Screening for congenital cataracts: a cost-consequence analysis of eye examination at maternity wards in comparison to well-baby clinics

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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.

Health technology
The study examined the use of two different eye screening strategies for newborn babies in order to detect congenital cataracts. Mandatory eye screening in maternity wards in combination with well-baby clinic screening was compared with eye screening at well-baby clinics alone.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis and cost-utility analysis.

Study population
The study population comprised a hypothetical cohort of 100,000 Swedish newborn babies.

Setting
The study setting was inpatient and outpatient care. The economic study was carried out in Sweden.

Dates to which data relate
The effectiveness data were derived from studies published between 2000 and 2003. The dates to which resource use referred were not reported. The price year was 2001.

Source of effectiveness data
The clinical data for the two screening options included the impact of screening on incidence of early detection, and the effect of age at surgery on visual outcome, as measured by monocular visual acuity (VA). Population estimates of the congenital cataract screening, representing annual incidences in Sweden included:

- the number of early detected total cataracts operated on in children younger than 1 year of age;
- the number of total cataracts operated on in the second year of life;
- the number of undetected cataracts;
- the number of partial cataracts generated after age 1 year; and
- the number of detected, partial, minimal and non-operated on cataracts.

Modelling
Incidence data and age-related outcome data were combined to determine the health outcomes of the different screening strategies. No further details were provided.

Sources searched to identify primary studies
To estimate the impact of screening strategy on the incidence of early detection, the results from a retrospective study were used (Magnusson et al. 2003, see 'Other Publications of Related Interest' for bibliographic details). This study looked at 72 children born between 1992 and 1998 who had surgery for congenital cataracts before 1 year of age. The effect of age at surgery on visual outcome was derived from two retrospective studies based on children born in Western Sweden between 1980 and 1994 who had been diagnosed with bilateral cataracts. The authors assumed population estimates on the annual incidence of cataracts operated on, non-operated on and missed. Such assumptions were in some cases based on the published literature.

Methods used to judge relevance and validity, and for extracting data
The process used to identify the data was not reported. No inclusion criteria for any of the parameters were specified. The method used to select the estimates was neither reported nor discussed. The authors appropriately reported the assumptions made to derive annual incidences.

Measure of benefits used in the economic analysis
The measures of benefits used were gained years with VA greater than 0.1 of the better eye, and quality-adjusted life-years (QALYs). The health outcomes were modelled. The gained years comprising VA greater than 0.1 were measured between 0 and 12 years of age, and summed.

Using data derived from a published study (Kobelt et al. 2002, see 'Other Publications of Related Interest' below for bibliographic details), quality of life weights were correlated with visual ability. Quality of life weights were derived from the trade off between length of life and quality of life. However, no clear details were reported on how these quality of life weights were derived, or on the source from which they were elicited. Discounting was necessary, as QALYs could be incurred over a long period (between 12 and 18 years), and was appropriately carried out an annual rate of 3%.

Direct costs
The direct costs included in the analysis were those to the health care system. These costs covered the instruction of personnel, actual time performing the screening, screening equipment, treatment of the cataracts (including surgery), follow-up appointments at the eye clinic, treatment of postoperative complications, and glasses and contact lenses. The estimated costs for treating congenital cataracts were obtained from data from an eye hospital in Stockholm, Sweden. The costs for screening at maternity wards originated from a university hospital in Lund, Sweden. The study reported the total costs. Discounting was necessary, as the costs could be incurred during the first 18 years of life, and future costs were appropriately discounted at an annual rate of 3%. The price year was 2001. The costs and the quantities were not reported separately. The authors reported the average costs per cataract extraction and check-ups. This was used in both screening options as there was no reason to believe that the proportion of bilateral and unilateral cataracts would differ between the two.

Statistical analysis of costs
The costs were treated as point estimates (i.e. the data were deterministic).

Indirect Costs
Productivity losses were not reported.

Currency
Sensitivity analysis
The authors reported very few details of the sensitivity analysis they undertook. A series of one-way sensitivity analyses was conducted to assess the robustness of the study results through systematic variation of key variables.

Estimated benefits used in the economic analysis
The total expected gain in years for 22 children of VA greater than 0.1, owing to the early treatment of children as a result of the combined maternity ward/well-baby screening, was 59.75. The corresponding total expected gain in discounted QALYs was 4.1.

