

COST-EFFECTIVENESS OF TUBERCULOSIS TREATMENT FROM THE PATIENTS' PERSPECTIVE

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SUMMARY

Objective: To compare the cost-effectiveness of two strategies for supervising the Directly Observed Treatment Short course (DOTS) during the intensive phase of Tuberculosis treatment.

Methodology: 600 newly diagnosed previously untreated smear-positive pulmonary tuberculosis patients were randomly assigned to the study and control groups.

A trained lay supervisor supervised each study group patient at home while nurses supervised the control group patients at the clinic.

Results: At the end of the study, the control group incurred personal cost in transport fare 14 times higher, and lost income 6.5 times more, than the study group.

Conclusion: It is concluded that home-based lay worker supervised Directly Observed Treatment Short course is more cost effective from the patients' point of view.

DOTS needs to be re-focused out of the hospitals and clinics and made community based in view of the increasing TB caseload occasioned by HIV/AIDS.

Key Words: *Cost effectiveness; Tuberculosis treatment; Personal cost; Patients' perspective.*

INTRODUCTION

Cost- effectiveness studies involve assessing the gains (effectiveness) and resource input (costs) of alternative ways of achieving a specified objective. The alternative with the lowest cost per unit of effectiveness is the most effective, and is generally to be preferred on grounds of economic efficiency¹. Cost-effectiveness analysis (CEA) assists decision-making by programme managers and policy makers. It is one of a number of different techniques for performing an economic evaluation².

Good guidelines for performing evaluations have been available for some time now³. Despite disagreement among economists over what constitutes good practice, broad areas of agreement are⁴: a) the alternatives used as the basis of comparison should be clearly stated; b) sufficient details of how costs and effects were evaluated and measured should be

provided for readers to be able to evaluate their reliability; c) marginal rather than average cost should be used (in a marginal analysis, the difference in programme cost between one option and another, and the resulting difference in effect is analysed rather than just comparing average cost and effect of the whole programme) ; d) the view point of the analysis should be clearly specified; costs differ depending on whose viewpoint is being presented (the patient, the provider, or society as a whole); e) some form of discounting is required when either costs or effects accrue over a period of time (when the future costs and effects are included in the analysis, the discount system gives them a lower weight compared to current costs and effects); f) the sensitivity of results to variations of critical assumptions should be explained.

Chemotherapy for TB is known to be cost effective⁵. Published studies covering cost

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effectiveness of TB treatment relevant to middle or low income countries abound⁶⁻¹⁶. The inputs covered by the cost analysis were similar in most of the studies although they were categorized differently. They covered drugs, supplies, staff, and hospital costs. These studies compared either different treatment regimens (a longer regimen without Rifampicin with shorter regimen with Rifampicin), mode of treatment delivery and follow-up (In-patient care in the first two months of treatment with an entirely out-patient programme).

In a review of published cost effectiveness studies on TB treatment programmes, Fryatt¹⁷ confirmed that ambulatory care is more cost effective than hospitalized care from a user's perspective but directly observed compared with self-administered is more cost effective from the provider's perspective, although outcome was not actually measured in these studies. He recommended further studies based on user's perspective that will compare different models of service delivery and that will include measures of outcome.

The cost of TB illness and its treatment from the point of view of patients and their families can be either direct (through charges and fees) or indirect (through loss of income, cost of transport or time away from work). Though sputum tests (AFB) for diagnosis and anti-TB drugs are provided free, yet the economic cost of taking this treatment is high for majority of these patients, especially in the face of frequent fuel shortages and spiraling cost of transport in Nigeria and also due to lost wages. These were contributing to high default rate witnessed in the clinic¹⁸.

The TB clinic in the University of Nigeria Teaching Hospital (UNTH) Enugu as in most of Nigeria is run on a clinic-based Directly Observed Treatment Short course (DOTS). The clinic adopted the DOTS strategy by 1994. Initially, all patients were compulsorily admitted into the ward during the intensive phase (the first 2 months) of the short course chemotherapy for the purposes of supervised therapy. About 1996, the National Tuberculosis and Leprosy

