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Home care by outreach nursing for chronic obstructive pulmonary disease (Review)

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[Intervention Review]

Home care by outreach nursing for chronic obstructive pulmonary disease

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ABSTRACT

Background

Chronic obstructive pulmonary disease (COPD) is characterised by progressive airflow obstruction, worsening exercise performance and health deterioration. It is associated with significant morbidity, mortality and health system burden.

Objectives

To evaluate the effectiveness of outreach respiratory health care worker programmes for COPD patients in terms of improving lung function, exercise tolerance and health related quality of life (HRQL) of patient and carer, and reducing mortality and medical service utilisation.

Search methods

The Cochrane Airways Group Specialised Register of Trials was searched (November 2011). Study references were hand-searched for additional studies we contacted study authors to identify other unpublished studies.

Selection criteria

We included only randomised controlled trials of COPD patients. We included interventions involving an outreach nurse visiting patients in their homes, providing support, education, monitoring health and liaising with physicians. Studies in which the therapeutic intervention under test was physical training were not included.

Data collection and analysis

Two reviewers independently assessed trial quality and extracted data. We contacted study authors for additional information.

Main results

We pooled mortality data from eight studies and found a non-significant reduction in mortality at 12 months (OR 0.72, 95% CI 0.45 to, 1.15).

We pooled four studies that assessed disease-specific heath-related quality of life (HRQL) and found a statistically significant improvement in HRQL (mean difference -2.61, 95% CI -4.82 to -0.40).

Hospitalisations were reported in five studies. Although there was no statistically significant difference in the number of hospitalisations (OR 1.01, 95% CI 0.71 to 1.44), there was significant heterogeneity. Although this heterogeneity appeared to be caused by one outlying study with a statistically significant decrease in hospitalisations in patients receiving home care, whereas the other studies showed a

non-significant increase in hospitalisations, we could not draw firm conclusions about why this heterogeneity exists. Data on GP visits and emergency department presentations were available, however no consistent effect in these was observed with the intervention. The intervention also incurred higher health care costs than standard care as reported in a single study.

Very few studies provided data on lung function or exercise performance, so there was insufficient evidence to assess impact on these outcomes.

Authors' conclusions

Outreach nursing programmes for COPD improved disease-specific HRQL. However the effect on hospitalisations was heterogeneous, reducing admissions in one study, but increasing them in others, therefore we could not draw firm conclusions for this outcome.

PLAIN LANGUAGE SUMMARY

Does delivery of home care by outreach nurses improve outcomes for people with chronic obstructive pulmonary disease?

Home visits from nurses for people with chronic lung disease (chronic obstructive pulmonary disease, COPD - a combinations of emphysema and chronic bronchitis) aim to help people maintain their health and reduce the need for hospital stays. The nurses delivering this care aim to help people use their treatments well, provide education about coping strategies, and monitor the lung disease. However, this review of nine randomised controlled trial found that home care resulted in an improvement in people's quality of life, but has an unpredictable effect on the risk of being admitted to hospital. We could only find information on the cost of care from one study, but this indicated that home care was an expensive form of care. More research is needed to confirm the usefulness of home visits for people with COPD.

SUMMARY OF FINDINGS

Summary of findings for the main comparison. Home care outreach nursing for patients with COPD

Home care outreach nursing for patients with COPD

Patient or population: patients with COPD
Settings:
Intervention: home care outreach nursing

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Control	Home care outreach nursing				
Mortality Follow-up: 4-12 months	**Study population**		**OR 0.72** (0.45 to 1.15)	711 (5 studies)	⊕⊕⊝⊝ **low** [1,2]	[1] Subjects not blinded due to the nature of the intervention [2] Wide confidence intervals that include the possibility of significant benefit or harm
	127 per 1000	**95 per 1000** (61 to 143)				
SGRQ Total SGRQ (Total) Score. Scale from: 0 to 100. Lower score indicates better quality of life. Follow-up: 3-12 months	The mean SGRQ total in the control groups was **- 0.1 units**	The mean SGRQ total in the intervention groups was **2.60 units lower** (4.81 to 0.39 lower)		587 (4 studies)	⊕⊕⊝⊝ **low** [1,2]	[1] Subjects not blinded due to the nature of the intervention [2] Wide confidence intervals
Hospitalisation Follow-up: 3-12 months	**Study population**		**OR 1.01** (0.71 to 1.44)	686 (5 studies)	⊕⊕⊝⊝ **low** [1,2]	[1] Subjects not blinded due to the nature of the intervention [2] Wide confidence intervals that include the possibility of significant benefit or harm
	480 per 1000	**482 per 1000** (396 to 571)				

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **OR:** Odds ratio;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

Very low quality: We are very uncertain about the estimate.

1 Subjects not blinded due to the nature of the intervention
2 Wide confidence intervals that include the possibility of significant benefit or harm

BACKGROUND

Chronic obstructive pulmonary disease (COPD) is associated with substantial morbidity and costs to the health care system. The prevalence of COPD is increasing in the community and represents a serious public health issue.

Outreach healthcare delivery in the community, given by a respiratory health worker, may benefit patients with COPD by encouraging self-management behaviour with education about pulmonary disease, medication (in particular, the correct inhaler technique) and coping strategies. Also, regular visits, including objective measures of lung function, permits greater surveillance of deteriorations. The desired outcome of an outreach care programme is to maintain the patient's optimal respiratory state, thus maintaining health status and reducing hospital admissions. With increasing interest in outreach 'shared care' and 'coordinated care' programmes it is important to evaluate the available evidence as to whether such programmes improve the lives of patients with COPD and those who care for them.

Our aim was to update this systematic review evaluating the impact of outreach nursing care in patients with COPD.

OBJECTIVES

Search and critically appraise the relevant literature, in order to determine the strength of the evidence, that outreach respiratory nursing care may:

1. Improve lung function (as measured by FEV_1) and exercise and tolerance;
2. Improve health related quality of life (HRQL) of patients with COPD;
3. Reduce mortality;
4. Reduce health care system costs;
5. Affect the quality of life of the principal carer at home.

METHODS

Criteria for considering studies for this review

Types of studies

We included only randomised controlled trials in which the home visits were provided by a respiratory nurse or similar respiratory health worker to patients with COPD.

Types of participants

We included participants with chronic obstructive pulmonary disease, as defined according to pulmonary function test findings, consistent with British Thoracic Society criteria (BTS 1997).

Types of interventions

We included interventions comprising home visits by a respiratory nurse or similar respiratory health worker, to facilitate health care, provide education, provide social support, identify respiratory deteriorations promptly and reinforce correct technique with inhaler therapy. Eligible control groups were patients who received routine care, without respiratory nurse/health worker input. We considered studies with co-interventions, with subgroup analysis as necessary. We included only trials with at least three months of follow-up as it this was considered an appropriate minimum duration of follow-up to observe any clinically significant benefits of the intervention.

Types of outcome measures

1. Patient related: Pulmonary function and exercise tolerance, HRQL and mortality.
2. Costs to health care system: Hospital admissions, emergency department presentations, GP or family doctor visits and medical costs.
3. Carer related: HRQL and satisfaction.

Search methods for identification of studies

Electronic searches

We searched the Cochrane Airways Group Specialised Register of trials which is derived from systematic searches of bibliographic databases including the Cochrane Central Register of Controlled Trials (CENTRAL) *(The Cochrane library)*, MEDLINE, EMBASE, CINAHL, AMED and PsychINFO, and handsearched respiratory journals and meeting abstracts (please see Appendix 1 for further details). The register contains a variety of studies published in foreign languages. We did not exclude trials on the basis of language.

All records in the Register coded as 'COPD' were searched with the following terms:

nurs* or healthcare* or "health care*" or "health provid*" or "health work*" or "health person*" or "home care*" or "home-care*" or outreach* or out-reach* or community*

The most recent search was conducted in November 2011.

Searching other resources

We reviewed reference lists of all included studies and of reviews to identify potentially relevant citations. We also made enquiries regarding other published or unpublished studies known to the authors of the included studies

Data collection and analysis

Selection of studies

From the title, abstract, or descriptors, one of us (CXW) independently reviewed the literature searches. We excluded all studies that were clearly not randomised controlled trials or that clearly did not fit the inclusion criteria. Two of us (CXW and KC) reviewed all other citations independently in full text, assessing for inclusion based on study design, population, intervention and outcome.

Data extraction and management

Two authors (CXW and KC) independently extracted data for the trials using a standardised data extraction form before data was entered into The Cochrane Collaboration software program RevMan 5. CXW corresponded with trialists to obtain missing and raw data.

Additional data were obtained from the authors of Littlejohns 1991. Unfortunately the principal author of Bergner 1988 has died.

Additional data was sought from the five new studies without success.

Assessment of risk of bias in included studies

We assessed the risk of bias for allocation sequence generation, allocation concealment, blinding, handling of missing data, selective outcome reporting and other threats to validity in the studies. This is in line with the recommendations made in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2008).

