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CLINICAL STUDY

An economic comparison of hospital-based and community-based glaucoma clinics

A Sharma[1], M Jofre-Bonet[2], M Panca[2], JG Lawrenson[3] and I Murdoch[1]

Abstract

Introduction **We have established one model for community care of glaucoma clinic patients. Community optometrists received training and accreditation in glaucoma care. Once qualified they alternated between running half day glaucoma clinics in their own High Street practices and assisting in a hospital-based glaucoma clinic session. This paper reports the cost of this model.**

Methods **Micro-costing was undertaken for the hospital clinic. A consensus meeting was held to agree costs for community clinics involving all optometrists in the project along with representatives of the multiple chain optometry practices who had participated. Costs to patients both indirect and direct were calculated following structured interviews of 197 patients attending hospital clinics and 194 attending community clinics.**

Results **The estimated cost per patient attendance to the hospital clinic was £63.91 and the estimated cost per attendance to the community clinic was £145.62. For patients the combined direct and indirect cost to attend the hospital clinic was £6.15 and the cost to attend the community clinic £5.91.**

Discussion **The principal reason for the higher cost in the community clinic was higher overhead costs in the community. Re-referral to the hospital system only occurred for 9% of patients and was not a large contribution to the increased cost. Time requested to next appointment was similar for the two clinics. Sensitivity analysis shows a strong effect of increasing patients seen per clinic. It would, however, require 25 patients to be seen per clinician per day in the community in order to make the costs comparable.**

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Introduction

The implementation of the NICE guidelines on the diagnosis and management of chronic open angle glaucoma, and ocular hypertension (http://www.nice.org.uk/CG85) has coincided with a major increase in both referral refinement schemes and schemes to increase care in the community. A majority of these schemes involve optometrists.[1] Although referral refinement has received some attention as a potentially cost-effective process, the same is not true for care in the community.[2] To our knowledge, the only major study to fully investigate this to date was the Bristol glaucoma shared care study that showed their model, while safe clinically, not to be cost effective.[2,3]

In 2009, a report was published on the costs of implementing NICE guidance on glaucoma (http://www.nice.org.uk/nicemedia/live/12145/44043/44043.pdf). While it estimates the number of cases that may be suitable for care in the community and HES cost of reviewing these 'suspected chronic open angle glaucoma' and 'ocular hypertensive' patients, there is no reference to the cost of reviewing these patients by another model.

We have established one model for community care of glaucoma clinic patients. Community optometrists received structured training with a subsequent formal accreditation assessment in glaucoma care. Once accredited they alternated between running half day glaucoma clinics in their own High Street practices (with hospital patients attending), and assisting in a hospital-based glaucoma clinic session. This paper reports the cost of this model.

[1]Department of Genetics, Institute of Ophthalmology, London, UK

[2]Department of Economics, City University London, London, UK

[3]Department of Optometry and Visual Science, City University London, London, UK

Correspondence:
A Sharma, Department of Genetics, Institute of Ophthalmology, 11-43 Bath Street, London EC1V 9EL, UK
Tel: +44 (0)20 7608 6896;
Fax: +44 (0)20 7250 3207.
E-mail: anu1478@hotmail.co.uk

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Materials and methods

Hospital clinics

Patient hospital attendance costs have been previously reported.[4] Four to six patients attending each glaucoma clinic were asked to complete a questionnaire, providing information on the method of transport used to travel to the clinic. We collected data as a part of this longitudinal study from optometry practices within the vicinity of two Moorfields outreach clinics over a period of 1 year. Four practices were linked to Moorfields Ealing ($n=100$ consultations) outreach and two were linked to Moorfields Upney ($n=94$). The times taken for each aspect of consultation visits were recorded. In addition, work/care time loss was calculated for both patients and any accompanying person. The published patients' costs have been adjusted for this analysis with the average inflation rate to reflect the current costs.

Micro-costing was undertaken for the hospital clinic in Ealing by the finance department at Moorfields Eye Hospital NHS Foundation Trust. Micro-costing was based on following up a sample of patients through the process of a visit complemented with time lines for patients in clinics. The approach used was micro-costing quantity data collection methods.[5]

The Ealing glaucoma service is currently run each Monday for the entire day. An outline of patient contact time was formed by taking a sample of patient times as well as discussion with the lead clinician. Staff costs and non-pay costs were analysed and allocated to the hospital clinic in Ealing. This included staff time not directly related to a time spent with a patient and fixed/semi fixed costs for the clinic that are not dependent upon the clinic.

