Cost-effectiveness of public-funded options for cataract surgery in Mysore, India
Singh A J, Garner P, Floyd K

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
Three strategies for cataract surgery were examined. The strategies were mobile government camps, walk-in services at a state medical college hospital, and patients transported in from satellite clinics to a non-governmental hospital. Only conventional surgery, that is intra-capsular cataract extraction (ICCE) and extra-capsular cataract extraction (ECCE) with or without intraocular lens (IOL) implants, was considered.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients requiring cataract surgery.

Setting
The setting was the community and a hospital. The economic study was carried out in India.

Dates to which data relate
All of the data were gathered between April 1996 and March 1997. The costs were evaluated 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 effectiveness analysis.

Study sample
Power calculations were carried out to ensure that differences in the main outcome measure were statistically significant. A random district (i.e. Mysore) was selected from the 6 potential districts that achieved 80 to 100% of the cataract-surgery targets in 1996-97. The three interventions were delivered at the study district. Of those patients identified from surgical registers, 245 (128 men and 117 women) were contacted by field visits in more than 200 villages and were included in the study sample. Of the original sample, 37 patients had been excluded as they came from other districts, 4 had died, 33 had incomplete addresses, 10 could not be found, 3 were not available for interview, and 9 came from villages that were not accessible. There were 70 patients in the government camp group (undergoing both ICCE and ECCE), 49 patients in the state medical college group (28 undergoing ICCE/ECCE and 21 receiving
IOL), and 126 patients in the non-governmental hospital group (53 undergoing ICCE/ECCE and 73 receiving IOL).

**Study design**
This was a retrospective cohort study that was carried out at several centres. The patients were allocated to the study groups on the basis of the district to which they belonged. No details of the follow-up were reported. The outcome assessment was not performed blind.

**Analysis of effectiveness**
All of the patients included in the initial study sample were accounted for in the analysis of effectiveness. The outcome measure used was patient satisfaction, which was estimated through interviews. The patients were asked if they were satisfied with the operation and their responses categorised as "happy/good vision", "vision better but not perfect", "little better/not satisfied" and "blind". The patients in the first two categories were classified as "satisfied with surgery". The proportion of patients who remained blind was also recorded. The baseline comparability between groups was not discussed.

**Effectiveness results**
The proportions of patients satisfied with surgery were:

51% (95% confidence interval, CI: 39 - 64) with ICCE/ECCE in the government camp group;

82% (95% CI: 63 - 94) with ICCE/ECCE and 95% (95% CI: 76 - 100) with IOL in the state medical college group; and

85% (95% CI: 72 - 93) with ICCE/ECCE and 93% (95% CI: 90 - 99) with IOL in the non-governmental hospital group.

A logistic regression analysis showed that the type of provider, type of surgery and age were all significant predictors of poor outcome on camp surgery versus the rest (odds ratio 4.8, 95% CI: 2.6 - 12.4) and ICCE versus IOL (odds ratio 4.9, 95% CI: 1.29 - 19.2).

A sub-group analysis was performed among patients aged older than 60 years for whom the odds of poor outcomes were three times higher. However, there were significant variations among the three providers: 56.8% of the old patients operated on in camps were dissatisfied, in contrast with 25% for the state medical college hospital and 16.2% for the non-governmental provider.

The number of patients blind in the operated eye was:

25 with ICCE/ECCE in the government camp group;

4 with ICCE/ECCE and 0 with IOL in the state medical college group; and

5 with ICCE/ECCE and 2 with IOL in the non-governmental hospital group.

Reasons for blindness were poor-quality surgery (21 patients, 66%), poor-quality postoperative care (5 patients, 16%), faulty case selection (4 patients, 12%) and uncertain without further investigation (2 patients, 6%).

**Clinical conclusions**
The effectiveness analysis showed that poor outcomes were generally associated with government camps.

**Measure of benefits used in the economic analysis**
The summary benefit measure was the proportion of patients satisfied. This was derived directly from the clinical study.
Direct costs
The cost analysis was undertaken from a societal perspective, thus all the direct costs were considered. These included provider costs for surgery (e.g. staff, land and buildings, equipment, transport, supplies and maintenance), community costs (e.g. organisers' costs for patients' board and lodging, and publicity to inform prospective patients about the existence of the camps) and the patients' costs (e.g. travelling expenses). IOL surgery was excluded from the costing analysis to allow comparability between the different providers. The unit costs were not presented separately from the quantities of resources used. The costs were estimated from published sources, interviews with staff, quotations from suppliers of vehicles and equipment, wage bills, fuel consumption, vehicle logbooks, government registers and community sources. Discounting was not relevant because of the short timeframe of the analysis. However, the capital costs were discounted at a rate of 10%. All the economic data were gathered between April 1996 and March 1997, and 1996/97 prices were used.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs (i.e. wages lost by the patient and any attendants during and after the period of surgery), were included in the economic evaluation. Limited information on the calculation of the indirect costs was provided. The unit costs and the quantities of resources used were not reported. The costs were estimated using 1996/97 prices. No discounting was applied. The costs and resource use data were estimated from the sample of patients included in the effectiveness study.

