Telemedicine network telecolposcopy compared with computer-based telecolposcopy

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
Telemedicine network telecolposcopy was compared with computer-based telecolposcopy for the diagnosis of potential lower genital tract neoplasia.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised women aged 18 years or older who sought colposcopic examination at two rural sites. The inclusion criteria were a recent (less than 6 months) abnormal Pap smear result or a lower genital tract condition that required colposcopic evaluation. The exclusion criteria included menses, severe cervicitis, pregnancy, and transient colposcopic or telemedicine technical difficulties. Patients who declined to participate were also excluded.

Setting
The setting was primary care. The economic analysis was carried out in the USA.

Dates to which data relate
The effectiveness data were collected from observational data from June 1998 to April 2000. The costs seem to have been expressed in 1990 prices. The authors referred to the paper of Bishai et al. (2003) for further information on the costing analysis (see 'Other Publications of Related Interest' below for bibliographic details).

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

Link between effectiveness and cost data
The cost data were not derived from the same patient population as the effectiveness information. The costs were derived from administrative data provided by the rural and central sites involved in the project.

Study sample
For full information on the study sample the authors referred to the parent study (Ferris et al. 2002, see 'Other Publications of Related Interest' below for bibliographic details). A total of 264 participants were enrolled in the study. However, only 211 patients with complete data were analysed for the evaluation of colposcopy adequacy and management, while 146 patients were used for the evaluation of sensitivity and specificity.
Study design
The study design was a within-group comparison that was conducted in two rural and central clinics. The participants were analysed by both network and computer approaches to determine the operational characteristics and the sensitivity and specificity of the technologies. Therefore, only information gathered at the time of the diagnosis was included in the analysis. All participants were evaluated by both technologies, each delayed and not-delayed. The investigators consisted of two local clinicians (one per site) and three expert colposcopists (one site expert and two distant experts). The authors reported that the distant expert and local clinician were blinded to the initial cross-validation examination. The site expert, local clinician and distant experts independently recorded the findings of their examination. The assessment of the images was conducted randomly to avoid bias.

Analysis of effectiveness
Effectiveness was defined as the proportions of examinations graded as "satisfactory", the proportions of examinations in which biopsy was recommended, and the proportions of examination in which endocervical curettage was recommended. The sensitivity and specificity of both methods were estimated using two definitions of disease. One definition was normal versus any other histological diagnosis. The other was normal or cervical intraepithelial neoplasia (CIN) versus any more severe diagnosis. The reader is referred to Ferris et al. 2002 for full information on the baseline characteristics.

Effectiveness results
A higher rate of satisfactory colposcopic examinations was reported with the use of network telecolposcopy (64%) than with computer-based telecolposcopy (44.1%), (p<0.0001).

There were no significant differences in the rate of satisfactory colposcopy between delayed and real-time examinations.

The delayed versions suggested more cervical biopsies compared with the synchronous versions: 70.6% for delayed network and 74.9% for delayed computer examinations versus 69.2% for non-delayed network and 63.5% for non-delayed computer examinations, (p=0.005).

Difference in the rate of biopsy indication between delayed and real-time versions was greater for computer telecolposcopy than for network telecolposcopy, (p=0.03).

Similar results were achieved in the endocervical curettage indications. A significantly greater rate of endocervical curettage was requested for the two delayed types of telecolposcopy than for the non-delayed versions, (p=0.028), with a greater difference between delayed and non-delayed computer examinations than for the network examinations, (p=0.048).

The sensitivity and specificity were similar for the four types of telecolposcopy when the cancer cursor CIN 2 or worse threshold was considered. However, a significantly greater specificity was noted for computer telecolposcopy, compared with network telecolposcopy, when using the lower threshold of CIN 1 or worse, (p=0.014).

Clinical conclusions
The results of the effectiveness analysis suggested that, overall, telemedicine network telecolposcopy was no more accurate than computer-based telecolposcopy for the diagnosis of potential lower genital tract neoplasia. Similar results were achieved when comparing real-time telemedicine with delayed telemedicine.