Data synthesis

Data were entered in to RevMan 5. Continuous data were pooled with a fixed effect model as a weighted mean difference. Dichotomous data were pooled with a Peto Odds Ratio (OR). We prepared a summary of findings table for the 2011 update. Because primary outcomes were not specified, we chose to include mortality, HRQL (as measured by the SGRQ total score) and hospitalisations. This was a post hoc decision.

RESULTS

Description of studies

Results of the search

The literature search returned 489 references. Fourty one references were identified from this search for retrieval and possible inclusion in the review, and 11 studies were obtained from the bibliographies of retrieved articles. One paper was identified through a personal communication with the author (Bergner 1988) and one abstract from conference proceedings was also identified for possible inclusion in the review. From these, nine papers corresponding to nine trials were selected for inclusion in the review. The updated literature search run in November 2011 returned 65 references of which none were eligible for inclusion.

Included studies

The nine included studies were published between 1987 and 2006. Three studies originated from the U.S.A. (Aiken 2006; Bergner 1988; Coultas 2005), two from the U.K. (Cockcroft 1987; Littlejohns 1991), two from Australia (Hermiz 2002; Smith 1999), and one each from Canada (Bourbeau 2003) and Hong Kong (Kwok 2004). For full details of the trials, see Characteristics of included studies.

A total of 1498 participants were included in these nine studies. Participants had moderately severe disease as assessed by inclusion criteria such as patient symptoms, recent exacerbations, hospitalisations and spirometry results. Published details on baseline severity for all the studies are available in Table 1.

In brief, all studies investigated the effects of a supervised, home-based intervention in patients with COPD using a parallel group RCT design. The home-based intervention represented a respiratory nurse providing care, education and support in a patient's home. The effects of this was assessed via a variety of outcomes, including patient based outcomes (lung function, exercise testing, HRQL and mortality), health system based outcomes (medical service utilisation), and carer based outcomes (HRQL, satisfaction).

Eight of the nine studies had sample sizes that were moderately large: 96 (Smith 1999), 117 (Hermiz 2002), 152 (Littlejohns 1991), 157 (Kwok 2004), 191 (Bourbeau 2003), 192 (Aiken 2006), 217 (Coultas 2005) and 301 (Bergner 1988). The Cockcroft 1987 study had 75 participants.

Two studies followed-up the effect of the intervention at three months (Aiken 2006; Hermiz 2002), one at four months (Bourbeau 2003), four at six months (Aiken 2006; Bergner 1988; Coultas 2005; Kwok 2004), one at nine months (Aiken 2006) and five at 12 months (Bergner 1988; Bourbeau 2003; Cockcroft 1987; Littlejohns 1991; Smith 1999).

Coultas 2005 had two intervention groups. Both groups involved a respiratory nurse providing home visits but one group received additional training in specific training aimed at helping people with COPD adopt healthy lifestyle behaviours. Given both intervention groups involved the use of nurse home visits, the primary focus of this review, the data from both these intervention arms were combined and treated as a single intervention for the purpose of meta-analysis.

Excluded studies

Forty-eight papers were excluded for the following reasons: predominantly concerned with physical rehabilitation or exercise (n=19), not supervised by a nurse at home (n=15), not a RCT (n=11), data previously reported (n=2) and the intervention was of too short a duration (n=1).

Risk of bias in included studies

Although the nine studies were RCTs, there were important methodological limitations in all studies summarised below. Agreement for assessment of study quality was reached by the reviewers. Full details of our risk of bias judgments can be found in Characteristics of included studies and summaries of our judgments found in Figure 1 and Figure 2.

Figure 1. Methodological quality summary: review authors' judgements about each methodological quality item for each included study.

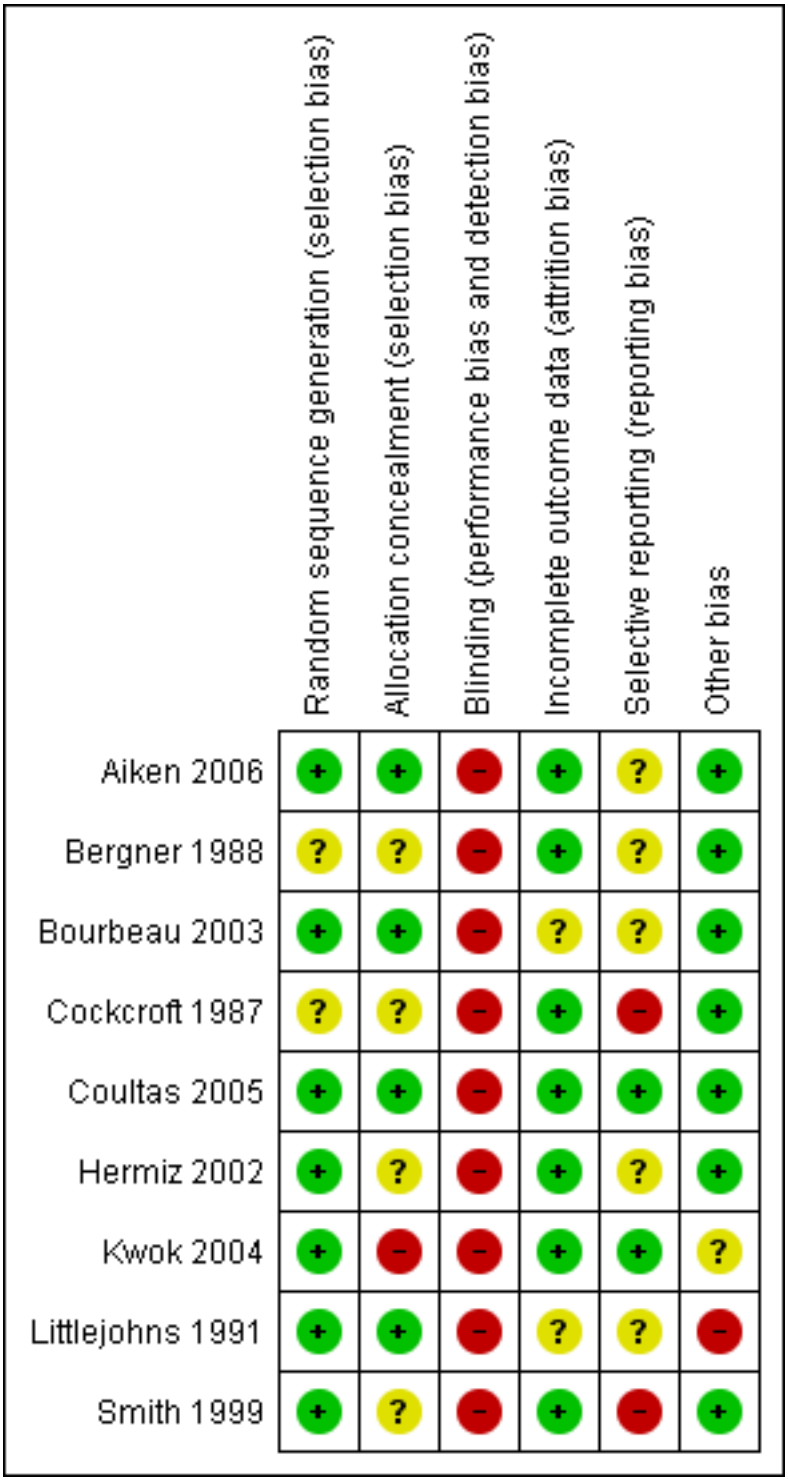
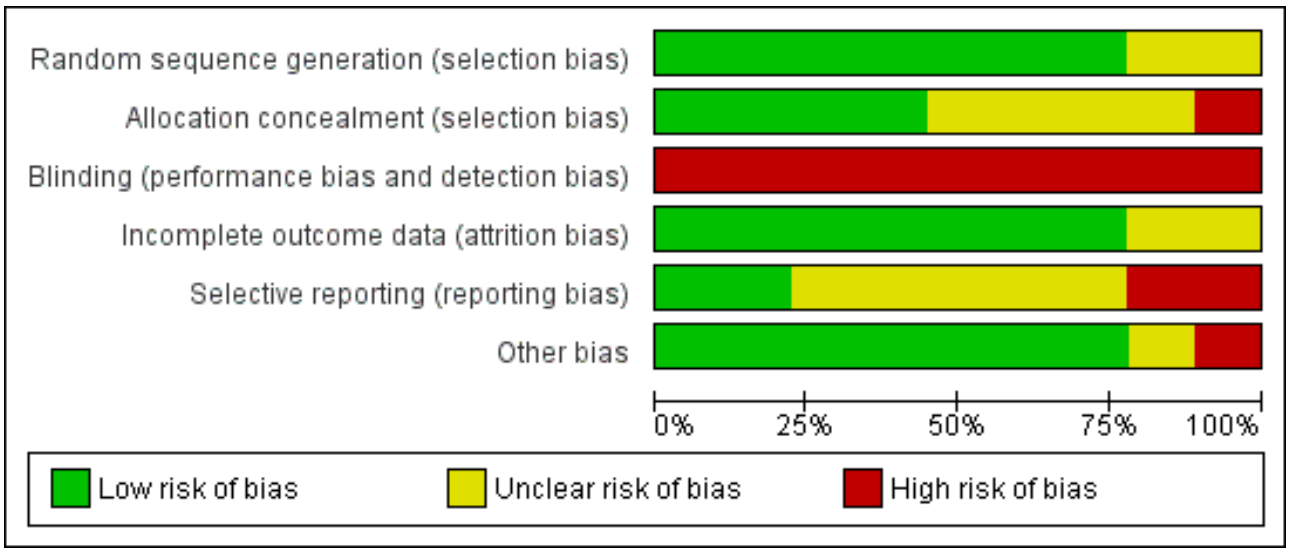


Figure 2. Methodological quality graph: review authors' judgements about each methodological quality item presented as percentages across all included studies.