Control Programme (NTLCP) introduced ambulatory DOTS whereby patients who are not seriously ill could come from home to the clinic daily for two months during the intensive phase of their treatment for the purposes of supervised therapy. At the end of the intensive phase, if a sputum smear positive patient becomes smear negative, he/she self administers the continuation phase of the treatment at home for six months but comes to the clinic monthly for clinical follow up and renewal of drugs. At this clinic, sputum tests for diagnosis (AFB) and anti-TB drugs are offered free to the patients according to the NTLCP policy. Thus the only costs these patients bear during the intensive phase were indirect cost due to cost of transport to and from the hospital, loss of wages as a result of having to visit the hospital daily for the purposes of being supervised for daily paid workers, and time away from work for public workers. For government workers who are paid monthly, whether they come to work or not, the economy suffers greatly due to their absence from duty. It was envisaged that if lay people from patients' homes were trained and used to supervise DOTS at home, TB treatment would become more cost effective from the patients' point of view. A study was designed to investigate the feasibility of recruiting and training lay people to supervise DOTS at home and to compare the cost effectiveness of this home based lay worker supervised with facility based health worker supervised DOTS. The result of the first part of this study (feasibility of training lay people to supervise DOTS at home and their effectiveness) has been previously reported¹⁹. This paper reports on the comparative cost-effectiveness of these two strategies for DOTS supervision.

PATIENTS AND METHODS

This prospective analytical study was carried out at the University of Nigeria Teaching Hospital (UNTH) Enugu, Enugu State, a foremost referral centre for the treatment of TB in the whole of the southeast region of Nigeria. Six hundred (600) adult newly diagnosed and previously untreated sputum smear positive TB

patients who enrolled in the clinic from May 1998 to September 2000 were recruited into the study. All retreatment and extra pulmonary cases were excluded from the study.

TB patients in UNTH who were not severely ill as to warrant an admission have the choice of either to be ambulant (in which case they come to the hospital daily for purposes of being observed to swallow their medicine) or to be admitted into the ward during the intensive phase of Short Course Chemotherapy (SCC). All those who had previously chosen to be ambulant and who met our inclusion criteria were approached and the purpose of the study explained to them. Those who gave written consent were recruited into the study. These were randomly allocated into the study or the control group by balloting. The clinic nurses administered the randomization. The study group patients were required to nominate a supervisor from his/her home who was trained and used to supervise the intensive phase of DOTS at home. Most patients nominated the people who brought them to the hospital. Clinic nurses supervised the control group patients at the facility.

The training covered such topics as the cause of TB, its method of spread, method of treatment and the concept of DOTS. They were also taught how to mark the patient's treatment card. This training session lasted about 1 hour and was done at the end of work each clinic day. After the training, the supervisor of each study group patient received the patient's treatment card as well as a two-week dose of the patient's drugs. The patient or the supervisor was required to come back every two weeks with his/her treatment card for re-supply of drugs. Thus each study group patient required only 4 visits to the hospital to complete the intensive phase in contrast to the 56 days a control group patient will visit. During such re-visit, the treatment card was inspected to ascertain that the markings were being correctly done. Any patient that defaulted from treatment was promptly traced and brought back to treatment not later than 5 days after such default using the defaulter tracing system of the control

programme. All such defaulters were dropped from the study and had their intensive phase DOTS supervised thereafter at the clinic daily. A random 10% sub-sample of the study group patients was paid surprise visits at home for on the spot monitoring.

Through the use of a short structured questionnaire, the following information were obtained: a) Demographic data of the trained supervisors; the variables of interest were the age, sex, educational status, religion, occupation, relationship with the patient and residence (if different from patient's own); b) The cost of transport (as reported by the patient) each day patient came for treatment; and c) Whether patients were able to continue with their normal businesses in the course of their treatment.

For each unit cost of transport, the amount that a study group and control group patient spent was calculated and compared. The number of patients from each group who could not continue with their usual daily activities during the study was calculated, and using the gross national product (GNP/ capita) as income that each patient who could not continue with his /her usual daily activity would have lost, the income lost by each group during the intensive phase was computed and compared.

The patient's treatment card contained information on his/her age, sex, occupation, pre and post- intensive phase sputum status. This card also furnished information on whether the patient completed treatment or not. These were all fed into the computer. Statistical analysis was done using the EPINFO version 6 software packages. Statistical calculations were carried out at the 5% significance level. Chi-square statistics was used to compare proportions. The result of the comparative cost effectiveness analysis is reported below.

RESULT

Table 1 shows the occupation of patients studied. Majority of the patients were traders followed by students and civil/public servants and self-employed artisans.

Table 1 Occupation of patients

Occupation	Percentage frequency
Traders	29
Students	23
Self employed artisans	15
Civil/Public servants	15
Farmers	10
Unemployed	7
Labourers	1

Table 2 shows the amount of money spent on transport daily by patients from the 2 groups. For each unit of transport cost Y, the study group patient spent 4 x Y Naira on transport whereas the control group patient spent 56 x Y Naira on transport. Thus the control group patient spent 14 times the amount a study group patient spent to receive his/her treatment.

