Effectiveness of chronic obstructive pulmonary disease-management programs: systematic review and meta-analysis

Peytremann-Bridevaux I, Staeger P, Bridevaux PO, Ghali WA, Burnand B

CRD summary
The authors concluded that chronic obstructive pulmonary disease-management programmes modestly improved exercise capacity, health-related quality of life, and hospital admissions, but not all-cause mortality. Given the limitations with the included studies, such as study variation and uncertainties relating to the synthesis, the authors’ conclusions should be interpreted with some caution.

Authors’ objectives
To assess the effectiveness of disease-management programmes in patients with chronic obstructive pulmonary disease (COPD).

Searching
MEDLINE, EMBASE, CINAHL, PsycINFO, and the Cochrane Library were searched from inception to December 2006. Search terms were reported. In addition, reference lists of retrieved articles and relevant reviews were manually searched.

Study selection
Studies that assessed the effectiveness of disease management programmes in adults with COPD were eligible for inclusion if the interventions fulfilled the operational definition, i.e. studies had to include two or more different components (such as physical exercise, self-management, and structured follow-up), and actively involve two or more health care professionals in patient care. Eligible studies also had to consider patient education and at least one component had to last at least 12 months. Studies including only inpatients or patients receiving palliative care were excluded.

The outcomes of interest were all-cause mortality, lung function, exercise capacity (measured as walking distance), health-related quality of life, respiratory symptoms, acute exacerbations, and health care use.

Included studies were conducted in the USA, Canada, the Netherlands, New Zealand, Spain and Sweden. The mean age of participants ranged from 61 to 75 years (where reported). Intervention components included education, self-management, action plans, training sessions, organisational and support, health care professionals, evidence-based medicine, pulmonary rehabilitation, influenza immunisation, smoking cessation, evaluation and feedback.

Two reviewers independently screened studies for inclusion. Disagreements were resolved by consensus or through referral to a third reviewer.

Assessment of study quality
Study quality was assessed according to the Jadad scale, the qualitative categories proposed by the Cochrane Collaboration Handbook, and the ‘Health Technology Assessment-disease management’ instrument. Allocation concealment and reporting of patients’ follow-up were assessed, but given the nature of the interventions, blinding was not achieved; studies could receive a maximum Jadad score of 3 points.

The authors did not state how many reviewers performed the validity assessment.

Data extraction
Data required to calculate mean differences and 95% confidence intervals were extracted for exercise capacity. Odds ratios (ORs) and 95% confidence intervals were extracted for mortality.

Three reviewers independently extracted data.
Methods of synthesis
A random-effects model was used to pool odds ratios and 95% confidence intervals. Mean differences were pooled to calculate weighted mean differences (WMDs) and 95% confidence intervals. Where there was evidence of significant clinical heterogeneity between studies, findings were reported as a narrative synthesis. Statistical heterogeneity was assessed using the Cochrane Q test and $I^2$ statistics.

Sensitivity analysis was undertaken for all-cause mortality by including only higher quality studies.

Publication bias was assessed using funnel plots.

Results of the review
Thirteen studies (n = 8,191 patients; range 26 to 6,428) were included in the review: nine RCTs, one non-randomised controlled trial, and three uncontrolled before-and-after trials. Overall, the quality of RCTs was moderate; five RCTs scored 3 on the Jadad scale, three scored 2, and one scored 1.

Meta-analysis showed that disease management programmes statistically significantly improved exercise capacity at 12 months; average walking distances were increased by 32.2m (95% CI 4.1 to 60.3; five RCTs). Qualitative synthesis found that only three of seven studies reported statistically significant improvements in walking distance. There was no evidence of statistical heterogeneity or publication bias.

There was no statistically significant difference in all-cause mortality during the first 12 months (10 studies). Sensitivity analysis did not significantly alter the findings. There was no evidence of statistical heterogeneity or publication bias.

Qualitative synthesis indicated that eight of 12 studies reported positive effects on health-related quality of life.

Seven of 10 studies showed improvements in health care use in terms of reduced hospitalisations or length of stay and reduced outpatient visits.

Three of seven studies reported significant improvements in symptoms or acute exacerbations.

Only one of seven studies reported a statistically significant treatment effect on lung function at 12 months.

Other outcomes were reported in the review.

Authors’ conclusions
Chronic obstructive pulmonary disease-management programmes modestly improved exercise capacity, health-related quality of life, and hospital admissions, but not all-cause mortality.

CRD commentary
The review question and supporting criteria were clearly defined. An appropriate search of the literature was undertaken, although it was unclear whether language restrictions were applied. The authors undertook study selection and data extraction in duplicate, but as the process was unclear for validity assessment, reviewer error and bias could not be ruled out.

The authors assessed the quality of the studies; they acknowledged the inclusion of study designs other than RCTs and the potential for bias due to the quality of the studies. The authors also acknowledged clinical and methodological heterogeneity among studies. Appropriate methods appear to have been used to combine the studies. However, the qualitative synthesis was somewhat limited, with no significance values reported, and the confidence intervals presented for the quantitative analyses were wide, which questioned the robustness of the findings.

Given the limitations with the included studies and uncertainties regarding the synthesis, the authors’ conclusions should be interpreted with some caution.
Implications of the review for practice and research

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

Research: The authors stated that future research should include an international consensus process to identify the key intervention components and study outcomes that are of greatest importance to patients with COPD. In addition, process features and economic indicators should be measured to facilitate the implementation of disease-management programmes.

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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.