Allocation

Allocation concealment was unclear in four studies (Bergner 1988; Cockcroft 1987; Hermiz 2002; Smith 1999) and inadequate in one (Kwok 2004).

Blinding

Due to the nature of the studies, it was not possible to blind patients to their assignment group. One study employed a blinded investigator to measure outcomes (Aiken 2006). The remaining eight were unblinded.This may have affected potentially outcome measures dependent on patient factors, such as the health related quality of life questionnaires, effort on lung function testing or effort on exercise performance testing. However, objective outcome measures (hospitalisations, mortality) would have been unlikely to have been affected.

Incomplete outcome data

Incomplete outcome reporting of data could not be excluded in two studies (Bourbeau 2003; Littlejohns 1991).

Selective reporting

Selective reporting, which is defined as the selection of a subset of the original variables recorded, on the basis of the results, for inclusion in publication of trials, was unclear in six studies (Aiken 2006; Bergner 1988; Bourbeau 2003; Hermiz 2002; Littlejohns 1991; Smith 1999), and inadequate in one (Cockcroft 1987).

Other potential sources of bias

Other potential sources of bias could not be excluded in two studies (Kwok 2004; Littlejohns 1991). In Kwok 2004, doctors of patients in the control group were able to refer patients to receive home care visits. Kwok 2004 did not report how often these home care visits occurred or whether patients in the control group who did receive occasional respiratory nurse home visits were excluded from the final analysis. This may have led to a false-negative result. In Littlejohns 1991, there was evidence of differing baseline severity of disease in the control and intervention group. Finally, although this was not a primary focus of the studies, concomitant pharmacotherapy can have a major impact on outcomes assessed and merits reporting in both trials and the review. Better presentation of data related to baseline and change in pharmacotherapy usage may be informative.

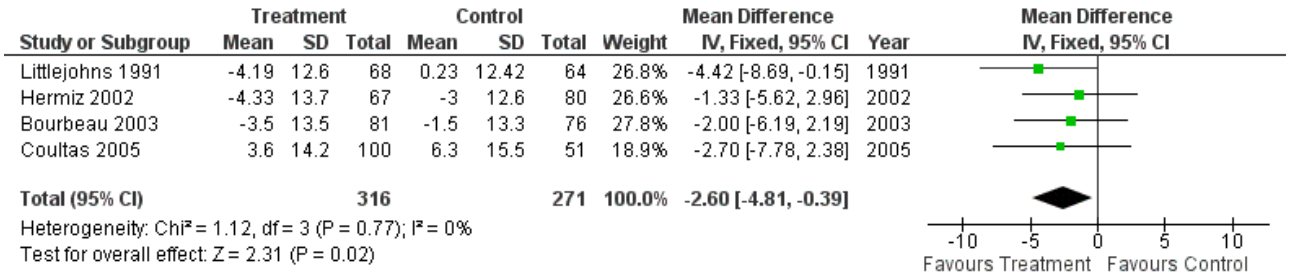
Effects of interventions

See: **Summary of findings for the main comparison** Home care outreach nursing for patients with COPD

Health Related Quality of Life

Four studies (Bourbeau 2003; Coultas 2005; Hermiz 2002; Littlejohns 1991) measured HRQL using the St George's Respiratory Questionnaire (SGRQ). This is a disease-specific questionnaire for COPD. Using this questionnaire, a change of four units is clinically significant. Unpublished data was obtained from one of the authors of Littlejohns 1991. Data for the change in SGRQ total score was available from all four studies, and meta-analysis demonstrated that HRQL by this questionnaire improved with the intervention (MD -2.60; 95% CI -4.81 to -0.39; Figure 3) and this was a statistically significant difference. Data for the SGRQ sub-scores; activity (Analysis 1.5); impact (Analysis 1.6) and symptoms (Analysis 1.7); was only available from three studies (Bourbeau 2003; Coultas 2005; Hermiz 2002). The reduction is SGRQ sub-scores was not statistically significant.

Figure 3. Forest plot of comparison: 1 Respiratory outreach nurse vs control, outcome: 1.3 Change in SGRQ Total Score.



Two studies (Bergner 1988; Littlejohns 1991) measured HRQL using the Sickness Impact Profile (SIP). This is a general health measure of HRQL. Standard deviations of the mean change in SIP scores were obtainable only from Littlejohns 1991 who reported that the 'physical score' was significantly improved in the intervention group and so data were not pooled (Analysis 1.8). In contrast, however, Bergner 1988 found no significant difference in the 'physical score' with the intervention.

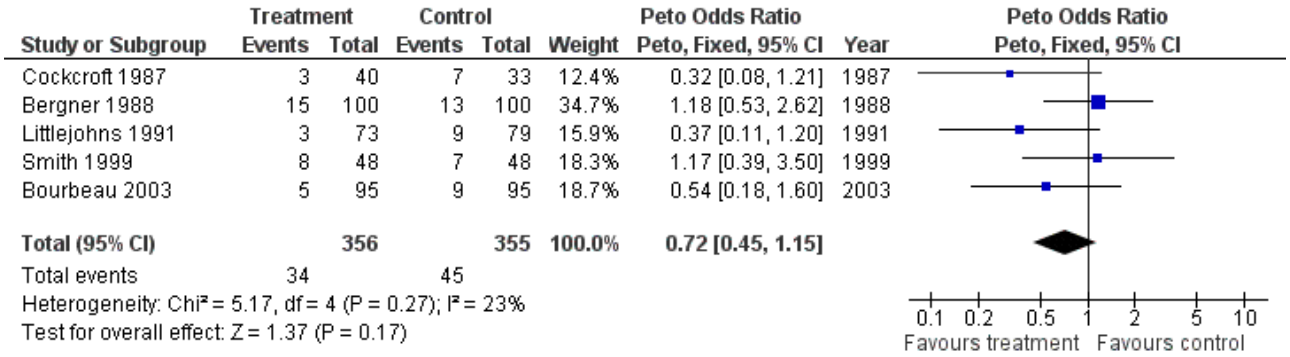
Two studies measured HRQL using the SF-36 (Aiken 2006; Coultas 2005). This is a general health measure of HRQL. Sufficient data was not obtainable from any of these studies, however, limiting analysis. Coultas 2005 did not find any change in SF-36 score with the intervention. Aiken 2006 reported a significant improvement in the linear trajectories of SF-36 scores with the intervention, however this study included both patients with COPD and congestive heart failure and insufficient disease-specific data was available for subgroup statistical analysis.

One study (Smith 1999) measured HRQL using a modified Dartmouth Primary Care Co-operative, (COOP). Sufficient data was not obtainable from this study however, limiting the analysis. When individual items were compared between baseline and twelve months in the intervention arm, three scores were significantly lower, (emotional condition, difficulty doing daily tasks because of physical and emotional health and a general HRQL). The remaining seven items did not show a significant difference between baseline and post-intervention.

Mortality

Five studies assessed mortality at 12 months (Bergner 1988; Bourbeau 2003; Cockcroft 1987; Littlejohns 1991; Smith 1999), two at six months (Coultas 2005; Kwok 2004) and one at three months (Hermiz 2002). The decrease in the number of deaths with the intervention was not statistically significant (Peto OR 0.72; 95% CI 0.45 to 1.15; Figure 4).

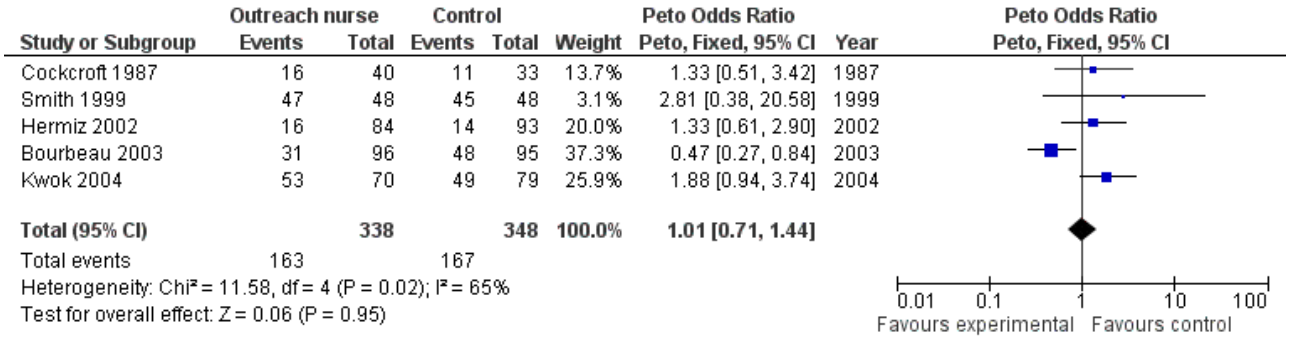
Figure 4. Forest plot of comparison: 1 Respiratory outreach nurse vs control, outcome: 1.9 Mortality.



