A meta-analysis of the effect of hospital-based case management on hospital length-of-stay and readmission

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CRD summary
This review evaluated the effects of hospital-based case management (CM) on the length of hospital stay and readmission rates. The authors concluded that patients receiving hospital-based CM interventions experienced a 6% decrease in readmission rate. However, the authors' analyses were subject to a number of limitations that may have affected the reliability of their conclusions.

Authors' objectives
To evaluate the effects of hospital-based case management (CM) on the length of hospital stay and readmission rates.

Searching
MEDLINE (1966 to 2003), CINAHL (1982 to 2003) and HealthSTAR (1975 to 2003) were searched; the search terms were reported. The authors also checked the reference lists of previous reviews and contacted experts for additional studies. Only studies published in English language journals were retrieved.

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

Specific interventions included in the review
Studies that compared any hospital-based CM intervention with usual care were eligible for inclusion. Hospital-based CM was defined as a dynamic system of care including the construction of interdisciplinary protocols, continual monitoring and the facilitation of a treatment plan. Studies assessing hospital-to-community-based CM and community-based CM were excluded from the review. Of the 12 included studies, eleven evaluated nurse-led interventions and one evaluated a physician-led intervention.

The interventions included one or more of the following components: assessment; education; collaboration; discharge plan; use of a protocol; linkage; and post-discharge monitoring either through home visits or telephone calls. All but one study included an assessment component and the majority of studies also involved education and collaboration. Usual care was poorly defined in most studies. The majority of the studies were carried out in U.S. hospitals.

Participants included in the review
Studies including hospitalised patients aged at least 18 years old were eligible for inclusion. Studies of patients who were receiving out-patient care or who were mentally ill were excluded from the review. The included studies were of elderly patients with a mean age of 72.2 years. The included patients were diagnosed as suffering from heart failure, age-related frailty, stroke, chronic obstructive pulmonary disease, critical illness or epilepsy.

Outcomes assessed in the review
Studies assessing the hospital length of stay (LOS) and hospital readmission rates were eligible for inclusion. LOS was defined as the average number of days spent in hospital per patient during the study period. Readmission rates were defined as the proportion of patients readmitted on at least one occasion during the follow-up period of the study.

How were decisions on the relevance of primary studies made?
One author reviewed the abstracts of each retrieved article and two reviewers then independently assessed the full papers of potentially relevant studies. Studies were included when both reviewers reached agreement.
Assessment of study quality
The methodological quality of the studies was assessed using the Jadad scale (randomisation, blinding, and withdrawals or drop-outs) with studies awarded a score of between 0 and 5 points. The quality of the interventions was also assessed using criteria developed by the author based on the following six components of CM: comprehensive assessment, education/consultation, collaboration, discharge planning, linkage with the community and post-discharge follow-up. Studies were awarded one point for each interventional component. The methodological and interventional scores were combined (maximum of 11 points) and the studies classified as high quality (8 to 11 points), moderate quality (4 to 7 points) or low quality (0 to 3 points). Assessments were performed independently by each of the two authors and any disagreements were resolved through consensus.

Data extraction
Two reviewers independently extracted the data and any discrepancies were resolved through discussion. Data were extracted to enable the calculation of standardised differences in means with 95% confidence intervals (CIs) for LOS, and odds ratios (ORs) with 95% CIs for readmission rates. Studies which reported only that the results were not significant were given a designated effect size of zero. The authors of the primary studies were contacted where necessary for missing data. One study used different study designs for the diagnosis-specific subgroups and only subgroup data generated by the RCT component were extracted and included in the analysis.

Methods of synthesis
How were the studies combined?
Studies were combined in the presence of significant heterogeneity using a random-effects analysis. A pooled overall average weight effect size (AWES) for hospital LOS and a pooled OR for hospital readmission were calculated along with 95% CIs. The effect size was also interpreted as a binominal effect size display. Publication bias was assessed using funnel plots and, where evident, the fail-safe N was estimated.

How were differences between studies investigated?
Statistical homogeneity was assessed using the Q statistic. Sensitivity analyses were performed to assess the effects of study quality, CM components, diagnoses and geographical setting (i.e. which country the study was set in).

