Cost-effectiveness of community health workers in tuberculosis control in Bangladesh


Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
A programme of tuberculosis (TB) control (diagnosis and treatment) was examined. This was, run by either the Bangladesh Rural Advancement Committee (BRAC) using community health workers (CHWs), or by the government, which did not use CHWs.

With the government programme, patients suspected of having pulmonary TB submitted three sputum specimens within two days to the thana health complexes for laboratory examination. They were diagnosed as sputum positive if two specimens were positive for acid-fast bacilli. Then, if symptoms persisted but the sputum was negative, patients underwent chest radiography at the private or government health facilities. An 8-month, short-course treatment regimen was used for treating sputum-positive patients. In the first 2 to 3 months, sputum-positive individuals were given drugs weekly at the thana health complexes, while sputum-negative patients were given drugs monthly.

With the BRAC programme, suspected TB patients were given sputum containers for two samples and asked to bring them to the sputum collection centre, where a third sputum sample was collected. If symptoms persisted but the sputum was negative, patients were referred to the thana health complexes or district hospitals. Treatment of all TB patients followed national guidelines. CHWs observed new patients swallow the drugs during the first 2 to 3 months, while patients undergoing retreatment were observed for the entire period. After the initial 2- to 3-month period, patients collected drugs once a week from the home of the CHW. BRAC staff supervised the CHWs.

Type of intervention
Diagnosis and treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients suspected of having pulmonary TB.

Setting
The setting was secondary care. The economic study was carried out in Bangladesh.

Dates to which data relate
The effectiveness and resource use data were gathered from July 1996 to June 1997. The costs were valued using 1996/1997 prices.

Source of effectiveness data
The effectiveness evidence was derived from a single study.
Link between effectiveness and cost data
The costing was carried out prospectively on the same sample of patients as that used in the clinical study.

Study sample
Power calculations were not reported. The patients were identified in two districts. There were 186 patients (71.5% men) in the BRAC group and 185 (80% men) in the government group. The mean age of the patients was 40.3 (+/- 15.4) years (median age 37; age range: 9 - 75) in the BRAC group and 37.7 (+/- 14.2) years (median age 36.4; age range: 9 - 80) in the government group. The method of sample selection was not extensively described. In addition, it was not stated whether some patients were excluded for any reason from the study sample, or whether any refused to participate.

Study design
This was a prospective cohort study that was carried out in several centres in two districts in Bangladesh. The patients were allocated to treatment group according to district. The length of follow-up was not explicitly stated but it could have been 8 months. It was unclear whether some patients were lost to follow-up.

Analysis of effectiveness
It was not stated whether the outcome assessment considered all of those patients initially recruited. The outcome measures used in the effectiveness analysis were the numbers of patients who were cured, completed treatment, were successfully treated, defaulted, died, failed treatment, or were transferred or referred. Patients successfully treated were those who were cured and completed the treatment. The authors stated that the two districts were comparable in sociodemographic aspects but no statistical analysis was reported.

Effectiveness results
Over 91% of patients included in both groups were sputum positive.

For sputum-positive patients in the BRAC group versus the government group, respectively:
the rates of cure were 84.1% versus 82.2%,
the rates of patients who completed treatment were 1.2% and 0%,
the rates of death were 10% and 11.8%,
the rates of failure were 1.8% and 0%,
the rates of patients who defaulted were 2.3% and 2.4%, and
the rates of patients who were transferred or referred were 0.6% and 3.6%.

For sputum-positive patients in the BRAC group versus the government group, respectively:
the rates of patients who completed treatment were 62.5% and 87.5%,
the rates of patients who died were 18.7% and 0%,
the rates of patients who defaulted were 18.7% and 0%, and
the rates of patients who were referred were 0% and 12.5%.

Clinical conclusions
The effectiveness analysis showed that the BRAC programme achieved a high cure rate. However, the treatment completion rate of sputum-negative and extra-pulmonary patients in BRAC areas was lower than in district health complexes run by the government programme.

**Measure of benefits used in the economic analysis**
The summary benefit measures used were the rates of cure and treatment success. These were derived directly from the clinical study.

