Cataract surgery cost utility revisited in 2012: a new economic paradigm
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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.

CRD summary
The study objective was to assess the cost-effectiveness of cataract surgery in 2012 and compare it to cost-effectiveness in 2000. The authors concluded that cataract surgery was highly cost-effective. The study appeared to be well conducted but limitations in the reporting make it difficult to assess the validity of the results. Use of a no-treatment comparator may not have been suitable. The results should be used with a degree of caution.

Type of economic evaluation
Cost-utility analysis

Study objective
To assess the cost-effectiveness of cataract surgery in 2012 and compare it to cost-effectiveness in 2000.

Interventions
Interventions included first-eye (better seeing eye) and bilateral cataract extraction and intraocular lens implantation (cataract surgery). The comparator was no surgery (untreated cataract).

Location/setting
USA/secondary care

Methods
Analytical approach:
A 2002 study (Busbee et al. 2002) was updated with 2012 costs. A 13-year time horizon was used, equivalent to the mean life expectancy of the average 73-year-old study cohort patient. The previous study assumed a 12-year life expectancy. Two perspectives were adopted: societal and third-party payer. The previous study did not include the societal perspective.

Effectiveness data:
The primary measure of clinical effectiveness was visual acuity, derived from the published multinational 1998 PORT study (Norregaard et al. 1998). Visual acuity was translated into utility scores. The no surgery comparator arm was assumed to result in no change to visual acuity.

Monetary benefit and utility valuations:
Utilities were gathered from patients with various ocular impairments (primarily macular degeneration and diabetic retinopathy) from multiple studies using the time trade-off technique. Patients were asked how much of their expected remaining life they were willing to trade for different levels of visual acuity. Utility estimates incorporated adverse events associated with cataract surgery.

Measure of benefit:
The primary measure of benefit was quality-adjusted life-years (QALYs). Future QALYs were discounted at an annual rate of 3%.

Cost data:
The third-party payer perspective analysis included direct ophthalmic medical costs (such as physician services, anaesthesia, pharmaceuticals, adverse events) and direct non-ophthalmic medical costs (such as vision-associated depression, injury, nursing home admission). Direct ophthalmic costs were one-time costs and non-ophthalmic costs
were recurring. The present study used resource use from the previous study for direct medical costs and updated costs using 2012 Medicare fees; non-ophthalmic medical costs were derived from a published study that assessed costs associated with vision loss.

The societal perspective analysis additionally included caregiver and lost employment costs. Caregiver costs were assumed to include transportation costs. The cost of lost employment was derived from United States Census Bureau's Americans with Disabilities studies; these studies assumed that 12% of patients over aged 70 were working in gainful employment.

Costs were reported in 2012 US Dollars ($) and were adjusted for inflation where necessary using the Medical Care component of the Consumer Price Index. This index was also used to compare the results of the 2002 model to the results of the updated 2012 model in real 2012 dollars. Future costs were discounted at an annual rate of 3%.

Analysis of uncertainty:
Sensitivity analysis was conducted to assess the impact of assuming a higher baseline vision level on the results.

Results
Over 13 years, surgery was estimated to produce 1.62 QALYs in first-eye procedures and 2.8152 QALYs in second-eye procedures. Direct medical costs of cataract surgery decreased from $4,033 in 2000 to $2,653 in 2012. For first-eye surgery, the cost-utility ratio when considering direct ophthalmic medical costs only was $2,658 per QALY in 2000 and $1,636 per QALY in 2012.

Analysis including non-ophthalmic costs and indirect medical costs and the societal perspective analysis indicated that both first-eye and bilateral cataract surgery were dominant compared to no surgery and resulted in QALY gains and cost-savings. An incremental analysis of first-eye surgery and bilateral surgery found that bilateral surgery resulted in a gain of 1.19 QALYs at a cost of $2,653, a cost-utility ratio of $2,222 per QALY.

Sensitivity analysis indicated that cost-effectiveness was reduced if a better baseline vision was assumed but ratios remained low.

Authors' conclusions
The authors concluded that cataract surgery was highly cost-effective.

CRD commentary
Interventions:
The intervention and comparator were clearly stated. The appropriateness of the comparator is unclear: it is likely that in practice patients would be offered alternative treatments to surgery rather than doing nothing, in which case these alternatives should have been considered in the analysis in order to accurately assess the cost-effectiveness of surgery. If such alternatives exist then using a do nothing comparator is likely to have over-estimated expected QALY gains for surgery (assuming alternative treatments are expected to improve patient outcomes); the likely effect on costs is unclear.

Effectiveness/benefits:
Utilities were derived from a patient cohort with vision loss. Whether or not utilities should be based on patient or general population preferences is contentious. As the authors highlighted, using alternative cohorts to value health states can produce significantly different results. This issue should be carefully considered when comparing these results to other studies that may have used alternative preference elicitation methods.

QALY data were based on a study from 2002; the authors suggested that improvements in surgery since the PORT study was conducted may mean that QALY gains have been underestimated. A more accurate assessment of expected QALY gains from current surgery would require more up-to-date data.

The authors appeared to assume that patient vision would remain constant after surgery. If vision was expected to deteriorate over time then the QALY estimates may have been overestimated.
Costs:
Cost categories and results were clearly reported. Reporting of the different sources used to derive specific costs was not always clear. No resource utilization data was reported, which reduced the transparency and reproducibility of the cost analysis. The sources were specific to the USA context; care should be used when generalising these results to alternative settings. It was not clear how costs were calculated for productivity losses and whether different rates of employment were assumed for different ages. If the same rate of employment was applied to all patients over the age of 73 that might result in an inaccurate estimation of productivity costs. Future costs and benefits were appropriately discounted.

Analysis and results:
The PORT study used to derive many of the cost and effectiveness parameter estimates was referenced but few details about the study were reported in the current study. The PORT study also informed the 2002 study so more details may be available there. It was unclear whether the PORT study was randomised and whether efforts were made to control for confounding. There were insufficient details to assess whether this biased results.

Results of the analysis were reported clearly. The authors chose a 13-year time horizon based on average life expectancy of the cohort. As 50% of patients would still be alive at this point this may result in an underestimation of benefits from cataract surgery. Only a limited sensitivity analysis was conducted and the methods were not reported so it was difficult to assess the validity of this analysis.

Care should be taken when attempting to generalise these results due to the specificity of data to the USA context.

Concluding remarks:
The study appeared to be well conducted but limitations in the reporting make it difficult to assess the validity of the results. Use of a no-treatment comparator may not have been suitable. The results should be used with a degree of caution.

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