Medical Service Utilisation

Data regarding hospitalisations was available from five studies (Bourbeau 2003; Cockcroft 1987; Hermiz 2002; Kwok 2004; Smith 1999). Overall, meta-analysis demonstrated no significant change in the number of hospitalisations with the intervention (Peto OR 1.01; 95% CI 0.71 to 1.44; Figure 5). However, significant statistical heterogeneity was observed (I^2 = 65%). Inspection of the forest plot indicated that the heterogeneity was due to one outlying study (Bourbeau 2003), and that sensitivity analysis may be justified although we had no specified subgroup analysis a priori. Subgroup analysis excluding this study demonstrated a statistically significant increase in the number of hospitalisations in patients receiving the intervention (Peto OR 1.59; 95% CI 1.02 to 2.47), and this is considered further in the Discussion.

Figure 5. Forest plot of comparison: 1 Respiratory outreach nurse vs control, outcome: 1.10 Hospitalisation.



Data regarding the duration of hospital stay was available from one study (Cockcroft 1987), with this study demonstrating a longer duration of stay in the intervention group.

Data regarding GPor family doctor visits was available from three studies (Bourbeau 2003; Coultas 2005; Hermiz 2002), however insufficient data was available to perform pooled analysis (Analysis 1.4). Bourbeau 2003 reported a significant decrease in the number of unscheduled family doctor visits, but no change in the number of scheduled family doctor visits, with the intervention. Both Coultas 2005 and Hermiz 2002 reported no change in the number of family doctor visits.

Data regarding emergency department presentations was available from four studies (Aiken 2006; Bourbeau 2003; Kwok 2004; Coultas 2005), however insufficient data was available to perform pooled analysis. Bourbeau 2003 reported a significant decrease in the number of patients with one or two emergency department presentations in the intervention group. However, other studies observed no similar difference. Aiken 2006 reported no difference in the average number of emergency department presentations per month. Kwok 2004 reported no difference in the mean number of emergency department presentations per patient. Coultas 2005 reported no difference in the number of mean change in the number of emergency department presentations per patient.

Data regarding costs associated with the intervention was reported in one study (Bergner 1988), which reported significantly higher average annual medical costs with the intervention of $9,768 compared with $5,051 for the control, (P=0.02).

Lung Function and Exercise Testing

A full analysis of the % change from baseline in FEV_1 was not possible because sufficient data were obtainable from the authors of one study only (Littlejohns 1991) and therefore data were not pooled. In Littlejohns 1991 there was no significant difference in FEV_1. Following the intervention, no significant difference in FEV_1 was reported by Bergner 1988, and no significant change in either FEV_1 or FVC was reported by Bourbeau 2003.

Data regarding exercise testing was only available from two studies (Littlejohns 1991; Kwok 2004). There was no significant difference in the distance walked in a standard six-minute walking distance test following the intervention (MD 5.05; 95% CI -15.08 to 25.18; Analysis 1.10).

Carer related HRQL and satisfaction

We did not find any data for carer quality of life or satisfaction.

DISCUSSION

Summary of main results

Nine studies assessed the benefits of outreach nursing care for patients with COPD in 1498 patients. A number of outcomes which were only reported by single studies in the original review were now reported by multiple studies, permitting pooled analysis on a greater number of outcomes.

Whilst there was some methodological variation in the delivery and assessment of the intervention across studies, most notably with regard to study duration, sample size and the frequency of assessment, all investigated the effects of a supervised, home-based intervention in patients with COPD using a parallel group RCT design. The home-based interventions represented a respiratory nurse providing care, education and support in a patient's home. Studies employed a variety of outcome measures which allowed some pooled analysis. Whilst the studies were conducted over a wide time range, there did not appear to be any obvious effect related to the year of study.

There was insufficient data available to determine the effect of home care interventions on lung function and exercise capacity.

Quality of life was measure by a number of HRQL questionnaires. Meta-analysis of data from four studies employing the disease specific SGRQ found a significant improvement in HRQL in patients receiving with outreach nursing care compared to those receiving usual care. Two general health status questionnaires were administered in a number of studies, however insufficient data was available for pooled analysis. However, in contrast to the improvement in disease-specific health questionnaire the individual results of the general health status questionnaires were mixed.

Mortality data was available from eight studies. Meta-analysis demonstrated a decrease in the number of deaths with outreach nursing care, but this was not statistically significant.

Data on medical service utilisation was available from a number of studies. Hospitalisations were reported in five studies. Overall, meta-analysis did not demonstrate a significant change in the number of hospitalisations. However, significant statistical heterogeneity was seen with one outlying study (Bourbeau

2003), which reported a statistically significant decrease in hospitalisations with the intervention, in contrast to the other four studies reporting hospitalisations which reported increases in hospitalisations with the intervention. It was not readily apparent why one study reported results in contrast to the others, however excluding this study revealed a statistically significant increase in the number of hospitalisations in patients receiving the home care intervention in the remaining four studies (Cockcroft 1987; Hermiz 2002; Kwok 2004; Smith 1999). We did not specify sub group analyses to investigate heterogeneity a priori and we do not have an explanation for the conflicting direction of the treatment effects in these studies. The increase in hospitalisations in patients receiving home care in the four studies (Cockcroft 1987; Hermiz 2002; Kwok 2004; Smith 1999) seems to conflict with the improvement in quality of life and mortality found in these same patients. A possible explanation for this apparent discrepancy may be that the educational component of outreach nursing may enable patients to recognise deteriorations promptly, seeking medical service assistance where necessary and thus improving overall quality of life and mortality.

Data on GP or family doctor visits and emergency department presentations was also available from two studies. However, insufficient data was available for pooled analysis and there was no clear trend with the individual results of studies.

Though there were potential improvements in quality of life and mortality, the home care intervention may incur substantially higher health care costs than standard outpatient care for COPD as reported by Bergner 1988, although this is an old study and may not represent the true cost of these interventions today.

Quality of the evidence

Study quality is a potential issue in this review, with some studies being of unclear methodological quality. It is not possible to blind patients to whether or not they received the intervention.

AUTHORS' CONCLUSIONS

Implications for practice

Outreach nursing programmes for COPD improved disease-specific HRQL. However the effect on hospitalisations was heterogeneous, reducing admissions in one study, but increasing them in others, therefore we could not draw firm conclusions for this outcome.

Implications for research

There is a need for further long term (one year or more) studies, in which the health status and quality of life of patient and carer are measured with appropriate validated instruments. These studies should be of sufficient power and duration to permit further estimation of impact on mortality and medical service utilisation.

ACKNOWLEDGEMENTS

We would like to acknowledge the other authors who contributed to the original review: Sarah Appleton, Robert Adams, Anne-Marie Southcott and Richard Ruffin.

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CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Aiken 2006

Methods	RCT
Participants	192 patients with COPD or chronic heart failure who had an estimated two-year life expectancy. Patients with COPD were required to have oxygen saturations of less than 88% on room air, or baseline pO2 less than 55 on room air, and to be on continuous oxygen. Patients were required to exhibit marked limitation of physical functioning, in that any activity resulted in fatigue, palpitation, dyspnoea or angina. All patients were required to have exhibited recent exacerbation of their conditions.
Interventions	1. Intervention group (n = 33): Patients in the intervention group received the 'Phoenix Care Program'. This program aimed to increase self-management of illness and knowledge of health-related resources by providing information and education, improve patients' preparedness for end of life by promoting acquisition of appropriate legal documents and discussion of these with significant others, and enhance physical and mental functioning by case management and education. 2. Control group (n=28): Patients in the control group received usual care provided by managed care organisations, including medication and technical treatment. The duration of the intervention period was 9 months.
Outcomes	Patient self-management of illness and knowledge of resources, preparedness for end of life, physical and mental functioning (including SF-36), and medical system utilisation (emergency department visits, hospitalisations and associated length of stay). The outcomes of the interventions were assessed at 3 monthly intervals following enrolment.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"Randomization was carried out within diagnosis in blocks of 30 patients... sealed envelopes, colour-coded by diagnosis and containing the assignment to condition, were shuffled and assigned to participants in order of shuffling."
Allocation concealment (selection bias)	Low risk	"The Enroller, blinded to condition, opened the sealed envelope that identified the patient's study condition."
Blinding (performance bias and detection bias) All outcomes	High risk	This study was single-blinded, with follow-up measurements assessed by personnel blinded to the study group.
Incomplete outcome data (attrition bias) All outcomes	Low risk	
Selective reporting (reporting bias)	Unclear risk	Unclear
Other bias	Low risk	

