EXTENDED REPORT

Falls and health status in elderly women following first eye cataract surgery: an economic evaluation conducted alongside a randomised controlled trial

Tracey H Sach, Alexander J E Foss, Richard M Gregson, Anwar Zaman, Francis Osborn, Tahir Masud, Rowan H Harwood

Br J Ophthalmol 2007;**91**:1675–1679. doi: 10.1136/bjo.2007.118687

See end of article for authors' affiliations

Correspondence to: Dr Tracey Sach, School of Chemical Sciences and Pharmacy, University of East Anglia, Norwich NR4 7TJ, UK; T.Sach@uea.ac.uk

Accepted 25 May 2007
Published Online First 21 June 2007

Aim: To evaluate the cost-effectiveness of first eye cataract surgery compared with no surgery from a health service and personal social services perspective.

Methods: An economic evaluation undertaken alongside a randomised controlled trial of first eye cataract surgery in secondary care ophthalmology clinics. A sample of 306 women over 70 years old with bilateral cataracts was randomised to cataract surgery (expedited, approximately four weeks) or control (routine, 12 months wait); 75% of participants had baseline acuity of 6/12 or better. Outcomes included falls and the EuroQol EQ-5D.

Results: The operated group cost a mean £2004 (bootstrapped) more than the control group over one year (95% confidence interval (CI), £1363 to £2833) ($p<0.001$), but experienced on average 0.456 fewer falls, an incremental cost per fall prevented of £4390. The bootstrapped mean gain in quality adjusted life years (QALYs) per patient was 0.056 (95% CI, 0.006 to 0.108) ($p<0.001$). The incremental cost–utility ratio was £35 704, above the currently accepted UK threshold level of willingness to pay per QALY of £30 000. However, in an analysis modelling costs and benefits over patients' expected lifetime, the incremental cost per QALY was £13 172, under conservative assumptions.

Conclusions: First eye cataract surgery, while cost-ineffective over the trial period, was probably cost-effective over the participants' remaining lifetime.

Health care interventions should be effective, affordable, and of sufficient priority over competing calls on limited resources.

Health economic evaluation aims to quantify the incremental costs and benefits of an intervention compared with an appropriate comparator, in order to establish whether the intervention offers value for money. Ideally health benefits are measured on a common generic scale, usually using ''utilities'', measuring health related quality of life (HRQL) on a scale of 0 (death) to 1 (perfect health). HRQL is then combined with length of life changes to estimate the difference in quality adjusted life years (QALYs) between the interventions being compared. This enables direct comparison with diverse other health interventions.[1] A variety of instruments has been developed to measure HRQL.[2–4] The UK's National Institute for Health and Clinical Excellence (NICE) prefers outcomes to be measured using this approach.[5]

The prevalence of cataract is very high among elderly people (20% unoperated at age 70, rising to 50% in over 80s).[6] Surgery for cataract is common, but substantial unmet need remains in the population.[7] The UK government has committed the NHS to providing rapid access to surgery for anyone deemed to require it by their clinician.[8] The sight restoring effects of surgery in patients with severe bilateral cataract are self evident. However, there has been a very significant trend over the past two decades for undertaking cataract surgery at an increasingly early stage, with a rising proportion having 6/12 vision or better at the time of listing.[9 10] The cost-effectiveness of surgery in these patients is open to question.

We previously demonstrated benefits from first eye surgery in a randomised controlled trial (with ''waiting list'' controls), in terms of gains in visual acuity, contrast sensitivity, stereopsis, activity, anxiety, depression, confidence, visual disability and handicap, and reduced rate of falls and fractures.[11]

In this paper we present an economic evaluation of first eye surgery compared with no surgery ever, both in terms of cost-effectiveness and cost-utility, from an NHS and personal social services perspective. Carers' costs are presented separately.

METHODS

Participants and randomisation

Participants were women over 70 years of age with bilateral unoperated cataract, referred to secondary care, who were suitable for phacoemulsification. Exclusions included severe visual impairment or comorbid eye disease, and memory problems preventing the completion of questionnaires. Ethics committee approval was granted, and participants gave their informed written consent.