Measure of benefits used in the economic analysis
As the outcomes results suggested that both techniques were similar, the analysis should be considered a cost-minimisation analysis.
Direct costs
Only the costs of essential equipment for telemedicine network and computer-based telecolposcopy were included in the analysis. All other costs were assumed to be similar between the two groups and were omitted from the costing calculation. In addition, all costs related to video image equipment and the transmission of real-time images were excluded from the overall costs of computer-based telecolposcopy. The cost data were derived from interviews held with the administrators at the rural and central sites. The costs seem to have been expressed in 1990 prices. Five-year straight line depreciation was assumed. Discounting was not needed as the costs were assumed to have been incurred during a short time. The perspective adopted was not reported in this article, but it seems to have been that of the health service provider.

Statistical analysis of costs
The costs were treated as point estimates.

Indirect Costs
The indirect costs were not included in the analysis. The authors assumed that the patient's time and travel costs were identical for both telecolposcopy methods.

Currency
US dollars ($).

Sensitivity analysis
Patient-level data were available to analyse and present the effectiveness results. Therefore, uncertainty was handled through classical statistical techniques such as hypothesis testing. No further sensitivity analyses were performed on the costing analysis.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The total fixed costs for full capacity of the equipment, that is, 1,200 patients per year, was $55,077 (or $46 per patient) for network telecolposcopy versus $21,972 (or $18 per patient) for computer-based telecolposcopy. The difference was $33,105.

The greatest savings arose from avoidance of the line charge ($24,420) for network telecolposcopy.

Synthesis of costs and benefits
The costs and effects were not combined as the analysis was considered a cost-minimisation study.

Authors' conclusions
Compared with the fast high-technology approach of network telecolposcopy, computer-based telecolposcopy may be a reasonable, cost-effective adjunct to on-site colposcopy for evaluating women in medically underserved areas.

CRD COMMENTARY - Selection of comparators
The reason for the selection of the comparator was clear. Some rural sites have limited access to specific health care technologies, and network and computer-based telecolposcopy may improve access to health care. However, their costs and effects needed to be compared before their use could be recommended. Both alternatives seem to have represented
current practice in the authors' setting. You should decide if this is widely used health technology in your own setting.

**Validity of estimate of measure of effectiveness**
The choice of outcomes seems to have been appropriate for the study question. It was not easy to determine whether the study sample was appropriate to answer the study question, as no information on power calculations was provided. For the same reason it was not possible to assess whether the study sample was representative of the study population. The study design was carefully performed. However, the results from the statistical analysis were not reported consistently throughout the text. The interpretation of the outcome results were difficult to understand.

**Validity of estimate of measure of benefit**
As both techniques showed similar outcomes between the groups, the analysis was considered to be a cost-minimisation analysis. Please see the comments in the 'Validity of estimate of measure of effectiveness' field (above).

**Validity of estimate of costs**
The perspective adopted was not stated clearly, and it was unclear what categories were omitted under the assumption of equal costs between the groups. There was limited information on the costing exercise and the reader is strongly advised to read Bishai et al. 2003 for a detail explanation. As only costs were reported it was difficult to assess what was included in each category, and this may hinder the reproducibility of the results. It is likely that the omissions may have influenced the cost results and the internal validity of the analysis. The costs seem to have been inflated, but this issue was not described further. Again the internal validity of the study is questioned. A similar scenario applies to the unit prices and their sources. The year to which the prices referred was unclear, and this will hamper any possible inflation exercises.

**Other issues**
The authors provided references of other settings where these technologies were compared. The issue of generalisability was not fully addressed in the paper, and is thus a shortcoming in the presentation of the results. However, the authors provided enough arguments in their discussion about the reason for implementing computer-based technologies. The authors acknowledged the fact that the technology is moving fast and the costs of network telecolposcopy have decreased over the last couple of years.

**Implications of the study**
Computer-based telecolposcopy seems to be a cost-effective intervention in comparison with network telecolposcopy. The authors suggested “the results of our study seem to support the further development and perhaps implementation of computer-based telecolposcopy services in medically underserved regions, in many cases considered the real world”.

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**Bibliographic details**

**PubMedID**
15874845

**Other publications of related interest**
Ferris DG, Macfee MS, Miller JA, et al. The efficacy of telecolposcopy compared with traditional colposcopy.