Community clinics

The same questionnaire as in the hospital-based study was used for patients attending community eye clinics. The interviews, however, were by telephone. The patients gave written consent at the time of attending their appointment at the community clinic. Information was provided on the method of transport used to travel to the community clinic, miles travelled by car users, and cost incurred from public transport or taxi use. In addition, they were asked whether they had taken time off work, whether wages had been lost as a result of attending the clinic, if they had been accompanied to the clinic and whether dependants had to be cared for to enable them to attend.

Non-healthcare direct costs for individuals were identified as out-pocket expenses arising from attending the glaucoma community clinic. The direct cost of travel was based on the cost of the return journey for those travelling by public transport or taxi. The cost of car travel was calculated at £0.60 per mile.[6] Wages loss calculations were based on information provided by participants.

Indirect costs refer to the activity or opportunity foregone as a consequence of attending glaucoma clinic. In line with assumptions used in previous work on time costs, where time was not given up from work (patients and companions), the time was classified as 'leisure time' and was valued as 30% of the average gross wage.[7] We entered data using EpiInfo (WHO v.3: 4:1).

To elicit the cost of the service in the community micro-costing was not feasible due to the diverse nature of the practices participating. At the end of the data collection period a consensus meeting was held with all optometrists involved in the project in addition to representatives of the multiple chain optometry practices who had participated. Participants had completed individual estimates of the rental (including equipment and services) and opportunity costs of running a half-day glaucoma session in clinics in the community. After several rounds of discussions on what that cost might be, the consensus meeting reached agreement on costs for independent optometrist practices (£640) and for multiple chain practices (£834). Costs were calculated on the basis of prices for the 2010–2011 financial year. Sensitivity analysis was performed exploring the number of patients' valuation in the community setting.

Repeatability of patient data collection

The sampling methodology resulted in six patients having repeat data collection (all at Upney). Four patients gave the same responses for employment. One changed from unemployed to employed and one changed from professional to retired. Five out of the six patients used the same method of transport. In three instances, the patient was accompanied on both visits. As these six patients have been questioned twice, the second responses were removed from the analysis.

Results

Patient sample characteristics

A total of 194 individuals attending community clinics completed questionnaires of which 100 were in the Ealing area. In the hospital clinics, 197 individuals completed questionnaires of which 99 were in Ealing area.

Table 1 shows that close to half of those questioned had come with someone to the clinics (44% in the community and 58% in the hospital). There was not a huge difference in the proportion accompanied between ethnicities;

Table 1 Ethnic composition of patients attending the community clinics at Ealing and Upney

Ethnicity	*Hospital clinic*, N *(% accompanied)*			*Community clinic*, N *(% accompanied)*		
	Male	*Female*	*Total*	*Male*	*Female*	*Total*
White	63 (52%)	58 (67%)	121 (60%)	71 (39%)	81 (52%)	152 (46%)
Eastern Asian	0	1 (100%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)
Indian	20 (55%)	19 (68%)	39 (62%)	7 (43%)	9 (44%)	16 (44%)
Pakistani	10 (30%)	4 (75%)	14 (43%)	3 (0%)	5 (50%)	8 (38%v)
African	7 (14%)	5 (100%)	12 (50%)	3 (0%)	1 (0%)	4 (0%)
Caribbean	4 (25%)	6 (67%)	10 (50%)	7 (0%)	7 (86%)	14 (43%)
Total	104 (47%)	93 (70%)	197 (58%)	91 (34%)	103 (53%)	194 (44%)

however, females were more likely to come with someone than males. There was a very slight trend towards the older being more often accompanied. In the community, 14/19 (74%) of those aged $\geq$85 years were accompanied and 13/19 (68%) in the hospital clinic.

Costs to patients

The majority of people came to both hospital and community practice areas by bus and car. Females came to the community clinics by bus (38%) and car (38%), whereas half of the males came by bus (51%). At Ealing hospital only 6% of attendees used hospital transport, whereas at the Upney clinic there was not a single person who used hospital transport. No hospital transport was used in the community-based clinics.