Bergner 1988

Methods	RCT
Participants	301 patients with COPD with enrolled. Patients had to have a clinical diagnosis of COPD, a FEV1 and FEV1/FVC ratio < 60% predicted, be homebound (by US Medicare criteria, for use of public transport), be between 40-75 years of age, be able to administer aerosolised metaproterenol, be a local resident, be capable of co-operating with the study. Patients were excluded if there was a primary diagnosis of asthma, a primary diagnosis of other functionally limiting disease which would significantly affect patient mortality, or if they received standard home nursing care during the 6 months prior to study entry.
Interventions	1. Respiratory home care group (n = 99): Patients in the respiratory home care group received specialised care from trained respiratory nurses at least one a month. 2. Standard home care group (n = 102): Patients in the standard home care group received standard home care from nurses at least once a month. 3: Control group (n = 100): Patients in the control group continued to receive usual care. The duration of the intervention period was 12 months.
Outcomes	Survival, costs (health care services, travel by patient, cost to family and household, drugs), pulmonary function, everyday function, Sickness Impact Profile (SIP), General Well-Being Schedule, 10 minute walk test and index of independence in daily living. The outcomes of the interventions were assessed at 6 and 12 months after enrolment.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Information regarding sequence generation was not available.
Allocation concealment (selection bias)	Unclear risk	Information regarding allocation concealment was not available.
Blinding (performance bias and detection bias) All outcomes	High risk	This study was unblinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	
Selective reporting (reporting bias)	Unclear risk	Unclear
Other bias	Low risk	

Bourbeau 2003

Methods	RCT
Participants	191 patients who were hospitalised at least once in the preceding year for an acute exacerbation of COPD. Patients had to have stable COPD (respiratory symptoms and medication unchanged for at least 4 weeks prior to enrolment), be at least 50 years of age, be a current or previous smoker, have a FEV1

Bourbeau 2003 *(Continued)*

	after use of a bronchodilatory between 25-70% of the predicted normal value and FEV1:FVC ratio less than 70%, no previous diagnosis of asthma, left congestive heart failure, terminal disease, dementia, or uncontrolled psychiatric illness, no participation in a respiratory rehabilitation program in the past year and no long-term care facility stays.
Interventions	1. Intervention group (n = 96): Patients in the intervention group received a disease-specific self-management program. This consisted of 1 hour per week of teaching at home for 7 to 8 weeks conducted by health professional case managers (nurses in 4 centres, respiratory therapists in 2 centres, and a physiotherapist in 1 centre). Follow up was then conducted by weekly telephone calls for 8 weeks, and then monthly calls for the remainder of the study. 2. Control group (n=95): Patients in the control group continued to receive usual care managed by their respective specialists or GP. The duration of the intervention period was 12 months.
Outcomes	Spirometry (FEV1 and FVC), exercise capacity (6-minute walk test distance), acute exacerbations, medical service utilisation (hospital admissions, emergency department visits, family physician visits) and health related quality of life (St George Respiratory Questionnaire). The outcomes of the interventions were assessed at 4 and 12 months.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"Patients underwent randomisation with the use of a central computed-generated list of random numbers. Randomization was stratified per centre and in blocks of 6, and patients were assigned to the...intervention group or to usual care".
Allocation concealment (selection bias)	Low risk	"The blocking factor was not known by the investigators or their staff at each participating centre"
Blinding (performance bias and detection bias) All outcomes	High risk	This study was unblinded.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Explanation for patient attrition was not provided.
Selective reporting (reporting bias)	Unclear risk	Unclear
Other bias	Low risk	

Cockcroft 1987

Methods	RCT
Participants	75 patients with COPD were enrolled. Patients had to have been admitted to hospital at least twice in the previous 3 years or new patients who had been seen within the past year. Patients were excluded if their disability was not caused by a respiratory condition and those unable to understand the questionnaires.

Cockcroft 1987 *(Continued)*

Interventions	1. Intervention group (n = 42): Patients in the intervention group had a respiratory nurse visit once a month to provide support and goal setting. The intervention was mainly educative for patients to identify problems in activities of daily living and to increase independence in these activities. Patients were encouraged to contact GPs when required. Nurses did not contact doctors except in emergencies. 2. Control group (n = 33): Patients in the control group continued to receive usual care. The duration of the intervention period was 12 months.
Outcomes	HRQL (General Health Questionnaire), number and duration of admissions to hospital, number of deaths, PEFR and patient knowledge of condition and medicines. The outcomes of the interventions were assessed at the end of the 12 month intervention period.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	"Randomisation was stratified according to the number of admissions to hospital in the previous three years"
Allocation concealment (selection bias)	Unclear risk	Information regarding allocation concealment was not available.
Blinding (performance bias and detection bias) All outcomes	High risk	This study was single-blinded, with follow-up measurements assessed by personnel blinded to the study group.
Incomplete outcome data (attrition bias) All outcomes	Low risk	
Selective reporting (reporting bias)	High risk	"A set of visual analogue scales concerning physical and psychological aspects of the patients' lives, also designed for the study (were used)." These were not reported.
Other bias	Low risk	

Coultas 2005

Methods	RCT
Participants	217 patients with COPD who fulfilled three criteria: were a current or former smoker with at least a 20-pack-year smoking history, had at least one respiratory symptom (e.g. cough, shortness of breath, wheeze) during the past 12 months, and had demonstrable airflow obstruction (FEV1/FVC ratio < 70% and FEV1 < 80% predicted).
Interventions	1. Medical management group (n = 49): Patients in the medical management group received approximately 8 hours of education about the diagnosis of COPD, the assessment of COPD severity, patient self-management, smoking cessation, follow-up and the formation of an action plan for exacerbations. 2. Medical and collaborative management group (n = 51): In addition to medical management, patients in the medical and collaborative management group received approximately 8 additional hours of training in 'collaborative care', intended to facilitate the adoption of healthy behaviours such as lifestyle and self-management skills.

Coultas 2005 *(Continued)*

	3. Control group (n = 51): Patients in the control group continued to receive usual care. The duration of the intervention period was 6 months.
Outcomes	Health related quality of life (St George Respiratory Questionnaire, SF-36 and illness intrusiveness), medical service utilisation (physician office visits, emergency department visits and hospitalisations for lung disease and other conditions). The outcomes of the interventions were assessed at the end of the 6 month intervention period.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"Patients were randomly assigned.. using a computer-generated random list."
Allocation concealment (selection bias)	Low risk	As above.
Blinding (performance bias and detection bias) All outcomes	High risk	This study was unblinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	
Selective reporting (reporting bias)	Low risk	
Other bias	Low risk	

Hermiz 2002

Methods	RCT
Participants	117 patients who attended a hospital emergency department or were admitted to hospital with COPD. Patients were excluded if they resided outside the study region, had insufficient English speaking skills, were resident in a nursing home, or were confused or demented.
Interventions	1. Intervention group (n = 84): Patients in the intervention group received two home visits by a community nurse. These visits included a detailed assessment of the patient's health status and respiratory function, the provision of verbal and written education on disease, advice on stopping smoking, management of activities of daily living, emergency conservation, exercise, understanding and use of drugs, health maintenance, and early recognition of signs that require medical intervention. 2. Control group (n = 93): Patients in the control group continued to receive usual care managed by their respective specialists of GPs. The duration of the intervention period was 1 month.
Outcomes	Health related quality of life (St George's Respiratory Questionnaire), medical service utilisation (GP visits, emergency department visits and hospital admissions), patient knowledge, GP action and patient behaviour.

Hermiz 2002 *(Continued)*

	The outcomes of the interventions were assessed after 3 months.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"[We] had intended to use randomised permuted blocks with a block size of four at both sites, but, because of the smaller number of cases at Macarthur Health Service, we used a simple randomisation at that site"
Allocation concealment (selection bias)	Unclear risk	Information regarding allocation concealment was not available.
Blinding (performance bias and detection bias) All outcomes	High risk	This study was unblinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	
Selective reporting (reporting bias)	Unclear risk	Unclear
Other bias	Low risk	

Kwok 2004

Methods	RCT
Participants	157 patients hospitalised for COPD. Patients had to be 60 years or older, be residing locally, and have at least one hospital admission for COPD in the 6 months prior to the current admission. Patients were excluded if they had communication problems, were under institutional care or had a terminal disease with a life expectancy of less than 6 months were excluded.
Interventions	1. Intervention group (n = 77): Patients in the intervention group had a nurse perform weekly visits for the first 4 weeks, and then monthly visits up to 6 months. The initial visit was to review the patient's condition, give health counselling, provide psychosocial support to the patient and family caregivers, arrange social and health services when required, and to encourage the use of a telephone hotline when symptoms arose. Subsequent visits were to monitor changes in the subjects' physical conditions, to reinforce health counselling, and to encourage the use of the telephone hotline. 2. Control group (n = 80): Patients in the control group continued to receive usual care. The duration of the intervention period was 6 months.
Outcomes	Exercise capacity (6-minute walk test distance), General Health Questionnaire, London Handicap Domain scale, Multimensional Health Locus, Cost of Care Index and medical service utilisation (emergency department visits and hospital admissions). The outcomes of the interventions were assessed at the end of the 6 month intervention period.
Notes	

Kwok 2004 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"The other research nurse then allocated research grouping using a random number table."
Allocation concealment (selection bias)	High risk	"She then confirmed the recruitment by contacting another research nurse by telephone. The other research nurse then allocated research grouping using a random number table."
Blinding (performance bias and detection bias) All outcomes	High risk	This study was unblinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	
Selective reporting (reporting bias)	Low risk	
Other bias	Unclear risk	"Three control subjects, as opposed to no intervention group subjects, were under an outpatient pulmonary rehabilitation program. This might have slightly favoured the control group."