Participants were randomised to immediate first eye cataract surgery (median 27 days), or no surgery (''waiting list'' controls, who had surgery after 9 to 13 months, median 337 days). Only one eye was operated on. All had refraction. The primary clinical end point was rate of falling, and the trial was powered to detect a one third reduction in the rate of falling.[11]

Resource use and costing

All contacts with health and social services, including care home admissions, use of informal care, equipment provided, and home modifications (table 1), were collected at an individual patient level from diaries ascertained at three and nine months by telephone interview, and at six and 12 months

Abbreviations: CEAC, cost-effectiveness acceptability curve; HRQL, health related quality of life; ICER, incremental cost-effectiveness ratio; QALY, quality adjusted life year; WTP, willingness to pay

Table 1 Base case unit costs in 2004 pounds sterling

Resource item	Unit cost (£)†	Source
Primary health care		
GP (per surgery consultation lasting 9.36 minutes)	21	PSSRU[12]
Practice nurse/district nurse (per consultation)	9	PSSRU
Secondary health care		
A&E (per visit)	83	PSSRU
Outpatients first visit (geriatric medicine)	222	DH[13]
Outpatients follow up visit (geriatric medicine)	125	DH
Cost per bed day for elderly patients	166	PSSRU
Cataract operation	672	DH
Lower limb fractures (day case)	777	DH
Upper limb fractures (day case)	858	DH
Personal social services		
Local authority home care worker (per visit)	12	PSSRU
Day centre visits (per visit)	29	PSSRU
Short term residential care (per day)	56	PSSRU
Long term residential care (per day)	53	PSSRU
Short term nursing home (per day)	73	PSSRU
Long term nursing home (per day)	75	PSSRU
Meals on wheels (per meal)		Wiltshire foods
Special equipment (per item) (items ranged from long handled	3	
sponge to electric buggy)	4 to 499	Varied (available from author)
Patient and carer		
Independently provided home care (per visit)	10	PSSRU
Average net weekly earnings (all ages, excluding overtime and minus 35% for income tax, NI, and pension)	321	NES†[14]

†New Earnings Survey 2003, inflated to 2004 wage rates using earnings inflation rate of 0.045.
A&E, accident and emergency department; DH, Department of Health; GP, general practitioner; NI, national insurance; PSSRU, Personal Social Services Research Unit.

by face to face interview. Equipment and modifications were assumed to have been paid for by social services with unit costs from the Personal Social Services Research Unit, where available,[12] and from internet mobility store price catalogues. In addition, we measured the time costs of informal carers using the human capital approach, applying average net weekly earnings (table 1). Carer costs are excluded from the base case analysis because of controversy surrounding the methods used to value time,[15] but are included separately in line with the approach taken by NICE.[5] All costs in this paper are presented in 2004 pounds sterling (inflated using the hospital and community health services inflation index[12] where necessary).

Outcomes

Patient utility was estimated using the EQ-5D [www.euroqol.org], which has five dimensions (mobility, self care, usual activities, pain or discomfort, and anxiety or depression), each rated at one of three levels (none, some, severe problems).[2] When combined, these create 243 possible health states, each of which has an empirically measured utility score assigned (using the time–trade off technique[16]).[17] The EQ-5D was administered at baseline and at six months, and was used to construct patient specific utility paths. In the base case it was assumed the six month value would apply one month after surgery (as the benefits of surgery are rapid) and would remain constant over a further 11 months.

The number of QALYs for the 12 month trial period was estimated for each patient using area under the curve analysis, taking account of baseline. The overall difference in mean QALYs between surgery and no surgery was calculated. Costs and benefits were not discounted in the base case as the trial period was a single year.

Modelling longer term cost-utility

The benefits of cataract operations are lifelong,[18] so a long term analysis was conducted using UK Government life tables to estimate lifetime costs and benefits for each participant where life expectancy was based on their own age and sex.[19] Annual costs for the control group were assumed to remain the same in subsequent years as that observed in the trial period. For the intervention group, costs over the final three quarters of the year only were rescaled to reflect a full year, as costs in the first quarter of the year were significantly higher than in each subsequent quarter ($p<0.001$) and are therefore unlikely to reflect future resource use. The rescaled total annual cost was assumed to remain constant over the remaining lifespan. Utility was assumed to remain constant over the remaining lifetime for both groups (a conservative assumption as without the operation vision deteriorates over time).[11 20–22] Both costs and benefits were discounted in the lifetime analysis using a rate of 3.5% per annum.[5 23]

Statistical analysis

Eighteen patients (5.9%) did not complete the six month EQ-5D questions and were excluded. Patients with missing resource use data at one or more time points (death between data collection points ($n = 2$) and early withdrawal ($n = 19$)) were imputed using the last observed value carried forward approach and apportioned for the appropriate period. Ten participants who had early non-trial surgery were analysed using intention to treat.