Cost results
The total discounted costs of the combined maternity/well-baby clinic screening over the first 18 years of life for 22 children were SEK 7,899,000, compared with SEK 6,939,000 for the well-baby screening programme alone.

Synthesis of costs and benefits
The costs and benefits were combined using an incremental cost-effectiveness ratio (i.e. the additional cost per additional years of VA greater than 0.1) and an incremental cost-utility ratio (i.e. the additional cost per QALY gained).

When combined maternity ward/well-baby clinic screening was compared with well-baby screening alone, the additional cost per additional year of VA greater than 0.1 was SEK 16,100, whereas the additional cost per QALY gained was SEK 234,000.

The results of the sensitivity analysis showed that, when the number of lost cases was varied (it was assumed that 3 were lost in the base-case scenario), the cost per gained year of VA greater than 0.1 varied between SEK 14,400 (2 lost cases) and SEK 11,900 (1 lost case).

When these same assumptions were tested in the cost-utility analysis, the cost per QALY gained was SEK 252,000 when 2 children were lost to detection and SEK 300,000 when 1 child was lost to detection. The results of the sensitivity analysis also showed that the incremental cost-utility ratio was dependent on the discount rate used.

Authors' conclusions
The incremental expense of introducing mandatory combined maternity ward/well-baby clinic screening on a nationwide basis was cost-effective and was found to be within acceptable levels of cost per quality-adjusted life-year (QALY) gained.

CRD COMMENTARY - Selection of comparators
A justification was given for using well-baby clinic screening alone as the comparator. It represented one of the ways in which newborn eye examinations have been performed in Sweden. You should decide if this represents a widely used intervention in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness parameters were derived from published research. A systematic review of the literature does not appear to have been performed, as no search methods or inclusion criteria were reported. Each parameter was based on one study and appropriate details of these studies were reported. The authors appear to have made a large number of assumptions about incidence estimates, which were neither explored in the sensitivity analysis nor discussed.

Validity of estimate of measure of benefit
The estimation of health benefits (i.e. QALYs and years of VA greater than 0.1) were derived from combining results of the retrospective studies and the authors’ own assumptions. The QALYs gained were appropriately discounted, although it was unclear over which period they were accrued. Quality of life weights were derived from the trade off between length of life and quality of life. However, no clear details were reported on how these quality of life weights were derived, or from whom they were elicited.

Validity of estimate of costs
The analysis of the costs appears to have been performed from the perspective of the health care system in Sweden. All the relevant categories of costs, and all relevant costs, appear to have been included in the analysis. As such, any omissions are unlikely to have affected the authors’ conclusions. The cost data were derived from two Swedish hospitals. Discounting was necessary, as the costs could be incurred over an 18-year period, and was appropriately performed. The authors did not evaluate uncertainty in the cost data since the only limited sensitivity analysis they undertook did not include costs. The authors reported the price year, which will ease any future inflation exercises, but did not report the dates to which the costs and resource use related. Further, the authors did not report the costs and the quantities separately, which will hamper the generalisability and transferability of the authors' results to other settings.

Other issues
The authors reported that no previous study had addressed the economic aspects of newborn eye examination. The authors did not address the issue of generalisability of their results to those from other settings. The results of the study do not appear to have been presented selectively, and the conclusions would appear to be an adequate reflection of the scope of the analysis. However, incidence estimates were based on the authors’ own assumptions, and these were not varied in sensitivity analyses. The authors reported a further limitation to their study, in that it may have been biased as it was founded on retrospective studies with a low number of children. The authors pointed out that the rarity of congenital cataract diagnosis makes it difficult to conduct a large randomised controlled trial.

Implications of the study
The authors reported that the initiation of a prospective national congenital cataract register will enable the opportunity to investigate data prospectively and to retest their results.

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Other publications of related interest
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MeSH
Ambulatory Care Facilities; Blindness /prevention & control; Cataract /congenital /diagnosis; Cohort Studies; Cost-Benefit Analysis; Female; Health Care Costs; Hospitals, Maternity; Humans; Infant, Newborn; Male; Mass Screening /economics /methods; Physical Examination /economics /methods; Quality-Adjusted Life Years; Retrospective Studies; Sensitivity and Specificity; Sweden

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