelle générique a été développé et appliqué par les agents hospitaliers TB (TBO), 2) le résultat en terme d'achèvement du travail de recherche, d'analyse des données et d'articles écrits et 3) les résultats du projet de recherche.

**SCHÉMA :** Une étude descriptive pour déterminer les processus de diagnostic chez les patients considérés comme suspects de TB qui ont été admis dans les salles générales de l'hôpital au cours d'une période de 4 semaines.

**RÉSULTATS :** Vingt-cinq TBOs ont été entraînés à développer le protocole de recherche. Un travail satisfaisant

a été accompli par 19 TBOs ; 17 d'entre eux ont participé à un atelier d'analyse et de rédaction d'un article et 11 ont présenté un article de recherche. Les données de cinq articles ont été collationnées. Sur 900 admissions hospitalières, 153 patients (17%) ont été considérés comme suspects ; parmi ceux-ci, 37% ont été diagnostiqués comme tuberculeux, 38% sont sortis avec un autre diagnostic et 25% sont décédés ou ont disparu au cours des investigations.

**CONCLUSION :** Cette première tentative de développement des capacités de recherche chez les agents TB hospitaliers au Malawi a été un succès partiel et peut, grâce à une dissémination locale et à une rétro-information, aider à améliorer la rapidité du diagnostic de TB chez les patients hospitalisés.

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## RESUMEN

**MARCO DE REFERENCIA :** Programa Nacional de Control de la Tuberculosis de Malawi.

**OBJETIVO :** Describir 1) la manera como los agentes hospitalarios de tuberculosis (TBO) desarrollaron e implementaron un proyecto de investigación operacional genérico, 2) el resultado en términos de cumplimiento del trabajo de investigación, de análisis de datos y de artículos escritos y 3) los resultados del proyecto de investigación.

**DISEÑO :** Estudio descriptivo para la determinación de los procesos diagnósticos en pacientes considerados como sospechosos de TB hospitalizados en salas generales durante 4 semanas.

**RESULTADOS :** Se entrenaron 25 TBO para desarrollar el proyecto de investigación ; 19 de ellos realizaron un

trabajo satisfactorio, de los cuales 17 participaron a un taller de análisis y redacción de un artículo y 11 propusieron un artículo de investigación. Los datos de cinco artículos fueron confrontados. De un total de 900 pacientes hospitalizados, 153 (17%) eran sospechosos de TB, en el 37% de los cuales se diagnosticó una TB, en el 38% se dio el alta con otro diagnóstico y en 25% se constató el fallecimiento o el abandono durante la investigación.

**CONCLUSIÓN :** Este primer intento de desarrollo de capacidades de investigación en los agentes hospitalarios de Malawi tuvo un éxito parcial y puede, a través de una diseminación local y de una retroinformación, ayudar a mejorar la rapidez del diagnóstico de TB en los pacientes hospitalizados.

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