Non-parametric bootstrap analysis using the percentile method confidence interval was undertaken.[24] The resulting incremental cost and QALYs were used to generate an incremental cost-effectiveness ratio.

Cost-effectiveness acceptability curves (CEAC) were drawn.[25] These plot the probability of an intervention being cost-effective compared with an alternative for different levels of willingness to pay (WTP) per QALY.

Sensitivity analysis

Sensitivity analyses were carried out to test the robustness of both the short and longer term results. Costs in the operated group were skewed by a few very high cost patients. The top 2% and then top 5% of patients were removed. We undertook

Table 2 Resource use and mean difference in resource use per patient over the 12 months for first eye cataract surgery and no cataract surgery

Resource use item	Surgery (n = 148)	No surgery (n = 140)	Mean difference (95% CI)
Secondary health care			
Cataract Operation (per op)	1 (0.00)	0.11 (0.31)	0.89 (0.84 to 0.95)
Outpatients first and follow up visit (n)	5.99 (4.28)	2.79 (3.91)	3.20 (2.25 to 4.15)
Bed days (n)	3.13 (10.20)	1.16 (3.22)	1.96 (0.22 to 3.71)
A&E (No of visits)	0.39 (0.85)	0.12 (0.37)	0.26 (0.11 to 0.42)
Lower limb fractures (n)	0.01 (0.08)	0.01 (0.08)	0.00 (−0.02 to 0.02)
Upper limb fractures (n)	0.02 (0.14)	0.09 (0.36)	−0.07 (−0.14 to −0.01)
Primary health care			
GP (No of visits)	4.72 (3.79)	5.04 (4.96)	−0.33 (−1.36 to 0.70)
Practice/district nurse (No of visits)	5.22 (9.97)	3.40 (3.59)	1.82 (0.09 to 3.54)
Personal social services			
LA home care worker (No of hours)	12.29 (40.13)	9.39 (31.45)	2.90 (−5.46 to 11.23)
Day centre visits (No of days)	0.13 (0.62)	0.11 (0.74)	0.01 (−0.14 to 0.17)
Residential care (No of days)	9.67 (54.16)	0.50 (3.51)	9.17 (0.35 to 17.99)
Nursing home care (No of days)	0.00 (0.00)	0.14 (1.26)	−0.14 (−0.35 to 0.07)
Meals on wheels (No of days)	3.60 (21.00)	1.86 (21.97)	1.74 (−3.25 to 6.74)
Special equipment (No of items)	0.20 (0.75)	0.37 (1.03)	−0.17 (−0.38 to 0.04)
Patient and carer			
Home care (No of hours)	3.31 (6.99)	4.11 (8.57)	−0.80 (−2.63 to 1.02)
Time costs (No stopped working)	0.01 (0.16)	0.04 (0.28)	−0.02 (−0.08 to 0.03)

Values are mean (SD).
A&E, accident and emergency department; CI, confidence interval; GP, general practitioner; LA, local authority.

threshold analysis to find the price of cataract surgery (the single largest unit cost) which would make it cost-effective. We varied the assumption about time course of gain in quality of life after operation (immediate and gradual over six months). Finally, in the longer term modelling we tested the impact of varying the discount rate from the 3.5%, assumed in the base case to 0%, 3%, and 5% as recommended.[1]

RESULTS

Data from 288 participants (148 intervention and 140 control) were included in the economic analysis. Baseline visual acuity was 6/12 or better in 75%. Mean corrected acuity was 0.28 log MAR, equivalent to about Snellen 6/11.4.

Resource use and costs

Overall service use was higher in the operated group in the year after randomisation, particularly in the first three months after surgery (3.6 times higher, $p<0.001$). Costs over months 4–12 were not significantly different between groups. There were some potentially important baseline imbalances in reported prior resource use (in the month before randomisation), although baseline EuroQol was similar ($p = 0.9$). For example, there were four care home residents in the operated group compared with only one in the control group. The greatest resource use and cost was for hospital outpatient visits (mainly non-ophthalmic) (see tables 2 and 3).

