The application of teleophthalmology in examining patients with glaucoma: a pilot study

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 use of teleophthalmology during the examination of patients with glaucoma in a decentralised practice.

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
Patients with routine check-ups for glaucoma were studied. The patients had to have readable optic discs, retinal nerve fibre layer images, and normal field data from previous eye clinic visits.

Setting
The setting was primary care and secondary care. The study was undertaken in Oulu, Finland.

Dates to which data relate
The effectiveness evidence and resource use data were gathered from February to May 1998 for the teleophthalmology group, and from January to May 1997 for the university clinic group. The price year was not reported.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The resource use data were collected using patient questionnaires. These seem to have been distributed to the intervention group (teleophthalmology) during, or shortly after, the visit. The comparison group was included retrospectively, and the questionnaire could have been distributed to them up to a year after the visit to the university clinic took place.

Study sample
The study was a feasibility and pilot study, and so the number of patients included was not determined using power calculations. Thirty consecutive patients were invited to visit their local practice for examination using teleophthalmology, of which 29 agreed to participate in the study. These were compared with 41 consecutive patients from the same geographic area, who had visited the university glaucoma clinic one year earlier. Apart from age, no other baseline characteristics were given.
**Study design**

The study was an open, non-randomised prospective study using retrospective controls. Two centres participated in the study: the local practice where teleophthalmology took place, and the eye clinic where centralised care was provided. The patients were not followed beyond the day of the examination.

**Analysis of effectiveness**

The effectiveness was assessed by the patients' willingness to undergo a future telemedicine visit, and the patients' satisfaction with the care during the visit. All the patients appear to have been included in the analysis of effectiveness. It was stated that the mean age, plus or minus the standard deviation, in each group was 64 (+/-14) years. No attempt was made to control for potential confounding factors.

**Effectiveness results**

Eighty-six per cent of the patients in the teleophthalmology group were very satisfied with the overall care, compared with 69% in the control group. This difference was not significant at the 0.05 level. However, 69% of the patients in the teleophthalmology group were very satisfied with the information and guidance during their visit, compared with 42% in the control group. This difference was significant, (p=0.023). Ninety-five per cent of all patients wanted to have their next visit in the telemedicine clinic. The confidence intervals for the estimates were not provided.

**Clinical conclusions**

The authors concluded that teleophthalmology may be a preferred strategy amongst patients. However, more research is needed to ensure a good understanding of the effectiveness of the technology.

**Measure of benefits used in the economic analysis**

The authors did not derive a summary measure of benefit. The study should therefore be categorised as a cost-consequences analysis.

**Direct costs**

The total fixed direct costs of acquiring and installing the teleophthalmology technology were assessed. Further, the resource use was assessed as part of the study, but separately from the unit costs. Variable costs, such as nurse time, physician time, secretary time, archiving, and patient travel expenses and salary were also estimated. The costs were not discounted, which was appropriate given the lack of follow-up.

**Statistical analysis of costs**

No statistical analysis of costs was carried out.

**Indirect Costs**

The salary costs were estimated assuming 3-hour visits (6 hours for visits to the eye clinic) for the patients and escorts, and 13% of the cases for patients and 6% of cases for the escorts, at a unit cost of 15 FIM.

The travel costs were estimated assuming 50 hours (25 multiplied by 2) for the intervention versus 196 hours (98 multiplied by 2) for the comparator, at a unit cost of 1.8 FIM per km.

**Currency**

The results were predominantly presented in Finnish marks (FIM). However, some results were converted to US dollars ($) using a conversion rate of $1 = 5 FIM.
Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
This cost-consequence analysis did not present the benefits of treatment.

Cost results
The cost data were presented in two tables, which were difficult to interpret. The authors also used a bar chart to draw the conclusion that the intervention cost 550 FIM per case, when conducting 300 examinations per year. Finally, an unpublished source was cited as providing the evidence for a cost of $111 per clinic visit. The authors subsequently stated "Thus, when the higher travelling costs of the control are taken into account, the telemedicine visit saved approximately $55 per visit".

Synthesis of costs and benefits
Not applicable.

Authors' conclusions
This study was undertaken as a pilot project to undertake a preliminary assessment of a teleophthalmology-based investigation technology. The authors commented that the patient satisfaction with teleophthalmology was high, and that there may be cost-savings associated with the technology. However, the authors emphasised that the study groups may not have been comparable, and that the quality of the assessment images was not comparable between the eye-clinic and teleophthalmology groups. Further, the authors commented that the equipment was not user-friendly. Therefore, they concluded that further research is needed to assess the clinical and cost consequences of teleophthalmology.

CRD COMMENTARY - Selection of comparators
Teleophthalmology was compared with attending an eye clinic. A visit to an eye clinic represents current practice, and was therefore an appropriate comparator.

Validity of estimate of measure of effectiveness
The measure of effectiveness, in terms of satisfaction with treatment, was derived from patient questionnaires. It was unclear when these questionnaires were distributed to the patients. This may have played a role in the assessment of the comparator group, since these patients underwent treatment one year prior to the study and, therefore, may have had a longer time in which to make the assessment. This, in turn, may have resulted in recall bias. It is not ideal to compare a treatment group with historical controls. Indeed, the authors acknowledged that the estimated difference in patient satisfaction might have been due to a systematic difference in the delivery of care in the context of the study (the teleophthalmology group) and regular clinical practice (the eye clinical group). It is therefore difficult to assess whether the estimates are valid.

Validity of estimate of measure of benefit
There was no summary measure of benefit.

Validity of estimate of costs
The resource use was reported separately from the unit costs. The resource use was also assessed through patient questionnaires. Thus, the limitations identified with the effectiveness estimate also apply to the cost estimate. One additional problem is that the sources of the unit costs were not reported. Also, the method of presentation meant that it was impossible to determine the relationship between the final costs and the cost components. Finally, it seems like
that the authors have estimated resource use on only one third of the patients in the control group. No further commentary or explanation for this was provided. It is therefore difficult to assess the validity of the cost estimates.

Other issues
The authors compared their results appropriately with the one other study that, to their knowledge, evaluated telemedicine. The authors did not explicitly address the issue of generalisability to other settings. This was a pilot study of an intervention. It was not designed to provide conclusive evidence of the costs and the effectiveness of teleophthalmology. Therefore, the conclusions made by the authors reflect the scope of the study. However, the cost results were not fully reported and they were presented in a way which was difficult to comprehend.

Implications of the study
The authors state that further research is needed to evaluate the alternative methods.

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