The costs for both Ealing and Upney were virtually the same for patients attending the community clinics compared with the hospital clinics. In the hospital-based study, only a few patients reported the amount of money they lost due to glaucoma clinic attendance. We therefore used HRMC and Office for National Statistic websites to extract data on average wages for different professional groups and used them in the calculation for both groups for comparative purposes. In the community-based study, all patients who attended or accompanied someone to glaucoma clinic stated the amount of money they lost. If these figures are used in the calculation, the costs for working time are more than double, from a mean of £2.19 per person to a mean of £5.60 per person.

In Table 2, we summarise the costs to patients. For the purposes of comparison, the same methodologies were used for community patients as for hospital patients.

Cost per attendance

Table 3 shows the estimated cost involved when patients attend a glaucoma service in a community-based or hospital-based clinic. In the micro-costing of the hospital-based clinics, staff costs include both clinical and administrative staff members (£4992), and non-pay costs include facilities, patient transport, domestics, interpreter's fees, depreciation, and sundries (£1510).

Table 2 The direct and indirect costs to patients attending glaucoma clinics in a hospital- and community-based setting

Patient costs	*Hospital*			*Community*		
	Ealing	*Upney*	*Mean*	*Ealing*	*Upney*	*Mean*
Travel cost	£3.00	£4.90	£3.95	£3.30	£4.15	£3.73
Working time	£2.40	£2.00	£2.20	£2.08	£2.29	£2.19
Leisure time	£4.40	£4.60	£4.50	£4.45	£4.14	£4.30
Total	£9.80	£11.50	£10.65	£9.83	£10.59	£10.22

Table 3 Costs of glaucoma clinic appointments in hospital- and community-based clinics

Resources	*Hospital*	*Community*
Service cost		
Total cost per day (two sessions)	£7477.00	£1601.81
No. of patients per day (two sessions)	117	11
Average cost per attendance	£63.91	£145.62
Glaucoma clinic cost per year/patient	£102.25	£254.17
Patient cost		
Mean travelling cost for patient	£3.95	£3.72
Mean time cost for patient	£2.20	£2.19
Cost per patient attendance	£6.15	£5.91
Cost per year/patient	£9.84	£10.32

An overhead allocation of 15% (an estimate at the time this costing was prepared) was calculated for satellite sites (£975), and using the timings given to the individual steps of the patient attendance this produced a clinic cost (£7477) and an estimated average cost per attendance (£63.91) based on average clinic attendances of 117.

In the community-based clinics, the estimated opportunity costs of the resources involved in running a single day optometrist practice-based clinic were £1601.81 (an average of complete day costs for multiple and independent practices with a 9% re-referral cost factored in). This results in an estimated average cost per attendance of £145.62 based on average clinic attendances of 11.

The recall interval requested following each consultation allows calculation of the glaucoma clinic cost per year per patient. This recall period was almost the same for both clinics (6.9 months for community

and 7 months for hospital), thus gave no change in differential costs between the clinics. The cost to patients per year clinic attendance is similar between hospital and community clinics, being £9.84 for the hospital-based service and £10.32 for the community-based service. The numbers seen per clinician in the community clinics were smaller.

Sensitivity analysis

As the factor driving the difference in costs per patient is the cost per clinic, as a sensitivity analysis, we calculate in Table 4 the effect of increased number of patients seen in the community clinic with and without omitting the 9% of patients seen in the community that were referred back to the hospital for further investigations and treatment to illustrate the impact that the referral back into the hospital system had on the costs.

It can be seen that the number of patients seen has to increase substantially to make the costs comparable, and the 9% re-referral to the Hospital system has a smaller effect on the costs.

Table 4 Sensitivity analysis modelling number of patients seen in community clinic per day against cost per attendance

No of attendances	*11*	*15*	*20*	*25*
Cost/attendance	£145.62	£106.79	£80.09	£64.07
Cost/attendance omitting re-referral to hospital system	£134.00	£98.27	£73.70	£58.96

Discussion

Our study has shown community-based clinics to be more costly to run than hospital-based clinics. This finding is the same as the report from Bristol for their model of care in the community. It is appropriate to compare the two studies for sources of cost escalation in the community clinics. Both studies have investigated the quality of care received in the community compared to the hospital. For our study, this is the subject of a future report but was in essence comparable as was the case in Bristol, meaning negligible cost implications.