The bootstrapped mean (SD) total cost per patient (excluding carer time costs) in the operated group was £3250 (£352) compared

Table 3 Cost and cost difference per patient over the 12 months for first eye cataract surgery and no cataract surgery

	Value (£ Sterling)		
Resource use item	Surgery (n = 148)	No surgery (n = 140)	Mean difference (95% CI)
Secondary health care	2312 (2033)	881 (1175)	1432 (1049 to 1815)
Cataract operation	672 (0)	72 (209)	600 (565 to 635)
Outpatients first and follow up visit	1066 (751)	520 (687)	546 (379 to 713)
Cost per bed day	519 (1703)	193 (535)	326 (36 to 616)
A&E	32 (71)	10 (31)	22 (9 to 34)
Lower limb fractures	5 (64)	6 (66)	−0 (−15 to 15)
Upper limb fractures	17 (121)	80 (307)	−62 (−117 to −7)
Primary health care	146 (133)	137 (113)	9 (−19 to 38)
GP (number of visits)	99 (80)	106 (104)	−7 (−28 to 15)
Practice/district nurse	47 (90)	31 (32)	16 (1 to 32)
Personal social services	791 (3113)	231 (593)	560 (45 to 1075)
LA home care worker	147 (482)	113 (377)	35 (−65 to 135)
Day centre visits	48 (234)	43 (279)	5 (−55 to 65)
Residential care	546 (3056)	28 (198)	517 (20 to 1015)
Nursing home care	0 (0)	10 (91)	−10 (−26 to 5)
Meals on wheels	28 (164)	14 (171)	14 (−25 to 53)
Special equipment	22 (94)	22 (79)	−0 (−20 to 20)
Patient and carer	453 (1069)	620 (1640)	−167 (−490 to 157)
Home care	396 (847)	471 (969)	−74 (−286 to 137)
Time costs	56 (686)	149 (1164)	−93 (−316 to 131)

Values are mean (SD) 2004 pounds Sterling.
A&E, accident and emergency department; CI, confidence interval.

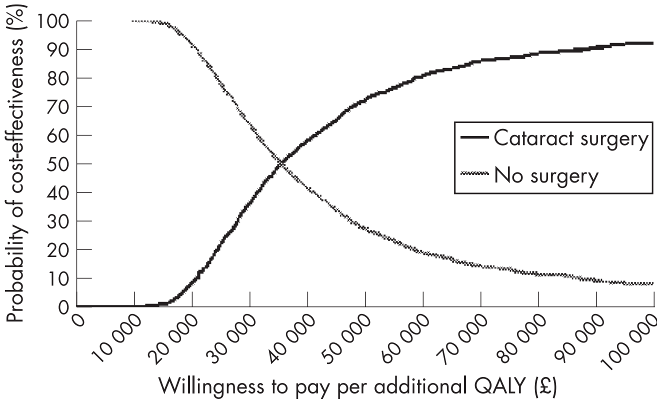

Figure 1 Cost-effectiveness acceptability curve (CEAC) for first eye cataract surgery *vs* no surgery in the base case over the one year trial period.

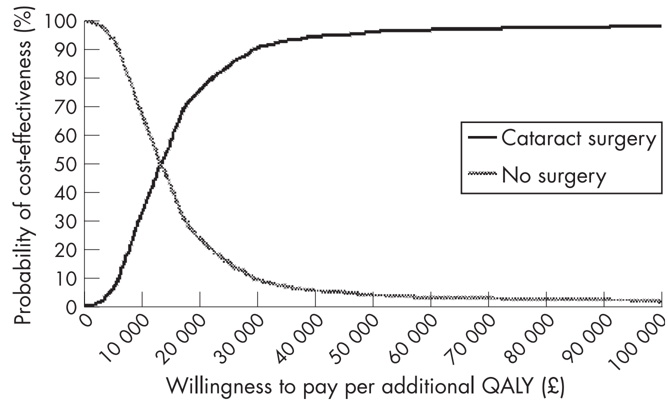

Figure 2 Cost-effectiveness acceptability curve (CEAC) for first eye cataract surgery *vs* no surgery in the base case over participants remaining life expectancy (longer term model).

with £1247 (£120) in the control group (difference = £2004 (95% confidence interval (CI), £1363 to £2833)) ($p<0.001$). Total secondary care costs (£2312 *vs* £881, $p<0.001$) and total personal social services costs (£791 *vs* £231, $p = 0.033$) were also higher in the operated group. There was no difference for primary care costs (£146 *vs* £137, $p = 0.515$) or carer time costs (£453 *vs* £620, $p = 0.310$). None of the patients in the control group incurred total costs over £7421 during the trial year. However, seven operated participants incurred total costs over £10 700, with three over £21 000. Two of these three high cost users died.

