Telemonitoring or structured telephone support programmes for patients with chronic heart failure: systematic review and meta-analysis

Clark R A, Inglis S C, McAlister F A, Cleland J G, Stewart S

CRD summary
This review evaluated the efficacy of remote monitoring programmes versus regular medical visits in patients with chronic heart failure (CHF). Remote monitoring was associated with a lower rate of hospitalisation due to CHF and with decreased all-cause mortality. These conclusions are likely to be reliable, but it should be noted that they were based on relatively few studies and participants.

Authors' objectives
To review the efficacy of remote monitoring programmes as opposed to regular clinic or home visits in patients with chronic heart failure (CHF).

Searching
The Cochrane CENTRAL Register, MEDLINE, EMBASE, CINAHL, AMED, ISI Web of Knowledge, HSTAT, Ingenta, Zetoc, LILACS, the Science Citation Index, the National Research Register, PsycINFO and Web of Science were searched from 1 January 2002 to 6 May 2006; the search terms were reported. Reference lists of relevant studies and unpublished conference proceedings were checked, and experts on the topic were contacted for additional studies. No language restrictions were applied.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion in the review.

Specific interventions included in the review
Studies comparing remote monitoring programmes with standard care in patients with CHF were eligible for inclusion. Remote monitoring programmes included standardised telephone contact, telemonitoring, or both, and consisted of structured contacts targeted at the patient and performed by a health professional from the first month after hospital discharge. Standardised telephone contacts were aimed at monitoring symptoms and medicine use, as well as advising on lifestyle. Telemonitoring consisted of monitoring symptoms and transmission of information such as weight, pulse, blood-pressure, and electrocardiographic findings. Remote monitoring had to be the only intervention provided and it could not be integrated with clinic or home visits. The length of follow-up ranged from 3 to 16 months.

Participants included in the review
Studies evaluating remote monitoring programmes in patients with CHF living at home were eligible. All included studies enrolled patients with symptomatic CHF classified as stage II-IV according to the New York Heart Association. The mean age of the participants ranged from 57 to 75 years.

Outcomes assessed in the review
The authors did not state any inclusion criteria relating specifically to the outcomes. The primary outcomes were all-cause mortality, all-cause hospitalisation and hospitalisation due to CHF. The secondary outcomes were costs, acceptability and quality of life. In the included studies, quality of life was assessed by the Minnesota Living with Heart Failure Questionnaire, the Patient Health Questionnaire 9 item (PHQ-9), the General Health Questionnaire, the Chronic Heart Failure Symptomatology Questionnaire and/or the Health Distress Score.

How were decisions on the relevance of primary studies made?
Two reviewers independently selected the studies, with any disagreements resolved by a third reviewer.
Assessment of study quality
Two reviewers independently assessed the quality of the studies, with any disagreements resolved by a third reviewer. Study quality was evaluated according to the Cochrane recommendations on randomisation, allocation concealment, blinding of the patients and assessors, and completeness of follow-up.

Data extraction
Two reviewers independently extracted the data, with any disagreements resolved by a third reviewer. Data were extracted to calculate risk ratios (RRs), risk difference and the corresponding 95% confidence intervals (CIs).

Methods of synthesis
How were the studies combined?
Data for the primary outcomes were pooled using the DerSimonian and Laird random-effects model with an intention-to-treat analysis. The secondary outcomes were presented narratively and were tabulated. Publication bias was visually evaluated by a funnel plot.

How were differences between studies investigated?
Statistical heterogeneity was tested using Cochran's Q test and the I-squared statistic.

Results of the review
Fourteen RCTs (n=4,264) were included.

The included studies were all scored as being of adequate quality. Four studies evaluated telemonitoring, nine evaluated structured telephone contacts and one evaluated both methods.

All-cause mortality.
Remote monitoring programmes were associated with a statistically significant 20% reduction in all-cause mortality (RR 0.80, 95% CI: 0.69, 0.92) without statistical heterogeneity between the studies. The decrease in all-cause mortality was apparently more pronounced with telemonitoring (RR 0.62, 95% CI: 0.45, 0.85, p=0.003) than with structured telephone support (RR 0.85, 95% CI: 0.72, 1.01, p=0.06).

All-cause hospitalisation and hospitalisation due to CHF.
The rate of all-cause hospitalisation was comparable between the intervention and control groups, whereas hospitalisation due to CHF was significantly reduced by remote monitoring programmes (RR 0.79, 95% CI: 0.69, 0.89). There was no evidence of statistical heterogeneity (p=0.76; I-squared 0%).

Quality of life, cost and patient acceptability.
Quality of life and patient acceptability were reported in 6 and 4 studies, respectively. Remote monitoring was associated with a significant improvement in quality of life, and it was regarded as acceptable and/or easy to use in 3 studies.

The authors stated that publication bias was unlikely, as assessed by funnel plot.

Cost information
Four studies calculated health care costs for the structured telephone support. Three of these investigations reported per-patient costs of between $23.60 and $443 lower for patients randomised to the intervention. No cost information was reported by studies on telemonitoring.

Authors' conclusions
In patients with CHF, remote monitoring programmes reduce the rate of hospitalisation due to CHF and all-cause mortality, but there seems to be no significant effect on all-cause hospitalisation.

CRD commentary
This review addressed a well-defined question in terms of the study design, participants and interventions. The authors searched several relevant databases and efforts were made to find further information by reviewing reference lists. The potential influence of publication bias was considered in the report and no evidence of it was found for the primary outcome of the review. No restrictions on language were applied. The authors attempted to minimise bias and errors during the review process by carrying out the study selection, data extraction and quality assessment processes in duplicate.

Statistical heterogeneity was assessed and the authors stated that there was no significant statistical heterogeneity for the main outcomes; this supports the authors’ decision to pool the data in a meta-analysis. As the authors acknowledged, a limitation of this review was the relatively small number of studies and participants. The authors' cautious conclusions appear appropriate and are likely to be reliable.

Implications of the review for practice and research
Practice: Remote monitoring programmes may be useful for patients with CHF who have problems reaching specialised care centres for regular clinic visits.

Research: Future studies on remote monitoring programmes for patients with CHF should evaluate quality of life, acceptability and costs.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.