An economic evaluation of home care for children with newly diagnosed diabetes: results from a randomized controlled trial

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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
Home care or inpatient hospital care in the treatment of newly diagnosed Type I diabetic children.

Type of intervention
Treatment; supportive care.

Economic study type
Cost-effectiveness analysis.

Study population
Diabetic patients fulfilling the following criteria entered the study: aged between 2 and 17 years, having no diabetic siblings, living at a home within 1 hour of the study hospital, and having at least one parent being able to give the required care.

Setting
Hospital and community. The economic study was carried out in Montreal, Canada.

Dates to which data relate
The effectiveness and resource utilisation data were collected between September 1989 and October 1991. The price year was 1991.

Source of effectiveness data
The evidence for the final outcomes was derived from a single study.

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

Study sample
Power calculations were not used to determine sample size. The study sample comprised 63 patients fulfilling the study's inclusion criteria. The home care group consisted of 32 randomly designated patients, whereas the traditional hospital care group consisted of 31 randomly allocated patients.

Study design
The study was a randomised controlled trial, carried out in a single study centre. The duration of the follow-up for all
clinical outcomes, except glycemic level was 24 months. Glycemic level was measured for the final time at 36 months after randomisation. No loss to follow-up was reported.

Analysis of effectiveness
The principal (intention to treat or treatment completers only) used in the analysis of the clinical outcomes was not specified. The main health outcome measures were glycemic level (percentage of glycosylated haemoglobin HbA1c in the blood) and the incidence of adverse events (hyperglycemia with ketosis, diabetic ketoacidosis, severe hypoglycemia, and chronic hyperglycemia). The psychological aspects of adjustment to diabetes and school absence were also measured. The groups at diagnosis were shown comparable in terms of age, gender, socioeconomic status, glycemic (HbA1c) levels, and insulin dosage.

Effectiveness results
It was discovered that in terms of mean glycemic level, there was no significant difference between the groups at diagnosis (home care 10.7% versus traditional care 10.0%, P>0.26), and at 12 months (home care 6.4% versus traditional care 6.1%, P>0.55). The corresponding values at 24 and 36 months were 6.1% versus 6.8%, P<0.02 and 6.4% versus 7.1%, P<0.05, respectively. The number of incidents of adverse diabetes-related clinical events were 32 in the home care group against 31 in the traditional care group. In terms of psychological aspects of adjustment to diabetes, no significant differences between the groups were detected. The p-value for the difference in school absence was greater than 0.85.

Clinical conclusions
The authors concluded that “home care improved the children's metabolic outcomes without adversely affecting their psychological adjustment to diabetes”. The “key health effect finding was that the home care group had better glycemic control”.

Measure of benefits used in the economic analysis
The main health outcome measures were glycemic level (percentage of glycosylated haemoglobin HbA1c in the blood quarterly measured) and the incidence of adverse events (hyperglycemia with ketosis, diabetic ketoacidosis, severe hypoglycemia, and chronic hyperglycemia).

Direct costs
Costs were discounted. Resource utilisation was reported separately from costs. Cost items were not reported separately. The cost items consisted of the cost of hospital services (including a wide range of services), costs of drugs, costs of physician contacts, costs of psychological counselling and diabetic nursing services, the cost of government contribution to pension plan for hospital staff, and the parents’ out-of-pocket spending.

The cost results were reported in terms of cost effects (the difference in costs between the study groups). The main perspective adopted by the study was societal, although the cost results were also calculated from the perspective of the government, the hospital, the health care system, and the parents.

The main source of resource utilisation data was the study hospital records and staff judgements. The main sources of cost data were the study hospital records, Quebec's physician fee scale in 1991, and parental information, collected using a questionnaire, regarding out-of-pocket spending. The date to which the price data referred was 1991. The government's allowance for insulin and medical supplies to all families, a few diabetes-related health services not provided in the study hospital, and the values of residents’ and interns’ services were not included in the cost analysis (the cost results were insensitive to these omissions). The lower future health costs due to better health outcomes for the patients in the home care group were not considered in the study.

Statistical analysis of costs
Student's t test was used to investigate the statistical significance of the difference in costs between the groups.

**Indirect Costs**
Costs were discounted. The value of parents' diabetes-related time was estimated, the estimation being based on a set of assumptions regarding the time devoted to the patients and the parents' earnings. The source of data regarding average hourly earnings of mothers (fathers) was Quebec's 1991 report. The price year was 1991.

**Currency**
Canadian dollars (Can$). A conversion was performed using the exchange rate of 1991, Can$1 = US$0.87.

**Sensitivity analysis**
One-way and multi-way sensitivity analyses were performed on all key parameters of the cost analysis. In the multi-way sensitivity analysis, two scenarios (higher cost and lower cost) were constructed to capture the impacts of "all plausible errors that would render the baseline cost effect estimate too low" or too high.

**Estimated benefits used in the economic analysis**
It was shown that in terms of mean glycemic level, there was no significant difference between the groups at diagnosis (home care 10.7% versus traditional care 10.0%, P>0.26), and at 12 months (home care 6.4% versus traditional care 6.1%, P>0.55). The corresponding values at 24 and 36 months were 6.1% versus 6.8%, P<0.02 and 6.4% versus 7.1%, P<0.05, respectively. The number of incidents of adverse diabetes-related clinical events were 32 in the home care group against 31 in the traditional care group.

**Cost results**
The discount rate was 5%. From the societal point of view, the average cost of patients in the home care group was $48 (SD, $274) higher than in the control group (P>0.85). The government and health system cost effects (the cost of home care minus the cost of traditional care) were $890 (SD, $139) and $768 (SD, $165), respectively (P=0.001 in both cases). Parents' cost effect was -$720 (SD, $188). Parents' time was valued at $11.88 per hour.

**Synthesis of costs and benefits**
A synthesis was not performed since the home care was the weakly dominant strategy (with similar social cost per child but with better heath outcomes). The sensitivity analysis established the robustness of hospital, government, and parent (the cut-off points was $0.50 for the value of parent's time) cost effect results. The social cost effect became statistically significant if the value of parents' time were set at $4.73 or less. The upper and lower bounds of the social cost effect corresponding to higher and lower cost scenarios were $689 and -$650.

**Authors' conclusions**
Using home care to reduce hospital stays for children with newly diagnosed Type I diabetes improved children's health outcomes without significantly increasing social costs.

**CRD COMMENTARY - Selection of comparators**
A justification was given for the choice of the comparator. Inpatient hospital care was used as the comparator since it was regarded as the traditional method of treatment for patients. You should consider whether this is a widely used health technology in your own setting.

**Validity of estimate of measure of benefit**
The estimates of the benefit measures are likely to be internally valid because of the randomised design adopted in the
study.

**Validity of estimate of costs**  
The resource utilisation was extensively reported. Adequate details of the methods of cost estimation were given. The inclusion of future health costs that were not considered in the study might enhance the cost-effectiveness of home care compared to traditional hospital care.

**Other issues**  
The issue of generalisability to other settings or countries was addressed by performing comprehensive sensitivity analysis.

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