Cost-effectiveness

The bootstrapped mean (SD) number of falls per patient in the base case was 0.934 (0.122) for operated participants and 1.390 (0.296) for the control group (difference −0.456 (95% CI, −1.153 to −0.083)) ($p<0.001$). The incremental cost per fall prevented was £4390 without carer costs and £3983 with carer costs included.

Cost-utility results without carer time costs included

The bootstrapped mean difference in QALYs per patient in the base case was 0.056 (95% CI, 0.006 to 0.108) ($p<0.001$). The incremental cost-effectiveness ratio for surgery in the base case was £35 704. Figure 1 shows the CEAC for the first year after surgery. At a WTP of £30 000 per QALY there is a 35.6% chance of cataract surgery being cost-effective in this population.

Cost-utility results with carer time costs included

Surgery remained more costly than control (£3684 *vs* £1866, $p<0.001$), although the mean bootstrapped cost difference of £1818 (95% CI, £1057 to £2639)) ($p<0.001$) was lower. Incremental cost-effectiveness with carer's time cost incorporated was £32 391.

Modelling longer term cost-utility

Extrapolating beyond the trial period to assume a time frame for analysis over expected remaining lifetime revealed a mean (SD) total bootstrapped cost per patient of £17 933 (£2722) operated, compared with £10 725 (£1147) control, mean difference = £7208 (95% CI, £1720 to £13 654) ($p<0.001$). The mean difference in QALYs per patient was 0.547 (95% CI, 0.084 to 0.963) ($p<0.001$), with a long term incremental cost-effectiveness ratio of £13 172 when a public sector perspective was taken, and assuming that the utility remained constant in the control group. (In fact, in the six month trial period alone utility in the control group deteriorated from 0.70 to 0.67.) The long term incremental cost-effectiveness ratio was £10 382 when carer costs were included (table 4). Figure 2 shows the CEAC for the longer term model. At a WTP of £30 000 per QALY there is a 90.4% chance of cataract surgery being cost-effective in this population.

Sensitivity analysis

The incremental cost–utility ratios for various assumptions and sensitivity analyses are given in table 4. Excluding the 2% (three participants) who had total costs in excess of £20 000 per annum gave an incremental cost–effectiveness ratio of £27 205 for the trial period. When the 5% (7 participants) incurring total costs above £10 000 per annum were excluded, the incremental cost–effectiveness ratio was £18 170 for the trial period. The unit cost threshold for the cataract operation itself, at which the ICER fell beneath £30 000, was £329 (49% of the actual cost) for the trial period analysis. Changing the assumptions about the time course of improvement after surgery had little effect on conclusions in the trial period or longer term analysis. Using different discount rates in the longer term modelling did not change the ICER significantly. We also drew 90% confidence boxes around the mean point estimates of incremental costs and benefits. These, together with the results using different discount rates, can be obtained from the corresponding author.

DISCUSSION

First eye cataract surgery is associated with gains in visual function, visual disability, activity, anxiety and depression, confidence, handicap, and quality of life,[11] but it also has an associated cost, and the relative cost per unit of gain can be calculated to compare this with other interventions.

We found a cost per QALY gained of £35 704 for costs and benefits measured within a year of randomisation, falling to

Table 4 Summary of incremental cost-effectiveness ratios for first eye cataract surgery (in 2004 pounds sterling)

	Value (£ Sterling)	
	ICER over one year	ICER over lifetime
Base case, public sector costs only	35 704	13 172
Base case, carer costs included	32 391	10 382
2% highest cost participants (n = 3) excluded, public sector costs only	27 205	7 401
5% highest cost participants (n = 7) excluded, public sector costs only	18 386	1 741
QoL improvement applies from time of operation, public sector costs only	34 220	13 097
QoL improvement gradual over 6 months, public sector costs only	46 033	13 445

ICER, incremental cost-effectiveness ratio; QoL, quality of life.