**Direct costs**
The cost analysis was carried out from a societal perspective. The direct costs included were shared costs, health workers and administrative staff (excluding basic training), capital costs, BRAC and government overhead costs for TB patients (10% and 5%, respectively, calculated following staff discussions), and costs for drugs and logistics. The shared costs included salary, buildings, furniture, supervision, transportation and vehicles, and were estimated through observation and interviews with health staff. The capital costs included building costs, and were derived from accounting books and financial reports for the BRAC and from market prices for the government programme. The costs for drugs and logistics were calculated from the national TB programme price list. The unit costs were not presented separately from the quantities of resources used. The resource use data were gathered from July 1996 to June 1997. Discounting was not relevant since the costs were incurred during one year.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
The indirect costs (i.e. time costs for patients attending visits for diagnosis and treatment) were accounted for in the analysis because a societal perspective was adopted. Patient costs, which were gathered also for the people accompanying the patient, were calculated using the average daily wage. The resource use data referred to a sample of 18 BRAC patients and 20 government patients. Discounting was not relevant given the short timeframe of the analysis. The unit costs were not presented separately from the quantities of resources used. The resource use data were gathered from July 1996 to June 1997.

**Currency**
The costs were estimated using the local currency (Takas), then converted into US dollars ($). The exchange rate for 1996/1997 was $1 = Taka 42.22.

**Sensitivity analysis**
Sensitivity analyses were not performed.

**Estimated benefits used in the economic analysis**
See the 'Effectiveness Results' section.

**Cost results**
The estimated annual costs were $7,351 with the BRAC programme and $10,697 with the government programme. The two main expenditures in both areas were for salaries and drugs, which together accounted for 77% (BRAC) and 83% (government) of the total expenditures.

**Synthesis of costs and benefits**
Average cost-effectiveness ratios were calculated to combine the costs and benefits of the two programmes.

When using the health care perspective, the cost per patient cured was $52 with the BRAC programme and $77 with the government programme. The cost per successfully treated patient was $48 with the BRAC programme and $70 with the government programme.

When using the societal perspective, the cost per patient cured was $64.2 with the BRAC programme and $96 with the government programme.

**Authors' conclusions**

Although there were similar cure rates in both the Bangladesh Rural Advancement Committee (BRAC) and government areas, the total health system costs in BRAC areas were substantially lower (48%) than in government facilities. Thus, for the same money, the BRAC programme could diagnose, treat and cure three patients with tuberculosis (TB), while only two patients would be cured under the government programme. The authors pointed out that local services might reduce patient costs considerably.

**CRD COMMENTARY - Selection of comparators**

The authors provided a justification for the choice of the comparators, which represented the two types of programme for TB control in Bangladesh. You should decide whether they are valid comparators in your own setting.

**Validity of estimate of measure of effectiveness**

The effectiveness evidence came from an observational study. Patient allocation to the study groups was based on the district to which each individual belonged. The study groups were quite comparable at baseline. In addition, the authors stated that the two districts were similar to other areas of the country. Thus, the study sample was representative of the patient population. However, owing to the observational design, the impact of confounding factors cannot be ruled out. Limited information on the follow-up was provided and it was unclear whether all eligible patients were identified and included in the analysis. No justification for the choice of sample size was provided. In addition, no statistical test was used to test the significance of differences in clinical outcomes. These issues tend to limit the internal validity of the analysis.

**Validity of estimate of measure of benefit**

The benefit measures were specific to the disease considered in the study and are not comparable with the benefits of other health care interventions. The use of a more generalisable measure would have been useful.

**Validity of estimate of costs**

The cost analysis was carried out from a societal perspective. It appears that all the relevant categories of costs were considered. There was limited information on the unit costs and quantities of resources used, which limits the possibility of replicating the results of the analysis in other settings. The sources used to derive the cost estimates were reported for all items. Most of the costs came from local sources. No statistical analyses of the costs were carried out and the cost estimates were specific to the study setting. The price year was reported, which aids reflation exercises in other settings.

**Other issues**

The authors reported the results of other evaluations of similar programmes and noted that local epidemiological and social variables may strongly affect the cost estimates. The issue of the generalisability of the study results to other settings was not explicitly addressed and no sensitivity analyses were carried out. In effect, the study focused on the Bangladesh setting. Thus, the external validity of the analysis was low. Average cost-effectiveness ratios were calculated, but an incremental analysis would have been helpful. In general, the main weakness of the study appears to have been the lack of statistical analyses for the effectiveness and cost results.
Implications of the study
The authors suggested that in Bangladesh, where most CHW programmes were run by non-governmental organisations, government health services should collaborate with such organisations to mobilise CHWs for TB control.

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Other publications of related interest


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