Table 2 Transportation Cost

TRANSPORT COST (₦)	NUMBER OF PATIENTS*	
	STUDY GROUP	CONTROL GROUP
80-119	120 (40)	114 (38)
120-159	60 (20)	69 (23)
160-199	30 (10)	36 (12)
200-239	54 (18)	45 (15)
240-279	27 (9)	21 (7)
280-319	9 (3)	15 (5)
TOTAL	300 (100)	300

*Numbers in parentheses are percentages.

Table 3 compares the proportion of patients who could not continue with their usual daily activities because of the demand of the treatment protocol on their lives. The difference in these proportions is highly statistically significant ($X^2 = 193.6; P < 0.0001$). With a gross national product per capita of \$260 in the year 2000¹⁹, the study group lost a total of \$260 x 30, which is equal to \$7800 only whereas the control group lost \$260 x 195, which is equal to \$50700 only. This amount is 6.5 times higher than what the study group patients lost. If the losses incurred by the patient's companion to the hospital were added to this, the ratio would be much higher.

Table 3: Proportions Unable To Continue With Their Usual Daily Activity

GROUP	Continuation With Usual Daily Activity		TOTAL
	Unable to continue	Able to continue	
STUDY GROUP	30	270	300
CONTROL GROUP	195	105	300
TOTAL	225	375	600

$X^2 = 193.6; P < 0.0001$

DISCUSSION

According to Murray et al⁵, cost of TB programme can be divided into 4 components:

1. Fixed cost associated with the use of facilities outside the TB programme such as hospitals, clinics, and sometimes laboratory services. This does not apply to the UNTH TB clinic and therefore to the patients studied because the facilities are only used for the TB programme.
2. Fixed cost associated with the TB programme itself such as the salary of coordinators, purchase of vehicles and purchase of equipment in the TB reference laboratory. This is the only fixed cost that applies to the UNTH TB clinic and is spread uniformly across both groups studied.
3. Variable cost, which is a function of the number of patients diagnosed and treated and includes drugs, reagents for sputum examination, food for in-patients in the hospital, and paper for keeping patients' record. The patients in this study incurred the same variable cost since they were all outpatients who did not have to pay food bills or any service charge as the programme provided free sputum tests and drugs.
4. Personal cost, which is incurred by the patient in receiving the treatment and this includes the cost of transport to/fro the hospital daily for the purposes of being supervised, the cost in terms of time and the cost in terms of lost income. In this study, the study group and the control group

differed significantly in the personal cost they incurred.

Unlike in some other studies^{8,16,23-24}, this study used the quantifiable personal cost incurred by the patients to measure the cost effectiveness of the two strategies for DOTS supervision compared. It has been reported elsewhere¹⁹ that the two strategies achieved similar outcome (sputum conversion and treatment completion rates at the end of the intensive phase). Though the transport cost data from this study implies that the 2 groups came from essentially the same environment (as equal proportions spent similar amounts on transport), the control group patients who had to travel to the clinic daily to be supervised by clinic nurses incurred costs in transport fares that was 14 times more than what the study group patients spent for the duration of the study, for a comparable distance to the hospital. In addition, the control group patients incurred loss in wages that was 6.5 times more than the study group patients. This shows that the strategy of home-based lay worker supervised DOTS is more cost effective than the facility based health worker supervised DOTS from the patient's point of view. These findings are similar to the findings of Wilkinson²⁰ and Wilkinson et al^{21, 22}, and confirm that good outcome measures are achievable and sustainable even in resource poor settings despite a massive caseload if community resources can be harnessed. Finally, this study included real outcome measures¹⁹ and measured cost from the users' perspective as recommended by Fryatt¹⁷.

CONCLUSION AND RECOMMENDATIONS

We conclude that home based lay worker supervised DOTS is more cost effective from the patient's point of view than clinic based health worker supervised DOTS. In settings such as Nigeria with poor health facility coverage²⁵ and fragile public transport system and where patients often have to travel for more than one hour to reach the nearest health facility, the high personal cost incurred by the patient may negate the effect of free tests and drugs

provided in the programme and encourage non-compliance with treatment.

We therefore recommend that public health planners should additionally consider the patients' point of view when assessing the cost effectiveness of TB treatment since it is the personal cost that the patients incurred that may determine access to care in the NTLCP. Secondly, DOTS needs to be refocused out of the hospitals and clinics and made to become community based in order to make it more cost effective from the patients' point of view, especially in this era of HIV/AIDS with its spiraling effect on the incidence of TB.

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