In the Bristol study, community clinics requested an average of 6 months follow-up and hospital clinics an average of 10 months follow-up.[2] This had an impact on the costs that was not observed in our model, where both clinics requested an average of 7 months follow-up. The Bristol study, however, had a protocol of 6-monthly follow-up for the community, thus this difference may well have been related to the study design.

A second cost escalator relates to re-referral back into the hospital system, thus incurring a double cost for attendance. In our study, 9% of patients were referred back into the hospital system. The figure was larger in the Bristol study, where an average of 22% (range 19–27%) over the 2-year study period were re-referred back to the hospital system.[8] The proportion in Bristol directly relates to the strict protocol that applied to community reviews and a change in this protocol could reduce the proportion. In our study, many cases were discussed by the optometrist when they next met the consultant and this may account for the lower proportion. It is interesting to note removal of the cost of these re-referrals in the sensitivity analysis did not have a profound effect in the clinic cost per attendance. Even if we model re-referral at 22%, the cost per clinic attendance in the community rises to £157.24, illustrating a smaller proportionate contribution of re-referral to costs in our case.

One reason for the cost differential between the optometrist-based and hospital-based clinics is the fact that fewer patients are seen per clinician in the former. Our sensitivity analysis shows that the increase in the average number of patients seen in the optometrist-based clinics that is necessary to approximate the costs of a hospital-based review is 25 patients per day. In our study, all glaucoma clinic patients with appointments for review set at 6 months or more were included. With a more selected case mix, increased throughput might be safely achievable.

The principal reason for the large cost-differential observed is the high opportunity cost for the community setting. The sight test fee (including fees from private and NHS tests) represents a declining proportion of practice revenue for optometrists and there has been an increasing cross-subsidisation of the costs of the sight test by sales of optical appliances. Although nationally the total expenditure on NHS sight tests has risen substantially in recent years due to the increased eligibility to free sight tests, the contribution of NHS work to practice turnover has fallen significantly leading to a reliance on retail sales within the business model of optometry practices (http://www.college-optometrists.org/en/utilities/document-summary.cfm?docid=C86163DB-8340-9061-1E1CBD2A50B744F8). In response to this, rental costs have increased substantially as optometry practices have adopted prime High Street locations to maintain a commercial advantage. In the current study, lost retail income from spectacle sales made a major contribution to the high opportunity costs for the optometry setting. The sensitivity analysis modelling shows that the average cost per attendance can be reduced significantly by increasing the throughput of patients for a single overhead cost. Although these numbers are not feasible for a single optometrist, it may be possible

for a larger practice with multiple consulting rooms and a larger number of attending clinicians. However, it is unclear at this time how many optometrists would be willing to undertake the additional training required and be prepared to take on this extended clinical role.

This paper is a contribution towards the challenge by NICE for more information and research concerning the cost implications of service delivery. We have shown that the community model we piloted is more than double the cost of the hospital-based service. In addition it provided no change in indirect or direct costs to patients in our urban setting. We discuss the changes to the model that might make community clinics more cost-effective, namely, increasing the patient numbers seen in each clinic and reducing overhead costs. In a more rural situation, it is more likely that there may be a saving to patients by having a more local service, as the distances travelled will be greater. It is important that similar work is undertaken in varied settings to inform the many new service provision initiatives being implemented.

Summary

What was known before

- To our knowledge, the only major study to fully investigate glaucoma community schemes was the Bristol glaucoma shared care study.
- The Bristol study showed their model, while safe clinically, not to be cost effective.
- The main reasons why the model was not cost-effective were due to re-referrals back to the hospital from the community and possibly study design.

What this study adds

- Our community glaucoma scheme was also shown not to be cost effective.
- The main reason for this in our study was due to higher overhead costs in the community.
- The cost effectiveness of the model could be improved by increasing the number of patients seen in the community.

Conflict of interest

The authors declare no conflict of interest.

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