Littlejohns 1991

Methods	RCT
Participants	152 patients with COPD were enrolled. Patients had to be 30-75 years old, have no other major disease, and have a FEV1 < 60% predicted. Patients also had to be in a stable state as judged by the patient and physician with no change or perceived need for change in medication for at least six weeks before recruitment.
Interventions	1. Intervention group (n = 73): Patients in the intervention group received care from respiratory health worker plus routine outpatient appointments. This included health education, supervision of domiciliary oxygen and correct inhalation techniques, monitoring spirometry and symptoms to enable acute exacerbations and heart failure to be detected and treated, liaison between GP and hospital based services. 2. Control group (n = 79): Patients in the control group continued to receive usual care (outpatient care/ chest clinic care only). The duration of the intervention period was 12 months.
Outcomes	Mortality, FEV1, six minute walk, HRQL: Sickness Impact Profile. The outcomes of the interventions were assessed at the end of the 12 month intervention period.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement

Littlejohns 1991 *(Continued)*

Random sequence generation (selection bias)	Low risk	"Random numbers were generated by tables in permuted blocks of four stratified by age (55 years and above and below 55) and sex."
Allocation concealment (selection bias)	Low risk	"The groups to which successive patients were to be allocated were noted in sealed, numbered envelopes, which were kept centrally. The physician recruiting a patient contacted the controller, who opened the appropriate envelope."
Blinding (performance bias and detection bias) All outcomes	High risk	This study was not blinded.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Incomplete outcome data was not sufficiently described.
Selective reporting (reporting bias)	Unclear risk	All stated outcomes were addressed, however the original protocol was not available and we were thus unable to determine if selective reporting occurred.
Other bias	High risk	"When the Sickness Impact Profile scores of survivors only are compared at the start of the study the survivors in the intervention group had higher total, physical, and psychosocial SIP scores than those in the non-intervention group (all significant at the 1% level)" "...whether there is bias in the study design that militates against the achievement of a difference between the two groups. The study was designed to assess the “effectiveness” rather than the “efficacy” of the respiratory health worker, so the clinicians were not given specific instructions regarding changes to their clinical practice."

Smith 1999

Methods	RCT
Participants	96 patients with COPD were enrolled. Patients had to have a principal diagnosis of COPD, greater than 40 years of age, have a FEV1/FVC < 60%, have no other active major comorbidity, be in a stable state, have a carer involved in their management, and be able to speak and read English.
Interventions	1. Intervention group (n = 48): Patients in the intervention group received home-based nursing intervention (HBNI) in addition to usual care from GP and OPD services. Home visits were made at 2-4 week intervals over 12 months. 2. Control group (n = 48): Patients in the control group were not visited by a nurse but received care from GP and OPD services. The duration of the intervention period was 12 months.
Outcomes	FEV1, mortality, rate of hospitalisation, number of bed days, OPD attendance, emergency service visits and quality of life (Dartmouth Primary Care Co-operative Quality of Life questionnaires). Carer quality of life was also measured. The outcomes of the interventions were assessed at the end of the 12 month intervention period.
Notes	
Risk of bias	

Smith 1999 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"Patients were randomised as they were enrolled from two lists of randomly computer generated numbers for the intervention and control group."
Allocation concealment (selection bias)	Unclear risk	Information regarding allocation concealment was not available.
Blinding (performance bias and detection bias) All outcomes	High risk	This study was unblinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	
Selective reporting (reporting bias)	High risk	"Attempts to perform questionnaires [and spirometry] in the control subjects were unsuccessful due to a combination of (I) these subjects perceived no immediate benefit of the trial; and (ii) the burden of participating in a study, including questionnaires, was greater than expected for those patients who had advanced airways disease."
Other bias	Low risk	

COPD: Chronic obstructive pulmonary disease
FEV1: Forced expiratory volume in one second
FVC: Forced vital capacity
HBNI:
HRQL: Health Related Quality of Life Questionnaire
OPD: Out patients department
PEFR: Peak expiratory flow rate

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Aimonino 2008	The intervention comprised of both physicians and nurse home visits. There was also a significant physical rehabilitation and occupational therapy component to the intervention.
Alonso 2004	The intervention was home hospitalisation.
Behnke 2003	The main intervention was an exercise program.
Boxall 2005	The intervention had a significant physical rehabilitation component.
Brown 1997	RCT, but study duration only 28 days. Readmission rates and costs were the only outcomes measured.
Busch 1988	RCT, main intervention was physical rehabilitation at home.
Campbell 1991	Not a RCT - pre-post study, not controlled. Patients were selected by their frequency of admissions, i.e. high frequency. Study did not exclude asthma patients.
Carrieri-Kohlman 2005	The intervention had a significant physical rehabilitation component.

Study	Reason for exclusion
Casas 2006	The intervention was largely by phone. There were few home visits and included physician visits.
Cockcroft 1981	RCT of unsupervised exercise rehabilitation programme, 6 weeks in a rehabilitation centre then four months at home.
Cummings 1990	Not a RCT. Pre/post experimental design. Patients required to have two or more functional impairments or a terminal illness.
Diaz 2005	The intervention was home hospitalisation.
Dranove 1985	Not a RCT.
Elliott 2004	The intervention had a significant exercise component.
Enguidanos 2005, 2006	Not a RCT.
Hernandez 2003	The intervention was home hospitalisation.
Hernandez-Vian 2007	Not a RCT.
Heslop 1988	Data previously published in Cockcroft 87.
Kara 2004	No home visit component.
Lorig 2003	No home visit component.
Man 2004	No home visit component and the intervention had a significant physical rehabilitation component.
McGavin 1977	Rehabilitation at home was unsupervised.
Murphy 2005	The intervention had a significant physical rehabilitation component.
Na 2005	The intervention had a significant physical rehabilitation component.
Neff 2003	Not a RCT.
Nguyen 2008	No home visit component.
Nissen 2007	The intervention was home hospitalisation.
Noonill 2007	Not a RCT.
O'Shea 2007	The intervention had a significant physical rehabilitation component.
Oh 2003	The intervention had a significant physical rehabilitation component.
Pison 2004	Not a RCT.
Rabow 2003	Not a RCT.
Rea 2004	The intervention did not have a significant home visit component.
Resqueti 2007	The intervention had a significant exercise component.

Study	Reason for exclusion
Roselle 1982	Not a RCT. Pre/post study design.
Sinclair 1980	Intervention group participants not supervised at home by the nurse. Patients selected for intervention/ control group depending on whether they lived in or outside city respectively.
Sridhar 2008	The intervention had a significant physical rehabilitation component.
Steele 2008	The intervention had a significant physical rehabilitation component.
Strijbos 1996	RCT of home care that included a high physiotherapy content designed to improve exercise capacity.
Vale 1993	Not a RCT. Pre/post experimental design.
Vrijhoef 2007	No home visit component.
Wedzicha 1998	RCT of hospital and community based physical rehabilitation programmes.
Weinberger 1996	RCT of 1396 veterans hospitalised with diabetes, congestive heart failure, COPD. Intervention involved close follow-up by nurse and primary care physician beginning at discharge and continuing for the 6 month study duration. It is not clear what the post discharge intervention is and it appears that the nurse did not make home visits.
Wijkstra 1994	RCT of community based programme with a high physiotherapy and physical training component.
Wijkstra 1995	18 month RCT of community based programme with a high physiotherapy and physical training component.
Wijkstra 1996	Data previously published in Wijkstra 94 and Wijkstra 95.
Xie 2003	The intervention had a significant exercise component.
Zwar 2008	The intervention did not have a significant home visit component.