£13 172 when costs and benefits were estimated over the anticipated remaining lifespan (10 years for a 78 year old woman, the median age) discounting future costs and benefits at 3.5%, and assuming that HRQL does not deteriorate further for someone with an unoperated cataract. Thus in reality the cost per QALY should be less than this. Currently the upper threshold for implementing interventions in the UK NHS is £30 000 per QALY.[5 26 27] Compared with other health care interventions, first eye cataract surgery for this population seems favourable over the longer term.[28]

One other study has reported a cost-effectiveness analysis of first eye cataract surgery alongside a randomised trial for a subgroup of patients predicted to have less than a 30% probability of gaining improvements in visual function after surgery.[29] They found that first eye surgery, compared with watchful waiting, was cost-effective. There are just five other cost-utility analyses, mostly short term and from non-randomised studies, evaluating first eye surgery in broader populations worldwide. These have been incorporated into a meta-analysis, which reports a wide range of costs per QALY (US $1000 to $22 000, 2004). The key factor affecting cost-utility was the assumed duration of the benefit, for which the authors argue the most valid period is the patient's lifespan.[18]

The main strength of the current study was that it was a preplanned analysis, using data from the perspectives of both formal health and social care, and informal carers, embedded in a randomised controlled trial.

The main caution is that some of our cost data were unexpected. Overall service use was considerably higher in the operated group in the year after randomisation, particularly in the first three months post-surgery. There were some potentially important baseline imbalances in reported resource use in the month before randomisation, most likely due to chance. A further explanation would be a raising of awareness and assertiveness towards available services. There was nothing to suggest from our informal observations that the excess service use was directly related to the cataract surgery. We have not been able to investigate this further. Much of the excess cost was concentrated in a few participants, who had comorbid illnesses, spent time in hospital, and in some cases died. The sensitivity analysis in which these outliers were excluded gave a (within year) ICER of £18 170 and a whole life ICER of £1741 when the top 5% of high users were excluded. These figures may be more generalisable.

Our main analysis was of cost-effectiveness over the year of follow up for which we had real data, but in reality the assumption that cataract surgery is done only for the benefits observed over the subsequent 12 months is invalid—the benefits are lifelong. Our long term model based on extrapolated data is hypothetical and therefore the results are indicative rather than definitive. Moreover, we assumed a comparator of no surgery ever. In reality many in the control group eventually have surgery, but our assumption allows us to estimate the "absolute" cost-effectiveness of the procedure. Given the considerable unmet need for surgery in the UK, many people with cataracts currently die before reaching operation.[7]

A large proportion of participants in this trial had minimally visually impairing cataract. Three quarters had acuity better than the driving standard (Snellen 6/12). This is an important group to study because they are numerous, are common in routine ophthalmology practice, and because it is this group (rather than those on the verge of blindness) in whom the priority given to surgery is open to question. Our study suggests that first eye cataract surgery for this group is likely to be cost-effective, especially if a lifelong time frame is considered.

ACKNOWLEDGEMENTS

Funded by the former Trent Regional NHS Research and Development scheme and the PPP Foundation (now the Health Foundation).

Authors' affiliations

Tracey H Sach, School of Chemical Sciences and Pharmacy, University of East Anglia, Norwich, UK
Alexander J E Foss, Richard M Gregson, Anwar Zaman, Francis Osborn, Department of Ophthalmology, University Hospital, Queen's Medical Centre, Nottingham, UK
Tahir Masud, Rowan H Harwood, Clinical Gerontology Research Unit, City Hospital, Nottingham, UK

Competing interests: None declared.