Results of the review
Twelve RCTs (n=2,876) were included in the review.

Six studies were reported to be high quality and six to be moderate quality.

LOS.
Overall results: CM interventions (10 studies) did not appear to be effective in reducing the LOS (AWES 0.094, 95% CI: -0.032, 0.220, p>0.7); significant heterogeneity was detected (p<0.025).

Sensitivity analyses: LOS was not affected by study quality, the number of CM components or the geographical setting. However, the interventions appeared to be effective for patients with heart failure, but not for those with a stroke or those classified as frail elderly; the studies were homogeneous (p>0.05).

Readmission rates.
Overall results: no statistically significant effect of CM on readmission rates (10 studies) was found (OR 0.87, 95% CI: 0.69, 1.04); the studies were homogeneous (p>0.1). Using a binominal effect size display this was interpreted as a 6% decrease in readmission rates.

Sensitivity analyses: readmission rates were not affected by study quality, the number of CM components or patient diagnosis. Studies conducted in the USA were found to be effective, but not studies conducted elsewhere; the studies were homogeneous (p>0.1).
Publication bias.

The authors concluded that there was no significant risk of publication bias in terms of LOS or readmission rates, based on the results of the funnel plot and fail-safe N.

**Authors' conclusions**

Patients receiving hospital-based CM interventions experienced a 6% decrease in readmission rate. Further studies to evaluate the effectiveness of CM interventions on other outcomes are required.

**CRD commentary**

This review was based on a clear research question that was described in terms of the intervention, population, study design and outcomes. The authors searched several relevant sources and attempts were made to identify unpublished studies. However, the review only included studies published in English language journals, which might have introduced language bias. The authors used funnel plots and the fail-safe N to assess the risk of publication bias and concluded that this was unlikely; this assessment may not, however, be reliable given the small number of included studies. Appropriate steps were taken to reduce the risk of bias and error in the study selection, quality assessment and data extraction processes. Study quality was assessed both in terms of methodological validity and interventional validity. The latter was assessed using the authors' own criteria, which appeared not to have been validated.

Details of the study characteristics, quality and outcome data were tabulated clearly. The studies were pooled in a meta-analysis despite evidence of statistical heterogeneity in some cases. This suggested that pooling might not always have been appropriate. Different scales were also combined to give a composite score, which may not be reliable. The studies differed in terms of the interventions and population; some differences in how control groups and hospital readmission rates were defined were also evident. The sensitivity analyses indicated that effect sizes may be affected by patients' diagnoses and the geographical setting, which suggested that the interventions may not always be generalisable to other populations and hospitals outside the USA. However, some statistical comparisons considered only very small numbers of studies and might not, therefore, have been reliable. Overall, given these limitations, the authors' findings should be interpreted with caution, although their recommendations for further RCTs and reviews of other outcome measures appear reasonable.

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

Practice: The authors did not state any implications for practice.

Research: The authors stated that further RCTs are required to clearly define CM interventions and usual care. They also stated that meta-analyses to assess the effectiveness of CM interventions on other outcomes are needed.

**Bibliographic details**


**PubMedID**

16027568

**Other publications of related interest**

This additional published commentary may also be of interest. Harris R. Review: hospital based case management does not reduce length of hospital stay or readmissions in adults. Evid Based Nurs 2006;9:54.

**Indexing Status**

Subject indexing assigned by NLM
MeSH
Aged; Bias (Epidemiology); Case Management /organization & administration; Confidence Intervals; Critical Illness /therapy; Effect Modifier, Epidemiologic; Epilepsy /therapy; Frail Elderly /statistics & numerical data; Health Services Research /organization & administration; Heart Failure /therapy; Humans; Length of Stay /statistics & numerical data; Outcome Assessment (Health Care); Patient Readmission /statistics & numerical data; Pulmonary Disease, Chronic Obstructive /therapy; Randomized Controlled Trials as Topic; Research Design; Sensitivity and Specificity; Stroke /therapy

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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.