DATA AND ANALYSES

Comparison 1. Respiratory outreach nurse vs control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Change in SGRQ Total Score	4	587	Mean Difference (IV, Fixed, 95% CI)	-2.60 [-4.81, -0.39]
2 Mortality	5	711	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.72 [0.45, 1.15]
3 Hospitalisation	5	686	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.01 [0.71, 1.44]

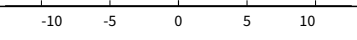
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4 Family doctor visits	1		Peto Odds Ratio (Peto, Fixed, 95% CI)	Totals not selected
5 Change in SGRQ Activity Sub-score	3	455	Mean Difference (IV, Fixed, 95% CI)	-1.32 [-4.46, 1.82]
6 Change in SGRQ Impact Sub-score	3	455	Mean Difference (IV, Fixed, 95% CI)	-2.63 [-5.77, 0.50]
7 Change in SGRQ Symptoms Sub-score	3	429	Mean Difference (IV, Fixed, 95% CI)	-1.15 [-4.70, 2.41]
8 Change in SIP scores (generic HRQL)	2		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
8.1 total	2		Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
8.2 physical	2		Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
8.3 psychosocial	2		Mean Difference (IV, Fixed, 95% CI)	0.0 [0.0, 0.0]
9 FEV1 % Change	2		Mean Difference (IV, Fixed, 95% CI)	Totals not selected
10 Six minute walk distance, change (m)	2	272	Mean Difference (IV, Fixed, 95% CI)	5.05 [-15.08, 25.18]

Analysis 1.1. Comparison 1 Respiratory outreach nurse vs control, Outcome 1 Change in SGRQ Total Score.

Study or subgroup	Treatment N	Treatment Mean(SD)	Control N	Control Mean(SD)	Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
Littlejohns 1991	68	-4.2 (12.6)	64	0.2 (12.4)		26.79%	-4.42[-8.69,-0.15]
Hermiz 2002	67	-4.3 (13.7)	80	-3 (12.6)		26.56%	-1.33[-5.62,2.96]
Bourbeau 2003	81	-3.5 (13.5)	76	-1.5 (13.3)		27.77%	-2[-6.19,2.19]
Coultas 2005	100	3.6 (14.2)	51	6.3 (15.5)		18.89%	-2.7[-7.78,2.38]
Total * **	**316**		**271**			**100%**	**-2.6[-4.81,-0.39]**

Heterogeneity: Tau^2=0; Chi^2=1.12, df=3(P=0.77); I^2=0%

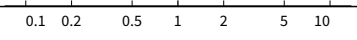
Test for overall effect: Z=2.31(P=0.02)



Favours Treatment — Favours Control

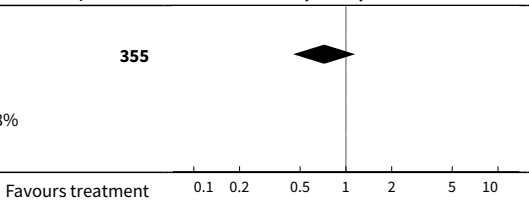
Analysis 1.2. Comparison 1 Respiratory outreach nurse vs control, Outcome 2 Mortality.

Study or subgroup	Treatment n/N	Control n/N	Peto Odds Ratio Peto, Fixed, 95% CI	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Cockcroft 1987	3/40	7/33		12.42%	0.32[0.08,1.21]
Bergner 1988	15/100	13/100		34.67%	1.18[0.53,2.62]
Littlejohns 1991	3/73	9/79		15.91%	0.37[0.11,1.2]
Smith 1999	8/48	7/48		18.32%	1.17[0.39,3.5]
Bourbeau 2003	5/95	9/95		18.68%	0.54[0.18,1.6]



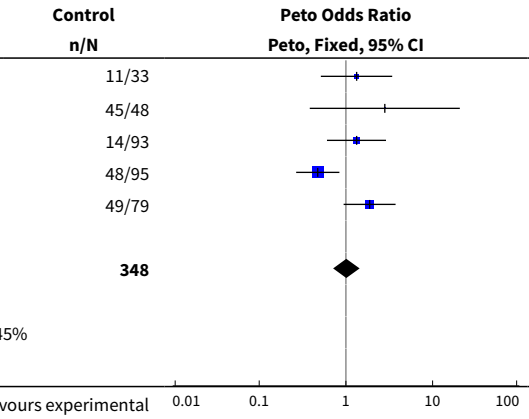
Favours treatment — Favours control

Study or subgroup	Treatment n/N	Control n/N	Peto Odds Ratio Peto, Fixed, 95% CI	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Total (95% CI)	**356**	**355**		**100%**	**0.72[0.45,1.15]**
Total events: 34 (Treatment), 45 (Control)					
Heterogeneity: Tau^2=0; Chi^2=5.17, df=4(P=0.27); I^2=22.58%					
Test for overall effect: Z=1.37(P=0.17)					



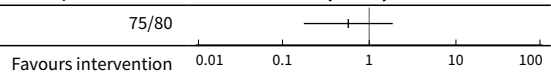
Analysis 1.3. Comparison 1 Respiratory outreach nurse vs control, Outcome 3 Hospitalisation.

Study or subgroup	Outreach nurse n/N	Control n/N	Peto Odds Ratio Peto, Fixed, 95% CI	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
Cockcroft 1987	16/40	11/33		13.7%	1.33[0.51,3.42]
Smith 1999	47/48	45/48		3.1%	2.81[0.38,20.58]
Hermiz 2002	16/84	14/93		20.03%	1.33[0.61,2.9]
Bourbeau 2003	31/96	48/95		37.31%	0.47[0.27,0.84]
Kwok 2004	53/70	49/79		25.86%	1.88[0.94,3.74]
Total (95% CI)	**338**	**348**		**100%**	**1.01[0.71,1.44]**
Total events: 163 (Outreach nurse), 167 (Control)					
Heterogeneity: Tau^2=0; Chi^2=11.58, df=4(P=0.02); I^2=65.45%					
Test for overall effect: Z=0.06(P=0.95)					



Analysis 1.4. Comparison 1 Respiratory outreach nurse vs control, Outcome 4 Family doctor visits.

Study or subgroup	Intervention n/N	Control n/N	Peto Odds Ratio Peto, Fixed, 95% CI	Peto Odds Ratio Peto, Fixed, 95% CI
Hermiz 2002	60/67	75/80		0.57[0.18,1.87]



Analysis 1.5. Comparison 1 Respiratory outreach nurse vs control, Outcome 5 Change in SGRQ Activity Sub-score.

Study or subgroup	Treatment N	Treatment Mean(SD)	Control N	Control Mean(SD)	Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
Hermiz 2002	67	-4.5 (16.9)	80	-1.5 (17.8)		31.17%	-2.97[-8.59,2.65]
Bourbeau 2003	81	0.8 (15.8)	76	0.2 (14.7)		43.26%	0.6[-4.17,5.37]
Coultas 2005	100	2 (17.2)	51	4.5 (19)		25.57%	-2.55[-8.76,3.66]
Total ***	**248**		**207**			**100%**	**-1.32[-4.46,1.82]**
Heterogeneity: Tau^2=0; Chi^2=1.1, df=2(P=0.58); I^2=0%							
Test for overall effect: Z=0.82(P=0.41)							

Analysis 1.6. Comparison 1 Respiratory outreach nurse vs control, Outcome 6 Change in SGRQ Impact Sub-score.

Study or subgroup	Treatment N	Treatment Mean(SD)	Control N	Control Mean(SD)	Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
Hermiz 2002	67	-6.1 (17.5)	80	-6.3 (15.4)		33.94%	0.21[-5.17,5.59]
Bourbeau 2003	81	-6.1 (16.3)	76	-1.4 (14)		43.65%	-4.7[-9.44,0.04]
Coultas 2005	100	7.1 (18.7)	51	10 (20.1)		22.41%	-2.92[-9.54,3.7]
Total ***	**248**		**207**			**100%**	**-2.63[-5.77,0.5]**
Heterogeneity: Tau^2=0; Chi^2=1.81, df=2(P=0.4); I^2=0%							
Test for overall effect: Z=1.65(P=0.1)							

Favours Treatment — Favours control

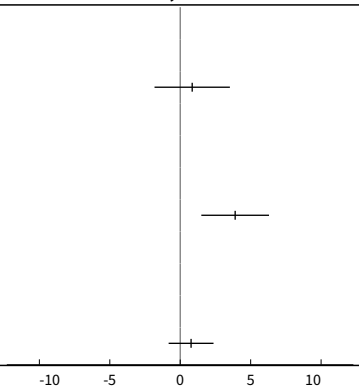
Analysis 1.7. Comparison 1 Respiratory outreach nurse vs control, Outcome 7 Change in SGRQ Symptoms Sub-score.

Study or subgroup	Treatment N	Treatment Mean(SD)	Control N	Control Mean(SD)	Mean Difference Fixed, 95% CI	Weight	Mean Difference Fixed, 95% CI
Hermiz 2002	67	1.5 (17.1)	80	4.7 (21.5)		32.46%	-3.18[-9.42,3.06]
Bourbeau 2003	81	-3.1 (20.9)	76	-4.9 (17.8)		34.43%	1.8[-4.26,7.86]
Coultas 2005	100	-4.7 (15.6)	25	-2.5 (13.7)		33.11%	-2.22[-8.4,3.96]
Total ***	**248**		**181**			**100%**	**-1.15[-4.7,2.41]**
Heterogeneity: Tau^2=0; Chi^2=1.43, df=2(P=0.49); I^2=0%							
Test for overall effect: Z=0.63(P=0.53)							

Favours treatment — Favours control

Analysis 1.8. Comparison 1 Respiratory outreach nurse vs control, Outcome 8 Change in SIP scores (generic HRQL).