Currency
Indian rupees (Rs). These conversion rate to US dollars ($) was $1 = Rs36.

Sensitivity analysis
Univariate sensitivity analyses were carried out to assess the robustness of the cost-effectiveness results to variations in the cost of the land, throughput, and outcomes for the different providers. Alternative values were derived from estimates obtained from the sample of patients included in the study.

Estimated benefits used in the economic analysis
The rates of satisfaction were 51.4% with government camps, 82.1% with medical college hospitals and 84.9% with non-governmental hospitals.

Cost results
The patient costs were Rs334 with government camps, Rs1,098 with medical college hospitals and Rs694 with non-governmental hospitals.

The provider costs were Rs1,465 with government camps, Rs4,109 with medical college hospitals and Rs1,074 with non-governmental hospitals.

The total costs were Rs1,798 ($50) with government camps, Rs5,189 ($144) with medical college hospitals and Rs1,639 ($46) with non-governmental hospitals.

Synthesis of costs and benefits
Average cost-effectiveness ratios were calculated to combine the costs and benefits of the alternative treatments.

The average cost per satisfied patient was Rs3,500 ($97) with government camps, Rs6,320 ($176) with medical college
hospitals and Rs1,931 ($54) with non-governmental hospitals.

The sensitivity analysis showed that non-governmental hospitals remained the most cost-effective strategy in most scenarios. Only when bed use at the state medical college was increased substantially from 21% (actual) to 80% (ideal) did the cost-effectiveness become equivalent to the non-governmental hospital. Camps became a cost-effective alternative only if 40 or more surgeries were performed in a camp with a patient satisfaction level of 80%.

Authors' conclusions
The non-governmental hospital represented a more cost-effective service for cataract surgery than government camps in a district in India.

CRD COMMENTARY - Selection of comparators
The authors provided a justification for their choice of the comparators, which represented the three available surgical strategies for the treatment of cataracts in India. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness data came from an observational study, although patient allocation to the treatment groups was based on the village to which each patient belonged. The district from which the patients were identified was randomly selected. The baseline comparability of the patients included in the study groups was not discussed. Power calculations were reported, although few details were provided. The information on follow-up was not reported clearly. These issues tend to limit the internal validity of the study.

Validity of estimate of measure of benefit
The summary benefit measure was specific to the disease considered in the study and is not easily compared with the benefits of other health care interventions. The authors stated that the choice of the benefit measure was based on the assumption that there was a high correlation between a patient's subjective appreciation of improved sight and an objectively assessed visual acuity.

Validity of estimate of costs
The choice of a societal perspective was appropriate as all relevant categories of costs were included in the analysis. The reasons for the exclusion of some cost categories were provided. The unit costs were not presented separately from the quantities of resources used, which might limit the possibility of replicating the results in other setting. The source of the data was reported. 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 time periods.

Other issues
The authors reported extensive results of other published studies on the cost-effectiveness of comparable interventions in order to assess the validity of their findings. Overall, it was noted that the outcomes varied greatly. In relation to the issue of the generalisability of the study results, the authors noted that caution is required when extrapolating the results of the analysis to other settings, as the analysis was performed in a single district. The study referred to patients requiring cataract surgery and this was reflected in the authors' conclusions.

Implications of the study
The study results support the use of an approach based on non-government hospitals, where patients are screened in improvised outpatient satellite clinics and brought into a permanent good-quality surgical facility. The results of the current study might have relevant implications for the World Health Organization's "Vision 2020 initiative". The
authors pointed out the importance of the further development of methods for the accreditation of surgeons, facilities, and other providers by clearly laid down criteria.

**Source of funding**
Supported by the Department for International Development (UK) and an Overseas Research Studentship grant.

**Bibliographic details**

**PubMedID**
10675117

**Other publications of related interest**


**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Blindness /epidemiology /prevention & control; Cataract /epidemiology; Cataract Extraction /economics; Cost-Benefit Analysis; Female; Humans; India /epidemiology; Male; Mobile Health Units /economics /utilization; Outcome and Process Assessment (Health Care); Patient Satisfaction /statistics & numerical data; Postoperative Complications /epidemiology; Rural Health Services /economics /standards; Treatment Outcome

**AccessionNumber**
22000008014

**Date bibliographic record published**
31/01/2006

**Date abstract record published**
31/01/2006