Teledermatology in Hong Kong: a cost-effective method to provide service to the elderly patients living in institutions
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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 health technology examined in the study was a telemedicine service for the diagnosis of dermatological diseases by means of an electronic transfer medium that transmits visual and acoustic information through live audiovisual connections. The technology allows the diagnosis of patients to be made without the physical presence of the doctor at the place of consultation.

Type of intervention
Diagnosis; Treatment; Telemedicine.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised elderly institutionalised patients with dermatological problems.

Setting
The telemedicine service was located in a teaching hospital (Prince of Wales Hospital, PWH), while the patients lived at the Shatin Hospital (SH) and a residential home for elderly people (EP). The economic study was carried out in Hong Kong.

Dates to which data relate
The dates during which data on both effectiveness and resources used were gathered were not reported. The price year was not specified.

Source of effectiveness data
A single study was used as source of the effectiveness evidence.

Link between effectiveness and cost data
The costing was undertaken prospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
Power calculations were not performed to determine the sample size. Seventy-four patients (all older than 55 years of age) living in the two study institutions and requiring dermatological visits were enrolled in the study. A resident medical officer first saw patients and, if a specialist opinion were necessary, patients were asked to participate in the study. The dermatologist at PWS attempted to make a diagnosis and plan using a live audiovisual connection.
Study design
The study was based on a cohort of patients who underwent both the traditional visit and the new telemedicine service. The same dermatologist saw all patients. On the same day, the dermatologist saw the patient face-to-face for the same purpose. The location of the face-to-face contact was not reported. The study was carried out in three centres (PGH, SH, and EP). Patients were not followed-up after the diagnosis had been made.

Analysis of effectiveness
It appears that all patients included in the study were accounted for in the analysis. The primary health outcomes assessed in the analysis were the rates of matching both in terms of the diagnosis made with the telemedicine service and the traditional service (correct, differential, or wrong) and in terms of investigation and management plan (matched or unmatched). No further details were given. Patient preferences for the two approaches were also recorded. Only one group of patients was used to derive the effectiveness evidence and the traditional method of face-to-face consultation was considered as the gold standard.

Effectiveness results
The rate of matching between the two diagnostic approaches was 74.3% (55 patients).

Differential diagnoses and uncertain diagnoses were recorded in 17.6% (13 patients) and 8.1% (6 patients) of the sample.

Overall, 87.8% of the investigation and 83.8% of the management plan were matched.

Forty-one patients expressed their opinion on the teledermatologic service: 87.8 (36 patients) preferred teledermatology to conventional consultation and only 12.2% (5 patients) preferred conventional consultation.

Clinical conclusions
The teledermatology service provided an apparently good rate of matching with visit to the home and was well accepted by the patients in comparison with the conventional face-to-face approach.

Measure of benefits used in the economic analysis
Health outcomes were left disaggregated and no summary benefit measure was used. Therefore a cost-consequences analysis was conducted.

Direct costs
Discounting was not conducted because of the short time horizon of the study. The cost/resource boundary adopted was not clearly reported, but it appears to have been that of the health service. Unit costs and quantities of resources used were reported separately for many cost items. The health services included in the cost analysis were: set-up costs (telemedicine equipment and installation, such as polycom viewstation, 21" TV, cordless stereo headphone system, ISDN lines, etc), annual maintenance cost (on-site maintenance and ISDN costs), and staff cost (during teleconsultation or transportation costs in non-emergency ambulance service). The estimation of costs and quantities was presumably based on actual data obtained from the institutions where the study was conducted. The dates during which data on both effectiveness and resources used were gathered were not reported. The price year was not specified.

Statistical analysis of costs
No statistical analyses were carried out.

Indirect Costs
Indirect costs were not included.

**Currency**
Hong Kong dollars (HK$). The exchange rate of HK dollars to UK pounds sterling (gbp) was 1 = HK$12.6.

**Sensitivity analysis**
Sensitivity analyses were not conducted.

**Estimated benefits used in the economic analysis**
Please refer to the effectiveness results reported earlier.

**Cost results**
Total set-up costs for the three sites were HK$268,278.

Total annual maintenance costs were HK$88,200.

Staff cost per patient was HK$57.7 with teleconsultation, HK$322.8 when a patient was transported to specialty clinic, and HK$445.9 when a dermatologist was sent to the two separate facilities where patients lived.

The telemedicine service realised per-patient cost-savings of HK$265.1 in comparison with sending patients to the specialist clinic. However, the cost of set-up and maintenance costs have to be taken into account: to offset maintenance costs, at least 48 patients must be seen through teleconsultation and to offset set-up costs in both sites, more than 145 patients have to be seen.

Since the average number of patients seen at the authors' institutions was 89 per year, about 3.55 years would be necessary to offset costs in both sites.

This time frame (3.55 years) was perhaps overestimated if both the increasing number of patients seen and the depreciation costs of the equipment were considered.

**Synthesis of costs and benefits**
Not relevant.

**Authors' conclusions**
The teledermatology service was cost-effective for institutionalised elderly patients in the urban setting of Hong Kong. The key to the programme's success was the number of patients involved in the service. Therefore, a multidisciplinary approach should be ensured to offset quickly the fixed costs of the service.

**CRD COMMENTARY - Selection of comparators**
The reason for the selection of the comparators seems clear, although it was not explicitly reported. Sending patients to one specialty clinic or monthly visits of a dermatologist to the institutions where patients live were selected because they represented two feasible options commonly used in the setting in which the study was conducted. You, as a user of this database, should assess whether they represent commonly used procedures in your own setting.

**Validity of estimate of measure of effectiveness**
The effectiveness analysis was based on the results from a single cohort of patients who underwent both the conventional and new approach for the diagnosis of dermatological diseases. In addition, the same dermatologist saw all
patients. On the one hand, problems related to confounding factors and selection biases were avoided, but on the other, there could, as the authors acknowledged, have been a risk of overestimation of the diagnostic accuracy. Power calculations were not performed on the sample and the dates during which the effectiveness evidence was gathered were not reported. Also, there was a lack of detail around exactly how the diagnosis and plan were recorded, such that the degree of matching was not transparent.

**Validity of estimate of measure of benefit**
No summary benefit measure was used in the economic analysis. Therefore please refer to the commentary above. It would have been interesting to have assessed the impact of the interventions on patient health through the use of a specific health outcome measure.

**Validity of estimate of costs**
Costs were treated deterministically and no sensitivity analyses were conducted, therefore the cost estimations were quite specific to the study setting. No price year was reported. However, the exchange rate from HK dollars into UK pounds sterling was reported. Statistical analyses on quantities were not conducted, but quantities of resources and unit costs were reported separately for many cost items included in the analysis. The threshold analysis was also useful.

**Other issues**
The study results appeared to confirm those from published studies, but the study did not support the findings of previous studies that indicated that the time necessary to make a diagnosis through teleconsultations was longer than the time involved in face-to-face visits. The issue of the generalisability of the results was not addressed and effectiveness results were reported selectively. However, the conclusion regarding cost-effectiveness would seem to be reasonably applicable to other settings, given that the cost differential would be likely to increase in less densely populated areas.

**Implications of the study**
The authors stated that the teledermatology service was particularly important for patients who have difficulties in travelling to see a doctor, such as elderly and disabled people, and that further studies should focus on the application of telemedicine in postgraduate training. These conclusions should be viewed in the light of the caveats described above.

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