Study or subgroup	Intervention N	Intervention Mean(SD)	Control N	Control Mean(SD)	Mean Difference Fixed, 95% CI	Mean Difference Fixed, 95% CI
1.8.1 total						
Bergner 1988	93	-0.5 (0)	90	-1.8 (0)		Not estimable
Littlejohns 1991	69	0.5 (9.5)	64	-0.3 (6)		0.85[-1.82,3.52]
1.8.2 physical						
Bergner 1988	93	0.2 (0)	90	-0.9 (0)		Not estimable
Littlejohns 1991	69	5.5 (7.9)	64	1.6 (6.1)		3.9[1.5,6.3]
1.8.3 psychosocial						
Bergner 1988	93	-0.4 (0)	90	-2.1 (0)		Not estimable
Littlejohns 1991	69	0.6 (5)	64	-0.2 (4.4)		0.77[-0.82,2.36]



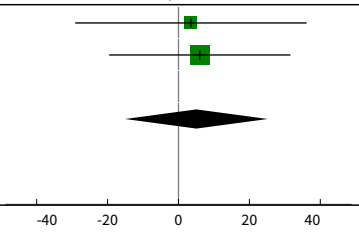
favours control — favours treatment I

Analysis 1.9. Comparison 1 Respiratory outreach nurse vs control, Outcome 9 FEV1 % Change.

Study or subgroup	Intervention		Control		Mean Difference	Mean Difference
	N	Mean(SD)	N	Mean(SD)	Fixed, 95% CI	Fixed, 95% CI
Bergner 1988	93	1.8 (0)	90	0 (0)		Not estimable
Littlejohns 1991	68	-2.1 (11.6)	65	-0.1 (14.7)		-1.91[-6.42,2.6]

Analysis 1.10. Comparison 1 Respiratory outreach nurse vs control, Outcome 10 Six minute walk distance, change (m).

Study or subgroup	Intervention		Control		Mean Difference	Weight	Mean Difference
	N	Mean(SD)	N	Mean(SD)	Fixed, 95% CI		Fixed, 95% CI
Littlejohns 1991	68	-1.4 (91.6)	64	-4.9 (99.3)		38.03%	3.5[-29.14,36.14]
Kwok 2004	67	8 (81)	73	2 (72.7)		61.97%	6[-19.57,31.57]
Total ***	**135**		**137**			**100%**	**5.05[-15.08,25.18]**
Heterogeneity: Tau^2=0; Chi^2=0.01, df=1(P=0.91); I^2=0%							
Test for overall effect: Z=0.49(P=0.62)							



ADDITIONAL TABLES

Table 1. Baseline lung function (FEV1 %predicted) and inclusion criteria related to exacerbation frequency

Study	Baseline FEV1 %predicted	Exacerbation frequency
Aiken 2006	Not reported	Patients had recent exacerbations as evidenced by treatment in an emergency department, urgent care facility, or hospital within the 3 months prior to enrolment. Participants averaged 0.12 emergency department visits per month (SD 0.18) in the previous 6 months. Control participants averaged 0.11 ED visits per month (SD 0.20).
Bergner 1988	34%	FEV1 <60% predicted Average 11.7 hospital days in previous year
Bourbeau 2003	FEV1 1 L	stable COPD (respiratory symptoms and medication unchanged for at least 4 weeks before enrolment) FEV1 after the use of a bronchodilator between 25% and 70% of the predicted normal value There were approx 1.6 acute exacerbation visits per person in the year previous to study entry
Cockcroft 1987	FEV1 0.8 L	Patients who had been admitted to hospital at least twice during the previous three years and new patients who had been seen during the past year were eligible
Coultas 2005	40% patients stage IIA (≥50<80%)	FEV1< 80% predicted

Table 1. Baseline lung function (FEV1 %predicted) and inclusion criteria related to exacerbation frequency *(Continued)*

	44% IIB (≥30<50%) 16% III (<30%)	
Hermiz 2002	Not reported	
Kwok 2004	Intervention PEF 155 L/min Control PEF 51 L/min	
Littlejohns 1991	Intervention 45.2% (22 4) Control 50.2% (23-0)	FEVI < 60% predicted Partcipants were in a stable state as judged by the patient and physician with no change or perceived need for change in medication for at least six weeks before recruitment.
Smith 1999	33%	Patients required to have a FEV1/FVC ratio of less than 60%, no other active major illnesses at time of entry into study and, be in a stable state.

APPENDICES

Appendix 1. Sources and search methods for the Cochrane Airways Group Specialised Register (CAGR)

Electronic searches: core databases

Database	Frequency of search
MEDLINE (Ovid)	Weekly
EMBASE (Ovid)	Weekly
CENTRAL (*the Cochrane Library*)	Quarterly
PsycINFO (Ovid)	Monthly
CINAHL (EBSCO)	Monthly
AMED (EBSCO)	Monthly

Hand-searches: core respiratory conference abstracts

Conference	Years searched
American Academy of Allergy, Asthma and Immunology (AAAAI)	2001 onwards
American Thoracic Society (ATS)	2001 onwards

(Continued)

Asia Pacific Society of Respirology (APSR)	2004 onwards
British Thoracic Society Winter Meeting (BTS)	2000 onwards
Chest Meeting	2003 onwards
European Respiratory Society (ERS)	1992, 1994, 2000 onwards
International Primary Care Respiratory Group Congress (IPCRG)	2002 onwards
Thoracic Society of Australia and New Zealand (TSANZ)	1999 onwards

MEDLINE search strategy used to identify trials for the CAGR

COPD search

1. Lung Diseases, Obstructive/

2. exp Pulmonary Disease, Chronic Obstructive/

3. emphysema$.mp.

4. (chronic$ adj3 bronchiti$).mp.

5. (obstruct$ adj3 (pulmonary or lung$ or airway$ or airflow$ or bronch$ or respirat$)).mp.

6. COPD.mp.

7. COAD.mp.

8. COBD.mp.

9. AECB.mp.

10. or/1-9

Filter to identify RCTs

1. exp "clinical trial [publication type]"/

2. (randomised or randomised).ab,ti.

3. placebo.ab,ti.

4. dt.fs.

5. randomly.ab,ti.

6. trial.ab,ti.

7. groups.ab,ti.

8. or/1-7

9. Animals/

10. Humans/

11. 9 not (9 and 10)

12. 8 not 11

The MEDLINE strategy and RCT filter are adapted to identify trials in other electronic databases

WHAT'S NEW

Date	Event	Description
11 November 2011	New citation required but conclusions have not changed	New literature search run.
11 November 2011	New search has been performed	New literature search run, no new studies found. Search strategy added to appendix 1.

HISTORY

Protocol first published: Issue 2, 1998
Review first published: Issue 1, 2000

Date	Event	Description
24 January 2011	New search has been performed	New literature search run (November 2009), five new studies added.
24 January 2011	New citation required and conclusions have changed	We have been able to draw new conclusions with regards to mortality, health related quality of life and hospital admissions. There was one additional study that contributed mortality data to this update and this did not alter the pooled result. We were able to report data for three additional studies for HRQL as measured by the SGRQ and found a statistically significant improvement among patients receiving home care. We were able to enter data for hospital admissions in this update and although there was no statistically significant difference in admissions in patients receiving home care to those on usual care, there was significant heterogeneity which makes it difficult to draw conclusions.
28 July 2008	Amended	Converted to new review format.
23 May 2001	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

Christopher X Wong: Protocol, assessment of studies for inclusion, study quality assessment, data extraction and manuscript review.
Kristin Carson: Assessment of studies for inclusion, study quality assessment, data extraction and data entry and manuscript review.
Brian Smith: Manuscript review.

DECLARATIONS OF INTEREST

CXW: none known
KVC: none known
BJS: I am lead author on a RCT that was included in this review

SOURCES OF SUPPORT

Internal sources

- NHS Research and Development, UK.

External sources

- ACAGN (Australasian Cochrane Airways Group Network) Student Scholarship, Australia.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

We have included mortality, hospitalisations and disease specific HRQL (SGRQ) in the summary of findings table. This was a post-hoc decision; whilst primary outcomes would ordinarily be included in the summary of findings table, the original protocol did not specific primary and secondary outcomes.

INDEX TERMS

Medical Subject Headings (MeSH)

Community Health Nursing; Health Status; Home Care Services [standards]; Hospitalization [statistics & numerical data]; Lung Diseases, Obstructive [mortality] [*nursing] [rehabilitation]; Program Evaluation; Quality of Life; Randomized Controlled Trials as Topic

MeSH check words

Humans