Costs and benefits of personalized healthcare for patients with chronic heart failure in the 
care and education program "Telemedicine for the Heart"

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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.

CRD summary
The objective was to assess the costs and benefits of a personalised telemedicine health care programme for patients 
with chronic heart failure, in Germany. The authors concluded that the programme reduced costs, hospitalisations, and 
mortality, and improved quality of life. The cost-effectiveness results strongly favoured the telemedicine programme, 
but the conclusions could have been more cautious, given the quality of the evidence.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study evaluated the costs and effects of a personalised remote medicine (telemedicine) programme for patients 
with chronic heart failure.

Interventions
The intervention was the German health care and education programme, called Telemedicine for the Heart. This 
consisted of telephone calls from a nurse, every two weeks, to motivate patients to keep diaries of regular self-measured 
blood pressure, pulse, and weight, and to record these measurements in their notes. If the measurements fell outside set 
limits, treating physicians were called and therapy was adjusted if necessary. The control group consisted of randomly 
selected patients, with regular health insurance, who did not receive the intervention.

Location/setting
Germany/secondary care.

Methods
Analytical approach:
The analysis was based on one clinical study. Patients were followed-up for a maximum of two years. The authors 
stated that the analysis was conducted from the perspective of statutory health insurance.

Effectiveness data:
The key effectiveness outcomes were mortality, hospitalisations, and patient quality of life, measured on the self-
completed Short Form (SF-36) Health Survey, at the start of the programme, and at the end of the observation period. 
A retrospective analysis of data from a German statutory health insurance database was conducted. The patients had 
symptomatic heart failure and a recent in-patient stay due to heart failure. Each programme participant (281 patients) 
was matched to three control patients (843 patients), for age, gender, New York Heart Association (NYHA) status, and 
number and kind of prior hospital admissions. Mortality trends were examined using Kaplan-Meier plots. Patient 
satisfaction with the programme was measured, using an individual semi-poll of participants, during the programme.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
There was no summary measure of benefit. Mortality, hospitalisations, and quality of life were reported.
Cost data:
The cost categories were medications, hospitalisations, and therapeutic aids. The total costs were normalised to annual costs, to directly compare the different observational periods; the costs for each patient were extrapolated to one year. The costs were reported in Euros (EUR).

Analysis of uncertainty:
Standard deviations were reported for the costs outcomes. Student t-tests were conducted to assess cost differences. Approximate costs for the telemedicine programme were considered.

Results
Over a mean observational period of 582 days (SD 134), 8.5% (24/281) of programme participants died. Over a mean observational period of 552 days (SD 164), 13.2% (111/843) of control patients died. The difference between the number of deaths in each group was statistically significant (p<0.05). The number needed to participate in the programme to prevent one death was 22. There were on average 1.02 hospital admissions per patient per year with the programme, compared with 1.30 without it.

The mean overall cost per programme participant was EUR 7,897 (SD 12,699). The mean cost for the control group was EUR 10,530 (SD 21,140). Programme participants cost on average EUR 2,633 less than control patients (regardless of survival); a 25% cost reduction.

In the sensitivity analysis including the average programme cost per participant, this almost halved the cost reduction with the programme versus the control. The cost advantage was greatest for patients with NYHA stage II disease, and there was a cost disadvantage (programme participants cost more than control patients) for patients with more severe NYHA stages (III or IV) of disease.

Authors' conclusions
The authors concluded that the telemedicine programme reduced costs, hospitalisations, and mortality, and improved quality of life.

CRD commentary
Interventions:
The intervention was clearly reported. The paper implied that there were other multidisciplinary heart failure programmes that were in use. The control group consisted of patients who did not receive the intervention, which implies that the comparator was standard practice, which was appropriate. The care given to these control patients was not described, making it difficult to assess the generalisability of the results to other settings.

Effectiveness/benefits:
The key characteristics of the intervention and control groups were clearly reported. The authors reported that the difference in mortality between the two arms was statistically significant, but this needed confirmation in large, randomised trials. They stated that the the SF-36 physical subscale scores were equivalent for both groups, but these data were not given. They also stated that the mental sum scale showed a better quality of life for programme participants, but the diagram indicated that this difference was minimal and some subscales were worse for programme participants. So, the conclusion that the programme resulted in improved quality of life is not supported.

Costs:
The cost items were appropriate for the perspective adopted. The methods used to measure and value the resource use were not reported. The cost outcomes were clearly reported for the main analysis, but were not fully reported for the sensitivity analysis, when the cost of the intervention was included. A full economic evaluation should incorporate the cost of the intervention in the main analysis. The price year was not reported, and the authors did not discuss discounting of future costs or benefits. They stated that the cost calculations were complex due to the high levels of comorbidity, and a follow-up project was planned to improve the inclusion and evaluation of comorbidities.

Analysis and results:
The methods were clearly reported, but the results could have been reported better. The study had a retrospective, observational design, leaving it open to selection bias. The authors tried to ensure the comparability of the groups by...
matching patients on key characteristics, but some important ones, such as smoking status, and socioeconomic parameters, could not be included due to a lack of information. This left a significant risk of selection bias, and the authors recommended that a randomised controlled trial should be conducted. Another limitation was the short time horizon, which means that conclusions cannot be made on the long-term costs and benefits of the programme. The authors indicated that further studies should assess which components of the programme contributed to the mortality and cost reductions.

Concluding remarks:
The cost-effectiveness results strongly favoured the telemedicine programme, but the authors could have been more cautious in their conclusions, given the quality of the evidence.

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