REFERENCES

1 **Drummond M**, Schulpher M, Torrance GW, *et al. Methods for the economic evaluation of health care programmes*, third edition. Oxford: Oxford University Press, 2005.
2 **Brooks R**. EuroQol: the current state of play. *Health Policy* 1996;**37**:53–72.
3 **Brazier JE**, Roberts J, Deverill M. The estimation of a preference-based measure of health from the SF-36. *J Health Econ* 2002;**21**:271–92.
4 **Feeny D**, Furlong W, Boyle M, *et al.* Multi-attribute health status classification systems: health utilities index. *Pharmacoeconomics* 1995;**7**:490–502.
5 **NICE**. Guide to the Methods of technology appraisal, April 2004. Accessed online on 21 February 2007 [http://www.nice.org.uk/pdf/TAP_Methods.pdf].
6 **Reidy A**, Minassian DC, Vafidis G, *et al.* Prevalence of serious eye disease and visual impairment in a north London population: population based, cross sectional study. *BMJ* 1998;**316**:1643–6.
7 **Minassian DC**, Reidy A, Desai P, *et al.* The deficit in cataract surgery in England and Wales and the escalating problem of visual impairment: epidemiological modelling of the population dynamics of cataract. *Br J Ophthalmol* 2000;**84**:4–8.
8 **Department of Health**. *The NHS plan: a plan for investment, a plan for reform.* London: HMSO, 2000:101–105, Accessed online on 3 January 2007 [http://www.dh.gov.uk/assetRoot/04/05/57/83/04055783.pdf].
9 **Desai P**, Reidy A, Minassian DC. Profile of patients presenting for cataract surgery in the UK: national data collection. *Br J Ophthalmol* 1999;**83**:893–6.
10 **Leinonen J**, Laatikainen L. Changes in visual acuity of patients undergoing cataract surgery during the last two decades. *Acta Ophthalmol Scand* 2002;**80**:506–11.
11 **Harwood RH**, Foss AJ, Osborn F, *et al.* Falls and health status in elderly women following first eye cataract surgery: a randomised controlled trial. *Br J Ophthalmol* 2005;**89**:53–9.
12 **Curtis L**, Netten A. Unit Costs of Health and Social Care 2004. Accessed on-line on 14 March 2006 [http://www.pssru.ac.uk/pdf/uc2004/uc2004.pdf].
13 **Department of Health**. *NHS reference costs 2003*, Accessed online 13 October 2005 [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4070195].
14 **National Statistics**. *New earnings survey 2003*, Accessed online on 21 February 2007 [http://www.statistics.gov.uk/downloads/theme_labour/NES2003_Analyses_For_Part-Time_Employees/Vol_F.pdf].
15 **Sach TH**, Whynes DK. Measuring indirect costs: is there a problem? *Appl Health Econ Health Policy* 2003;**2**:135–9.
16 **Torrance GW**. Measurement of health state utilities for economic appraisal. *J Health Econ* 1986;**5**:1–30.
17 **Dolan P**, Gudex C, Kind P, *et al.* A social tariff for the EuroQol: results from a UK general population survey (Discussion Paper 138). University of York: Centre for Health Economics 1995. Accessed online on 21 February 2007 [http://www.york.ac.uk/inst/che/pdf/DP138.pdf].
18 **Lansingh VC**, Carter MJ, Martens M. Global cost-effectiveness of cataract surgery. *Ophthalmology* 2007;**114**:1670–8.
19 **Government Actuary Department Interim Life Tables**. Accessed online on 16 November 2006 [http://www.gad.gov.uk/Life_Tables/Interim_life_tables.htm].
20 **Leske MC**, Chylack LT, He Q, *et al.* Incidence and progression of cortical and posterior subcapsular opacities: the Longitudinal Study of Cataract. The LSC Group. *Ophthalmology* 1997;**104**:1987–93.
21 **Leske MC**, Wu SY, Nemesure B, *et al.* Incidence and progression of lens opacities in the Barbados Eye Studies. *Ophthalmology* 2000;**107**:1267–73.
22 **Magno BV**, Datiles MB, Lasa MS. Progression of lens opacities in cataract patients after one year. *Acta Ophthalmol Scand* 1995;**73**:45–9.
23 **HM Treasury**. Green Book. Appraisal and evaluation in central government, 2003. Accessed online 21 February 2007 [http://www.hm-treasury.gov.uk/Economic_Data_and_Tools/greenbook/data_greenbook_index.cfm].
24 **Heyse JF**, Cook JR, Carides GW. Statistical considerations in analysing health care resource utilization and cost data. In:Drummond M, McGuire A, editors. *Economic evaluation in health care.* Oxford: Oxford University Press, 2001:215–35.
25 **Fenwick E**, Claxton K, Sculpher MJ. Representing uncertainty: the role of cost-effectiveness acceptability curves. *Health Econ* 2001;**10**:779–87.
26 **Towse A**, Pritchard C, Devlin N. *Cost effectiveness thresholds: economic and ethical issues.* London: Office of Health Economics, November, 2002.
27 **Raftery J**. NICE: faster access to modern treatments? Analysis of guidance on health technologies. *BMJ* 2001;**320**:1300–3.
28 **Wolstenholme J**, Gray A. Making difficult choices: decision making in health care. Accessed on 21 February 2007 [www.herc.ox.ac.uk/research/QALY_league_table.pdf].
29 **Naeim A**, Keeler EB, Gutierrez PR, *et al.* Is cataract surgery cost-effective among older patients with a low predicted probability for improvement in reported visual functioning? *Med Care* 2006;**44**:982–9.