Effectiveness of comprehensive disease management programmes in improving clinical outcomes in heart failure patients: a meta-analysis

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CRD summary
This review concluded that disease management programmes (DMPs) significantly reduce mortality and hospitalisation in patients with heart failure. Different types of DMP appear to have similar results, suggesting that the choice of programme will depend on local factors. The reliability of the authors’ conclusions is undermined by the differences between the studies.

Authors' objectives
To evaluate the effectiveness of disease management programmes (DMPs) in improving heart failure (HF) clinical outcomes.

Searching
MEDLINE (1980 to 2004), EMBASE (1980 to 2004), CINAHL (1982 to 2004), the Cochrane Controlled Trials Register (Issue 3, 2004) and the Cochrane EPOC Register of trials were searched, in duplicate, for articles published in any language; the search terms were reported. Several pertinent journals were handsearched from 1990 to 2004. Personal files and the reference lists of retrieved studies were checked, and experts in the field and authors of ongoing studies, or studies presented at conferences, were also contacted.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion. The patients were followed up for 3 to 22 months (mean 6).

Specific interventions included in the review
Studies that compared a comprehensive DMP with usual care were eligible for inclusion. The DMPs varied widely in their delivery, setting and duration; most were multidisciplinary or were nurse-led. Usual care also varied, and was not well-defined in some studies. Most of the studies were conducted in academic settings, tertiary care or urban hospitals.

Participants included in the review
Studies of patients with a diagnosis of HF and receiving follow-up at an out-patient setting were eligible for inclusion. The participants had a mean age of 73 years, 58% were female and 75% were Caucasian. Diagnosis was mainly based on symptoms and clinical and radiological findings, with more recent studies looking specifically at the presence of left ventricular systolic dysfunction. Most of the studies enrolled participants who were at high-risk of hospitalisation for HF or other chronic conditions.

Outcomes assessed in the review
Studies had to report all-cause mortality and/or the rate of hospitalisation, and HF-related hospitalisations and/or HF-related mortality, to be eligible for inclusion. The length of hospital stay, number of days in hospital and quality of life were also reported. The main outcomes were all-cause mortality and all-cause (re) hospitalisations.

How were decisions on the relevance of primary studies made?
Two independent reviewers determine the eligibility of the studies, and any disagreements were resolved by consensus.

Assessment of study quality
The methodological quality of the studies was assessed with regards to method of randomisation, blinding of the outcome assessor, completeness of follow-up and use of intention-to-treat analysis. Studies were considered to be of ‘high quality’ if all components were met. The authors did not state how many reviewers performed the validity assessment.
Data extraction
For binary outcomes, the number of patients experiencing the outcome of interest was extracted and used to calculate an odds ratio (OR) with 95% confidence intervals (CIs). For continuous outcomes, the mean and standard deviation were extracted and used to calculate a mean difference. Each patient could only provide one outcome event. The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
A pooled OR or weighted mean difference (WMD), with 95% CI, was calculated using the method of Yusuf-Peto and DerSimonian and Laird (random-effects). Results for quality of life were presented in a narrative summary. Publication bias was explored through funnel plots, using the main outcome of all-cause mortality.

How were differences between studies investigated?
The statistical heterogeneity of each outcome was assessed using the Cochran Q test (significance threshold of p>0.05). Sensitivity analyses were performed to explore potential differences based on intervention, duration of follow-up, year of publication, country of study and methodological quality. Outlier studies were also identified.

Results of the review
Thirty-three RCTs (n>7,400) were included.

Twelve studies reported adequate methods of randomisation: the outcome assessors and care providers were blinded in 8 studies, while the patients were blinded in 3 studies. All but one study achieved a follow-up rate greater than 75%, and 18 studies performed an intention-to-treat analysis. Ten studies were considered to be 'high quality'.

Compared with usual care, DMPs were associated with a statistically significant reduction in the likelihood of mortality (OR 0.80, 95% CI: 0.69, 0.93, p=0.003; based on 5,308 patients in 28 studies) and all-cause hospitalisation (OR 0.76, 95% CI: 0.69, 0.94, p<0.00001; based on 7,387 patients in 32 studies).

Compared with usual care, DMPs were associated with a statistically significant reduction in the likelihood of HF-specific mortality (OR 0.37, 95% CI: 0.21, 0.73, p<0.0002; based on 700 patients in 4 studies), HF-related hospitalisation (OR 0.58, 95% CI: 0.50, 0.67, p<0.00001; based on 3,817 patients in 20 studies) and fewer number of all-cause days in hospital (WMD –1.49 days, 95% CI: -2.03, -0.95, p<0.00001; based on 2,356 patients in 12 studies). DMPs were also favourable with regards to HF-related number of days in hospital, length of hospital stay and number of hospital readmissions, however, the authors stated that there were insufficient data to reliably pool the results.

Evidence of statistical heterogeneity was shown in the main analyses. It was largely accounted for in the sensitivity analyses or following the exclusion of a single outlying study. The results of the sensitivity analyses suggested that results were similar for mortality, all-cause and HF-related hospitalisation rates, across different DMP approaches. High-quality studies and those of 3- to 6-month duration were consistently associated with significant reductions in all main outcomes. Nurse-led interventions did not impact on all-cause mortality.

Sixteen studies evaluated quality of life. Of these, eight reported a statistically significant improvement in quality-of-life score, four reported discordant results and four did not report any statistical significant difference between DMP and usual care.

The funnel plot was fairly symmetrical, suggesting little evidence for publication bias.

Authors' conclusions
DMPs reduce mortality and hospitalisations in patients with HF. Different types of DMP approaches appear similarly effective, suggesting that the choice of programme will depend on local health service characteristics, the patient population and available resources.

CRD commentary
The review addressed a clear research question and was supported by clear inclusion criteria. Several sources were used...
to identify published and unpublished studies in any language. Publication bias was explored and graphical results suggested little evidence of bias. Methods were used to minimise the potential for reviewer error and bias when selecting studies for inclusion, although it was unclear if such measures were used in the validity assessment or data extraction. The use of a component approach in the validity assessment was appropriate, the results of which were considered in the analysis. Adequate details of each included study were presented, and these highlighted variation in the interventions; the authors also stated that the definition of usual care varied. The presence of heterogeneity was perhaps not unexpected based on the apparent complexity of the interventions and variation in the comparator of usual care. The authors went on to explore potential reasons for this heterogeneity. However, reasons for the differences were unexplained for some outcomes, as were reasons for outlying studies. Overall, although the evidence presented supports the authors’ conclusions, the apparent heterogeneity may undermine their reliability.

**Implications of the review for practice and research**

**Practice:** The authors stated that the choice of a specific programme will depend on the characteristics of the local health service, the patient population and available resources.

**Research:** The authors stated that ongoing and future trials will address the relative effectiveness of different types of interventions and identify which programme to adopt in practice.

**Funding**

Ontario Ministry of Health and Long-Term Care; Canadian Institutes of Health Research.

**Bibliographic details**


**PubMedID**

16198629

**DOI**

10.1016/j.ejheart.2005.08.005

**Indexing Status**

Subject indexing assigned by NLM

**MeSH**

Delivery of Health Care /trends; Disease Management; Heart Failure /therapy; Humans; Program Evaluation /trends; Randomized Controlled Trials as Topic; Treatment Outcome

**AccessionNumber**

12006000059

**Date bibliographic record published**

25/10/2006

**Date abstract record published**

01/12/2008

**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.